

THE ROLE OF INTERNET INTERMEDIARIES IN COMBATTING CYBERCRIME: OBLIGATIONS AND LIABILITY

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Abstract

Even though the internet is a very useful asset to everyday life, it can facilitate crime as it can be used to achieve unlawful goals. Stepping up against cybercrime effectively requires extensive international cooperation between law enforcement agencies and the private sector, and between the law enforcement agencies themselves. Internet intermediary service providers such as ISPs, hosting providers and search engine providers are in a special position when it comes to tackling cybercrime: they have to balance carefully between protecting the rights of their users (such as the right to privacy or free speech) and exercising corporate responsibility to prevent and respond to cybercrimes. These providers are sometimes indispensable participants of a successful investigation, because they are the entities that are in a position to provide data to law enforcement agencies and carry out blocking orders. One of the aims of this paper is to give a short overview of those voluntary and obligatory actions that the providers take in order to support the investigative process in Hungary. Besides these actions that stem from the social responsibility and legally enacted obligations, the providers may also be held liable for the actions of third parties (although they may be exempted if certain conditions are met). The second aim of this paper is to analyze the twofold nature of the position of intermediary service providers and to map the arising conflicts between their liability and their role as participants of cybercrime investigations.

1. Introduction

There is a recurring phrase, that comes up frequently in the press and public debates, namely that the smaller and bigger tech-companies shall be involved in ensuring the „lawful” and „proper” functioning of the internet. This statement and the related policies to strengthen state regulation or to facilitate the self-regulation of these enterprises are impressive, but often incapable to live up to the expectations. That is not surprising because one has to overcome serious difficulties already at the starting point when aiming to define what the lawful functioning of a supranational global network – which connects several countries - consisting of thousands of devices is. Which one is the country or international organization that should create the rules that define „proper” functioning? Would we be even capable to create one global legal framework, leading to several nations giving up part of their sovereign rights to share one jointly worded set of community norms? In the past years – as among others Tamás Klein notes [4] – we have come a long way and don’t consider the internet a lawless territory anymore, however we still can’t recognize the online sphere as *res communis omnium usus*, as the outer space yet. The internet as an infrastructure is a set of standardized technical solutions, which are based on physical and mathematical rationale,

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therefore rather than ensuring the proper functioning of the internet itself we should concentrate on having an impact on those behaviours that are conducted during the use of the World Wide Web. The behaviours shown while using the internet may be unlawful, they can cause harm to other users and can negatively affect the functioning of the devices that constitute the infrastructure. Therefore, the legitimate use of the infrastructure is usually the cornerstone of the new regulatory initiatives rather than the regulation of the functioning of the infrastructure. If a murder happens in a building, we usually call the police and not the owner of the property. Why would we do differently when a crime happens in the online sphere, where the sole right to deliver justice and inflict punishment on wrongdoers also belongs to the national criminal justice system? Having said this, we also have to note that some of the service providers have such influence over the infrastructure or over some elements thereof, that their involvement is necessary to conduct criminal investigations successfully. Besides the facts that the service providers have to help law enforcement agencies – typically based on their legal obligations – these providers themselves may be held liable for third party information. In an ideal situation, these interests are parallel: by fulfilling their legal obligations to aid the law enforcement agencies the providers also adhere to the conditions of exemption from liability. There may be some situations where the interest of the provider and the law enforcement agencies concur: some providers might not be willing to contribute to the success of the criminal investigations, because if they recognise that they had knowledge of certain information they might lose the possibility to be exempted from liability provided by sectoral legislation. Hungary is a good example to illustrate the theoretical clash between providers' obligations and voluntary measures to prevent or put an end to infringements. The common European liability framework attaches liability to actual knowledge about the illegal information, which might hinder the providers' willingness to prevent and police these infringements on their own. The users may also have some expectations towards the service provider such as the confidential handling of personal data. Stemming from the Data Protection regulation² of the EU and the Hungarian Act on the right of informational self-determination and the freedom of information³ the users shall lawfully expect that the provider handle their personal data confidentially and the providers can be held liable for breaching this obligation. This applies to IP addresses as well, because in the Breyer-case, the Court of Justice of the European Union (hereinafter the CJEU) ruled that dynamic IP address should be considered as personal data.⁴ Providers therefore may be reluctant to share certain information on their clients.

The prompt regulation of intermediary obligations and liability is still an open question throughout Europe. There seems to be however a common understanding the service providers certainly have some kind of responsibility, yet the form and scope is still undecided. There is a proposal⁵ in front of the legislators of the EU which's main goal is to reform cross-border access to electronic evidence and to enhance cooperation with service providers. As the explanatory memorandum of the proposal highlights, Member States have expanded their national tools resulting in the fragmentation of norms, and conflicting obligations. The proposal was recently criticised for not

² Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, 4.5.2016, p. 1–88.

³ Act CXII of 2011. on the right of informational self-determination and the freedom of information (Infotv.).

⁴ C- 582/14 REQUEST for a preliminary ruling under Article 267 TFEU from the Bundesgerichtshof (Federal Court of Justice, Germany), made by decision of 28 October 2014, received at the Court on 17 December 2014, in the proceedings Patrick Breyer v Bundesrepublik Deutschland.

⁵ Proposal for a regulation of the European Parliament and of the Council on European Production and Preservation Order for electronic evidence in criminal matters.

taking into account the different legal obligations of service providers that already exist.⁶ National rules that complement European legal instruments are very important to provide a level playing field for the providers who operate on the European market. These rules are important for law enforcement agencies as well, because pursuant to the proposed regulation these agencies will be able to contact service providers in other Member States directly, therefore having information on and understanding the extent of the providers' exact obligations and the scope of their liabilities in different Member States is of paramount importance in order to conduct a successful procedure.

The aim of this study is to show through the example of one Member State (Hungary) how diverse the obligations and liability of intermediary service providers can be. The paper also highlights those points where the Hungarian regulation differs from the common European norms.

2. The types of intermediary service providers

The term intermediary service provider does not refer to one specific type of provider; it describes a certain legally defined group of actors that provide information society services. For the purposes of this paper it is crucial to make a clear distinction between the different types of intermediary service providers, because each actor has a different relation to unlawful information, therefore their involvement in the investigative process and the existence and scope of their liability may differ. The E-commerce Directive defines the following types of intermediary service providers:

- mere conduit and network access providers
- caching providers
- hosting providers.⁷

The Hungarian E-commerce Act regulates a wider set of services and also considers location tool service providers (i.e. search engine providers) and application suppliers intermediary service providers.⁸ The reason behind considering application suppliers intermediaries lies in the new developments of the communications sector whereby internet-technology based services gain more emphasis. In today's chain of communication mere conduits are becoming mere infrastructure providers, because they do not have control over the transmitted information. Application service providers provide electronic data transfer services which are similar in nature to traditional electronic communications services (such as instant messaging applications). Search engine providers are also considered intermediary service providers by the Hungarian E-commerce Act due to their special role in the chain of online information flow. These providers don't host nor provide access to electronic data, but they have a closer connection to it than mere conduits. Search engine providers facilitate the easy findability of information online and in order to do this effectively they use algorithms to – among others – aggregate and rank information on the web.

There should be noted that there is a commonly used term both in the Hungarian and the European legal terminology: 'electronic communications services provider'. The rules of the Hungarian Act

⁶ 2nd WORKING DOCUMENT(B) on the Proposal for a Regulation on European Production and Preservation Orders for electronic evidence in criminal matters. (2018/0108 (COD)) -Scope of application and relation with other instruments. Committee on Civil Liberties, Justice and Home Affairs. Rapporteur: Birgit Sippel.

⁷ Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market OJ L 178, 17.7.2000, p. 1–16.

⁸ Act CVIII of 2001 on Electronic Commerce and on Information Society Services Section 2. 1)

XC. of 2017. on the Code of Criminal Procedure (hereinafter: Code of Criminal Procedure) mention these providers as the subjects of obligations. According to the interpretative provisions of the Hungarian Act C. of 2003. on Electronic Communications (hereinafter the Electronic Communications Act) the main element of the definition of electronic communication service provider is that it consists wholly or mainly in the conveyance and, where applicable, switching or routing of signals.⁹ There is an overlap between intermediary service providers and electronic communication service providers: those intermediaries that are mere conduits and providers of network access services (the internet service providers) are electronic communication service providers as well.

The Hungarian legal system does not trust the providers with the decision on the amount of their involvement in the work of the investigative authorities, since both the Criminal Procedure Act and the Electronic Communications Act are very specific in terms of the obligations of the providers during the investigative process. However, there are no common rules for all the intermediary service providers: each type of provider has their own set of obligations based on their position and role in the process of online communication. The following section of the study aims to give a short overview of the obligations that intermediary service providers have to undertake.

3. Obligations of intermediary service providers in relation to the criminal procedure

3.1. Request for information, data retention

The Hungarian Code of Criminal Procedure states that the supply or transmission of information, data or documents can be requested from any public body, business organisation, foundation, public endowment and public organisation.¹⁰ Therefore, upon receiving such a request, intermediary service providers and the other electronic communications service providers must provide the requesting organization with the specified data. Some investigative authorities can only request data supply from electronic communications service providers with a warrant issued by public prosecutor's office¹¹, except when issuing the warrant would result in a delay that is seriously detrimental to achieving the goals of the investigation. If the requested organization fails to fulfil the request within the prescribed deadline, or unlawfully refuses to fulfil the request, a disciplinary penalty may be imposed and other coercive measures may be ordered.

Despite their obligations to provide information to investigative authorities in criminal proceedings, most of the providers do not have a general obligation to store data related to their users. Even if a provider does have an obligation to store data, it does not include all kinds of data handled by the provider only certain types of it, furthermore the law sets out a time limit after which stored data should be deleted. The Hungarian Electronic Communications Act that is based on the European data retention directive¹² regulates only the data retention obligation of the electronic communication service providers and specifies the categories of data that are affected by this

⁹ Electronic Communications Act Section 188. 14.

¹⁰ Code of Criminal Procedure Section 261. (1)

¹¹ Namely the internal crime prevention department and the intelligence department of the police and other investigative authorities furthermore the counterterrorism department of the police.

¹² Directive 2006/24/EC of the European Parliament and of the Council of 15 March 2006 on the retention of data generated or processed in connection with the provision of publicly available electronic communications services or of public communications networks and amending Directive 2002/58/EC OJ L 105, 13.4.2006, p. 54–63.

obligation¹³. It has to be noted that the European equivalent of this provision had a rather controversial history, because Data Retention Directive¹⁴ was invalidated by the CJEU in the judgement in Digital Rights Ireland and Seitlinger cases¹⁵. The Court stipulated that the main reason for the invalidity of this piece of legislation was the data retention obligation of this scale interferes with the right of privacy and the right to the protection of personal data in such a particularly serious way, which is not in compliance with necessity and proportionality requirements. The arguments of the CJEU focused on the fact, that the authorities were able to request data retention anytime in cases of serious crimes, which however are not defined properly, and in relation to all users and devices. Although Directive was invalidated, the provisions of the Hungarian Electronic Communications Act were not modified substantially; the Hungarian rules still oblige the providers to retain a wide range of data. Besides this, the Hungarian provisions have always ignored one of the guarantees of the Directive and haven't limited the objective of the data retention obligation to fight against serious crimes. The Electronic Communications Act states that the main goal of the data retention obligation is to ensure the discharge of the legally defined respective duties of those bodies that are authorized to request data.¹⁶

The rest of the intermediary service providers, the hosting service providers, search engine providers and caching providers doesn't have a general data retention obligation, despite the fact that they could contribute to the success of the investigations in many cases. The Hungarian E-commerce Act was modified in 2016, and according to the explanatory memorandum to the bill, the goal of the revision was to create a basis for the data retention and cooperation obligation of all the providers regulated by the Act. Contrary to this statement, the revised Act only contains one provision, which sets out a data retention obligation for application service providers only and under very special circumstances. Those application suppliers who provide information society services featuring encrypted communication between users, shall safeguard and disclose metadata when so requested.¹⁷

Despite the fact that there is no general data retention obligation that applies to all intermediary service providers the court, the prosecutor and the investigating authority may order the retention of specific electronic data on an individual basis. The obliged provider may be the holder, the processor, controller of the data in question and since all intermediaries are able to perform these operations on data, any of them could be the subject of this obligation. The provider on which this retention obligation was imposed should invariably retain the data in question and should ensure its secure hosting, prevent any activity that would result in its change, deletion, destruction, transfer and prevent the unlawful creation of copies and unlawful access to it.¹⁸

3.2. Cooperation in covert information gathering and for the use of covert means

The new Code of Criminal Procedure of Hungary which has entered into force in 2018 stipulates that with a judicial permit the information systems may be covertly surveilled and/or signals sent

¹³ Section 159/A (1)

¹⁴ Directive 2006/24/EC of the European Parliament and of the Council of 15 March 2006 on the retention of data generated or processed in connection with the provision of publicly available electronic communications services or of public communications networks and amending Directive 2002/58/EC OJ L 105, 13.4.2006, p. 54–63.

¹⁵ C- 293/12 and C- 594/12. Digital Rights Ireland Ltd v Minister for Communications, Marine and Natural Resources and Others and Kärntner Landesregierung and Others.

¹⁶ Section 159/A (1)

¹⁷ E-commerce Act. Section 3/B.

¹⁸ Code of Criminal Procedure. 316.§ (1)-(4)

through electronic communication networks by electronic communication devices may be intercepted.¹⁹ There is a difference between the surveillance of a system and the interception of communications. While surveillance of an information system means the examination of the whole system including static (stored) and dynamic data (communication), during the interception of communications only the network traffic is being examined. To conduct the former, access to the computer itself is needed, while network traffic interception can be conducted remotely with the cooperation of the internet service provider as well. In Hungary several organizations are authorized by sectoral laws to conduct covert information gathering and to use covert means: the act on public prosecutor's office²⁰, the act on police²¹, the act on the National Tax and Customs Authority²² and the act on national security²³ all give authorization to certain organizations. In order to enable the aforementioned agencies to perform these actions, the Electronic Communications Act requires electronic communications service providers to cooperate.²⁴ During the course of the cooperation the electronic communications services providers should provide the conditions for the application of the means and methods of acquisition of messages and communications and data transmitted through the network in respect of the equipment and premises used and operated by them.²⁵ Furthermore the providers shall set up an appropriate technical system that meets the requirements of the authorized organizations – in particular a basic monitoring subsystem – and shall bear all the costs of these systems²⁶. There is a Government Decree 180/2004. which sets out the detailed rules of the cooperation between providers and organizations that are authorized to conduct covert information gathering and use concealed tools.²⁷ According to the decree, the service provider shall provide for the conditions of covert information gathering such as providing a restricted space for the placement of devices to be used, ensuring that there are competent employees present and establishing a 24/7 on-call duty system.

If there is a need to create more detailed rules for the order of cooperation, the organizations authorized for information gathering can initiate the conclusion of a memorandum of understanding with the electronic communication service provider. This memorandum of understanding is an atypical contract, whereby the providers are obliged to conclude the contract within 60 days from its initiation. According to the Hungarian Civil Code, an obligation to contract may be prescribed by any piece of legislation, when there is a public interest objective that justifies the use of such an instrument²⁸. This obligation shall be imposed only in exceptional cases, because it limits the provider's freedom to enter into contracts. The detection and sanctioning of cybercrime however is a valid public interest objective, that can serve as a basis for the limitation of the providers freedom to enter into contracts. Such memorandums of understanding are widely used in Hungary: most of the electronic communication service providers has such a cooperation agreement with the Hungarian National Police Headquarters²⁹.

¹⁹ Code of Criminal Procedure Section 232.

²⁰ Act CLXIII on the public prosecutor's office.

²¹ Act XXXIV. of 1994. of the police.

²² Act CXXII. of 2010 on the National Tax and Customs Authority.

²³ Act CXXV. of 1995 on national security services.

²⁴ Electronic Communications Act Section 92. (1)

²⁵ Electronic Communications Act Section 92. (4)

²⁶ Electronic Communications Act Section 92. (5)

²⁷ Government Decree 180/2004 (V.26.) on the order of cooperation between organizations performing the electronic communication tasks and organization authorized for secret data collection and secret information gathering

²⁸ Act V of 2013 on the Civil Code Section 6:71 [Statutory obligation to conclude a contract].

²⁹ See for example: http://www.police.hu/sites/default/files/ot_2_0.doc

Those application suppliers who provide information society services featuring encrypted communication between users, where the content of communications or the functions related to establishing communication channels are not exclusively implemented on the user's terminal equipment (end-to-end encryption), shall be required to disclose to the agency authorized to conduct covert investigations the contents of transmissions.³⁰ By this provision the Act allows for the interception of such communication which takes place by the use of applications that have similar functions as electronic communication service providers, such as instant messaging (Viber, Whatsapp), therefore it provides the authorized bodies with an instrument similar to traditional wiretapping.

3.3. Rendering electronic data temporarily or permanently inaccessible

There are three types of cybercrime according to the Convention on Cybercrime³¹ which was ratified by Hungary in 2004. The first group of cybercrimes consist of the offences against the confidentiality, integrity and availability of computer data and systems. The subject of these crimes is the information system and the tool of the commission of the act is usually the information system as well. The second group consists of the 'computer related' offences, where the subject and the tool are also the information system but the act is committed with a fraudulent intent to either produce inauthentic data to be considered or acted upon for legal purposes as if it were authentic, or to gain economic benefit.³² The third and broadest category of cybercrime is the category of content related offences (child pornography and copyright infringements).The Hungarian legal system recognizes more offences as content related crimes: libel and slander are criminalized in Hungary and constitute a content-related cybercrime when committed by the use of the internet. In Hungary there are many methods of making providers remove illegal content, but these measures are scattered throughout the legal system and doesn't form a coherent system. The Code of Criminal Procedure provides a two-tier solution for rendering electronic data temporarily inaccessible.³³

- in the case of offences where there is place for public prosecution, the hosting service providers and those intermediary providers which offer hosting services as well, may be obliged to temporarily remove allegedly unlawful data³⁴.
- In the case of serious offences such as drug trafficking, child pornography, offences against the state and terrorist offences, investigative authorities may order internet service providers to render electronic data permanently inaccessible if hosting service provider mentioned in the previous point failed to comply with its obligation to remove the data in question³⁵. Rendering electronic data temporarily inaccessible may be ordered if the hosting service provider is established abroad and requests for mutual assistance didn't bring a result. In this case the obliged electronic communication service provider shall fulfill the request in compliance with the procedure and technical specification prescribed by the National Media and Infocommunications Authority.

It has to be noted that there is a difference between the two instruments. In the first case the data itself is removed from the server on which it is hosted. In the second case it isn't, merely access is

³⁰ E-commerce Act Section. 3/B.

³¹ <https://www.coe.int/en/web/conventions/full-list/-/conventions/rms/0900001680081561>

³² Convention on Cybercrime, Title 2 – Computer-related offences.

³³ Code of Criminal Procedure Section 335.

³⁴ Code of Criminal Procedure Section 336.

³⁵ Code of Criminal Procedure Section 337.

prevented through technical blocking solutions (for example by blocking the URL or the IP address) and it remains available to subscribers of other countries or subscribers who use VPN services or web browsers routing the information through proxy servers (such as TOR). Both measures are temporary and can only last until the final judgement in the case is reached by the court. If the court rules that the information is indeed unlawful, rendering the data permanently inaccessible must be ordered pursuant to the provisions of the Hungarian Penal Code.³⁶ But if the court finds that the electronic data is not unlawful, the court orders the restoration of the data or the unblocking access to the data.

Besides these measures there is one supplementary provision in the Code of Criminal Procedure, which is used to notify media content provider, the hosting service provider and other intermediary service provider about allegedly unlawful content before they receive an official order from the investigative authorities.³⁷ Pursuant to the notification the providers have the right to evaluate the information in question and voluntarily remove it, if they find it unlawful. The aim of this provision is to facilitate the swift removal of clearly unlawful information (such as child pornography) because if the provider acts on its own volition there is no need to wait for the court's permission to issue an order to remove the data, which can take a long time. There is another less manifest aim of this provision: to give rise to the liability of the providers for third party information. Despite the fact that the act stresses that the removal based on such a notification is voluntary, the provider may be held liable under the E-commerce Act as a consequence of its ignorance or its misjudgment of the unlawful nature of the information. The next chapter of this paper will examine the liability framework of intermediary service providers in Hungary in detail, but here we should note that the E-commerce Act – similarly to the E-commerce Directive – stipulates that the hosting provider shall only be exempted from liability for third party information if it doesn't have knowledge of the unlawful nature thereof. After the reception of the investigative authority's notification the provider can no longer successfully argue that it didn't have knowledge of the allegedly unlawful third-party information hosted in or transmitted through its service, since it was brought to its knowledge directly and in order to make the decision not to remove it, the provider had to make its own assessment. It is quite clear that the removal of the information based on the notification is only namely voluntary, because the provider has to take into account that not removing the information, may give rise to its own liability and possibly its sanctioning, which is not a very attractive option.

4. The instruments to remove unlawful content outside the system of criminal procedure

4.1. Notice and takedown procedure

There are other methods to remove unlawful content from the network that fall outside the scope of criminal proceedings. The E-commerce Act only provides for the exemption of the hosting provider and the search engine provider from liability if the provider upon obtaining knowledge of illegal activity in connection with the information acts expeditiously to remove or to disable access to the information. This obligation applies regardless of the source of the information, so stakeholder notification or complaints are both suitable to invoke liability. The Hungarian E-commerce Act contains more detailed rules on intermediary liability than the E-commerce Directive and sets up a notice-and-takedown procedure. The Hungarian notice-and-takedown procedure can only be used in

³⁶ Penal Code Section 77.

³⁷ Code of Criminal Procedure Section 338.

two instances: in the case of copyright infringements and in the case of infringement of minor's personality rights. The procedure starts with the notification of the intermediary service provider in a private document representing conclusive evidence or in an authentic instrument. Pursuant to the reception of the notification the provider has 12 hours to take the measures necessary for the removal of the information indicated in the notification, or for the disabling of access to it.³⁸ The mere conduits and the ISPs do not have similar obligations, so if these providers obtain knowledge of illegal activities in connection with their networks, they do not have to take any measures in order to terminate it. Usually due to network security reasons the providers do put an end unlawful activities. The largest Hungarian ISP-s all include provisions into their end-user contracts which allow for the termination of the service if they notice any unlawful communications.

4.2. Administrative action against illegal media content

If an infringement occurs in services that are to be regarded as media services or online press products the Hungarian Media Council can also order intermediary service providers to disable access to the service in question.³⁹ The new Audiovisual Media Services Directive (hereinafter the AVMSD)⁴⁰ stipulates that video-sharing platforms providers have to take certain measures in order to protect the audience from content the dissemination of which constitutes an offence under EU law⁴¹. As video-sharing platforms are hosting service providers, we have to highlight that one of these obligations shall be the introduction of complaint procedures, where the provider has to assess the unlawfulness of the content and remove it if it might indeed constitute and offence. Although the AVMSD itself doesn't set out a specific obligation to take down presumably unlawful content, gaining knowledge of such content through user's complaints also serves as a basis for provider's liability.

4.3. Internet Hotline

Hotlines are commonly existing organizations throughout Europe, with aim to facilitate the fast removal of illegal content. The Internet Hotline⁴² operates in Hungary since 2015 and it is a part of the INHOPE network.⁴³ Users can make complaints in the following nine categories: content made accessible without permission, online harassment, paedophile content, racist / hateful content, violent content, data phishing sites, content infected with viruses, spyware or worms, content promoting drug use, content inciting acts of terrorism, promoting or contributing to terrorism, other content that may be harmful for minors. When the associates of the Hotline find, that the referred content is illegal, they ask the content provider (who made the content available) to delete it. If the content provider doesn't comply, the Hotline asks the operator of the server on which the content is hosted to remove it. The Hotline – despite that it is a useful tool – is only a legal aid service, its decisions and orders are not binding to the providers.

³⁸ E-commerce Act Section 13. (4)

³⁹ Media Act Section 188. (2)

⁴⁰ Directive (EU) 2018/1808 of the European Parliament and of the Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) in view of changing market realities OJ L 303, 28.11.2018, p. 69–92.

⁴¹ AVMSD Article 28b. 1. (C)

⁴² <http://english.nmhh.hu/internet hotline/>

⁴³ <http://www.inhope.org/gns/home.aspx>

4.4. Self-regulation and corporate social responsibility

Frosio notes that governments try to coerce online intermediaries into implementing policy strategies such as graduated response, monitoring and filtering obligations through self-regulation and voluntary measures. [3] Some providers have adopted measures to tackle the issue of unlawful content online, for example, big providers such as Google and Facebook have detailed community guidelines to regulate user's behaviour. Recently the notion of corporate social responsibility has gained popularity pursuant to which providers take certain actions to protect users and fundamental values online. At this point we should echo Laidlaw's concern [7] who thinks that from a human rights perspective the ultimate question is, whether the CSR frameworks are sufficient to provide the standards and compliance mechanisms needed to protect and respect fundamental rights such as freedom of expression. Some scholars argue that the responsibility of intermediaries shall be examined from a moral rather than a legal point of view, yet scientific literature lack the description of the ethical framework which define service providers' responsibility [9]. This phenomenon also exists in Hungary, because the key players of the industry are global companies who operate on the Central-Eastern-European markets. András Koltay draws attention to a problem caused by that these providers have established a 'pseudo legal system', namely that regulation of democratic publicity gets outsourced and the procedural guarantees that stem from the principle of the rule of law doesn't exist in these systems. [5]

5. The liability of intermediary service providers in Hungary

5.1. Intermediary liability in general

The existence and extent of intermediary liability is a much-debated area of legal literature. The first ideas on intermediary liability – especially on the liability of the ISPs – have emerged in the United States, where the notion of intermediary immunity was codified by the Communications Decency Act in 1996. The European Union adopted a regime of limited liability, without the introduction of a notice and takedown regime. The rules of the E-commerce Act constitute a horizontal framework for liability, which means that they are to be applied on all legal areas, therefore when conditions are met, the provider is exempted from both criminal and civil liability. The basis of the Hungarian liability framework is that service providers shall be liable for any unlawful information they have made available.⁴⁴ In some cases however providers can be held liable for third party information as well. Such as the liability of ISP's, the liability of intermediary service providers can be described as secondary liability, though there are ongoing debates about the interpretation of this term in different legal systems. [1] As László Dornfeld notes there are pragmatic reasons for holding providers liable: contrary to the users who are unknown and unidentifiable, the service providers are relatively easy to find and pursue. [2] The E-commerce Directive and the Hungarian E-commerce Act both list the conditions that should be met in order to be exempted from liability for third party content. Liability itself is however not homogenous in nature, the conditions that allow for exculpation are different and the differentiation is based on the activities of the provider. Ákos Kóhidi highlights that in the case of mere conduits and caching the facts that justify limited liability are objective in nature, while in the case of hosting services and search engines there is a subjective element: becoming aware of the unlawful information.[6] Mere conduits are not liable for the information transmitted, on condition that they do not initiate the transmission; does not select the receiver of the transmission; and does not select or modify the

⁴⁴ E-commerce Act Section 7. (1)

information contained in the transmission.⁴⁵ The E-commerce Act sets out the same conditions for the exemption of application service providers.⁴⁶ Caching providers are not liable for the automatic, intermediate and temporary storage of that information, performed for the sole purpose of making more efficient the information's onward transmission to other recipients of the service upon their request, on condition that they:

- do not modify the information;
- comply with conditions on access to the information;
- comply with rules regarding the updating of the information, specified in a manner widely recognized and used by industry;
- do not interfere with the lawful use of technology, widely recognized and used by industry, to obtain data on the use of the information; and
- act expeditiously to remove or to disable access to the information it has stored upon obtaining actual knowledge of the fact that the information at the initial source of the transmission has been removed from the network, or access to it has been disabled, or that a court or an administrative authority has ordered such removal or disablement.⁴⁷

Hosting service providers are not liable for the information stored at the request of a recipient of the service, on condition that they do not have actual knowledge of illegal activity or information and, as regards claims for damages, is not aware of facts or circumstances from which the illegal activity or information is apparent; or upon obtaining such knowledge or awareness, acts expeditiously to remove or to disable access to the information.⁴⁸ According to the E-commerce Act, the same conditions apply for the exemption of search engine providers as well.⁴⁹

The Hungarian law goes beyond the provisions of the Directive and contains additional rules that are to be applied in the case of copyright infringement and for the infringement of minor's personality rights. These additional rules introduce the Hungarian notice and takedown procedure which was elaborated in detail by the previous section of this study.

5.2. Criminal liability of intermediary service providers

The criminal liability regime that is to be applied to intermediary service providers complements the general liability regime set out by the Hungarian E-commerce Act. Only that perpetrator can be the subject of criminal liability. According the Hungarian Penal Code 'perpetrator' means the principal, the covert offender and the coactor, as well as the abettor and the aider (the accomplices).⁵⁰ Based on this, intermediary service providers are unlikely to be carry out the acts described by the Criminal Code, because they are in most cases legitimate economic services without the intention to carry out criminal activities. They may be accomplices by knowingly and by voluntarily aiding the

⁴⁵ E-Commerce Directive Article 12.

⁴⁶ E-commerce Act Section 8.

⁴⁷ E-Commerce Directive Article 13.

⁴⁸ E-Commerce Directive Article 14.

⁴⁹ E-commerce Act Section 11.

⁵⁰ Criminal Code Section 12.

commission of a crime. Aid can be physical, for example by making the infrastructure available for criminal use and psychological for example by encouraging the offenders to use their infrastructure for their purposes. Both physical and psychological aid can be realized in a form of a deliberate act or an omission and for the purposes of this study the latter is more interesting. The previous part of this study gave a short introduction to those measures that providers can be ordered to do to aid criminal investigations. Providers can opt for non-compliance in which case they are in failure to act, despite that they had a legally imposed duty to do so. In this case an omission can give rise to criminal liability.

5.3. Civil liability for criminal conduct

The most common debates around intermediaries concern the civil liability for the loss or harm caused by third party content. In Hungary the Code of Criminal Procedure allows for pursuing civil law claims for compensation in criminal procedures. The general liability framework of the E-commerce Act also applies in these situations, but if the conditions to be exempted from liability are not met, providers can be held liable for damages. In American legal theory the notion of intermediary immunity starts to shift towards intermediary liability. Lichtman and Posner for example note that ISP's are in a perfect position to tackle the distribution of malware, therefore they should have a duty to prevent the dissemination of such information. The authors set up a 4-tier argument to show when would it be appropriate to hold ISP's liable for unlawful third-party information. Holding intermediary service providers liable can be a viable option if the individuals who commit the act are hard to identify, the affected parties can allocate liability efficiently through contractual design, the ISP can detect, deter or otherwise influence bad acts in question and where providers can internalize negative externalities. [8]

6. Conclusions

As shown in the first section of this study intermediary service providers can aid criminal investigations in various ways: with simple information sharing and by blocking websites alike. Most of the activities of these providers however are not voluntary, they are based on legally set out obligations. Non-compliance, may give rise to the provider's criminal and civil liability, but liability for third party information is limited, because if certain conditions are met, providers may be exempted. By abiding the law and fulfilling their mandatory obligations during criminal investigations the providers may also avoid being held liable. However this approach hinders their willingness to introduce voluntary measures to combat these crimes. Originating from the United States a new approach is emerging, which stipulates that providers should be held liable for third party information, because they have a responsibility, and the means to prevent cybercrime. The theories of moral responsibility and platform self-regulation have started to appear in Europe as well, but further research is needed to examine the possible effects of the extension of intermediary liability and also to clarify the connection between liability and responsibility in continental legal theory.

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EDUCATION IN CYBERSECURITY

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Abstract

The article addresses education as the smartest investment in cybersecurity. One of the most intriguing findings is that 95% of security incidents involve human errors. Most security attacks are concerned with human weakness to attract victims and persuade them to give involuntary access to personal and sensitive information. To eliminate errors caused by social engineering and negligence and to increase users' awareness of the threats, technologies and services should be combined with education. Education in the field of cybersecurity is a necessary consideration for both individuals and families, as well as for businesses, governments and educational institutions.

For families and parents, the online safety of children is of major importance. Equally essential is the protection of information that might affect your personal finances, and precious family assets, such as photos, videos etc.

For educational institutions, it is important to understand the link between the online world and the "real" one. Teachers, staff, students, tutors, pupils, etc. should be trained in appropriate on-line behavior to reduce vulnerabilities and create a safer online environment.

A better awareness through security education can help enterprises protect their intellectual property and ensure availability of services.

Governments hold an enormous amount of personal data and records of their citizens, as well as confidential government information, which most often serves as a target for attack. Only through education and awareness, the confidence in public services can be gained. Cybersecurity depends on education.

1. Introduction

We are facing an eyebrow-raising talent shortfall in cybersecurity. The cybersecurity job market, according to a joint report by Frost&Sullivan and (ISC)2, will see a labor shortage exceeding 1,5 million unfilled positions by 2020 [1]. Given the rapid and continuous evolution of threats, it is critical that educational cybersecurity programs share best practices and curriculum updates.

But it is just as important for enterprises — from startup businesses to large corporations, and from small nonprofits to vast government agencies — to do their part. They have the means as well as the critical need to enhance their employees' cybersecurity knowledge.

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Even those employees who did arrive with security knowledge have more to learn. The field of cybersecurity is constantly expanding, with more domains to secure and more ways to attack. Intrusions are harder to detect; attackers are stealthier and more evasive.

The best defense is to provide comprehensive education programs for all. You don't have to turn everyone into a cybersecurity expert. IBM, for example, requires all employees to complete digital training each year, which covers matters from secure handling of client data to appropriate sharing on social media sites. Employees can easily learn how to spot and avoid the most frequent types of threats, such as phishing attacks in emails.

Whether taught in a school, university setting or carried out in an enterprise, cybersecurity is a holistic problem and needs a holistic solution. Just as educational institutions start to develop interdisciplinary approaches (such as joint programs between computer science and business, medical, law, economics, public policy, criminology, and even journalism schools), organizations should ensure that their approach to security reaches the people responsible for infrastructure, human resources, data, applications, ethics assurance, management policy, and legal compliance.

There have been technological advancements within the last few years to help secure corporate networks against unintentional, or intentional, risky behavior by users. But while such technical controls and the establishment of sound policies are essential components of effective security, educating, in cybersecurity is one of the best investments a country can make — and a rational recognition that it will take all of us to create a more secure future[2].

2. The initial period - school - acquaintance with the aspects of cybersecurity and safe "surfing" in a virtual environment

The peculiarity of the socio-economic development of the Moldovan economy, and of the world economy as a whole, determines the presence of a significant number of risks, including informational ones, which pose a threat to the stable functioning of any enterprise and person.

These aspects require the formation of an “informational” culture, which should be cultivated in every person, starting from school. These will then develop in the course of evolution at the university and at the workplace. All these steps, in our view, must comply with certain requirements/standards, and with three pillars – three qualities:

- a) to study – to explore – to know;
- b) to teach – to accustom – to be able;
- c) responsibility – consciousness – implication.

So, in school/ lyceum we consider it is necessary to develop and to implement in the following areas: the study of awareness of students about staying safe while surfing the Internet; the familiarization with the rules of safe work on the Internet; the formation of students' informational culture, the ability to independently find the necessary information using web-resources; the discipline training while working on the network.

The trainees should know: the list of the Internet information services; the rules of the safe work on the Internet; and the danger of a global computer network.

The trainees should be able to: responsibly treat the use of on-line technologies; work with web-browser; use information resources; search for information on the Internet.

A good start for the Republic of Moldova is that on June 14, 2018 the Memorandum of Understanding on the development of digital education in general education was signed, and as a result of this agreement the curriculum, the electronic support and the Guide for Students and Teachers of the 1st grade were developed; the virtual library, www.smartedu.md, was consolidated; funds have been collected for the procurement of 1850 digital tablets in support of each 1st grade teacher across the country. In the 2018-2019 academic year, the "Digital Education" module will be studied by 34,642 students, being compulsory for the 1st grade pupils and optional for those of II - VI grades. In this respect, it is important that Digital Education also develops cybersecurity culture. Analyzing the primary, secondary and lyceum curricula for Informatics, compulsory or optional, we only met in the updated curriculum for the VIIth grade - HOW TO BEHAVE IN THE VIRTUAL SPACE. In this regard, we consider that cybersecurity education modules must be included in every curriculum of Informatics for all the grades from the 1st to the XIIth.

The International Center for Protection and Promotion of Women's Rights "La Strada" of the Republic of Moldova undertook a series of actions to create information services for both children and parents/teachers (portal www.siguronline.md). The portal provides young users with the opportunity to access useful information about how to protect themselves from abusive content and actions in the virtual environment, how to develop a responsible attitude to the posted content, and to report possible abuse, while retaining anonymity. The General Prosecutor Office has set up a hotline where virtual crimes can be reported. The Police General Inspectorate has been involved in a number of projects such as, *Together we make the Internet better !*, *An informed child - A protected child* for the protection of children's rights and needs in the Republic of Moldova. We come to realize that we all have a common responsibility to make cyber space safer for everyone, especially for children, namely through information, education and awareness.

3. The transit period - the university - the study and development of the principles and standards to ensure and respect for cybersecurity

Methods and cybersecurity technologies - is the youngest area of IT in our country. The other areas – software, hardware, service – to the contrary, have roots in the “inherited” technologies that were formed several decades ago.

Education of cybersecurity can be divided in two directions: the first is future civil servants, whose activities are not focused on the direct provision of cybersecurity, and the second is training future officials, whose activities are directly focused on the provision and supervision of cybersecurity.

When forming the list of competencies, various formal sources of requirements that employers can present to cybersecurity specialists were analyzed: legislatively approved qualification requirements of the Republic of Moldova state institutions; requirements for civil servants working in the field of cybersecurity; recently appeared professional standards in the field of IT and IS; various international standards for the protection of information, from which you can learn a lot of valuable information about what different levels specialists should be able to do; regulatory documents existing at enterprises describing the functional responsibilities of such specialists, etc.

Education in the field of cybersecurity, in addition to methods and technologies for protecting information resources, always includes the study of means of attack too.

Mass issues on the specialties of the cybersecurity group appeared recently, and only now, the effectiveness of their preparation can be analyzed.

The peculiarity of cybersecurity as an educational subject is that it must combine knowledge in the field of natural sciences and technology, as well as in law, management, a number of humanities, therefore, in addition to courses on methods and means of data protection, fundamental mathematical disciplines, advanced IT training, and the study of organizational and legal aspects of ensuring cybersecurity should be included in the limited scope of the curriculum.

The complex of technical disciplines for students of the cybersecurity is also optimized – they study various aspects of cybersecurity in the physical environment and the features of the organization of this environment itself, mastering the theory and practice of building computing systems. In addition, graduates of this specialty should be able to solve all organizational issues of cybersecurity, which is also dedicated to a separate discipline.

Also, between July 10 and October 31, 2017, a survey was conducted to identify the target professions and training needs in the field of IT security in Moldova. The questionnaire containing 23 questions was completed by 199 companies (the only case in the Moldovan practice when a questionnaire in the field was completed by such a large number of enterprises), IT companies, the provider-companies of electronic communication services and banks, which demonstrates an increased interest from companies in the field of cybersecurity.

Based on this survey, in the recent years, at the Technical University of Moldova, the State University of Moldova, the Academy of Economic Studies of Moldova, and Alecu Russo State University of Balti new learning programs in cybersecurity are emerging.

For the design and development of license and master programs in Cybersecurity, also, an analysis of European curriculum documents has been carried out: European Agency for Network and Information Security (ENISA) - Cyber Security Education, National Institute of Standards and Technology (NIST) for Cybersecurity Education (NICE), Information Systems Security Association (ISSA), Information Systems Audit and Control Association (ISACA), Toward Curricular Guidelines for Cybersecurity (ACM), IEEE Computer Society, etc.

At these universities is conducted the targeted training of specialists for the Central Bank, the Ministry of Internal Affairs, and other state institutions of the Republic of Moldova. This approach has a number of advantages. The organization, recruiting graduates who actively collaborated during the last years of training with the university, receives not only the necessary specialist but also a person whom they already know from both professional and moral points of view, which is important for working in the field of cybersecurity. On the other hand, specialists of enterprises with whom the faculty cooperates, actively participate in the educational process, and this involvement of practitioners in teaching allows maintaining the relevance of the courses.

Now there is a technical-scientific center at the Technical University of Moldova. In fact, it has also become the center of crystallization of educational processes on cybersecurity – teaching experience is spread through it, advanced data protection technologies being actively developed and introduced into the educational process.

Today, this center is gradually turning into a mini techno park that teaches students and provides various services in the field of cybersecurity, solving quite complex tasks in the development of new protection methods for the state or commercial enterprises.

Such a synthesis of business and education allows the university independently to earn money to improve its educational process, attract highly qualified specialists to teach and improve the professional level of its employees.

For higher professional education in the field of cybersecurity, the cooperation with companies, which are developing data protection tools, is vital. For universities, such cooperation is not only an opportunity to get modern equipment and software, but also a way to make students feel the pulse of the industry. For market participants, it is an opportunity to influence the university environment, to help universities prepare really necessary industry specialists. Therefore, university professors and practical workers from the company, highly appreciate the level of theoretical training of specialists in the field of cybersecurity in universities, but note its insufficiency from the practical point of view. The main difficulty that university graduates face in finding employment is the lack of skills in the applied use of their knowledge. According to both teachers and practitioners, close cooperation with companies makes it possible to remedy this situation.

The main objectives of such cooperation programs are: the dissemination of advanced knowledge and experience into the field of information protection from modern computer threats; the support of the most talented students interested in studying cybersecurity issues; teachers' training in the field of cybersecurity, as well as the formation of a platform for the exchange of teaching experience with colleagues; providing affordable antivirus protection for higher education institutions, centers of advanced training and retraining of teachers.

Therefore, we believe that the effect brings only an integrated approach to the implementation of the program, which involves a combination of its three main elements: training, research activities and practice. The university partners "Bitdefender", "Endava", "Academia Cisco" provide free training courses, teaching materials, analytical and statistical data, research and reviews of the company leading experts on computer and cybersecurity. Distance seminars are held for teachers and students, master classes and meetings with experts are organized. Under the guidance of experts, students write graduation projects on topics proposed by the company, prepare analytical reviews and articles. Leading experts review all these materials, and the results of the most interesting student studies are applied in the work of the company.

The second line of study at the faculty is cybersecurity aspect of future students whose activities are not focused on the direct provision of cybersecurity. In this case, we consider the method of using the educational-research cryptographic system at the State Engineering University of Armenia, a success [3]. In this respect, TUM initiated a project to develop the Security e-Learning Platform, a teaching-learning tool, individual and distance learning, research and demonstration of real-world security solutions based on case studies. For the start, 5 modules are provided: Criminal Investigation Forensic, Malware Analysis, Reverse Engineering, Clean Code and Capture the Flag (CTF Competition with Various Security Exercises). Such an approach can be used not only by cybersecurity teachers and students, but also by those who do not have a professional background in the field, but intend to study this area whether they are interested in increasing their security skills or to better understand security issues.

With the development of information technologies and the growth rate of their implementation in all socially significant spheres of the society, the problems of information protection become more substantial, which determined the emergence of specialties related to information protection in the list of areas for training specialists in most technical universities. However, knowing the basics of cybersecurity is necessary for almost every user of electronic means of processing and exchanging information. In essence, cybersecurity tends to turn into “third literacy” along with “second literacy” – computer skills and information technology.

To summarize it all we can conclude that the university education in cybersecurity (mostly higher) is not without flaws. According to some representatives of the state institutions, modern education does not meet modern challenges of cybersecurity; graduates are good in physics, mathematics, crypto algorithms, but cannot name the attack vector, the penetration testing methods, not to mention practical skills. It gives the feeling that education in the field of IS got stuck in the 80s of the last century, when the state was in a great need of cryptography specialists; a major bias in the field of fundamental knowledge; the lack of practice (again pen tests and all this here).

4. Reinforcement period - respecting a viable cybersecurity strategy at the workplace

One of the important directions in ensuring cybersecurity is the implementation of it at the workplace in each institution, public or private. You can use advanced software and hardware methods and means of ensuring cybersecurity, write the most correct and complete cybersecurity policies, but without the participation of all the employees of the company/institution, the effectiveness of the cybersecurity framework will be minimal. The human factor is the weakest link of any ISF.

Risks associated with human resources, the so-called personnel risks, are basic for all other types of risks that pose a threat to the stability of an economic entity. Moreover, in the area of risk formation again, the personnel decide everything. The entire enterprise management system directly depends on the personnel management system. The prevention and minimization of personnel risks is the main task in the human resource management process. It is necessary to take into account the fact that the conditions for the occurrence of such risks are present at each stage of the personnel management process.

The process of managing human resources in a company is continuous and is conditionally divided into several stages: the formation of personnel structure, the use of human resources and the release of personnel. Personnel and cybersecurity at all stages should be built at the forefront. The discrepancies between the qualitative and quantitative composition of the staff, the ineffectiveness of the selection procedures are only the main aspects that the organization may face [4].

The fact that the weakest-protected link in any process or system is the human being has been known since pre-computer times. Therefore, among other cyber-criminal situations prevail those in which, as a component of the information system, it is he (the man) who is being exposed. Cyber-criminals are actively using social engineering techniques when attacking him: according to Symantec Corporation, almost 70% of successful attacks are associated with it [5].

Practical implementation of all the provisions of the established cybersecurity policy will require from the company long-term practical efforts. One of the main and most difficult areas of employment is to work with the staff whose goals are the selection and preliminary inspection of

personnel recruited (for service); staff training; achievement of mutual understanding of managers and employees in matters of cybersecurity; psychological training in order to withstand the methods of the so-called “social engineering”.

In one of his books, Bruce Schneier, a well-known cybersecurity specialist, noted that the “mathematical system is impeccable in the general system of cybersecurity measures, computers are vulnerable, networks are generally lousy, and people are just abominable. I have studied many issues related to the security of computers and networks, and I can say that there is no solution to the problem of the human factor” [6].

This statement most clearly and vividly demonstrates the importance of targeted measures for the selection, placement and work with the personnel of the enterprise in order to prevent the creation of “bottlenecks” and so-called information systems and so on; the human factor has not become the most significant source of threats to cybersecurity. The main reason determining the importance of the human factor in the general system of information protection is that, with all the sophistication of modern automation tools, information systems continue to be man-machine complexes and their (systems) functioning depends largely on the work of individuals. It is for this reason that inadequate treatment of information system components by employees of an enterprise can cause serious damage to cybersecurity even if there are well-developed security policies and highly efficient software and hardware information protection.

In addition to careful selection, one of the important bases for working with personnel is its training in methods of ensuring cybersecurity and safe work with information systems. Training and the subsequent control of the received (available) knowledge can be both primary, and repeated. In general, the employee of an enterprise cannot be allowed to perform his or her duties and work with information systems until he/she has been trained in cybersecurity and will not: be familiarized in details with all the requirements and general applicable rules at the enterprise; be fully trained in the methods and techniques of ensuring cybersecurity necessary for the performance of his/her official duties; be acquainted with all possible measures of responsibility (disciplinary, administrative, criminal) that can be applied to him/her in case of violation of the requirements, as well as in the event of damage caused by his/her fault.

At the end of all preliminary work, the employee must give all the necessary commitments not to disclose confidential information, and testify in written form that he/she is fully familiar with the basic provisions of the security policy. In the course of work, an enterprise may also conduct periodic monitoring of knowledge and skills related to cybersecurity in order to attest to the competence of employees in this field. In addition, one of the training tools may be periodic staff familiarization with actual examples of recent incidents related to cybersecurity. Besides, additional training of enterprise personnel can be carried out in the following cases: the introduction of new automated information systems; changes in business processes of the enterprise; changes in security policy requirements (for example, due to changes in legal requirements).

The need for additional training in the implementation of new information systems and, in particular, integrated enterprise management systems, as a rule, may be due to the emergence of new software functionality and changes in information processing procedures. Also, the access to integrated information systems can potentially give access to previously inaccessible information and provide previously unavailable opportunities to influence various information flows. In this regard, it may be necessary for employees to make additional commitments to comply with cybersecurity measures. Similar organizational measures, to ensure the protection of information,

may be necessary when changing the enterprise business processes, when its structure changes, the distribution of functions between departments and employees' duties, and accordingly, changes are made to organizational charts, staffing tables and job descriptions of personnel. Changes in security policy requirements can be associated with the emergence of new threats, changes in legal requirements, expansion of markets, changes in the attitude of management and owners of the company to cybersecurity issues and other factors - all these clarifications and changes must also be fully and promptly communicated to staff.

In the process of learning, a clarification of rational reasons for which the company applies such a security policy may have some significance. This can serve both, better to understand and assimilate the positions of the security policy, as well as to relieve some of the psychological tensions that inevitably arise when taking restrictive measures and imposing additional duties, the necessity of which is not always obvious and understandable to ordinary employees and specialists.

A separate area of ordinary training and advanced training can be the development of company personnel skills to counter the methods of so-called social engineering (this approach is also sometimes called "sociotechnics"). The use of social engineering methods for illegal entry into information systems is associated with the so-called "human factor", which is a combination of certain psychological inclinations and characteristics of thinking and behavior, which are peculiar to almost all the people. To the number of such propensities and features can be attributed: inability to adequately assess the danger in some situations; specific relation to rarely occurring events (dulled attention); excessive trust and reliance on automation; susceptibility to manipulation, based, for example, on the desire to help people (including strangers) or on excessive trust to people dressed in a special uniform, etc. [7].

To minimize the risks associated with human factors, it is necessary to organize a documented and approved work of the staff by the bank/company management towards awareness increasing and training in cybersecurity, including the development and implementation of plans, training programs and awareness-raising in the field of cybersecurity, as well as monitoring the results of the implementation of these plans.

Education of the personnel in the field of cybersecurity is necessary for the following purposes: developing and maintaining awareness among employees of the importance of safety in the use of information technologies, knowledge of the procedure for handling undesirable events and incidents; awareness of the employees of their role and place, as well as the duties and responsibility for ensuring the protection of information in the company; increasing the level of knowledge by employees of the basic rules of cybersecurity; communicating to employees the main positions, restrictions and requirements of existing documents (policies) in the field of cybersecurity; bringing to employees facts about which cybersecurity tools are used, as well as how to use these tools correctly and effectively.

The need to train and raise awareness of cybersecurity personnel is governed by the GD No. 201 Mandatory Cybersecurity Requirements of 03/28/2017, which requires public institutions to implement the Cybersecurity Management System. The head of the authority shall designate by administrative act the person (subdivision) responsible for the implementation of the cybersecurity management system in the institution and the responsible person shall be required to participate, at least once a year, in cybersecurity training courses and, respectively, to organize courses for the employees of the institution.

Cybersecurity education should include the following areas: raising awareness of workers in matters of cybersecurity (general course); safe work with personal data in the company; organization of business continuity and recovery after interruptions.

The main forms of education can be individual training (introductory, repeated and extraordinary briefings); special training with the involvement of external training centers; awareness raising: distance learning, social engineering methods (memos, posters, screen lockers, etc., reflecting all the requirements of the enterprises' regulatory documents on cybersecurity).

In accordance with the State Norms of Moldova, training and awareness plan requirements should be established for the frequency of training and awareness raising.

Unfortunately, a survey conducted last year on a sample of about 160 companies and institutions within a project to raise IT needs to increase cultural information and cybersecurity in Moldova shows that companies and institutions do not pay sufficient importance to cybersecurity (62% of respondents) and that they have a training program and awareness on cyber security (81% of respondents). It is also necessary to determine the list of documents that appear as evidence of the implementation of training and awareness-raising programs in the field of cybersecurity. Individual training (instruction) should be completed with an oral survey, and an assessment of the acquired skills of safe ways of work. The employee who conducted the briefing checks the knowledge.

With a distributed institution structure, it makes sense to impose responsibilities for training and awareness raising in the field of cybersecurity to a special employee appointed in each remote unit. As part of the self-assessment, the internal auditors of the institution should regularly monitor the level of awareness of employees of the audited units, the completeness and accuracy of the training documents, the timeliness of communicating new cybersecurity requirements.

The cybersecurity service should monitor the effectiveness of training by quantitative and qualitative analysis of the actions of employees, followed in response to certain events.

The training system under consideration is a scalable process aimed at constantly improving the level of knowledge, skills and qualifications in the field of cybersecurity of employees and integrates with existing business processes. As a result of the introduction of a training system and raising awareness in the field of cybersecurity in an institution, the number of incidents in this area related to human factors will be significantly reduced, as well as the misuse of resources.

Success and high security, including cybersecurity provides a continuous process of education and training of personnel in the field of cybersecurity. Training can be carried out in some areas and forms. Namely, the Complex Program: full-time courses; E-courses; Introductory briefings; posters; screensavers; animated and video clips; computer games; booklets, brochures, memos; souvenirs; efficiency mark, a comprehensive program to improve awareness of the company's staff. What is good about an integrated approach in addressing issues of raising the awareness of company personnel in matters of cybersecurity? – It guarantees a high level of security of the company information resources; involves staff training cybersecurity on an ongoing basis; helps to manage the risk more effectively; has a positive effect on the company image; testifies to a high level of responsibility of the company management towards its employees; helps to prevent losses that are inevitable when staff of the company violates cybersecurity.

Introductory briefing for new employees. The familiarization with corporative security regulations for hiring is an important step towards conscious and strict adherence to corporative security rules by company staff. There can also be developed: an e-learning course on the rules of corporative security adopted by the organization; tests to check the level of knowledge of the company staff; educational flash and video clips on corporative security rules; illustrated memos on the main issues of the corporative security.

Posters. Thematic posters about corporative security issues are one of the most effective means of maintaining an atmosphere of corporative security and building a corporate culture of personnel on working safely with the company's information resources. Posters placed in all places accessible to the personnel of the company make it possible regularly to remind about the rules and requirements for ensuring corporative security adopted by the company.

Screensavers. The installation of corporative security screensavers is an effective way to remind the staff about the company's corporative security rules and regulations. It is recommended to update screensavers every 2 months to increase their effectiveness.

Animated and video clips – a bright and visual tool that allows in an attractive, unobtrusive way to convey to staff the rules and regulations for working with information resources of the company. Creating a corporative flash video on security issues: the flash movie script is developed in accordance with the organizational and administrative documentation of the institution in the field of corporative security and the corporate culture adopted by the company. The recommended duration of a flash movie is no longer than 1.5 minutes. The film assumes the use of announcer dubbing, including staged scenes with the involvement of actors, graphics. The shooting is carried out using professional equipment on the territory of the institution. The recommended duration of the video - 15 - 20 minutes.

Security Competitions (Cyber Drill, CTF) or Computer games. We offer a new look to the problem of compliance with the cybersecurity rules adopted by the company and to invite colleagues to participate. An entertaining cybersecurity quest is the best way to convey to employees the most important skills and knowledge.

In 2018, Information Technology and Cyber Security Service, in collaboration with European partners, Technical University of Moldova and some Moldovan private companies, managed to organize several Cyber Drill sessions for security officers from national companies and institutions. Also, the Technical University students organize annually CTF competitions and also participate in the international ones (Suceava, Bucharest, Volga, etc.)

Booklets, pamphlets, memos – are a convenient way to inform new employees about the company rules and regulations on corporative security. The memo written in simple, accessible language, the content of which reflects the main provisions of the safety regulations, is easy to use, has a bright, attractive aspect.

Evaluating the effectiveness of implementing an awareness-raising program is a very important phase of the awareness program. It is advisable to evaluate the effectiveness of the program after the staff has been trained and a number of measures have been implemented to maintain the corporative security atmosphere in the company. As part of the events, aimed at assessing the effectiveness of implementing an awareness-raising program. In this regard, you can send authorized provocative messages by corporative e-mail and SMS / MMS, which motivate users to

violate corporative rules and corporative security policies. The purpose of the work is to assess the implementation of basic corporative security rules by employees when using corporate e-mail and business cellular communications, in order to improve the program for raising awareness of corporative security issues.

In the framework of the work implementation to achieve the stated goals, the tasks of checking the elements of the program of raising awareness on the following issues are solved: password policies; compliance with license fairness; anti-virus attacks; complying with the rules of the IT services use in terms of the e-mail and the Internet utilization; abidance with cybersecurity rules when using service mobile devices and service cellular communication. Typical ways in which an enterprise can constantly remind its employees of the need to be careful are: placing and periodically changing (updating the design and content) reminders of the need to comply with the requirements of cybersecurity policies on items constantly in sight of employees during the working day: wall and desktop calendars, coffee mugs, covers of notebooks, desk exhibits, pens, pencils and other stationery; periodic emailing of relevant messages; use of screensavers containing relevant reminders; use of voice mail and speakerphone for periodic transmission of messages about the need to comply with cybersecurity rules, etc. [8].

5. Conclusions

We need to make security more of a realistic notion for the general public. A lot of users do not necessarily know where their data go. Rather than just corporate security awareness training, as professionals, we need to be bringing cybersecurity culture into the home as well.

Cybersecurity truly is a public safety issue. We have seen weaponized social media posts, IT devices turning into attack droids, and phones being hacked to see GPS locations. These issues are everyday occurrences. Therefore, we need to regulate the idea of security into our everyday culture, exactly the way we have normalized other safety issues. It could be illustrated by a simple example with cars. When it was found that the cars were unsafe, the seat belts were added.

For the Internet, we need a security-focused and educational mindset. This is especially the case in regards to innovations within technology. A scary awareness video is insufficient. In contrast, cybersecurity should be an ongoing education. The more we equip the public with this knowledge, the more efficient we will be in the future [9].

We would like to note that one of the main qualities that should be developed starting from school and cultivated at all subsequent stages is consciousness and awareness that a person is part of a whole class, group, working team, and that success, prosperity and security depends on his intellectual, spiritual and physical contribution. By instilling a sense of consciousness, the person will rejoice with all his might for the work that he is doing, and this is the best guarantee that cybersecurity and success in any business will be achieved.

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EXAMINING THE ROLE OF THE KNOWLEDGE GAP AS A DRIVER TOWARDS E-GOVERNMENT SERVICE ADOPTION

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Abstract

Using data from the multivariable, nationally representative Good State Public Administration Opinion Survey carried out in 2017 by the Institute for Research and Development on State and Governance at the National University of Public Service in Hungary, the aim of the paper is to test the hypothesis that the knowledge gap theory can be applied to the use of online public administration services: higher status equals not only wider and more sophisticated usage of ICT tools (and more awareness of trust in the Internet), but also more knowledge about public administration procedures themselves, which has resulted in various channel-preferences and routines among the users of different public services. The results show that the knowledge gap clearly exists in terms of public administration-related knowledge and it affects the choice of channels for managing administrative issues.

1. Introduction: the adoption of e-government services – a widely researched topic with some imbalances

1.1. The rich field of adoption of e-government services research

The adoption of different e-government services (the use of electronic/digital means instead of personal attendance) by private individuals and enterprises alike is one of the focal points of the rapidly expanding scientific literature on e-government. Van Dijk et al. [26] gave a good summary of the relevant theoretical frameworks that have been widely used in recent decades to describe and understand the proliferation of e-services (or even the lack of it) in the early stages of e-government development:

- The theory of Diffusion of Innovations (DOI) [21]
- Technology Acceptance Model (TAM) [10]
- Social Learning Theory [4, 18]
- The Theory of Technology Domestication [24]
- The theory of Reasoned Action (TRA) [12], or the Theory of Planned Behaviour (TPB) [1].

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Why people use or, conversely, do not use e-government services is a basic research question and as Aranyosy [3] put it, in the past decade the use of the UTAUT model (Unified Theory of Acceptance and Use of Technology) [27] gained acceptance in e-government literature, however, the TAM and the DOI are also popular among researchers who seek to construct technology acceptance models [e.g. 20]. However, many researchers think that the core factors of DOI and TAM are more or less identical: relative advantage can be substituted with perceived usefulness and complexity with perceived ease of use [9]. Shareef et al. [23] developed an e-government specific adoption model (*Figure 1.*), because in their opinion, TAM, DOI, TPB cannot capture and specify the complete essence of e-Gov adoption behaviour of private individuals (however, the model is a good summary of the relevant factors from *all* the models mentioned earlier). The e-Government Adoption Model (GAM) also takes into account the service maturity levels. If we take a closer look at the constructs, one additional and important element can be seen, which is trust.

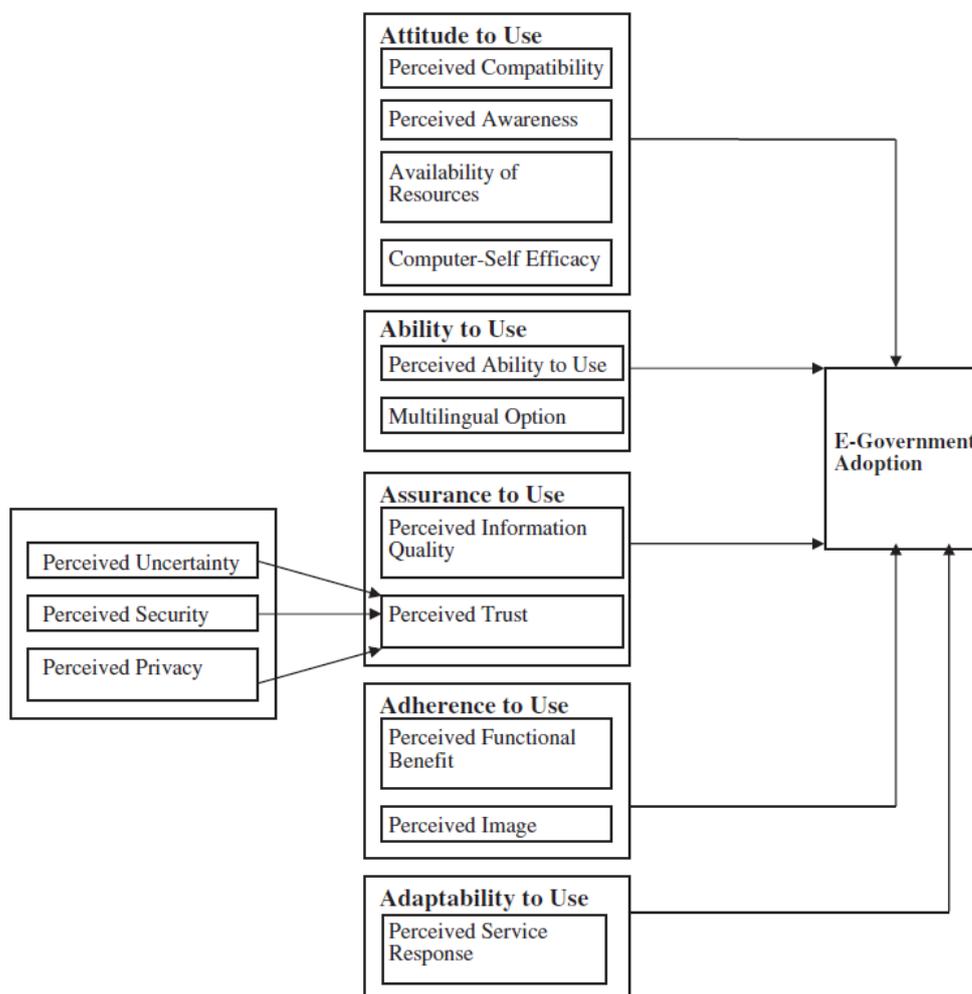


Figure 1. The e-Government Adoption Model (GAM [23])

The presence of trust is not surprising. In the literature dealing with e-government take up, almost every model contains or develops some kind of trust-related construct, which is regarded as a separate dimension in most research. Early research by Wang [28] examined factors affecting the proliferation of an electronic tax return system in Taiwan. The research was based on the TAM model, but expanded it with a “perceived credibility” dimension. The general tendency is to incorporate different constructions of trust into the explanatory variables in the use of acceptance

models. Lean et al. [19] tested a model based on the work of Carter and Bélanger [9] and Bomil and Ingoo [6]. The study integrates constructs from TAM and DOI which have been moderated by a culture variable (uncertainty avoidance) and a trust model in five dimensions (*Figure 2.*). Belanchea et al. [5] also proposed to integrate trust and personal values into the Technology Acceptance Model.

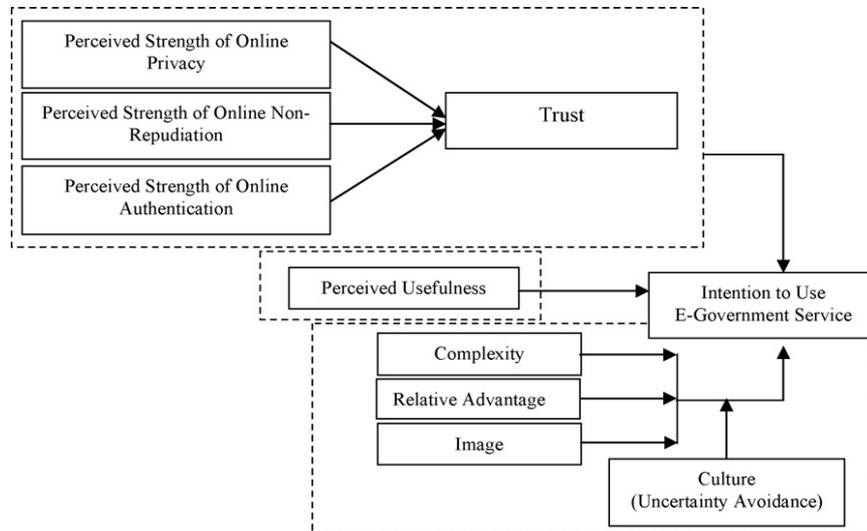


Figure 2. Theoretical framework used by Lean et al. [19]

Individual, personal characteristics became an important part of acceptance models, however, there are only a few studies that look beyond constructs related to technology (which is not surprising as the aim of the used models is to explain technology acceptance). However, other, public administration-related factors can be equally important in the adoption process. There are only a few constructs that appear in the developed models dealing with this topic. As can be seen in *Figure 2.*, Lean et al. [19] placed uncertainty avoidance in the model, which attempted to show discomfort related to complicated administrative matters and fear of possible errors and sanctions (even if its effect was not significant in their case). In the UTAUT model, individual characteristics are also present, where experience is an important factor, however survey data used for this paper show: in Hungary people have only dealt with 1.3 cases on average in the last three years before the survey. In that case, the majority of people do not have the opportunity to become familiar with public administration processes (digitally or not). The GAM model also partially and implicitly contains this aspect in the perceived information quality construct (information at the website is up-to-date, relevant and easy to understand).

Seo and Bernsen [22] were among the few who implemented the knowledge of public administration procedures as an enabling factor while they investigated the attitudes of non-users versus users toward e-government services in two locales. Starting from the original definition of self-efficacy, their hypothesis was that people prefer traditional government services over a counter if they are unfamiliar with and insecure about certain procedures (because they do not understand the procedure, the terms used in the documents etc.) as in that way they can gain support and guidance through the process. The basic knowledge about procedures can empower people to perform relevant tasks. Seo and Bernsen create the factor “perceived necessary knowledge” and define it as “the knowledge one perceives to be required in understanding related terms and

following a given procedure.”² The construct is a determinant of ‘perceived behavioural control’ by Ajzen [2] and, as Seo and Bernsen [22] put it, it is important to include factors beyond perceived usefulness and perceived ease of use, because a person is not without limitation (s)he forms an intention to act: limited capabilities, time or environmental resources can limit the freedom or ability to act (and the self-efficacy factor can be seen as being an antecedent of perceived behavioural control).

The research conducted by Dimitrova and Chen [11] among American internet users has shown a strong relationship with the experience and technical skills of internet use and the use of e-government, and also show that personal attitudes toward uncertainty affect adoption. Familiarity with processes (“Prior interest in government”, measured by earlier contacts with government officials in the past) was also a significant factor. This leads us to the knowledge gap theory which can contribute to formulating a more precise model of e-government service adoption.

1.2. Knowledge gap hypothesis – is it valid for knowledge about public administration services?

The core statement of the knowledge gap theory is that there is a discrepancy in people’s level of knowledge about issues, which varies according to their socioeconomic status (SES) and it is caused by the different ways of engagement with mass media content. The theory was formulated in the early 1970’s by Tichenor, Donohue and Olien [25]: “*As the infusion of mass media information into a social system increases, higher socioeconomic status segments tend to acquire this information faster than lower socioeconomic-status population segments so that the gap in knowledge between the two tends to increase rather than decrease.*” The theory also gave five reasons why the knowledge gap exists: 1) communication skills (more education improves reading and memory skills) 2) stored information/prior, already existing knowledge 3) relevant social contact (higher status people have more and more diverse social connections) 4) personal media reference (lower status people may be looking for less domains in the media) 5) resource structure (certain sources are targeted for their specific audiences).

Two narrative reviews of the knowledge gap-related literature [13, 14] and a meta-analysis of 46 knowledge gap studies [17] proves the existence of a knowledge gap. The analysis carried out by Hwang and Jeong also shows that the magnitude of this SES-knowledge relationship varies across different studies ranging from relatively weak to relatively strong, and moderated by the topic of knowledge. The review found that in the case of social-political issue knowledge (which does not equate with public administration knowledge, but could also show the relevance of the theory in this field), the knowledge gap is wider in comparison to other topics (e.g. health, science knowledge).

Bonfadelli [7] examined the knowledge gap theory in the internet era and found that the Internet may have a direct or indirect impact on every member of society as a whole, but those with a higher status also use it more quickly and efficiently, and states that the knowledge gaps in the digital media use may be more extreme than gaps in the uses of the traditional mass media. It can also be observed in the so-called “second-level digital divides”, which refers to the gaps in usage skills that can persist after the divides of physical internet access have been overcome [15]. Hargittai and Hsie

² The construct of perceived necessary knowledge contained three items: “I had (expect to have) the knowledge necessary to follow the procedures of municipality eServices”, “I had (expect to have) the knowledge to interact through municipality eServices”, “I had (expect to have) the knowledge necessary to understand the underlying procedures and mentioned terminology in the municipality eServices”

[16] state that digital inequality can refer both to how existing social inequalities can affect the adoption and use of digital technologies, but also how differential uses of the Internet can influence social stratification. While Hwang and Jeong [17] found that there were no significant differences in the magnitude of the knowledge gap between the two time points in classical knowledge gap studies, this may change with the proliferation of interactive, digital media.

As demonstrated in the literature above, the examination of knowledge gaps in e-government service adoption can contribute to the comprehensive understanding of the phenomenon, and provides a wider understanding of the technology-oriented models. The main aim of this paper is – with secondary analysis of an existing database – to validate and conceptualise the knowledge gap theory as a contributor to perceived behavioural control.

2. Methodology

The empirical basis of the research is the Good State Public Administration Opinion Survey which was carried out in Hungary in the middle of 2017 by Szociometrum Social Science Research. The survey questions were tested on a representative sample for the adult (age 18+) Hungarian population. The sampling method was multistage, proportionally stratified probability sampling, while the database was also corrected ex post with matrix weighting procedure in respect to age, gender, region, settlement type and education. The Survey contained 70 questions, some with many sub-questions to explore many aspects of public opinion on public administration including the digitalisation of different procedures. Among others, the survey provided the opportunity to use a large (n=2506) representative database, with data about citizens' usage and experience of different areas of e-government services, their channel preferences and the obstacles they face while dealing with public administration procedures. During the construction of the questionnaire for the survey (as the first of its kind), there was no intention to build or test any adoption models, however many constructs that were presented earlier in the literature section of this paper can be examined. For this paper, three main constructs were built using the items of the questionnaire: trust in the Internet (using questions relating to the intention of giving personal/financial data on the Internet), the difficulty of dealing with public administration (containing items relating to perceived difficulties with communicating and with filling out forms, which can be treated as subscales) and intensity and variety of internet use. As Hwang and Jeong [17] put it, the measurement of knowledge (belief-type, awareness-type, factual-type) was also found to be a significant moderator of the knowledge gap in various studies. The difficulty of dealing with public administration constructs is based on perceived capabilities and therefore of a less factual-type, in that way the results may show a narrower gap. The original questions and the reliability of the scales (Cronbach's Alpha) are included in *Table 1*. The questions were measured on a Likert scale and was used for factor analysis to calculate the constructs (as they can be viewed as an interval scale [8]).

Trust in the Internet, privacy (Cronbach's Alpha: 0,849)	Answer option
I never give my bank account data while shopping online.	1-perfectly true 4-not true at all
I do not register on online platforms unless I have to.	1-perfectly true 4-not true at all
I am averse to giving my personal information on the Internet.	1-perfectly true 4-not true at all
There are some personal data of mine that I would not give even while registering on state organisations' websites.	1-perfectly true 4-not true at all
Difficulty of dealing with public administration (Cronbach's Alpha: 0,918)	
<i>Official communication (Cronbach's Alpha: 0,895)</i>	
How difficult is for you when conducting a formal/official telephone conversation?	1-I am unable to do it 4-I am easily capable of doing it
How difficult is for you to write an official letter?	1-I am unable to do it 4-I am easily capable of doing it
How difficult is for you to articulate your case in person with customer services?	1-I am unable to do it 4-I am easily capable of doing it
How difficult is for you to prepare a power of attorney?	1-I am unable to do it 4-I am easily capable of doing it
How difficult is it for you to commission a lawyer?	1-I am unable to do it 4-I am easily capable of doing it
<i>Filling out forms (Cronbach's Alpha: 0,889)</i>	
It is characteristic of me that I have difficulties in filling out official forms.	1-perfectly true 4-not true at all
It is characteristic of me that I have difficulties in understanding official forms.	1-perfectly true 4-not true at all
It is characteristic of me that I have difficulties in filling out the necessary data in official forms.	1-perfectly true 4-not true at all
It is characteristic of me that I have difficulties if I have to justify the data filled in official forms.	1-perfectly true 4-not true at all
It is characteristic of me that I usually ask for help in filling out official forms.	1-perfectly true 4-not true at all
Intensity and variety of internet use (Cronbach's Alpha: 0,802)	
<i>How often do you carry out the following activities?</i>	
searching online	1 – never 4 – almost every day
reading news online	1 – never 4 – almost every day
e-mail	1 – never 4 – almost every day
online messaging	1 – never 4 – almost every day
using social media sites	1 – never 4 – almost every day
VOIP	1 – never 4 – almost every day
Learning activities online	1 – never 4 – almost every day
shopping online	1 – never 4 – almost every day
selling online	1 – never 4 – almost every day
online banking	1 – never 4 – almost every day
managing public utilities	1 – never 4 – almost every day

Table 1. The questions and answer options used for the constructs of this study (Good State Public Administration Opinion Survey 2017)

3. Results

One of the main results of the survey was that one third of the respondents (32.5%) had not been involved in any public administration procedures in the last three years. This demonstrates the fact that e-government services cannot be “killer applications” because their rarity, and experience is hardly a relevant factor in this respect. Another important result was that the usage of e-government services was marginal in Hungary: 8.1% of the respondents said that they had used online services

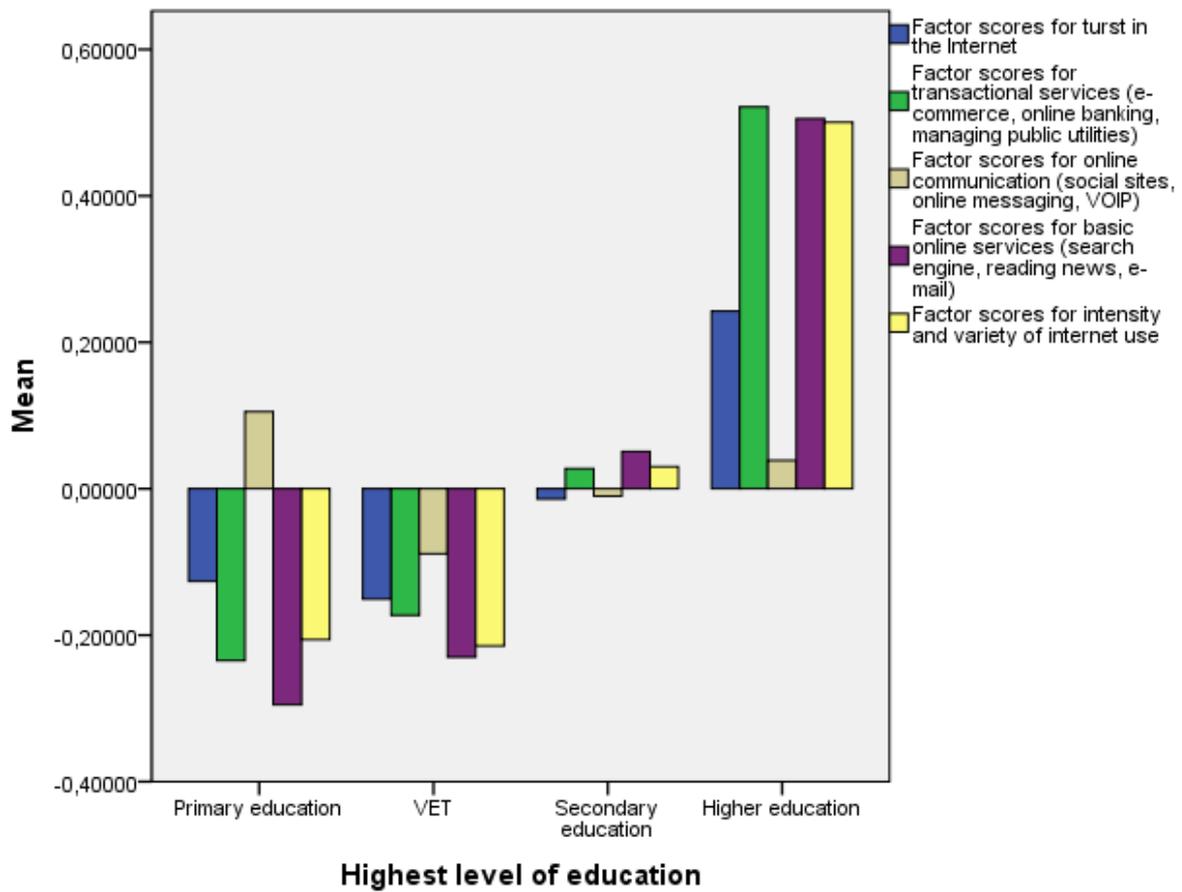
to handle their cases in the last three years. The low proportion of e-government users emphasises the importance of further e-government service adoption-related research in Hungary.

3.1. The existence of the knowledge gap

Our hypothesis is that the existence of the knowledge gap can be observed both in the usage patterns of the Internet and also in the perceived capability to deal with public administration procedures (as a construct for examining public administration related knowledge). Both constructs were calculated in two ways in order to give a deeper understanding: for public administration knowledge, two subscales were also created (communicating with public administration, managing official forms), and the variety and intensity of internet use were further divided into basic, communicational and transactional factors (these distinctions can also be seen in *Table 2.*). To prove the existence of the knowledge gap, we examined our constructs against education, as the main predictor of socioeconomic status (*Figure 3. and 4.*).

As it can be seen in the literature dealing with the secondary digital divide, education significantly affects internet usage habits. As can be seen in *Figure 3.*, there are huge discrepancies between people who have or have not at least completed secondary level education (among all internet users in the sample), and people with higher education can make the most out of the Internet. One important and unexpected thing is that people with only primary education use social sites and online actively (while not pursuing any other activities on the Internet frequently). It may provide an opportunity to target customer service to a customer base that is hard to achieve with digital means of communication. Trust in the Internet is showing the same patterns and moving together with the variety and intensity of internet use (this is partially caused by experience with transactional services in general). It shows that computer self-efficacy, a major factor in almost every e-government adoption models, is also deeply rooted in socioeconomic factors.

In terms of public administration knowledge/capabilities, a smoother, cascading transition can be observed (*Figure 4.*) between the educational groups, the more educated someone the less difficulties (s)he has while communicating with public administration or managing/filling out forms. In other words, lesser educated people need more help dealing with their public administration-related cases, so *we can state that the knowledge gap clearly (and significantly) exists in regard to public administration-related knowledge.*



Cases weighted by Iskolázottság, régiók, településtípusok, életkor és nem szerinti súlyok

Figure 3. Trust in the internet and the intensity and variety of internet use (in three category and summarised) between educational groups (N=1651, Good State Public Administration Opinion Survey 2017)

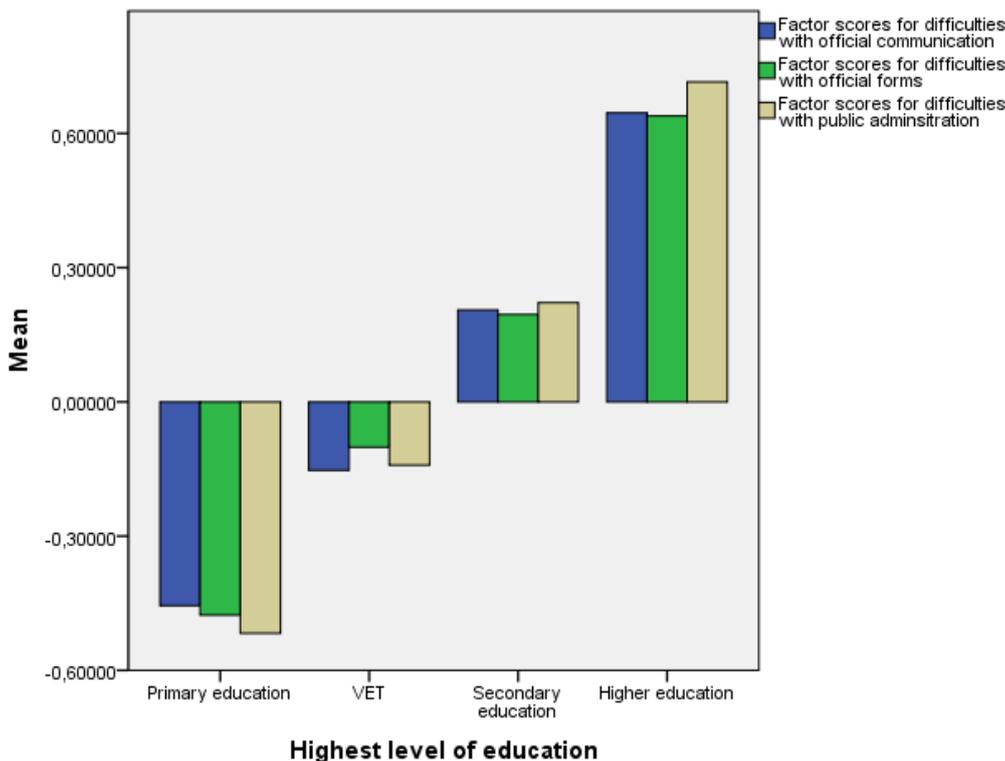


Figure 4. The difficulties with public administration (communication, managing forms and summarised) between educational groups (N=2380, Good State Public Administration Opinion Survey 2017)

3.2. The effect of the knowledge gap on e-government adoption and channel preferences

According to various questions on people’s channel preferences (*Table 2.*) we can state that 60% of the regular internet user (!) respondents said that they try to avoid e-government services if possible, and 74% said of them that they prefer personal contact to the Internet. There are many factors that can contribute to these preferences (the heavy development of one stop shop Governmental Windows, the quality and quantity of currently available e-government services etc.), but we can state that the knowledge gap also plays a significant role.

	I try to avoid using online governmental services if possible (N=1667)	I would rather contact public administration in person than on the Internet (N=1660)
Entirely true	36%	52%
Mainly true	24%	22%
Mainly not true	20%	16%
Not true at all	19%	10%

Table 2. Channel preferences of internet users in the sample (Good State Public Administration Opinion Survey 2017)

As the intensity and variety of internet usage and difficulties with public administration case handling are also highly correlating factors, we could state that on the one hand, one is predicting the other, and on the other hand, e-government services - in order to gain more attention and usage - need to be not only easy-to-use, but have to provide guidance and hide potential complexity from the user (*Figure 5.*).

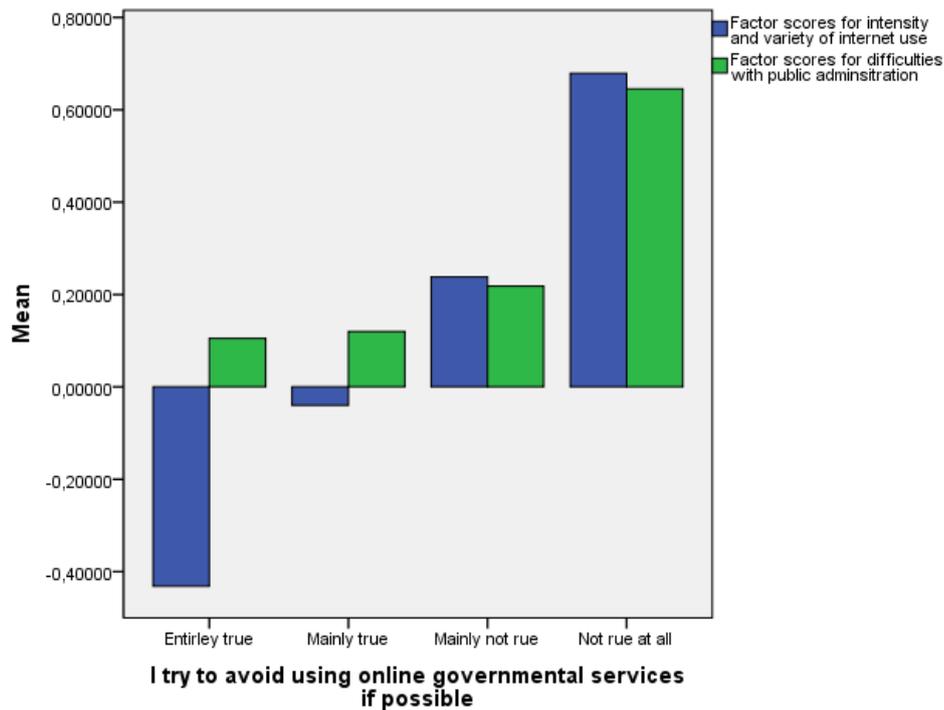


Figure 5. The avoidance of e-government services and factor scores of internet use and PA-knowledge (N=1603, Good State Public Administration Opinion Survey 2017)

4. Conclusion

In times, when a significant amount of public funding is used to develop e-government services (sometimes in parallel with customer service offices and physical one stop shops), to know how the knowledge gap (and other factors) affects e-government adoption or channel preferences is essential in order to optimally use resources. Using the representative database from the Good State Public Administration Opinion Survey the paper showed that a wide knowledge gap exists among Hungarian citizens in terms of public administration-related knowledge and consequently how they can deal with procedures relating to official forms and in communicating their cases. These gaps (together with the discrepancies in internet use) significantly influence the choice of channel for managing administrative issues.

In knowledge gap research, seeing only a given point of time and one issue is only sufficient to say that the gap does or does not exist. Further research is needed in order to compare the knowledge gap over time (widening, stagnating or shrinking) and also to examine not e-government as a whole but rather different cases or group of cases as they have different publicity and media coverage (e.g. the introduction of the widely advertised, proactive Electronic Personal Income Tax Return service). All in all, the knowledge about public administration procedures is an important contributor of e-government adoption and can be used to examine people's channel preferences that could help to optimise resources in public administration.

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THE IMPACT OF THE COUNCIL OF EUROPE RECOMMENDATION CM/REC (2017)5 ON EVOTING PROTOCOLS

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Abstract

Evoting systems are defined by the protocol system employed and two such protocols are the Envelope and Token protocols. On the 14 June 2017, the Council of Europe passed its recommendations for evoting systems for elections and referendums, which define requirements for the core functioning of an evoting system. This paper assesses these two main protocols and assesses their viability in context of the Recommendations.

1. Introduction

This paper analyses two key e-voting system protocols, namely the Envelope and Token protocols, and assesses their viability in regards to the Council of Europe's Recommendation CM/Rec(2017)5[2].

On the 14 June 2017 the "Recommendation CM/Rec(2017)5[2] of the Committee of Ministers to Member States on standards for e-voting" and the two addenda containing an explanatory memorandum [10] and guidelines [11] were passed. This superseded Recommendation 2004(11) on the same topic [1]. For such purposes the major concern is the evoting protocol itself, which is the method applied that defines the systems core functioning and includes the cryptographic methodology of the system. This paper focuses on the main improvements of 2017(5) as compared to 2004(11), which arguably lie in the areas of (i) verifiability; and (ii) strong protection of voting secrecy.

2. Framework of Analysis

There is no such thing as an information system and/or cryptographic system that can provide perfect security in all dimensions at this stage. The question really is for us: (i) to identify the security dimensions; and (ii) to determine the extent of the security provided by a system in these dimensions; in order to assess the e-voting system as a whole, according to the Recommendations CM/Rec(2017)5 of the Council of Europe. It is important to distinguish between which security safeguards are organisational measures, that is a result of human effort at the time of the election, and which are technical, that is a result of system programming that functions independently from human work effort at the time of an election. This paper is primarily concerned with the technical aspects of the e-voting system and to the extent to which the e-voting system can provide

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safeguards independently of organisational measures, for organisational measures in themselves can be manipulated and hence are a risk to security. For clarity, organisational measures would include the transporting of the ballot box data file from one location to another by the election committee. This in itself could provide a risk to security as the file may be corrupted.

In the following, only those standards, abbreviated SD, of CM/Rec (2017)5 have been selected that directly relate to the core functioning of an evoting system namely, its protocol. Standards unrelated to the evoting protocol,² pertaining for example to organisational issues, are not the focus of this paper.

In assessing the evoting protocols according to the Standards, six basic criteria (A-F) and their dimensions have been defined, namely:

(A) Equal suffrage includes:

- (i) The unique identification of voters (SD 7);
- (ii) Access granted only to authenticated voters (SD 8);
- (iii) Only appropriate number of votes per voter are stored in the electronic ballot box (SD 9);
- (iv) Only appropriate number of votes per voter are included in the final count (SD 9).

Note that (i) and (ii) are generic properties that are independent from the evoting protocol.

(B) Individual Verifiability includes:

- (i) Verification by the voter that the voters' intention is accurately represented by the vote and that the "sealed vote" has entered the ballot box without being altered. (SD 15);
- (ii) Voter confirmation that the vote has been cast successfully (SD 16).

(C) General Verifiability includes:

- (i) Sound evidence, be provided, "that each authentic vote is accurately included in the ... election results" and be independently verifiable from the evoting system (SD 17);
- (ii) Sound evidence, be provided that "only eligible voters' votes have been included in the ... election results" and be independently verifiable from the evoting system (SD 18);

(D) Secret suffrage includes:

- (i) Ensuring the secrecy of previous voting choices made by the voter before issuing his or her final vote. (SD 25);

² An example for this would be Standard 16: The voter shall receive confirmation by the system that the vote has been cast successfully and that the whole voting procedure has been completed. This standard certainly relates to verifiability, but does not concern the eVoting protocol, rather it is an issue of user interface design independent from the eVoting protocol itself.

- (ii) Anonymity of votes, notably that the unsealed vote and the voter cannot be linked during counting. (SD 26);
- (iii) Ensuring “that the secrecy of the vote be respected at all stages of the voting procedure.” (SD 19).

(E) No premature disclosure of election results:

- (i) Secrecy of the number of votes for any voting option is to be maintained until after the closure of the electronic ballot box. (SD 24).

(F) Anti-coercion:

- (i) Not providing the voter with proof of the content of a vote cast “for use by third parties.” (SD 23).

3. Enveloping Protocols

Enveloping is an example of a protocol family, where anonymization takes place after the vote was added to the ballot box. Let us first look at how the Envelope scheme, so named because of its similarity to ordinary postal voting procedures, basically works. Enveloping has been widely implemented, probably because of its intuitive appeal due to its emulation of postal voting, and as an example we will take a look at the Estonian e-Voting system [5][7], which has been implemented in elections in Estonia since 2005 [5, p. 4][3, p. 83].

3.1. General Overview

The envelope evoting process can be split into three stages:

3.1.1. Casting a Vote

The voter downloads a voting client application and uses it to identify himself, via his ID-Card by entering in the PIN associated with his authentication key, to the VFS³, which verifies the voter’s eligibility to vote, in order to receive the list of candidates, based on the voter’s constituency, for whom he is eligible to vote [5, p. 7][7, p. 705][3, p. 87]. The voter’s vote and the random number generated, r , supplied by the e-voting client is encrypted using the public key of the election committee, and this creates the inner envelope [5, p. 7][7, p. 705]. The voter then confirms his vote by digitally signing the inner envelope creating a second layer known as the outer envelope [5, p. 7]. The outer envelope containing the inner envelope is sent to the server and it returns a QR-code, which enables the voter to verify and/or change his vote a maximum of three times for up to 30 minutes after casting his initial vote [7, p. 706].

3.1.2. Verification

To verify and/or to change the vote, the voter scans in the QR-code using a different device from which he initially voted and the smart device sends the code to the VFS, which passes it on to the

³ Vote Forwarding Server (VFS) is the only server that is publically accessible. “It verifies voter eligibility, and acts as an intermediary to the back end vote storage server, which is not accessible from the Internet.” [7, p. 705]

VSS⁴. From the session code, the VSS identifies the vote stored in the system and sends it back via the VFS. The encrypted vote only as well as a list of all the possible candidates are received by the smart device. It encrypts all the possible combinations for the candidates with the original public key used to encrypt the vote and compares it with the voters' intended choice. If there is a match the candidate is displayed. The voter also has the option to change the vote [7, p. 706].

The e-voting system stores the voting envelopes on the VSS until it is time to count the votes. [7, p. 705]

3.1.3. Counting

At this time, the outer envelope, which contains the voter's digital signature, and the inner envelope, consisting of the vote encrypted by the public key, are separated as seen in the figure below. The anonymous encrypted votes are stored on a DVD and transferred to a separate machine that decrypts and counts the votes. [7, p.706].

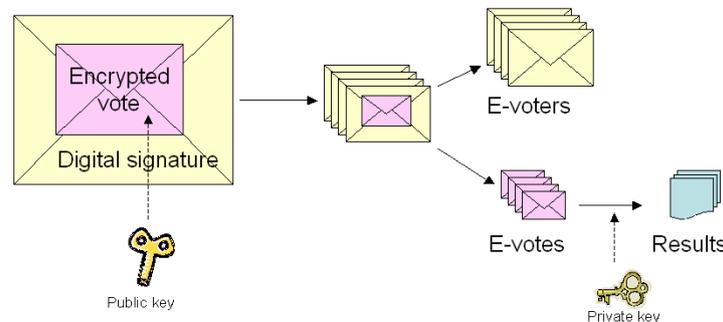


Figure 1. Envelope e-voting system [6, p. 10, fig. 2]

3.2. Envelope Protocol in the Light of CM/Rec(2017)

Using the envelope system as defined by the literature, it is possible for the voter to accurately verify his vote and to verify that the sealed vote has entered the electronic ballot box (VSS) without being altered and since all interactions are logged⁵ manipulation should be detectable fulfilling the requirements of SD 15.

However, during the verification stage of the voting process, it is questionable as to whether the system is able to compute large scale and complex voting possibilities using such devices as a smartphone [7, p. 706] in order to compare the voter's intention to all possible votes to find a match, because this could equate to thousands of combinations. For example, we have an election with preference voting, enabling the voter to select from 10 parties and 10 candidates per party, for preference voting, from which voters may select 3 from the party they voted for. This would be a typical scheme, for instance, in an Austrian national or European Parliament elections. For each party, there are $n! / (n-k)! k! = 10! / 7!3! = 120$ combinations of preference votes and for all 10 parties, 1200 combinations. If voters are not limited to the candidates of the party they voted for in

⁴ Vote Storage Server “(VSS) is a backend server that stores signed encrypted votes during the online voting period. Upon receiving a vote from the VFS, it confirms that the vote is formatted correctly and verifies the voter's digital signature.” [7, p. 705]

⁵ Log Server “is an internal logging and monitoring platform that collects events and statistics from the VFS and VSS.” [7, p. 705]

their preference votes, the number of combinations increases to over 160,000, whose RSA-encrypted inner envelope has to be computed. This requires considerable computing power and memory, on the device and may create a non-negligible data load.

Moreover, the envelope protocol is not able to provide any evidence that authentic votes from only eligible voters are accurately included in the respective election results and to verify this by means that are independent from the e-voting system as required by SD 17 and SD 18 of the recommendations. Once voting has ceased and the votes are to be counted, the inner and outer envelopes are split. The inner envelopes that contain only the encrypted votes are then burnt on a DVD and decrypted and counted on a separate server. It is at this point, where there is true anonymity in terms of who voted for whom. There is no way at this stage to check that the voter's vote has been included in the election results, for there is no connection between the voter and the vote itself and no way to ascertain that connection without using the original e-voting server containing the original file where the inner and outer envelopes were still bound. In this way, the recommendations have not and cannot be fulfilled using the envelope protocol. Furthermore, the files with the inner envelope could be swapped during transportation from one server to another, and hence the election manipulated. There would be no way to detect manipulation without using the original e-voting server nor to check if any one individual vote had been included in the election results. It is because the inner envelopes are completely anonymous, that make the votes unverifiable. An independent recount is also not possible without compromising anonymity. SD 18, that is to provide "sound evidence" that the eligible voters' votes has been included in the final result, is also not possible for the same reasons. This protocol can only provide verification that the vote has entered the ballot box (VSS), not if it has been included in the final tally. There is no end-to-end relationship that is, voter to tally, of any form.

It should be noted that in contrast to SD 15, SD 17 and 18 only provide a vague passive voice recommendation: "The e-voting system shall provide sound evidence ..." instead of as in SD 15 demanding that "The voter shall be able to verify that ...". Hence, one may argue that only SD 15, which is limited to requiring verifiability that the vote accurately reached the ballot box, is subject to verification by the voter, whereas the more far reaching criteria SD 17 and SD 18 which require verifiability that the eligible voters' authentic votes are included in the final tally only require unspecified "sound evidence" of verifiability. However, the only way to reproduce the tallying procedure is to take SD 15 voter-verifiable ballot box and subject it to a recount by an independent authority. This however, as we will see below (4.4. Secret suffrage), may seriously compromise voter secrecy.

4. Token-based Protocols

4.1. General Overview⁶

The token protocol is a two-staged process. The first stage is to attain a valid, signed Voting Card, which allows the voter to at any stage during the voting period to cast a vote. The second stage is to vote via an electronic ballot sheet using the Voting Card attained in the first stage, as the only means of authentication, which is the deciding factor in making the voter, anonymous.

⁶ For a detailed description of the token protocol see, Prosser & Müller-Török [9]

4.1.1. Stage 1

The voter first identifies himself to the election system. This can be done by any current means of identification. The voter client generates a very large random number as token and submits it to the election system for a blind signature. The blind signature gives an authentic signature on the token, nevertheless the server never sees the token it signs.⁷ In everyday terms this could be seen as signature of a document in a sealed envelope lined with carbon paper. The signor signs on the sealed envelope without ever seeing the content of the envelope. Nevertheless, it is an authentic signature that is imprinted on the sealed document via the carbon paper.⁸

The same process can be repeated with one (or several) election observers, eg. an OSCE or Council of Europe Server System, each adding another signature to the voting card, so all observers sign the original token. At the end of the first stage, the voter has a voting card $VC=[t, t^d]$ validly signed by the election system (and possibly observers $VC=[t, t^d, t^\delta]$ with their asymmetric keys (ϵ, δ, μ)).

If several constituencies have to be served, the server maintains a key pair (e, d, m) per constituency and the constituency C is added to the $VC = [t, t^{d(C)}, t^\delta, C]$.

A meaningful implementation of the protocol will of course enable symmetric (password-based) encryption of the VC, for instance with AES [9] to prevent possible misuse of the voting card. This of course also means that if the voter forgets the password for encrypting the VC, the vote is lost.

4.1.2. Voting

During the voting stage the voter sends in his Voting Card (VC) via a web site or app using his VC as the only means of identification. After successfully checking whether the VC has already been used and whether the signature/s of the election system (possibly specific to the constituency indicated) and observer/s are correct, the ballot box server returns the ballot sheet, which is then filled in by the voter.

The voting client cryptographically concatenates the VC and ballot in a way that the link cannot be broken afterwards and submits this as the vote. If an election system allows multiple (replacement) votes, the voter may use his VC multiple times. Each time the new vote replaces the existing vote/s already submitted under the same token.

4.1.3. Counting

The votes in the ballot box are already anonymous, and are only validated by a correctly signed VC to which they are concatenated. Counting therefore involves the following steps:

⁷ The election system has an asymmetric key pair (e, d, m) , the paper uses standard notation for public key cryptography, for an introduction see [9]), of which after successful identification it sends back the public key (e, m) to the voter's client system. The client system (typically a Java applet or app) generates two very large random numbers, r (which will serve as a "pad") and t (the token). It computes $x=r^e \cdot t$, which it sends to the server, which due to the padding does not "see" the t it is supposed to sign. The server sends back x^d . The client "extracts" the signed token by computing $x^d/r = t^d$. This calculation can easily be shown by expanding x : $(r^e \cdot t)^d/r = (r^e)^d \cdot t^d/r = t^d$. The client then concatenates the voting card $VC = [t, t^d]$. Note: All calculations are of course done modulo m , the modulus of the election system's key pair (e, d, m) . For ease of exposition the modulus has been omitted.

⁸ Consider r^e to be the carbon paper.

- (i) Validating the concatenation of VC and ballot sheet;
- (ii) Checking the signatures of election system and observer/s on the VC according to their public keys (e,m) and that the token was used only once; and
- (iii) Checking the ballot⁹ and including it in the tally.

4.2. Independent Recount

Since the ballot box does not contain any data that identifies the voter it can be disseminated to other authorities for an independent recount without compromising voting secrecy. Literally, *anybody* may perform the above steps, once the ballot box has been made available.

4.3. Individual Verifiability

The ballot box line items, that is the VC and ballot, may also be published on a web site, possibly segmented into constituencies. Each voter can then individually check that his vote entered the tally correctly by searching the web page for his token, t . The same list also enables to check the validity of the token signature/s t^d , t^δ and the concatenation with the ballot. Since the token is used by the voter, he does not compromise voting secrecy in checking his vote.

This list therefore combines individual verifiability by the voter and collective verification of the entire result. The system indeed offers a much higher degree of transparency of the result than conventional voting procedures.

5. The Protocols in context

5.1. Equal Suffrage

Dimension (i) and (ii), that of: the unique identification of voters; and the granting of access to only authenticated voters, corresponding to SD 7 and SD 8 respectively, are standard building blocks of any evoting system and are independent of the evoting protocols' functionality. Ensuring that only the appropriate number of votes per voter are stored in the ballot box and included in the final count, SD 9, dimensions (iii) and (iv), applies to elections, where replacement votes are a requirement, opposed to a referendum. Both the envelope and the token protocols are able to accommodate for this functionality providing the last of the replacement votes are reliably selected for the tally.

5.2. Individual Verifiability

Verification that the voter's intention is accurately represented by the vote and the sealed vote has entered the ballot box without being altered, dimension (i) and confirmation to the voter that the vote has been cast successfully, dimension (ii), corresponding to SD 15 and 16 respectively, ensure

⁹ Checking the ballot includes checking that the voter has submitted a vote. It may be a requirement by the election law that the electronic media allows voters to submit an invalid vote, whether by mistake or as an intentionally invalid vote, in order to treat paper and electronic voting in an equal way. SD 13 of the Recommendations states that "the e-voting system shall provide the voter with a means of participating in an election or referendum without the voter exercising a preference for any of the voting options." [2]

verifiability only in the voting stage of the election process, but does not ensure verifiability for an individual voter that his or her vote has been included in the election results. Hence a third dimension is necessary, namely that an individual voter can verify that his or her vote has been included in the final election results. Please note that according to the SD 15, and 16 individual verifiability only extends to the ballot box but does not include the final tally and therefore any misdemeanour between the vote entering the ballot box and computation of the final tally would not be covered by the recommendations and represents a breach in voting security. General verifiability, however, covered by SD 17 and 18, do encompass the final election results, but not verifiability for an individual voter, therefore a voter' right to check that his or her vote has been accurately included in the final election results is not ensured by the recommendations as shown below in Figure 2.

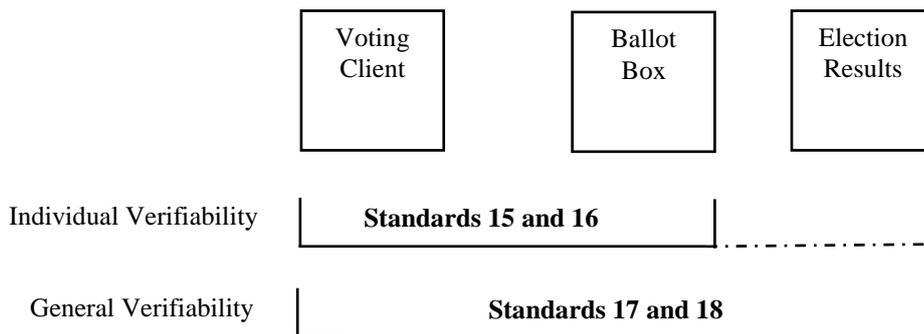


Figure 2. Standards and their verifiability

The token protocol enables the voter to verify that his or her sealed vote has been accurately entered into the ballot box and additionally, enables the voter to check that his or her vote has been included in the election results, while maintaining voter secrecy at all stages of the election process. The envelope protocol, however, is unable to allow an individual voter to check that his or her vote has been included in the final results.

5.3. General Verifiability

In the token protocol general verifiability is achieved by publishing a list of the tokens, their blindly issued digital signature by the election authority and by the observer/s, if observers are used in the election or referendum, the vote and the concatenation information between the authenticated token and the vote and therefore there is a complete audit trail which enables the following verifications:

- a. Each token entered the tally once;
- b. Each token is properly authenticated by the election authority and, if used, by the observers;
- c. Each vote is concatenated with a valid token;
- d. The vote count published by the election authority can be reproduced with this published list and therefore be verified; and
- e. Comparison between the number of authenticated tokens and the number of tokens issued by the election authority and the observer/s ensures that no tokens/votes have been suppressed.

The Envelope protocol, however, does not enable publication of the ballot box data because this would mean to compromise voting secrecy for the entire electorate. If, on the other hand, only the

individual votes are published, it is not possible to verify whether these votes represent a “legitimate” voters’ decision. Therefore, “verification” using the envelope protocol is to simply count a list of published votes, without being able to individually identify votes from one another and hence does not represent a complete audit trail, which is needed to “provide sound evidence”, SD 17 and 18, that free suffrage has been ensured.

5.4. Secret suffrage

SD 25 requires that replacement votes be identified in the ballot box. In the envelope protocol the identifying property is the voter ID, which remains linked to his or her vote stored in the ballot box. It is not until counting that the Voter ID is stripped away, leaving only the vote itself. However, this creates a security breach because votes could easily be inserted and there would be no way to discern corrupt votes from authentic votes. In the token protocol the identifying factor is the anonymised yet authenticated token. SD 25 and SD 26 are fulfilled by the envelope protocol system, however at the cost of compromising voter secrecy, because the Voter ID is intrinsically linked to the vote. Relating to the protocol itself, it cannot be said that the envelope protocol fulfils SD 19, that is that the protocol ensures voting secrecy at all stages. The entire protection of voting secrecy relies on the fact that nobody possesses the votes containing the outer and inner envelope as they are stored in the ballot box, and the private key of the election committee. So voter secrecy hinges on organisational security measures. The token protocol, however, does ensure voting secrecy at all stages of the voting procedure in accordance with SD 19 and fulfils SD 25 and 26.

5.5. No premature disclosure of results

SD 19 and 26 using the envelope protocol cannot possibly be fulfilled. The ballot box for each vote contains the following information: Voter ID, digital signature of the voter and the ballot. Voting secrecy in these protocols is achieved by “separating” the voter information from the ballot. Although this may work fine in the physical world where once a ballot sheet is taken out of a paper envelope, it is not in the paper envelope anymore because the physical ballot sheet exists only once, but this is not necessarily true in the digital world. In the digital world systems are backed up regularly. There are tape backups, backup buffer files, mirrored databases and virtualised server structures, all to ensure the integrity of the data and the operation of the system. It cannot be guaranteed that the data in the ballot box exists just once at any one time without compromising basic computer system functionality.

In the case of the envelope protocol, it is true that the vote is encrypted with a private key of the election committee, which is applied to the ballot only after the separation, however, if the ballot box in its original state, and the private key of the election committee, are brought together, voting secrecy can be compromised for the entire electorate in an automated way. This is also the reason why independent and external recounts are highly problematic, because they would require to hand over the ballot box and the private election key to a third party. It is hence, impossible to implement SD 17 and 18 without severely compromising SD 19, 25 and 26. These two groups of standards for envelope protocol are mutually exclusive. The token protocol, however, do not have these pitfalls as the ballot is already anonymised at the very point in the time it enters the ballot box and that is why the ballot box can be easily handed over to third parties and/or published.

5.6. Anti-coercion

Anti-coercion is a general issue with every form of distance voting including postal voting. It could be said that there is no form of distance voting generally that can fulfil this requirement. There is a clear goal antinomy between any form of individual verifiability and the requirements of SD 23, namely not providing the voter with proof of a vote cast. This is outside the control of the protocol design capabilities. A legislator enabling remote voting, whether on paper or digitally, must be aware that voter coercion, such as family voting and vote buying and the like, is impossible to avoid. There are many ways one can provide proof to third parties of a vote cast and this can be as simple as video taping a vote being cast with a mobile phone. There must be a point where voters take responsibility for their right to free suffrage and if there is a problem, to take action to report it. We can programme secure systems to as far as possible protect voters rights to free suffrage but the public itself must ultimately embrace that right.

6. Conclusion

CM/Rec (2017)5 effectively creates a watershed between voting protocols, depending on whether anonymization happens before or after the vote is submitted to the electronic ballot box. Envelope protocols are good examples for anonymization after that point and it remains doubtful whether given the requirements of CM/Rec (2017)5 they are still viable for they cannot fulfil the requirements of the council of Europe. Token-based protocols have the potential of anonymization before the submission of the vote, which means the ballot box is subject to external verification without compromising voter secrecy.

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SAFEGUARDS AGAINST ELECTORAL FRAUD VS. ACCESSIBILITY AND CITIZENS' CONVENIENCE – NEED FOR CHANGES IN THE GERMAN ELECTORAL SYSTEM

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Abstract

Democratic elections are the basis of democracy. Allegations of electoral fraud lead to protests and violent clashes all over the world. In order to avoid such scenes, the electoral system has to be reliable and transparent. At the same time, voter turnout must be kept high in order to maintain the will of the people in a representative way. However, the required accessibility and citizens' convenience often seems to be in conflict with system security. Higher safeguards often comes with more formalisation and therefore less flexibility for the individual. This article shows how the German electoral system can be improved, while combining safety standards with citizens' convenience. For this purpose, significant weaknesses of voting in polling stations, postal vote, the count of votes and digitalization, especially e-voting are identified. To remedy these weaknesses, solutions from various European democracies are presented as reform approaches for the German electoral system.

Keywords: *electoral fraud, e-voting, postal vote, voting in polling stations, count of votes*

1. Introduction

The coincidence of various national and international developments is relevant to the security and citizens' convenience of the German electoral system. *First:* Elections and democracy lead to conflicts worldwide. Examples from 2018 are the elections in Turkey [13], Zimbabwe [21] and Russia [22]. A secure and transparent election system can avoid such incidents. *Second:* Globalization has changed the lifestyle of German citizens [30]. There are more and more Germans who have several residences or live abroad [18]. The German suffrage is based on the age, the nationality and the main residence of the citizens [38]. Therefore, globalization leads to greater complexity in suffrage. *Third:* Since the 1970s there has been a trend to declining voter turnout in political elections in Germany [40]. At the same time, the number of postal voters has been rising steadily [25]. *Fourth:* There is a tendency to make narrow majority results. Therefore, even the manipulation of a few votes can decide on political majorities [28]. *Fifth:* Accessibility and citizens' convenience are increasingly becoming the focus of public action. Long after taking over administrative tasks in economy, modern information and communication technologies are also

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established by the government. So it is questionable whether the execution of integer election has to be restricted to a ballpoint pen and paper ballot [27].

2. Voting in polling stations

Voting at polling stations is generally considered to be particularly safe [3]. Although there is a trend towards an increasing use of postal voting, most German voters still vote in person at polling stations [16]. For this reason, manipulations could have far-reaching consequences, as the majority of votes cast could potentially be affected. This gives rise to the investigation of two areas of risk. On the one hand, the identification of identity in the polling station, on the other hand, problems in connection with electoral rolls.

2.1. Identity and polling station

The current practice in German polling stations is as follows: Before the ballot paper is thrown into the ballot box, the voter's identity is established by the electoral committee. To do this, it is sufficient to present the electoral notification and to establish the right to vote in the electoral roll. The presentation of an official photo ID is generally not required. It is mandatory only, if there are doubts to the identity of the voter or if the voter doesn't carry his electoral notification [38].

Although the current practice of identity check meets the spirit of citizens' convenience, the lack of a clear identification of each voter leads to a security gap in the German electoral system. The following scenario points out the importance of unambiguous identification:

Citizen *C* gives away/sells his election notification to the election fraudster *F* or *F* steals the electoral notification of *C*. In addition, *C* and *F* are assigned to *different polling stations*. *F* can therefore cast one vote at each of two different polling stations - his own polling station and in the polling station of *C*.

Case modification:

C and *F* are assigned to *the same polling station* of a major city. *F* first votes with its electoral notification. Dressed differently, *F* returns some time later to the same polling station to vote again with *C*'s election notification.

The case modification points to the changed social framework conditions due to the advancing urbanization. It is becoming more difficult for the electoral committee to reliably determine the identity of voters on the basis of the electoral notification [31]. A key recommendation in White and Johnston's report on electoral fraud in the UK is the introduction of an identity obligation at the polling station [41]. This approach can easily be transferred to the German system, as every German who has reached the age of 16 is required to have an identity card [32]. Other official photo IDs such as a driver's license or passport also appear to be suitable [41].

The use of biometric identification procedures for voter authentication in polling stations also represents a considerable reform approach. Biometric recognition methods identify a person based on unique behavioral and physical characteristics such as fingerprints, handprints, DNA, iris, voice or handwriting. Unlike other forms of proof of identity, biometric characteristics cannot be forgotten, lost, copied or stolen. The simultaneous improvement of security and citizens' convenience as well as the acceleration of the process are considered as advantages of biometric recognition procedures. Thus, voters would not have to carry an additional ID document with them

when using this form of authentication. On the other hand, there is the risk that physical characteristics are not replaceable. If the digital reproductions fall into the wrong hands, extensive misuse can occur [1].

2.2. Problems with electoral rolls

The electoral roll lists all persons who are eligible to vote in a local authority on Election Day [17]. The accuracy of the electoral register is of decisive importance for the conduct of a tamper-proof election. As an important control instrument, it should guarantee that only eligible persons are entitled to vote and that every voter is entitled to vote exactly once. All persons registered in the electoral roll receive an electoral notification [26]. In Germany, the electoral roll is drawn up *ex officio* [10]. For this purpose, the local authorities compile a separate electoral register for each general electoral district. The local population register serves as the basis [2].

By far the most serious loss of integrity in a voter register is the fact that a voter is listed in several registers at the same time [38]. This happens particularly due to data transmission errors between local authorities as a result of relocations. Duplicate entries may already be based on errors in local population registers [9]. Or may occur after the electoral roll has been drawn up. In this case, the voter receives several electoral notifications from different local authorities. The affected persons are thus actively informed of the possibility of double voting. In combination with a large number of incorrect data sets (around 4.8 million incorrect population registration data, as of 2008), there is a major security risk [39].

The introduction of a central population register for Germany and the introduction of a nationwide electoral register could remedy this problem. A central register would store all registration data of citizens at a central place (e.g. as in Austria at the Federal Ministry of the Interior) [24]. As a result of centralization, incorrect entries in several population registers would in fact be not possible. As explained, the electoral register is based on local registration data. Thus, the accuracy of the registration data takes a key role for the accuracy of the electoral roll.

A nationwide electronic electoral register would also be a solution to be considered. A nationwide electronic electoral roll is a register that centrally registers all German citizens entitled to vote. Combined with the use of networked voting computers, the link to the polling station of the home constituency could also be broken. Voters could then vote at any polling station in Germany. Adapting the ballot to current mobility behavior would also have a positive effect on the goal of citizens' convenience and accessibility. Furthermore, the lowering of the percentage of postal votes and non-voters is seen as a possible opportunity [2]. The problem of double registrations would also be superfluous, as there would only be one electoral register.

3. Postal vote

At present, postal voting is the only way of voting that is independent of time and place, and for this reason the most user-friendly form of voting [2]. It is possible for all eligible voters without stating reasons and is increasingly popular among citizens [8]. As a result of this development, postal votes can have an increasing influence on the outcome of elections. At the same time, postal voting involves numerous risks in bridging distances. This makes fraud in postal voting much easier than voting at the polling station [35].

3.1. Identity and postal voting

When applying for postal ballot documents, the following points are insufficient for a reliable identity verification:

- The information requested in the ballot paper proposal (surname, first name, date of birth, address) represents only a minor hurdle for abusive requests by third parties. In addition, the accuracy of a power of attorney can hardly be established by the local authority [38].
- Furthermore, § 27 Paragraph 1 BWO assesses the filing of an application by simple e-mail as equivalent to written form. As a result, e-mail applications without a qualified electronic signature are accepted. This passage is in competition with § 3 a Paragraph 2 VwVfG according to which only e-mails with a qualified electronic signature are equivalent to written form [28]. Concerns about this procedure are the easy falsification of e-mails and the simplicity of creating e-mail addresses with the data of a voter [4].
- The ballot paper may be sent to an address other than the address of residence or delivered to a third party. This increases the citizens' convenience but also the susceptibility to manipulation [38]. The control notification sent at the same time to the residential address [11] increases the protection against manipulations only relatively because this only informs the citizen concerned. The delivery of the election documents by a simple letter to the address of a perhaps unauthorized person takes place anyway.

In order to counter the shortcomings described above, the formulation of Austrian electoral law offers a suitable alternative: In Austria it is generally necessary to establish the applicant's identity. For oral and written applications, the voter must prove his or her identity, for example by presenting an official photo ID or passport number. However, there are two exceptions for written applications. On the one hand, applicants known to the authorities do not have to prove their identity. On the other hand, the qualified electronic signature acts as proof of identity when an application is submitted by e-mail. The postal voting documents requested without a qualified electronic signature are sent by registered letter and must be received in person. Election documents requested with a qualified electronic signature end up in the applicant's letterbox as a standard letter [23].

3.2. Problems with postal delivery

The postal vote requires the transmission of the ballot letter from the private sphere of the voter to the ballot box. For this reason, it seems advisable to take a closer look at the weaknesses in the transmission medium - the postal system [3]. In Germany there is no legal provision for the secure delivery of postal voting documents. At present, postal voting documents are sent to voters by a simple letter [28]. The eligible voter bears the risk of loss or delays by post [38]. The confidentiality and integrity of postal votes may be violated by postal employees. Possible worst case scenarios are opening and reading the contents of the election letters - vote and voter identity - as well as changing, throwing away or adding new election letters [3].

A possible reform approach to counter problems with the sending of postal voting documents is the legal establishment of a secure form of delivery. Here, too, it is worth taking a look at Austrian electoral law: § 5a Paragraph 8 BPräsWG defines various forms of delivery. As mentioned above, postal voting documents are generally sent by registered letter. A simple letter is sufficient if the application has been received in person or by e-mail with a qualified electronic signature.

Furthermore, the particular risk of manipulation in medical and nursing homes is taken into account - in the case of nursing home residents, the registered letter must be addressed exclusively to them and marked like this: "Not to authorized postal representatives" [6].

In order to increase security when returning election letters, official notes on receipt should be considered as a reform approach. At present, only election letters that are received late get such a note [11]. The purpose of the entry note is: Upon request, the voter can obtain information from the local authority whether his election letter reached the local authority on time. In order to make this information possible, it would be necessary to compare the ballot paper number printed on the ballot paper with the ballot paper list [38]. Finally, both or a combination of both reform approaches have the potential to increase security in the delivery and return of postal voting documents without resulting in a loss of civic convenience. Under the premise that "care and accuracy have the highest priority over thrift" [38]³, concerns about administrative and cost issues can be invalidated.

4. Counting

The election must not only be protected against attacks from third parties, but equally important is protection against election fraud from the inside - namely by the state organizing the election. The points of attack addressed refer to the counting of votes and the storage of postal votes. Intentional manipulation of the results presupposes agreement in the election committee in the absence of election observers at the same time. Under these conditions, the following manipulations are conceivable: The incorrect intentional assignment of votes to another party or the invalidation of votes although these would be considered valid. Moreover, the officials responsible for safe keeping the postal votes could exchange the election envelopes or add new ones. As long as the number of envelopes added remains smaller than the number of registered postal voters, the risk of discovery is expected to be low [35].

The described attacks would not cause any irregularities in the checksums of German election reports. With the focus on the risk of the election committee adding ballot papers, the content of the election report is insufficient and therefore in need of reform. At present, the election report does not contain any information on the number of ballots received, used, unused or damaged [29]. Rather, "the local authority [...] hands over official ballot papers in sufficient numbers to the head of each electoral district before the start of the electoral process" [11].⁴ The inclusion of these fields could increase transparency and thus meet possible distrust towards the electoral committee [29].

Furthermore, the use of technical means (e-counting) could offer a new perspective for integer counting. In this way, incorrect interpretations of ballots or unintentional counting errors could be avoided [7]. E-counting systems have been used in Switzerland's government practice since 2001. The Chaos Computer Club has criticized the use of these systems [12]. This raises concerns about a real quality improvement. In addition, the use of electronic voting devices in Germany is limited by the Constitutional Court's ruling on voting computers [7].

5. E-Voting

The most important voting channel for electronic voting today is online voting. Voting online is similar to postal voting, a convenient form of voting for citizens. Like any other voting channel, e-

³ please refer Schreiber, § 36 Rn. 5 e. (My translation, my emphasis)

⁴ please refer Bundeswahlordnung, § 49 Nummer 3. (My translation, my emphasis)

voting must comply with the principles of democratic elections [15]. A particular challenge for information technology is the implementation of the electoral principles of the public and secrecy of the election.

The decision of the German Constitutional Court in 2009 on the use of voting computers in parliamentary elections is of great importance for the principle of public. According to the principle of public, the central steps of electoral action and result determination must be verifiable. Due to violation of this electoral principle while using voting computers in German parliamentary elections, the law on the use of voting equipment was declared unconstitutional. Nevertheless, the ruling of the Constitutional Court does not exclude the use of electronic voting machines [7]. This fundamental decision on public voting is also of great influence beyond the borders: At the European level, the Committee of Ministers created the Recommendation CMRec(2017)5 on the standards of e-voting. This Recommendation establishes verifiability requirements that take into account the view of the public principle according to German case law.

In its Recommendation, the Council of Europe proposes review mechanisms in the sense of end-to-end verifiability for the implementation of the principle of the public [14]. The end-to-end verifiability is a security mechanism through which the voter can follow the complete path of his vote (casting of vote - transfer of vote - storage of vote - counting of votes) [3]. In the same way, the anonymization of voter identity by means of information technology is of eminent importance for the protection of electoral secrecy. Accordingly, the e-voting procedure - in particular the counting - must be designed in such a way that no connection between the unencrypted vote and the voter can be reconstructed [15]. In order to meet this requirement, anonymization must take place before the vote is cast. Nevertheless, technical security measures are not sufficient for system security. Secure e-voting systems can only be created through the interaction of technical and organizational safeguards [33]. However, a remaining risk for system security can never be ruled out [38]. Whether this remaining risk is acceptable is a political question [34].

A particular problem for the reintroduction of e-voting in Germany is the rare use of the electronic functions of the identity card. The online ID card function (eID function) of the Identity card allows citizens to identify themselves safely on the Internet [5]. The reliable identification of voters on the Internet is a basic requirement for online elections. In the absence of a reliable identification on the Internet, online voting would not have been an option for two-thirds of Germans eligible to vote in 2015 [20]. This limits the potential of e-voting enormously.

5.1. Evaluation in the context of postal voting

As described for postal voting, bridging distances involves numerous risks. Online voting and postal voting are both forms of remote voting. Finally, it has to be assessed whether online voting could be an alternative to postal voting for the German electoral system. For evaluation, the most critical electoral law principles for distance voting will be used: The protection of electoral secrecy and the guarantee of principle of public.

As with postal voting, the voter is responsible for a secret, personal and uninfluenced vote in online voting. Both forms of voting are outside the control of the electoral committee and the public [3]. Online voting could offer new opportunities for protecting electoral secrecy. For example, the Estonian online voting software allows voters to overwrite their votes as often as they like until the end of the voting period. Only the last vote is included in the election result [19]. This seems a suitable measure to counter undue influence, as the voter can change the vote content at any time.

Furthermore, the online election could offer a new perspective for the public principle. In postal voting, the voter is currently unable to understand what happens to his or her vote after sending the ballot letter. This is not the case with online voting: individual verifiability allows voters to verify that their votes have been entered correctly in the ballot box [3]. The universal verifiability enables interested persons to observe the correct counting from their home computer without being restricted to a single polling station [36].

The end-to-end verifiability makes the entire voting process reproducible and enables complete error tracking. Independent of the cryptographic methods used, the greatest information technology skill lies in transferring this mathematical-cryptographic evidences into a form that is comprehensible to the citizen [37]. In spite of the strengths shown, it remains to be taken into account: A careful evaluation of existing threats in online elections is essential and at the same time extremely difficult. Manipulations could expand largely in online elections. In postal voting, this risk is considerably limited by the decentralized structure of the postal voting districts [3].

6. Conclusion

The agreement of both objectives, protection against manipulation on the one hand and citizen convenience on the other, is of central importance for the quality of an electoral system. Protection against possible fraud makes an important contribution to the legitimation of political decisions. It ensures that citizens have the necessary confidence in democracy. An equally important part is the system's civic convenience. With the key words comfort, accessibility and comprehensibility, the component of citizen convenience ensures a high participation rate.

As the article shows, improving protection against possible manipulation contradict the objective of citizen convenience in many fields. Conversely, improvements in citizen convenience often lead to lower security against manipulation. In order to combine these often competing aims, it is necessary to make an appropriate assessment in each field. Only in this way a suitable balance can be found for the entire system.

7. References

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THE NEW CUSTOMISABLE ELECTRONIC ADMINISTRATION USER INTERFACE IN HUNGARY

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Abstract

The Act No. CCXXII. of 2015 on general rules of electronic administration and trust services, (hereinafter 'eAdministration Act'), defined the concept of customisable electronic administration user interface (hereinafter 'SZÜF').

The purpose of establishing the SZÜF portal was to create a single gate entry point (as a starting page) for electronic administration of central and local government, linking the various IT systems of different institutions.

The new customisable electronic administration user interface was launched in January 2018. According to the plans, it will shortly replace the former magyarorszag.hu portal as the point of single contact portal of Hungary. The new SZÜF portal has a more modern and pure design as well as a life-situation based approach to publish existing eGovernment services.

The electronic administration services are available to the client after electronic identification and authentication by the Central Authentication Agent. Services can be used by natural persons (citizens) and organisations (including public administrations, businesses). The identified client can access their digital post-box, can manage their personal calendar, and can save their favourite services among the eGovernment services available on the portal.

The SZÜF portal provides infrastructure and applications services to the connected organisations supporting the electronic administration process. For the connected service providers (public administration bodies designated by eAdministration Act) the SZÜF provides specific content and service management solutions. These services may be integrated in the SZÜF or be outside the SZÜF. Currently there are big differences in the quality of services. As a first step, the collection of e-administration information and services was completed. The next task is to ensure uniformity, service-oriented platform and interoperability.

The purpose of this study is to present the areas for further development of the services of the SZÜF portal while presenting the results achieved. Achieved goals: a single gate entry point for electronic services for natural persons and organizations on a customisable interface with new online request submission options (e-Paper, iForm). Further development is needed: unification, interoperability and integration of services, connection of additional organizations, possibility of situation-based administration.

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1. Introduction

January 1, 2018 is an important milestone in the history of Hungarian e-administration. Decades of development resulted in new levels of e-administration.

- 1950-1989. Beginnings, computerisation. Computing is a tool for solving administrative tasks.[5] At that time, the one-way administration model was developed [11], [7], which could only be implemented in practice in the 2000s.
- 1990-2000. Development of government informatics. Information technology (IT) becomes an essential element of public administration's development. [12], [13] In Hungary, the development of back office systems in support of public tasks has taken place.
- 2001-2011. Model based on Central System (KR). The development of front office services is launched. As a result of the development of the legal environment, e-administration has become an equivalent to paper-based administration, but the heavily centralized, closed framework required by law could not be adapted to the evolving technology.
- 2012-2017. SZEÜSZ² model. The reform of the regulation of electronic administration³ aims to create a client-centric, decentralised model. Administrative procedures can be subdivided into elements and individual SZEÜSZ supports the solution of these subareas. The services may be built from the SZEÜSZ modules. The priority of administrative developments is to ensure that client relationships are really one-stop-shop, to enable citizens, businesses and organisations to manage their cases electronically. [16], [20]
- From 2018. Default electronic communication and administration. The business entities, the state, the local government, the budget authority, the public prosecutor, the notary, the public body, other administrative authorities and the legal representative of the client are required for electronic administration. [2, 9. §] For natural persons, electronic administration is possibility unless otherwise provided by law. [2, 8-9. §.]

The eAdministration Act [2] and the Administrative Procedure Act [3] have created a legal basis for the life-situation based, one-stop shop e-administration, allowing the combined management of the related procedures. On January 2, 2018 a new administrative interface (in Hungarian: SZÜF) was launched, with KÖFOP⁴ support, for the renewal of the eGovernment Portal. [17], [18]

2. The new SZÜF

2.1. The SZÜF - service, application and user interface

The SZÜF can be defined in several aspects:

² Regulated Electronic Administration Services (in Hungarian: SZEÜSZ)

³ Main legislation: Act CCXXII of 2015 on the general rules for electronic administration (eAdministration Act) 451/2016 (XII. 19.) Government decree on the related rules of electronic administration (eAdministration Decree). Act CL of 2016 on general administration procedures (Administrative Procedure Act).

⁴ KÖFOP-1.0.0-VEKOP-15-2016-00025 Provision of central application level services for the standard access and interoperability of specialized public administration systems (<https://nisz.hu/en/projektek/provision-central-application-level-services-standard-access-and-interoperability>)

- Central Electronic Administration Service (in Hungarian: KEÜSZ)
- Customisable Internet application provided by a designated service provider that supplies the identified client with a centralized access to fulfilment of e-administration declarations, procedural acts, and other obligations and to use the e-administration services available to the client.
- Portal⁵, statutory public electronic information platform (user interface) and the central collection of e-administration services. [2, 1. §., 38. §.], [1, 34. §., 128. §]

Compliance with e-administration obligations poses a challenge for the majority of organisations, so the SZÜF provides support services to the e-administration processes for organisations. Such services of the SZÜF may be its own services, specialised applications for the processing of a particular case, and support applications (e.g. form filler applications), SZEÜSZ and KEÜSZ services. The method of connection depends on several factors (e.g. customer base size, number of administrative processes, automation of processes, own administrative interface, or the support of e-administration by specialist systems).

Connection levels:

- Basic level (loose connection): Access to the service provider interface and applications of the connecting organisation is available via the SZÜF link.
- Incorporation (close connection) The connected organisation provides its own application through the SZÜF framework.
- Full integration: Form-filling support services operating in the SZÜF infrastructure.⁶

2.2. The SZÜF portal

Main expectations:

- The starting point for electronic administration.
- For natural and legal persons, organisations without legal personality, and authorised agents.
- Central Government Service Bus-based, unified service platform (framework) that ensures the access to Regulated and Central Electronic Administrative Services (SZEÜSZ, KEÜSZ) and specialist systems.
- Unified identification and authentication, role-based privileges.
- Uniform appearance (simplicity, transparency, quick and easy access, responsiveness).

⁵ Initially web-lak.hu, ekozig.magyarorszag.hu, from 2018 known as szuf.magyarorszag.hu

⁶ For information on the service, connection documents on the <https://szeusz.gov.hu/szuf> website are available after registration.

- Customisable for identified clients⁷.
- Support for client-situation-based search.

Portal users may include:

- Client-side end-users (anonym and registered users with SZÜF account),
- Administrators (users acting on behalf of connected organisations),
- Application developers,
- Operators.

2.3. Public interface

The public information interface of SZÜF portal (<https://szuf.magyarorszag.hu>) is available for everyone. [1, 34. §.]

Portal structure:

- Left menu (navigation): login, favourites, messages, calendar, administration (browser), help, operation (information), authentication, The Client Setting Register (link).
- Top menu: News, contact (access to the Governmental Hotline), presentation (SZÜF interface).
- Main part: Cases, services, applications.

The case descriptions are required to be prepared by the connected organisations, on the basis of predefined principles for the editorial interface of the SZÜF. It is expected that the description of the case is fully comprehensive, but should be simple, brief, concise and easy understand. It is important that users without legal, administrative knowledge, and experience to understand the description. The cases/services are divided into 15 main categories. In addition to navigation, free text Search helps to find a relevant case or application.

The professional background of the information is supported by a knowledge base based on artificial intelligence. [1, 38-39. §.] [10]

There are three types of links (buttons) that can be added to the case description according to the way the case is handled: electronically (external link, ÁNYK, iForm, or applet), by phone, personally.

The client-situation/life-situation⁸ based administration is currently not provided, although it is possible to assign a particular case to situation or event.

⁷ Except services of loose connection

⁸ Life-situation e.g. birth, illness, accident, school start, marriage, change of name, job search, starting business, working abroad, start of industrial, commercial activities, transport services, construction, home creation, operation of

Figure 1. Public interface of SZÜF

Source: https://szuf.magyarorszag.hu/szuf_fooldal#fooldal (02 Jan 2019)

2.4. Identification and storage

You can use the services of the Central Client Authentication Agent (in Hungarian: KAÜ) to log in:

- Client Gate
- electronic identification service by electronic identity card containing a storage unit (eID card)
- Partial Code Telephone Authentication (in Hungarian: RKTA)

The issue of identification and authentication has been extensively studied in recent years. [19], [21], [8], [14] Although the eID card number is over 4 million⁹, and the number of client gate registration is 3.7 million¹⁰, clients have still primarily used client gate to log in.

From October 2017, the authentic digital post service is available, providing a unified interface and storage space¹¹ for citizens, office gates and the company gates.

After the successful identification of a natural person, it is possible to manage organizational assignments. To do this, the system also uses data from several records (authorization, role, person-to-organisation). Identified users have access to SZÜF account services (profile management, storage management, mailing, messaging, calendar management, and querying activities).

the vehicle, travel, settlement, obtaining of citizenship, loss of card, social need, retirement, crime, death. The client situations include a list of cases that may be based on each other.[15]

⁹ <http://www.kormany.hu/hu/belugyminiszterium/hirek/eszemelyiforgalomban> (23 Jan 2019)

¹⁰ <https://ugyintezes.magyarorszag.hu/dokumentumok/mohustat.xls> (23 Jan 2019)

¹¹ <https://tarhely.gov.hu/levelezes> (02 Jan 2019)

The default storage space can be personal (KÜNY¹²-registration), office (for connected organisations), or company gate (for business entities). [1, 84-90. §] Storage of office or company gate is a common mailbox, where stakeholders and authorized persons have access to official documents of the organization or company in one place.

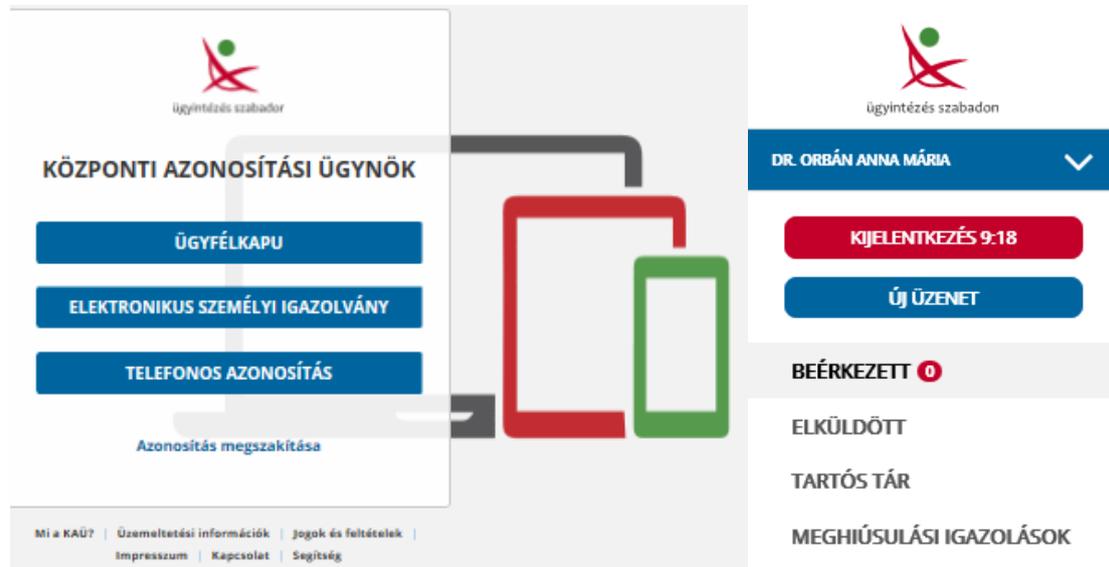


Figure 2. Identification with KAÜ and storage space

Source: <https://kau.gov.hu> and <https://tarhely.gov.hu/levelezes> (02 Jan 2019)

You can use the New Message menu item to upload encrypted (. kr) files created with the General Form Filler (in Hungarian: ANYK). Uploaded documents are available in the Sent folder (for 30 days). Documents not received within 5 business days will be notified to the Failure Certificates folder (for 180 days). The Inbox folder displays documents (replies, receipts) sent by the agencies (for 30 days). These documents can be downloaded, deleted, or placed in the Permanent Storage by the user.

3. Research data and analysis

Electronic administration is now possible on a number of administrative portals. I have been looking at services available on three interfaces, mainly from client side, and have been tested in practice in recent years.

The main aspects of the study are:

- content of case descriptions,
- choice of administrative channels, especially electronic solutions,
- requests, management of forms.

¹² Central Client Registration Database (in Hungarian: KÜNY)

The KÖFOP project was closed at the end of 2018. Therefore, in this study I present the status of the e-administration user interface and published cases/services in January 2019. By reviewing the descriptions of services, case types, you can see:

- eGovernment Portal (magyarorszag.hu)
 - The case description (case 233) and services (400) are in a different menu item.
 - The advantage of case descriptions is that they summarize cases related to a given life-situation¹³, with legislative references (pointing to the current state of time, to a given paragraph), the disadvantage is the official language and the often outdated legal environment.
 - Services are in alphabetical order, for the selected service there is short information and redirection to the interface of the given service, if necessary, by calling the client gate identification.
- Web Assistant application system
 - The interface changed in the autumn of 2018, aligned with the SZÜF image.
 - The disadvantage of the change is that English description are no longer available in the framework.¹⁴
 - The case descriptions are drafted in plain language and do not contain legal references.
- SZÜF
 - Case descriptions are in plain language but with differing levels of details.
 - The user is not informed about what happens when the electronic channels are selected.
 - Legislative references are not aligned with the current time; they do not point to a given paragraph.

The problem is that the same case is described differently on the three interfaces.

There are three types of administration channels available on the SZÜF interface: electronically, by telephone, personally. The links (buttons) are not complete. The description often refers to other options (e.g. post), but personal administration does not display in all cases.

86 of the 708 case descriptions are included in the titles of that ‘information’. These cases are usually handled only personally. In reality, the number of information is 117, which is in 2 cases of email sending option, and 8 cases refers to a possibility (electronically from January 1, 2019), which is not yet working because the forms are not yet available.

¹³ Personal life (22), Property (18), Work (17), Social Security (14), Finances (12), Education (10), Law (56), Consumer Protection (2), Public administration (9), Business (68), Documents (5) (<https://ugyintezes.magyarorszag.hu/ugyek>)

¹⁴ But they still available on the website (http://www.nyilvantarto.hu/en/web_assistant)

	eGovernment Portal (magyarorszag.hu)	Web Assistant (nyilvantarto.hu/ugyseged)	SZÜF (szuf.magyarorszag.hu)
Possibility of e-administration	from 2005	from 2013	from 2018
Clients	natural persons	natural persons	natural and non-natural persons
Services, case types	400	49 ¹⁵	708
from these requires identification	142	45	527
Identification	Client Gate	Client Gate, from 2016 KAÜ	KAÜ
Unified framework	not	yes	yes
Description of cases	official languages with legal references (https://net.jogtar.hu/)	plain language without legal references	plain language with legal regulations (http://njt.hu)
Client situation-based administration	only in the case description	not	planned
Multilingualism	prescribed (eAdministration Decree 34. §)	until 2018 in framework, now on the website	planned

Table 1. Comparison of the e-administration user interfaces (January 2, 2019)

Category	Number of cases	Electronically	Personally	By phone	By post
Family	14	4	11	0	1
Education, Research	20	13	9	0	1
Health	11	6	7	0	0
Finance	25	21	6	0	0
Retirement, Allowance, Aid	28	20	15	2	4
Life in Hungary	6	0	6	0	0
Traveling abroad	8	5	4	0	0
Business	106	74	52	3	3
Property	41	36	18	1	0
Documents	26	19	13	4	1
Administration, Law	169	139	73	8	42
Agriculture, Environment	100	99	81	0	30
Election	12	11	6	1	8
Utilities providers	31	31	9	3	0
Municipality ¹⁶	111	89	81	0	0
All:	708	567	391	22	90

Table 2. Cases and administrative channels by category on the SZÜF portal (January 2, 2019)

¹⁵ Mandate may be entered in the Client Setting Register for 80 cases

¹⁶ A very small proportion of municipal cases is available from the current interface (only 7 municipalities have connected).

Most of the electronically handled cases (567) require identification (527). The method of identification depends on how the organisation connects. 402 cases require KAÜ or client gate identification, which is followed by further identification in 22 cases (e.g. TAJ number¹⁷, service registration). In 24 cases the service can be used by registering on the website of the connected organization. Other methods of identification are also found (e.g. received code after form filling, study ID, tax number, document data or number). Unfortunately, multiple logins may be required. For example, the SZÜF login is not enough to use the Web Assistant, and you must log on again after the redirection.

Most of the cases (80%) may be handled electronically, more than half of the cases refer to the possibility of personal administration. The number of cases that may be handled by phone (3%) and post (13%) is low.

More than 40% of electronically handled cases are redirected to another interface (loose connection). For example, Web Assistant, Hungarian State Treasury, National Tax and Customs Administration, National Health Insurance Fund, Government Offices, Government Windows and Utilities providers. Unfortunately, the redirect is one-sided, not a back-link.

There are essentially three options for filling and submitting requests and forms.

General Form Filler Program (in Hungarian: ÁNYK)

From the beginning, the forms used in the official procedure may be filled by the ÁNYK program. ÁNYK is a JAVA-based framework program that must first be installed on a computer. The forms required for each cases can be installed on the program. After filling out forms and attaching PDF documents, verification and authentication (AVDH¹⁸) can be available. The submission may be by identification with client gate (KAÜ, company or office gate). The .kr forms (data in XML format) can be sent as a new message within the mailbox system. Users can read information about installing the ÁNYK program and forms in a pop-up window. Users may be informed of the availability of the necessary forms from description.

e-Paper - a General-Purpose Application Form Service

The e-Paper is a new, authenticated messaging application available on the online interface (<https://epapir.gov.hu/>). SZÜF is calling it an external application. The interface is similar to an email. The personal data of the identified client is automatically filled in (name, birth name, mother name, place and date of birth). It also supports the use of the Company Gate. The theme group, the case type, or the recipient may select from list. Reference can also be made to the history of office administration. The subject and text of the letter is a free-text field. There you can enter the content of the mail. You can attach documents to your mail (authentication with AVDH). The finalized letter can be sent. The message is also a ZIP file (.krx), with XML data content.

iForm – Form Filler Web Application

There are three areas of iForm technology: form management, form editing (design), form filling. With the iForm form designer, the connected organisation can create the form template and then publish it. The form management handles form-specific data. The SZÜF provides support services

¹⁷ The social security identification number (TAJ number)

¹⁸ Identification Based Document Authentication (in Hungarian: AVDH)

(full integration). The submitted data is also in XML format¹⁹. The technology can be integrated into many systems (e.g. the municipal ASP system, MUKER, IKR).

	ÁNYK	e-Paper	iForm
Start use	from 2000	from 2017	2016
Interface	installed program and forms	online	online
Form	designed	free-text content	designed
Attachments	PDF	multiple format	multiple format
Identification	Client Gate, KAÜ	KAÜ	KAÜ

Table 3. Compare of form filler application (January 2, 2019)

All three applications produce authenticated XML-formatted documents. The online form fills are planned. At present, the ÁNYK is still the most widespread. For cases initiated from the SZÜF interface, the following forms are used: ÁNYK (168), e-Paper (133) and iForm (68).

4. Summary and recommendations

Requirements	Evaluation and recommendations
All e-administration services are concentrated in one place and can be made available to customers in a unified framework.	This is only partially realized. It can be seen that the local authorities have the biggest lag, although more than 90% of municipalities have joined the ASP system. The fragmentation of cases is also a problem ²⁰ . In the longer term, the number of cases needs to be reduced and standardized. It is recommended to insert mobile applications in the interface.
Customisable services.	It is implemented only in the services provided through the SZÜF framework and infrastructure. There are two possibilities in the longer term. Either large organisations provide personalized services on their own interface, either they modify their connection.
Life-situation based administration.	It is included in the plans, but not in practice. This also requires cooperation among several organisations and the reorganisation of administrative processes. As a first step, it is recommended creating situation-based search, facilitating customer orientation. In the longer term, it should be possible to start cases related to situations at one point.
Interoperability.	One of the main aspects is the cooperation of SZEÜSZs, KEÜSZs and specialist systems. The improvements also require the renewal of the specialist systems.
Platform independence.	The SZÜF portal is responsive. Providers' own interfaces, including external applications should ensure that they can be used alongside computers on mobile devices.
Privacy and security.	Highly managed area. Compliance with legislation (especially GDPR [9]) and standards are assured.

Table 4. Realisation of requirements in practice (January 2, 2019)

¹⁹ The ÁNYK compatible XML format ensures collaboration with old specialist systems.

²⁰ E.g. 8 cases are related to the complaint announcement, separate cases per organisation.

In practice, the requirements of the SZÜF portal and framework have only been partially realised.

An intensive marketing campaign and education [6] would also be needed to disseminate e-administration as widely as possible. At present, very few people are familiar with the SZÜF portal, even the majority of administrative staff do not know the interface.

All in all, it can be concluded that the SZÜF is a key element in the implementation of client-based administration. In addition to its many advantages, it requires further development.

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AGILITY IN PUBLIC ADMINISTRATION – IS AGILITY A POSSIBILITY AND WHERE ARE ITS LIMITS?

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Abstract

Digitalization offers a variety of advantages: speed, efficiency and agility [1]. Its goal is to speed up workflow processes, to give the employees more time to focus on important work and to provide them with the opportunity to be agile in order to meet new expectations, new requirements and new trends. Besides speed and efficiency, agility is one of the most important goals because it is an answer to the requirements of a volatile, uncertain, complex and ambiguous environment – the so called VUCA world. [2] In the private sector the concept of agility has already proved to be an answer to rapid change and volatility but is it also a concept for Public Administration with its own special requirements of stability and continuity as well? This paper tries to answer this question and to work out the limits of the new concept considering agile methods and agile organizational elements.

1. Introduction

1.1. The Issue

Since public administration has to face Digital Transformation [3] and innovation, they also gradually start to adopt the agile approach to help their organizations harness the opportunities offered by Digital Transformation as well as innovation to provide the public services of the future which meet changed customers' expectations [4].

Agility, as a business concept, originates from a manufacturing context and the need to be more flexible. This need also arose in the organizational context and therefore the concept of agility was transferred to the organizational context. [5] The two main points about being agile are emphasized as (a) an organization operating in a changing competitive environment and (b) the organization can take effective action to benefit itself and its customers and exhibit responsiveness in a turbulent environment. [6] A general definition offered by Horsapple and Li: “*Agility is the result of integration alertness to changes (recognizing, opportunities/challenges) – both internal and environmental – with a capability to use resources in responding (proactive/reactive) to such changes, all in a timely, flexible, affordable, relevant manner.*” [7] Since we live in a VUCA world, our government and public administration also needs to react faster, more efficiently and more

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effectively to meet the requirements of all stakeholders, all threats and any rapid alteration with its challenges. This leads to the question of the characteristics of public administration.

Our public administration stands for stability, security and the control of public interests. [8] Quite the opposite of agility. These core principles of stability etc. arisen from the need to provide solutions which guarantee the principles of equal treatment (non-discrimination) and legal certainty. Valid laws and provisions, regulations and guidelines as well as the resulting tasks are deduced from these principles and result in a special organizational structure with fixed organizational processes. They are tailored to cope with daily work but not to meet the requirements of a VUCA world.[9] These principles also demand working methods which allow people to cope with stable and inflexible structures, routine and regularity, as well as employees who are willing to work in an environment with comparatively little change in their day-to-day working life and are therefore comfortable with regulations, avoidance of any uncertainty, high power distance etc.

Considering agility and the core principles of public administration the question arises, whether agility as an organizational concept is suitable and could be implemented in public administration.

1.2. The Study

To remedy this fundamental question we needed (a) a catalogue of characteristics of agile organizational elements and agile working methods as well as (b) people who try to work agile in public administration and are therefore able to assess the suitability of the agile concept for public administration.

To create a frame-work we first of all identified the dimensions of agile organization elements and agile methods, then we looked for criteria which describe these dimensions and indicators which allow us to measure them. The whole frame-work is based on literature. The cornerstones of agile organizations are described by Häusling [10] in the areas of agile organizational elements and agile methods. The dimensions *organizational structures*, *business processes* and *strategy* describe the organizational elements. The dimensions *management culture*, *human resource management*, and *organizational culture* describe the usage of methods. Each of the six dimensions consists of core elements and its indicators for measurement. Table 2 gives an example of the dimension *processes* with its elements.

Dimension <i>Processes</i> literature based	
Agile Project Management	Complex and dynamic project management Focus on performance / outcome Change is regarded as a chance for improvement Alertness - continuous response to trends and alterations Fixed budgets and time-span Focus on customers and customer feedback Visualization of the project steps e.g. backlog, scrum board etc. Quick decision making / short decision-making channels Project team is authorized to make decisions Self-management of the team / working in cross-functional teams Working in sprints with defined partial results Working in continuous improvement loops

Table 1. Results of the literature study concerning the dimension „processes” and its describing elements.

Afterwards we designed a semi-structured interview guide.

Six experts were identified for the interviews who are also a part of experiments on working agile in public administration. One expert is part of a so called “Forum for Agility”. He is experienced in different agile ways. He actively practices agility in his day to day work and he tries to transfer the new findings into public administration in general. Two experts work in the public administrations of cities and three experts work in the public administration of districts. Two of the six experts are located in a separate staff unit, one expert works in a so called “innovation laboratory” and one other works in the department of Agility. Only one expert works in a “normal” department (see table 1).

Interview	Organization	Field of Duty
1 Expert	County / Baden-Württemberg, population > 250.000	Division Digitalization
1 Expert	County / Bavaria, population < 100.000	Division County-Development
3 Expert	City / Baden-Württemberg, population > 100.000	Division Digitalization / Agility
1 Expert	Forum Agility	Agility in Public Administration

Table 2. Interview partners

The results of the literary review and the interview results were compared and analyzed to see if they are reciprocally related to be able to answer the question raised in this paper.

Additionally all experts were asked about the limits of agility in public administration. The answers were analyzed and compiled to get an overview.

2. Agility in Public Administration – findings based on dimensions and elements of agility

To find out if agility could be implemented in public administration, we analyzed the answers of the interviews. First of all the experts emphasized as elements of an agile organization, agile project management, agile attitudes and agile values. They named agile values such as customer orientation, quick decision making and short decision-making channels as well as changes in decision making procedures (so that the team could decide), adaption of their reporting system, working in self-management, working in inter-divisional and cross-functional teams, networking as well as working in sprints and continuous improvement loops. Table 3 gives an overview of the findings considering the dimension *Processes* as an example of all the other dimensions.

Dimension <i>Processes</i> interview based	
Agile Project Management	Customer orientation Visualization of the project steps e.g. backlog, scrum board etc. Changes in decision-making procedures and short decision-making channels Adaption of the project reporting Project team is authorized to make decisions Self-management of the team / working in cross-functional teams Inter-divisional networking cooperation Working in sprints with partially defined results Working in continuous improvement loops

Table 3. Results of the interviews concerning the dimension „processes” and its describing elements (shorten version, for the complete table see [11])

Another core element seems to be the working attitude in support units and departments of public administration. One expert said that it is only possible there to work agile if the functional

departments such as finances, human resources, ICT-departments etc. promote a culture of service. He subsumed this under the element *inter-divisional networking cooperation*.

None of the experts mentioned *focus on performance / outcome, change regarded as a chance for improvement, alertness – a continuous response to trends and alterations, fixed budgets and time-span*.

Similar to the results in respect of *Agile Project Management* are the results of the other elements. The reorganization of business processes and organizational structure were seen as major topics as well as a space specially designed for agile teams and New Work.

All of the experts favor an open and target-oriented organizational structure and ask for clarification of the responsibilities of the departments and its members as well as the constructive handling of business interfaces which offers a higher potential for improvement. Information channels should be defined to guarantee transparent processes with its own working atmosphere. If information is available where it is needed (anytime and anywhere), employees act proactively, react faster, more flexibly and more efficiently.

Four of the five experts said that they implemented parallel structures to the bureaucratic-hierarchical structure (see figure 1). Their project teams work in a network inter-divisional structure. This new parallel structure is supported by a different interior and working space design e.g. two of the five experts had implemented creative rooms to support agile work.

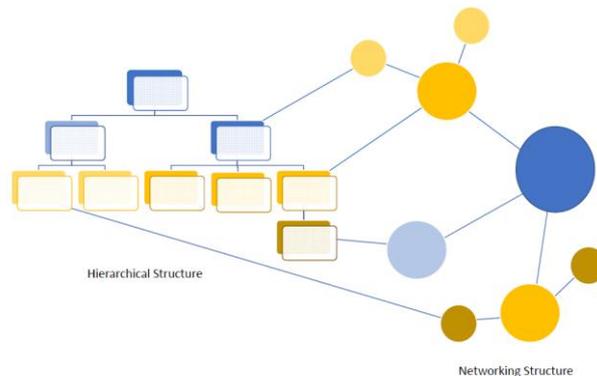


Figure 1. Parallel working structure

All of the experts emphasized that customer-orientation is one of the major aspects. They all want to add value on the service for the customer. Even if in public administration customers are more diversified than in the private sector, they point out that it is essential to integrate them in service-design processes. One expert said that customers are always part of the solution, not part of the problem. [12] Inviting customers to give feedback was not mentioned by any of the experts during the interviews. Working in projects with customers is common practice in the “innovation laboratory”.

Agile work was defined by using agile methods. These are used in the areas of business management as well as human resource management and they should be used to encourage an agile organizational culture. None of the experts mentioned management as one of the core elements of agility. That is amazing because it is well known that this is a major factor to implement agility. Kotter & Rathgeber state that public administration is “managed well BUT bureaucratic and unable to proactively act / react quickly” [13]. This statement proves that public administration has not yet

found a balanced way to manage and lead to a guaranteed agility. Even if it is said that management and leadership is very important, there is little to nothing done to change the culture of leadership or even to improve or to support managers in public management. It is still hierarchical. [14] One of the experts pointed out that this is a problem in public management. [15]

Employee participation together with the transfer of responsibility to the employees receives special mention by the experts. They think it is one of the most essential elements. All of the experts noted that they focus on both aspects and implement them. Two experts already involve their teams in the process of setting goals as well as encouraging their teams to take on the responsibility for their steps and the accountability for their actions.

All of the experts stated that responsibility and accountability arises out of self-management and autonomous work. They try to create an atmosphere of empowerment, participation and autonomy within their teams. This working style also motivates their people, encourages new ways of thinking and working as well as achieving improved working results. [16] One expert mentioned that they decided to implement agile methods in the whole organization due to these positive effects. One of the experts pointed out that employee participation is one of the key factors for organizational change. Therefore, they encourage participation in their “innovation laboratory” in order to encourage change.

Asked about the elements of *management and leadership* all experts referred to further education programs and information events. Other tools to support management and leadership (e.g. alternative career prospects) are not supported in their organizations.

Learning on a trial and error basis is looked at critically because of the legal framework and the promise to guarantee legal conformity. So this is an aspect which is not easy to implement even in agile work spaces. Four of the experts mentioned that they implemented learning on a trial and error basis by introducing sprints which offer the possibility for detecting failure quickly and changing action accordingly. In this way a culture of constructive criticism could be achieved.

Considering the catalogue of characteristics of agile organizational elements and agile working methods as well as the results of the analysis of the interviews of the experts – who are already working agile in public administration - the question whether agility could be a concept for public administration with its special requirements of stability and continuity can be answered with a positive yes. The question about the limits of agility in public administration is still unanswered.

3. Limits of Agility in Public Administration

The second part of the interview showed an additional perspective of agility in public administration and was subsumed in an answer from one of the experts: “The limits of agility are set by those who set the framework for our work, allocate resources, and who show their willingness to accept agility within the organization.”³ [17] Aspects of this framework are explained in the following lines.

Agility and Federalism: The federal structure of the public administration in Germany includes the following levels: towns and cities, counties, states and the government. The particular importance of

³ Original in German: „Die Grenzen sind letztlich dort, wo diejenigen, die uns die Rahmenbedingungen, die Ressourcen zur Verfügung stellen, bereit sind, agil mit zu gehen oder nicht mit zu gehen.“

public administration results from its monopoly and its legally regulated mandatory tasks and its voluntary services. All of these tasks can be structured into routine work, semi-structured and unstructured work as well as in sovereign, political and voluntary tasks.

Asked about the possibility of implementing agility, all of the experts explained that agility is a possibility at all levels of the federal structure if the principle of appropriateness is respected.

Legal and political requirements: The core principles of equal treatment (non-discrimination) and legal certainty have to be guaranteed throughout all decisions and actions within public administration but there are several opportunities to achieve more flexibility – and therefore more agility – without any violation of any applicable law. [18] Hill argues that the scope for action and decision-making activities – the so called *discretion power* – should be used positively. This opinion is supported by all of the experts. Two experts pointed out that they see difficulties arising with procurement law because there is little discretion left.

Allocation of resources: Resource allocation is the biggest limitation of the implementation of agility in the opinion of all respondents. Especially if it comes to salary levels regarding qualified specialists and skilled workers, as well as budgetary inflexibility and position- as well as personal planning. They say that the normal position plans are not compatible with agility. Two experts pointed out that the transformation process needs more staff at the beginning, more training of the staff appointed and also the expertise of external personnel. All of these aspects raise the cost and the budgets need to be increased. The managers in charge need to be aware of this otherwise agility can't be implemented properly.

Willingness to change and preparedness to change: All of the experts agree on the fact that if there is no willingness to implement agility by those responsible members in top management or by politicians, it is not possible to implement agility in an organization as well as across all federal levels. They are responsible for resource allocation and set the rules, they motivate and de-motivate staff. Additionally the elected representatives e.g. the city council, need to support the changes. Besides these limits concerning willingness and preparedness, implementation depends on the ability of each individual. Not every person is able to work agile and not every person is able to change his/her habits after a long working life.

4. Summary

Considering today's trends and major changes such as the Digital Transformation or the requirements of a VUCA world, we asked whether agility is a suitable concept for Public Administration with its special requirements of stability and continuity.

To answer this question we developed a framework of dimensions and elements which describe agility based on literature, to be able to interview experts in public administration to a greater extent and to assess their answers. Since the study is based on a sample of six interviews it can be seen as a first step towards testing the methodology and the results can be interpreted as an indicator. General conclusions on the applicability and limitations of agility in public administration need to be verified by further research.

Nevertheless, the results indicate that agility is compatible with the requirements of public administration. All of the experts pointed out that service-oriented tasks demand agility because agility increases speed, efficiency, customer-orientation and continuous improvement. These

characteristics of agility also serve project management and the fulfillment of semi-structured, as well as unstructured, tasks. On the other hand they concluded that the implementation of agility depends on (1) the willingness of the responsible members in top management and of the politicians, (2) the particular areas of responsibility and tasks, and (3) the business processes and structures as well as (4) the individual ability. These are obviously the barriers which have to be overcome for the implementation of agility.

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THE POWER OF VIRTUALITY AS A CHALLENGE FOR GOVERNMENTS: A POST-STATE DYSTOPIA

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Abstract

This study presumes that the giant technology corporations that dominate the Internet are becoming a historical power factor competing with governments. The so-called netocracy has already reached a level of influencing people that may have a real threat to the survival of governments and states. It analyses info-technology revolution as a trend and phenomenon that shape state power, the “new separation of powers”, which state governments have to face. Netocrats behind internet-based intelligent applications are becoming more efficient and successful power structures than the states. It is dubious whether any national or regional regulation and sanctioning will be able to limit the web’s technology titans’ power and influence over the people. Regarding the states and governments it is vital for the future whether they can move from the physical reality to digital (virtual) space where its citizens are living more intensively and in an increasing number. The so-called “digital state” is not simply a convenience, efficiency or service development issue. The “digital state” is the issue of the future existence of the state. It concludes that as far as netocracy progresses in governing and manipulating net-addictive people, the vision of the end of the history of state as a kind of archetype in state-theoretical thinking is becoming more and more realistic.

Keywords: government, post-state, dystopia, netocracy, cyberspace, digitalization, internet, power

1. Introduction: A Vision on the State

“He who has ears let him hear” (*The Holy Bible* Mt. 13:9, 43). We did not always conceive what was going on around us. In 2008, for example, one day before the financial collapse of the global economy, a whole world believed that everything was all fine. “History has come to an end.” This is how *Francis Fukuyama* saw the future in the turn of the 1990s (F. Fukuyama 1992). According to the basics of the vision, history was the story of states battling against each other. In the future, instead of the nation states, global and liberal values will dominate the new power structure. He was wrong. He himself admitted it later. From 2004 he announced the concept of nation-building (F. Fukuyama 2004). He recognised what *S. P. Huntington* had written in 1997 about the importance of cultural (civilization) issues including national issues in the history of the future and the present (S.P. Huntington 1997). Finally, *R. Kagan* reopened history and the new era of state building by the announcement of “The Return of History” (R. Kagan 2008).

Our article is looking for the ember beneath the ash in the most important social theoretical issue of the turn of the century: Is it really possible that “history” as the history of states comes to an end in the near future? What are the dangers and new challenges that the development of states faces?

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In the evolution of human community, the history of the state is an important but short and fractured period. The history of the state is almost only six thousand years of the hundreds of thousands of years of human evolution, and during this “short” period civilizations, empires and state forms have sunk. History has often “come to an end”, thus dystopia, the vision of the end of the history of state is a kind of archetype in state-theoretical thinking. Dystopia represents a negative social and historical vision, which was mostly provided for us by fiction (e.g. A. *Huxley* or G. *Orwell*'s cult novels). However, science is also turning more and more courageously towards the study of the future. What are the trends and phenomenon that shape state power, the “new separation of powers”, which state governments have to face? Are there new, more efficient and successful power structures than the states being formed? According to the conclusion of our article the giant technology corporations that dominate the Internet are becoming a historical power factor. Netocracy has already reached a level of influencing people that may have a real threat to the survival of state forms. The concept of netocracy was introduced by the *Wired magazine* in the 90s. It is dubious whether any national or regional regulation and sanctioning will be able to limit their real power. The battle is already going on in cyberspace, thus the “digital state” and cyber technology competitions have become vital for the future of the states.

2. The history and the recent development of the separation of powers

2.1. The history of the separation of powers

The theory of state and the theory of power are of the same age. State science defines the essence of power as the power of the state (M. Samu 1992). Nearly six thousand years have passed since the first empires until the formation of today's state forms. Prior to the emergence of states, power relations were formed at the level of smaller communities and tribes. The direction of history leads from smaller to larger units. Since their existence, the ruling and state-governing forces have been trying to centralise power and gain dominance over other states. However, in their constant effort the separation of powers is inevitable: sharing power with other states and other power factors. Our study deals with today's tendencies of sharing state power. The internet revolution creates such new power structures, “network powers” that sooner or later will question the real power of state governments over their citizens. The post-state vision is a well-known ideology of history that has always fallen as a human endeavour (see, e.g. communism) (G. Claeys 2017). However, the new power factor globally dominating information technology are beginning to go beyond human control. They are realities without ideology, so governments have to consider them as serious threats. Is it possible that a new era of the separation of powers has begun? Is it possible that the era of states soon comes to an end? These are audacious questions, since as a result of our historical approach we consider the states as stable structures. We have learnt history as the history of the states, therefore the end of history goes beyond our imagination. However, it is worth looking back into greater perspectives, since states have developed only in the last six thousand years of hundreds of thousands of years of homo sapiens' history, and every state will be abolished and transformed with time. Written history is the story of the states' power and survival struggle, in which each state evolves and then disappears in time. J. N. Harari, an Israeli historian, in his work *Homo Deus* published in 2016 finds that, as a feature of today's digital revolution, people and countries are less and less governed by the governments (J. N. Harari 2016). They are becoming a mere administrative apparatus, they manage but do not govern. Power is not held by the state but perhaps by some other entity. Has the history of a new separation of powers unknown so far begun?

Before looking for answers it is useful to look back at the state history of power relations. They emerged in three dimensions: on the one hand, power rivalry, which historically took place between

empires and states, but thousands of wiles of diplomacy and gaining dominance have always been present in the interstate contest for power. The second dimension is the separation of powers, which can be characterised as the relationship between the ruling/governing state power and the competing non-state powers. The third dimension is the sovereign ruler, and the factors limiting and controlling the power of state governments. There was and there is a close logical relationship between these three dimensions, but there is no complete conceptual overlap.

In the history of ideas, the control over state governance can also be interpreted as a value-based approach of governance and power. According to this, the more limited the state power is the better, the more moral and humane it can be. The ruler must also respect certain moral ideals and justice requirements, that is, power cannot be unlimited. Aristotle separates the state organisation into three different power factors: the organ deliberating on state affairs, the senior official branch and the body serving justice (Aristotle 1994). The analysis of their relationship is already premised in the philosopher's book "Ethics" that the exercise of power has to relate itself to certain norms. The moral approach is fulfilled in the Christian theory of the state. According to *St. Augustine*, the secular exercise of power must always be given a moral proof (St. Augustine 2006). According to the Augustinian theory of the state, the internal essence of the operation of state power is not the exercise of power but the enforcement of a moral goal, justice and public good. *St. Thomas Aquino's* natural law approach introduces the requirement for the moral, i.e. value-based self-justification of secular powers. Calvinism and *Th. Hobbes's* philosophy further relativizes the exercise of power and its humanisation and promulgates the importance of its separation (Th. Hobbes 2011). The ideological streams of humanism, rationalism and the appreciation of human freedom and dignity are ultimately fulfilled in *J. Locke's* work and in the principle of the exercise of power being subject to the rule of law (J. Locke 2011).

An ancient form of the separation of powers occurred when the state and the ecclesiastical orders were separated. The separation of secular and ecclesiastical powers increased the perception of the secular governance according to moral values and moral truths. The separation of powers between the priesthood representing the divine power and the state power was historically more typical than power rivalry, although power wars between the state and the Churches were often present in history. The counterpoint to these is the ecclesiastical state, which keeps the separated power of the two poles in a unique unity as a state form existing up to the present. In Europe, the Enlightenment overwhelmed the Churches as power factors. Before the Enlightenment, not only the ecclesiastical (divine) powers shared power with the state. History is full of conspiracy theories of secret power "orders", for example, legends about orders of chivalry or the power of Freemasons. Since the 15th century, bankers or city-states with economic power have also been present as an independent power factor as opposed to state power. Humanism and the ensuing first national constitutions brought man (and not God) into focus. The people as a power factor, however, appears as the source of power rather than as the exerciser of power. Popular sovereignty (social contract) did not separate state power nor did it limit state power, it provided even more powerful principles and constitutional foundations for state power. Since the Enlightenment, state governance has faced new challenges, none of which has threatened the development of the state as a power institution to date. Historically, *Locke* is the pioneer in the separation of legislation and enforcement, later *Montesquieu* fulfils the triad of powers with the judiciary, the essence of which is to prevent the concentration of power [12]. Rousseau's principle of popular sovereignty gave rational and normative explanation to the source and origin of power, further weakening the mysticism of government power. The government's compulsion of the modern separation of powers appeared vis-a-vis the legislation and the judiciary as public powers. The other dimension of sharing powers was a kind of power pact with political actors such as the ruling parties or the opposition parties.

The historical direction of the separation of powers was to make it compliant with the “divine” norms before the Enlightenment and later with the democratic norms (humanism).

Since the Enlightenment, the world order without the Church – as a power factor – has been characterised by the power rivalry between state powers with varied intensity. The power concept of the “world order” in the literature of political sciences shares the “cake” of military, economic and information influence among the states. Dominance is measured in the possession of economic and human resources. Governments are in a constant struggle to increase their power domination and influence over other states. There has always been a dominance order among the states of the world reflecting true power. It outlines a kind of “sovereignty map” where the spectrum ranges from the puppet states to super powers. The immense literature of the “world order” has been written by *H. Kissinger, F. Fukuyama, S. P. Huntington, R. Kagan* and other political oracles in recent decades. Americans who have made the world believe that the “power cake” is distributed by them (USA) and some great powers.

To sum up, the compass of the separation of state power has always followed some “divine” or moral value. The methodology of violent or diplomatic power struggle between the states has only been repeated. Their common characteristic feature is that the development of the state as a power structure would not have been jeopardised but rather strengthened by them. The state has become a lasting and successful community framework. In contrast, the info-technology revolution shows the relations of state power unknown so far. There is no moral orientation and the methodology of the power struggle for people in cyberspace is also unpredictable.

2.2. The recent development of the separation of powers

The 20th century brought several new elements to the formula of sharing power in state governance. On the one hand, big business, later multinational corporations forced governments into power pacts. On the other hand, media power joined the factors of non-public power. Media, as a “branch of power” is the star of the 20th century, which had lost its “shine” by the turn of the millennium, and it is being replaced apace by the “new media” of the Internet. Organised crime “capturing” the weak governments is historically not significant as a problem. In particular, international and supranational organisations (*IMF, World Bank, EU Commission*) and influential international interest groups emerged as power factors after World War II. These “supranational” institutions also operate according to the “nature” of politics: they want more and more power. They can only gain power at the expense of nation states, so they are constantly confronting them. They become really dangerous when they are allied with financial and economic corporate empires of supranational global interest. In the past two decades, the global finance has become the main power challenge to state governments. Power can be separated into political and economic sides only in theory. In fact, state governments, supranational institutions and global finance want to have influence on the same citizen, the struggle for power is getting harsher, but the majority of the sates persevere in the competition. There are examples of strategic agreements between states and the world of finance, but they only last as long as no real conflict of interest occurs. The peculiar power-sharing between politics (the state) and economy (companies) is always a temporary win-win situation, a “ceasefire” of power. Since the 1970s, the universal enforcement of globalisation and liberal values has given rise to the illusion that nation states and state governments become secondary actors. The protagonist will be the global world order value-driven by the USA. This vision has predicted a high chance of nation states and sovereignty getting into the dustbin of history.

Simultaneously, a new power vision emerged: the power of networks. The netocracy concept is analysed in *“Netocracy – The New Power Elite and Life After Capitalism”* written by two Swedish

philosophers, *Alexander Bard* and *Jan Söderqvist* (Bard-Söderqvist 2002). The authors call the formation of the economy and society formed by the new information and communications technologies informationalism, which they think will replace the social economic order of today as capitalism replaced feudalism.

Networks as a power factor can be interpreted in several ways. The network of conscious citizens who own and control information is also a power factor. The Internet has “reversed” the relationship between the state and the citizen, but nowadays it is rather the citizen who checks the state with a few mouse clicks. The information power and toolbox of an individual is expanding. On the other hand, the state has to “surf” in the fast and free flow of data while millions are watching each of its step. Although this civil control limits state power, but it does not mean a real power rivalry for the state. The state has power over its citizens, ultimately through laws and legitimate means of violence. However, the citizen is increasingly living in cyberspace where the traditional tools of state power no longer work. Is the power over the people slowly slipping out of the hands of the states?

3. Result: Identifying new actors of power

The issue of the separation of powers leads us to the fundamental question of our subject: What does real power mean when we talk about states, their sovereignty and governance? If we measure power in statute, army, police, money and minerals, these are, without question, state-owned. State power is the right to govern (legislation, government) and to decide upon (judiciary) the citizens, which also includes the possibility of the power of force (violence). Both democratic and authoritarian states have influence of power over the people, the difference between them does not lie in this fact. In addition to the formal features of power, it is an exciting question whether the ruling forces of the state (institutions) actually exercise real influence on the citizens’ decisions, that is, whether the real power is held by them. Is the media in the domination over the people a rival power factor for the state? To what extent do other states or global organisations influence the citizens of a state?

According to our thesis, there are already new, barely known power factors that may pose a serious threat to state power structures. According to *J. N. Harari*’s dark vision, new power systems that are more powerful than states and governments are emerging (Harari 2016). Netocrats behind internet-based intelligent applications can be dangerous to the existence of the nearly six-thousand-year-old state forms or at least a historic challenge to every state. Our starting point is that real power is the actual influence over the people. Nowadays, especially the people of advanced societies are the “people living in the Internet”. Human factor providing for the essence of state power is dramatically changing. Internet is a free, extrajudicial zone that destroys state sovereignty, ignores the national boundaries, breaks into the private sphere and perhaps poses the worst global security risk (Harari 2016). We are living our lives in this virtual space and less and less in physical reality. If we consider someone (something) that can really influence people’s decision and thoughts, it is wiser to look for real power in the virtual space. The new power factor is behind Internet applications.

Of course, here we have to stop for a moment and acknowledge the blessings of the Internet and the development of information technology, which we all literally enjoy. However, the products of the development of human culture, in addition to its blessings, often fulfil its curse. According to the world-famous psychologist, *Mihály Csíkszentmihályi*, many human creations start an independent evolutionary power, survival rivalry with man. Up to a point they are useful, they provide freedom

and development, but with time they become overwhelming, make people addictive, become parasitic and devastating: they develop further regardless of the creator. The history of weapons is of this type, but he also mentions hundreds of household electrical appliances per family (M. Csíkszentmihályi 1993).

4. Discussion on the future of the states in cyberspace

How far has the strengthening of netocracy that governs and manipulates net-addictive people progressed and where does it lead to? Regarding the powers of the Internet's algorithms (methods of data process) and applications the tech-company empires owned by *Silicon Valley* (*Microsoft, Google, Facebook, Amazon, Apple*, etc.) are the most visible today. But the scenery is more varied than that and, in particular, changes rapidly. Let's think about it, 25 years ago no one used the Internet. Today, more than half of the world's population live their lives in the world wide web, this is where they make their decisions, organise their work and private contacts. Over the past ten years, the number of net users in the world has grown tenfold. 70% of young people in the world (aged 15-24) and 95% of young people in the developed countries are net users, thus it is only a matter of time for everyone in the world to lead a net-addictive life. Instead of statistics, however, it is enough to walk in the streets, travel by public transport with open eyes and watch the "relationship" between people and their smartphones. Psychologists, pedagogues and anthropologists ring the alarm bell: The world wide web services cause an irreversible psychological addiction to the youth. *John Harris* wrote an article entitled "*Silicon Valley Is Eating Your Soul*" in the January 1, 2018 issue of the British daily newspaper, *the Guardian*. In the article he mentions *Sean Parker*, the former president of *Facebook*, according to whom the social media network "basically transforms the social (human) relationships and only God knows what it does to the minds of our children". According to the quote of the article, *Ch. Palihapitiya*, a former senior executive at Facebook considers that Internet applications "deliver dopamine doses (hormones of happiness) so that the transformation of man will lead to the destruction of today's society". Internet applications know everything and analyse everything about people living in the world wide web. We receive personal offers on a moment-to-moment basis that are based on our customs (e.g. travel, reading, shopping, etc.) and the analysis of our personality. The number of people who do not make their own decisions but get them is increasing. The "System" that thinks instead of us and that knows us better than we do is slowly influencing or manipulating all of our steps, so that we often do not even make decisions. From purchasing to political choices, the "power" of individual decision is slowly redirected to the providers of Internet networks. The Internet and social networks are the scenes of the free exchange of views with almost no limitations. However, the rules are also written on the basis of interests by those managing the system algorithms and applications for Internet. This is how the individual, in the unforeseeably expanding dimensions of the power over the people, will be possessed by the people and corporate giants operating the Internet and social networks. According to the aforementioned vision, these are more effective power structures in governing the people than the states and governments. People follow "them", more precisely, they are increasingly following only "them". They are, of course, influencing people out of economic interest up to a point, but then manipulation becomes total, that is, all human relation systems are ruled over by them (N. Kis 2018). And by this, the six-thousand-year-old power structure of state and governance can merge with the new power structure of the cyberspace of history. Are politics, parliaments and elections slowly becoming rather sceneries?

5. Conclusion

We analysed whether the nation-state governments have recognised the new power rival. It seems they have. There are stronger and stronger regulatory and sanctioning measures against tech moguls taken by economic powers ranging from the *USA* to the *European Union*, and *China* openly limits the operation of the world wide web. Every super power's president has already pleaded against the networks of the so-called cryptocurrencies (bitcoin, block chains) sweeping through the Internet nowadays, there have been state bans and fights initiated against them. It is dubious, however, whether any national or regional regulation (see the EU's data protection regulation and fines) and sanctioning is capable of limiting the web's technology titans' influence over the people. We might have serious doubts about this even today, as it is enough if we look at the effectiveness of the operation between the state apparatuses and the aforementioned tech corporations. Cyber security policy, the regulation and sanctioning of corporate cyber powers are necessary but far from sufficient.

Regarding the states it is vital for the future whether the state can move from the physical reality to the digital (virtual) space where its citizens are living more intensively and in a growing number. The so-called "digital state" is not a convenience, efficiency or service development issue. The "digital state" is the issue of the future existence of the state. It means that the state and its government follow their citizens if they do not want to lose them for good. The "digital state" can transfer its functions to the virtual space, that is, it can also protect, serve and influence the citizens there. It perseveres in the competition of the tech giants' services and algorithms. The internet has webbed the world in 25 years. The cyber-power struggle may be over within decades. According to Harari, it has already been over: "The government turtle cannot keep up with the rabbit of technology". Let's be optimistic, perhaps it is not too late for the governments to recognise the gravity of the danger threatening the survival of their own state power. *G. Orwell* in his novel "1984" written in the 1940s imagined the power of the "Big Brother" ruling over even the thoughts of the people within the framework of the imperial form of government. Internet applications, however, will no longer need either states or governments. Moreover, it may no longer need humans either, but it will really mean "the end of history". At least our human history.

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WHAT IS THE STATE'S ROLE IN A WORLD DRIVEN BY AI TOOLS?

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Abstract

Artificial Intelligence (AI) is one of those digital innovations that can fundamentally change the society including the public sector and its public servants. It may even help shape a new role and give new legitimacy to the public sector and governments in general. AI solutions (e.g. chatbots, process automation, and image recognition software) transform public sector work and the public sector workforce. In our acceptance, AI can save lives and greatly enhance safety by predicting potential risks or looming structural failures. In our day-to-day life, AI can streamline customer experience and create new experiences never imagined.

Even if we tend to develop, AI still remains an unknown world. We don't know by sure what is AI, we don't know if we have to monitor the AI's use, we haven't established yet the responsible authority, we are not sure about the opportunities of AI and if these opportunities will be ethically used and proposed in a transparent manner.

Information technologies are developed outside of the reaction of the state and faster than the law and legal provisions. Thus, by this article, we aim to identify legal and organizational constraints, which have to be settled in parallel with the development of AI systems.

1. Introduction

From the very beginning, the state was conceived as an ideal living environment, applicable to the human species, designed to eradicate chaos, to stop the selfish lusts of representatives of certain social strata, and to provide citizens with a peaceful environment of survival.

Over time, we noticed that the functions and role of the state have been re-conceptualized so that it must be established not only as a form of peacekeeping but also as an environment of optimal and friendly coexistence, capable to provide citizens with psychological comfort and development prospects.

In order to achieve the predetermined goal, there were initiated state foundation actions, developed complex operating mechanisms and established diversified forms of regulation.

However, due to the defective mechanisms, the mercantile tendencies of the state representatives, the intense politicization and the passivity of the social representatives, the state institution compromised its existence, abused the citizens' trust and threatened the existence of common living.

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The degree of development, the type, and form of organization of the state, generally determines the quality of life. However, over the last decade, information technologies have been identified as an instrument to ensure social welfare and to regain citizen's trust.

Therefore, we are witnessing the launch of a new form of social organization, driven by digitization and automation and the promotion of the idea of optimizing human activity through technology and substitution of human decisions with algorithms and automated actions.

The new technologies overturn the usual form of social organization and building a new form that is guided by the interests of ICT manufacturers and IT service providers based on consumer interests, market economy principles, information technology, and algorithms.

As a result, rhetorical questions arise: Will artificial intelligence kill or save the state? What is the state's role in a world driven by AI tools? How do we build a new social reality?

Through this article, we will support the idea that the existence of the state must be maintained and it should be ensured in parallel with technological development. By using new realities to streamline human activity and successfully carry out tasks allocated by citizens, the state should control the exclusive power to exercise authority over the developed technologies and algorithms.

Certainly, the world of artificial intelligence is a new step in the development of humankind that must not be stopped. Moreover, the advancement of this world must be controlled. Otherwise, the lack of control can generate irreversible situations and mechanisms.

In the evolution of the new world, we must start from the fact that Man is the center of the universe, and that the technique is meant to be used by humans rather than humans being used by new technologies. The technique, being perceived as a mechanism that improves the quality of life and generates human well-being, is just an attribute of social life and not a form of organization.

By creating a new social reality, the role of the state and of the law must not be threatened. The principles of organizing the World of Artificial Intelligence must be adjusted to the principles and the role of the state.

The role of the state as a social-political entity is considered to fulfill the following tasks:

- ensuring social organization and preventing the introduction of social chaos and social anarchy that generates war;
- elaboration of regulations and control over the social organization mechanism by implementing the state coercive force;
- ensuring social protection, over individual goods and personal interests, as well as undermining self-interest towards communities' ones;
- ensuring an optimal environment for coexistence and social development.

Considering the above mentioned, we believe that in the context of the development of new social realities, the state must maintain a monopoly on key actions related to the organization, regulation, protection, and continuity of the development of the quality of social life. Even with the

development of super-intelligent systems, the state must maintain control over the deployed algorithms in such a way to be able to control if they bring benefits to society and not vice versa.

As far as essential services are concerned, they are offered to ensure the realization of fundamental human rights and are preserved through the Universal Declaration of Human Rights.

2. Organization of relationships produced in context of development and deployment of AI tools

AI in practice is really the application of algorithms to data in a process that is controlled by humans. Therefore, in this sense governance needs to adapt to handle and regulate computer software that is used in activities that can affect human well-being such as voting machines, transportation, health systems, and many others.

Computer technology has advanced at such a rapid pace; government oversight has not been able to keep up. It is interesting to think that to build a bridge you must be a licensed mechanical engineer; however, software developers require no such license to work on many types of systems that can affect human life, such as medical devices.

Can we have governance for computer software without stifling innovation and delaying potential benefits to human life? I am not sure.

Thus, we believe that in assuring control over the development of AI services, the state must take urgent action. From an organizational perspective, the state should be concerned about organizing processes of development, standardization and control over intelligent artificial systems.

At the same time, from an organizational perspective, we must keep in mind that the use of intelligent artificial systems does not imply the existence of borders, which should lead us to initiate international co-operation and control. Given the intensifying worldwide activism in AI regulation and AI's anticipated substantial and global impact on human society, we propose a consistent international regulatory framework as its focal point — to streamline and coordinate national policymaking efforts.

From an organizational perspective, control bodies have to be set up at the level of the state, responsible for the elaboration of quality standards, issuance of the appropriate certificates, authorization, as well as control over the implemented systems. Moreover, we believe that from an organizational perspective, as a model for the organization of the AI domain, can serve the the Internet field and the practice accumulated up to now.

At the same time, we mention that the idea of standardization is already widely promoted in China and could be taken as an example by other states as well. Chinese government suggests that China plans to play a role in setting technical standards for AI, and Chinese companies would be required to adhere to these standards.

The Chinese government sees standardization not only as a way to provide competitiveness for their companies, but also as a way to go from being a follower to setting the pace, says Jeffrey Ding, a student at Oxford University's Future of Humanity Institute who studies China's nascent AI industry.

Attorney Matthew Scherer proposes a novel approach: he would create an agency tasked with “ensur[ing] that AI is safe, secure, susceptible to human control, and aligned with human interests, both by deterring the creation of AI that lack those features and by encouraging the development of beneficial AI that include those features.” This theoretical agency would be responsible for developing policy and operating a certification program for AI developers, manufacturers, and operators; under this scheme, companies that obtain AI certification enjoy limited tort liability, whereas uncertified AI-related companies are subject to strict liability. The risks of strict liability and the inevitable costs of certification might prevent small startups from entering the market while favoring larger companies like Google, which can absorb the expense of either approach. However, Scherer’s scheme otherwise strikes a fair balance between incentivizing safety and shepherding innovation [1].

Any number of organizational schemes could work, but the government should establish control over the future sooner rather than later—before it is too late.

3. Regulation of artificial intelligence

Regulating social relations is one of the most successful forms of establishing state control over a field. Regarding the regulation of the AI phenomenon, we still do not have a unanimous opinion, but by this article, we will insist on the need for urgent regulation.

AI regulation would improve our perception of safety, and our perception that humans remain in control and are in power to protect themselves. Existence of laws determines the predictability of legal relations and helps to promote citizens' trust in using and promoting the use of new systems. It could also mitigate any new risks, which the use of AI creates.

Thus, we need to understand that regulations are necessary, but proposed regulations should be developed in such a way as to be able to protect peoples against AI’s risks and simultaneously promote innovations. It is also important that those who produce and use AI technologies are actually able to comply with regulation, and that regulation does not stifle worthwhile advances in the technology. Outside specifically regulated sectors, the general approach of law and regulation is that innovation is freely permitted, but that those responsible must bear the consequences if that innovation causes certain types of harm. If our existing law and regulation can deal with AI innovation in that way, no immediate change is needed. The argument, if one exists, for requiring all those who adopt an AI technology to demonstrate that it achieves a higher standard of performance and reliability than other innovations has not yet been made out [2].

Establishment of clearly defined rules are determined by the need to explain from legal point of view at least the following circumstances:

- What is an AI tool, AI software, or AI system;
- What kind of AI systems or AI functionalities could be considered as allowed or prohibited one?
- Situations in which public authorities should verify the validity of the results offered by the developed AI tools;

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- Mechanisms that have to be used by AI developers and AI users in context of the release of the AI software or system;
 - Rights and obligations of parties involved in the development, authorization and use of AI, as well as legal status of the authorities nominated to be responsible for the control in field of AI development.

3.1. Legal framing of the notion of AI

First point on which I will insist from regulation point of view will be the legal definition and the legal framing of the notion of AI.

Analyzing the regulations adopted until now, I did not find any regulation entitled to establish the legal dimension of the AI as new social reality. Generally the term is considered as an abbreviation of Artificial Intelligence and it is understood as a “*the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages*” [3], “a branch of computer science dealing with the simulation of intelligent behavior in computers” [4], or “*a system’s ability to correctly interpret external data, to learn from such data and to use those learnings to achieve specific goals and tasks through flexible adaptation*” [5].

However, I appreciate the efforts of the European Commission, which state that AI refers to *systems that display intelligent behavior by analyzing their environment and taking actions – with some degree of autonomy – to achieve specific goals*. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications) [6].

More than that, at the end of 2018, European Commission have adopted a draft version of the Ethics Guidelines for Trustworthy AI and this document provide a more complex definition and provide definitions for AI as a system and AI as scientific discipline. According to the mentioned text, AI refers to *systems designed by humans that, given a complex goal, act in the physical or digital world by perceiving their environment, interpreting the collected structured or unstructured data, reasoning on the knowledge derived from this data and deciding the best action(s) to take (according to pre-defined parameters) to achieve the given goal*. AI systems can also be designed to learn to adapt their behavior by analyzing how the environment is affected by their previous actions.

As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems).

However, the definitions provided by media in general refers the concept of artificial intelligence to some kind of ability to plan, reason and learn, sense and build some kind of perception of knowledge and communicate in natural language.

Analyzing the definitions mentioned above, I found that they do not provide an overview on functionality of artificial intelligence, that’s why, by this article I propose to introduce a technical

definition, which could be further used as legal one or as point of reference for completing the legal framework. From my point of view, AI have to be understood primarily as a system or software determined by algorithms, settled up to mimic or supersede aspects of natural phenomena or/ and human intelligence, able to provide based on learned activities, better results and/ or new capacities for acting.

AI software can learn from data like images or text, experience, evolved, or anything else researchers are yet to invent. Secondly, we have to point that architecturally AI is determined by algorithms, formulas and capacity to use those formula for predicting or/ and acting.

One of the most important fact, which define the artificial intelligence, is algorithm. An algorithm is a set of instructions; however, the AI implies a system that can modify its algorithms in response to learned inputs rather than "givens". The output of an algorithm will not surprise its author, who could have reached the same conclusion "manually". The distinguishing feature of intelligence is the ability to surprise the author.

Taking in consideration the above mentioned, we are not able to affirm that the results of AI are always correct. Beginning from this conclusion, I will argue in this article that AI tools used should be verified, especially in strategic sectors, and a regulation should be established in this sense.

We witness a huge development of artificial intelligent tools and systems, our individual lives and our civilization as a whole are governed to an ever-increasing extent by algorithms and domain-specific artificial intelligence [7]. Well-known examples include such ubiquitous things as smartphones, smart homes, smart cities, air traffic control systems², internet search engines [8], self-driving cars [9]. The operation of such algorithms, for the most part, proceed without incident, but there is always the possibility that an unlikely “black swan” event [10] might occur, threaten to plunge the whole system into chaos. We have already witnessed errors in functioning of AI systems: in 2010, an unexpected "flash crash" in a US stock market left the financial world dumbfounded. The crash occurred because of computer algorithms interacting with the financial market in an unforeseen manner [11].

In March 2018 an experimental Uber vehicle, operating in autonomous mode, struck and killed a pedestrian in Tempe, Arizona—the first fatal accident of its kind. Another example of failure is an AI system designed to predict the likelihood of an offender committing yet another crime in the future had its predictions influenced largely by race. The system falsely predicted that black men were more likely to commit other crimes. Aside from being racist, the AI system was inaccurate in its predictions overall. This and multiple other examples show that AI predictions can be bigoted and unethical [12].

Analyzing the above mentioned examples, it is clear that AI algorithms are not yet in a perfect shape and technologies are still in process of development, that's why I think that putting AI into mass circulation has to be supervised and controlled, otherwise, uncontrolled situations could happen. At this point, I will call for the urgent involvement of state in developing of regulations and control methods, over wise it could be too late and the state may lose the power of control.

² Tagesanzeiger. (2008). Computer-Panne legt US-Flugverkehr lahm. (<http://www.tagesanzeiger.ch/ausland/amerika/ComputerPanne-legt-USFlugverkehr-lahm/story/13800972>)

3.2. Legal view on functioning and characteristics of the artificial intelligent systems

Artificial intelligence is one of the most hyped terms in the 21st century, and yet one of the most misunderstood, and therefore, it is important to define and determine, from the legal perspective, all the phenomena's which could be covered by one or another term.

Very often, when talking about AI, we like to couple it with other terms such as Machine Learning, Deep Learning, and Neural Networks.

In general, an intelligent system processes information in three very distinctive stages: reception, interpretation, and learning. Reception is the process in which some receptors (e.g. eyes or ears of the human body) receives signals from the environment, and send those signals to a processing agent (i.e. the brain) in formats that are interpretable by the processing system (i.e. electromagnetic signals).

Then comes the interpretation process, in which the processing agent (i.e. the brain) performs three operations to the data sent by the receptors. Finally, based on the current state of the entire system (i.e. how hungry you are), the processing agent (i.e. the brain) determines the importance of each piece of information it receives, and present to the users only the information that passes a certain threshold (in humans, this is called attention). That is why when you are hungry; you are more likely to see apples and food compared to other objects.

In AI, interpretation usually happens in a large information processing system on the cloud, using sophisticated machine learning algorithms such as neural networks.

With recent developments in machine learning and game-playing algorithms (especially in deep neural networks), AI systems can exceptionally well identify objects based on a body of reference, enabling development of amazing innovations such as self-driving cars. However, we cannot stop here, since the library of reference used by the processing agent is limited, especially in the beginning of its life cycle (a baby might not know what an apple even is).

Taking in consideration the above mentioned, we conclude that quality of the result of the thinking is proportional to the quality of the information processing tools. You cannot establish a 100 percent orientation of intelligent car in case if the vision of that vehicle is limited.

As consequence, I consider, that designing the way of thinking of a system is a complex mechanism, and if we want to prevent potential damages or minimize them, we have to propose as process validation requirement a systematic evaluation, over wise you cannot be able to confirm the 100% validity of the result provided by AI tool.

More than that, actually, the AIs are good at classifying a situation into categories and optimizing based on the parameters provided. However, it cannot create these categories or parameters from scratch without help from human developers.

This is because AI "sees" the world as multiple, purely mathematical matrices, and does not have the intrinsic ability to empathize with human experiences unless we teach it to. So, from here we conclude another important characteristic of AI, which has to be considered in law making that quality of the AI's abilities depend not just by quality of processing tools but also by quality of experiences learned or settled.

Going far and far, we are witnessing how artificial intelligence software transform itself in autonomous bodies. A scholar of Stanford university Nils Nillson identifies the notion of artificial intelligence as „[an] activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment. “. Therefore, it is clear that artificial intelligent software will going to be transformed in autonomous entities created by humans with the idea to be able to complete the given tasks, while having the environment in regard. As a consequence, the autonomous character of the AI has to be inscribed in Law, and the regulations has to contain norms capable to limit the possibilities of autonomous actions of the artificial intelligence.

4. Protection against AI

While AI can foster and enable our values, like many other powerful technologies, its dual-use nature implies that AI can also be used to infringe them. As consequence, state should develop clear proactive and reactive measures oriented to prevent infringements and harms. A balance must thus be considered between what should and what can be done with AI, and due care should be given to what should not be done with AI. Of course, our understanding of rules and principles evolves over time and may change in the future.

For the moment, it is important to determine which AI uses are to be banned or subjected to special control. In the context of the above mentioned, we will point out that, firstly, we have to put under control, systems which by concept are able to affect the fundamental human rights of the citizen, as well as state security and peaceful development of the world.

AI owners should inform consumers about AI use and rights allocated. More than that, AI developers should be obliged to develop a by default protective scenario for people who are not interested to use AI tool but are interested to use companies services.

Software engineers are responsible for the design of the algorithms behind all of these systems. It is the software engineers who enable smart assistants to answer our questions more accurately, help doctors to improve the detection of health risks, and allow police officers to better identify pockets of rising crime risks. However, not all the times, the provided applications are compatible with basic security and human rights provisions. That’s why, we propose to establish as general rule for deployment of AI tools and systems – ethics screening.

Software engineers do not usually receive training in human rights law. Yet with each line of code, they may well be interpreting, applying and even breaching key human rights law concepts – without even knowing it.

For example, a ethics screening can help software developers understand what indirect discrimination is and why it is prohibited by law. (Any discrimination based on race, color, sex, language, religion, political or other opinion, national or social origin, property, association with a national minority, birth or other status is prohibited under article 14 of the European Convention on Human Rights.)

Direct discrimination occurs when an individual is treated less favorably based on one or more of these protected grounds. Indirect discrimination occurs when a rule that is neutral in appearance leads to less favorable treatment of an individual (or a group of individuals).

Similarly, understanding the intricacies of the right to a fair trial and its corollary, presumption of innocence, may lead to better-informed choices in algorithm design. That could help avoid the possibility that algorithms would presume that the number of police arrests in a multi-ethnic neighborhood correlates with the number of effective criminal convictions.

Even more importantly, it would assist them in developing unbiased choices of datasets that are not proxies for discrimination based on ethnicity or race. For example, wealth and income data combined with geographic location data may be used as a proxy for the identification of populations from a certain ethnic background if they tend to concentrate in a particular neighborhood.

Therefore, I think that, as soon as it is not too late, is time to call states to react, protect, and limit the development of harmful AI tools or systems. A special attention should be proved to autonomous weapons, self-driving cars, autonomous devices, health care products and human evaluation tools.

5. Conclusion

The AI technologies becomes more prominent every day. Developed in the context of evolution of digital technologies this new context represents a new and exciting time for all of citizens, companies, state and us.

In principle, the idea of having interconnected smart devices enabling efficient interaction between machines and humans, helping those in their daily tasks, may seem a uniquely beneficial scenario. Furthermore, if considered individually, the information generated by the devices and online platforms may seem irrelevant and even harmless. However, when combined, these data can reveal a detailed and intelligent scenario. This possibility has increasingly attracted the interest of companies seeking through information crossing techniques; get an unprecedented view of their consumers. The data from these various interconnected devices, algorithms, and autonomous mechanisms of action may pose risks to constitutional rights of users such as privacy, security, physical and emotional integrity, exposing them to enhanced risks and losses that they are not yet fully aware. Adding up to the increased potential for damage and challenges posed in the context of AI, there is still no satisfactory regulation by the law. It is an urgent necessity. Despite being civilly and constitutionally protected values, it is necessary for a specific law to ensure the enforcement of the security and privacy of users in this techno-regulated scenario from a meta-technology perspective of the law. The rule of law has an important role to play in the consolidation of constitutional rights in the new digital world. Without legal and binding obligations to review private companies' practices such as unconstitutional algorithms, uninformed content removal or treatment and sharing of personal data beyond the object of a certain service, these practices tend to increase even more with the enlargement of the AI. The challenge is to observe, analyses these practices, and measure their importance and risks while seeking to guide technology through efficient legal regulation, preserving autonomy, privacy and safety.

On the other hand, the users voluntarily provide their data online, feeding databases with a huge amount of personal information, without worrying about how systems oversee and treat their information. Therefore, it is essential that consumers be well aware of these risks and be even more careful with their data in an AI world.

No one knows for sure how the AI will affect our lives in the future. Integrated, related, targeted and combined data collected from smart devices, providing numerous opportunities for analysis of

this information and converting each information in a relevant information to be combined and analyzed. Whether or not, the way we interact with machines and algorithms tends to be more and more intense. Businesses, citizens and public authorities should weigh benefits and risks cautiously. Moreover, the state should be aware of its role in this context aiming to, on one side, not excessively hamper the economic and technological development in progress, and, on the other, regulate effectively these practices in order to curb abuses and protect the existing constitutional rights.

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THE REVIEW OF EVALUATION PRACTICES, FOCUSING ON CHALLENGES IN THE HUNGARIAN SMALL AND MEDIUM CITIES

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Abstract

There is an emphasized attention in the policies of the Hungarian Government on the smart city developments. Ten cities, including Tata, are selected as host settlements for smart city pilot developmental projects. The international evaluation systems can provide a good basis for comparative analysis however there is a need for a well-structured efficient local evaluation system on smart intervention. Smart governance needs to be put through for achieving the best available citizen-centred results. It is desired from the local and central governmental institutions to provide enabling environment which can function as an intermediate engine of digital developments for the social and smart interventions.

As a complex digitization developmental program focusing not just on the infrastructural development but also on the improvement of the human abilities, the Hungarian Government launched the comprehensive Digital Welfare Program. The monitoring of the executed programs and the reasonable, effective measurement of the impacts of the developmental programs are inadequate for policy and decision makers to evaluate the results and to disclose the basis of the required further interventions. We intend to reveal the relevant literature review of the international practices, the convenient possibilities of social and economic evaluation and reporting. We analyse these processes in detail in Hungarian context based on a case study about the Hungarian city of Tata, however these smart city strategies – programmes - projects are in the preparation phases or at the beginning of implementations. Following these, we formulate the possible future sequences of the research.

1. Introduction

In 1930, 30% of the world population lived in urban areas, nowadays it reaches 55% and according to the latest prognosis it will reach 68% by 2050[1]. This is the third phase of urbanisation, where knowledge orientation and cultural diversity are the key factors. The modern cities play an important role in economic growth nowadays[2]. Cities should cope with many serious, critical wicked issues for example global warming and instable economic environment.[3] As Giffinger [4] states “ the development of a city strongly influenced by its ability to handle strong economic structural changes over time”. This urbanisation trend causes also a lot of wicked issues which should be considered into the strategic planning practices of the city policy makers who have to deal

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with numerous negative effects, such as the urban traffic congestion, air quality, urban mobility, the aging of the population and the strengthening trends of inequalities and digital transformation.[5] The main goal of decision makers shall be the production and execution of sustainable and harmonious development programs which can improve the wellbeing of citizens. The applied interventions always must be considered rather as an integrated part of existing socio-economic circumstances than greenfield city investments. [3]

Against this background, the process of digital transition involving the concept of smart cities indicates the need of re-thinking governance, allocating resources for re-skilling, and adapting new technologies, as well as legislative and policy issues. Digital tools and solutions are reshaping public services and the mode of how city governments respond to citizen's need as their experiences are one of the key drivers of digital transition in addition to modernisation of the city's services, increase internal efficiency and transparency, facilitating the access to information, as well as expanding the coverage of existing services. Enhancing the capacities of cities to deliver digital services and tackling these challenges requires policy responses at all levels and by all actors, relying on the partnership between cities, citizens and business actors. New adaptable strategies and action plans are needed to carry out successfully these cooperation-based innovative, technology led developmental programs in urban areas.

On the basis of the emerging new tasks and challenges a bundle of definitions can be found in the scientific literature which try to catch the real characteristics of the future cities. One of them is smart city concept which is numerously approached and which can be traced back to the concept of digital cities.[6] The concept of smart city also embraces the wired, virtual, intelligent, information, digital, knowledge, learning, green, sustainable city and smart community.[7] Not only the information and communications technology should be considered but also the human / social and environmental dimensions. The city management system can profit from the integration of new technologies, a widespread collection, integration, analyzation. The optimization of date can improve the quality and velocity of decision making processes.[8]

According to the Hungarian governmental regulation [9], the smart city is such a settlement which prepares its integrated developmental strategy through the smart city methodology. The smart city methodology "improves its natural and built environment, digital infrastructure, quality of municipal services and economic efficiency through modern and innovative information technology applications in a sustainable manner, increasingly involving its population.

Recently, the Hungarian cities have the opportunity to execute such development programs which can improve the quality of life of citizens and make up in the last decades missed infrastructural investments. New forms and tools of governance, emphasizing collaboration and cooperation, can encourage these progresses. Its finance is partly covered by the cohesion funds of the European Union and by the Hungarian government. The Modern Cities Program was launched in 2015 representing "the bottom to the top" approach. It involves 23 cities with county rights. The acting Hungarian prime minister personally visited all of cities between March 2015 and May 2017. Its ex-ante calculated costs run into approximately 3400 billion HUF. The developments involve infrastructural, cultural, educational and scientific institutional and urban rehabilitative projects.[10] In the framework of the Digital Welfare Program, focusing specially on digitalization, several smart city pilot developments will be financed in a few chosen Hungarian cities (including city of Tata) providing best practises for further investments in other urban areas. This study argues that there is a strong need for efficient institutional design and capacity-building at the level of cities and the emerging functional urban areas. However, the results are indicative and insights are used as a

basis for discussion. It is clearly shown by the revival of research related to the complex measurement of digital capacities and capabilities.

The paper lays on three pillars: the first pillar reveals the international evaluation practices of smart cities, the second contextualizes the situation of Hungarian digital and smart city developments. The third pillar is the analysis of the selected case study of Tata. The projects of the developmental programs are still in the beginning phase therefore we are lack of concrete data however we are in a continuous follow up and eager to collect information from the relevant stakeholders and later formulate useful conclusions.

2. Smart cities in the international evaluation practices

A well-functioning public administration has to be able to apply effective strategies which rely on evidence, data and must pass the steps of preparation, implementation, monitoring, reporting and evaluation. [11] An increasing number of literature can be observed about the evaluation practices in smart (and intelligent) city developments. [5, 12, 13] Even one of the 17 goals of the United Nations 2030 Agenda for Development Goal is considered with urbanization. Goal 11 is to “ make cities and human settlements inclusive, safe, resilient and sustainable. [14] The follow-up indicators reveals the problem of “poor availability of standardized, open and comparable data, the lack of strong data collection institutions at the city scale...and the context specific application of the goal by diverse actors in widely different cities”. [15]

Horváthné Barsi [16] categorizes the smart city evaluations into three main categories:

1. usage of indicators – can be used in the preparation of investment decisions, formulation of strategic priorities and development programs.
2. clustering and self-organizing map – useful in the visualisation of complex information
3. models and modelling – processing simulation and gaining predictions

As Schönert [17] notes a ranking system can cause a huge publicity and can draw the attention to specific issue. It can also improve the debate process, can provide the possibility to reveal the studying effect. However, several disadvantages can be observed: the debate can be just about the place in the ranking, as a consequence of revealing the place of the city in the ranking can cause the re-discussion of the long-term strategies, it can even strengthen the spatial clichés. Not only the ranking’s objective and dissemination, but also its methodology must be taken into consideration. A well-designed, specific ranking is applicable.[18]

The ranking of the European medium-sized smart citizens is identified according to six dimensions: smart economy, smart people, smart governance, smart mobility, smart environment and smart living.[19]

The holistic evaluation of 44 Chinese cities was executed in a framework of 5 dimensions (smart infrastructure, smart governance, smart economy, smart people and smart environment) consisting of 18 indicators selected by semi-structured interviews (5 researchers and 5 professionals) and weighted by the Entropy method. By the performance evaluation was applied the Technique for Order Preference by Similarity to Ideal Solution.[20]

The holistic and integrated CITY keys performance measurement framework, developed in order to help cities in project and city level assessments, contains 5 main categories, people, planet, prosperity, governance and propagation. It contains output and impact indicator as well. [21] Lombardi [22] proposes a model based on the modified form of the triple helix model (introducing civil society as a plus unifying factor) for evaluating the smart city performance. The interrelations between the components of smart city (smart governance, smart economy, smart living, smart environment, smart human capital) is analysed by using analytic network process.

Comparing the sustainability and smart city indicator frameworks reveals that the majority of indicators can be connected to the economic and social sustainability meanwhile in the sustainability frameworks environmental and social indicators have the majority.[23] As Shi et al. state [5] “evaluation of the city can support investors as an important guide for the cities to judge their strengths and to define their strategies for future development.” Akande et al. [24] analysed the smartness and sustainability of the capital cities of the European Union. They found that most of the cities of the bottom are located in Eastern-Europe and the wealthier cities show better performance. Nevertheless, there is a legitimate claim to monitor and evaluate not only the smart city performance [25], but also the results and impacts of these developmental program.

City evaluation approaches are mainly project focused with city-level evaluations. [26] The British Standards Institutions Smart City Framework was suspended when the Organization for Standardization (ISO) have published the 37106:2018 “Guidance on establishing smart city operating models for sustainable communities”. It provides a guidance for decision-makers about the main steps of formulation an “open, collaborative, citizen-centric and digitally-enabled operating model” for city governance. The ISO: 37122 “Sustainable development in communities – indicators for Smart Cities” is under preparation.

According to another approach of the European Commission, focusing particularly on the creative cities, a framework is developed with three major facets (cultural vibrancy, creative economy, enabling environment) consisting of 29 indicators. [27]

The multidimensional performance model of current creative cities applying a holistic approach takes into consideration the network influence next to intelligence and sustainability in the city evaluation process.[28]

The potential smartness of Polish cities is analysed through 6 dimensions (smart transport and mobility, smart environment, smart living, smart governance, smart economy). Recently the investments are mainly connected to intelligent transport systems. [29] The implementation of smart city developments were evaluated based on a questionnaire in 57 Polish cities.[30]

To sum up, the experiences and practices of measuring national-level governmental performances show that the nature and quality of digital capacities becomes understandable and measurable when broken down into different dimensions. The one-dimensional measurement is suitable for examining the impact of a specific factor in relation to a similarly specific dimension of digital capacity, for example, what effect the degree of providing new services has on local economic growth. The disadvantage of the one-dimensional measurements is that they are inherently unable to give the “big picture” of digital capacities as a whole.

On the contrary, the multi-dimensional approach is not only “tailor-made”, meaning that the measurements integrated into the nature of the given dimension provide suitable evidence, it also

has the advantage of allowing the dimensions to be broken down into further sub-areas in order to examine the relationship between the phenomenon that one wishes to measure and the appropriate indicator.

There is not even a common definition for the concept of smart city, smart intervention and what smartness does really mean. Through our research we hold to the definition of the Hungarian Government. As a consequence, several indexes are commonly used and cited by cities according to their common interest. These methods of evaluations provide the basis of comparative analysis. One of the problems with the previously cited systems is that they concern with large cities, at least from the average Hungarian city point of view. A framework connecting the national level with city level could proceed better informed policy making processes.

3. Smart city programs in Hungary

Hungary's performance is lagging behind the European Union in aspect of digitalisation according to the ranking of the overall composite Digital Economy and Society Index³ (DESI). As a consequence of this and as a response to trends of digitalization in our world and challenges of the recent economic growth, the Hungarian Government decided to set up the Digital Welfare Program 1.0. As a part of achieving its objectives, a new, affordable, so called "basic package", internet subscription was introduced for the citizens and the rate of VAT on internet services was also significantly decreased in 2018. It was also stated that there must be built at least one free WIFI access point in the centre of every municipality and a public data cadastre must be formulated, filled with data. The aim of the Hungarian 5G Coalition (formed on 19 June 2017) is to gain a central leading position in the ongoing and future research. Hungary wants to become the centre of research and applications of 5G. The industrial application of 5G has a high level of reliability and can improve the efficiency and profitability of digital investments. It can promote the spread of IoT solutions and other sensor-based practices. Hungary (both the citizen and the business sphere) has to be prepared for the challenges of digitalization. The foundation of Artificial Intelligence Coalition is another core point of the ongoing developmental program.

The formulation of digital wellbeing lays on following three pillars in the DWP: digital competences, digital economy and digital state. Their roots originate from the digital infrastructure. The emerging challenges can be handled by the coalitions of various actors such the corporations, the local and central government, the non-governmental organizations, research and higher educational institutes etc.) An effective digital state should be able to efficiently implement the new results of the scientific world e.g. the use of network research in case of the healthcare system. Next to the development of e-governmental interfaces in the state-state, state-citizen relations, the improvement of robotization (partly through the techniques (e.g. deep learning) of artificial intelligence. One of key factors of the central and local governance to be able to handle successfully the social – economic – environmental challenges of the future is the implementation of high-tech digital infrastructure. The well-educated and capable public servants and the digitally- trained also contribute to the adaption of digital services. The codification of terms connected to digitalisation

³ Hungary was placed 21th in 2015, and 23rd in 2018 in the ranking. Its performance was significantly under the average of the European Union. The DESI covers 5 dimension of digitalization: connectivity, human capital, use of internet, integration of digital technology and digital public services The detailed data are available at: [https://digital-agenda-data.eu/charts/desi-composite#chart={"indicator":"DESI_SLIDERS","breakdown":{"DESI_1_CONN":5,"DESI_2_HC":5,"DESI_3_UI":3,"DESI_4_IDT":4,"DESI_5_DPS":3},"unit-measure":"pc_DESI_SLIDERS","time-period":"2018"}](https://digital-agenda-data.eu/charts/desi-composite#chart={)

and smart cities are carried out parallelly with the formulation of developmental strategies and programs.

One of the first study was carried out in 2011 to analyse the preparedness of cities to these digital challenges. The assessment of 9 Hungarian cities (including Debrecen, Győr, Kőszeg, Miskolc, Pécs, Szeged, Székesfehérvár, Tatabánya and Veszprém) [31] contains 79 indicators in 7 dimensions (people, business sphere, transportation, urban services, energy, water and communication). The recent problems of the Hungarian cities can be handled not only with infrastructural investments but also with the application of information and communication techniques. The integrated whole of government program, the Digital Welfare Program (DWP) 2.0 [32] was launched in order to continue and expand the Digital Welfare Program 1.0 horizontally cover the measures of digitalization in Hungary. The smart city developments appear in it as a horizontal theme.

As a pre-condition of accessing the European research, development and innovation financial resources, the Hungarian Government accepted the Hungarian Smart Specialisation Strategy S3 in 2014 in connection with Europe 2020 strategy, which promotes smart, sustainable and inclusive growth. [33] The scientific idea of smart specialisation was discovered and used by decision-makers in practice within in a relatively short time as a response to the negative effects of the financial crises.[34]

4. Strategy development and capacity-building in flux: a case of the Hungarian town Tata

In developing a digital strategy, it is crucial to clarify what digital city means in a concrete case? Another important issue is what the citizens want to achieve? On the contrary, the city leadership and management should explore how to map and involve stakeholders?

A Hungarian town Tata (23.000 inhabitants) is one of the cities chosen to implement smart city pilot projects in Hungary financially supported by the Digital Welfare Program in order to be able to construct their own smart city development vision. The town seeks to play a role of a “strategic enabler” in order to develop a new business model between the public and private actor. The solutions to successful digitalisation are delivered at different levels and require multi-level governance arrangements as well as effective collaborations between the public and private sectors. As a result, ICT as an enabling technology will provide access for everyone.

Similarly to many cities, Tata is currently at the stage of designing and planning their visions and strategies. In doing so, direct participation, engagement and collaboration between public, private and civil society stakeholders have a key importance for the creation of “collaborative digital ecosystem”. It also includes the need for building regional and international networks, which is dependent to a great extent on establishing common communication strategies and new narratives as an important instrument of city promotion. As a first step, Tata has been a member of the Alliance of Pannon Cities, which wants to increase the integration (including regional development) between the participants and other stakeholders.

In the process of testing and demonstrating innovative solutions there is a strong need to link digitalisation to other policy sectors of the local economy which means mainly tourism, transport and logistics in the case of Tata. As one of the beginning steps on the road of becoming a

sustainable and smart city, Tata has already implemented several projects (e.g. public lighting, intermodal public transport terminal) increasing energy and public transportation efficiency.

In order to establish a proper professional supporting environment, an internationally accepted urban and regional developmental professional centre is going to be established. Tata, XVIIth District of Budapest, Moholy-Nagy University of Art and Design Budapest and Edutus University formed a cooperation for the better local implementation of smart city projects. As a new collaborative partner, the National University of Public Service organises courses about smart cities for public servants working in Hungarian municipalities and in the neighbouring countries. It provides the possibility to improve skills in the field of software, technologies, social media which is inevitable to be able to accomplish the best smart city projects improving the wellbeing of citizens.

The city is committed to spread the municipal e-governmental services, Tata joined to the ASP⁴ which is a centrally developed system providing e-services to the joined cities and villages. Tata is joining among others to the system of treatment of documents, inheritance system, municipal tax system, industrial and commercial system, and the immovable property cadastre and the electronic administration portal including electronically filling forms.

The examination of the development of the strategy will be followed by personal interviews at the formulating professional centre of smart cities arising from the Civitas Sapiens Workshop.

Even the digital capacities of humans should be improved in Hungary, including Tata. As a response to this challenge, two digital points are functioning in the city with the aim of improving the basic digital skills of the citizens. There is not a common evaluation framework focusing on the local /urban and national performances. A common system is developed for evaluation and follow-up the national performances in Hungary through the Good State and Governance Report [35] however there is a lack of its deep regional and urban ties. The previously mentioned indicator system can function as lightening towers and their concrete building stones could be the projects with their project-level monitoring and reporting tools and finally it would be wishful to build up an intermediate body, functioning as a place-based planning institution (in terms of North [36]) as the construction plans.

The importance of involving citizen in fostering citizen-centric services are out of question. Their concrete forms can evolve within the spread of smart governance (which term is still also a subject of a scientific dialogue.) By the continuous follow of the improvements of Tata we hope that we are going to be able to describe a good Hungarian practise, serving as a good and efficient example for other Hungarian cities. The smart city development are resource intensives therefore an efficient institution (in terms of North [36]) with feedback mechanisms is out of question. The new databases emerging form the implemented developments provide new possibilities for the municipal leaders which is worth of examining their effects and applications.

5. Conclusions

In a broader perspective there is a growing importance of city-level digital strategy and leadership in delivering user-centric eGovernment to improve the delivery of services through engagement in

⁴ Application Service Provider (ASP) is a central framework which provides central hardware and software infrastructure to municipalities.

networks and partnerships. In order to establish a “digital ecosystem” there is a need to create a digital strategy which should be relied on a strong leadership with proper institutional and administrative capacities. Designating a digital leader to oversee the implementation of the digital strategy is also a critical success factor. Finally, current experiences indicate that towns and smaller cities should participate more actively in European and international networks to promote peer learning and the development of digital skills within their service teams.

Against the background of the above, digital capacity is a multi-level, multi-dimension integrated concept that means more than the sum of its parts. This is due to the interactive effect that results if the quantifiable ratios change between the given dimensions of capacity. In other words, a higher value found for some dimension does not necessarily lead to an improvement in the aggregate result.

Consequently, the value of the net result of the aggregate city capacity can decline despite the fact that the value of one or another dimension shows significant improvement. This entails a major potential pitfall that can only be avoided with measurements that take into account the various dimensions and unique city-specific characteristics as well as the and quality and quantity of the data collection.

It can be seen that the academic sphere has started to put more emphasize on the analyses of the different forms of smart city evaluations. However, the observer can face with the fact that there is not a homogenous definition for the concept of smart city. Notwithstanding, its developments are commonly accepted and supported. Nevertheless, being aware of the importance of accountability and transparency, more analyses are necessary for the monitoring, reporting and evaluating processes of the developments both at project and regional/city level. Further techniques need to be accomplished in the research.

In order to localise services, a multi-level approach needed which at the same time requires the harmonising of public and user goals, existing toolkits, data flows, common standards. The initiatives and efforts of towns and small cities - as we have seen in the case of Tata - will fulfil the role of building blocks for bridging the gap between different approaches, cultures and languages in the near future.

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INSPECTING CURRENT CYBERSECURITY STATUS AND NEW TRENDS IN HUNGARY

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Abstract

In the 21st century online services became standard way to handle our affairs every day. The digital revolution and usage of smart devices made possible the existence of new type of cybersecurity threats. The malware distribution and their impact are constantly changing. The primary goal of cybersecurity attacks is catching sensitive data and business benefit. Instead of hobby hacking well organized cybercrime groups carry out the most offense. Computer Security Incident Response Teams (CSIRTs) must handle security incidents for e-Government information systems appropriately. This is extremely important if we want to mitigate the impact of a cybersecurity threat.

In this paper, I will examine the available statistical data and reports of Government Incident Response Team of Hungary. Analyzing this information will point out what are the new trends of threats and malware. This paper also presents the findings gained from processed data.

Keywords: *malware, threat, cybersecurity, incident*

1. Introduction

In the 21st century digital online services are available in almost every field of life. The proper operation of digital services can make our lives much easier and their use is self-evident. Our personal and other specific data are accessible from different devices like computers, tablets, smartphones, and IoT devices or through different cloud services. However if our data are available online they are exposed to theft, destruction or unwanted manipulation. The problem was identified several years ago in European Union level, and Regulation (EU) No 526/2013 of European parliament defined the tasks of European Union Agency for Network and Information Security (ENISA).

“The threat landscape is continuously changing and security incidents can undermine the trust that users have in technology, networks and services, thereby affecting their ability to exploit the full potential of the internal market and widespread use of information and communication technologies (ICT).” [1]

This regulation also defines some important generic findings: “Network and information security problems are global issues. There is a need for closer international cooperation to improve security standards, including the definition of common norms of behaviour and codes of conduct, and information sharing, promoting swifter international collaboration in response to, as well as a global approach to, network and information security issues.” [1]

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The ENISA should provide also operational cooperation with EU Member States CSIRTs (Computer Security Incident Response Teams). According to the EU cybersecurity aims:

“At the same time, today’s ICT systems can be seriously affected by security incidents, such as technical failures and viruses. These kinds of incidents, often called network and information systems (NIS) incidents, are becoming more frequent and difficult to deal with.

Moreover, cyber-attacks are estimated to cost the global economy €400 billion every year.

Many businesses and government across the EU rely on digital networks and infrastructure to provide their essential services. This means that when NIS incidents occur, they can have a huge impact by compromising services and stopping businesses from working properly.” [2]

2. Background and research input

ENISA publishes annual reports as Threat Landscapes. From year 2012 these reports are available and contain information about threat agents and attack vectors. These threat landscapes provide information about:

- Top threats (current threat landscape)
- Threat agents and
- Threat trends.

The main purpose of these reports is to identify a cyber-security threat landscape based on aggregated data collected from various ENISA stakeholders and also from a global perspective from international sources.

In ENISA Threat Landscapes the used data source can be grouped in the following categories;

- Reports from Virus/Malware protection vendors, that cover operating specific data;
- Reports from CERTS, that cover incidents data;
- Reports from security agencies, that cover incidents, attacks and threat agents with a geographical focus;
- Reports from commercial security companies, that focus on particular areas of threats;
- Reports from industrial associations and committees, that focus on threats that are related to members infrastructure;
- Reports from Network of Excellence, that provide to predict future threats based on upcoming application areas, assets and types of infrastructure.

3. Analyzing of the threat landscape reports

ENISA Threat Landscape reports [3] and related web application [4] contains information about cyber threats. Currently 49 different threat type are identified. If we want to classify them into group, at least three different group can be created:

- Generic (common) threats;
- Hardware (HDW) related threats;
- 5G/Virtualization/SDN (Software Defined Network) related threats;

Generic threats

Malware: Malware is malicious code that can be installed in a device and cause harm to components (hardware, software, data) if this device.

Web-based attacks: Web based attacks are those that use web components as an attack surface.

Web application attacks: Web application attacks are related to attacks against available web applications and web services.

Denial of Service: A cyber-attack that aims to exhaust system or network resources to render them unavailable to its users.

Botnets: A network of infected machines typically from all over the world used for malicious activities.

Phishing: An attack that aims to lure users to malicious sites in order to covertly steal usernames, passwords and financial credentials.

Spam: Spam or unsolicited e-mail is the main means for the transport of malware and malicious URLs.

Ransomware: Ransomware is a type of malware that imprisons user data by making them unavailable or by encrypting them and requesting a ransom to release them.

Insider Threat: An insider threat is a malicious actor acting from within an organization/company for his own or a third party's agenda.

Exploit kits: Exploit kits are - next to botnets - major tools for the installation of malware.

Data breaches: Data breaches refer to incidents involving the illegal disclosure and dissemination of user data.

Identity theft: Identity theft is a special case of data breach and is related to compromise of identity information of humans or machines.

Information leakage: Information leakage is a category of cyber-threats abusing weaknesses of runtime systems, of components configuration, programming mistakes and user behavior in order to leak important information.

Cyber espionage: The act of espionage in cyber terms.

Physical manipulation/damage/theft/loss: Though not always a technical/cyber threat, physical manipulation/damage/theft/loss continues to have severe impact on all kinds of digital assets. Physical loss and theft used to be the most important causes of data breaches.

Unauthorized activities: This threat is implemented by performing unauthorized activities (e.g. through abuse of access rights, escalation of privileges, vulnerabilities, etc.). Some forms for unauthorized activities may be:

- Unauthorized access to resources/information
- Unauthorized installation of software
- Unauthorized use of software
- Unauthorized administration of devices and systems

Hardware related threats

HDW specific threats:

Such threats may relate to different hardware-related assets, exploit vulnerabilities which are specific to the hardware assets in scope of this document, or require different handling when compared to traditional IT security approaches. The described threats can cause/affect or be related to other threats in various ways. This way of specifying threats would not be suitable to determine the most relevant hardware-related risks due to its ambiguity (i.e. the successful manifestation of one threat can cause more threats to successfully manifest). However, listing threats in a more detailed (yet unfortunately ambiguous to a certain degree) manner ensures that this document provides guidance for readers with different backgrounds and expectations who do have to put less effort into understanding which further events could be caused by few accurate threats. In addition, it supports the design of good practices on multiple levels and taking potential security measures for multiple assets into account.

HDW modifications:

The modification of hardware can be performed in various ways; this threat focuses on non-intrusive ways which (ab-) use available interfaces (such as Firewire, PCI Express, or USB) to modify hardware to carry out/support unintended functions. The threat table below will contain various examples of potential hardware modifications.

HDW Attack Persistence:

Traditional security controls focus on the prevention and detection of logical threats on the application or operating system level. Attacks that are carried out in a way that bypasses those levels (e.g. by attacking firmware which may not even be accessible by the operating system/application or modifying the functioning of hardware in a transparent way) cannot be detected by traditional controls or mechanisms to verify the integrity of the computing environment.

This results in a very high level of attack persistence that can be achieved by attackers and cannot even be countered with a complete system re-install.

HDW Remote Firmware Attacks:

Attacks which can compromise the firmware of a device in a remote way (e.g. software vulnerabilities are exploited in the firmware of an Ethernet network interface card) result in the same impact as described in Firmware Modification above, however, no logical or physical access to the device is required. If the attack is carried out in a sophisticated way (e.g. by immediately modifying essential functions), there is also no way for traditional security controls to detect the attack.

HDW Traffic Sniffing:

The access to network traffic is a common threat in typical IT environments. However, in the context of hardware-related attacks, traffic sniffing is not limited to network connections but can also be carried out on internal buses and connections, such as the memory or hard drive bus. Those bus systems traditionally do not assume threats from within those system/devices which are physically connected so that no compensating controls are implemented.

HDW Firmware Modification:

The modification of firmware is less intrusive than the physical modification of hardware and can have very similar effects. The function of the hardware can be modified, processed data intercepted, and security functionality be bypassed by modifying (i.e. exploiting weakness of) the logic which manages the hardware. Firmware modifications can be implanted in different ways, e.g. by:

- Using existing firmware update mechanisms,
- exploiting a vulnerability in the firmware already loaded onto the device and
- using binary firmware loading mechanisms, or exploiting the lack of access control/write protection of firmware storage (e.g. unlocked NVRAM during boot).

HDW Surveillance:

Surveillance is a specific type of access to information that combines the basic information access with a focus on personal/private data and the use of hardware to gather information from the physical world, for example by (ab-) using microphones, cameras, or location data. Typical personal mobile computing environment comprise various sensors that can be abused to form strong surveillance capabilities.

HDW Data Tampering/Spoofing:

Comparable to surveillance threats, the tampering or spoofing of data on mobile computing devices can have wider impact than typical data tampering: Spoofed location, audio, or visual data can lead to a variety of abuse scenarios.

HDW Information Access:

Hardware devices and mobile computing devices in particular, store all types of information which often form/represent significant parts of the identity and belongings of users. Hardware-related attacks can lead to a completeness of information access that extends the capabilities of typical logical IT threats and thus need to be covered in a dedicated manner.

HDW Malfunction:

In a connected world that is supported by computing devices in all areas of life, the malfunction of devices can result in a variety of harm and negative impact. Several specific threat scenarios are for example the malfunctioning of medical devices (performing critical tasks on a patient), access control systems (preventing unauthorized access to people's homes), or monitoring systems (e.g. for hazards such as fire).

HDW Denial-of-Service:

Comparable to malfunction, (successful) denial-of-service attacks are comparable to maliciously induced malfunction. This threat represents the denial-of-service of mobile/personal/embedded devices, e.g. the crash of a smartphone, the outage of a monitoring solution, or the error state of an alarm system.

Denial-of-service attacks originating from mobile/personal/embedded devices (e.g. as happened recently in the case of the Mirai Botnet [5]) can be a threat for the same classes of devices, however, it would be a generic threat. In addition, it is also a potential effect/impact of a successful materialization of a threat like Remote Firmware Attacks.

HDW Modification-of-Service:

Mobile computing devices provide a variety of services, tampering with the way the service is delivered or changing the result/outcome of the service delivery, various specific threat scenarios can be realized. While the malfunctioning of a device can impact various assets, the modification-of-service can in addition pave the way for further threats/attacks. This kind of attacks will bother us in the future, in particular in complex autonomous systems found often in vehicles and complex industrial systems.

HDW Loss of Compliance:

Mobile computing devices are used in various areas, some of those requiring strict certification (e.g. FDA approval or the CE marking) for any computing device to be used. Modification of those devices in any way can result in a loss of certification and thus compliance violations. Tampered devices can also violate regular security violations when it comes to access control requirements.

HDW waste of resources:

Attacks on certain types of mobile computing devices can result in a waste of resources. While energy can also be wasted as a result of logical attacks, even bigger amounts and different types of resources (e.g. water) can be wasted when control systems are attacked.

5G/Virtualization/SDN related threats

5G technology suffers from several threats:

- 5G Spectrum sensing data falsification (signal fading, harmful interference)
- 5G MAC layer attack (MAC spoofing, congestion attack, jamming attack)
- 5G User emulation (exclusive use of bandwidth, mimic incumbent signals)

Threats to servers of virtualized network functions:

Virtualization of functions and their operation on virtual machines (e.g., a server that can be used as a network switch) is a common practice in SDN. Therefore traditional security threats for servers

running virtualized network operations such as network monitoring, access control, network management etc. should be considered.

Threats related to virtualization mechanism (Network Virtualization bypassing):

The use of the network between different tenants need to assure that only legitimated traffic enters or leaves a network slice, but also that any switching element checks and enforces the traffic isolation by installing legitimate flow rules preventing slice trespassing.

Software/Firmware exploits in SDN:

This threat involves exploiting vulnerabilities of the software/firmware in order to cause some malfunction, reduction or disruption of service, eavesdrop data or destroy/compromise data. Software/firmware exploits may occur in all layers of the SDN reference architecture, and depending on the layer that they relate to they have been distinguished into network element software/firmware exploits, controller software/firmware exploits, and SDN applications software/firmware exploits. Software/firmware exploits of network elements and controllers cause the malfunction or even their termination of operation. In the case of switches, for example, the exploited switches can drop, slow down, clone or deviate network traffic. Exploited switches software/firmware can also create forged traffic in order to exhaust other switches and/or the controllers the switches are connected to.

Beyond that SDN components and SDN communication can suffer from different threats (e.g. SDN API exploitation, identity spoofing, .side channel attack ...)

Table 1 summarize the top 15 threats occur in ENISA Threat Landscape.

From these report we can identify the following statements:

- Malware, Web-based attacks, Web application attack are the most frequent threats in all examined year.
- From position 4 to 9 the threats hardly change their positions. Two new threats occurred in that list (Ransomware, Insider threat) and two went down (Exploit kits, Physical damage/theft/loss).
- Ransomware increased in period 2014 – 2017
- A new threat introduced in the 2018 year report, the cryptojacking.

Cryptojacking (also called malicious cryptomining) is an emerging online threat that hides on a computer or mobile device and uses the machine's resources to *mine* forms of online money known as cryptocurrencies. It's a burgeoning menace that can take over web browsers, as well as compromise all kinds of devices, from desktops and laptops, to smart phones and even network servers.

	2014	2015	2016	2017	2018
1.	Malicious code (Worms/Trojans)	Malware	Malware	Malware	Malware
2.	Web-based attacks	Web-based attacks	Web-based attacks	Web-based attacks	Web-based attacks
3.	Web application attacks	Web application attacks	Web application attacks	Web application attacks	Web application attacks
4.	Botnets	Botnets	Denial of Service	Phishing	Phishing
5.	Denial of Service	Denial of Service	Botnets	Spam	Denial of Service
6.	Spam	Physical damage/theft/loss	Phishing	Denial of Service	Spam
7.	Phishing	Insider threat	Spam	Ransomware	Botnets
8.	Exploit kits	Phishing	Ransomware	Botnets	Data breaches
9.	Data breaches	Spam	Insider threat	Insider threat	Insider threat
10.	Physical damage/theft/loss	Exploit kits	Physical damage/theft/loss	Physical damage/theft/loss	Physical damage/theft/loss
11.	Insider threat	Data breaches	Exploit kits	Data breaches	Information leakage
12.	Information leakage	Identity theft	Data breaches	Identity theft	Identity theft
13.	Identity theft	Information leakage	Identity theft	Information leakage	Cryptojacking
14.	Cyber espionage	Ransomware	Information leakage	Exploit kits	Ransomware
15.	Ransomware	Cyber espionage	Cyber espionage	Cyber espionage	Cyber espionage

Table 1. Top 15 threats from annual ENISA Threat Landscapes 2014 - 2018

4. Hungarian CSIRT incident results

Hungarian National Cyber Security Center (GovCERT-Hungary – Government Incident Response Team) regularly publish awareness material. Such publication Hungarian name is “Nemzetközi IT Biztonsági Sajtószemle”. It contains news from IT security different fields like a press review and also a report from announced security incidents in Hungary. [6]

I have summarized the available weekly reports for year 2018, and tried to identify trends and rules. It can also be interesting, how follows the Hungarian incidents the international expectations submitted by ENISA.

We can't compare the results directly, because ENISA reports are Threat Landscapes, and GovCERT-Hungary results contain completed and reported incidents. Each uses different taxonomies, the mapping between them not necessarily evident.

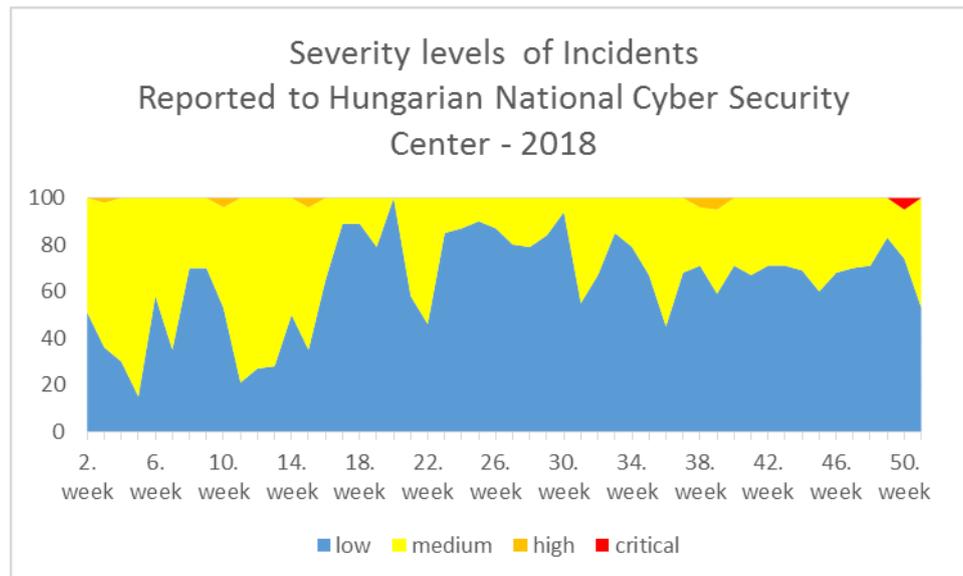


Figure 1. Severity levels of reported incidents in Hungary - 2018

Analyzing the severity levels of reported incidents (Figure 1) we can identify that high and critical incidents are relatively rare. Totally five incidents got that severity during 2018. The ratio of the low and medium level incidents are continuously alter. Usually the ration of the low level incidents are higher than medium incidents.

Inspecting the weekly statistics of GovCERT Hungary (Figure 2), the top five incidents are:

1. Malware
2. Phishing
3. Unauthorized access
4. SPAM
5. Web based attack/defacement.

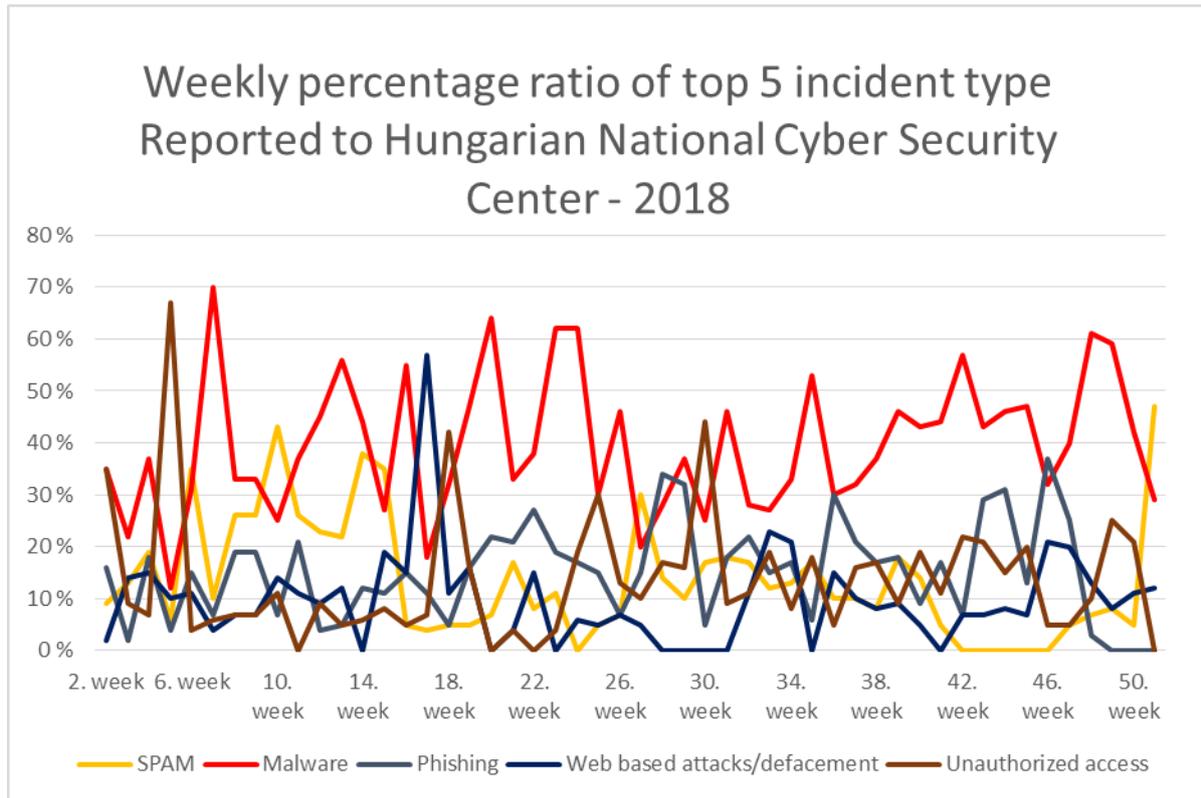


Figure 2. Top 5 reported incidents in Hungary - 2018

In summary we can say that, the incidents in Hungary fundamentally follow the international trends.

5. Identified trends and new threats

Ransomware attacks will continue. A new form of malware can be spread about, the ransomworm. It exhibits the behaviors of both ransomware, which encrypts data and demands payment for a decryption key, and a worm, which self-replicates by exploiting security vulnerabilities and can automatically propagate throughout a network without user interaction.

Malicious spam also will be the primary vector of malware. Many malware infections start with an email message, which may or may not have either a link, an attachment, or both. At the very least, be aware that malware may leverage files you might not consider dangerous, like Office documents, to start the infection process.

The Android platform has long been a more popular target for malicious app-makers. The open nature of the platform and low barriers to entry for developers has long been a double-edged sword, making it easier to get apps built and functional. The growing and persistent threat of mobile malware is also expected. While malware that runs on the Windows operating system vastly outnumbers malware for any other platform, users of mobile devices are increasingly subject to malicious activity pushing malware apps to their phones, tablets, or other devices running Android and iOS.

Cryptominer code in mobile games or utilities will also be increased. The code would run whether or not the app itself was running, and functioned as a constant drain on the phone's (or other device's) battery.

As our homes and businesses adopt more internet-connected devices, especially those not traditionally connected to the internet, criminals have been devising new ways to hijack those devices to use as nodes in huge botnets. Criminals can then leverage these botnets to engage in distributed denial-of-service attacks, mine cryptocurrency, and infiltrate networks for the purposes of espionage or data theft.

A new threat also can become popular called phishing-in-the-app. One way that criminals can bypass the Play Market's source code checks was by not including anything malicious in the app itself, but rather by making an app that, in essence, is a browser window to a phishing site. The apps, in this case, were designed in tandem with the phishing site so the user had a seamless experience.

6. Conclusion

The world of cyber security threats is sophisticated. The threat landscape is huge, offensive and defensive technologies change continuously. According to Symantech predictions [7], attacker will exploit artificial intelligence (AI) and use AI to aid their assaults. The growing 5G deployment will increase attack surface area. The botnet-powered distributed denial of service attacks will massively use IoT devices. Attacks will increase that target is supply chain, the attacker try to implant malware into legitimate software packages at its usual distribution location. Beyond that file less malware attacks increase. Proper data protection and incident response will be challenge for all organization.

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A BIBLIOMETRIC ANALYSIS OF CYBERSECURITY RESEARCH PAPERS IN EASTERN EUROPE: CASE STUDY FROM THE REPUBLIC OF MOLDOVA

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Abstract

Nowadays it has become clear that cybersecurity must be an integral and indivisible part of technological progress and it must be integrated at the core of ICTs. Almost all states around the world show their cybersecurity commitment and the Eastern Europe countries, including the Republic of Moldova are no exception. Moldova ranked globally 73rd (out of 165 countries) in the 2017 Global Cybersecurity Index by ITU, ahead of six other countries in the region.

Nevertheless, we believe that cybersecurity is not sufficiently addresses by the academic community at the national level. The field of bibliometrics studies publication patterns by using quantitative analysis and statistics. This article aims to explore the level of research in cybersecurity at the national level and compare it with Eastern Europe countries' level, using bibliometric analysis of scientific publications, authored by researches from Moldova. The study is based on data from the national database (National Bibliometric Instrument) with over 68.000 research publications and 2 international databases – Scopus Elsevier and Web of Science.

1. Introduction

A recent study by Cybersecurity Ventures estimates that the global cost of cybercrime could exceed \$6 trillion annually by 2021. To grasp the magnitude of that figure, note that the IMF has estimated the total costs associated with the 2007–2008 global financial crisis at about \$12 trillion. In other words, every two years cybersecurity will cost the global economy an amount equal to that lost in a financial crisis that many compare with the Great Depression [7]. Cybersecurity and information security do share similarities; they also create maximum protection and efficiency when combined. Despite similarities, there are key differences that distinguish the two. Nevertheless, there is consensus that there is no standard or universally accepted definition of cybersecurity [26]. According to ISO/IEC 27032:2012 [13], cybersecurity is defined as preservation of confidentiality, integrity and availability of information in the cyberspace. At the same time, cybersecurity is considered an interdisciplinary domain, a statement supported by the Cybersecurity Report issued by the High Level Advisory Group of the EC Scientific Advice Mechanism in March 2017, saying that “cybersecurity is not a clearly demarcated field of academic study that lends itself readily to scientific investigation. Rather, cybersecurity combines a multiplicity of disciplines from the technical to behavioural and cultural. Scientific study is further complicated by the rapidly evolving

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nature of threats, the difficulty to undertake controlled experiments and the pace of technical change and innovation. In short, cybersecurity is much more than a science” [23].

Bibliometrics, coined by Pritchard in 1969, as the application of mathematics and statistical methods to books and other media of communication, focuses on the quantitative analysis of scientific and scholarly publications, being therefore considered suitable for the assessment of research [19].

Bibliometric studies measuring the published research outputs of cybersecurity have been few so far at the international level. Some of them have focused on the implementation of cybersecurity in specific areas of activity, such as healthcare [5, 14]. Other studies are more concerned with the bibliometric analysis of various facets and components of cybersecurity, including Big Data [2], malware [1], mobile forensics [10], Cloud forensics studies [4] or reaction to new security threat classes [19]. Other investigations were concerned with bibliometric analyses of recent research on machine learning for cyber security [17] or bibliometric analysis of cyberbehavior [20]. Some works were more specific and investigated the literature on terrorism [10] or aimed to provide a systematic literature review focusing on cybersecurity management, intellectual capital and trust [17].

This paper would like to complement the existing analyses, by presenting a bibliometric study of the development of research in cybersecurity in 10 Eastern European countries during the period 2008-2018, with a case study on the Republic of Moldova. The study investigated cybersecurity research papers indexed in Web of Science and Scopus databases, the publications of authors from the Republic of Moldova were further examined, based on data from the national database of scientific publications – National Bibliometric Instrument [12]. The study aims to answer the following questions: (1) What are the total number and geographical spread of publications in cybersecurity in Eastern Europe? (2) What is the production of cybersecurity papers by authors from the Republic of Moldova according to document types, languages used, authors’ institutions and publications sources? (3) Is there a relationship between the countries’ rankings in terms of bibliometric analyses of cybersecurity papers and in terms of the general level of cybersecurity commitments (such as ITU Global Cybersecurity Index and UN E-Government Survey).

2. Data and methods

The study is based on data from 3 sources: Web of Science (Core Collection), Scopus and the IBN - National Bibliometric Instrument from the Republic of Moldova, which includes over 68.000 publications from the national scientific journals and conference proceedings. A search was carried out in January 2019 for journal articles, proceedings papers and reviews published in the period 2008-2018 which have “cybersecurity” or “cyber security” (although the one word spelling is considered correct, the two word spelling is used extensively as well [6]) in the title, abstract or keywords, by authors from the Eastern Europe countries. For the purpose of this study, Eastern Europe countries (EEC) are Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia and Ukraine, according to UN Statistics Division classification [27].

In order to compare records from WoS and Scopus the following data were extracted:

- Total number of publications with at least one author from each of the EEC;
- Total number of publications on computer science with at least one author from each of the EEC;
- Total number of publications on cybersecurity with at least one author from each of the EEC.

Disambiguation and matching of references was not part of the research described in this article. We then conducted a bibliometric analysis of cybersecurity publications from IBN, by authors from the Republic of Moldova, extracting 28 records, accompanied by the relevant bibliographic information (authors, affiliations, titles, sources, languages, editors, volume, pagination, keywords).

We also extracted data on cybersecurity indicators of the EEC from 2 relevant global rankings: ITU Global Cybersecurity Index [11], which measures the type, level and evolution over time of cybersecurity commitment in countries and UN E-Government Survey [29], because cybersecurity is a key factor in the transformation to resilient e-Government.

3. Results

3.1. Production and Impact of Eastern Europe countries' publications

Publications

During the period established for this study, the 10 Eastern European countries (EEC) produced a total of 441 publications on cybersecurity, according to Scopus and 504 publications according to WoS, as detailed in Table 1, which lists for each country the number of publications, the number of citations and the mean number of citations per publication.

Overall, Scopus is listing 10.026 publications on cybersecurity for the period 2008-2018 and WoS – 9.300 publications, the share of EEC publications being 4.4% in Scopus and 5.4% in WoS. As can be seen, the difference is acceptable and represents about 1%. Just for comparison, the share of BRICS countries' (which include Russia) publications in cybersecurity is 16.7% in WoS and 12.2% in Scopus, while the share of the Commonwealth of Independent States (CIS) countries' (which include Belarus, Moldova and Russia) publications in this area is 1.4% in Scopus and 1.2% in WoS.

It will be seen that the top 5 most productive countries according to both Scopus and WoS are the Russian Federation, Poland, Romania, Czech Republic and Ukraine, which combined account for 90% of publications according to WoS and 91.6% according to Scopus. The other half of the EEC, the remaining 5 countries have an insignificant contribution from this perspective. The leader in terms of citations is Poland, followed by Russian Federation, Romania and Ukraine. Poland is also the leader in terms of the mean number of citations per publication, according to WoS.

As cybersecurity is part of computer science [24], we also examined the share of publications in cybersecurity from the total number of publications in computer science produced by EEC, as listed by Scopus and WoS (Figure 1).

Nr	Country	Nr publications in WoS	Nr citations in WoS	Mean number of citations per publications in WoS
1	Romania	129	122	0,9
2	Poland	106	244	2,3
3	Russian Federation	104	78	0,8
4	Czech Republic	63	45	0,7
5	Ukraine	50	17	0,3
6	Hungary	32	34	1,1
7	Bulgaria	11	11	1,0
8	Slovakia	7	6	0,9
9	Belarus	1	0	0,0
10	Republic of Moldova	1	0	0,0
	<i>Total</i>	504	557	

Nr	Country	Nr publications in Scopus	Nr citations in Scopus	Mean number of citations per publications in Scopus
1	Russian Federation	116	163	1,4
2	Poland	104	198	1,9
3	Czech Republic	67	93	1,4
4	Ukraine	60	107	1,8
5	Romania	57	85	1,5
6	Hungary	19	24	1,3
7	Bulgaria	8	4	0,5
8	Slovakia	5	12	2,4
9	Belarus	3	13	4,3
10	Republic of Moldova	2	0	0,0
	<i>Total</i>	441	699	

Table 1. Cybersecurity publications by 10 EEC during 2008-2018 indexed in WoS and Scopus

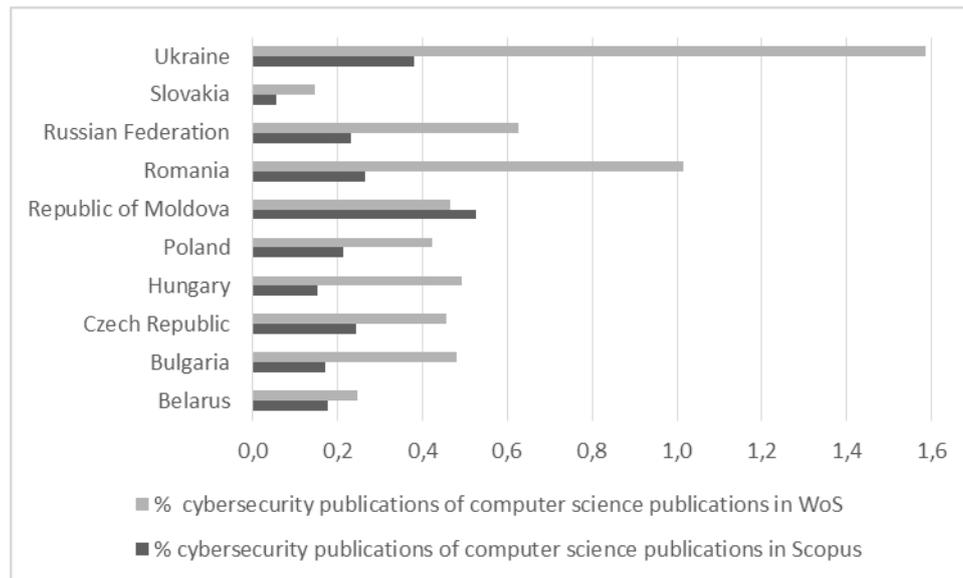


Figure 1. Share of EEC cybersecurity publications of computer science publications in WoS and Scopus

According to Scopus data, none of EEC exceeds the share of 1%, while WoS data demonstrates that only 2 countries pass the 1% threshold – Ukraine and Romania. The scarcity of research works on cybersecurity proves this area is not yet commanding enough attention of the research community, especially in developing countries. On the global level, three countries – USA, UK and China – produce 56% of research publications in cybersecurity, according to both Scopus and WoS records. The dynamics of cybersecurity publications is also impressive, as shown in Figure 2, with a steady growth, having increased roughly 20 times during this decade.

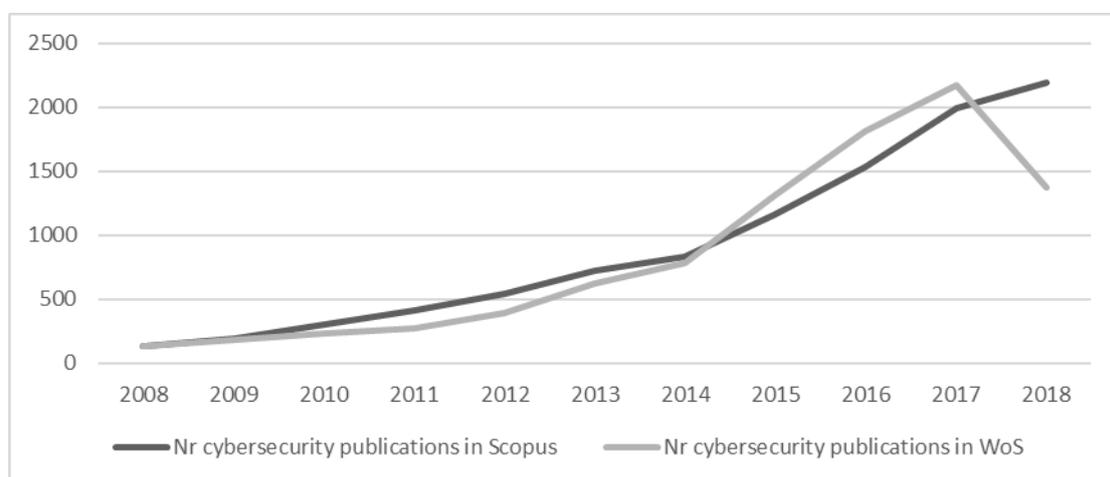


Figure 2. Total number of cybersecurity publications listed in Scopus and WoS during 2008-2018

Table 2 shows the distribution of document types of EEC cybersecurity publications during the study period. Not surprisingly, conference paper account for roughly 60% of all publications both in Scopus and WoS, followed by journal articles with 32% and book chapters. This might be explained by the fact, that journals usually have stricter and more rigorous requirements or there is an adequate number of specialised conferences, which enable faster communication of research results.

Document type	Count in WoS	%	Count in Scopus	%
Conference paper	332	66,5	265	60,1
Article	160	32,1	141	32,0
Book chapter	19	3,8	18	4,1
Book	0	0,0	4	0,9
Review	2	0,4	6	1,4

Table 2. Document types and their counts of EEC cybersecurity publications, as listed in Scopus and WoS

Based on Scopus records, we also investigated international collaborations of EEC and revealed that, as a whole, the majority of joint publications of EEC countries are with the world leaders in cybersecurity research – UK (4.3%), the USA (4.1%), followed by Italy (2.7%), France (1.8%) and Germany (1.4%). As can be noted, the majority of collaborations involve countries outside Eastern Europe, most probably due to the higher level of expertise available, beneficial for the EEC. The collaborations that lie within the Eastern Europe boundaries are less popular, accounting per total only 4%, with most publications co-authored, in decreasing order, with Poland, Ukraine, Russia, Romania and Belarus.

It should also be pointed out that we are only examining research publications for our bibliometric analysis, while the number of publications produced by cybersecurity professional communities is usually much higher, as shown in [9].

Cybersecurity rankings

Having performed the bibliometric analysis of research publications in cybersecurity of EEC and revealing that the most productive countries were the Russian Federation, Poland, Romania, Czech Republic and Ukraine, both in terms of publications count, as well as citations, we set to find if the same situation applied in terms of cybersecurity rankings. The goal of such rankings is to measure the countries' commitment towards cybersecurity, assessing the legal, technical, organizational, capacity-building and cooperation frameworks necessary to ensure a robust and resilient e-government system.

Nr	Country	EGDI score	EGDI level
1	Russian Federation	0,7969	(Very high)
2	Poland	0,7926	(Very high)
3	Belarus	0,7641	(Very high)
4	Hungary	0,7265	(High)
5	Bulgaria	0,7177	(High)
6	Slovakia	0,7155	(High)
7	Czech Republic	0,7084	(High)
8	Romania	0,6671	(High)
9	Republic of Moldova	0,659	(High)
10	Ukraine	0,6165	(High)
	<i>Europe average EGDI</i>	<i>0,77</i>	<i>(Very high)</i>

Table 3. Eastern Europe countries' rankings according to ITU GCI and UN EGDI (source [2, 6])

Nr	Country	ITU Cybersecurity score	ITU Cybersecurity Global rank
1	Russian Federation	0,788	10
2	Poland	0,622	33
3	Czech Republic	0,609	35
4	Belarus	0,592	39
5	Romania	0,585	42
6	Bulgaria	0,579	44
7	Hungary	0,534	51
8	Ukraine	0,501	59
9	Republic of Moldova	0,418	73
10	Slovakia	0,362	82

Table 3 (cont). Eastern Europe countries' rankings according to ITU GCI and UN EGDI (source [2, 6])

The data on cybersecurity indicators of the EEC from 2 relevant global rankings: ITU Global Cybersecurity Index 2017 and UN E-Government Survey 2018, presented in Table 3, revealed that both in terms of e-Government development and cybersecurity commitments Russian Federation and Poland maintain the leading positions. According to the ITU report, the Russian Federation scores best in cybersecurity capacity building: its commitments range from developing cybersecurity standards to R&D and from public awareness to a home-grown cybersecurity industry, such as Kaspersky Labs [11]. The same similarity applies to the Czech Republic in terms of cybersecurity score (3rd among EEC in ITU ranking). The “intruder” here is Belarus, which although positioned low in cybersecurity research publications, is on leading positions in terms of e-Government development (3rd among EEC in EGDI) and cybersecurity development (4th in ITU ranking), which is due to coherent implementation of relevant strategies aiming to enhance ICTs in the provision of e-government services [29]. Ukraine, although in top 5 Eastern Europe countries in terms of cybersecurity publications productivity, isn't doing so well in terms of e-Government development (10th position among EEC in EGDI), as well as cybersecurity (8th position in ITU ranking). This can probably be explained by the unstable political situation in the country, affecting its development in all areas.

3.2. Case study: Republic of Moldova

Moldova is a parliamentary republic in Eastern Europe, bordering Ukraine and Romania, with a resident population of 3.5 million, as of October 2018 [28] and GNI per capita at \$2180 in 2017 [21]. Moldova's EGDI is estimated as high, with a score of 0.659 (lower than Europe average of 0.77, but higher than world average of 0.55), which positions it on the 9th place among EEC in terms of e-Government development. Republic of Moldova is second in the top 10 countries for e-Government among landlocked developing countries, scoring high values for 2 out of the 3 indices making the EGDI - Human Capital Index (0.7274) and Online Service Index (0.7708) [29]. This is mostly due to the consistent implementation of the e-Transformation Agenda, funded by the World Bank and partially by the national government. This strategic program provides a unified vision to modernize and improve the efficiency of public services through IT governance, enhancing the IT capacity of the public sector. In terms of cybersecurity, Moldova is again on the 9th position among EEC. Moldova ranked globally 73rd (out of 165 countries), ahead of six other countries in the CIS region.

This is due to the presence and development of sections devoted to cybersecurity in government ICT programs, legal and regulatory framework, provided by the legislation on preventing and combating digital crimes [16] and on personal data protection [15], as well as the existence of the relevant national institutions, such as the IT and Cybersecurity Division, Division for Cybercrime Investigation at the General Prosecutor's Office, national CERTs etc. A lot of awareness raising and capacity building activities and campaigns on cybersecurity are being carried out as well, such as the Moldova Cyber Week [20], CyberSec conferences, ALERT Cyber Drill for CIS and EU representatives etc.

Although Moldova's standing in e-Gov and cybersecurity rankings is good, the productivity of national research publications in cybersecurity is quite low. Scopus is listing 2 publications by authors from Moldova, and WoS just one. For a more detailed assessment, we decided to further examine the publications of authors from the Republic of Moldova, based on data from the national database of scientific publications – National Bibliometric Instrument (IBN). We extracted 28 records according to our search criteria, accompanied by the relevant bibliographic information (authors, affiliations, titles, sources, languages, editors, volume, pagination, keywords). Despite the small number of records, we attempted to present a bibliometric analysis, although we are aware that some of the findings may not be representative.

These 28 publications are distributed quite unevenly during the study period, as shown in Figure 3, with almost 60% of them being conference papers. The publication peaks usually occur in years when conferences focusing on cybersecurity were organised (2017).

In terms of publications language, more than half of the publications are written in Romanian, about 40% are in English and the remaining 7% are in Russian. Almost all publications in English are conference proceedings, produced as a result of specialised international conferences that were organised in Moldova.

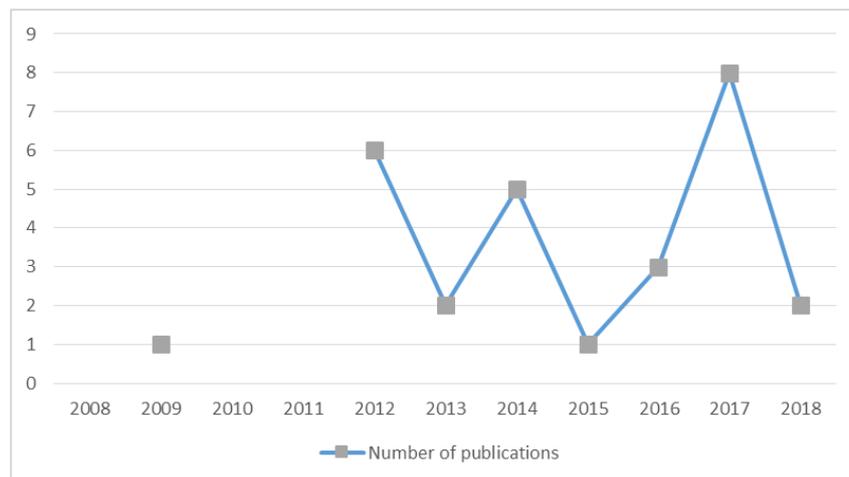


Figure 3. Number of publications in individual years, based on data from IBN (www.ibn.idsi.md)

The largest share of records under investigation (60%) are “solo” publications, written by a single author, 36% of publications have 2 authors and only one is authored by 3 persons, denoting that collaborative writing in this area is not very common.

Nr	Organisation	Publications count
1	Academy of Economic Studies	5
2	Ministry of Defense of RM	4
3	Technical University of Moldova	4
4	Academy of Public Administration	3
5	Military Academy of the Armed Forces	3
6	International Relations Institute from Moldova	2
7	State University of Moldova	2
8	Free International University of Moldova	2
9	Police Academy of the Ministry of Internal Affairs of RM	1
10	National Regulatory Agency for Electronic Communications and Information Technology	1
11	Information and Documentation Centre on NATO from Moldova	1
12	National Council for Accreditation and Attestation	1
13	Institute for Juridical and Political Research	1

Table 4. Publications distribution per organisations

At the level of organisations (Table 4), the top 3 most productive institutions are the Academy of Economic Studies, the Ministry of Defence and the Technical University of Moldova. This is due to the fact, that both of these higher education institutions have extensive IT training courses and specialisations, as well as specialised departments dealing with training in various aspects of cybersecurity. The top 3 most frequent keywords used by authors are “cybersecurity”, “strategy” and “threat”. As far as the publication sources are concerned, the spread of papers in many journals and conferences in this phase of bibliometric analysis did not exhibit a real core.

In terms of the publications’ subjects, these vary greatly, including a wide range of issues such as cybersecurity strategies development, cyber defence, combating cyberbullying, cyber warfare. More specialised papers focus on the role and importance of cybersecurity in different areas: e-Government systems, provision of electronic services, healthcare sector, nuclear security, terrorism, human right and the digital economy. Some of the publications are of a more technical nature, dealing with specific issues, such as email security, data protection, networks and different types of attacks.

4. Conclusions

Based on the findings from the study we can state that cybersecurity research publications are only starting to gain momentum, as cybersecurity becomes one of the main concerns in our digital, information driven world.

Based on the key results we achieved, we may conclude that the most productive Eastern Europe countries in cybersecurity according to both Scopus and WoS are the Russian Federation, Poland, Romania, Czech Republic and Ukraine, which combined account for 90% of publications. The dynamics of cybersecurity publications exhibits a steady growth, having increased roughly 20 times during this decade. As compared to the research publications productivity, both in terms of e-Government development and cybersecurity commitments Russian Federation and Poland maintain

the leading positions. In contrast, Belarus, which although positioned low in cybersecurity research publications, is on leading positions in terms of e-Government and cybersecurity development.

Among the Eastern Europe countries, the Republic of Moldova has an infinitesimal contribution in terms of international research publications on cybersecurity both in Scopus and WoS. At the national level, the productivity in this area is also quite low, with publications being distributed unevenly during the study period, written mostly in Romanian and the majority being conference papers.

The situation of scarcity in the information concerning research in cybersecurity proved clearly the need for systemic exploration. The current study provides a good foundation and appropriate framework for further analyses.

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CYBERSECURITY IN THE V4 COUNTRIES – A CROSS-BORDER CASE STUDY

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Abstract

Information sharing is one of the major issues in cybersecurity nowadays. Although it is essential for all players in the cyberspace to get relevant information on the latest threats but giving such threat intelligence for others is not as easy as it seems. Obviously, there are national rules and regulations that make this difficult, but the lack of trust between the different entities is also a challenge, especially when such data should cross the borders. The Visegrad 4 countries started an exemplary cooperation under the name of Central European Cyber Security Platform or CECSP a few years ago that can serve as a case study for similar multilateral initiatives. In this paper, we present the history of this cooperation, the actual achievements and difficulties in practice. Besides the literature review, we also highlight our thoughts of from the practitioners' approach as we are participating in the daily operative collaboration. Based on the findings we propose some steps how these countries should go beyond the actual results.

1. Introduction

Today, thanks to the rapid development of information technology and the expansion of digitization, cyberspace becomes a significant part of our life, as electronic public services, digital economy and networked society play an important role both in our work and in our general activities. The importance of digital infrastructures and services in public, financial, educational and economic processes is indisputable. Meanwhile, threats from cyberspace are dynamically growing in parallel with the development of digital infrastructures and services, therefore the security-related improvement of cyber ecosystem has become an increasingly important issue.

In the last decade cybersecurity has appeared as a key challenge for all countries and organizations, resulting the establishment of organizations or divisions that are responsible for the creation and maintenance of information security (e.g. authorities, CSIRTs³, Security Operation Centers, cyber defense agencies or centers of excellence, etc.). Due to the possible cross-border nature of threats and incidents, it became relatively clear at an early stage that in addition to the above-mentioned IT security organizations, cooperation through various international forums and mechanisms is also needed.

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First, the communities of incident management centers (CERT⁴/CSIRT) have been set up, followed by the development of common strategic objectives and cooperation. By now, the main international organizations (NATO, EU, ITU, OSCE) all put cybersecurity on their agenda. Currently, many bilateral, international, sectoral, strategic and operational cooperation works worldwide.

This wide list of cooperation was augmented in 2013, as the Czech Republic and Austria has initiated a regional cooperation by the name of Central European Cyber Security Platform or CECSP. The regional agreement has created strategic and operational cooperation between the four Visegrád countries (Czech Republic, Hungary, Poland, Slovakia) and Austria. CECSP is a natural next step of the Central European Defense Co-operation (CEDC), established in 2011, but it is not part of the latter one. Besides the five countries, Slovenia is also one of the founding member states of CEDC, that aims to facilitate the military-focused collaboration. There is only one similar, regional defense platform in Europe, NORDEFECO, founded by the Nordic countries, but it doesn't have a specific, cybersecurity-oriented agreement. [20]

The question may arise, considering that CECSP countries are participating in several already existing organizations, that what new role can be played by CECSP, what added value can it create in the cooperation with other operational and strategic levels. To answer this question, an overview is needed on the platform's participants and their goals and activities in the cyberspace.

2. CECSP countries' cyber security structure

Countries that are members of the platform participate in the activities of the major international communities without exception, and because of the fact that cyber security regulations of these communities are developing into the same direction, CECSP countries have essentially similar legal and organizational structures. [1] It is important to emphasize that until 2016, when Directive on security of network and information systems (NIS Directive) was adopted, only guidelines and strategic objectives from international organizations and national experiences (best practices) have shown examples internationally, therefore the countries' preparedness and organizational system was different. [5]

It is worth comparing the cybersecurity preparedness and system of the countries that are members of the platform on the basis of their national strategy and organization system. The detailed strategic and organizational analysis is not part of the present study, only the highlighting of the main similarities and differences is our aim by drawing up a comprehensive picture.

The first national cyber security strategies were established at about the same time by the CECSP countries. The Czech Republic was the first who published a national strategy on cybersecurity in 2008, then Slovakia in 2011, and finally Austria, Poland and Hungary, all in 2013 [8] [21] [22] [23] [24]. Of course, over the years most of them have reviewed their strategy, as Slovakia and the Czech Republic formulated a new strategy for the period 2015-2020, meanwhile Poland published its own in 2017. Hungary also extended its own cybersecurity strategy with a sectoral strategy required by the NIS Directive in 2018. In their case, the legal and organizational review is made based on the latest edition.

⁴ Computer Emergency Response Team

We can say that the national strategies of all five countries include the relevant areas from international (ENISA, NATO, ITU) cybersecurity strategy guidance, such as objectives for education, research and development, awareness-raising, public-private partnership, law enforcement, international cooperation, and critical infrastructure protection. The strategies under consideration vary from the legislative perspective. Some of the strategies aims the creation or the update of a comprehensive information security regulation (for Slovakia or Poland), while for other countries they refer specifically to the legal regulation of one or two areas in the strategy paper (for example in the case of Hungary). Regarding cyber security organizations, it should be highlighted that all evaluated strategies identify the governmental and/or national incident management center (GovCERT / national CERT), the regulatory body with rights and responsibilities and the organization or ministry responsible for coordination and for decision-making. [9]

There is a discrepancy between the regulation of areas outside the government, the regulation of critical infrastructures and the organizational coverage. In case of some strategies, the development of regulations and the creation of specialized organizations can be observed only as a goal in some sectors, while in other cases the critical infrastructure and/or sectoral regulations are already existing and the goal is to strengthen and further develop them.

Each evaluated strategies deal with question of non-governmental, sectoral CERTs and the establishment military CERTs. The countries have a same approach in terms of the need for the creation of special sectoral CERTs. In Austria, there are many commercial CERTs are operating and has a military CERT (MilCERT), whereas in Hungary and the Czech Republic one of the objectives is the establishment of a sectoral CERT.

The strategies cannot be used to draw a conclusion on the similarity or differences of the organizational structures, as a number of organizational development and transformation took place in the Member States due to the adoption of the strategies, such as the creation of commercial CERTs or the formation of military CERTs. For example, in Hungary the Defense Sector Electronic Information Security Incident Management Center (MilCERT) was established in March 1, 2016.

3. Objectives and operation of Central European Cyber Security Platform

In accordance with the fundamental objectives of the CECSP countries, the main aims of the close regional cooperation are to work together in accordance with the policies, initiatives of EU and NATO and to help each other with their experiences in developing a national cybersecurity legislation and organizational structure. The most important goal of the platform is to gain more defense and resiliency in case of cyberattacks through this regional cooperation. The peculiarity of this platform is that the historical foundations of the Visegrád countries are resting on a cooperative approach since 1991 towards European integration. CECSP cooperation is a comprehensive approach to cybersecurity issues, covering major levels of cybersecurity (strategic-operative, government-military, national-international). Accordingly, representatives of the platform include the ministries responsible for cybersecurity, military and national CSIRTs or authorities responsible for information security. In addition, the European Network and Information Security Agency (ENISA), with its international experience, assists and supports the work of the platform as an observer. [7]

In CECSP, the aim of the highest-level cooperation is to be more successful in international, community (EU) or allied (NATO) lobbying and to be able to represent a regionally discussed and agreed single position. As a result, Member States will have an opportunity to better reach out the

consideration and validation of their positions and proposals on community or allied level. Such cooperation and reconciliation has been observed over the past years when negotiating cybersecurity regulations within the European Union (such as the NIS Directive or the EU Cybersecurity Act).

After the establishment of a common, European level international regulation (for example, the adoption of the NIS directive), the support function of the platform is maintained, since it can also provide a podium for discussing legal and technical issues arising during the implementation and evaluating cooperation mechanisms. Another objective of this cooperation at the strategic level is to create a platform between the countries to support cooperation and share experience in R&D projects.

We can also mention the establishment of cooperation on the operational level as a priority goal, which is realized in the CERTs / CSIRTs cooperation. Just like in other CSIRT communities, members share their experiences, report lessons-learned of major successful or failed attacks and good practices to community members, and make their collaboration more effective by organizing cybersecurity exercises in order to develop the skills and preparedness of IT security professionals for current cybersecurity challenges and attacks.

In 2013, when the platform was created, the main goal was to build trust, to define a cooperation framework and its rules and to develop a work program. Each year, the platform has at least one strategic and operational meeting. The presidency is responsible for the management of the platform and the organization of the meetings. Member States fill the presidency in a rotating system for one year (in alphabetical order). Hungary in 2015 acted as chairman of the platform. In this year, there was a strategic-decision-makers working group meeting and an operational level meeting in Budapest.

Each year, the platform organizes various cyber security exercises for its members, despite all participating national CERTs in the platform are taking part in EU and NATO exercises without exception. In addition to practice the skills of professionals involved in red and blue teaming, such events can also provide an opportunity to test and discuss the experiences gained in the allied and community exercises and conclude them in a narrower community.

So far, Hungary has organized two exercises for the members of the platform. The first one was held in 23 June 2014, right after the establishment of CECSP. [6] The second one was a decision-making and procedural exercise (Table Top Exercise, TTX) in 2015, when Hungary was the president of the platform. The latest exercise took place in May 2017 in Brno, the Czech Republic. It was developed by the Masaryk University and was held in a special environment. This exercise didn't focus on cooperation, but on testing and developing the technical skills of participating players. [18] In 2018, there wasn't any regional exercise, as all countries participated in ENISA's Cyber Europe 2018 cyber crisis exercise event.

4. Cybersecurity on the political level in V4 cooperation

As we mentioned before, CECSP is independent from the institutional V4 cooperation or from the Central European Defense Co-operation (CEDC), but it couldn't come alive without the political support of the governments of the affected countries. As soon as the political leaders realized the potential impact of cyberattacks, the need of cyberdefense on regional level has appeared in the presidency programs and has evolved parallelly with the NATO/EU objectives.

CEDC, CECSP and the V4 are all independent cooperation, that has their own work programs, priorities. These cooperation mechanisms support and respect each other, therefore if they have similar priority or aim in their agenda, they make it in a joint effort (for example a joint conference, workshop of the V4 and the CECSP presidencies). It is important to highlight, that the work program and the meeting agendas of the CECSP are not publicly available, while this is a close cooperation of the governmental and national CSIRTs, authorities, National Cyber Security Agencies, which in some countries (in Hungary and in Slovakia) work within a special service. For this paper, we can use only the official articles and short online reports of the participant organizations as a reference. Therefore, in this part we review the cyber-related goals of each V4 presidency from 2012, where this issue was first mentioned.

4.1. 2012/2013 Polish Presidency

Cybersecurity was first mentioned in this program in a military context: “There will be a need for V4 consultations on NATO Russian relations, a V4 common position on Missile Defence and on the Russian response, on NATO cooperation with Ukraine and Georgia, consultations on CFE and force deployment in the region, consultations, in the broader format of V4+ Baltic states + Romania and Bulgaria, on common security issues, and with regard to cyber security and energy security.” [15]

4.2. 2013/2014 Hungarian Presidency

In this year, cybersecurity got a higher focus due to CECSP, that was led by the Czech Republic in 2013 and Austria in 2014. That was an intensive time, the Member States met for a technical meeting in Prague [2] [19] and on a strategic meeting in Vienna [3] [4] [17]. Meanwhile, on the political level the parties described their goals as follows:

- “Emphasizing the importance of cyber security awareness and strengthening dialogue and cooperation at policy and operational level in the field of cyber defense;
- Promoting efforts to make information exchange and knowledge transfer (lessons learned and best practices) more efficient in the field of cyber and information security.
- Exchange of knowledge and practical expertise countering cybercrime with Western Balkan countries.”

We can also identify the military approach, but cybercrime and cyber diplomacy also appeared in this year. V4 countries proposed “discussion include the setting up of a long-term cyber security cooperation mechanism” in the context of security policy and related to NATO and the Common Security and Defence Policy of the European Union. They also “endeavor to strengthen the V4-B3 cooperation, particularly in the fields of [...] cyber security” and promote further cooperation with the Western Balkan countries “on judicial cooperation in criminal matters and fight against corruption, and fight against cybercrime.” [12]

4.3. 2014/2015 Slovak Presidency

Information and cyber security got a separate chapter in this presidency program and became one of the major issues. “The primary objective is to increase the immunity of information systems in the

V4 countries against cyber-attacks and to decrease computer-based crime.” To reach this goal, Slovakia focused on the following topics:

- “Streamlining management of information/cyber security, security risk management;
- Protecting human rights and fundamental freedoms in connection with the use of information and communication infrastructure (including the Internet);
- Increasing awareness and competencies, education in the area of information/cyber security;
- Cooperation at international level in the area of information/cyber security (exchanging skills, experience and sharing information);
 - Completing mutual consultations in order to harmonize the approaches taken by V4 countries and considering mutual support when adopting decisions and their subsequent implementation within international organizations (EU, NATO, UN and others);
 - Supporting an improvement in the standing of the Central European Cyber Security Platform;
 - Creating a safe environment (prevention, response to security incidents, the scope of specialized CSIRT/CERT-type teams, for example the implementation of joint simulation exercises on critical information infrastructure protection, creating a secure communication channel to share information on current threats and on-going large-scale security incidents, linking of early warning and information sharing in the V4.” [11]

As we can see, this program has defined the scope of CECSP cooperation, and the platform is still working based on the above-mentioned principles. In this year, cyber didn’t appear in any other relation, except the defense and security policy part, where it was treated as a general security risk.

4.4. 2015/2016 Czech Presidency

The Czech Presidency placed cybersecurity to the operational level. As CECSP’s operational capability has been proven, this issue disappeared from the list of strategic questions. The Presidency Program has the following statement: “Cybersecurity is also a prospective topic for the Visegrad cooperation. The CZ V4 PRES will push to deepen and increase the efficiency of cooperation within the Central European Cyber Security Platform (CECSP). This will particularly include harmonising the positions of the V4 countries on fundamental topics of cyber security, including their positions within international organisations, organising expert workshops and introducing standards and secured channels as part of communication among the CECSP states. The V4 will also continue in the practice of cooperation among specialised police units and national “centres of excellence” focused on research in the area of cybernetic crime.”

The Czech National Security Authority got the task to facilitate the operational level cooperation. Their specific activities were specified in the program:

- “At the strategic level, the CZ V4 PRES will seek progress in harmonising the approach of individual states and their positions and opinions on major cyber security issues within international organisations, forums and discussions. This includes primarily the legislation

being negotiated in the working bodies of the Council of the EU and European Commission and documents negotiated under the OSCE and International Telecommunication Union;

- At the operational level among top CERT sites we want to organise workshops on selected topics (e.g. intrusion detection and honeypots, penetration testing, etc.);
- The CZ V4 PRES is committed to implementing standards and secure channels in communications among CECSP states.” [14]

4.5. 2016/2017 Polish Presidency

Following the previous year’s approach, cybersecurity remained on the technical level and highlights the importance of CECSP. This area is summarized only in one paragraph:

“Cyber-security: cooperation to enhance the protection against cyber threats inter alia by means of CSIRT cooperation and the Central European Cyber Security Platform (CECSP); building permanent relations between the CECSP and the V4. Furthermore encouraging cooperation between special Police units and national “centres of excellence” that focus on conducting research in the field of cyber-crime.” [16]

Cybersecurity also disappeared from the defense policy and was only mentioned once under the police cooperation part, in relation with cybercrime. We can find the reason of this low priority in the European legislation. In this year, the NIS Directive was adopted and required a pan-European approach for cyber defense. The need for a regional cooperation has seemingly decreased.

4.6. 2017/2018 Hungarian Presidency

2017 is a turning point in the era of cybersecurity. There were two state sponsored malware campaigns (WannaCry and NotPetya) that caused global chaos, meanwhile more and more details had been revealed on the effects of cyberattacks during the US presidential election. The Hungarian Presidency Program clearly reflects to these threats and cyberdefense got a higher focus than in the previous year.

First of all, due to hybrid threats, cybersecurity is mentioned in a military context again: “Defence policy cooperation in the V4+Ukraine and V4+Moldova formats, focusing on examining possibilities for joint work on defence sector reform, sharing experience on cyber defence and hybrid war, resilience and a potential involvement in the V4 EU Battlegroup (in the case of Ukraine)”. This is emphasized with a planned Cyber Workshop between the V4 countries and the United States.

On the other hand, the operational cooperation is described in more details: “In the field of cyber security, the Presidency’s goal is to strengthen the resilience of critical infrastructure, especially with the aim of revealing and averting risks and attacks coming from the cyberspace. The Hungarian Presidency will carry on the cooperation between cyber security organisations and network security centres of V4 countries, for which information-sharing on incidents is indispensable. In cooperation with the rotating Chair of the Central European Cyber Security Platform, the Hungarian Presidency will organise expert meetings and joint exercises and trainings related to incident management. The Presidency also plans to hold consultations aiming to formulate joint V4 positions on current topics of the EU’s agenda, in particular on the

implementation of the Directive on Security of Network and Information Systems (NIS), and the revision of the Cybersecurity Strategy of the EU.” [13]

4.7. 2018/2019 Slovak Presidency

The actual Presidency Program also deals with cybersecurity, but it's not as ambitious as it was in the previous year. It focuses on cybercrime and the usage of cryptocurrencies: “Digital evolution and the development of cyber space bring an increasing number of cyberattacks, which, in some EU Member States, even exceed the number of standard crimes. Therefore, within the Presidency of the V4, we shall focus on the strengthening and improvement of cooperation in the fight against cybercrime connected with the misuse of crypto currencies, especially bitcoin.”

Then it turns to CECSP and highlights the success of the Slovak Presidency of this forum in 2017: “With regard to CECSP cooperation, during the Slovak Presidency in 2017 the member countries started to coordinate their activities, stances, and positions even on the EU level. This initiative did not go unnoticed by other members of the EU. For example, as a result France joined in on the coordination of CECSP activities in matters of the cybersecurity of the European Union.” [10]

5. Effectiveness, benefits and future of CECSP cooperation

As it was mentioned before, the work program of the CECSP cooperation, the agenda and the outcome of the meetings are not publicly available, so we can draw our conclusion mainly from the official reports and articles of the participant organizations (CERTs, Cybersecurity Centers and Authorities). Participating countries have common objectives, basic regulations and organizational system for the operation of the Central European Platform. According to the articles, since the establishment of the CECSP cooperation, mainly the basic operational and strategic discussions and annual cyber security exercises can be observed.

For the effective trust building, it is important to know how does the other parties work, what are their organizational and legal structure, moreover, the creation of personal contacts is also essential. We can say that thanks for the first two years of the CECSP cooperation, the countries participating in the platform are familiar with the legal and organizational features of each other in detail and had the opportunity to build up the trust and to understand other parties. Naturally, the platform needed to create cooperation methods to direct the information sharing, CSIRT cooperation, that could be tested, analyzed and further developed by cyber exercises. As a result, they had opportunity for detailed technical consultations, discussions and could identify additional actors and areas of expertise for the further development and deepening the cooperation.

It is clearly seen that before 2018, there were different type of cyber exercises within the platform. At the beginning, in 2014 and 2015 there were decision making and procedural exercises (so called table top exercises), where the platform tested and practiced its cooperation methods and rules. The development of the cooperation can be clearly seen in this area, as the type of the platform exercise changed and deepened. In 2016 the Czech National Cyber Security Center held a red team – blue team technical exercise for the CECSP CSIRT partners. During this exercise, the players' technical skills were tested and trained, furthermore, the information sharing amongst them were also tested and trained.

The CECSP platform gave a good opportunity to share our best practices for each other and to gather ideas for further national developments. A good example for this also can be the exercise

held by the National Cyber Security Center of Czech Republic, because the exercise was held within a closed, specially built technical environment, as a so called cyber range. This cyber range was created by a special PPP cooperation of the Government (National Cyber Security Center), a University (Masaryk University) and private companies.

Another important element of the development of cooperation and trust was that the participating countries had the opportunity to jointly face with the international requirements (EU and other international regulation) and cybersecurity challenges (e.g. WannaCry, NotPetya, etc.) in the past years.

As it was mentioned above, the NIS Directive, adopted in 2016, is the first European regulation to provide mandatory legislative and technical (CSIRT) co-operation and defines minimum requirements in national regulation for the Member States. Accordingly, the CECSP Member States had to review their national cyber security strategy, in line with NIS requirements, as well as their national legislation for the core services sectors and the sectors providing digital services. As a result, the CECSP member states have nearly the same national strategy, national regulations and organizational structure and are set up on the same basis.

Collaboration and information sharing between CSIRTs is implemented through binding rules, in case of incident reporting and cross-border incident management as well. In the area of cybersecurity exercises, some mandatory events are also required, like Cyber Europe exercise and the exercise of CSIRT Network, etc., therefore the questions of technical trainings and the testing of cooperation arrangements is also covered by the European Union.

The question may arise that besides the rules and cooperation mechanisms established by NIS Directive and Cybersecurity Act what role does the regional cooperation play in the small group of EU members? It is undeniable that the strategic and technical cooperation described in this paper is covered by the new EU rules, but the operational cooperation of the CSIRTs and the strategical cooperation of the authorities can be used and further developed on EU level. The already existing regional cooperation, the built trust, the regional discussions and developments should not be finished, but it could be continued and transposed to other, more specialized areas (such as research and development, education, awareness raising, law enforcement, professional training, common EU research applications, etc.). It is important to see that within the EU, regional cooperation is still an important issue, that should be supported and strengthened, for example in research and development projects, trainings etc. Inclusion of actual CECSP parties (authority and CSIRT) into these new areas of cooperation and confidence-building between the parties can be beneficial and can be a logical next step of the platform.

Finally, it should be emphasized that the platform will still provide a perfect opportunity in the future for countries to develop a stronger common position on international level and can be forum to discuss their ideas, questions and experiences at the transposition stage. We highly propose to pay special attention to the Cybersecurity Act, as this EU legislation is a unique opportunity for the V4 countries' cybersecurity ecosystem.

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DESIGN OF A WEB-BASED LEARNING MODEL: SHIFTING THE ACCENT FROM KNOWLEDGE TRANSMISSION TO KNOWLEDGE CONSTRUCTION

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Abstract

The aim of this work is to design a web-based learning model using learning techniques based on knowledge construction in order to increase learners' competency in higher education.

Since knowledge is under a change as a result of improvements in the technology, the learning approaches that levitate around students' learning activities could be considerably improved by web-based learning environments that switched education from knowledge transmission to knowledge construction. In addition to the development of learning patterns, educational technologies are constantly expanding. Changes produced by universities, course content, quality assurance, educational leadership, cultural and ethical occurrences have to be considered in the development of web-based learning in order to meet their requirements. But even now, much of the web-based learning environments are accomplished without embedding pedagogical considerations based on learning issues and learner-centred paradigm.

This paper analyses and states the principles that could be implemented in a web-based learning model relying on the combination of various aspects of e-learning strategies, pedagogical insights, as well managerial and technological techniques. The key point is the cognitive change that shapes learning behaviour from simple information transmission to a constructivist way. Acting as a present-day educational framework of approaches for effective web-based learning, the research presents a set of steps following the exploration of instructional context concerning learning theories and pedagogical principles of the web-based learning paradigm.

The approaches investigated by this research are settled on the base of specific references, European recommendations, theoretical researches regarding the vision of web-based learning environments, and literature relevant case studies. The paper proposes that, as a part of the shared technology environment, more attention need to be concentrated on developing and reinforcing the collaborative and constructive web-based learning system in higher education. As well, the author brings out the lack of the researches regarding web-based learning applied in higher education of the Republic of Moldova and proposes a particular and modern web-based learning paradigm.

Keywords: *web-based learning, knowledge construction, collaborative learning, constructivist approach, web-based learning paradigm.*

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1. Introduction

Nowadays web-based learning (WBL) represents a meaningful method to acquire knowledge and skills by applying web technologies and tools in teaching practices. Essentially, web-based learning is treated under different interchangeable concepts as e-learning, computer-based learning, technology-mediated learning, etc., the meaning and basic principles of them are being the same. According to the paper “eLearning - Better eLearning for Europe” (European Commission, 2003), the use of the information and communication technology (ICT) is not in itself the goal of e-learning; e-learning has become shorthand for a vision in which ICT-mediated learning is an integral component of education processes and systems. Further, within the specialised literature, e-learning is recognized in the role of the learning on the web or the learning distributed mainly online.

E-learning types allow students to access learning materials and multimedia packages or to join courses by using ICT. The web-based learning environment could consist from a learning management system till of a large number of programmes and tools, like online degree programmes, joint online learning courses, Massive Open Online Courses (MOOCs), blogs, social networking, videoconferencing applications, messaging, voice communication. In short, skilled learners could widely use a mixture of programs in the virtual world to complete their tasks and solve their problems.

The experience of implementing a WBL via relevant systems in the last years demonstrates great benefits for the teachers, students and academic institutions. Yet, the topic of how to develop principles or benchmarks to ensure the quality of web-based education is still new.

One of the initial studies produced by The Institute for Higher Education Policy, USA, designed the quality assurance benchmarks including such topics as course development, faculty training, student services, learning resources, infrastructure, and outcomes assessment (Phipps & Merisotis, 2000). Also, in the last decade, in order to underpin better use of ICT in the context of adult learning The Renewed European Agenda for Adult Learning (2011) defined the focus for new technologies “as a means of widening access and improving the quality of provision, e.g. by exploiting new opportunities for distance learning and the creation of e-learning tools and platforms in order to reach new target groups, in particular those with special needs or who live in remote areas”. The study “European Exchange Mechanisms for e-Learning Content and e-Skills Development” (2010) specified the need to support at the EU level the activity of “*promoting better and greater use of e-learning by: promoting the development of courses and mechanisms facilitating the exchange of e-skills training resources; supporting the networking of e-learning and training centres with the European Network of Living Labs and promoting successful e-learning strategies*”.

Generally, the effective integration of the web in education is a complex, multi-component process, involving not only the initial capital for technologies but organisational and managerial, curricular and pedagogical aspects, learning theory approaches and issues as well.

2. Background

2.1. Research goal

Integration of web-based learning and knowledge construction applied in higher education is a process not sufficiently developed in the Republic of Moldova, that’s why it needs to be carefully

reviewed. Moreover, there are still a number of issues that restrict the use of e-learning throughout Europe as stated in The European-wide e-Learning Recognition Review Report (2015).

The study represents a theoretical research on designing a web-based learning model by using various aspects. The accent is on the elements that could be implemented in web-based learning relying on the association between e-learning strategies, pedagogical insights, collaborative learning techniques and organisational states. As more examples of these systems are elaborated in educational scenery, web-based learning will become an important part of the large spectrum of teaching activities and managing responsibilities, with particular attention to higher education. A literature review was undertaken to analyse the condition of research in the field of web-based learning. Then, a conceptual framework was developed based on the literature review in order to introduce the value of web-based learning in higher education. The paper is not giving empirical findings from larger research into web-based learning.

2.2. Literature Review

The study explanations regarding web-based learning features are connected with the general framework which supports the WBL design process. The development of web-based learning environments has affected the educational structures that support distance learning and lifelong learning programs by matching a large range of academic tools with digital communication technology. Learning processes organised by means of the web assist mostly a personalised and self-directed process of learning and enable students to study individually and more rootedly the interest areas. The web-based learning offers significant potential for the improvement of education but it is only a tool, and can only be useful if the educational goals for which it is used are plainly outlined.

Web-based learning is a broad concept relying on pedagogical principles. Govindasamy (2002) states that one of the most crucial prerequisites for successful implementation of e-learning process is the need for careful consideration of the underlying pedagogy, or how learning takes place online. One of the important outcomes of the WBL is the increase of communication and collaboration between teachers and students to exchange and share teaching / learning content and educational practices.

Referring to Cook et al (2010), the term web-based learning encompasses a broad range of instructional approaches (tutorial, asynchronous discussion, live conferencing, practice exercises, cognitive interactivity and presentation blending in with other instructional activities).

Instruction delivered through e-learning is relying on specific features introduced by Uzunboylu (2006), namely: (a) relevant content stated for learning objectives, (b) using of specific instructional methods, (c) media elements used to deliver the instructional content and methods, and (d) instruction is designed to build new knowledge and skills required to achieve individual learning goals as well as to improve overall organizational performance.

Wang & Jiang (2018) specified that a WBL action takes place within a large learning system that comprises learning management, content management, learning object libraries, and virtual learning communities.

Implementation of online learning is eventually being produced through the management of teaching and learning processes by the software known as Learning Management Systems (LMS) or

Content Management Systems (CMS). There are several environments that meet a set of features for creating successful web-based learning courses, for example: Moodle, TelEduc, BlackBoard, WebCT, Toolbook, TopClass Server, among others (Lopes, 2014). Steps required to install, design, and implement a LMS within an education organisation will cover aspects of software engineering methodology that it is up to a technology specialist.

The biggest challenge of a WBL system, in my opinion, represents the learning framework structured from a socio-constructivist paradigm in order to create flexible learning resources, learning diversity, learning practices and skills within a viable learning community.

The constructivist theory of learning distinguishes learning as a process in which individuals build their new knowledge based on the previously accumulated experience (Komulainen & Natsheh, 2008). The previous experience allows students to define new mental models and concepts and to build up a subsequent experience. Thus, knowledge is no longer passively received, and it is constructed through a process of active learning in which students acquire knowledge, build hypotheses, make decisions, and use their own mental models.

Issa et al. (2014) determined that a socio constructivist model defines three major elements: teaching, cognitive and social presence. According to Guo (2017), learning theories based on constructivist approaches value the student-centred idea, while teachers change from knowledge transmitters into knowledge facilitators who encourage students to learn knowledge construction.

A body of literature on e-learning practises provides a broader understanding and substantial experience of the activities related to pedagogy, the techniques of teaching, involving interactivity, collaboration, and unity learning (Thomas, 2014; Basak et al, 2016; Kahiigi et al, 2008; Hadjerrouit, 2010; Phipps & Merisotis, 2000; Suryawanshi & Suryawanshi, 2015). According to them, utilisation of e-learning environment enhances a modern communication link between teachers and students and ensures knowledge transfer to accomplish student personal learning objectives, as well it supports critical success factors like university support, computer training, qualitative learning resources, web-based technology awareness, ability, and skills.

In a great measure, development of a WBL model is passing through major implementations in terms of pedagogical issues, learning theories' priorities, quality assurance, educational leadership, ethical concepts, and learning patterns, presenting great opportunities previously unavailable for academic institutions in order to maximize their educational potential. These particularities pose a serious challenge to any organisation that supports e-learning technologies taking into considerations significant pedagogical principles of the LMS, managing teaching and supporting the instructional technology based on practical techniques of instructional delivery (Lopes, 2014).

Within the report "E-learning quality. Aspects and criteria for evaluation of e-learning in higher education" (2008, p.39), the model for quality assessment of e-learning comprises ten quality aspects: material/content, structure/virtual environment, communication, cooperation and interactivity, student assessment, flexibility and adaptability, support (student and staff), staff qualifications and practice, vision and institutional leadership, resource allocation, the holistic and process aspect. A combination of all of these aspects is necessary to align in a functional manner by adopting a systematic view and fit all parts in a coherent manner on the basis of the pedagogical philosophy (ibid. p.40).

Among the main features of e-learning systems, flexibility, accessibility, interactivity, constructivist approach, student-centred, the economy of resources, and motivation of students should be paid most attention to.

As a whole, the literature review reveals that underlying the web-based learning role for increasing learning processes demonstrates real benefits and opportunities for learner-teacher interaction and knowledge building. The flexible procedure that supplies e-learning should simplify the administration and management of teaching and learning.

3. A framework for designing web-based learning model

The review carried out on WBL features has led to the identification of the challenges to be faced when planning the design and development of a mechanism for WBL in academic institutions.

3.1. Strategic dimension design

Particular attention to research is to analyse WBL system requirements, thus easier understanding how to design an e-learning environment in higher education. In this regard, some frameworks are reviewed.

A strategic framework for designing WBL system by Asgarimehr et al. (2012) follows the viewpoint of e-learning tackling the aspects of cooperation, overlaps and matches three factors: government, industry and educational system. The authors pointed out the designing of any educational system should determine the mission and goals of the institution because it directly influences the educational system's pattern. Regarding a higher education institution, its framework should design and include the main components, namely education, research, and entrepreneurship. According to the report "An e-learning strategy to promote technology enabled learning in UCC" (2012), the strategic direction of e-learning should be guided by pedagogically-led and learner-centred approaches that gain advantages from the enabling role of technology to increase learning environment and support dynamic capability and diversity across academic institutions.

Tsai' model (2009) illustrates four dimensions of the characteristics of e-learning environments and three core domains (perceived-skill, affection and self-regulation) of student e-learning metacognitive strategies: (1) flexible time and space, (2) indirect social interaction, (3) abundant information resources, and (4) dynamic learning interfaces. He proposed this model to describe how students interact with complex e-learning environments when they are involved with web-based learning.

Grani and Cukusi, (2007) presented the results of the comprehensive study related to the design of UNITE's pedagogical framework that consists of five components: (1) pedagogical framework context, (2) pedagogical approaches, (3) assessment techniques, (4) teacher training and (5) current pedagogical practices implemented in national curricula, and national specifics.

The most complex framework for designing WBL system was introduced by Khan (2001). He described factors that help to create a meaningful learning environment, and put them into eight dimensions: *institutional, management, technological, pedagogical, ethical, interface design, resource support, and evaluation*. Each dimension has several sub-dimensions focused on a specific aspect of a WBL environment.

A model by Issa et al. (2014), more intuitive for higher education, is able to create a learning community capable of collaborating at all levels: administration level, program level, instructor level, course level, research level, and student level. Figure 1 exemplifies the correlation between major system's components in a networked learning community.

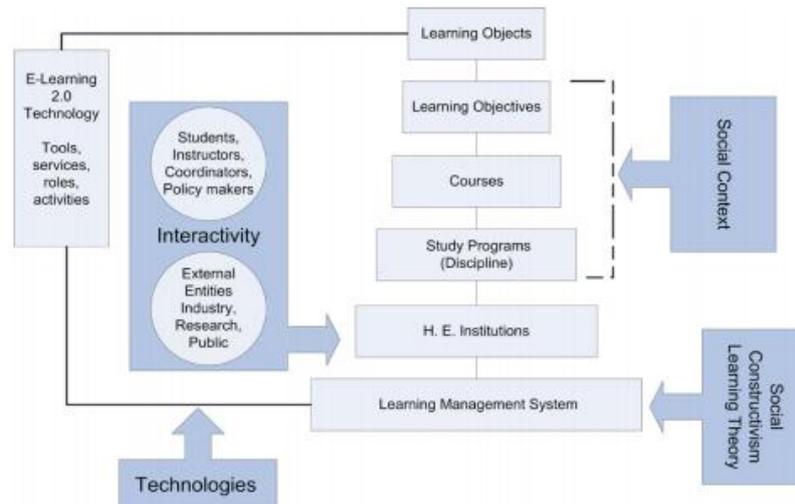


Figure 1. Framework for Networked Learning Community (source: Issa et al., 2014)

Taking into account possible combinations of presented models, it could be concluded that principles of WBL make use in case of a pedagogical framework that enables the creation of a set of specific features, which run and guide e-learning scenarios and outlines.

3.2. Constructivism in web-based learning

The principal ideology of learning theories presents learning as a process that helps a person to understand, process, and retain knowledge during learning. Although there are many different approaches to learning, here it is analysed one of the basic type of learning theories - the constructivist approach. Further on, an overview of some of the web-based learning methods assisted by this theory is presented.

Constructivism highlights the value of the active self-involvement of students, thus managing and encouraging personalised learning activities via collaborative learning within social contexts. Kahiigi et al. (2008) specified this type of learning facilitates critical thinking and problem solving, helps build new ideas using previous knowledge and experience attained, and implies students to take on the responsibility of learning by actively participating in the learning process.

Hadjerrouit (2010) analysed the main features of WBL resources that in the pose of instructional content or activity delivered through the Web represent a focused concept, meet specific learning objectives and provide a learner-centred context.

Knowledge construction within WBL refers to the process of developing ideas, attitudes, and beliefs as a way by which a learner produces and links its new knowledge understandings with existing ones. In terms of knowledge building and educational technology, WBL needs to imply the development of learning patterns, the combination of e-learning strategies, collaborative learning techniques and pedagogical insights.

To design effective WBL environments, the university curricula needs to be adapted specifically and every teacher should be aware of what and how students will construct their knowledge. In this context, there are specific pedagogical methods which help teachers become active facilitators and, respectively, students become active participators in a web-learning environment. In my opinion, cognitive constructive schema of e-learning could be transformed into the base of *problem based learning*, *inquiry based learning*, *discovery learning*, and *knowledge building*.

It was mentioned above, a whole range of information systems and processes that contribute to web-based learning is provided by online learning services for students, teachers, and administrators like LMS or CMS. These web-based systems combine managerial, administrative and educational functionalities.

An example of such systems, very popular within Moldovan Universities, is Moodle, a free and open-source Learning Management System that is elaborated to facilitate the collaborative creation of content, organisation, control and to manage the publication of documents in a centralised environment. Moodle contains strong tools that contribute to enhance learning pedagogy and provide a personalised learning environment. Also, Moodle interface and educational design is oriented to *social constructivist* approach of learning. A comprehensive set of interactive tools and activities such as glossaries, choices, assignment, forums, wikis, game incorporated technologies, workshop, quizzes, database activities and others help students to become active learners by discovering and constructing their knowledge. All these interactive instruments are learner-centred. Content delivery could be sequential and linked to each lesson. Every unit could rely on some activities (workshop, glossary, lesson etc.) or assignments that help students work toward finishing the topic unit. Casas (2006) suggested that adopting and weaving constructivism into the course design provide students the opportunities to construct their own knowledge by using their different cognitive abilities to learn and interact with peers, teachers, and students.

In brief, this study specifies that the effectiveness of knowledge construction is a dimension that is crucial to any WBL environment and should be implemented as a unique combination of pedagogical, social and technological components by means of a Learning Management System. Learning environment insured with a range of social activities like group collaboration, seminars and workshops, group discussions and others contributes to knowledge building and discovering. As a result, due to important pedagogical and managerial features many Moldovan higher education institutions have adopted WBL platforms in their curricula to transform and renew the traditional teaching and learning strategies.

3.3. Features of web-based learning

As a result, to highlight features and insights of the designing of the WBL environment, in table 1 a matrix of the WBL particularities based on organizational, technological, pedagogical, and contextual interpretations and statements was summarized.

Inevitably, the complexity of WBL within the higher education context implies transformations of organisational structures and new methodological visions. Over the last years the structural challenges in Moldovan higher education institutions have particularly been assigned to the introduction of technology. To this consequence, web technology has broadly ameliorated knowledge acquiring practices and learning techniques, as well as influenced the barriers of rigid organisational systems.

As-pects	Particularities	Actors' interactions	Description
organisational	<ul style="list-style-type: none"> - Collaboration network - Group management - Administered lessons - Learning community - Environment for socialisation - Research groups - Sharing teaching and research experiences 	University administration and teachers, students, community (stakeholders)	E-learning foresees an organisational framework for systematically analysing student web-based learning strategies. How online learning carries and how students interact with specific learning systems should be the tackle and adoption of a general university procedure that defines e-learning methods used to transform and support teaching and learning processes within the institution.
technological	<ul style="list-style-type: none"> - Design stage - Software development methodology - using a LMS or CMS as one network - flexibility of user access 	ICT staff, University administration and teachers	From the technological point of view, WBL use ICT and Internet services as delivery tools, viz. servers, LMS, CMS, Web 2.0 tools, browsers, e-mail, scripting languages, file transfer facilities, etc.
pedagogical	<ul style="list-style-type: none"> - Study programs - Learning theories and Metacognitive knowledge - Flexible course development - Pedagogical scenarios - Unified course approach - Learning outcomes - Interdisciplinary thematic topics - Best practices in teaching and learning according to national and international standards 	University administration, teachers and students, researchers and practitioners	Learning performance of students is enhanced by taking into consideration that students learn in different ways suitable for the different learning methods of learners. The learning process results from a "thinking struggle" of the students' perception of the reality. By carrying out a significant number of learning activities and participating in interactions to reflect their understanding, students are prepared to gain new knowledge and skills. Hence, the learning style must be differentiated, personalised and knowledge based.
contextual	<ul style="list-style-type: none"> - Available resource - Multimedia files - Scientific approach - Self-awareness and self-monitoring - Attitude and motivation - Study group interaction and communication - Peer and self-assessment 	University teachers and students	The active part played by students to task the information depends on the quality of the delivered context. Also, the amount of knowledge students own has an impact on their learning styles. Students study in different ways and the manner in which information is given out to them influences their capacity to learn. The constructivist e-learning systems should give the students opportunities for meaningful and self-directed learning and for views independent from the teachers and other students and offer chances to experience learning as a process allowing to improve self-efficiency in a specific field, e.g. by setting suitable tasks, by developing active learning and problem-solving strategies.

Table 1. Web-based learning paradigm

According to national educational provisions, in the Republic of Moldova during the last five years, a range of national strategic policies was launched by the Government and Ministry of Education, Culture and Research concerning the ICT implementation in the field of education and the management requirements to address new challenges. These documents mostly specify the national problems regarding the priorities of the growth and extension of the education system of the republic and indicate the lacks in this domain. The Education Development Strategy for 2014-2020 „Education 2020” (2014) (Strategia de dezvoltare a educației pentru anii 2014-2020 „Educația 2020”), states clearly that “Limited application of interactive ICT methods and devices for didactic and management purposes does not afford the achievement of quality objectives” and “Communication at school management level is dominated by classical methods of gathering information through paper-based information, and others. The use of ICT in the management of the education institutions would allow time efficiency and cost reduction. At the same time, it would allow the transparency of the educational process and organise the electronic books, the development and placement of digital contents and home works in electronic format so that they can be viewed by students and parents” (p.22). To ensure further solving and development of the stated problems, the Strategy establishes strategic development directions, here, it is highlighted “the efficient integration of information technologies in education” (p.49). The Code of Education (2014) (Codul Educației, 2014) is aimed at modernising the education system and aligning it with European standards, having the care of learning and teaching, research and development, management, internationalization, employability, student development, lifelong learning, quality assurance, accessibility, stakeholder-academia connection, and others.

As a whole, the national policies have so far concentrated on promoting the level of basic ICT skills among the teachers and students. Nevertheless, web-based learning processes and connected issues are not being discussed yet, and policies centred on specific features required for e-learning implementing have not been designed, the process remaining at the discretion of universities.

4. Practical perspective

The development of digital competence is interpreted nowadays as an important feature in the field of education, training and lifelong learning. One of the six main area of digital competence according to the European framework for digital competence DigComp is to produce and share digital content. Content creation concerns pedagogical aspect of the WBL too. In the context of applicability, DigComp could be used as a practical reference for the flexible course development of WBL.

In some cases, this part of the DigComp may turn out to be somewhat complex to perform, because web-based course design and bulding need to be addressed through various approaches, including pedagogical, administrative and technological ones.

5. Conclusions

The main study goal of this paper was to use the literature and personal experience to develop a framework of decisive elements in theoretical designing of WBL. To this end, the findings of the study highlighted the importance of pedagogical approaches and socio-constructivist learning.

As a result, the next conclusion can be drawn. The main factors that influence the design of WBL are the organisational, technological, pedagogical, and contextual approaches that rely on

interactivity, resource flexibility, collaboration and so on within a web learning platform. This conclusion is suited with features of the conceptual framework and literature review.

However, the paper is not providing empirical results from a bigger research of WBL in higher education. In this case, development of the elaborated framework will be considered within a new research, as well future study should also examine the connections between student online learning strategies and their online learning achievements.

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DIGITISATION AND SYSTEM INTEGRATION IN THE PUBLIC SECTOR – CONSEQUENCES FOR TEACHING¹

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Abstract

The digitisation of public sector ICT is driven by a number of factors, which are not altogether dissimilar from the private industries: Increased self-service via the Internet, the Internet of Things (IoT), real-time business intelligence and the advent of integrated information systems as the “backbone” of organisational ICT. This fundamentally changes the landscape of public sector ICT. Particularly the smart cities concept has become a main driver of this evolution, whereby the smart cities concept heavily relies on an intelligent infrastructure that is the large-scale application of IoT.

However, how does this translate into public sector-oriented education? This paper presents a university level teaching programme that covers the topics of integrated information systems for the environment described above. The paper deals with the research question how to embed such a programme in a conventional public sector-oriented university course programme. It details the didactic specificities and analyses the feedback from the roll out. It also analyses the prior knowledge required from students and the changes in other elements of a public administration course programme necessitated by a digitisation orientation.

1. Real-World Requirements

ICT in the past two decades generally saw the advent of several technological innovations that have had a considerable impact on business information systems:

- (i) Web-based information systems for customer self-service, whether for ordering, booking services or banking, effectively eliminating whole industries that had acted as intermediaries before (cf. travel agencies);
- (ii) A massive decrease in sensor prices which together with cloud services enabled the digitization of the infrastructure, both in manufacturing and in the city infrastructure (cf. [1]);
- (iii) In the past few years, real-time business intelligence (BI) has become feasible due to in-memory technology [3] that enables to analyse unprecedentedly large data sets in sequential mode without building pre-defined aggregation structures. [4]

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These innovations have also “arrived” in the public sector. Citizen-centric eGovernment enables citizens to quickly and time-independently process their requests and applications, however, it also means that citizens use self-service functions⁵. Sensor networks render a city infrastructure “intelligent” which then leads to the smart city concept, [2] whose data are input for real-time BI solutions. In this regard, public sector ICT has largely mimicked the evolution in the private sector.

However, sensor data, self-service input or the results of BI runs needs to be processed somewhere and linked to existing data. An example: Sensor input indicating that a spare part or component somewhere in the smart city is about to fail, must trigger a service order in the support system, probably procurement processes. The costs of such a service order need to be calculated and there has to be a link to the budgeting system. In the absence of such systems, the sensor input and related information will end up in nowhere. Digitisation hence organically requires system integration. The focus of such integration in manufacturing and logistics has been an Enterprise Resource Planning (ERP) tool (for an introduction cf. [5]). It combines information from accounting, materials management/procurement, manufacturing (where applicable), service management, sales (again, where applicable) and other more specific parts, such as project management. ERP systems also increasingly interact with BI applications both providing input for analyses and receiving analytical results – this works particularly well if BI and ERP system work on the same (in-memory) data basis, such as [6]. ERP systems are being used in public sector ICT, however, it is our observation that such systems are effectively used just for accounting purposes, and even within Accounting mainly for Budget Management and General Ledger (G/L) Accounting. This is of course not the point of an integrated information system. But it appears to be foreseeable that ERP systems already in place will also be used for other purposes, such as materials management and procurement.

These systems require the corresponding skills, most importantly (but not exhaustively)

- (i) Thinking in processes as well as tools and methods for process management;
- (ii) Understanding of process implementation in integrated and customizable information systems (a.k.a. ERP);
- (iii) Fundamental understanding of ICT technologies and their application including ICT risk assessment, such as cyber security;
- (iv) Techniques to structure and analyse large amounts of data including statistical methods.

What does this mean for public administration education, particularly on a university level educating the future leaders in public administration? Can education centred on blackboard and chalk stick prepare these future leaders in the civil service for their job? Even though the answer is obvious, the question remains how to “embed” these skills in a traditional public-sector university education. The remaining paper describes a teaching programme for the public sector application of ERP systems using SAP® ECC, however, it also advances the following refutable hypotheses as research question:

⁵ Useful when formatted data is collected via the web interface, not just free text, eg. via email.

H1: ERP-related subjects serve as a catalyst for curricular change in non-ICT-related areas;

H2: Public sector education while still being distinctly different from a business education approaches the latter in some key aspects.

However, before discussing these hypotheses, let us introduce the teaching programme developed.

2. The Teaching Programme Developed

2.1. The Content

The teaching programme consists of four subjects (two semester hours each), implementing a municipality *Civitas*. Subjects A and B have already been rolled out; the others have to be developed:

- A. Process and data modelling with Business Process Modelling Notation (BPMN) 2.0 [7] and Entity-Relationship Modelling (ERM) [8] followed by public sector budgeting with SAP® ECC, including budget execution and auditing in the municipality.

The prerequisites are knowledge in accounting, public sector budgeting, auditability principles and – like all the other subjects – a basic understanding of computing.

- B. The “service yard” (of *Civitas*) specifically for road cleaning as case study, that covers cost accounting, materials management and procurement as well as service orders (operations management and execution); also this section implemented in ECC.

The prerequisites are knowledge in accounting, materials management and basics of operations management.

- C. Real-time Business Intelligence for formatted data using in-memory computing for flexible analysis; this section will use SAP HANA.

The prerequisites are general knowledge of the public sector and accounting/budgeting.

- D. Real-time Business Intelligence for unformatted data using sound, imagery and video data and linking the data to the formatted data, again implemented in HANA plus tools for tagging analogue data.

The prerequisites are general knowledge of the public sector and data protection rules.

Development of Subjects A and B has been concluded and the subjects rolled out at several institutions in CEE: The National University of Public Service (NKE) and the University of Technology and Economics (BME), both in Budapest, the National Public Administration Academy (AAP) in Chisinau, the University for Public Administration and Finance (HVF) Ludwigsburg, WU Vienna. Except for one, these institutions engage – either exclusively (AAP, NKE, HVF) or at least also (WU) – in public administration education on a university level. Only BME offers a

technically-oriented education and will hence not be considered any further.⁶ Lectures C and D are to be developed in a “second wave” of curricular development.

Considering the programme in its entirety the requirements are (i) accounting/budgeting, (ii) materials management/basics in operations management, (iii) basics in ICT and – if the first course mentioned is not done – also (iv) process and data modelling/management. These elements are arguably not standard elements in public sector education.

The lectures are hands-on and every student implements the respective case study in his/her own virtual municipality. Each subjects are implemented in ICT tools: (i) for process modelling Adonis[®] modeller, (ii) for data modelling Visual Paradigm[®] and for the other elements SAP[®] ECC and HANA. They are accompanied of a host of ICT tools, that is Web trainers for data and process modelling, screen cam shows of decisive or error-prone steps in the process implementation and a text book detailing the implementation steps and which can also serve as a reference later on, when students again encounter such topics. The materials are available in English, German and Romanian.

2.2. Development of the Content

The universities originally participating in the programme development of Lectures A and B agreed on a detailed syllabus and a “storyline” of the case study in each lecture, whereby the storylines of the lectures of course need to be reconciled to enable the creation of big picture of the case. Lectures C and D are to be developed along very much the same lines.

Each lecture was piloted at least once, original language of development and piloting was English (for the very practical reason that English was the only language understood by all partners); the German and Romanian versions were derived thereafter. At the end of each pilot, feedback meetings were held including attendees in the pilot lectures. The feedback was included in the lecture design. This did not only comprise didactic issues but also mistakes in the case or the storyline. Only after stable state for the cases had been achieved, the English-language book was concluded [12] and the other language derivatives written [13, 14].

Technically, the content is implemented in two master clients in SAP ECC, which are copied into the operational client systems, where the lectures are then held.

2.3. Multi-Country Content

The course programme, from its very inception, was designed to be usable throughout the Danube region. The obvious issue in this regard is the language topic. However, other topics at least equally momentous include

- (i) Currencies and national calendars (the latter quite a common entry in logistics as it determines the factory calendar for scheduling): Our solution was to choose EUR, even though two of the original partner countries do not have EUR as currency; the Austrian industrial calendar was chosen as default.

⁶ In some respects, the issue at BME is the exact inverse of the issue discussed in the paper; at least one course that requires strong public sector knowledge (that is Course A) is offered to students who are not trained in this direction.

- (ii) Naming; each case study needs actors in the storyline including actors already created in the system: Our solution was to choose Latin names as this is some kind of common denominator in Europe.
- (iii) VAT treatment of invoices, i.e., whether VAT is deductible or not for public sector entities (key in accounting/budgeting, not so relevant for logistics); also rates vary, of course: Our solution was to show and prepare both variants in the system and let the lecturer choose, the VAT rate chosen was 20% (Austria and Moldova).
- (iv) General legal provisions about how a municipality works, which units it comprises; as an example, municipalities in some countries have police units, others do not, some maintain their own cadastres, etc.; also the fiscal transfer is organised in vastly different ways: Here we ran the very real risk of being confronted with criticism that the case study to be implemented is not “right”. We countered the risk by picking areas as neutral as possible and by pointing this issue out prominently.

Particularly Issues (iii) and (iv) constituted the main topics in this regard.

In ERP-/SAP-based business education, these points are either non-existent or play a much smaller role. For, instance VAT treatment plays a very minor role in courses focusing on cost accounting and logistics (the issue, for instance, never even occurs in Course B). Also (best practice) business processes in logistics/production/project management/etc. are the same everywhere; consumption-based materials management, for instance, is the same whether done in Stuttgart, Vienna, Budapest or Chisinau. Processes in public administration however are determined by national legislation to a much higher extent, which makes design of such case studies a lot more demanding – and sensitive because ultimately students have to accept them as useful for their settings.

2.4. Rollout

A core issue with any curricular development project is sustainability. To achieve this, local teaching personnel must be found and educated that (i) has a long-term perspective in the respective teaching institution, (ii) has the necessary pre-requisites and (iii) is intrinsically motivated to absorb the knowledge necessary to effectively teach the subjects.

The dissemination approach we chose and which proved itself was to hold a first – pilot – lecture with our staff and the prospective lecturer/s attending as students. Lecturers could also go through the subjects and practice by themselves after the lecture familiarising themselves with the content. The second lecture of each type was then held by the local lecturer/s with one of the developing staff in attendance. From the third “run” on, lecturers hold the subjects themselves. They are also free to adapt the transparencies to their specific needs.

Key element in the successful dissemination is a lecturer guidebook. This guide informs lecturers about typical issues during the subjects and how to solve them. This concerns issues behind the scenes of the case study. One example: When a material master in ECC is created using a template material, creation is facilitated to such an extent, where only few entries in the new material master need to be made. The material master has – depending on the material type – about 10 to 20 “views”, i.e. tabs of data. This may lead students to skip most of the tabs and only visit those tabs that need data modifications compared to the template. This procedure however leads to huge gaps in the data created, which in turn may cause errors later on, which may probably not be associated

with missing views in the material master and can cause an awkward standstill in the lecture. In the guidebook, lecturers are alerted to the issue, it is recommended to instruct students accordingly and there is information on how to fix the issue if it occurs. There are a large number of such issues an experienced lecturer has quite naturally come across and has learned to handle, but where a lecturer new to the topic needs guidance.

The guidebook also informs about background information variations to the case study and legal variations in the respective countries (which are included in the guide).

Let us now get back to the hypotheses listed in the first section and see how such a course and an established public sector course programme may interact.

3. A Closer Look at the Prerequisites

3.1. The Process View

In many cases public sector education appears to be legally oriented and focused on structures and cases. A procedural view of the Law in general and of administrative regulations in particular is not standard. However, a legal regulation can always be seen as a process – and it arguably helps to see it as a process (for an example see [9], [10]). For students of Business, process modelling and process management have become a standard feature. At WU Vienna, for instance, every student of whatever course programme has to pass “Business Information Systems I” very early on in the respective course programmes, where event-driven process chains [11] are taught. In public sector-oriented education, a process view on activities is often missing, where the lectures introduce not only a new topic but a radically different view on the entire discipline.

3.2. The ICT View

“eGovernment” has become a buzzword in public administration, however, many pertinent education programmes do little to prepare students in this regard. However, we maintain that a profound ICT education is an *essential and integral* part of any public administration course programme. This not only concerns an introduction to web applications and digital signatures/eID/registers behind the eID, but also to topics, such as data protection, cyber security and intellectual property rights in cyber; the latter three could be considered part of IT management, which of course also encompasses more traditional items, such as life cycle cost assessment for IT projects, IT project management and IT procurement. Also base technologies, such as IoT should be understood. Some methods, such as process modelling, often associated with ICT are in fact general business/organisational methods that can be used completely disassociated from any ICT application, for instance depicting a legal process as such to better analyse it.

Hence, integrated information systems are only one of many topics, but may serve as an introductory initiative, much like a “feeder”, to introduce a broader technology orientation in the curriculum. This leads to an ICT common body of knowledge, which as we believe should be defined for each public sector-oriented course programme ranging from the “basics” of web/IoT technology, registers and eID to IT management in a broader sense.

3.3. Accounting

In our experience, accounting knowledge is quite broadly taught in public sector education course programmes and hence accruals accounting and budgeting can be pre-supposed as common knowledge. This applies less to cost accounting which may be offered in a preparatory course. It should be noted that – completely in line with private sector accounting practices – also the public sector is moving to the triad of cash-based accounting (classical “cameralistics” budgeting) – accruals accounting with periodicity – cost accounting; cf. as an example the Austrian Bundeshaushaltsgesetz BHG 13⁷ which obliges all federal agencies to provide this triad.

3.4. Logistics

Logistics is an area, where organisations may gain or loose substantial amounts of money (cf. [15], Chapter 1.6 and 6.4 with examples). The more ICT-based systems are used to manage logistics the more advanced concepts of materials and operations planning may be implemented, methods which on a paper or near-paper basis (think MS Excel) are not viable, which however become viable in state-of-the-art ICT systems.

We observed that classical public administration course programmes provide little to no introduction to these concepts. Here a lot of future optimisation potential is lost due to the fact that next generation public administration leaders simply are not aware of the potentials to optimally organise and run their logistics and operations.

4. The Hypotheses Revisited – Embedding ERP in a Course Programme

Returning to our hypotheses advanced in the introductory section, we can now clarify them:

H1: In Section 3, we identified at least three areas, where ERP-based teaching content requires or at least promotes non-conventional content for public sector education: process management, ICT common body of knowledge and logistics.

H2: We also hold that these items, which are standard curricular items [16] in business education will also become standard features in public sector education. This will not negate the specificities of public sector education. However, it will tend to bring both strands of administration education – business and public administration – closer together.

It will be an interesting and worthwhile task to test both hypotheses, once a sufficient data set of pertinent course programmes will be available. However, if H2 will turn out to be valid, ERP-based education will have played an important part in this educational transformation and will have made public sector education “fit” for the new century.

⁷ Bundeshaushaltsgesetz 2013, download from <https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20006632>

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CRITICAL SUCCESS FACTORS OF TEACHING INFORMATION SYSTEMS AND ACCOUNTING AS AN INTEGRATED PROGRAMME

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Abstract

This paper has been written as a part of an international educational development project deployed in Germany, Moldova and Austria. In this context we explored through two cases how students can be taught at university level for the use of Enterprise Resource Planning and accounting by using an integrated approach. We identified four success criteria to deploy such a program, and systematically analyzed them in a Hungarian and German setting. Our findings confirmed that the role of instructors, the educational background of students, robustness of technology (hardware and software) and the physical facilities all contribute to the efficiency of the learning experience.

1. Problems of decision making in Public Administration – the gap in ICT and accounting skills

Digital transformation – that is the ubiquitous penetration of information communication technologies (ICT) – has transformed several industries and disciplines. Public administration processes, central and government services are being redesigned and re-conceptualized thanks to several ICT innovations in service delivery, e-participation, e-cohesion and government e-platforms [4]. With the commercially available data analysis, artificial intelligence and user-friendly information systems, however, the issue of re-conceptualizing decision support is becoming also a relevant and feasible question. Particularly, the use of accounting data for evidence-based decisions seems to be finally feasible for a wide range of administrators and managers thanks to the overabundance of tools. According to several sources, the key challenge of ICT supported decision making – especially in the areas of costing and budgeting - has been transferred from the lack or inappropriateness of methods and tools to a new bottleneck; to the necessity of developing skills to combine ICT usage and accounting in a seamless and integrated manner for a wide variety of professionals.

In our paper we argue for the need of new concepts and methods to prepare the future generations to meet this challenge, basically by gradually breaking down the silos of classic disciplinary approaches to teaching information systems and cost accounting. While traditionally, both topics have been taught by separate departments and using different curricula enabling students to deepen their knowledge in both areas, the linkage and pragmatic skills to bridge these two field has been tremendously missing, and causing the widening of the cognitive gap between accounting information and managerial decisions.

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We compare two concrete cases in two different environments for introducing a university level course to teach the use of information systems and cost accounting in an integrated manner. The first course ran at the Budapest University of Technology and Economics (BME) and the second at the University of Public Administration and Finance in Ludwigsburg (HVF). The course has been developed by two experts who have rolled it out in different countries and different educational institutions based on *Integration management with SAP ECC: implementing ERP software in a manufacturing company* [1] and give a detailed account of their experiences in this conference volume.

Our research question in this paper focuses on identifying the critical success factors of deploying such a course, by exploring the role of instructors, students, the technological conditions, and organizational aspects, in order to formulate hypothesis for further testing. Using the two cases, our objective is to fund an action research strategy to systematically develop skills for evidence based decision making using ICT and accounting.

The next sections of the paper are structured for discussing the followings. In the second section we present the key areas of the two disciplines – information systems (especially the so called enterprise resource planning applications) and accounting – from the point of content and their educational challenge. In the third chapter we provide an initial list of success criteria for teaching the program, basically as we encountered them by observing the two separate cases. During the fourth section we discuss how these factors had been treated at BME and HVF. Finally, in the last part we summarise our conclusions and implications for further research.

2. The two foundations for effective financial decisions making: information systems and accounting

2.1. The concept of Information Systems and Enterprise Resource Planning

The concept of information systems and their use in supporting decision making is a fairly old concept and has been discussed in several disciplines from decision science, through process analysis, all the way to corporate management [5]. Especially, in this latter context, the notion of Enterprise Resource Planning (ERP) has gained wide practical recognition, covering the notion of organizing information management based on an integrated, robust database which not only connects separate functions and levels of the particular organization, but also contains best practices and a wide industrial know-how encoded into the actual systems. Therefore, organizations who deploy ERPs not only embark on a system implementation projects, but very often face the challenge of redesigning their process or business practices based on what ERPs have to offer. [2] Enterprise Resource Planning system is quite complex, but there are few of them which are extremely multiplex. For little firms, ERP can be excessive, or maybe a simple one is sufferable but for multi-corporations is evidential to use. They can have hundreds of vendors, distributors, consumers and other partners in the supply chain, and it would unimaginable to control them one by one. The bigger an enterprise is, the more complex ERP system they usually have. One of the biggest, and famous software in the ERP fields is the SAP and many corporates use it like Audi, Mercedes, Vodafone, Xerox, Airbus, Coca Cola along with other.

The basic motivation for the enterprises to use that system is to control and follow every step in the supply chain, reduce cost and maximize profit at all level. In the system all account events are recorded from purchasing to selling which is largely dependent on the integration of different components.

An effective part of an ERP is the so called Material Requirement Planning (MRP I) which is also an important element in our study. Its features are:

- a) MRP comes across with demand of end-products broken by periods (Production Scheduling),
- b) system notes down every part of each end-product (Bill of Materials/BOM),
- c) type and amount of inventory (Inventory Management)

This function has its developed version, a more detailed one which is called Material Resource Planning or MRP II in short which:

- a) contains every feature that the MRP I has
- b) completes it with financial and marketing information
- c) Demand Forecasting
- d) Scheduling of Machine Capacity

ERPs have other powerful modules such as Customer Relationship Management (CRM), Supply Chain Management (SCM) and from our course point of view Accounting and Reporting elements.

In our case study, we focused on what financial accounting information is needed before making an investment decision, and how we can effectively put it into the service of managerial accounting. All this requires the use of advanced integrated information systems capable of providing instant information and transferring information to the right decision-making location.

In order to explore the issue and to understand its relevance we conducted a pilot survey in one of Hungary's leading higher education institutions (BME), involving a heterogeneous group of students who came from different countries of the world with different IT and financial skills. Additional questions included:

- What IT parameters should be in possession for the introduction of a relatively simpler information system,
- What IT preparations are required to implement the system,
- What professional (IT, financial, accounting) skills they need to have.

2.2. Financial Accounting and Management Accounting in the light of Reporting and Controlling

In Figure 1 we summarized the interrelationship between the three key concepts of accountancy and reporting: how financial accounting, managerial accounting and controlling are connected. The main focus of financial accounting is the accountable reporting of profit-and-loss statements mainly for external stakeholders, while management accounting puts decision making in its center based on the principle of responsibility, on the appropriate cost and performance system, and on the design of investment calculations.

The task of controlling is to continuously compare the planned costs, revenues, performances with the actual data, analyze the differences, explore the causes, and suggest possible measures. The controller's work should pay particular attention to the reliability of data, the correct choice of the methods used, and the credibility of results ending up in correct conclusions.

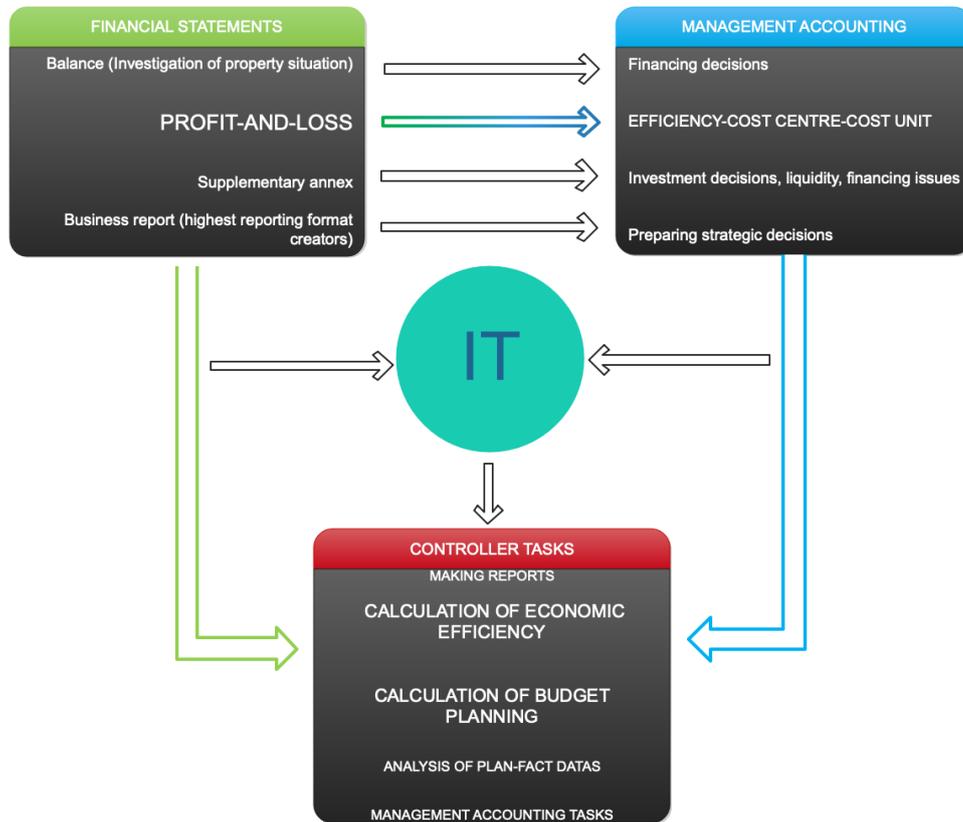


Figure 1. The relationship between financial accounting and management accounting in the light of controller tasks

Both in the education process and in the practical approach to accounting it is essential to draw the attention that revenue does not necessarily mean that the money has been received – cash on hand and revenues are two separate issues. Same applies to costs and expenses, since the outflow of money does not necessarily means that it appears as an expense immediately. From this point of view, in accounting, economists prepare their statements of revenue, expenses and investments according to the period in which they occurred, not taking into account whether the items are credited or charged.

For example, in the case of investing into a new service system management needs to pay out cash, but this only appears as an expense when it is put into operation, basically at the time of depreciation. The effectiveness of management decision in this case is assessed by developing cash flow models, therefore it is also important to quantify the factors influencing cash transfer. It does matter, indeed, whether an organization, is likely to pay for its obligations on time (coordination of timing of aligning its receivables and liabilities) or its investments are postponed, or facing liquidity problems irrespective of the investments – since these problems do not affect the economic value of the investment.

In order to assess cash situations managers need use the *cash flow statement which compares cash incomes and money outflows* for a particular period. It is not simply a reflection of the changes in the volume of funds, but it is also suitable for discovering the causes of change. Cash flow statements provide important information for management for two reasons. On one hand, management has a legitimate expectation that it wants to know how cash stock has developed and, on the other, the cash status is essential for the planning of expected cash incomes and outflows and keeping the money funds at an optimal level.

3. Preconditions of integrated SAP course

We identified four main success criteria for running an integrated ERP/Accounting course successfully based on the experience at BME: the pivotal and unique role of lecturers, the preparation of students, quality of technology and the physical infrastructure.

3.1. Lecturer(s)

When an institute considers organizing any a course the first major issue is who is delivering it, who is the lecturer. A lot of things depend on her/him like the mood of class, the amount of requirement and so on. Sometimes the students choose a course by examining who the instructor is. The more effective a lecturer is, the more popular the course is.

But what about the number of Lecturers or what about the field of expertise? These also need to be decided before an Institute intend to organize an SAP Course. The panel of Lecturer(s) should contain 1, 2 or maybe some of them. As we pointed out SAP is an ERP system, which requires both Information Technological and Accounting cognitions. For a person who will teach this type of course, both topics need to be familiar. In any case, for instance in software-configuration, in administration and in tasks related to the server side, it is good when the teacher knows what and how to do or repair. Let's suppose the client software lost connection or firewall blocks the system, an IT expert will be needed. On the other hand, maybe more important factor is the knowledge of accounting and controlling. Imagine what would happen if a teacher needs to explain the background of the bookkeeping or the cost centers without any accounting-related practice. These examples clearly show how important for the Lecturers to have both accounting and computer science experience.

At the best of times, the most practical version is when the lecturer has knowledge in both fields, if not, the course requires at least 2 people to teach: one IT and one accounting professional. As Brown and Atkins said, the lecturer's preparedness is the principle of quality:

"... clarity of presentation, structure, and expressiveness are key factors in effective lecturing." [3]

3.2. Participants and their educational background

Students who attend this type of class can be professionals or beginners. Professionals might be experts in computer technology or in accountancy, or even individuals who are willing to work with ERP systems. In the most of the cases the audience is non-professional and this presents the difficulty of lecture. Prior to the course, students had a few hours of basic controlling knowledge education. In the framework of the basic controlling knowledge education we focused on the conceptual definition of revenues and costs and cash flow.

Although the courses have been successfully completed by everybody, we assume that a more comprehensive financial and accounting knowledge would have contributed to a better understanding of the case study.

Control groups by education level	IT knowledge	Controlling knowledge	Accounting knowledge	Paper-based solution	MIS
Undergraduate	basic	basic	none	no	yes
Undergraduate	basic	basic	none	yes	yes
Economics	basic	basic	high level	no	yes
Economics	basic	basic	high level	yes	yes
Computer science economist	high level	basic	none	no	yes
Computer science economist	high level	basic	none	yes	yes
Computer science economist	high level	basic	high level	no	yes
Computer science economist	high level	basic	high level	yes	yes

Figure 2. Background knowledge summary of the participants

3.3. Technical background

Another impart element of a course is the ICT. A theoretic accounting lesson can be held only by its lecturer, but a lesson about SAP definitely not. The further subsections will reveal more details about this type of preconditions.

3.3.1. Hardware

It does not matter the computer is a PC or a Laptop, both can be proper to use. Few conditions are important to have for the organizer what they should check in advance.

SAP GUI (Graphical User Interface) requires optimally:

- a) 1 GB of Memory or more
- b) 1 GHz Processor or more
- c) At least 1 GB of Hard Disk, but it is closely linked to the components what he users want to install apart from the basic User Interface. A component is for instance Adobe LiveCycle Designer to implement automated forms.
- d) A display is necessary for the user to see what he/she is doing.
- e) A mouse with keyboard also beneficial to control the processes.
- f) A projector, what is very useful for the Lecturer to show and share her/his screen with the audience in order they see every step during the course.

The prerequisites mentioned before are easily feasible in the XXI. century. Maybe very few of the organizations have old technique whose devices are not enough up to date.

3.3.2. Software

When the hardware side is ready to use, the IT admin should install some software. Each of them is equally necessary, and the lecture makes sense if these software applications are set up.

- a) First of all, one thing is very important and should be ensured. This important factor is the operation system of the computer which must be Windows. From Windows 2000 to the newest is adequate, it is only up to the version of the next important software.
- b) The next software is the SAP GUI itself. It also has various versions, but for a course the students do not need the most recent one, for example the SAP GUI 730 services all the needs.
- c) Office package is recommended too, for example the GUI has a feature to export data to Excel or insert data to a formatted document in Word.
- d) Do not forget that scope is on the lecture and not only on the usage of SAP. We should think about the students and the Lecturers. One powerful tool is the desktop control wherewith the Lecturer can take over control of any computers in case of mistaking or lagging.

3.3.3. Other

Students often require notes or any other kind of curriculum. For those who attend an SAP Course for the first time, the Lecturer had better give them a support in need. However, it is almost impossible to hold a presentation, go to every person who left some steps and keep those interest who work fast:

- a) Before the users do anything with the computer, the Lecturers always give a quick insight to the theoretical side. For a better understanding, figures and tables could be very useful. This is called slides among these members.
- b) Experts' way of support during the usage of software is for example a guide book which contains all the arrangements, hopefully with a detailed explanation:
 - i. Printed version
 - ii. Digitized version, PDF for instance.
- c) The Lecturer must be aware of the whole curriculum but a failure can happen and for this case good to have the teachers' guide book. It should contain critical steps and their solutions.

3.3.4. Required knowledge areas in both fields

In the following Table we have summarized the minimum entry requirements/conditions of the course and also the expected outcome of students' knowledge improvement after the course.

Students had different backgrounds and educational experience – they come from different programs of BME. We think it is rather important in the future to create homogenous groups which in our opinion might influence the learning experience and obtained knowledge at the end of the course.

Field of study	Input	Output
ACCOUNTING	Revenues	<ul style="list-style-type: none"> • Net sales revenues • Contract revenues • Billing
	Expenses	<ul style="list-style-type: none"> • Cost allocation • Direct / Indirect expenses
	Materials, services	<ul style="list-style-type: none"> • Availability check • Price control • Gross / Net • Rebate • MRP • Semi-finished / finished products • Bill of Material • Depreciation
	Reports	<ul style="list-style-type: none"> • Invoices • Analyses • Interim reports
	Minimal user experience	<ul style="list-style-type: none"> • Basic configuration of SAP software • Usage of SAP software • System Thinking • Master Data • Transaction Data • Data flow
INFORMATION TECHNOLOGY		

Figure 3. Summarized input and output knowledge areas

3.4. Physical background

One factor during the organization of course is very critical and this is definitely the labor management.

Labor management appears where an Institute or its organizer Department does not have their own Computer Lab. In this case they must look for one, but it is harder than it seems for sure. Nowadays where the IT becomes one of the leading areas in the world, many people are interested in. That means the number of applicants is growing. Here comes the issue: the already installed Computer Labors has limited number of seats which ties their hands. The experiences show that they should see first where the course can be hold and check its limits. This limit is often about 15-20 people.

Another factor what should not be forget: the SAP GUI runs only on Windows operation system, so Linux, Ubuntu, Mac OS and so on is excluded. Programmers often use Linux system, designers and

modelers do often use Macintosh. If the organizer is about to hire a room from these areas of study, they need to fix every parameter before any preparation of the course.

4. Research: Case of BME & HVF

This section is about to compare two case studies of this research field. There were 2 SAP Courses in the near past with quite different circumstances. One course at the University of Technology and Economics in Budapest (BME) and the other one at the University of Public Administration and Finance in Ludwigsburg (HVF). Probably that based the whole research and caused the interesting results which can be seen in the table below.

Very important to mention that the BME is a technological University and its effect is obviously shown by the genders rate, 9 males and 2 females, summary 11 students. Mostly male Students choose to attend BME because of its profile and history, however it would be more desirable to increase the number of female students in order to popularize the idea to pursue a carrier in engineering. Well BME can be called a typical Technological University against HVF. In the course organized by HVF 33,3% of the participants was male and 66.6% was female, so 5 males and 10 females, 15 students at all. Here, another phenomenon can be observed: in the public administration sector traditionally more women choose to work, but according to the latest trends we see more men also in this field.

The participants presented above had a totally different educational background at the case of BME. They came from Mathematics, any kind of Engineering and Information Technology. Needless to say, these fields are a bit away from Finance, just a few of them had previously studied anything about Economy. On the other side, at HVF, the students were classmates, so they came from the same program. Their program is e-Government what means they had a deeper knowledge in economical fields.

Another area where the two courses varied is in the technological side. In Budapest the Labor was absolutely hi-tech with rather powerful PCs used for modelling, designing and programming. At HVF, there was a general PC rooms set up for normal users. The desks laid in parallel lines at BME and in "U" line at HVF. This factor has its effect on the ease of understanding. The Students who were not so familiar with the SAP system had a bit harder task, because they had not clear view to the Lecturer and to the screen due to the parallel lines and the PCs hid them. That caused a slower speed of learning and more questions about the handling of the software. The students, who stayed in "U" line and there was not any obstacle before them what could hide the screen and the Lecturer, had a quicker learning-tempo and quicker recognition. There was one more technological difference between these 2 studies and it was the state of software. In Budapest the SAP software was not installed before in the past, just set up for the duration of the course which caused a quite longer technical preparation. In Ludwigsburg the University has the SAP software installed in their PCs. This difference is caused by the course itself. At BME this course was the very first one about SAP, meanwhile in Ludwigsburg the SAP course is built in the program of the University and has been running for years.

The duration was the same of both cases. Twenty-four hours in 3 days, approximately 8 hours each. Beyond doubt this schedule is very intensive and hard to follow all around mentally, and it makes the participants work difficult. Couple of them with fewer financial background (BME) could not achieve successfully the SAP Course, exactly 8 had success in and 3 failed. The reason was following: at BME this course was optional and not built-in like at Ludwigsburg and another

Department arranged exams for some classes, few students were affected, needed to leave the course. At HVF all the students could pass the exam, 15 succeeded from 15.

Last difference of the 2 cases was in the number of Lecturers. At BME, there were 2 Lecturers at that period, but only one held the presentation simultaneously, so they changed each other systematically by the different parts. At HVF, there was only 1 Lecturer for the whole course. We can say, one person to hold the presentation is manageable, but it is tiring for sure to teach 8 hours a day almost in a row and 2 people could complement each other. This is why 2 Lecturers are preferred when a University consider to organize a course similar to this.

	BME	HVF
Students	11	15
Genders	M: 9 F: 2	M: 5 F: 10
Studies	Mathematics, Engineering, IT	Information Management, e-Government
Class room	Computer Lab with parallel lines	Computer Lab with "U" line
Technology	hi-tech PCs for designing, modelling	normal PCs for general Users
Software status	temporary	non-temporary
Organizations	not built-in	built-in
Duration	24 working hours	24 working hours
Successfully completed	8	15
Ideological approach of Students	technological, scientific	governmental
Number of Lecturer(s)	2	1

Figure 4. Comparison of Cases BME and HVF

In order to assess how much time does it take to prepare and run an integrated course, our research team have reviewed the time line and evaluated the entire project (Figure 4).

Without any doubt, the most time-consuming part of the Course organization was the searching of an appropriate Labor. It takes 5 weeks at all due to minor lack of information. This lack of information was come by the students, the participants who needed to consult with their other teachers about their program and we did not have any exact list of potential attendances. This results in 2 weeks of registration period within we also had to give some extra-basic information about accountancy in order to get any idea what it is. Prior to these 2 levels, we spent seven days with the agreement of the Lecturers about the course, the issue date, system requirements, etc. Right after we found an appropriate Computer room, a very important task had to be controlled: Software Installation. Of course, we set up one PC first and checked if it works or not, and after we getting aware of system's working ability. 19 PCs more continued (1 computer per Participants willing to join the course + 1 for Lecturers + few PC for safety reasons.) Last but not least, the next and last step was the course itself, 3 days as we mentioned before.

Project Timeline at BME

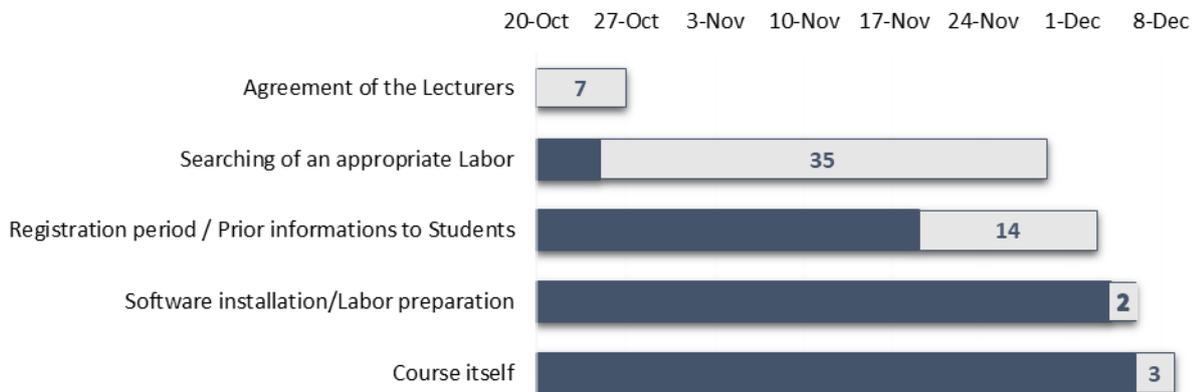


Figure 5. Project Timeline at BME

5. Conclusion

This paper has been written as a part of an international educational development project deployed in Germany, Moldova and Austria. In this context we explored through two cases how students can be taught at university level for the use of Enterprise Resource Planning and accounting by using an integrated approach.

We identified four success criteria to deploy such a program, and systematically analyzed them in a Hungarian and German setting. Our findings confirmed that the role of instructors, the educational background of students, robustness of technology (hardware and software) and the physical facilities all contribute to the efficiency of the learning experience.

Although, the original course has been developed for the purpose of public service education, we did find that the idea of integrating information systems into accounting education vastly improves the attention and interest of students in an engineering environment as well. The two cases serve as a convincing foundation for further developments and experiments for ICT and accountancy skill and knowledge building in order to improve evidence-based decision-making aptitude of future managers both in public and profit organizations.

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E-DEMOCRACY AND E-TOOLS OF CITIZEN PARTICIPATION ON LOCAL LEVEL IN POLAND

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Abstract

The development of information and communication technologies (ICT) brought many changes in various areas of human life. Also, democracy is being influenced by the use of electronic communication technologies, such as the Internet. ICT's impact on democracy and participation has led to the emergence of specific tools that allow citizens to use electronic tools of political participation. The use of technology in politics is a fascinating example of interaction between technology, public policy and also public opinion. How the law and society respond to advanced technology is worthy of study, particularly in countries, where e-tools of people's participation are becoming more and more popular among certain groups of political actors. The application of information and communication technologies in political decision-making processes in Poland is relatively new phenomenon – we may say that it has been observed for not more than 15 years. This paper will analyze Polish local practices and also attitudes of the Poles towards selected e-tools of civic participation on local level. Findings presented in the article prove that it is worth to consider the implementation of new participation solutions, since the society is interested in new convenient forms of participation in public life – not only on the local level but certainly also on the state level as well.

1. Introduction

Due to a very rapid development of new information and communication technologies, particularly the Internet, for several years now, modern technologies are used in democratic governance. Undoubtedly, this translates into a new quality of political phenomena. ICT's influence on democracy and participation has led to the emergence of specific instruments that allow citizens to use electronic tools of political participation. Over the last decade we have observed a growing awareness of the need to consider the application of the ICT for participation allowing the citizens to contribute to democratic debate and to express their views in popular votes. Thus, one may state that the use of technology in decision-making processes is a fascinating example of interaction between technology, public policy and also public opinion. How the law and society respond to advanced technology is worthy of study, particularly in countries, where e-tools are becoming more and more popular among certain groups of political actors. The aim of the paper is to discuss the use of e-tools of participation on local level in Poland. This paper will analyze Polish local practices and also attitudes of the Poles towards selected e-tools of civic participation on local level.

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This article has been written within the research project: E-voting as an alternative way of voting procedures in national elections. Experiences of selected countries and prospects for implementation e-voting in Poland (E-voting jako alternatywna procedura głosowania w elekcjach państwowych. Doświadczenia wybranych państw a perspektywy wdrożenia e-głosowania w Polsce) – financed by the National Science Center in Poland UMO-2014/15/B/HS5/01358.

2. Defining e-democracy

While describing the influence of modern technologies on the democratic system, it should be emphasized that the literature presents a major diversity as regards the understanding of *electronic democracy*.

Electronic democracy is a form of democratic practice which uses new information and communication technologies. *E-democracy* enables citizens of a given country to influence political decision making through direct and indirect democracy while using modern information technologies.

A very interesting understanding of e-democracy has been presented by Tero Päävärinta and Øystein Sæbø who defined *e-democracy* as a form of using information and communication technologies (ICT) in political debates and decision making. Päävärinta and Sæbø have emphasized that, on the one hand, new (electronic) means of political activity complement traditional channels², and on the other, they are treated as their counterbalance [19]. Considering rapid development of ICT and their use in various fields of social life, we may conclude that the perception of new technologies as complementary to traditional forms is more appropriate in this context. This can be supported by examples of e-democracy initiatives which have become popular in recent years. Additionally, the support for electronic governance is also provided by local communities [6, 21], and international communities [4], which expresses faith that new technologies have the potential to increase the level of democracy [19].

3. E-participation and major e-participation tools

The use of ICT by public institutions does have an impact on the contemporary democracy, and new information and communication technologies may enhance the centrality of citizens in their relations with state structures. ICT are also capable of stimulating civic activity, create conditions for enhancing public debate, and reduce social and political exclusion.

Engaging citizens in policy-making is an important aspect of what is sometimes called “good government” or “citizen-centric government”. The use of information and communication technologies to gather and analyze public input is expected to stimulate public deliberation.

² Such as *face-to-face* or single sided media communication (e.g. radio or television).

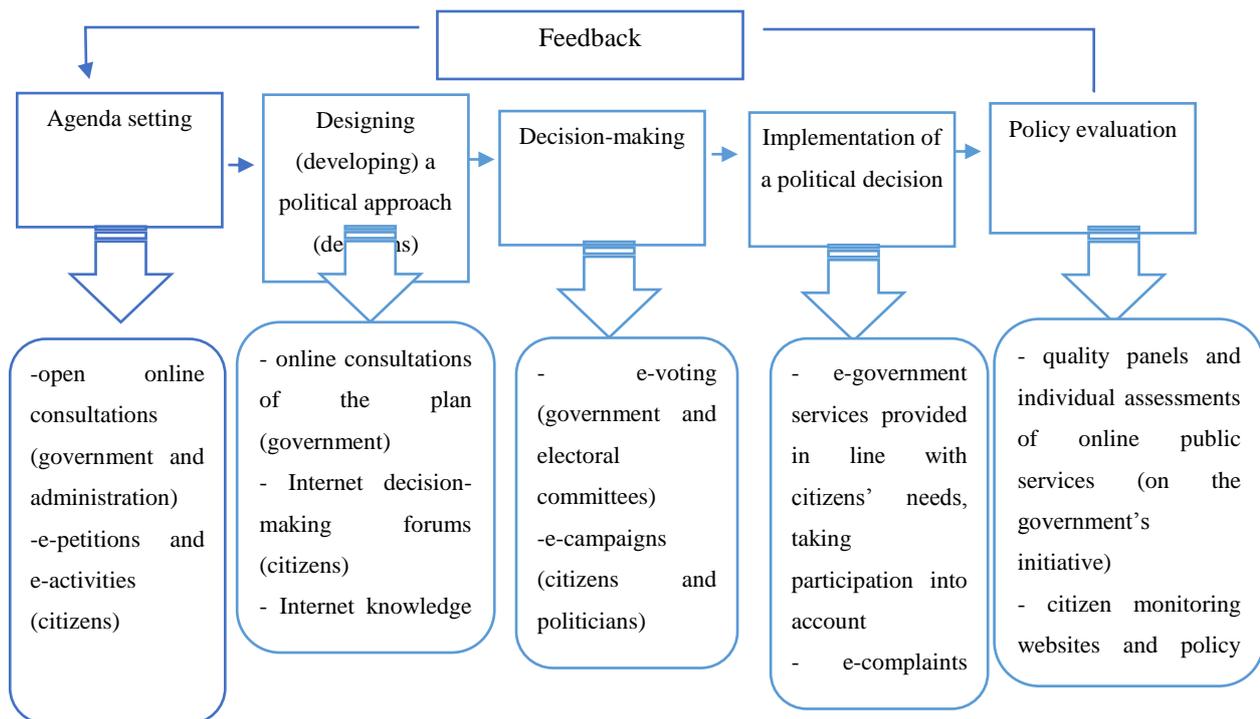


Chart 1. Main use of e-participation tools in political process

Source: own materials based on: van Dijk, 2012.

For many theoreticians, the use of ICT for e-democracy translates into larger than previously engagement of citizens who, while having modern technologies available, may become more engaged in political processes, in particular participative democracy. However, attention should be drawn to the fact that the use of ICT in democracy changes the role of governments (limitations), and consequently increased citizen activity (direct democracy) [2]. The phenomenon of enhanced engagement of citizens in the political life through ICT has been described by Jan van Dijk, who described such civic activity as electronic participation (e-participation) [24].

Jan van Dijk defines e-participation as “*the use of digital media to mediate and transform the relations of citizens to governments and to public administrations in the direction of more participation by citizens*” [25]. While referring to specific phases of the political process, van Dijk distinguishes several e-participation forms that can be used in political decision-making. The author emphasizes that during the first phase of agenda setting, political representatives do not only inform citizens about their activity at the official government website but also invite them to express their views about on going and planned political actions. Moreover, political representatives encourage the society to present their ideas, suggest changes etc. Although provision of information is the most often used application of ICT tools, it is not sufficient to talk about e-participation. Thus, we need to add the engagement of citizens in the process. For this reason, it is becoming more popular to enable citizens to influence their legal representatives through, for instance, e-petitions³. Today, in the Internet Era, the technological advancement has enabled to set up online consultations, discussions at web-based forums and social media portals. Those are referred to by van Dijk as the second phase of the political process, namely drafting a decision. Suggestions and comments

³ Scotland is a good example of that, since citizens can fill out on-line petition forms.

expressed by attendees of electronic discussions may play an important role, inter alia, while developing final bills or detailing political agendas in a specific areas [23; 26; 1; 8].

As regards decision making and the use of ICT, two forms of participation are referred to: electronic voting (elections, referenda, opinion polls) and e-campaigning. A very good example confirming the efficiency of e-campaigning were presidential campaigns by Barack Obama. Apart from politicians, citizens too can use the potential of e-campaigning, for instance to put pressure on the government. It is worth mentioning that recently one of the most popular applications of ICT are decision making decision-support systems, that are designed to facilitate the selection of the “most suitable” candidate or political group, and help citizens to make the best decision concerning their ideas and interests during a referendum [3].

While describing another stage, namely the policy execution, van Dijk highlights that the ICT can not only be used by the government to “detect” crime, e.g. in the Internet, but also the government can use the ICT to request assistance from citizens and ask them to report all kinds of offences and inform about irregularities in the functioning of public institutions using electronic tools, such as websites, special electronic town kiosks, mobile phones etc. Such snitching forms to secure public order have become increasingly popular, for example *Fix My Street* portal in Britain (<http://www.fixmystreet.com/>). It can be used to contact relevant institutions and notify them about road damage and request its repair.

As regards e-participation in policy evaluation we may distinguish various activities aimed at providing institutions with feedback regarding the quality of services provided. Special panels (tabs) at websites of those public institutions or automatic forms are used by citizens to express their opinion about a service. Those tools are frequently used by local government institutions and may contribute to continual improvement of service supplied [24].

Jan van Dijk noticed that various forms of e-participation are most frequently used for agenda setting and policy preparation. Policy evaluation is a second area of using electronic tools, mainly through citizen and civic organization initiatives. However, at the stage of actually making a decision and implementing it, the scope of using e-participation seems to be limited most probably due to the fact that the government are unwilling to let citizens participate in the process. It is worth adding that the true test of e-participation in the context of democracy is the influence of e-participation on political decisions. Therefore, as previously mentioned, the use of e-tools and increased engagement of citizens in this particular area is rather scarce [12].

As Sławomira Hajduk [7] notices, J. Ramon Gil-Garcia and Fernando Gonzalez-Miranda define e-participation as citizen engagement in public decisions supported by the use of the Internet [5]. Gil-Garcia and Gonzalez-Miranda distinguish several channels used for e-participation, such as local government blogs, chats with government representatives, and discussion forums [5; 7]. Of course, the range of e-tools of civic participation is longer [24]. Hajduk recalls enumeration made by Dimitris Zissis, Dimitrios Lekkas, Anastasia-Evangelia Papadopoulou [26], who also mention the following tools: webcasts, FAQ, decision-making games, e-panels, e-petitions, e-deliberative polling.

Opportunities created by e-participation tools give hope for counteracting such problems of contemporary democracy as lack of trust in the government, faint interest in politics and low level of active citizenship. On the other hand, however, such solutions are occasionally criticized by the political class in many CEE countries. Despite doubts related to e-tools of civic participation, we

may assume that the practice of using them in a number of countries in the world (Estonia, Switzerland, Norway ect.) will also prompt the inexperienced countries – to develop more interest in such tools, as well as to implement pilot projects and test those solutions

4. Attitudes of Poles towards e-participation tools at the local level

Positive experiences with the implementation and operation of e-voting in Estonia, Switzerland, Norway and other countries, have led to a discussion on new forms of participation in elections in many countries [15]. Also in Poland, at least for the past 10 years, a debate on implementation Internet voting has been conducted before every national election.

The application of information and communication technologies in political decision-making processes in Poland is relatively new phenomenon – we may say that it has been observed for not more than 15 years. The most popular forms of the application of ICT in political field are: electronic social consultations or choosing the projects within the process of participatory budgeting. One may not forget about the use of internet voting in pre-elections before presidential election in Civic Platform party in 2007 [16; 10].

In Poland there is no electronic voting system used in national or local elections. However, there are online social consultation tools such as e-mails and mailing lists, internet groups and forums, internet telephony (e.g. skype) and e-surveys, as well as websites that allow petitions to be submitted or websites designed specifically for social consultations. In addition, special portals are created that allow various institutions to consult many legal acts and other documents defining public policy [13; 17].

It should be stressed, there is no direct legal basis for using a participatory budget [18]. There are no regulations that would oblige the local authorities to co-create the budget project with the participation of residents or consult the final decision with them. However, there is no provision that, prohibits it [22].

It seems that the rapid development of new technologies, which can also be seen in the public domain, translates into a growing awareness among citizens (especially younger generations) of benefits of using the ICT in public services and administration. A growing variety of online services provides citizens with access to broad public services offered over the Internet. Such a provision of services generates measureable benefits for citizens, as well as the public administration. It improves contacts between citizens and public institutions at all levels.

Thus, we may assume that all the above mentioned conditions can influence the openness of the society towards new methods of participation on the local level. It is worth mentioning that citizens in Poland are generally open to the idea of adopting or using new electronic procedures (e-budgeting, e-consultations, e-elections, e-referendums on local level) mostly due to the fact that they are more convenient for them. As this paper focuses on the online variety of electronic tools of civic participation, the findings below are based on the surveys carried out in 2018 (April and May) on a group of 1231 people who made up a representative random sample of adult residents of Poland.

The survey involved 681 women (55.3%) and 550 (44.7%) men. The surveyed were residents of Poland at the age of 18–65+. Surveys varied regarding residence of subjects (443 people (36%) from rural areas, the reminder from cities, of which 185 people (15%) from cities up to 20 thou.

inhabitants, 221 (18%) from cities of 20–100 thou. inhabitants, 123 people (10%) from cities of 100–200 thou. inhabitants and 259 people (21%) from the largest cities above 200 thou. inhabitants), as well as regarding their age: 81 people (6.6%) at the age of 18-24, 212 people (17.2%) at the age of 25-34, 210 (17.1%) at the age of 35-44, 167 people (13.6%) at the age of 44-54, 195 people (15.8%) at the age of 55-64, and 366 people (29.7%) at the age of above 65 lat. The survey also took into consideration education and declared political orientation (right / center / left), which in the opinion of the author could have influenced their opinions regarding the use of electronic participation tools.

A study on the percentage of the respondents who approve having Poland adopt electronic means of local participation found that a total of 72.4% of the respondents either “strongly” or “mildly” favor the solution and that 17.2% oppose the option. In times of very dynamic development of ICT it seems to be something natural that people accept new ways of taking part in politics. In view of rapid advances in IT, widespread Internet access and technological progress in nearly every area of human life, one may presume that voters will want to see innovations also in their participation in public life possibilities to make them more accessible and convenient.

Question	Strongly opposed	Mildly opposed	Undecided	Mildly in favor	Strongly in favor
Do you approve introduction of electronic tools of civic participation in decision-making processes on the local level?	8.4	8.8	10.4	41.3	31.1
Do you approve introduction of the following tools supported by the internet solution?					
participatory e-budgeting	7.9	11.3	14.2	46.8	19.8
e-consultation	6.8	8.2	16.1	38.2	30.7
local e-referendum	11.5	10.1	20.1	36	22.3
local e-elections	14.2	12.8	20.5	30.3	22.2
local e-initiative	12.4	7.5	18.9	35.2	26

Table 1. Percent distribution of responses to the question: “Do you approve introduction of electronic tools of civic participation in decision-making processes on the local level?”

Source: own conclusions based on survey findings.

While analyzing data from table 1 we can see that as many as 72.4% of the surveyed gave positive answer (total answers “strongly in favor” and “mildly in favor”) to the question about the support of introducing electronic participation tools on the local level.

As regards the introduction of specific electronic tools, the surveyed gave similar answers, with the largest number of people supporting the implementation of e-voting on the citizen budget and electronic public consultations. In the case of a local referendum and local initiative, public support was high, respectively 58.3% and 61.2%. According to the analysis, the introduction of electronic voting for local elections raised major doubts, with only 52.3% of the surveyed supporting the solution. It should be noted that 27% of the surveyed were against the solution (total answers “strongly opposed” and “mildly opposed”). Over 20% of them were uncertain. It seems that “hard” institutional solutions raise major doubts among respondents (contrary to consultations, budget and initiatives which are perceived as more opinion forming tools rather than decision making – as it is with elections). Therefore, we may assume that the surveyed prefer to have consulting tools which do not imply final decision making. This might be the result of lower trust in new electronic tools comparing to traditional ones.

It is also worth drawing attention to the fact that findings of the survey show that in the case of general questions about their support to the introduction of e-participation tools on the local level, the electorate is much more enthusiastic, since 72.4% responded in favor (total “strongly in favor” and “mildly in favor”), and 17.2% of surveyed people opposed (“strongly opposed” and „mildly opposed”) and 10.4% were undecided. When the same question applies to specific e-participation tools, the survey showed much lower number of those in favor, on average 61.5% (average “strongly in favor” and “mildly in favor” for all e-tools) and more people were undecided – 18%.

Considering the ideological inclinations of the surveyed (left/center/right), the author of this paper assumed that citizens with centrist or leftist political orientation are more inclined to use electronic tools of participation. In recent years, politicians of these parties at least on several occasions expressed their support towards e-participation tools, believing that involving in public life via Internet is more comfortable for citizens (particularly for those living abroad) and that it has the potential to improve the level of development of civil society. In addition to that, supporters of centrist and liberal parties are younger and better educated than supporters of other parliamentary parties in Poland.

Considering the results of the survey with respect to the ideological inclinations of the surveyed (left/center/right), it is worth noting three issues that distinguish the respondents and that appear to be of significance:

- firstly, the majority of the respondents across all groups would like to see the option of electronic tools of participation made available on local level – this amounts to 69.6% of the left-wing respondents, 68.5% of the centrist voters, 51.5% of the right-wing respondents, and 61.4% of those who do not define their political views;
- secondly, the most diverse opinions were noted among the respondents who declared themselves to be leftist as well as those defining themselves as rightist. While 68,5% of the former spoke in favor of e-voting, 51.5% of the rightist voters shared their opinion. The difference between the two amounted to 18.1 percentage points. Furthermore, 15.5% of leftist voters expressed a reluctance to having e-tools of participation in Polish local identities. This view was shared by 26.1% of rightist voters (the difference on the issue between the left and right of the political spectrum amounted to 10.6 percentage points);
- thirdly, the smallest divergence in the proportions of responses in favor of e-tools (1.1 percentage points) was found between the leftist (69.5%) and the centrists (68.5%). Note that the two groups practically did not differ in the distribution of negative responses, which added up to 15.5% and 15.6% respectively.

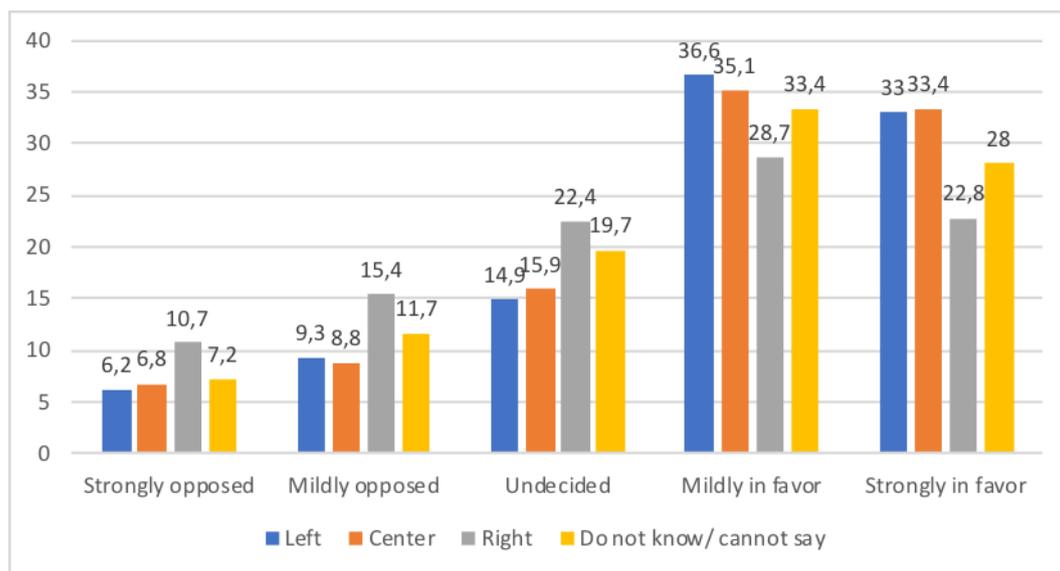


Chart 2. Percent distribution of responses to the question "Do you approve introduction of electronic tools of civic participation in decision-making processes on the local level?" relative to declared political views

Source: own surveys.

Answers to the question about specific solutions provided those are available seem to be very interesting. The analysis of data in table no. 2 shows that a clear majority of respondents were in favor.

In the case of a question about using e-participation tools, as many as 67.4% of the surveyed were in favor (total "strongly in favor" and "mildly in favor").

Question	Strongly opposed	Mildly opposed	Undecided	Mildly in favor	Strongly in favor
Given the option, would you use e-tools of participation in decision-making processes on local level?	7.2	10	15.4	36.7	30.7
Given the option, would you use the following e-tools of participation?					
participatory e-budgeting	6.2	12.1	17.9	36.7	27.1
e-consultation	5.8	12.8	17.2	33.6	30.6
local e-referendum	13	14.5	22.4	32.5	17.6
local e-elections	17.8	18.2	23.8	26.2	14
local e-initiative	15.7	12.3	22.1	27.9	22

Table 2. Percent distribution of responses to the question " Given the option, would you use e-tools of participation in decision-making processes on local level?"

Source: own conclusions based on survey findings.

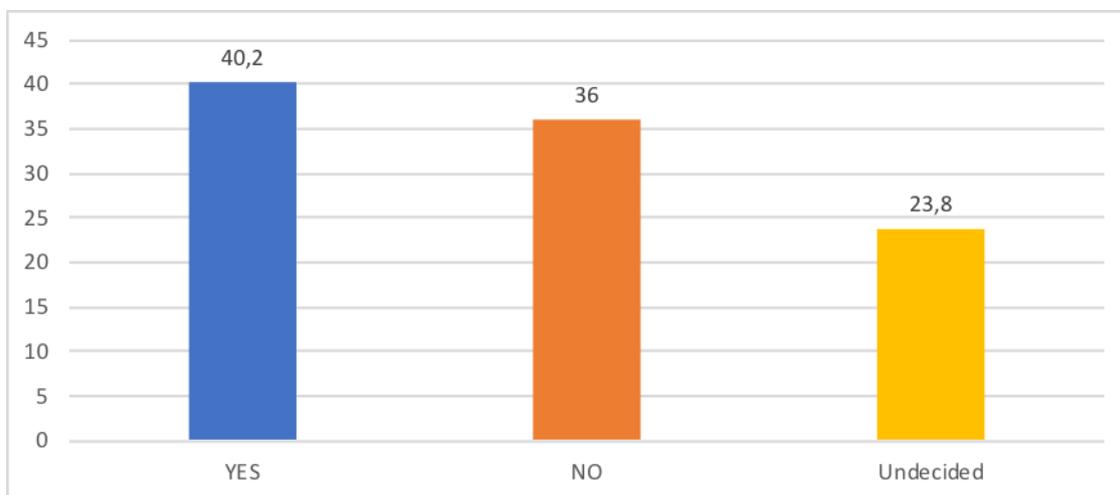
As regards the use of specific electronic solutions, the surveyed had similar opinions to those regarding their support to e-tools. The largest number of potential users would use e-consultations and e-citizen budget (respectively 64.2% and 63.8%). In the case of a local referendum and local initiative, public support was relatively high, respectively 50.1% and 49.9%. The fewer potential users are in favor of electronic local elections, since only 40.2% of the surveyed declared their participation in the decision-making process. It should be noted that 36% (total "strongly opposed" and "mildly opposed") of respondents indicated that they would not use electronic voting in local

elections. Nearly 24% of the surveyed remained undecided. Like in the case of the first question, it is clear that “hard” institutional solutions raise major doubts among respondents, and they are reluctant when it comes to declare the use of such solutions. We may assume that the respondents prefer to use consultations rather than decision making. Elections, contrary to consultations, initiatives, and budget, involve more “responsibility” and respondents are wary.

It is also worth mentioning the fact that the findings regarding “general” questions about the use of e-participation tools on the local level, respondents are much more enthusiastic – 67.4% were in favor (total “strongly in favor” and “mildly in favor”), whereas 17.2% of people opposed (“strongly opposed” and “mildly opposed”) and 15.4% were undecided. When the question refers to more specific e-participation tools, we get fewer supporters – on average 53.56% (average answers “strongly in favor” and “mildly in favor” for all e-tools) and more opponents – 25.7%, and 2.7% undecided.

Since, according to the analysis, electronic local elections seem to raise major doubts among the surveyed, the further part of the analysis concentrates on e-voting in local elections and analysis covered opinions of the respondents about the use of the solution.

As mentioned above, the largest number of respondents declared that in case of an opportunity to use e-voting in local elections, they would use it. Findings presented in chart 3 show, however, that the society is highly polarized, most probably due to the fact that the respondents are not familiar with e-elections, which makes them wary as regards the use of this form of voting.



**Chart 3. Percent distribution of responses to the question
"Given the option, would you vote over the Internet in local elections?"**

Source: own surveys.

Chart 4 show that the female respondents prevail among those who are wary as regards using e-election at the local level. Regarding gender there is no any substantial relationship.

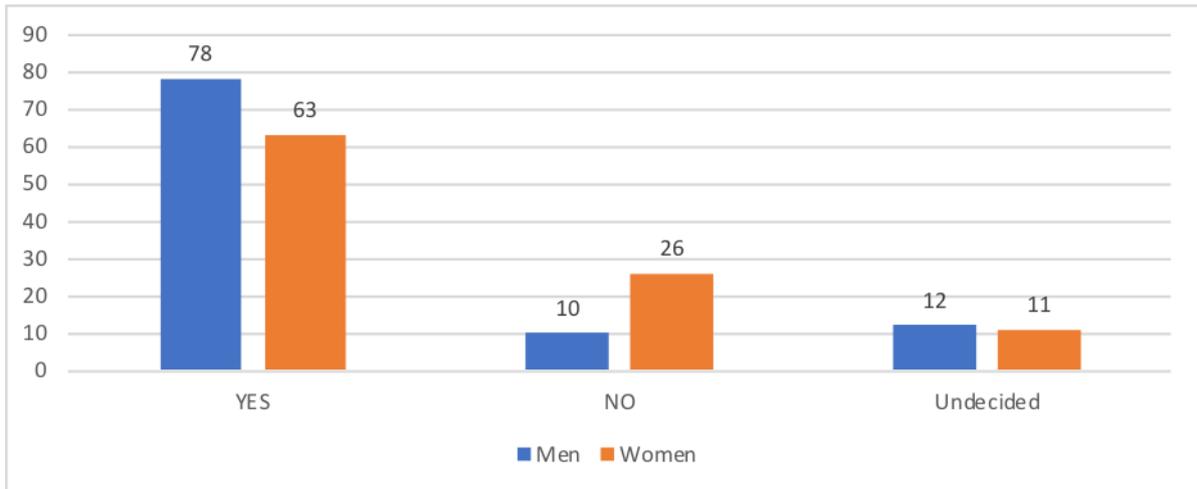


Chart 4. Percent distribution of responses to the question "Given the option, would you vote over the Internet in local elections?" (relative to sex)
Source: own surveys.

The author of the article assumes that the younger respondents will express higher support for e-voting in comparison to those representing older groups. The youth voters are comfortable with technology and are open to various technological innovations. Thus, they could also choose e voting as a potential way to participate in elections [11]. This opinion is also included in a report “Democracy Rebooted: The Future of Technology in Elections” published by the Atlantic Council, where Conny B. McCormack states that, “...the lives of younger voters are increasingly defined by the digital world, and they will want the elections process to reflect the rest of their lives” [12].

The possibility of engaging youth in the political system using technology seems to be a logical step.

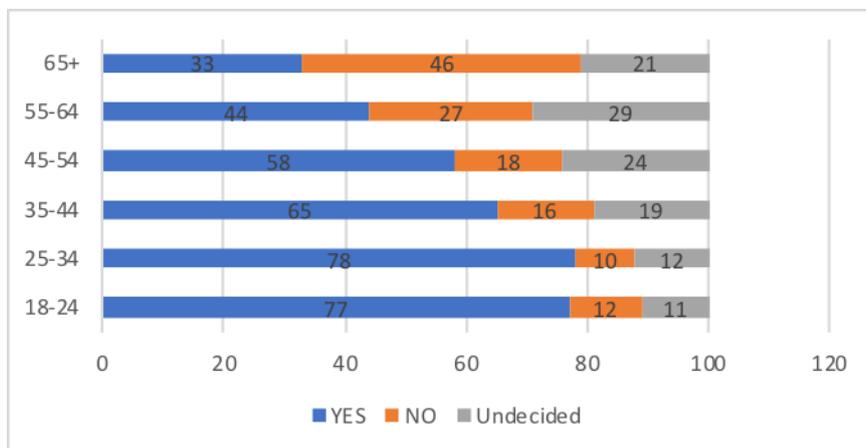


Chart 5. Percent distribution of responses to the question "Given the option, would you vote over the Internet in local elections?" (relative to age)
Source: own surveys.

Data presented in chart 5 are not surprising, since they show that those in favor of e-voting in local elections are respondents in two youngest groups, namely up to 34 year of age. We can see that the number of respondents who oppose e-voting grows with age. Therefore, we may conclude that groups that are most interested in using e-voting at the local level are citizens up to 54 years of age.

An important determinant of support for e-voting may be the place of residence. I assume that in terms of place of residence the support for e-voting covers largely with the map of political

preferences in Poland. Biggest towns in Poland are much more enthusiastic than the villages. This coincides with the fact that access to the Internet is smaller in rural areas than in more urbanized regions, especially in medium and large cities.

If we take into consideration respondents' place of residence, we can see that electronic voting in local elections is mostly supported by inhabitants of cities (80%), especially large cities, and the largest number of opponents are in rural areas (24%). It is not surprising, since in cities IT infrastructure and skills are much higher than in rural areas.

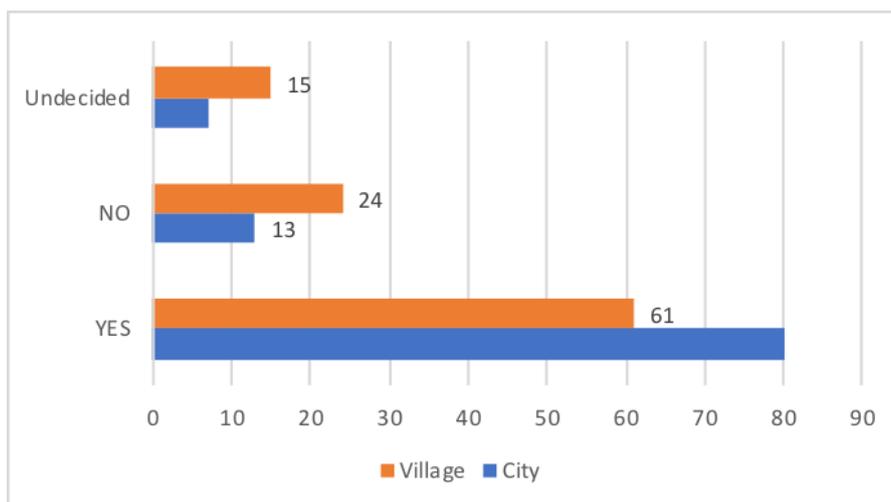


Chart 6. Percent distribution of responses to the question "Given the option, would you vote over the Internet in local elections?" (relative to place of living)
Source: own surveys.

Education was yet another criterion taken into consideration during the survey. There are opinions that people with higher education, who in many cases live in urban areas - will much more often choose e-voting, which is probably related to their knowledge on the Internet, or more broadly - new technologies. Mihel Solvak and Kristjan Vassil confirm this assumption in their research – they write: “A higher education appeared to be weakly but positively associated with internet voting, though its effect was not consistent” [27].

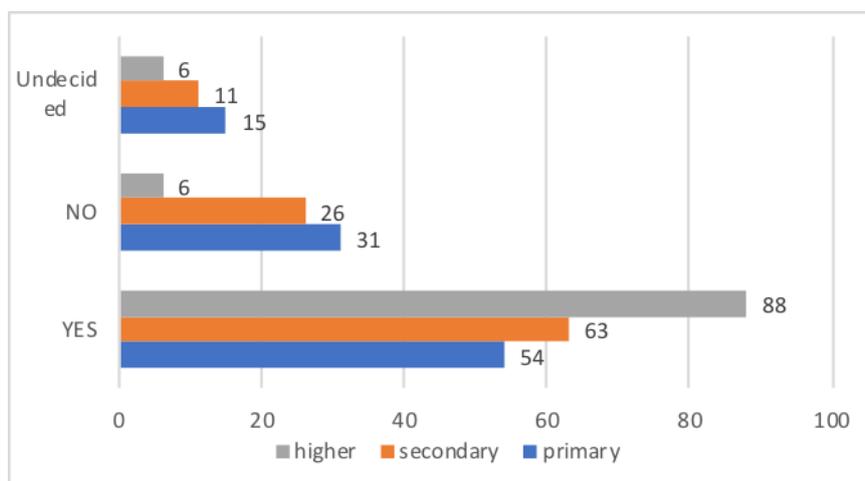


Chart 7. Percent distribution of responses to the question "Given the option, would you vote over the Internet in local elections?" (relative to education)
Source: own surveys.

Answers to the question about the use of e-voting in local elections show that respondents with higher education are most open to this form of voting.

5. Conclusions

One of the most important issues of the contemporary democracy is the declining political engagement of the electorate. Information and communication technologies seem to be very useful in this particular context, since apart from broader and faster access to information, they create opportunity to “modernize” decision-making and elections procedures and making them more attractive.

Findings presented in the article prove that it is worth to consider the implementation of new participation solutions, since the society is interested in new convenient forms of participation in public life – not only on the local level but certainly also on the state level as well. Answers to all questions related to the implementation of e-participation tools and e-voting itself prove that regardless of the different factors, the opinions of Poles are positive. Interestingly, in Poland there are no measures to implement e-voting as an alternative form of participation in general votes. At the local level, various e-tools solutions are practiced, however, it seems that these measures are still insufficient.

In recent years, the growing popularity of various innovative participation tools has been observed in a number of European countries and elsewhere in the world, including Estonia, Switzerland, United States and Australia. The rapid development of information and communication technologies (ICT) brings new tools, such as the Internet, mobile phones, digital platforms etc. in various field of social life, including politics. Modern technologies complement, expedite and improve three types of activities: provision of information, communication related to a large extend to the participation in a political debate and participation in making political decisions.

The introduction of citizen participation forms based on new technologies has been discussed not only among politicians and IT experts, but also social groups. The latter believe that such solutions not only increase mobility of citizens, but also contribute to simplified procedures and engagement of larger groups of citizens in decision making in cities, municipalities, regions etc.

Despite technical issues of Internet and e-tools security, benefits for various social groups as well as positive experience in many countries may provide a strong incentive to adopt e-tools not only in particular countries in Europe, including Poland, but also in other parts of the world.

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CITIZEN PARTICIPATION AS A TOOL FOR CREATING AN EFFECTIVE E- GOVERNANCE SYSTEM IN IRAQ

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Abstract

In a resource abundant environment, the people of Iraq have no right in the governance system. Thus, Iraq faces significant challenges in E-governance. In order to enhance E-governance and transparency in Iraq there is a need for creating an E-governance system that can motivate citizen participation in governance in the long-run.

Citizen participation is not effective, similar to the case of many other resource-rich countries in the Middle East and Africa. Since 2003, the Iraqi government has tried to tackle transparency, open governance, e-elections and e-governance; however, it failed. The failure may be attributed to different factors but the most crucial and influential one is lack of citizen participation. If people nurture E-governance, their collective effort will support government's effort in building a strong E-governance system. The main question for this study is; how can citizen participation contribute in nurturing E-governance in the case of Iraq?

This study outlines the role of effective citizen participation in creating E-governance in Iraq; this is a quantitative study Primary data collected from 100 participants was analyzed for this purpose. This study is composed of three main parts; the first part highlights theoretical perspective of E-governance in Iraq, and citizen participation. The second part focuses on discussing the data on e-governance. The final session of this study deals with the findings, and conclusions.

Keywords: *E-governance, E-government, Citizen Participation, Iraq*

1. Previous Research and Theory

e-Government got different connotations in the literature, including: electronic government, electronic governance, digital government, online government.” (Grönlund, 2004, p. 1). The study of electronic government has recently become the main duty of many governments worldwide. Iraq lags behind most countries in terms of e-government implementation. In fact, there have been attempts by the Iraqi government since 2003 to work on e-Government but the outcomes are not as people wish. E-governance requires active involvement of citizens in the process of completing it. Because, people want transparent and accountable government; the more transparent the government is, the better people know about public information and services. As is stated, “Digital public services contribute to better transparency, in a sense that citizens are more likely to understand how policies and rules are applied to their particular situation, this adds the feeling of

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being involved for the people.” (Li & Gregor, 2011). In regard to e-government, and citizen empowerment, the United Nations E-government survey 2010, has highlighted the “the importance of e-participation in all its aspects ranging from e-information, e-consultation to e-decision-making. Politicians and political decision makers represent the voice of citizens within government.” (2010, 84).

This session focuses on examining the previous research studies exclusively to find the gaps in the literature and recommend solutions. Even though, many scholars and researchers have undertaken serious reviews on the topic of e-Governance differently, the review of literature in this studies looking at specifically the citizen participation and its effect on e-Governance. Few scholars deal with barriers of adopting e-Governance, as Delopoulos (2010) in his study on barriers and opportunities for the adoption of e-Governance services has discussed the main barriers to adoption of e-Governance; importantly, citizen readiness in adopting e-Gov has been one barrier in reaching e-governance effectively usage in many communities.

The main goal for adopting e-Governance is to serve citizen and facilitate citizen interaction with government by making public information accessible via website. (Ndou, 2004). Accordingly, for adopting e-Government, governmental support is required for successful implementation. (Akbulut, 2003). Based on Modinis study, the barriers to e-Government are as follows: “leadership failure, financial inhibitors, digital divides and choices, poor coordination, workplace and organizational inflexibility, lack of trust, poor technical design.” (European Commission, 2007).

1.1. Theoretical Perspective on Citizen Participation

Most scholars researching on citizen participation acknowledge that citizen participation is crucial for achieving shared governance system. Regarding active citizen engagement in governance in the resource rich countries like Iraq, the citizen participation is poorly structured, and citizens are not involved in decision making and governance. This issue is thoroughly linked to e-Governance, and e-Government in which the issue matters citizen to a great deal, however their participation is restricted.

Globally, the governments work on digitalizing the public sector. For this purpose, the focus recently is on developing e-Government. Regardless of the world’s best practices, there are many countries like Iraq where yet there is nothing tangible. This study focuses on the perspective of empowering citizens in the e-Government process, because in Iraq there is a gap in which citizens are not aware and involved in e-Government development; thus, one important pillar is missing. In her work Nancy Roberts in “the Age of Direct Citizen Participation”, tackles few questions, one of which is; “does direct citizen participation function at all levels of government, in all sectors, for all issues, during all phases in the policy process, with all mechanisms of involvement”? (2008, p.7). In the context of citizen participation, Sherry R. Arnstein in “a Ladder of Citizen Participation,” defines citizen participation in three terms, as citizen participation, citizen control and maximum feasible involvement of the poor. (1969).

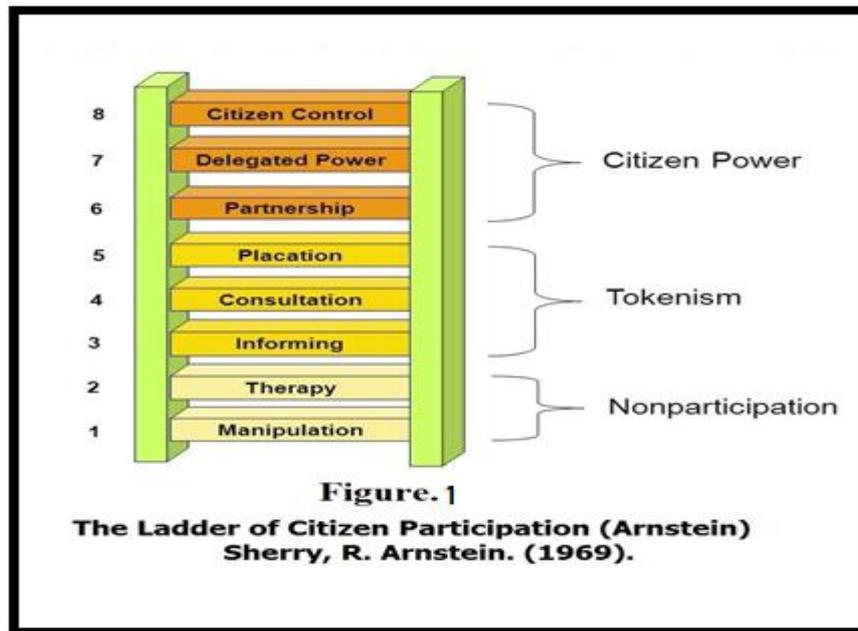


Figure 1. The ladder of Citizen Participation

In this regard, “citizen participation and empowerment have been acknowledged as the key factor for formulating national policies and their implementation.” (Brans et al. (2015). No doubt that citizens can be active facilitators in policy implementation even if they are not active participants of policy making. Paul Collier avers “governance conditionality as shifting power from governments to their own citizens.” (2007, p.127). In line with Collier, Kjar states that when power is transferred to lower levels, in which he means the public, decisions can be taken that are very responsive to the needs of the local community” (2004). that is to say, buying in people to decision making and power governance. In addition to that, Etzioni, addresses “the role of active society that encounter constraints that prohibits a society to be active and change”. (1968, p. 9). To emphasize this view, Arnstein adds that citizen participation is a code for citizen power. (Arnstein, 1969, p. 216). Concerning, the voice of people and their role in governance, participation is considered as “a central element of democracy, citizen participation in economic policy is advocated as a way to make government spending more pro-poor.” (Drautigam, 2005, p. 37).

Drawing a speculative conclusion on this session, “citizen participation could be implemented to influence the capacity of citizens and agencies to participate in management,” (Lauber & Knush, 2000, p.21). There is a crucial point which is about public awareness on e-government, in which “better citizen interacts with the state’s administrative structure through e-government; people can learn that they can participate in systems and they get the benefit of it. (Komito, 2005, p.41).

Lack of good governance, bad politics, poor infrastructure and poor human capital has all led to lack of active citizen participation in the e-Governance process in Iraq. There are many challenges and obstacles which until today Iraq could not overcome; among them are:

- a- The e-government infrastructure ICT is poor in terms of quality and quantity. Due to wars and instability in Iraq government could not have compatible infrastructure for initiating e-governance.
- b- There is lack of citizen empowerment in developing e-government project at different levels.

- c- Citizens barriers in which people alone cannot tackle them like; accessibility issues as Iraq has poor internet connections, and some regions do not have internet capacity or telecommunication is poor.
- d- There is lack of experience and knowledge in using e-government as there are limited programs and trainings for civic-awareness of the people.
- e- There is no trust in e-government from the side of the citizens, thus government has to work on building trust in e-government by enforcing rules and regulations of e-government at proper time.
- f- Citizen awareness is low and there is a need for boosting it for supporting better citizen readiness.
- g- The issues of privacy and security are at stake in Iraq as those are the obvious obstacles for citizens in using e-government. Government of Iraq failed in ensuring citizens with privacy rights and protection.

2. Data and Method

2.1. Method Analysis

This section discusses the methodological framework of the research and its data collection approach. The choice of this method was granted based on the scope of the study and importance of the methodology as a facilitating tool for bringing in scientific data and to draw conclusions on. For getting appropriate outcomes this study has used a quantitative method for collecting data.

2.2. Justification of the Using Quantitative Method

The main reason for using quantitative research method is to get data from different participants from different parts of Iraq, in which it gives data validity and fairness of researching on this sensitive topic. Moreover, quantitative data from diverse community members and getting various views on e-Government and its link to people was the goal for this method. Another rationale was getting to know how people in real terms think about e-governance and what do they know about it. Very crucially, this also avoids choosing those, and which participants the researcher wishes and vice versa, as this helps reducing individual bias in data collection process. This method, therefore, is open and fair in participation terms. Besides, it proves the usefulness of the findings and in drawing policy recommendations, would be more reliable, as e-Government is about the public more than the government.

2.3. Data Collection

The data collection process in this research is based on quantitative method in which an online survey-questionnaire is created and circulated from the Internet via social media links especially Facebook, Gmail, and Linked-in. The main objective of this method was reaching as many participants as possible for getting data from different parts of Iraq and from different individuals. The time frame for collecting data was December-January 2019. The phase of the sample was 100 participants. This survey might be among the few practical studies, which has been conducted yet. The questionnaire was composed of 13 questions, 4 general questions on participants' background

and 9 main questions on the topic. For some questions Likert scale was used and some were options and one open-ended question was asked to define e-Governance.

The target population for this research was highly educated citizens, because this topic interests those who know about governance, government, technology and development in the 21st century and are concerned and aware about developments in Iraq especially in digital terms.

Participants Demographic Analysis:

According to the data 74.70% of participants were from the public sector who are mostly government employees, while, only 14.30% of the participants were from private sector and only 11% from other sectors. In terms of gender 73.90% were male participants and 26.10%, the minority were female participants. The age groups were as 76.10% were 26 to 40 years which means majority of participants was from young generation and 12 % were less than 25 years, 9.80% were between the age of 41-50 years and only 2.10% were elder than 50 years. Regarding education level of participants in this study, 41.30% were MA/MSc holders, 28.30% were PhD holders, 21.70% were BA/BSc holders and 7.60% were students and only 1.10% from other levels. This indicates that participants of this study were knowledgeable about e-government to some extent since, in present times, most among the young generation are aware about technological developments in governance.

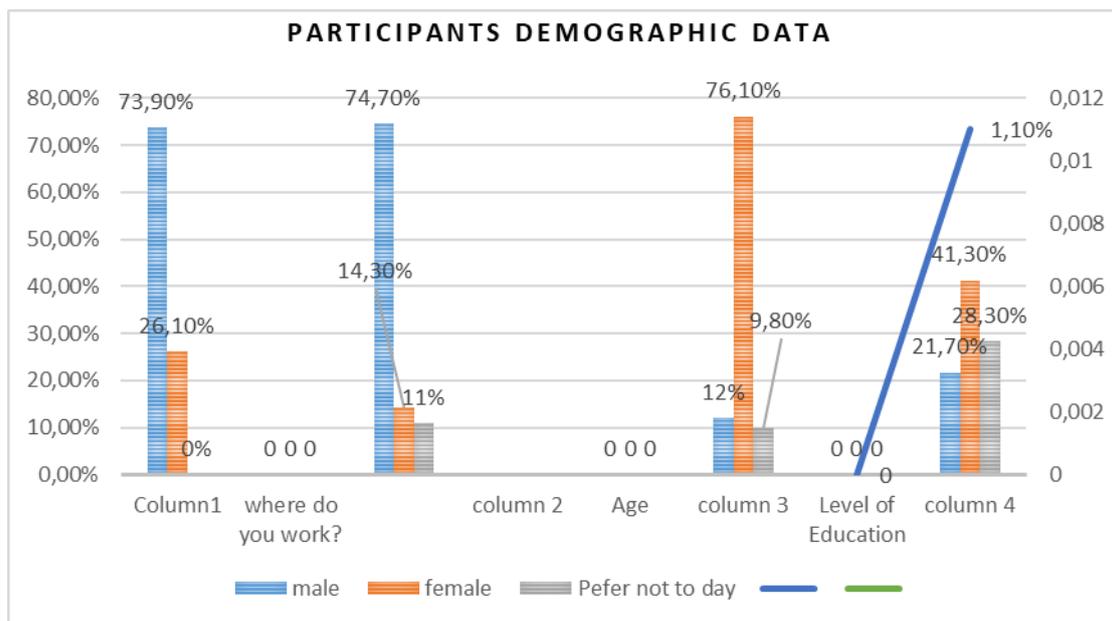


Figure 2. Participants demographic data

2.4. Discussions

The first question of this survey was “what is meant by the concept of e-Governance? As there have been many given definitions about e-government, the following are the most repeated **ones which were given by the participants including:**

E-Governance is a well-structured system that connects citizens to government
Using the electronic devices to cover the governmental works and procedures
Electronic governance: using technology to run government institutions
E-Governance Is the integration of information and communication technology in all the processes, with the aim of enhancing government ability to address the needs of the general public.
Electronic based method of governing
Delivering government services through electronic means
E-Governance means to change the concept of running the public sector from its current paper based state to an electronic one
A government that runs public affairs via internet and facilitate people's business online

Table 1. E-Governance

For the statistical part of the data, the questions are subjected to statistical analysis using SPSS. In accordance to the barriers of e-Government implementation in Iraq, the participants have had different choices, yet all the points were considered as serious constraints to e-Governance. According to the following chart 49% of respondents acknowledged that they agreed that the public can nurture e-Governance and a collective effort will support government in building a strong e-governance system in Iraq. 10% of participants strongly agreed with the statement. While 30% of respondents were neutral about this issue, a minority of the participants i.e. 8% disagreed with the issues whereas 3% of the participants strongly disagreed.

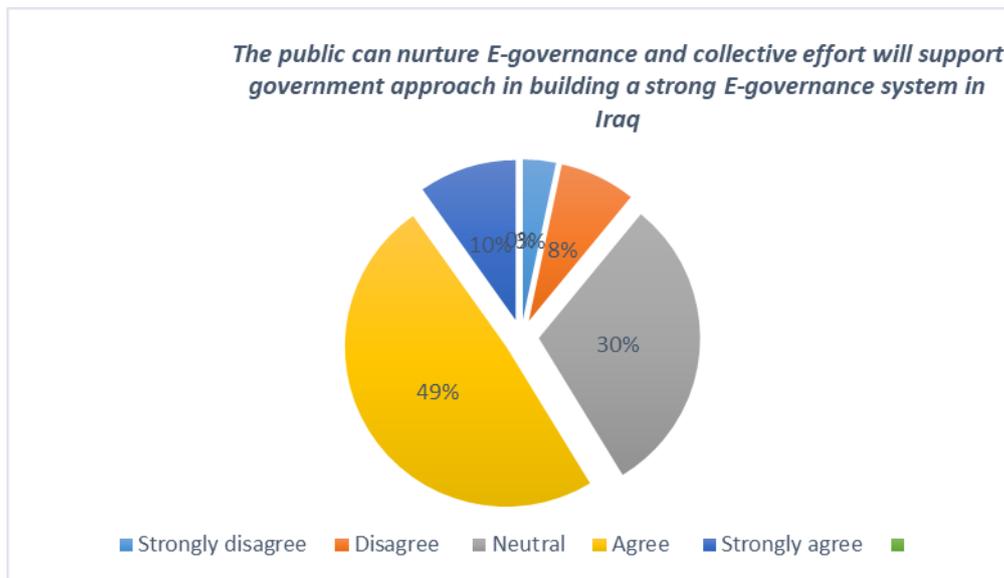


Figure 3. Support for E-Governance approach

In this survey the data showed that people are not sure about trusting e-Governance, thus, the ratio for trusting is low compared to those not trusting it. And that is all due to security, privacy and lack of data protection. The data shows that the issue of trust is not tackled well, and people have fear of using e-government services, which comes from issues linked to safety and privacy of data in using e-government. Based on the respondents' answers 25.9% of the respondents have mentioned that they fully trust e-government if government supports it, while majority of respondents counted as 58.8% were indifferent and stated they do not trust it at all, while ratio of 15.3% said that they trusted it to some extent.

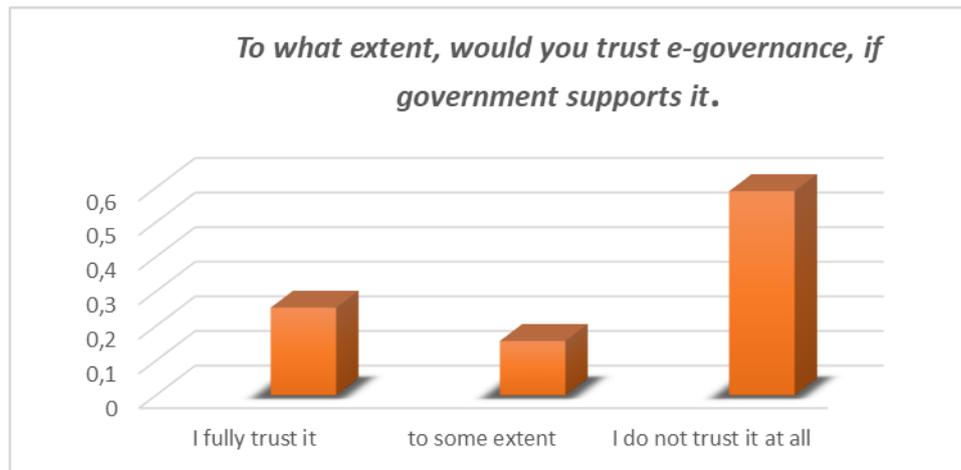


Figure 4. Trust in E-Governance approach

Trust in e-government, and e-governance is a critical point for people, and particularly for developing countries since exposure to digitalization was received late in Iraq. Yet, “trust is rarely given unconditionally especially to governments composed of unknown and unaccountable individuals. (Rothman, 2003). Though, in Iraq this may be true to certain extent yet there is lack of interaction of people and government due to lack of participation.

An essential prerequisite for enhancing transparency and accountability of government is through e-government process. As this bar chart shows on the topic of e-governance and its link to transparency and accountability, 50% of respondents agreed that e-governance can enhance transparency and accountability in Iraq. 11.7% strongly agreed with the statement. Whilst, 24.5% echoed that they are neutral about this topic, and few respondents 8.5% and 5.3% stated disagree and strongly disagree.

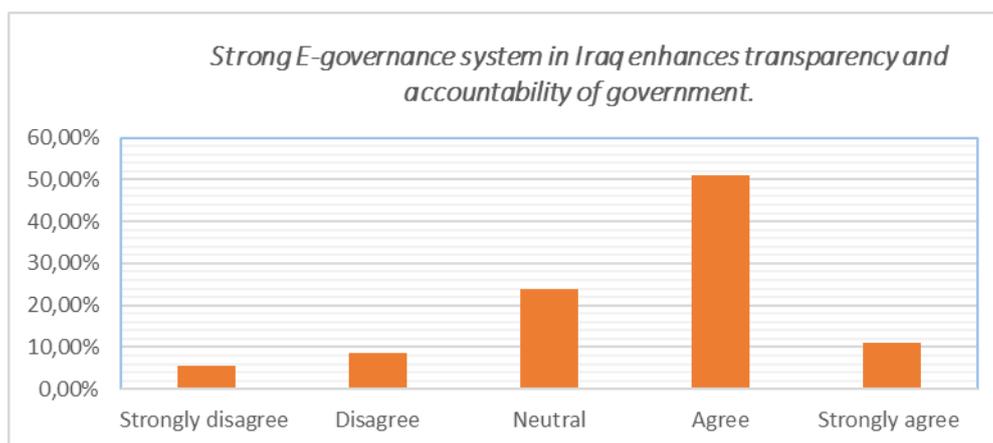


Figure 5. Strong E-Governance system and transparency

Concerning the main barriers and obstacle of e-governance, among the main barrier that were discussed in the data collection process were barriers linked to citizens and barriers linked to government. In the light of the results, 18% of the respondents agreed that government commitment was observed as a main challenge for people in e-government development. However, the majority of respondents 44.7% sounded that all the mentioned barriers in the chart were the reasons for poor e-governance in Iraq.

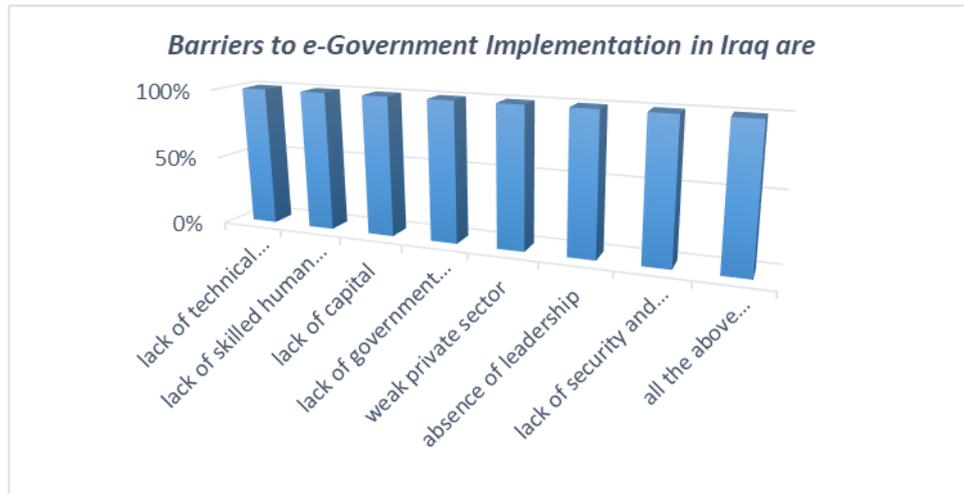


Figure 6. Barriers to e-Government

Another question, which was stated in this survey, was about government role in developing e-government, and investing in e-government progress. Based on the following data, majority of respondents stated disagree. There is a controversy in this question and the answer in part is about government commitment, and the other part is citizen capacity of adopting the services.

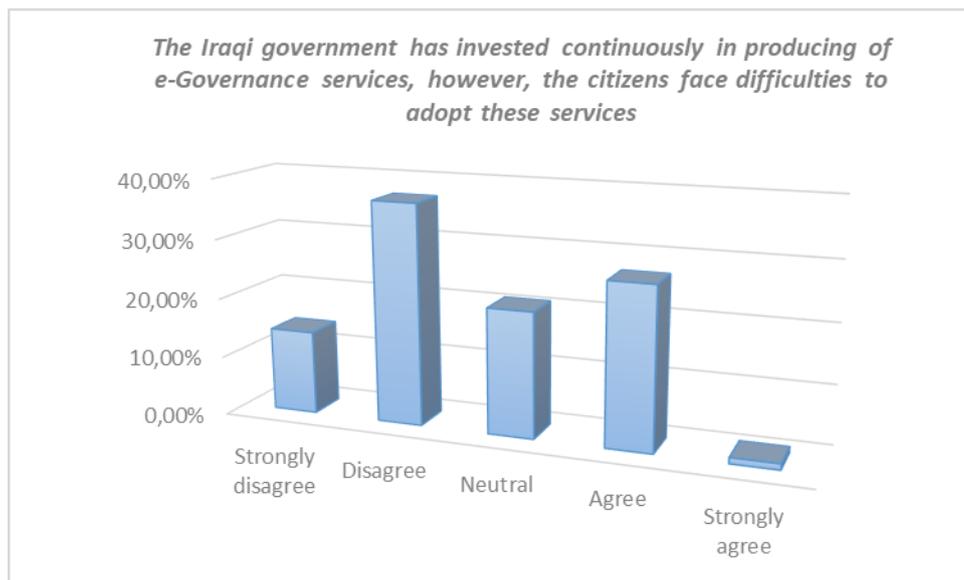


Figure 7. Investment in e-Government

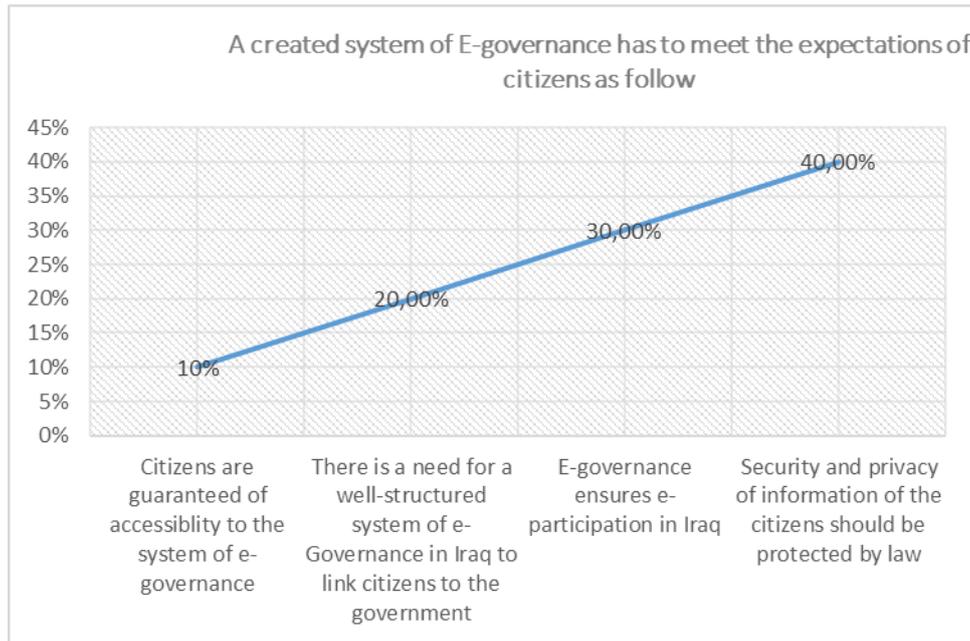


Figure 8. e-Government meets expectations

Another question in the survey questionnaire was “a created system of e-governance has to meet the expectations of citizens.” The main aim of asking about this statement was to seek the viewpoint of 100 citizens concerning e-governance. Four options were given among them the issue of security and privacy of information of citizens. 40% of participants agreed that privacy of citizens needs to be protected by law. While considering e-governance as an approach for ensuring e-participation has got 30% of participants’ agreement. The two other options including citizen accessibility to e-governance and creating a well-structured system for linking citizen to government got 10% to 20% votes. At this end, it shows that citizens are still concerned about privacy of data and trust compares it to their active participation in e-governance.

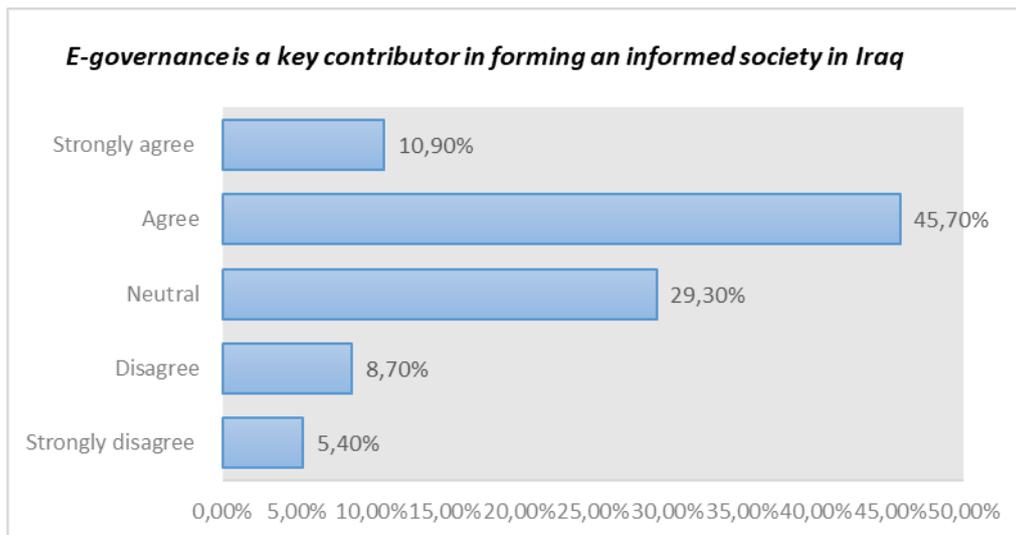


Figure 9. e-Governance and society

Data considering e-governance as a contributor to form an informed society in Iraq, 10 % of participants strongly agreed while majority of participants, as many as 45.70% agreed that e-governance helps in forming an informed society. 29.30% of respondents said they are neutral, and 8.7% disagreed that e-governance supports forming an informed society, and 5.4% acknowledged strongly disagree with the statement.

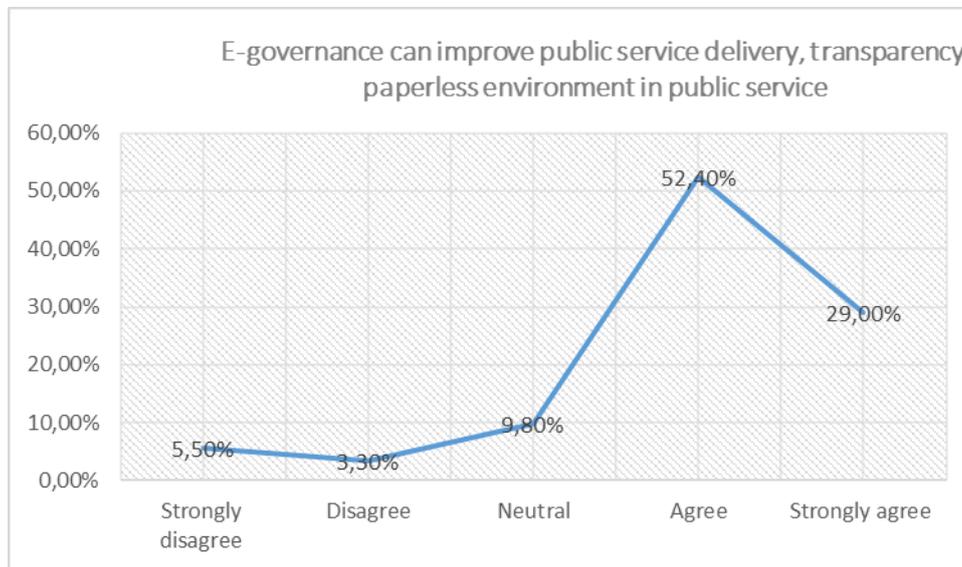


Figure 10. e-Governance and public service delivery

Data from 100 participants were sought, in which 29.00% respondents strongly agreed, and 52.40% of respondents agreed respectively, the majority of participants counted as roughly 80% were positive that e-governance can improve delivering public service, and transparency as well as it reduces paper work. A minority of the respondents, nearly 20% were negative about the statement in this survey.

2.5. Findings and Final Remarks

According to the findings of this study the following few have been selected as the top priority points to be tackled in the future by the Iraqi Central Government. The findings underpin that the government has to pay special attention for developing e-Governance systematically. This survey has revealed that there are certain challenges and barriers for the e-Governance development in which tackling them takes time and afford.

The manifest barriers were many and among them the government commitment in the light of the findings, government has to focus on overcoming the barriers and obstacle to improve e-governance. This study reveals that the citizens in Iraq are concerned about security and privacy of data and they do not trust e-governance unless the government guarantees citizens with safety of data and information.

There is still hope in e-governance based on data most people think that e-governance can lead to transparency and accountability in Iraq which helps in ending corruption and poor governance in the long run. As, credibility of government is related to the level of transparency of the government and citizens can fully trust government while they know well about the governance process that is

conducted by government, thus e-governance can be a tool for building this strong linkage between government and citizens.

In addition, Iraq has to put high priority on investing more systematically in e-governance development, while there is a pressing need for developing and training human capital for e-governance sector to push Iraq to step on e-government development.

Overall, this study shows that Iraq is not yet ready for implementing e-governance and there is a dire need for working on e-governance development at different levels. Based on the current data in this study and previous studies in the literature, e-governance can contribute in forming an educated and informed society, on the one hand, and on the other hand it can help in delivering high quality of public service to the citizens with low cost.

3. Conclusions

This study has made a serious attempt to respond to few critical questions about the role of citizen participation in e-Governance in Iraq. As put forward, Iraq needs a strong e-governance structure; and there is a need for developing technological infrastructure and human capital which are both necessary for e-governance development. In this context, citizens will only be empowered well when they are familiar and trained well, and then they can use and adopt e-governance easily.

This study has identified the main barriers and obstacles and recommends urgent focus on overcoming the main barriers to create convenient environment for e-governance implementation, particularly focusing on citizen participation and approaches of active citizen learning of e-governance. There is a pressing need for governmental commitment in e-governance development, as well as building trust which can help in bringing citizens into e-governance in Iraq.

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Appendix I

Survey- Questionnaire Form

Citizen Participation as a Tool for Creating an Effective E- Governance System in Iraq

Dear Respondent, I am a researcher and university lecturer at University of Raparin, I am conducting a research on (e-governance and citizen participation). Kindly asking you to answer these questions based on your knowledge and experience regarding this issue. Ensuring your answers will be kept strictly confidential and will be used only for research purpose. Your kind cooperation in this regard will be highly appreciated. Thanks in advance

Kind Regards,

Paiman Ramazan Ahmad

Section A: Demographics:

1- Gender

A. Female. B. Male. C. Prefer not to say

2- Age

A. Less than 25
B. 26 to 40 years
C. 41 to 50 years
D. More than 50 years

3- Level of Education

A. Bachelor
B. MA/MSc
C. PhD
D. Student
E. Others

Where do you work?

A. Public Sector, B. Private sector, C. Others.

Section B: Main questionnaire questions:**1. To what extent, would you trust e-governance, if government supports it.**

A. I fully trust it, B. To some extent, C. I do not trust it at all

2. What is meant by the concept of "E-governance"?**3. The public can nurture E-governance and collective effort will support government approach in building a strong E-governance system in Iraq**

Strongly disagree, B. Disagree, C. Neutral, D. Agree, E. Strongly agree.

4. Strong E-governance system in Iraq enhances transparency and accountability of government.

Strongly disagree, B. Disagree, C. Neutral, D. Agree, E. Strongly agree.

5. Barriers to e-Government Implementation in Iraq are ...

- a. Lack of technical infrastructure
- b. Lack of skilled human resource
- c. Lack of capital
- d. Lack of governmental commitment
- e. Weak private sector
- f. Absence of leadership
- g. Lack of security and stability
- h. All the above mentioned barriers

6. The Iraqi government has invested continuously in producing of e-Governance services, however, the citizens face difficulties to adopt these services.

Strongly disagree, B. Disagree, C. Neutral, D. Agree, E. Strongly agree.

7. A created system of E-governance has to meet the expectations of citizens as follow:

1. citizens are guaranteed of accessibility to the system of e-governance
2. there is a need for a well-structured system of E-governance in Iraq to link citizens to the government
3. e-Governance ensures e-participation in Iraq
4. security and privacy of information of the citizens should be protected by law

8. E-governance is a key contributor in forming an informed society in Iraq.

Strongly disagree, B. Disagree, C. Neutral, D. Agree, E. Strongly agree.

9. E-governance can improve public service delivery, transparency, paperless environment in public service.

Strongly disagree, B. Disagree, C. Neutral, D. Agree, E. Strongly agree.

PUBLIC FINANCING BEYOND PARTICIPATORY BUDGETING: THE QUANTUM BUDGET

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Abstract

The idea of so-called “Participatory Budgeting” (PB) has recently re-entered the modern political discourse. Major metropolises, such as New York, are making progress beyond mere piloting by paving the road for mandatory PB with new legislation, while communities of various sizes and politicians of various ranks all around the world aim to follow suit in an attempt to maintain an image of democratic progress. This paper shall scrutinize PB and provide a critique of PB from the perspective of democratic innovation. Another concept for increasing democratic power of citizens shall be described – the Quantum Budget. The Quantum Budget is an innovative way of funding communal projects that bases on Liquid Democracy. The paper will compare the Quantum Budget to Participatory Budgeting and provide a discussion on their potentials and weaknesses.

1. Introduction

The 20th century brought humanity new technologies in form of electronics (programmable hardware systems), informatics (the art of structuring and processing information by means of software), and electronic telecommunications – the art of transmitting information by means of the combined power of electronics and informatics. This new knowledge how to utilize the electron to serve humanity enabled the emergence of cyberspace as a new dimension for human interaction and as such unleashed unprecedented transformations in domains such as business, logistics, navigation, social interaction, etc. Business-to-business sales and consumer-level mail orders are today mainly conducted online, road maps have given way to interactive GPS navigation systems, romantic partners are sought in cyberspace, and so on.

However, in the context of governing society – that is, managing the common good, provisioning of public services, etc., the flows of work and ways of conduct remain largely the same as they’ve been for past generations. The power to rule over a society is still entrusted to elected representatives, as it has been before; public services are still provided by governmental institutions that are funded through a system of public financing; and this system of public financing is still run by a machine of elected representatives and professional agents that exact taxes from tax payers in order to transfer them to privileged beneficiaries. In short, all governance is mediated by the bureaucracy.

Several ideas have emerged to modernize societal governance by leveraging the possibilities brought by electronic computing and informatics. Efforts to modernize societal governance are mainly focussed on the digitalization of channels for interaction between citizens and government

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agencies [11] (e.g. online tax returns) or automated exchange of structured and unstructured data between government agencies. To foster democratic participation and transparency of government action, initiatives emerged to make government data available online for public use [10]. These ideas however face the critique that they don't leverage the full potentials of 20th century technologies to transform societal governance to become more democratic [6].

Ideas to make societal governance more democratic deal with the question how levied taxes are spent for the common good. One such idea is the Participatory Budgeting (PB), another is the Quantum Budget (QB). Both ideas aim to increase the power of citizens in deciding how public money is spent. This paper shall compare both ideas / concepts and shall aim to answer following research question: What is the transformational potential of each idea on the existing culture of public governance and politics?

To answer this research question, the paper shall first provide a description of each of the ideas in section 2. Section 3 shall provide a discussion of both concepts in comparison with each other. Section 4 shall conclude with a summary.

2. Involving Citizens: The Concepts

Ideas to increase citizen involvement in public governance can take two possible directions: they can envision citizens to take direct action without government intervention / moderation, or they can rely on consulting citizens on relevant matters and allowing them to participate in processes that would be otherwise handled entirely by professional government agents. Crowd-funded civil infrastructure such as road repairs (O'Reilly reports the example of a self-organized road repair job in Hawaii, where business owners themselves raised the funds to repair a local street within days instead of waiting several years for government to do it [5]) would be an example how citizens can take independent action in matters of public interest, while the consultation of citizens on planned urban development projects would be an example how citizens are offered a platform to participate (being heard, having a say) in such matters.

In the domain of public funding, notable ideas to increase citizen involvement are Participatory Budgeting (PB), which takes the participative approach, and Quantum Budget (QB), which aims to act as a tool for taking direct action. This section shall briefly describe each of them.

2.1. Participatory Budgeting

Participatory Budgeting (PB) is about enabling citizens to have a say in allocating a community's budget to community projects. The idea was popularized during the 1980s by the Brazilian Workers' Party, who succeeded in implementing PB in Porto Alegre in 1989. Following this successful implementation, the model spread rapidly to other cities in Brazil, and was later adopted in cities and municipalities throughout the world.

What characterizes PB is the moderated involvement of citizens in a process that starts with a search for ideas and results in some of the identified ideas being funded by the government. Accordingly, citizens are invited to submit ideas for projects to be funded, such as new schools, sewage systems, etc. Typically, a team of volunteers would be sourced from within the participants, who would then refine the collected ideas and moderate a process that involves voting on the refined ideas. "Elected" ideas would be finally delegated to the government to fund and realize them.

2.2. Quantum Budget

The Quantum Budget (QB) is the application of liquid democratic decision-making to public financing. The idea is novel and has not yet been applied to real-world situations. The idea as such has been first described in the book *Smart City Governance* [7] where it has been proposed as a non-mediated way of funding common projects / programmes / activities by a community. More specifically, this means that instead of decisions regarding public funding being the concern of representative or executive institutions such as parliaments or ministries, such decisions are conducted by all citizens collectively in a liquid democratic fashion.

To understand the Quantum Budget, one must have first an understanding of liquid democratic decision-making – or Liquid Democracy (LD) for short. In LD, a community makes decisions on common matters such as laws and regulations, mandates given to individuals and organisations, etc., through a network of societal power that comprises all individual members of the respective community [9]. Each member of the community has a specific share of societal power (this share can be equal, or weighted by some criteria chosen by the community), which it can delegate to other members of the community at any time. If a member of the community delegates its power to another member, then also any power which that member has received, will be delegated further. Any delegation of power can at any time be revoked, which makes the network liquid – at any moment, the distribution of societal power can change. This way, some members of the community will bundle enough power to act as ad-hoc representatives of the community in situations when a communal decision has to be made.

QB bases on the principles of LD; however, instead of delegating abstract power, funds (money) are delegated throughout the network. Accordingly, strong nodes in the network would be able to accumulate sufficient amounts of money to fund public projects / programs / initiatives. Building and maintaining communal infrastructure (roads, public transport, hospitals, schools, etc.), the provisioning of public services (public schooling, public health, law enforcement, etc.) can thus be organized and handled by individuals or organizations able to bundle the required amount of funding.

Instead of taxes being taken away from the members of the community through exaction by institutions such as tax administrations, contributions owed to the community remain in the possession of each member, but they cannot spend them for their own needs. The sum of all contributions is called the Virtual Communal Fund (VCF). Each member of the community controls a given share of the VCF – this could be for example an equal share of the whole VCF, or a share corresponding to their particular contribution to the VCF; such share of the VCF is called a *quantum* (Greek for part / share – this is where the Quantum Budget gets its name from). A member of the community can then delegate their quantum further or use it to finance public projects / programs / etc.

3. Quantum Budget in Comparison with Participative Budgeting

Participative Budgeting (PB) is a well-known concept that has been applied in many cities around the world over a time span of several decades. Thus, since late 1980s scientists have been able to extensively study the effects of PB on society, its impact, and effectiveness. Quantum Budget (QB) on the other hand is a novel idea, which has yet to be validated in the real-world, and tested for its practical feasibility. This section shall accordingly undertake an attempt to compare QB to PB by

conceptually discussing the differences between QB and PB, as well as compare the impact of each innovation on society.

3.1. Comparing the underlying concepts: participatory vs. liquid democracy

Geldmacher-Musiol et al. [4] provide a critical review of the many issues implied by citizen participation in general, with a focus on PB in particular. A major point of critique is that the introduction of PB initially triggers high expectations amongst citizens, which later often fail to materialize, resulting in frustration and disappointment amongst those who participated. This frustration is comprehensible, as many people participating in PB contribute their ideas and spend significant time to develop these ideas, to formulate them, to advocate them to their peers and authorities, just to have them rejected in the end. Frustrated participants, Geldmacher-Musiol et al. argue, give up participating in PB, which is one reason why PB fails to attract the participation of more than just a marginal percentage of citizens – considerably successful PBs attract only up to 2-3% of citizens eligible to vote (ibid.).

Another reason why PB fails to reach beyond only a marginal interest can be found in the varying levels of the general political interest of any population. Thus, Boje & Masser [3] found, up to 15-20% of a population have no interest in politics at all, up to 5-10% are politically active individuals who take part in political life through political parties or NGOs, and ca. 70-80% are politically passive, but can be “activated” to take stance on issues that they consider sufficiently relevant.

Compared to the other wide-spread forms of democratic engagement – representative democracy and direct democracy, participatory democracy is disproportionately wasteful with regards to the resources (time, energy) it demands from citizens. In a democracy, the conceptual sovereign body are the citizens collectively – i.e., all individuals eligible by law. Direct democracy, if exercised in form of occasional referenda on major political issues, demands only a symbolic expression of preference from the citizen as a manifestation of commitment to the democratic process. Same is true for representative democracy, where all that citizens need to do is to cast a vote for one of the available candidates or political parties to take part in the ritual that legitimises the continuation of the institutions of modern democracies. Participatory democracy in comparison, however, is extremely demanding, while offering (too) little reward in exchange for the time invested.

Liquid Democracy (LD) as a forth form of democratic engagement offers a way to overcome the issues of participatory democracy while preserving its potential to enable full democratic participation. Looking at it from a philosophical perspective, Blum & Zuber [2] found that LD is significantly more democratic than the other forms of democratic engagement.

LD achieves the goal to give more power to the conceptual sovereign in a democracy, i.e., the collective of citizens, by taking a direct-democratic approach, whereby each citizen can express their vote directly on any matters they'd consider being relevant to them. LD embeds the principles of representative democracy by allowing citizens to delegate their political power to other individuals (or organisations) whom they trust. On top of that, LD contains the features of participatory democracy: it allows citizens to self-organise into interest groups where they can engage in debates, make plans, and decide on matters of public interest, and finally delegate the execution of their decisions to existing institutions, organisations, or individuals. The three existing forms of democratic decision-making – participatory, direct, and representative, are combined in LD, which thus acts as a universal method for a community to exercise its sovereignty in the scope of their democracy.

The advantages that LD has over the other three forms of democratic engagement accordingly correspond to the advantages QB would have over PB and other forms of public financing. The state of the art in public financing is to take a representative approach – elected representatives in parliament or other institutions of modern democracies draft up and vote through the community's budget. In PB, these tasks are entrusted to citizens, who have to invest time and energy in engaging with all necessary processes, whereby such engagement often results in frustration and disappointment. Behind this backdrop, QB could offer a solution to satisfy the appetites of those citizens, who aim to actively engage in politics (the max. 5-10%), while preserving the interest of the majority who has no desire to be bothered unless something important comes across that would affect them (the 70-80%). Perhaps even the remaining 15-20% abstainers of representative democratic processes could be engaged in LD / QB, as they might wish to permanently delegate their political power to friends or family?

3.2. Comparing the impact: incremental vs. radical innovation

Both PB as well as QB are primarily about bringing innovation to democracy. PB aims to innovate by fostering citizen participation on top of an existing political and governmental culture, while QB aims to innovate by introducing a novel culture of politics and societal governance.

Innovation as such can be either incremental, or radical [1]. Incremental innovation is the improvement / alteration of something existing, while radical innovation is the invention of something (radically) novel, which did not previously exist. “Add successively as many mail coaches as you please,” wrote Joseph Schumpeter in his *The Theory of Economic Development* [cf. 1], “you will never get a railway thereby”. “Breeding home pigeons that could cover a given space with ever-increasing rapidity did not give us the laws of telegraphy, nor did breeding faster horses bring us the steam locomotive” wrote Edward Menge (ibid.) to likewise emphasize the importance of radical innovation.

Radical innovation bears potentials for *transforming* industry, economy, and society. The invention of the combustion engine has reduced animal-based transport to the level of tourism and sport, just as has the successful application of the screw propeller to ships transform naval transport and reduced sailing to a mere leisure activity; the introduction of electricity-based household appliances (kitchen stove, washing machine, dishwasher) has transformed society by making time available for leisure and eliminating the need for household servants; etc. Incremental innovation on the other hand, is crucial for the ripening process of technology, as well as its further development and fortification – it is due to incremental innovation of the underlying technology, that early flying machines have been transformed into the safe commercial aircrafts of today.

In the context of societal governance, PB is a slight add-on to the existing democratic processes. As such, it bases on the existing infrastructure provided by the respective governments – it requires that governments establish processes to support PB, govern the processes, and finally interpret and execute the will of the participants. This mediation by government bears fears and concerns on side of existing government structures, which imply limitations on the extent to which PB can unleash its innovative potentials.

Geldmacher-Musiol et al. [4] outline some of the fears and worries that occupy government officials: one such worry is that citizens can't grasp the complexity of the underlying processes to implement the chosen projects; another fear is that citizens would propose large quantities of silly or utopic ideas that would impede normal work of the public administration and draw away scarce

human resources from more important tasks. From a perspective of the citizens, Geldmacher-Musiol et al. (ibid.) emphasize the discontent with limitations of the available budget per project (e.g. just a couple of 10.000 EUR per project), or the limitations with regards to the area of application – e.g., limited to civil infrastructure such as roads, parks, schools, etc.

The discontent on each of the sides limits the extent to which PB could transform power relations in a democracy. PB initiatives are often regarded as publicity stunts of new governments or aspiring politicians that serve selfish goals such as self-promotion, legitimacy-building, or the creation of powerless new bureaucratic institutions that are really only an end in itself. PB disillusion citizens as it fails to meet their expectations with regards to the impact of citizen participation, and often fails to reward citizens properly for their participation. Accordingly, PB projects require a constant influx of new participants to sustain – pupils or students are a welcome target group, accordingly. This severely limits the ability of PB to develop into a sustainable culture that would transform politics as we know it.

Unlike PB that is being practiced for several decades worldwide, QB is only an idea for now. QB has neither been instantiated in form of an experimental prototype, and is far away from having been validated and tested in the real world. Accordingly, its transformational impact can only be discussed in form of thought experiments and philosophical discussions. Unlike PB, which can be exercised on top of the existing political framework, QB would require the introduction of new technological solutions. This would include “wiring” individual informatized tax contributions into the Virtual Communal Fund (VCF), setting-up mechanisms to access the VCF and to control such access, establishing mechanisms for notification of individuals of proposals on how to spend the funds available in the VCF, engineering of dashboards, forums, and other tools to visualize the underlying processes, etc.

As QB would require the establishment of a strong technical infrastructure on top of which liquid democratic processes required, amongst others, for QB, would run, it would change the power relations between the conceptual sovereign body (the collective of citizens) and the government. The needed infrastructural investments are expected to positively impact the economy, while the transformational impact QB would have on the political culture, is suggested to bear effects that would elevate civilization on to a new level [8].

4. Conclusion

This paper compared two ideas to increase citizen involvement in societal governance, namely the Participatory Budgeting (PB) and the Quantum Budget (QB). The ideas were compared from two perspectives – how they can increase the power of citizens on the relation with governments, and which impact they have / could have on transforming society.

From a perspective of democratic innovation, PB acts as a tool to fortify existing power relations between those who govern and those who are governed. Although it promises to foster democratic inclusion of citizens in the processes of public governance, it fails to deliver on such promise, leaving behind each round of PB disillusioned and disappointed citizens who fail to see their expectations met.

PB is an idea that complements existing forms of democratic action: *participative* democracy runs side-by-side along *representative* democracy and *direct* democracy as two well-established forms of interaction between those who rule and those who are ruled. This complementarity with existing

forms of interaction limits its potentials for societal transformation. QB on the other hand relies on a fourth form of democratic action – *liquid* democracy, which combines these three traditional forms of interaction into a new, technology-enabled framework for steering and governing society, where democratic action is a first-class citizen.

As QB is currently nothing more but an idea, significant research and engineering efforts would need to be put in place to develop the framework for a new generation of democracy. All these development and engineering efforts would however enable the development of a new culture, which would be “digital” from the very beginning. This new culture could then translate to new economic impulses, new investments into a digital transformation of society, new jobs, and new hopes for civilization to advance to a new level.

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REFLECTIONS ON THE PROPOSALS OF THE EUROPEAN COMMISSION FOR A DIGITAL TAX

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Abstract

Digitalisation leads to significant changes in many areas of the economy. Chancellor Angela Merkel believes that the increasing collection and the use of consumer data associated with digitalisation is creating fundamental justice problems. The public debate focuses on the taxation of international digital companies. Facebook and other Internet giants make high profits in Europe, but they are hardly taxed there. In the opinion of many politicians, this is unacceptable - but it complies with the applicable standards of the international tax system. The current corporate tax rules are built on the principle that profits should be taxed where the value is created. The tax rules were mainly conceived in the early 20th century for traditional businesses. They define what triggers a right to tax in a country ("where to tax") and how much of corporate income is allocated to a country ("how much to tax") largely based on having a physical presence in that country and without reflecting the value created by user participation. That means that non-residents for taxation purposes become liable to tax in a country only if they have a presence that amounts to a permanent establishment there. The Commission has made two legislative proposals in 2018. The new rules would ensure that online businesses contribute to public finances at the same level as traditional 'brick-and-mortar' companies. 1. A digital platform will be deemed to have a taxable 'digital presence' or a virtual permanent establishment in a Member State if it fulfils certain criteria. 2. The European Commission intends to introduce a 3% tax on sales through the sale of user data, the provision of online advertising and the provision of online marketplaces. The tax will apply to companies with a total turnover of EUR 750 million worldwide and a digital turnover of EUR 50 million in the EU. The digital tax raises various questions about the justifications. Especially for the export nation Germany, it could turn out to be a dangerous boomerang.

1. The problem

Digitalisation is leading to profound changes in many areas of the economy. New business models are emerging, the border between goods and services trade become indistinct. The collection and processing of data as well as intangible assets are becoming more and more important for the gross domestic product (GDP) and of course for the gross national product (GNP). Digital companies are growing faster than traditional businesses, this trend will continue. Without exception, the six most valuable companies in the world now are technology companies, with a strong digitalisation relevance. Five of them are from the USA (Apple, Amazon, Alphabet (Google), Microsoft, Facebook) one is from China (Alibaba). [1]

The public debate (not only) in Europe focuses on the taxation of international digital companies. The transformation of the global economy due to digitalisation is putting pressures on national

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corporate tax systems. Furthermore, the problem of international tax avoidance plays an important role. Some of the named companies have attracted attention because of spectacular tax avoidance strategies. Especially large US companies such as Google and Amazon are accused of withdrawing most parts of their profits from proper taxation. It is argued that local companies are contributing significantly to the financing of domestic infrastructure and social benefits, while international digital companies do not (adequately) do so. However, international tax avoidance is not only a problem of digital companies.

The digital giants mentioned above make huge profits with their business in the EU and of course in Germany, but they are hardly taxed in the EU and respectively in Germany. In the opinion of many politicians - not only in Germany - this is unacceptable, but it complies with the applicable standards of the international tax system. Accordingly, profits of foreign companies - may in principle - be taxed only domestically if they have a permanent physical presence there, but many foreign Internet companies can serve a certain market without having a branch in Germany. Profits made with lucrative activities, such as selling user-generated data and content, are not captured by today's tax rules - which in principle have been valid for decades - because these rules were not designed to encompass those companies acting global but having no physical presence in that country where they offer digital services.

The EU Commission has recognized this problem too: "In the digital economy, value is often created from a combination of algorithms, user data, sales functions and knowledge. This data will be used for targeted advertising. The profits are not necessarily taxed in the country of the user, but in the country where the advertising algorithms has been developed. This means that the user contribution to the profits is not taken into account when the company is taxed." [2]

Many Member States of the EU called the EU-Commission to take action to improve the fairness of tax systems. Meanwhile the taxation of the digital economy is a key part of the EU-Commission's fair taxation agenda. The Commission takes the view that uniform rules for the whole EU are needed to ensure that these companies pay taxes where they make profits. The Commission also sees a need for action, for a further reason. She argues that between companies with conventional business models on the one hand and the digital business models on the other hand, there is an overall tax differential in favor of the digital economy.

The Commission argues: "The effective tax rate for digital companies - such as social media companies, collaborative platforms and online content providers - is around half of traditional companies - and often much less. On average, digitalised businesses face an effective tax rate of only 9.5%, compared to an effective tax rate of 23.2% for traditional business models." [3] This tax gap is an indication of distorted competition. The challenge - from the view of the commission - is to ensure that digital companies also contribute their fair share of tax.

But this figures, called by the Commission, are not the result of measured tax payments but are based on calculations of the effective average tax rate using the method of Devereux and Griffith. In this method a hypothetical investment project with a given profit and a given structure of capital goods is considered and for this purpose, a hypothetical tax burden is calculated, which results from the difference of the capital values of the investment project before and after taxes. If one considers the actual average tax burden instead of the hypothetical tax burden, the result is not quite so clear. In another calculation, the ifo-Institute (a research Institute in Munich) came to the conclusion that the tax burden of digital companies is 20.9 % and the tax burden of non-digital companies is 26.7 %. [4] This tax differential is based on balance sheet data and the actual tax payments. These

figures represent the difference between profit before tax and profit after tax divided by pre-tax profit. The average total tax burden for digital businesses - according to this calculation - is therefore only 5.8 percentage points below the tax burden for non-digital companies. The tax differential between digital and non-digital companies is significantly lower than indicated by the European Commission - but there is a difference.

"The reason for this is an assumed higher share of non-capitalized costs in the investment structure [...] as well as more favorable depreciation rules for digital capital goods and the applicability of tax incentives for research, development and innovation." In other words, the European Commission complains that national taxation policies favor investment goods, which are widely used in the digital economy, and now they want to introduce completely new taxes in order to compensate the benefits caused by politics. The more accurate and appropriate approach would be to eliminate unjustified benefits that causes the differences. [5]

2. Common EU-wide solution

Even considering this smaller difference of percentage, the tax system seems to be unfair, traditional companies usually have a higher tax burden than digital companies. On 21 March 2018, the European Commission has made two proposals of tax rules for digital companies. This proposals aims at addressing the issues raised by the digital economy by setting out a comprehensive solution within the existing corporate tax systems of the Member States. It is said to provide a common system for taxing digital activities in the EU, which properly takes the features of the digital economy into account. A common EU-wide solution for the taxation of digital companies allows Member States to tax profits made in their territory, even if the companies do not have a physical presence in this country. The new rules should ensure that online businesses contribute to public finances in the same way as traditional businesses.

2.1 Proposal 1: A common reform of the EU's corporate tax rules for digital activities [6]

"A digital platform will be deemed to have a taxable "digital presence" or a virtual permanent establishment in a Member State if it fulfils one of the following criteria:

- It exceeds a threshold of € 7 million in annual revenues in a Member State
- It has more than 100,000 users in a Member State in a taxable year
- Over 3,000 business contracts for digital services are created between the company and business users (B2B) in a taxable year."

This proposal is to be regarded as an additional aspect of the existing tax rules. The concept of a significant digital presence is intended to establish a taxable nexus in a jurisdiction. The new system secures a link between where digital profits are made and where they are taxed. It enables Member States to tax profits made in their countries, even if a company does not have a physical presence there. The proposed rules for establishing a taxable nexus of a digital business in a Member State are based on revenues from supplying digital services, the number of users of "digital services" or the number of contracts for a digital service. For the three user-based criteria mentioned above (revenues, number of users and number of contracts) different applicable thresholds are set. There is a "significant digital presence" in a Member State if one or more of the following criteria are met: the revenues from providing digital services to users in a jurisdiction exceed € 7,000,000 in a tax

period, the number of users of a digital service in a Member State exceeds 100,000 in a tax period or the number of business contracts for digital services exceeds 3,000.

The Commission defines the term digital service: “digital services” means services which are delivered over the internet or an electronic network and the nature of which renders their supply essentially automated and involving minimal human intervention, including in particular: [7]

- (a) the supply of digitalised products generally, including software and changes to or upgrades of software;
- (b) services providing or supporting a business or personal presence on an electronic network such as a website or a webpage;
- (c) services automatically generated from a computer via the internet or an electronic network, in response to specific data input by the recipient;
- (d) the transfer for consideration of the right to put goods or services up for sale on an internet site operating as an online market on which potential buyers make their bids by an automated procedure and on which the parties are notified of a sale by electronic mail automatically generated from a computer;
- (e) Internet Service Packages (ISP) of information in which the telecommunications component forms an ancillary and subordinate part, in other words packages going beyond mere internet access and including other elements such as content pages giving access to news, weather or travel reports, playgrounds, website hosting, access to online debates or any other similar elements;
- (f) the services listed in an Annex (II), for example:
 - website hosting and webpage hosting,
 - automated, online and distance maintenance of programmes,
 - remote systems administration,
 - online data warehousing where specific data is stored and retrieved electronically,
 - online supply of on-demand disc space,
- (g) Digital services shall not include the services listed in an Annex (III) or the sale of goods or other services which is facilitated by using the internet or an electronic network.

List of services that are not deemed to be digital services (for example):

- radio and television broadcasting services,
- telecommunications services,
- goods, where the order and processing is done electronically,

- CD-ROMs, floppy disks and similar tangible media,
- printed matter, such as books, newsletters, newspapers or journals,
- CDs and audio cassettes,
- video cassettes and DVDs,
- games on a CD-ROM.

The mere sale of goods and services via the Internet or an electronic network is not considered as a digital service.

2.2 Proposal 2: An interim tax on certain revenue from digital activities [8]

The second proposal is only an intermediate step, until the comprehensive reform (proposal 1) will be implemented. In the medium term, the EU Commission wants to enact the concept of a permanent establishment in corporate taxation for digital companies.

The tax will apply to revenues created from activities where users play a major role in value creation and which are hard to capture with current tax rules, such as those revenues:

- created from selling online advertising space
- created from digital intermediary activities which allow users to interact with other users and which can facilitate the sale of goods and services between them
- created from the sale of data generated from user-provided information.

With a suggested tax rate of 3 % on gross annual revenues, derived from specific digital services, the EU-Commission estimates € 5 billion revenues for all Member States. The tax will only apply to companies with total annual worldwide revenues of € 750 million and EU revenues of € 50 million. [9] The proposed thresholds will ensure that only large companies will come under the scope of the new tax. Smaller start-up and scale-up companies will not be burdened.

For a short-term the EU-Commission proposed this (also called) “digital tax service”. This system (proposal 2) will apply only as an interim measure, until the comprehensive corporate tax rules (proposal 1) has been implemented and has inbuilt mechanisms to alleviate the possibility of double taxation. It should help to avoid unilateral measures in certain Member States, which could lead to a patchwork of national proposals and solutions. This “indirect tax” would apply to revenues created from certain digital activities which escape the current tax framework more or less entirely. The activities include: The placement of advertising on a digital interface (e.g., websites or mobile applications) targeted at the users of that interface, providing platforms (multi-page digital interfaces) that allow users to interact with others (e.g., Facebook), as well as from the sale of customer data (for example from Facebook).

So it would target the most urgent gaps and loopholes of digital activities and will apply to two main types of digital services. “Firstly, it will cover services where a huge value is created by user data, either through advertising or by the sale of the data collected by companies for example as

social media or search engines. Secondly, it will cover services of supplying digital platforms that facilitate interaction between users, who can then exchange goods and services via the platform (such as peer-to-peer sales apps).” [10]

In order to simplify administration, it is envisaged that the tax declaration and tax payment for the entire EU will only be made in one EU member state (so-called one-stop-shop principle). This is responsible for forwarding to the other recipients. It avoids companies having to submit separate digital tax returns in each of the EU Member States.

3. Critical remarks

On 21 March 2018, the European Commission has made two proposals of tax rules for digital companies. A long-term solution is to embed the taxation of the digital economy in the international corporate tax framework.

A short-term measure is to levy a separate tax, a kind of equalization tax, a Digital Service Tax (DST) that covers the main digital services. In doing so, the Commission respond to a request of some member states to develop a corresponding concept by extending the right of the member states to tax profits earned domestically, even if, according to previous understanding, there is no domestic permanent physical presence and so there is no basis for domestic taxation.

The proposal stipulates a tax rate of 3 % on the gross income of a taxpayer from the provision of certain digital services minus VAT and other similar taxes. In the medium term, the EU Commission wants to use the concept of a permanent establishment in corporate taxation for digital companies. The DST will be repealed if comprehensive measures have been adopted and Double taxation treaties with third countries have been implemented.

Initially, Germany, France and several other countries called for swift measures to increase the taxation of digital giants like Facebook and Google. While the German government initially endorse a “kind of digital taxation”, it has more and more doubts. The German government criticized the specific proposal made by the EU-Commission. Even the Advisory Council of the German Bundestag recommends not to support the proposals of the new tax rules. The Council argued that the proposals encounters serious legal concerns and it would be in their economic effects very questionable. The Digital Service Tax breaks with existing international tax rules of corporate taxation in different kinds. The introduction of this tax would be a paradigm shift. [11]

The EU Commission defines the Digital Service Tax as an indirect tax and sees the legal basis for the proposed directive as the common system of a digital tax in Article 113 TFEU concerning the harmonization of indirect taxes. This is controversial. Assuming that the DST is actually an indirect tax, it should burden the beneficiaries, the consumer. However, the intention of the EU Commission is to tax the profits of the companies via the detour of gross revenues. Understood as a direct tax, it is an intervention in the objective net principle. Gross income would be the subject of this kind of tax, not the net income of these companies. However, companies with low profit margins (often young companies) or companies with losses would be affected severely if gross income would be choose for the tax base. That is a paradigm shift, even as the marginal costs of these companies are very low and there is no serious and systematic impact on traded volumes (macroeconomic) or market prices expected. The digital tax reduce the margin of digital companies and thus acts as an income tax. [12] But the new tax would be levied in addition to the taxes already due under

applicable law. The consequence would be a double taxation. This would also hit companies already paying their "fair share" of taxes under the regime of their country of residence.

A problem of equity arises from the two thresholds proposed by the European Commission, namely worldwide revenues of € 750 million and taxable revenues of € 50 million in the Union, to cover only large companies. Due to the specific thresholds of the EU digital tax, only large-scale suppliers with market power are taxed. Why should a tax only hit very large companies?

One of the arguments put forward by the European Commission to justify digital taxation is the loss of tax revenue created by aggressive tax planning and tax avoidance practices of digital companies. According to the European Commission, digital taxation can help ensure that digital businesses make an appropriate contribution to public infrastructure financing. In addition, the revenue from digital taxation could contribute to the sustainability of public finances. But the estimated revenue from the EU digital tax would be relatively low. The EU-Commission estimates an amount of € 5 billion, the ifo-Institute Munich estimates additional revenue of € 3-4 billion for the member states. At around € 836 million, Germany receives by far the largest amount of digital tax revenue. The revenues of the digital tax of the United Kingdom and France are significantly lower at € 595 million and € 587 million, respectively. The volume of revenue in relation to the total tax revenue is negligible. In Germany and the United Kingdom, digital tax revenue would be just 0.1% of total tax revenues. In France, the share would be around 0.09%. [13] The justification put forward by the European Commission that digital taxation could generate additional public revenues that make a significant contribution to the sustainability of public finances is unrealistic.

The EU Digital Tax is also called as a "GAFA tax", a tax on the US tech giants: Google (Alphabet), Apple, Facebook and Amazon. In fact, much of the digital tax revenue is borne by US companies. Half of the forecast total digital tax revenue will come from companies headquartered in the United States.

Expected relative distribution of digital tax burden by region: [14]

40% EU

50% USA

10% rest of the world

This has the potential to further fuel the already smoldering trade dispute between EU and USA. Against the backdrop of the US and the European Union, it seems likely that the United States will impose trade, tariffs or other tax restrictions as a countermeasure. In such a scenario, income losses within the EU may occur that far exceed the fiscal revenue from the digital tax.

In this context, it is also possible that important countries like the USA or EU trading partners may wish to transfer the new tax rules (withholding tax in accordance with the revenues generated in the individual countries) to companies in the so-called Old Economy. For example, the US may want to tax profits generated by the German automotive and engineering industries. German automotive and engineering-industrie exports a lot of cars and machines. The taxes of these export-oriented companies like VW, Daimler and BMW are paid in Germany and not (or only to a relatively small extent) in USA or in the other countries where the goods are exported. A potential backlash would hit especially the German export-oriented economy. With regard to such countermeasures,

Germany is therefore particularly vulnerable, so that the digital tax can prove to be a boomerang that does not improve Germany's fiscal and trade position, but rather worsen it. [15]

If that's the case, Germany cannot reverse the legislation immediately. For the introduction, modification or abolition of this tax in the context of an EU directive requires unanimity. Should the directive be adopted, a new form of tax competition would be launched without a single Member State or group of Member States having a realistic opportunity to shape or stop this process in the light of new events and lessons learned. Limiting the freedom of design would go both ways: Neither could individual Member States or groups of Member States enforce higher rates of taxation against the Directive, nor could lower tax rates be set, nor could this tax be abolished. [16]

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INFLUENCE OF THE ECONOMIC GAP ON THE LEVEL OF E-GOVERNMENT IN THE DEVELOPING COUNTRIES - REPUBLIC OF MOLDOVA

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Abstract

The digital divide of developing countries vis-à-vis developed countries is also reflected in the level of e-Government development. Developing countries face the challenges of e-Government with fewer capacities and resources but also strong incentives for growth prospects.

Developing e-Government as a complex phenomenon involves multidisciplinary efforts: the development of electronic communications infrastructures and data infrastructures, the transformation of internal business-processes of governance, increased democracy and education, as well as a sustained economic level, etc.

The research analyzes the level of e-Government development in the Republic of Moldova in a regional context of a group of developing countries in an attempt to find particularities and similarities in the evolution of e-Governance in this space and to identify the development potential and opportunities and to overcome the gap in this area.

The study also addresses the prospect of alignment with European standards on e-government development, especially with regard to the single digital market, the European Interoperability Framework and others, as levers and drivers for increasing the socio-economic level of the Republic of Moldova, and building an open, participative and performing government.

1. Introduction

Electronic government is a great challenge for the traditional model of public administration. It has an overwhelming influence on how to organize internal government processes and on the services provided by citizenship and business governance.

Over the years, the issue of implementing eGovernment in developing countries and especially in transition countries has been the subject of numerous studies [2], [3], [4], [5], [6]. Research has focused on the specificities of e-Governance development in these countries, on the causes of failure of e-government projects [4], [5], [6] 7, barriers to e-Government implementation [2] [3], [6] on issues such as government policies in the field [4], [6], [7] ICT infrastructure, education, research, culture, democratic freedoms, etc.

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The purpose of this paper is to examine the situation regarding the e-Government development in the Republic of Moldova in an attempt to understand to what extent this process takes place in line with the general trends in the digitization of government, but also to help identify development opportunities.

In our study, we have been particularly interested in how the level of economic development of the country influences the phenomenon of e-Government and whether there are specific characteristics for developing countries in comparison to developed countries.

2. Reason of research

Several studies highlight factors whose influence on the e-Government implementation process is critical [2], [7], [12], [13], [14], [16], [17]. These include, for example, lack of infrastructure [7], lack of awareness of the role and opportunities of e-Government [2], funding of e-Government projects, political and legal issues, political support, resilience to change, vision and implementation strategy [14].

The most frequently mentioned and considered as critical factors are financing, IT infrastructure, legal issues, awareness and political support [14]. For example, in the case of developing countries, funding for e-Government projects is much more critical, as they have limited resources [7]. As a rule, e-Government projects in these countries are largely funded by external donors, and with the ending of these funding, project sustainability can no longer be ensured. On the other hand, projects funded in this way do not provide an approach that will lead to incremental improvements in which functionalities are improved over time so that efforts are not lost if funding is reduced.

In our research we took into account the economic aspect of the problem, the level of economic development being the basic criterion according to which countries are classified in different categories of development. We focused on a number of developing countries, according to the classification of the International Monetary Fund [18], [19] in the ex-communist area, in fact, countries that are or were in transition, in the idea that these countries have a somewhat common past, certain cultural features and other common features that would allow us to identify certain laws in the process of implementing eGovernment. These countries are: Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, Romania, Serbia, Tajikistan, Former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine, Uzbekistan.

We also intend to examine the dependence between the level of economic development and the level of e-Government in an expanded context, taking into account the relationship between the e-Government and the economic one in a group of developed countries in the European area, namely Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, United Kingdom. On the one hand, we considered it necessary to have a broader view on the relationship between e-Governance and economic development and, on the other hand, we wanted to see what are the particularities of developing countries in general and of the Republic Moldova in particular, in this picture of the relations between e-Government and economic development.

The Republic of Moldova is a country closer tied to European practices in all areas of economic and social life both in geographical proximity and especially through the association agreement. The Moldovan e-Government model will have to take this link into consideration, and technological

solutions for transforming governance will develop in an increasingly integrated information space with the European one, harmonization of the normative framework and alignment with European norms in this respect on the order of day, more and more current and important.

3. E-Government in Moldova

The Republic of Moldova is a developing country, a country in transition, detached from the former Soviet Union in 1991. At the end of the Soviet period, there were a significant number of local technological institutions and enterprises. They activated in the Soviet industry, especially in the military industry. For example, more than 35,000 specialists were employed in the electronics industry at the end of the 1980s [20] (for comparison, in 2018, the ICT sector employed 20,000 specialists [21]). During this time a human potential with experience and culture in the field of ICT has been created. The achievements of the Republic of Moldova in the field of ICT, especially in the electronic communications infrastructure, are largely due to this potential. The ICT sector contributed about 8.7% to GDP. Total exported ICT services amounted to US \$ 270 million in 2012, which represents about 10% of exports.

Moldova is part of the group of countries with a high level of EGDI, between 0.50 and 0.75, with an e-Government Development Index of 0.6590. Also, Moldova, being a lower middle-income country (GNI per capita – 5670 US dollars), records very high values of the On-line Services Index (0.7708) and the e-Participation Index (0.8596, global position - 37) and is one of 10 countries of this category, which have values of the e-Government Development Index above the global average. [1].

An important feature at this stage is that the means of communication and use of information applications are becoming more accessible, especially this refers to mobile telephony which has a coverage of about 125% and the penetration rate of the broadband mobile Internet of about 85% (<http://www.anrceti.md/>). This makes it possible to capitalize on great opportunities for development and better provision of on-line public services.

	EGDI	Online Service Component	Telecomm. Infrastructure Component	Human Capital Component
<i>High income countries average</i>	0.7838	0.8120	0.7018	0.8375
<i>Europe</i>	0.7727	0.7946	0.6765	0.8471
Republic of Moldova	0.6590	0.7708	0.4787	0.7274
<i>World</i>	0.5491	0.5691	0.4155	0.4155
<i>Lower middle income</i>	0.4411	0.4688	0.2703	0.5843

Table 1. E-Government Development Index in Moldova, 2018 [1]

Despite the fact that until now the progress made by the Republic of Moldova in implementing e-Government is obvious, there are, however, fears that the situation is not very high, the reasons for this being a series of limit factors.

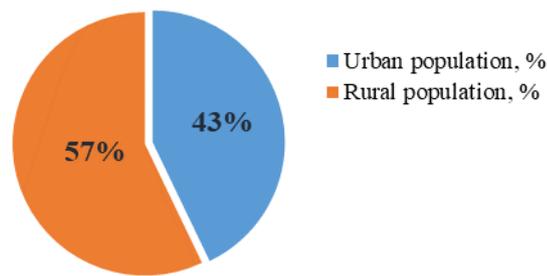


Figure 1. Urban / rural components in the population structure of the Republic of Moldova, 2018.

Source: www.staistica.md

World Economic Forum highlights the most problematic factors for doing business in Moldova. These include, first of all, corruption, political instability, government instability, inefficient government bureaucracy and access to finance.

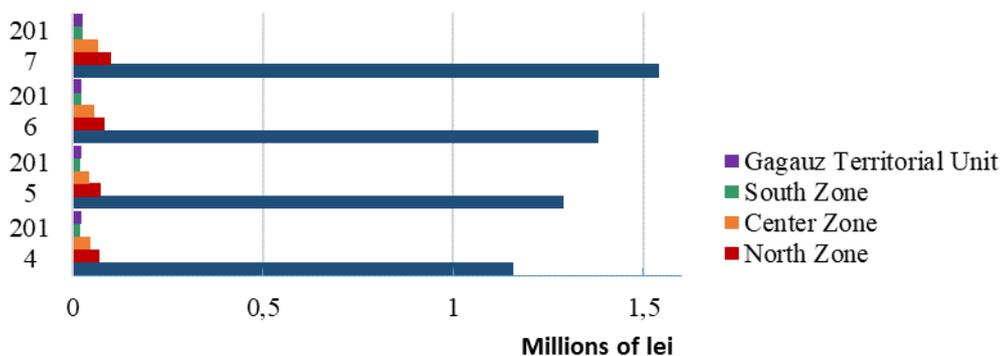


Figure 2. Expenditure of legal entities for IT, in territorial profile, 2017.

Source: www.staistica.md

Moldova has characteristics specific for developing countries [4], [6], [7]:

- Reduced funding opportunities for e-Government projects. The most important program of e-Government, Strategic Program for technological modernization of governance (e-Transformation) [12], adopted in 2011, was supported by the International Development Association (IDA) in a rate of over 85%, and, for example, expenditure on computerization of government, defense and compulsory insurance is just over 0.2% of GDP [8]<
- Demographic and territorial disparities. Over half of the country's population, 57% (Figure 1), live in rural areas. About 89% of the total IT expenditure of legal entities are made in Chisinau (Figure 2);
- Sporadic and uncoordinated use of electronic services[23];
- A poorly developed ICT market, in particular the IT market and low ICT absorption by companies [10];
- Low level of government procurement of advanced technologies (136th place from 138 countries) [10];
- Digitizing front-office processes, while back-office is still out of digitization [9].

4. Data sources

In order to establish a functional relationship between the economic development level and the level of development of e-Government in the group of countries that make up the research sample, current data with free access were used, namely:

- e-Government Development Index (EGDI), according to the United Nations [1],[22]
- GDP per capita, according to the World Bank (<http://api.worldbank.org>);
- Global Competitiveness Index (GCI), according to the World Economic Forum [18];
- Population structure of the Republic of Moldova, 2018. Source: www.staistica.md;
- Expenditure of legal entities for IT, in territorial profile, 2017. Source: www.staistica.md.

5. Data analysis and model estimation

We understand the notion of level of eGovernment development in a particular country, as defined in [1], as the availability and capacity of national institutions to use ICT to provide public services, and the E-Government Development Index (EGDI) as a measure which is used by government officials, policy makers, researchers and representatives of civil society and business to better understand the relative position of a country in using e-Government to deliver public services.

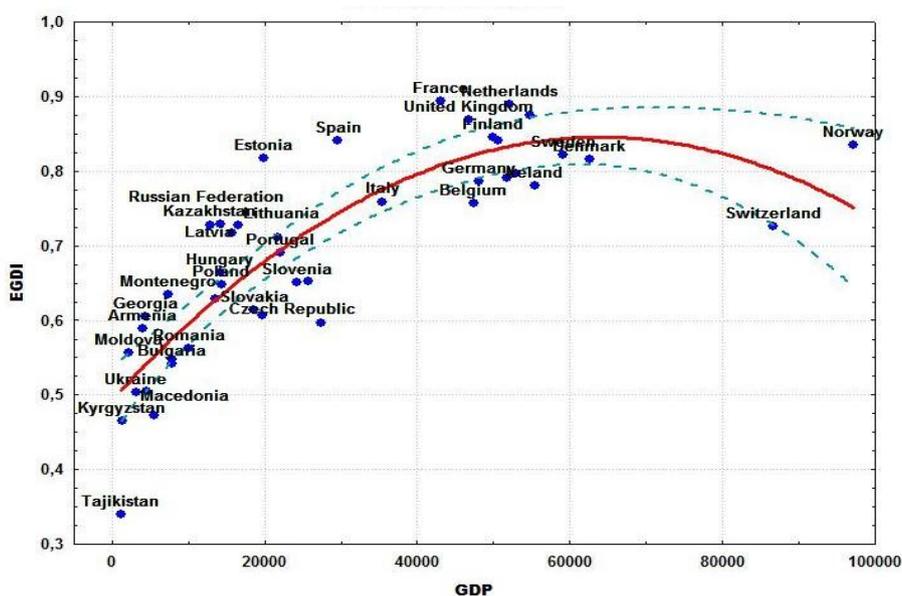


Figure 3. EGDI against GDP p/c, 2014

As an indicator of the level of development of e-Government, the composite E-Government Development Index (EGDI) indicator was taken, and as an independent variable and indicator attesting the level of economic development of the countries was taken into account GDP per capita.

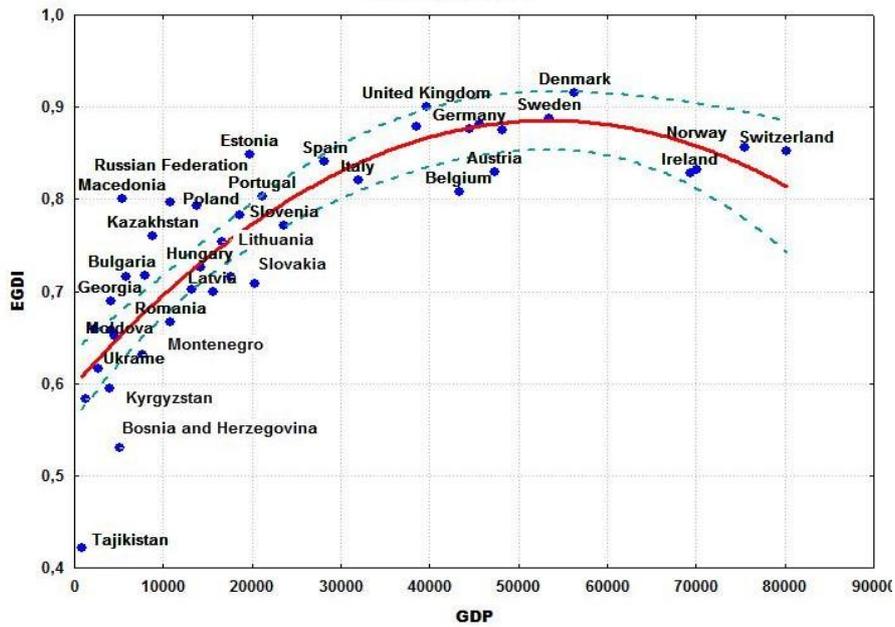


Figure 4. EGDI against GDP p/c, 2018

The analysis also used another development indicator - Global Competitiveness Index, calculated and maintained in the Global Competitiveness Reports 2014, 2018 of the World Economic Forum. The idea of analyzing the relationship between EGDI and GCI comes from the fact that the latter would reflect the level of development more complexly and would take into account far more factors than the level of economic development.

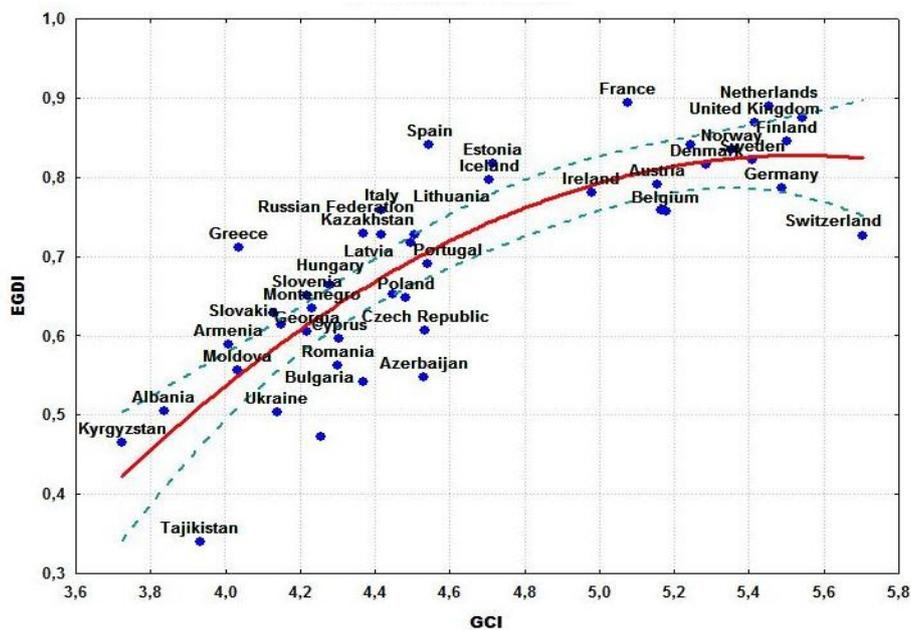


Figure 5. EGDI against GCI, 2014

We used to compare the data from the 2014 and 2018 reports to verify the relationship between the GDP per capita economic development indicators (Figure 3 and Figure 4) and the Global Development Index – GCI (Figure 5 and Figure 6).

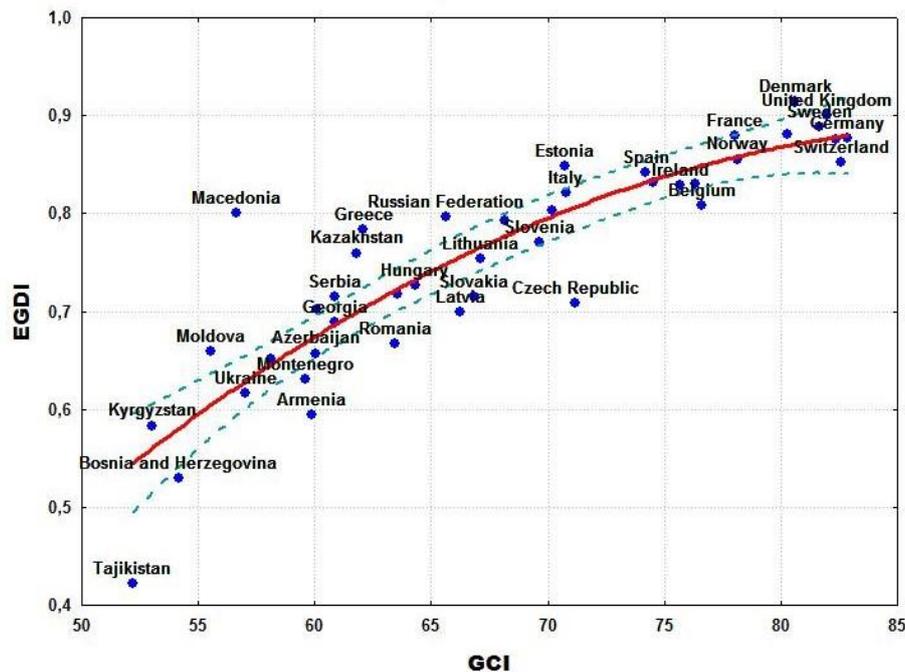


Figure 6. EGDI against GCI, 2018

The nature of the EGDI-GDP relations, on the one hand, and EGDI-GCI, on the other hand, is similar to the distance of 4 years: 2014 and 2018. The obtained diagrams confirm a direct relationship between the level of economic development of the country and the level of development eGovernment.

Over the 4 years, from 2014 to 2018, the value of EGDI has increased in both groups of countries. The average growth rate of EGDI in the developing countries was 0.09937, and the developed group - 0.05706, both increases being statistically significant.

The increase in the level of EGDI is generally slightly higher for the group of developing countries which may suggest that the countries in this group are more motivated at this stage to develop their own e-Government systems.

From a mathematical point of view, EGDI, like many similar composite indicators, is a weighted average, in this case, of three sub-indices: the Online Service Index (OSI), the Telecommunication Infrastructure Index (TII) and the Human Capital Index (HCI). The preference for EGDI came from the fact that it is established as a result of complex questionnaires (140 questions), in which the emphasis is on the identification of multiple aspects of the eGovernment concept, in close connection with the Sustainable Development Objectives.

The level of economic development is primarily represented by the broad general indicator used in development process research such as Gross Domestic Product (GDP) per capita in USD in current prices, and secondly by the composite Global Competitiveness Index as a measure of the level of the competitiveness of national economies, which in turn determines the productive level of these economies. Built on 98 variables that describe different aspects of country economies, GCI highlights the determinants of long-term development.

6. Observations and conclusions

The study aimed to investigate the dependence between the level of economic development of Moldova Republic and the level of development of e-Governance in the context of a group of developing countries in the ex-communist space. The choice of this group of countries is not coincidental, with several common features between these countries, such as the economic model, social relations, similarities in how to organize and perceive governance, and so on. On the other hand, it has been interesting to see how these countries are positioned in relation to economically advanced countries. The option was for the immediate neighborhood countries - developed countries in Europe, some of which have already gone through a transition from a planned economy to a market economy.

In parallel with the dependence between the e-Government development and the level of revenues, another dependence was taken into account, the level of e-Governance and the level of economic competitiveness. The reason for choosing to include GCI in research is that it is a much more complex variable that takes into account several aspects of economic development, some of which, in our opinion, may give us a slightly more appropriate picture of the essence of the economic factor.

Research finds a clear dependence of e-Governance on the level of economic development, which is in line with studies in the field [2, 4, 6, 7, 14, 16]. At the same time, there is a visible distinction between the level of e-Governance and the level of income between developing countries and developed countries. This finding suggests that, although there are various other influences about the level of e-Government development, income levels are decisive. Although the studies did not find significant quantitative influences between the level of development of e-Government and specific components of GCI such as Public-sector performance, Entrepreneurship, Digital skills among the population, Government policy stability policy, Government's long-term vision, Government's responsiveness to change, with the exception of the E-Participation Index, the influence of composite factor Global Competitiveness Index 4.0, is a significant one.

The challenge for the Republic of Moldova in this respect is both the gap with other countries and the internal disparities of economic and social development that do not tend to be overcome very soon and this can be very significant in the context of the global development competition that will be largely devoted to the digitization of social activities both within the government and in the private space. IT investments in the government sector and businesses are far too limited.

The Republic of Moldova is a country closer tied to European practices in all areas of economic and social life both in geographical proximity and especially through the association agreement. The Moldovan e-Government model will have to take this link into consideration, and technological solutions for transforming governance will develop in an increasingly integrated information space with the European one, harmonization of the normative framework and alignment with European norms in this respect on the order of day, more and more current and important.

The research was carried out on data that is the current situation of the countries in the sample. We consider it is of interest to investigate the evolution of the level of development of e-Governance, both depending on the level of economic development and on various other aspects, taking into consideration, for example, the temporal aspect of the phenomenon, but also a broader context of research subjects, which we hope to be able to achieve further.

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THE ROLE OF ICT IN POVERTY ALLEVIATION IN INDIA

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Abstract

This study examines the role of Information and Communications Technology (ICT) in combating poverty in a developing country like India. ICT includes a wide range of appliances and applications that facilitate access to information. Over the last couple of decades, quick access to relevant and reliable information has transformed the way the world lives and transacts business, transforming lives in the process. In this study, we examine the current and potential role such access to information has in speeding up India's fight against poverty.

The traditional view of Poverty describes it as an economic phenomenon, measured in monetary terms. Such a description facilitates its quantification and tracking across time. With the broadening of understanding, poverty has evolved into a multi-dimensional concept, that goes beyond material deprivation to include, among others, illiteracy, vulnerability, powerlessness, gender inequality, social exclusion and a lack of opportunity to fulfil one's potential.

With these broad definitions, the present study answers the following questions: 1) What is the role of ICT in economic empowerment of the poor including employment and income generation? 2) What is the role of ICT in combating social exclusion especially for women?

Keywords: *ICT, Poverty, multidimensional poverty, education, gender inequality, social exclusion.*

1. Introduction

Last two decades have witnessed technology pervade every aspect of our lives like never before. At the forefront of this technological revolution is the information explosion, made possible, in large part, through exponential growth in the ICT sector. While there are several fields where the developmental role of ICT is but obvious, there is an equal number of those where such a causative relationship is less evident on the surface. The role of ICT in poverty eradication is one area with direct as well as the indirect causal relationship. This study examines the different ways in which growth in the ICT sector influences a reduction in the incidence of poverty in India.

The concept of Poverty is dynamic and complex. Poverty is not a single identifiable condition, but a fluctuating set of circumstances [29]. The term 'poverty' can be considered to have a cluster of different overlapping meanings depending on the subject area or discourse [11]. There is a consensus among scholars that poverty is multidimensional in nature and any meaningful discourse on poverty must address it so. Consequently, this study takes into consideration different dimensions of poverty like income, employment, education, vulnerability, powerlessness, gender

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inequality, social exclusion and a lack of opportunity to fulfil one's potential, to examine the impact of ICT in poverty alleviation in India.

India is a vast and diverse country with a developing economy. While it is one of the fastest growing economies in the world, India is also home to one of the highest number of poor in the world. The IT Industry has been one of the major growth engines for the Indian economy over the last two decades and more. Curiously, this period coincides with the tremendous stride India has made in combating poverty and hunger across the country. Clearly though, much more needs to be done and much quicker to rid India of the scourge of poverty and the role of ICT will be examined in detail in the later sections.

The study is divided into three parts. Part one describes the ICT sector with particular reference to India. Part two discusses, briefly, the concept of poverty in its different dimensions. Part three examines the present and potential role of ICT in poverty eradication in India and the challenges involved. The study relies on data from secondary sources retrieved from the databases accessed through the library of the National University of Public Service, Budapest, the CEU Library, and official reports published by different departments of the Government of India and international agencies. The Indian Government agencies do not compile data for ICT as an industry or an entity. The data has to be collated after gathering facts and figures from different sources chiefly the IT/ITES Industry data and the telecommunication industry data.

2. Information and Communications Technology (ICT) in India

I begin by narrowing down to a definition of ICT, broad enough to encompass the width of this study. Simply put, ICT has been defined as “a technological means of collecting (inputting/gathering), collating (processing/analyzing), and conveying (outputting/transferring) information via technology” [1]. Furthermore, ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT) but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums [5]. These and other such definitions take more of a technology-oriented manufacturing view. In this paper, I follow the holistic definition of ICT as a combination of manufacturing and services industries that capture, transmit and display data and information electronically [18].

With 512.26 million internet subscribers, as of June 2018, India is ranked as the world's second largest market in terms of total internet users. India is also the world's second-largest telecommunications market with 1,191.40 million subscribers, as of September 2018. Over the next five years, the rise in mobile-phone penetration and decline in data costs will add 500 million new internet users in India, creating opportunities for new businesses. Furthermore, Indian IT firms generated the so far highest revenue of US\$ 167 billion in 2017-18, with an export figure of \$126 billion [13].

Impressive as these figures may seem, what is of greater significance is the fact that the above number of internet subscribers actually constitutes a mere 35% penetration overall with around 65% penetration into the urban market and just 20% rural [12], indicating a huge, still untapped potential.

3. The Concept of Poverty

Poverty as a concept makes its appearance in literature starting in the late eighteenth century, coinciding with the post-renaissance period of enlightenment, the French and the American Revolutions. However, it is around the late nineteenth century when formal studies of poverty emerged in social sciences and the references to poverty in literature peaked [22]. In the initial studies, poverty comes across as a monetary concept, defined terms of income and consumption, specifically, measured as a calorific requirement [23]. Later, eminent scholars applied this absolutist concept of basic minimum levels of income/consumption to develop a set of objective and universal human needs to define and measure [26]. In contrast, other renowned scholars took a relativistic view of poverty [30, 17]. Nevertheless, in both cases, the discourse on poverty essentially was centred on earnings and consumption.

Moving beyond income and consumption, poverty is defined as a lack of human capabilities where capabilities refer to the real opportunity that we have to, accomplish what we value [27, 28]. Sen's capability approach is widely regarded to be at once novel and of substantive importance for the conceptualization of multidimensional poverty and well-being [3].

Anand and Sen carried the argument on the multidimensional nature of poverty further. "Income-based poverty measures concentrate exclusively on deprivation in one variable in particular; viz. income. It has the advantage of simplicity in refraining from taking an interest in different aspects of deprivation. (However), when we consider several other ways in which a person can be severely deprived, we find other dimensions of disadvantage...The need for a multidimensional view of poverty and deprivation not only guides the search for an adequate indicator of human poverty, but it also clarifies why an income-based poverty measure cannot serve the same purpose" [4]. The framework of HPI (Human Poverty Index) proposed therein was broad-based to include

- i) survival deprivation,
- ii) deprivation of education and knowledge,
- iii) economic deprivation [4],
- iv) vulnerability and
- v) powerlessness and voicelessness [32].

The above variables are relevant for the developing countries, still grappling with widespread undernourishment and a general paucity of social amenities. Whereas in the developed world, where hunger is rare, literacy is widespread, health services are widespread and safe drinking water easily accessible, there is a tendency to concentrate on other variables like social exclusion and inability to take part in the life of the community [4].

The following section examines the role of ICT in poverty alleviation in India, along with the following dimensions: economic upliftment (employment and income generation), education, healthcare and combating vulnerability of women.

4. ICT in Poverty Alleviation

4.1. Economic Role of ICT

Arguably, the most widely followed prescriptive approach to tackling poverty is the one stemming out of the economic theory propounded by Keynes. This approach favours economic growth and the resultant employment generation as the key to economic wellbeing in society.

We begin by examining the output of the ICT sector in India.

	Year	11-12	12-13	13-14	14-15	15-16	16-17
Telecommunications		36.8	38.6	40.3	45.1	45.9	46.0
Cable Operators, recording, publishing etc.		9.9	10.8	12.5	14.5	15.3	16.7
Information and computer related services		49.2	55.1	63.5	75.3	97.1	106.0
Manufacture of communication equipment		2.2	2.0	3.1	2.6	7.2	8.9
IT/ BPM Industry		101	108	119	132.5	143	154
ICT Total		199.1	214.5	238.4	269.9	308.5	331.6

Table 1. Output of ICT Sector in India (in billion \$)

The data presented in Table 1 above shows a steady growth in the output of the ICT sector. These figures have been collated from more than one source and may hence serve an indicative purpose to show the importance of ICT in the Indian economy over the years. Turning our attention to the employment generation role of ICT, given below, in Table 2, is the data on the number of employees in the IT/ BPM Industry in direct and indirect employment respectively.

The figures for direct employment are understandably lower than those for indirect employment because of the industry requirement of higher education levels. However, it is in the potential of creating indirect jobs where the main role of ICT as an employer, in the reduction of poverty, is concerned. These indirect jobs involve sales of ICT hardware and software. Jobs in the BPM sector are a direct consequence of the integration of India's economy with the global economy, made possible solely by the Information and communication technology in the first place.

Year	Direct Employment	Indirect Employment
2011-12	2.8	8.9
2012-13	3	9.5
2013-14	3.29	10
2014-15	3.52	10
2015-16	3.7	10
2016-17	3.86	12

Table 2. Direct and Indirect Employment in IT/ BPM Industry in India (Source: Statista. Retrieved from <https://www.statista.com/statistics/320729/india-it-industry-direct-indirect-employment/> on 2018.12.11.)

ICT has made labour market accessibility easier; e.g. Labour Net is a Bangalore-based organisation that helps to connect, which utilises the mobile phone platform to match the skill set of people available for work with needs of those who require workers [6].

ICT is being used extensively in the agriculture and handicrafts sectors to provide information and accessibility to markets. Accessibility to information through ICT is a great enabler for markets, especially so for isolated or poor neighbourhoods [6]. For example, 'my farm info' is an agriculture information system that an Indian farmer can easily access through a mobile phone. The system utilises IOT technology, uses complex algorithms on the history of crop diseases and forewarns the farmer on such a possibility. It guides on better water management and through SMS provides weather updates and also latest mandi crop prices, to help the farmer make an informed decision at every step [19]. These steps can help a farmer, conventionally a weak link in India's fight against poverty.

4.2. Accessibility and Economic Empowerment of the poor using ICT

ICT has helped provide easy access to the poor, in particular to those living in remote or isolated areas, of the services that were, hitherto, out of reach for them. These are a bank account accessible through mobile application, credit or debit card linked through a mobile application. Making use of this location neutrality, the Government of India has launched the Pradhan Mantri Jan-Dhan Yojana (PMJDY), which ensures access to various financial services like availability of basic savings bank account, access to need-based credit, remittances facility, insurance and pension to the excluded sections i.e. weaker sections and low-income groups [20]. As a result, account ownership in India rose by more than 50%, according to the latest Global Findex Survey released by the World Bank in April 2018. As per the Global Findex Report, adult bank account holders in India increased to 80 per cent in 2017 as compared to 53 per cent in 2014. What's more, there is a sharp fall in the gender gap from 20 per cent in 2014 to 6 per cent in 2017 in bank accounts [9].

Further leveraging this financial inclusiveness by including more than 80% of adults into the banking system, Government of India has embarked upon a massive Direct Benefit Transfer Scheme, where beneficiaries of government schemes get the sum transferred directly to their bank accounts, ruling out frauds or manipulation by middlemen and ensuring hassle-free acquisition of benefits under various schemes. There are 434 welfare schemes under 56 Central ministries, totalling to a mammoth 1.67 billion transactions, amounting to 29 billion US Dollars, which have so far been included in this Direct Benefit Transfer Scheme. This translates to saving from a potential loss of over 12.9 billion US Dollars for these poor of the country [8].

5. ICT in Combating Gender Exclusion

5.1. Access to Information and Economic opportunity

One of the important dimensions of poverty as touched upon in the opening section is social exclusion. Social Exclusion is a broad concept. An individual or a group may be excluded owing to any of the factors like income, class, religion, ethnicity, caste, gender, age, level of education, physical disabilities among others. The present study discusses social exclusion from a gender perspective.

The previous section examined the role of ICT in economic growth and empowerment and in poverty alleviation. This section will focus on women's participation. There is a strong instrumental

rationale for ensuring women's participation in processes of growth: it will contribute to the inclusiveness of growth, not merely because women constitute 50% of the world's population, but also because women's access to economic resources improves distributional dynamics within the household [14].

The primary role that ICT performs in the given context is to provide women with access to information and economic opportunity. ICTs have been used by gender equality advocates the world over for putting out rights-based information. From multilateral agencies like UNIFEM to feminist activists at local levels, actors at different levels are involved in creating, collating and disseminating material on rights – legal rights, sexual and reproductive rights, women's human rights. This is done through websites, e-magazines and email. In many developed countries, websites provide assistance to women seeking help on domestic violence [16]. Self Employed Women's Association (SEWA) is an organization dedicated to creating employment opportunities for poor self-employed women workers. SEWA has a membership of 200,000 and is spread over 800 villages in the Indian state of Gujarat. It uses an interactive satellite communication and Internet-based training programme to develop a cadre of barefoot managers among the poor women workers, focusing on women in panchayats, forests, water conservation and so on. Through ICT, training is provided on issues as disaster management, leadership building, health and education, child development etc [15]. ICT can deliver potentially useful information, such as market prices for women in small and micro-enterprises. For example, use of cellular telephones illustrates how technology can be used to benefit women's lives, by saving travelling time between the market and suppliers, by allowing women to call for product prices and by facilitating the constant juggling of paid and unpaid family activities. Besides, ICT has played an important role in changing the concept of work and the workplace. New areas of employment such as teleworking, i.e. working from a distance, are becoming feasible with new technology [24].

There are other NGOs which are similarly using technology to make a difference in the lives of thousands of Indian women. Feminist Approach to Technology (FAT) is a not-for-profit organization that believes in empowering women by enabling them to access, use and create technology through a feminist rights-based framework. Established in 2008, it primarily operates in Delhi. The mission of FAT is to empower women by enhancing women's awareness, interest, and participation in technology. FAT encourages and enables women to feel capable and comfortable in working with technology and collaborating with other women's organizations to mainstream the issue of engendering technology [10].

5.2 Social Interaction, participation and Women's safety

One of the major hurdles to the empowerment of women is the issue of safety. The safety concerns come in the way of mobility and so do the restrictive timings that women are therefore bound to observe. Use of technology can help provide a safety cover. Electronic surveillance of susceptible areas can compensate for the inadequate physical presence of police. Safetipin and SafeCity are two examples of mobile-based applications which crowdsource (obtain ideas and content from other internet users) data to inform users about safer travel routes through urban environments. Similarly, the SOS emergency button on taxi service apps makes them feel safer – as one click sends the location of the taxi to pre-selected friends and allows them to track its progress [25].

Cyberspace offers a platform along with the benefit of anonymity to women to come together and voice their collective opposition to gender-related issues or issues of harassment. The *pink chaddi* campaign against the right-wing group by women in Bangalore is one such example.

6. Challenges and Limitations to extensive adoption of ICT

The previous sections enumerate the role of ICT in the alleviation of poverty and in gender inclusion in India. They exhibit the different ways in which new forms of information and communication have been capitalized upon to accelerate this process. Nevertheless, ICT can best be considered as an efficient tool, albeit with its own challenges and limitations. One of the unique characteristics of ICT is its highly dynamic nature. Innovations and changes take place in the field of Science and Technology, particularly in the field of Information Technology, at a rapid pace. Technologies become obsolete very quickly. This not only requires periodic upgradation of hardware and software involved, but also an equal measure of skill upgradation at the level of the user. Moreover, management and maintenance require a degree of technical expertise that is higher than what is conventionally required. These are some of the factors, which limit the adoption and application of ICT for poverty alleviation and social exclusion on a large scale. The challenges and limitations are described below:-

1. Different sections of the society are at different stages of readiness to imbibe digital technology. Besides, financial status determines accessibility and that can determine the former as well. Digital technology can be an equalizer in many ways as it breaks the traditional class divide, but at the same time, as per the examples cited here, it can actually end up reinforcing the traditional divisions in the society. For instance, affordability, as well as the level of education, can to a large extent determine the accessibility of the instrument as well as the skill required to handle a smartphone. Mobile Banking application that requires an Android software can, therefore, end up actually excluding a large section of the population for whose interest it may have been designed in the first place.
2. Cost is a limitation particularly when it comes to procurement, installation and maintenance of costly educational and surveillance equipment on a large scale. Here the cost refers to and includes the cost of establishing and running the network. This is of particular relevance to such remote and rural areas in a vast and developing country like India, where basic facilities like accessibility to power supply may have just about been made possible.
3. ICT impacts poverty alleviation both directly as well as indirectly. Direct impact, through job creation, is limited in scope as the high-end jobs require highly technical education and cannot be categorized as a poverty alleviation measure. In their indirect role, the lower end jobs e.g. sales and repair related jobs, suffer from a limitation of another sort, which is that they do not enhance, in sufficient measure, the tax and welfare base.
4. Another dichotomous factor is the issue of safety. While there are a number of ways in which ICT comes to the aid of women and weaker sections to enhance their safety, cyber safety is in itself a matter of concern. There are a large number of incidents of cyber crimes like cyberstalking, morphing, defamation, phishing, trolling, defamation etc. particularly against women being reported. The government has responded by tougher laws against these crimes. However, the safety concerns discourage the largescale adoption of ICT, which ironically, is a safety measure in the first place.
5. As mentioned above, ICT is just a tool. It does not, in itself, help to transcend deep-rooted societal biases. For instance, the gender bias has been reported to play out in such manner that in a village in the state of Haryana in India, the village council banned the use of mobile phones by women and young girls with an ostensible objective of preventing elopement [7]. This is an

example of how deep-rooted prejudices against women can stymie any forward movement in favour of gender equality and render the means like ICT useless in the process.

6. Privacy and Data Protection issues related to ICT are becoming increasingly relevant in view of several disclosures of invasion of privacy and unauthorized use and merchandising of data. Corporates and other organisations have been found to use this data for various ends, including commercial gains as well as targeted messaging to influence the target population. This has compelled governments to enact stringent laws to regulate the collection of and to prohibit unauthorized use of personal data of the people. This regulation, with a few exceptions related to National security, extends to governmental agencies. Such laws can be an impediment in pursuance of even the perfectly ethical objectives through the use of ICT.

To sum up, it needs to be reiterated that ICT is a vital tool for efficient and seamless exchange of information, ideas and knowledge. As with any tool, it requires expertise in proper handling to be able to provide the requisite results in any field including that of poverty reduction and gender inclusion.

7. Conclusion

Technology has become all-pervasive in the last couple of decades and more. The development in the field of ICT has opened up possibilities in every field. In this study, it has been argued that ICT can be immensely useful in winning the battle against poverty, which, for the poor in developing countries like India is an issue of survival, where hunger and malnutrition are its most obvious signs.

This study has quoted a few examples, where ICT has been used as a tool to accelerate the process of growth in the country and create better employment and earning opportunities. ICT has made a huge contribution in promoting financial inclusiveness in the country owing to the accessibility of banking and another financial service through mobile banking even in remote areas.

The targeted welfare schemes are nothing new, have, until recent past, been known for their inefficiencies primarily due to pilferage of the allocated funds. The use of ICT has enabled plugging of this gaping hole through Direct Benefit Transfer. This is an example of the use of modern technology for the neediest in the country.

It has been discussed in sufficient detail that poverty is no longer defined solely in terms of material deprivation, but deprivation in many different dimensions. Gender inequality and insecurity are important determinants of poverty. ICT has been successfully used in overcoming the obstacles to creating a more equitable world, particularly from the point of view of women. It has the potential of providing employment opportunities especially suited for women. It provides women with a forum for joint action. In addition, several applications that help to create a more secure atmosphere for women at work, at home and while travelling, are now available.

Although cost and accessibility, the so-called digital divide in a broader sense, certainly comes in the way, especially when we talk of the poorest of the poor in India, if there is one another extremely significant blockage to the full use of ICT, that is the mindset. There are instances where the existing prejudices have been allowed to persist and in fact are reinforced through ICT. Nevertheless, it is a tool, which if handled deftly can go a long way in the eradication of poverty in its several manifestations.

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APPLICATION OF COMPUTER GAMES IN PUBLIC ADMINISTRATION: LEARNING SYSTEM ANALYSIS AND TECHNOLOGY-SOCIETY POLICIES WITH SID MEYER'S CIVILIZATION

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Abstract

In this paper we explore how Civilization, one of the most popular turn based strategy games, enhances public administration (PA) education for entry level students. We pose the research question, how computer games in PA studies can be aligned systematically with curriculum design, and how they make educational experiences and processes more successful than standard teaching. We present an experiment which ran at the National University of Public Service in Budapest during the academic year of 2017/18 written up in a case study format. We describe the learning objectives of the Government Studies program and the objectives of the Information Society and System Analysis courses, where the students had been exposed to playing Civilization. Our findings suggest promising results using computer games in four aspects of PA: a) effectiveness and efficiency of learning, b) implications of advanced technologies in government studies, c) further applications of computer games (different uses of Civilization and others), d) PA problems that can be solved by games and how this idea is being receipt.

1. Introduction

Knowledge and skills in public administration areas have been changing rapidly. There is a more dominant need for analytical, decision making, complex system thinking skills, and especially understanding the implications of technology for social policies. Education of PA is struggling with these issues.

A new generation of students enter PA programs, and already a more ICT astute generation have appeared in PA organizations. The challenge is twofold; firstly, at the output of education they have to understand these new complexities and being able to contribute for PA policies, secondly, at the input phase they have to be addressed with content and methodologies which maintain their educational needs.

In this paper we explore how the application of computer games combined with system thinking and science-technology studies can enhance PA education and contribute to solving these educational challenges. We pose the research question, how computer games at the early stage of

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PA studies aligned with systematic curriculum design make educational experiences and the learning process more successful than standard teaching.

2. The role of science technology studies and system thinking in PA education – a theoretical and conceptual review

The National University of Public Service (NUPS) is responsible for educating the future leaders and managers of the Hungarian public sector. NUPS launched a five-year master program in Government Studies with the following objectives:

- educating its participants of the complex knowledge involving the tasks, organization and operation of state,
- to provide skills and knowledge for of systematically handling human capital, and performing high-level planning, strategic analysis and leadership tasks,
- to introduce the concept of strategic planning of public policy and analysis,
- to make students capable of creating government models, and understand the techniques, basic legal and public service frameworks,
- to familiarize students with the techniques of efficient management of the changes in state structure and governance,
- to educate students how to organize government activities using comparative methods and international models,
- to introduce the societal, political, economic and human elements which define and influence the function of government.

The Information Society course of this curriculum introduces the cultural, political and economic issues of the information society and the Internet, and reviews the state responses to this challenge by analyzing some information strategies. The strategic approach of the course is emphasized by presenting the strategic incentives of the ICT companies, so it deals with network and microeconomic issues, as well as the macroeconomic impacts by which the information economy has an impact on national competitiveness.

The Systems Theory and Analysis course familiarize students with the basic terms of cause-effect relations, elements of system thinking, and modeling complex legal, organizational and technological problems (positive and negative feedbacks, effects of delays and externalities, dynamic models, cause-effect diagrams). Students supposed to acquire skills to exploring, analyzing and evaluating basic system archetypes.

In order to methodologically enhance the two courses, the authors initiated the introduction of a well known turn-based strategy game series – Sid Meyers' Civilization. Games, especially strategy simulation games, such as Civilization, are great tools to illustrate system complexity, how and why leaders allocate their resources, and importantly what is impact of technology on social development and vice versa. During the gameplay of Civilization we can observe how nations

expand from ancient times as a result of economic development, geographical expansion, warfare and most importantly as the result of technology evolution.

In the case of the Information Society course Civilization was used primarily to show the dynamic perspective of socio-technical evolution, with Systems Theory course the game was applied for modelling and analysis as well. used test the methods and tools of the subject.

3. Use of computer games in education – experiences in PA education

The potential to use computer games in education has become relevant as their popularity and availability has grown. As the advancements in using video games and simulations for educational purposes in the corporate, government and military worlds have grown a similar change in the world of schools was raised [1]. With the appearance of serious games - games used for purposes outside of entertainment – a vast variety of opportunities have risen [2]. For instance, [3] uses an overview of two gaming based research programs in education to make a case for a gaming based future of education either through the specific use of commercial games, or through gamification and gaming techniques. Another literature review summarizes the effect of video games on students at the age of 14 years, finding links numerous cognitive and other outcomes; the most common of which were the acquisition of knowledge and motivational outcomes [4].

Civilization, is one of the oldest and most widely known turn based strategy games in the gaming industry. Its use in classrooms has been explored mainly in history education for instance discussing how useful the game is in effectively studying alternate historical events [5]. [6] explore the use of a specific lesson plan using Civilization IV to teach world history to ninth grade students in the hopes of encouraging high-order thinking. As [7] reports after experimenting with the IVth edition of the game series, student feedback indicates that the methods used allow many undergraduates to better understand complex historical concepts, as well as form assumptions based on critical analysis of the historical content of the game. Also, it helps children to learn visual conceptualization [8]. Using Civilization in classroom is fun, research proves that the enjoyment factor overrules the conceptual scaffolding, indicating that free flow and creativity is essential when video games are deployed in education [9].

Computer games are also used in PA and related fields. For instance, noteworthy applications are documented by [10] using SIM CITY, or [11] how to use games in politics. There are accounts also how to conceptually integrate games in civil service education [12]. Civilization is used how to learn about power games, and [13] claims that players of Civilization through their play get used to various theoretical tools, such as the concept of cultural, social and economic capital, and how they influence modern social practices and learning process.

Methodologically, most research in the field uses case study based approaches similar to [14], who also give a detailed guideline on how to design and execute research of this kind.

4. Research Methodology

Prior to the start of the course students would be surveyed to form an image of their experience as gamers, their specific experience with strategy video games or the Civilization series in particular, and overall the level of their digital literacy. Based on the information obtained we would then organize the volunteers into groups of 3 or 4, which we would be sure to balance out in terms of player experience. This was important to us as we expected to organize a larger scale multiplayer

event, where the groups would play against each other on the same map. The controlled division of the groups was meant to avoid certain teams getting a clear advantage over the others that would have made the game experience seem unfair. Table 1. depicts how students assessed their skills on a 1 (worst) to 4 (best) scale.

	DigiLit	Games	StratGames	Civ	Willingness
N Valid	97	97	97	97	97
Missing	0	0	0	0	0
Mean	2,49	2,76	2,07	1,58	2,61
Median	2,00	3,00	2,00	1,00	3,00
Minimum	0	0	0	0	0
Maximum	4	4	4	4	3

Table 1. Students' skills in digital literacy and gaming

They are assessed their digital literacy skills lower than experience with computer games, but knowledge of strategy games and particularly Civilization had been the lowest.

There has been no correlation between digital literacy, knowledge of games and willingness to participate – basically all respondents expressed interest to participate. Those who already played with Civilization they all expressed strong desire to take part in the experiment.

Group Number	S1Group (Semester 1)							S2Group (Semester 2)												
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10	11	12	13
Male	2	2	3	0	2	2	0	2	1	2	0	2	3	1	3	1	3	2	0	1
Female	1	1	1	1	1	2	1	0	2	0	3	1	0	2	0	2	0	0	3	1

Table 2. Group distribution by semesters and genders

Table 2. shows 7 groups in the First Part (InfoSoc), 13 groups in the Second Part (SysAnal), no significant difference in gender or any other variable. There were 19 players in S1 (11 male, 8 female) and 35 participants (21 male, 14 female) in S2.

Courses would be held on a weekly or bi-weekly basis. This would give us a set of regular opportunities to play the game as a group and discuss possible difficulties that arise throughout the semester. The sixth game in the series, Civilization VI, would be the version used in the classroom, but any of the previous games would do for use at home. Limitations of the computer hardware at our disposal meant that the latest game in the civilization series, Civilization VI, was not a reasonable choice. The chosen version then became Civilization IV, the latest of the games that would reliably run on our systems, and the one receiving the some of the best critical acclaim. During the classes the game would be used to provide simulated examples useful in helping the student grasp the otherwise theoretical concepts in practice.

The first class in the Information Society course would be dedicated to the introduction to the game Civilization IV itself. After assigning the students to their respective groups we would begin teaching them the primary game mechanics, making sure that by the end of the first class they

would possess all knowledge necessary to initiate, save and load their own games, to issue commands to their units, manage the production cues of their cities, assign technologies to research, and be able to find any additional relevant information on their own if need be. Assignments would be handed out via the E-learning systems in between classes.

A second class would be scheduled half way through the semester to provide the students an opportunity to address any concerns that arise along the way in person. Additionally, if time permitted, this class would also be used to start a multiplayer game session, where the groups would play competitively against each other. Practicing particular techniques connecting to the course material were focusing on the technology tree and exploring technology, and focusing on decisions, causality, teamwork and generalization.

The third and final class would be dedicated to discussing the completed tasks, and reflecting on the semester as a whole using a group interview format. The discussion would also be focused on gathering feedback to judge the overall effect of the program and to identify areas where it can be improved.

Over the course of the semester the groups would document the games they played and the tasks they completed in journals. These would contain the major decisions made during their gameplay, the reasoning and thought processes behind them, and the effects they had on the outcome compared and contrasted to their expectations. Solutions and answers to the assigned tasks and optionally any desired feedback would also be included in these journals.

The second semester of the course was different in many ways. Some of the limitations on us in the first semester were not present this time around, and we also made several changes based on feedback gathered from the students on our last session. The bi-weekly sessions became a reality this time. During the lecture hours a computer laboratory was made available, allowing us to organize regular sessions. A key difference was a much closer collaboration with the lectures and the connection of assignments with the topics presented during the lectures. Conceptually, the gaming sessions of the System Theory class used Civilization as an illustration for the topic starting with a presentation followed by team discussion and summarizing the previous and the upcoming home assignment.

First class had little difference compared to Information Society: students played Civilization and newcomers had to familiarize with the mechanics of the game. Topics of the second class were system attributes and system control. In the third modelling was discussed along with organizational use: students had to play with “Stanley’s Parable” for demonstrating the limitation of system models and how to apply flowcharts.

The fourth class dealt with system dynamics; students were introduced to the “beer game” and the “Surviving Mars” simulation. In the fifth class MIT’s Moral Machine was brought in and topically students discussed the process of decision making, which was further extended in the sixth session with complex networks. Here two new games were introduced Democracy 3 and Europa Universalis. Finally, in the last class the topic of scale-free networks was covered: here we returned to using Civilization.

In between classes students would be assigned tasks involving further gameplay to complete with their group.

Group assignments were restructured to feature a task list with individual point amounts assigned to each sub-task to allow the students an easier understanding of the weight of each element. We also made the decision to allow the students to form groups based on their own choosing. This was done based on the feedback from the students, where group dissonance was the most common difficulty experienced. New players were more likely to learn the game well if they worked together with others they were comfortable with, regardless of the other players' skills. Groups were only formed by us in such cases where students did not form groups of their own, or where groups did not have enough members. It is worth mentioning though, that these were freshmen students who did not yet know each other well in the first semester.

The product at the end would be a log of the events that occurred in the sessions, with specific attention dedicated to answering questions posed by the teachers.

5. Discussion of results

In Table 3. we summarize the number of students who provided feedback on their learning experience.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid NOT PLAYED	77	61,1	61,1	61,1
Valid PLAYED	49	38,9	38,9	100,0
Total	126	100,0	100,0	

Table 3. Group distribution by semesters and genders

In the following discussion section we give a general summary of these reports, our observations and juxtaposition of other sources such as colleagues' opinions.

5.1. Effectiveness and efficiency of learning

Attendance of classes varied greatly between the first and second semester. Requirements were different, while in the first term grades were given only based on the homework submission class attendance was not required for all the sessions only two of them had been mandatory. After drawing the conclusions we required the presence of at least one team member to be at the seminars and at the lectures. It was interesting to note, that the 24 seated Computer Lab occasionally proved to be too small and extra places needed to be created.

The 7 Study Groups during the first semester of the Information Society course reported that they enjoyed playing the game and working on the exercises but they did not value the content any higher than the lectures. From the course assessments we know, that our students had a great time in the first semester, but don't get much new information from our alternate method, they gain most of the subject's content from the lectures. During the second semester the 13 Study Groups although still enjoyed the gameplay they had to work on more assignment which were more tightly connected to the topics of the lectures in System Thinking.

The following basic knowledge concepts have been the learning objectives in the two programs:

Information Society

- To understand the impact of technology on society and how technology development is impacted by social developments.
- Technological determinism and diffusion theory.
- Gartner's Hype cycle.
- Social Construction of Technology and technorealism.

System Thinking

- System approach, system attributes, target predicates and decision making attributes.
- Complex cause and casual loop diagrams, modelling, participation modelling.
- Supply-chain management, flowcharts, Critical Path Method, and principles of process mapping.
- Basics of system dynamics and team dynamics.

In summary, the students had to acquire the view points and methodological frameworks of system analysis and technology-society relationship. The key objective was to convey a comprehensive approach to study PA, and to understand how structure determines behavior and results in specific events.

5.2. Technologies

Civilization models the impact of technology on society by using the "technology tree". Players choose the route how they climb this tree, that is in what sequence they explore and deploy new technological innovations. In order to facilitate discourses on the complex technology-society relationships we asked our students to discuss interesting technologies and their potential impact on society. The recommended technologies were included:

Space technologies, new materials, cloning (future based):

- Cloning and Genetic modification: For improvements in military and population control, as well as increasing the quality of life.
- Extra-terrestrial bases: To add the ability to construct bases on other astral bodies for a large boost to scientific research, as well as a great increase in resources.
- Terraforming: To create resource deposits on the map, and to help shape the terrain to the choosing of the player.
- Wormhole theory: Allows fast travel between planets.

- Alternative energy sources: Effects the populations happiness to reflect the reduced environmental impact

Information communication technologies (present, mainstream)

- Nanotechnology: For use in improving medical procedures and furthering scientific research capabilities.
- Artificial intelligence: To improve the effectiveness of mechanical units.
- Automated vehicles: Helps to improve effectiveness of trade and economic growth.
- 3D printing: Helps to reduce production costs in cities, provides cultural and happiness increases.
- LED technology: To reduce power consumption of electronic devices, thus increasing happiness and reducing upkeep costs.
- Retinal scanners: To help provide an extra measure of defense for keeping researched technologies safe from foreign espionage.
- Drone technology: Improves military capabilities and surveillance at the cost of a negative impact on happiness.

Socio-technical concepts:

- Social networking: Effects population growth and the spread of culture.
- Virtual reality: For use in better training military units, with added cultural and entertainment values.
- Universal translation technology: An important tool in aiding relations with foreign civilizations.
- International sports events: Helps to increase the populations health by promoting sports and exercise, as well as provide cultural bonuses to hosting countries.

5.3. Further applications of gaming

In order to collect suggestions from students based on their experiences both with computer games and with their government studies we asked them which other video games they believe could be used for other educational purposes in their program. The following is the summation of the recommended games and areas:

For the purposes of better understanding strategical thought-processes and other similar functions, many of the students recommended the use of other well renowned grand-strategy games such as Crusader Kings, Europa Universalis, or Hearts of Iron.

Various MMORPGs (Massively Multiplayer Online Role-Playing Games), such as World of Warcraft and Eve Online, were recommended to help depict the role of a single individual within a larger coherent system.

Several students recommended certain CCGs (Collectable Card Games) as a way to showcase the importance of risk-management, i.e. how to utilize the tools under our control to cope with random occurrences within the system.

The various games in the city-builder game series Sim City were recommended for use in showcasing causality, the effects that elements of a system can have on the others, and how to create models and diagrams of the process. The Sim City games tendency to showcase city information in graphs and charts was also a reason to suggest these games as a way to improve data interpretation abilities. Other city-builder games were also mentioned for this purpose, such as Banished or Zeus and Poseidon.

The afore mentioned MMORPGs were also commonly grouped together with certain team based tactical action games, such as DOTA 2 (Defense of the Ancients) or Heroes of the Storm, to train in team structuring and communication.

Numerous games of differing genres were mentioned as ways to help understand system characteristics and the ways to control and influence them. Real-time strategy games recommended here included Age of Empires, Starcraft and the Total War series. Survival/crafting games recommended included titles like Rust, Space engineers and Minecraft.

5.4. PA Problems that can be sold by games: reception of the idea

Beyond the learning objectives of the two particular courses students reported other – more general – impacts of the experiment. The groups consisting of three members were introduced to develop teamwork, and reflect in the journals on how they identified together key decision points, assessed alternatives and have come to joint decisions. They reported several learning conclusions and also how these exercises encouraged creativity.

Several feedbacks referred to the fact that after the course it is easier to connect cause-and-effect relationships between the various legal areas, and to grasp how society is impacted as an organic system. This is especially important in central and eastern European PA education which is traditionally employs only the use law and often handles the different legal areas separately barely touching the influence of technology on administrative thinking.

Thanks to our acquired experience and the important feedback from the students our methods during the Systems Theory course in the second semester became much more refined. Due to this our alternative opportunity for course completion became a bolder, more extensive rival to the traditional “lecture path”. Education of the subject proceeded along the same goals as before, that is the broad expanding of PA skills through the use of our method while still teaching the material in the curriculum in an enjoyable fashion.

6. Conclusion

System Analysis and Thinking subjects with Information Society topics in PA education help future leaders to understand complexities of our societies in the 21st century.

In the reported experiment at NUPS we tested the use of the turn based strategy game Civilization to identify the effects technology on society and individuals, so that students become more foresightful and empathetic in the choices they make in the future. Information Society also emphasizes the importance of Systems Theory as shown by the university in the course description. However, in order to demonstrate this to students it is not enough to illustrate how culture and technology affect each other in an information society, or what processes occur within society as a system - they must also understand how the mechanics of these dualities work. That is where believe the main contribution of our experiment lies, especially with the deployment methods and practical tools presented to students. Participating students reported that putting technology and complex system thinking with using strategy simulation concepts at the beginning of their Government Studies program raises not only awareness but also the experience factor of their education.

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ENABLING RELIABLE, INTEROPERABLE AND SECURE E-GOVERNMENT SERVICES IN CROATIA

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Abstract

In accordance with the Croatian Government Decree on starting an e-Citizen project, National Identification and Authentication System (NIAS) was identified as a key enabling factor for the development of user-oriented public electronic services. Its role is to manage the identities in the electronic government ecosystem in the Republic of Croatia. Furthermore, NIAS is responsible for authentication of entities which access common system and the exchange of identity information between entities that communicate with each other through a common system, or exchange documents and data as well as verifying the authenticity of such identities. NIAS provides a credible general framework of trust and identity management which greatly simplifies the necessary infrastructure, organization, and services with significantly reduced costs for all stakeholders. In this paper, we will provide design and security details of NIAS as a basis for reliable, interoperable and secure e-government services in the Republic of Croatia.

Keywords: *electronic government, electronic identity, authentication and authorization system*

1. Introduction

In June 2010 Croatian Government started the procedure for defining the National Identification and Authentication System (NIAS) as a shared resource and building component of the national system to support interoperability among government entities involved in providing digital services. In practice, this meant that all activities related to the definition, establishment, and development had to be the result of coordinated national priorities and goals, and their implementation had to be managed and coordinated at the level of the national system. The action that followed was Croatian Government Decree on starting an e-Citizen project in April 2013. With this Decree basic public sector ICT infrastructure and framework for the development of user-oriented public services was set: Central government portal, National Identification, and Authentication System and Personal User Box System.

Similar concepts have already been realized in other countries worldwide as well. For example, Sweden has a national intranet network for secure communication between government bodies and EU bodies as a part of e-Government service [5], the Czech Republic offers citizens communication with the national authorities at one universal office, where you can receive or verify documents or acts from different institutions of public administration [1], Austrian Citizen Card can be used to sign documents electronically [3], Estonia first implemented X-Road infrastructure for cross-border

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services in domains not covered by existing EU and regional initiatives [8], Government Gateway in Great Britain enables people to communicate and make transactions with government from a single point of entry [2], VANguard is an Australian government program that delivers cost-effective and reliable authentication services to secure business to government and government to government online transactions [7]. In Croatia, NIAS is designed on the principles of the EU project STORK (Secure Identity Across Borders Lined), respecting existing practices and accepted standards, so the electronic connectivity with EU member states can be established in the simplest and most effective possible way [4].

This paper describes the model of central authentication and authorization system NIAS to clarify the legal powers of action-based allocation and use of resources in e-Government in the Republic of Croatia. In 2010 Croatia was on the 35th in the world e-government rank, and four years later, has progressed for five places [6]. In the group with the other countries of southern Europe is in third place behind Spain and Slovenia, just in front of Italy and Portugal, but in a group of post-conflict countries holding the first place out of 33 countries. It is followed by Georgia, El Salvador, Bosnia and Herzegovina, Lebanon and Azerbaijan.

UN explains how to post-conflict situations linked to weak and fragile states where the judiciary and the government are ineffective and where there is no provision of services. Post-conflict states are countries on whose territory fought a war over the last few decades [6]. UN study has shown that these countries have made significant progress with a decentralized integrated organizational model of e-government. This new approach supports the strengthening of institutional links between different departments and sectors; greater effectiveness and efficiency of the control systems and better public services.

Of course, the efforts in Croatian e-government at all levels is still affected by the lack of integrated administrative simplification and plan of e-government development, lack of infrastructure and human resource capacity, as well as the gap between supply and demand of e-services. Croatia as a country of low income continues to fight with traditionally limited investments in information and communication technology and the lack of technical knowledge, high prices of technology and inefficient government regulation.

According to that background, main goals that are set to NIAS can be briefly summarized as:

- Oversight of spending billions of HRK from the budget for ICT projects
- Creation of a unified database of all citizens, craftsmen, companies, associations
- Savings through better use of ICT infrastructure
- Introduction of a unified operation mode in all state bodies
- Online and single sign-on communication with citizens and companies through standardized processes.

2. Position, Roles and Relationships of NIAS

A high-level position and relationship of NIAS in the Croatian eGovernment framework is illustrated in Figure 1. End users access the system through the Users portal which aggregates all

the available services. The communication is performed over Government Service Bus or GSB which goal is to provide all the necessary infrastructure to exchange the data among framework entities such as government service providers, public or private data registers, external services etc. NIAS represents the first point of access, whether it manages the registration process or the authentication process. Registration process entails the initial procedure of the user's electronic identity creation. The authentication process is the first step in any subsequent user access to the system in order to consume the service.

The model of the NIAS system as the identification and authentication entity consistently supports the establishment and enforcement of the authorization rules in the system that is left for the service providers to define depending on the sensitivity of the data. In this way NIAS as a supplier and verifier of identities in the electronic government and the other participants in the system with their authorization policies complement each other in a comprehensive authentication - authorization architecture at the national level, with the specific goal of achieving a high level of interoperability and reusability tackling the ever-existing problem of data redundancy and synchronization.

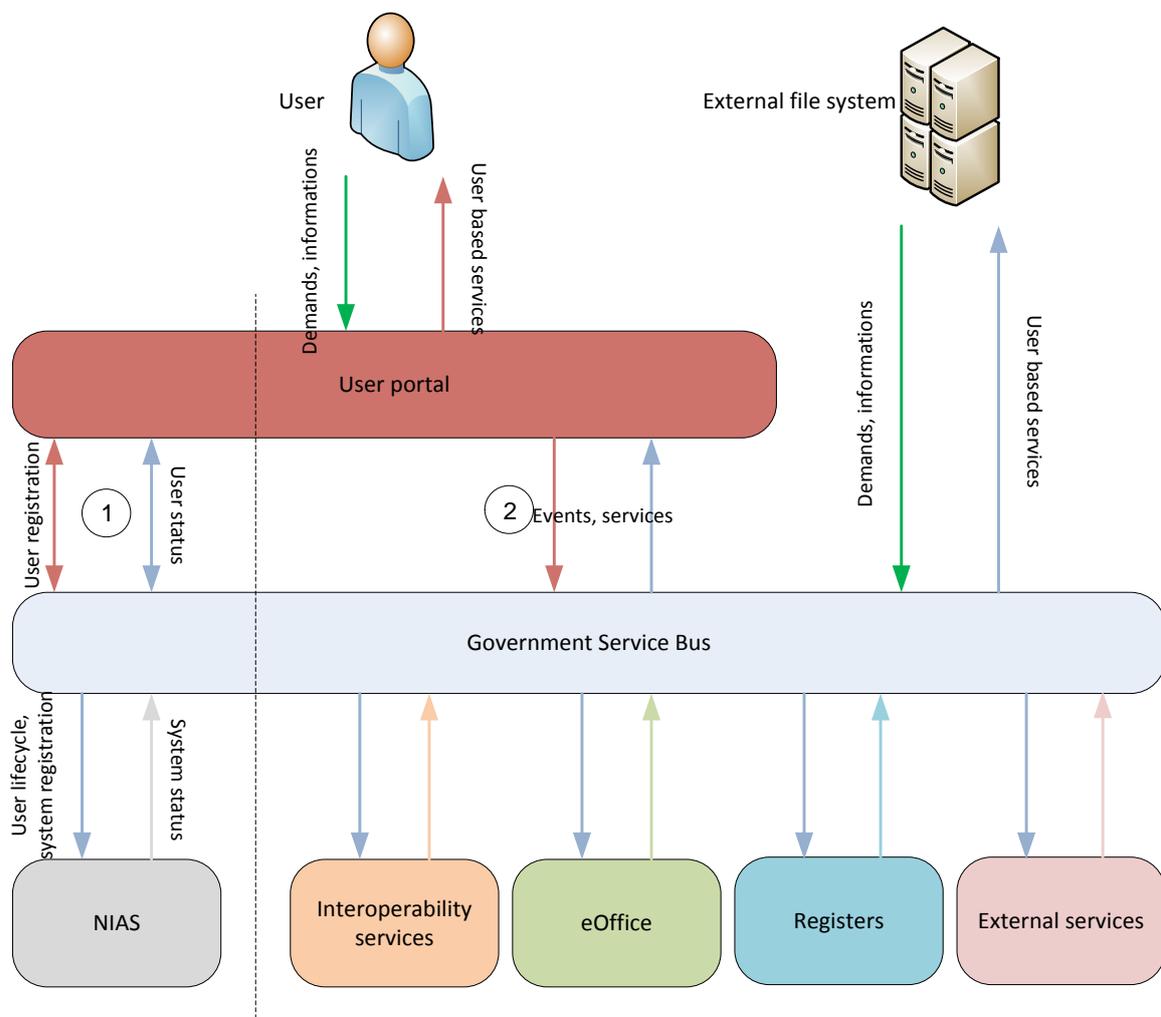


Figure 1. Relationship of NIAS to other building components of Croatian e-Government Initiative

2.1. Electronic Identity Elements

In order for citizens or business representatives to use electronic services, it is necessary to define appropriate elements and mechanisms to enable reliable remote identification. In digital world these mechanisms are known as processes to establish and allocate electronic identity to a real person, system, application, or service, which is then further used in the authentication process when the system checks to see if the other party is really who he/she says he/she is, as well as in the process of authorization when the system checks whether the user has the necessary privileges to perform some action.

Typical everyday examples of mentioned scenarios are the situations where a person uses the Internet, e-mail, mobile phone or similar to access specific information or electronic service. If the owner of the system allows its e-services to be used only by entities which are registered with him and he has awarded the appropriate authorization rights, he needs to establish the electronic identity management subsystem as part of its e-service system. Identity management checks the client identity and whether he/she has the necessary rights (authorization) prior to the use of the services. As a matter of fact, both parties must reliably determine who the other party is.

In the electronic administration, as the term is representing a connected back-office system of public administration, a user (person or business entity) should be given a possibility to have single electronic identity for all public electronic services instead of a myriad of various electronic credentials provided from every single public institution (or point of access), or even worse, from every single public electronic service. So, instead of every single public institution having established their own mechanisms for determining or verifying an electronic identity, a common central system should be built to manage all the data about electronic identities of people in the ecosystem of e-Government services. Such a system is represented by a trusted third-party component in the overall electronic communication framework between the participants in the transactions of e-Government.

Electronic identity in the e-Government presents a unique set of identification information about a particular entity (either persons or legal entities), which are maintained in electronic form and on the basis of which it is possible to unambiguously determine the identity to whom the data belong. Collecting and recording these data is performed by the predetermined and legally entitled institution(s) through the initial application process of registration in which the authorized officer must physically identify the potential user. The user is enrolled, and possibly further steps are performed in order to obtain additional security modules. Once enrolled, the user's data are then protected from unauthorized changing and updating. Registered entities can then use the given credentials for electronic communication in all processes that require electronic verification of identity in the concordance of the credential strength (security level).

The basic and mandatory element of electronic identity (e-ID) in the electronic government in the Republic of Croatia is Personal Identification Number (PIN), also abbreviated as OIB, as the unique identifier of the entity. OIB or PIN is a unique and universal identification number assigned to each physical or legal entity in the Republic of Croatia. It is administered and managed by the Ministry of Finance, Tax Administration. It is composed of 11 random digits devoid from any private or personal data such as gender, date, and place of birth etc. PIN/OIB provides uniqueness capability and reliable identification of users of electronic government in Croatia. Combined with optional Entity Name, PIN provides the starting point of a single electronic identity in the e-Government in the Republic of Croatia, as shown in Table 1.

This basic e-ID can be expanded with optional attributes such as surname, passwords, electronic box address etc. This set of attributes could optionally be expanded to include additional attributes that connect basic e-ID with additional information needed for example to prove the identity on the higher security levels (higher level credentials).

Basic identity element	e-ID – PIN number
An extensible set of optional attributes	Entity Name
	Entity (Personal) Surname
	Password (Authentication credential for security level 1)
	User Info box
	Mobile phone

Table 1. Basic electronic identity element and extensible set of optional attributes of electronic identity in the system of e-Government in Croatia

Service providers (government bodies, local bodies) that use NIAS may wish to extend the basic set of attributes of electronic identity provided by NIAS with additional, specific attributes which will be operated under their realm (jurisdiction) for the purpose of achieving the authorization policy at the local level. Additional attributes required for authentication at higher security levels by external credential providers (credential partners) can also be assigned to entity e-ID.

Likewise, the definition of the required security levels, authorization policies and the role of provided services are in the jurisdiction of service providers rather than NIAS. The role of NIAS is a safe delivery and validity of electronic identity authentication attributes. Basic e-ID in the e-government, together with a set of attributes from Table 1 is the responsibility of NIAS and provides proof of identity at the basic security level (Security Level 1).

The existence of a central directory of entities within NIAS represents one of the essential prerequisites for basic operations provided by NIAS. This directory does not explicitly exclude the existence of localized directories in the administrative bodies containing the connection of identities, their local roles or additional attributes of entities (such as employees) through which they cooperate with NIAS Central entity directory infrastructure established at NIAS contains a basic set of attributes required for the functionality of an electronic identity on the basic security level.

NIAS also provides and specifies mechanisms for expansion of the data set for the purpose of achieving higher security levels. All other attributes that serve as a base to establish authorization authority (roles, attributes related to positions, etc.) are the responsibility of the body that owns that data or provides electronic services, in compliance with policies and regulations set by NIAS.

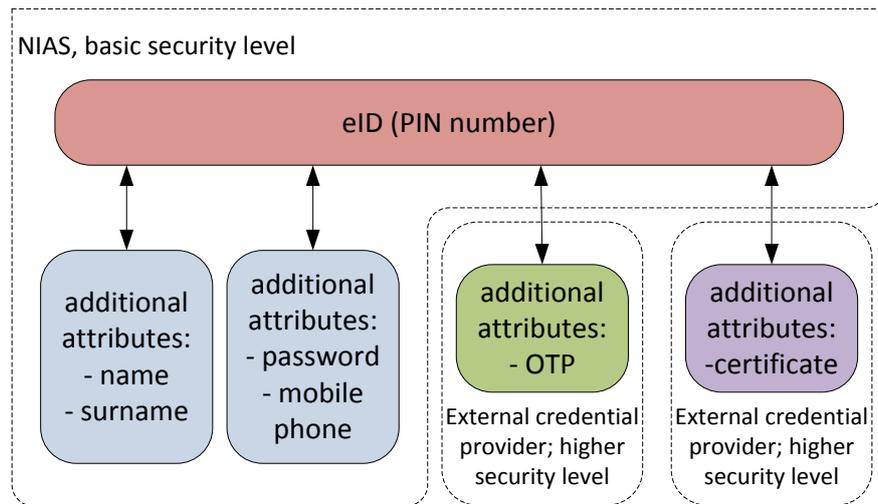


Figure 2. Organization of the elements of electronic identity system of e-Government in Croatia

Figure 2 shows the basic organization of electronic identity in the system of e-Government in Croatia. The basic data set (PIN/OIB number) forms the base on which to build additional attributes needed for multiple security levels. Creation of basic electronic identity, linking with the Tax Administration System that generates PIN/OIB, maintenance and deactivation of the identity is in the jurisdiction of NIAS. Additional information for electronic identity such as username/password allows the use of e-ID at the basic security level (security level 1 as will be described shortly). This data are under the authority of a NIAS as well. It is necessary to emphasize the following:

- Higher security levels and their corresponding additional data that may constitute electronic identity are optional and outside the jurisdiction of the NIAS (in the jurisdiction of external credential providers which have established partner relation to NIAS, i.e. electronic contracts). NIAS provides its association with its basic electronic identity. The external credential provider can be any other object that is by NIAS accepted as valid (partner relation).
- NIAS manages unique electronic identity management and the basic credential attributes required to achieve the basic security level.

3. Electronic Identity Registration and Operation

NIAS is designed with the goal to be flexible enough to allow interoperability and exchange of basic and specific attributes of the users of the system in order to provide electronic services (government bodies, local bodies, organizations) or define a relationship of trust in order to reduce unnecessary redundancy, i.e. increase the efficiency of the system.

Figure 3 depicts the scenario of the use of electronic identity:

1. User (citizen, company representative, an official in the administrative body) accesses the unified entry point through the government portal in order to achieve e-services.
2. To prove his identity, request for verification of identity shall be forwarded to the NIAS system.

3. If the required security level for the specified service level is equal to the security level 1 managed by NIAS, NIAS system will perform electronic verification of credentials. If the required security level is higher than 1, NIAS will request for verification of identity forward to outside ECP system who has a contract for such verification level
4. The user proves his identity by forwarding his credentials to the component for verification that is located within NIAS system in case of security level 1 or as part of the external ECP system for security level 2 or higher.
5. Proof of verified identity is forwarded to the authorization component of the components service provider. From this point, the process of authentication is completed and begins an authorization procedure whose successful outcome will initiate the service.
6. Authorization component of service provider checks the authority of electronic identity and obtained credentials. Assignment of rights is under the jurisdiction of the body that provides a particular service.
7. The user has consumed/not consumed electronic service.

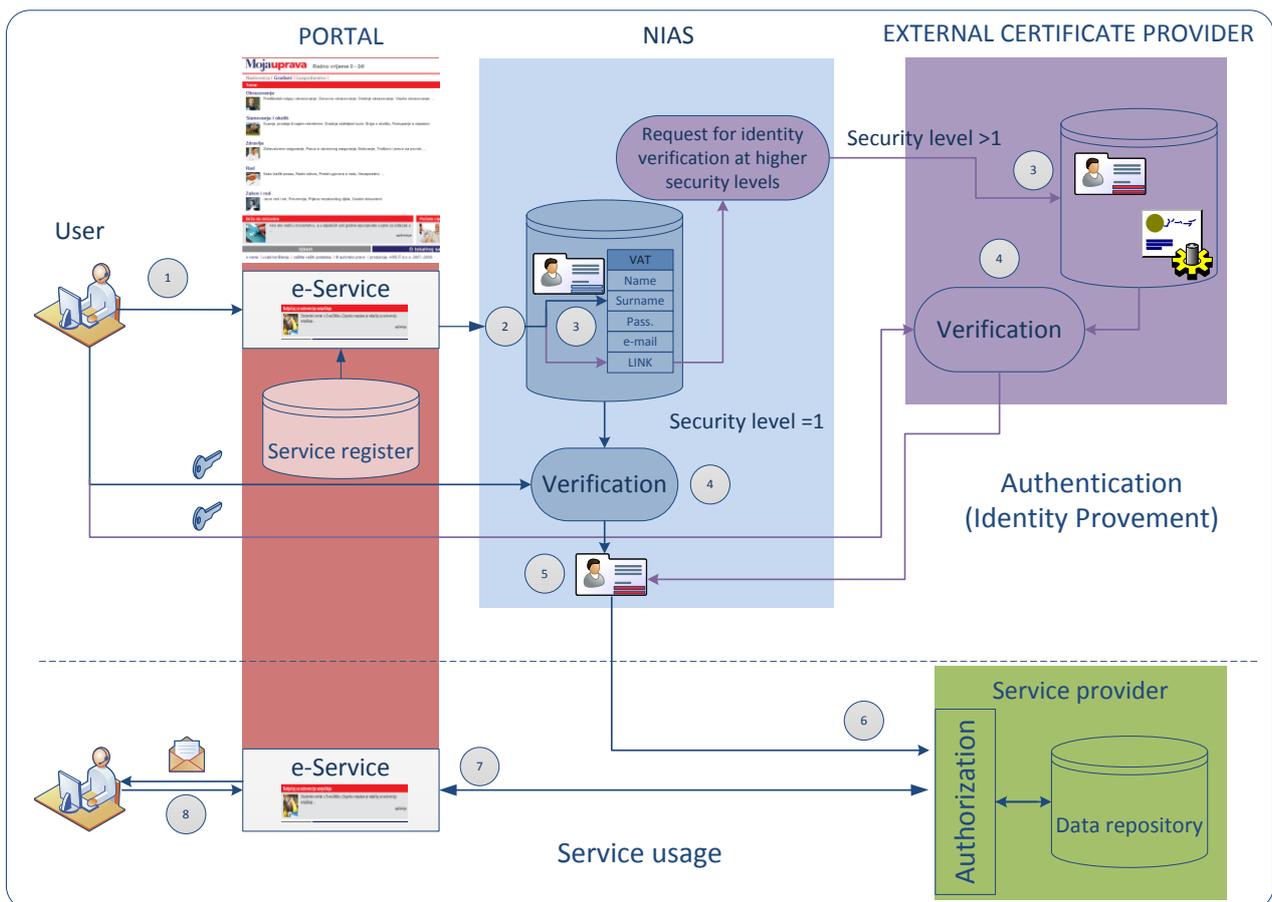


Figure 3. Use of electronic identity in the e-Government

3.1. Principles of assigning the security levels

The security levels are defined as the degree of certainty that the user is correctly identified with their electronic identity. In this context, authentication security levels are defined as a result of fulfilling a number of requirements that ensure two components:

- Satisfying level of confidence in the process of proving the identity in the creation of electronic credentials, which is part of the registration phase.
- Satisfying level of confidence in the process of delivery of electronic credentials, which is part of the electronic authentication phase.

Based on the analysis of risks and their impact on the reliability and security of establishing electronic services, Table 2 shows the general proposition of the reference matrix for determining the required Security Level (SL) of some service.

	Level of Risk				
Appearance	Very high	High	Medium	Low	Negligible
Almost sure	*	*	SL-3	SL-3	SL-3
Very likely	*	SL-4	SL-3	SL-3	SL-2
Moderately	SL-4	SL-4	SL-3	SL-2	SL-1
Unlikely	SL-4	SL-3	SL-2	SL-2	SL-1
Rare	SL-3	SL-3	SL-2	SL-1	SL-1
* Not applicable to a remote user authentication systems					

Table 2. Reference matrix to determine the required safety levels

The lowest security level (SL-0) presents the level at which the access to the service is allowed without the need for authentication or authorization mechanisms. Security level 1 (SL-1) is used to control and facilitate access to services and data with a low level of required protection. The mechanism used for proof of identity at this level the username and password (login/password). Security level 2 (SL-2) can be considered as a medium level of protection. In addition to identification and authentication using a username and password in the authentication procedure must be used at least one mechanism to prove the ownership of a certain object by users who access the service, such as a token that generates one-time passwords OTP.

Security level 3 (SL-3) is designed for services that require a high level of protection. This level is based on public key infrastructure (PKI). The highest security level (SL-4) is intended to access services that require the highest level of protection. In addition to PKI, biometric methods can be used. In addition to these basic divisions, the individual sub-levels can be further developed on the basis of certain technological solutions applied as shown in Table 3.

Security levels		
Level 0 (SL-0)	Level 0.1	Free access without identification
	Level 0.2	Access based on the e-ID
	Level 0.3	Access based on pseudonyms
Level 1 (SL-1)	Level 1.1	Username and password
	Level 1.2	User name and OTP
Level 2 (SL-2)	Level 2.1	Smart card
	Level 2.2	Security token
Level 3 (SL-3)	Level 3.1	Smart cards with PKI support
	Level 3.2	Hardware Security Module (HSM)
Level 4 (SL-4)	Level 4.1	PKI with biometric method (fingerprint)

Table 3. Elaboration of security levels and additional sub-levels

4. Conclusion

Abovementioned model of comparing security levels with the electronic service sophistication level is representing practical implementation of the theoretical model in the public administration in Croatia. Furthermore, implementation is followed with the quantitative analyses of the budget saving as well as the improvement of the citizen-public administration communication since according to the Central Bureau of Statistics (<http://www.dzs.hr>) a relatively low share of the usage of e-government services (47% in 2017) showed that the usage of e-government services was still not widespread, although it slightly increased (Figure 4). According to same statistics, the real usage of e-government services is in a real sector where most of the enterprises (more than 90%) in different activities (except manufacturing) use electronic services provided by different governmental bodies through NIAS system with full realization of its benefits.

Online government services enable citizens or representative of a business entity to access them at any time and from anywhere, regardless of working time or physical location of individual institutions. However, in such non-secure electronic environments, it is necessary to provide a mechanism that will allow reliable identification of both parties in communication. This is accomplished in a way that each participant is given an appropriate electronic identity in the e-Government, assigned and guaranteed by the reliable component, NIAS, in which both parties (user and service provider) have full confidence.

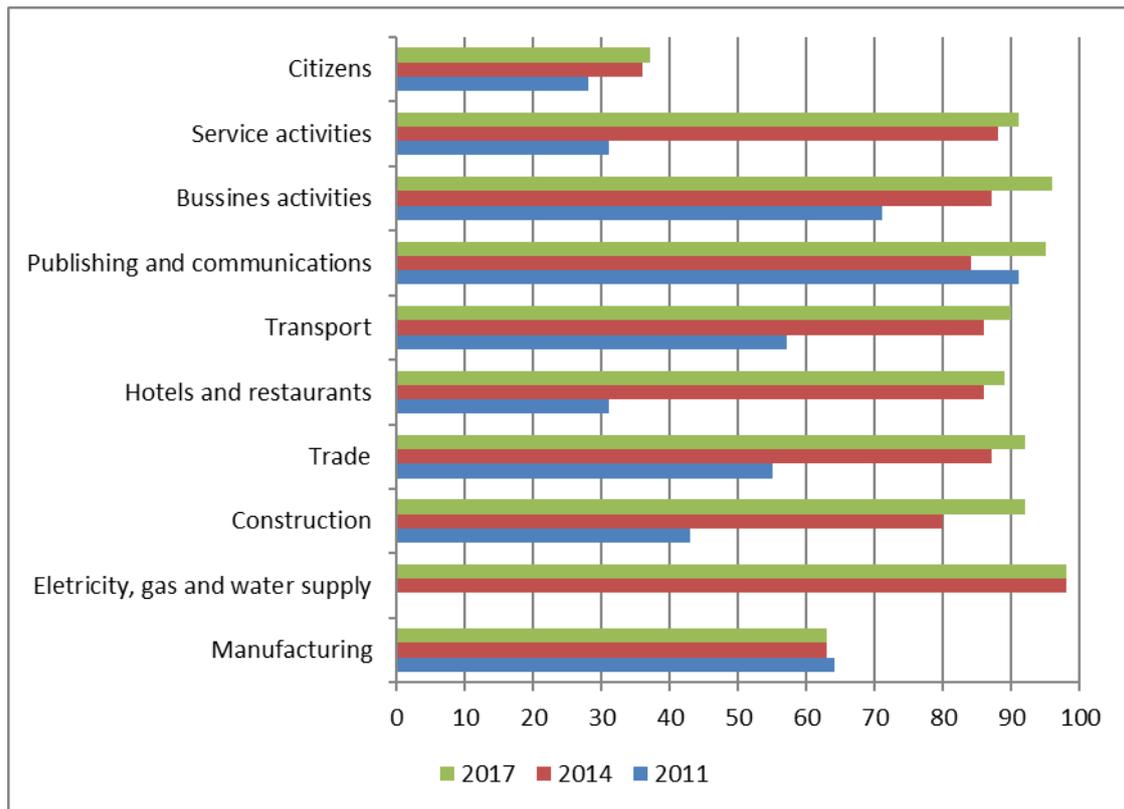


Figure 4. E-government usage (in %) by citizens and in enterprises by activities

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DIGITAL MATURITY IN THE ADMINISTRATION OF A UNIVERSITY OF APPLIED SCIENCES

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Abstract

Digital Transformation is very slowly coming within the reach Public Administration in town, city, county, state and the federal government. If and how it reaches Public Administration in the Universities of Applied Sciences (UAS) however, has not yet being analyzed. The UAS point out that they have a strong practical orientation and devote themselves to this in their research. Therefore, they have research programs and lecture programs focusing on Digital Transformation. Coming face to face with this, the question arises whether the Digital Transformation has not just found its way into research and teaching but also into the administration of UAS. This paper describes an analytical model for assessing digital maturity and then addresses this question through an example of a UAS in Baden-Württemberg.

1. Introduction

The UAS in Baden-Württemberg are on the one hand public institutions with bureaucratic administrative structures but on the other hand they are similar to a private business with their given autonomy and competition amongst themselves. [1] Their concern is to provide society and the economy with the strength for innovation through an up-to-date combination of science and practical orientation as well as excellent quality teaching. [2] In addition to their core responsibility for research and teaching they are also responsible for further adult education as knowledge for life-long learning. Countless papers as well as new teaching materials and methods prove that they achieve their responsibilities by working on Digital Transformation. The UAS administration has the responsibility to unburden and support the areas of research, teaching and further education and thus becomes a service provider. Because of this the UAS administration is different from other public administration. Considering digitalization this means that its transformation should be stretched to the areas of research, teaching, further education and administration.

The government of Baden-Württemberg stresses the importance of digitalization in its strategy with their statement: “We will support the Universities of Baden-Württemberg for further development of their business processes concerning research, teaching and knowledge transfer to make use of the possibilities offered by digitalization.”³ and the Commission of Research and Innovation (EFI) explains in its report that digitalization is the major requirement for excellence in research and teaching [3].

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³ „Wir werden die baden-württembergischen Hochschulen dabei unterstützen, ihre Geschäftsprozesse weiterzuentwickeln, um die Möglichkeiten der Digitalisierung zu nutzen: in der Forschung, in der Lehre und beim Wissenstransfers.“ [3]

The expectations of the service ability of UAS are rising [4] but not to the same extent as the means available. To bridge the gap between the demands and resources [5] there must be an increase in efficiency in all aspects to achieve a better provision of service and higher economic efficiency. [6] This could be achieved by using digital technology as shown by the following examples. Since the Eighties students at the University of Vienna have been able to obtain information or to enroll by using a screen text. [7] In Hungary the campus management system NEPTUN [8] is in use as are similar systems in Germany e.g. Fernuniversität Hagen [9]. So the question arises: if the Digital Transformation of UAS administration already exists and up to what extent Digital Maturity has been reached.

In order to analyze the extent of the digitalization and assess the maturity level of UAS administration, we need a general maturity model and information about their core processes to be able to design a data gathering instrument based on the maturity model and tailored to UAS as a vision of a “mature” UAS administration. Additionally we need a vision of a “mature” UAS administration to be able to define the scale for measuring the degree of maturity.

2. Degrees of Maturity and Maturity Models

First of all the core processes were identified within a framework of an organizational analysis and illustrated in a process map. Since there is no digital maturity model in the literature suitable for every organization and nothing specifically for UAS administration, the development of a digital maturity model followed. 12 different digital maturity models were identified and compared (see table 1). All of them were developed through business consultants, scientists, researchers and all of them are being successfully used in different organizations such as companies and ministries.

Each maturity model consists of (a) dimensions to define the business areas and (b) the indicators to check the extent of digitalization within the dimensions, (c) maturity levels for the assessment of the degree of digitalization. Comparing the models we noticed that the core dimensions are similar even if they are split in different ways. So we needed to define the number of maturity levels, to identify the relevant dimensions and to decide upon the indicators for the measurement. Considering the given circumstances of core processes and structures of UAS we worked through these three steps (a) to (c) identifying nine dimensions, each having equal importance, and their indicators (see table 1) as well as five maturity levels beginning with 0 (no digitalization up to minimal digital implementation) up to 4 (complete digitalization).

A questionnaire was designed based on the newly developed maturity model. To guarantee that the participants understood each dimension and its indicators additional explanations were given. The field survey took place in a faculty of one of the biggest UAS in Baden-Württemberg. The faculty was chosen as a random sample. 60 people were invited to complete the questionnaire online. 34 were professors, six scientists and six lecturers – representing the lecturing and research perspective dependent on the administration, eleven administrative employees and one secretary, one IT-administrator, one head of marketing – all representing the administration.

Maturity Model of													
Dimensions	Universität St. Gallen [10]	Deloitte [11]	Hochschule Ulm [12]	Wolf/Stroschen [13]	Bundesministerium des Innern [14]	BSP Business School Berlin [15]	FOSTEC & Company [16]	Appelfelder/Feldmann [17]	Netode AG [18]	DRP Reifegrad Fraunhofer [19]	Forrester [20]	Accenture [21]	SUM
Organizational structure	1	1	1	1	1		1		1		1	1	9
Information- and Communication Technology	1	1		1	1	1	1	1	1		1		9
Business Processes	1	1	1	1	1			1	1			1	8
Customer Experience / Customers Perspective	1	1	1		1	1	1	1	1				8
Culture & Expertise	1	1		1	1	1			1	1	1		8
Strategy	1	1			1	1	1		1	1		1	8
Employees			1	1	1	1		1		1			6
Products & Services	1		1	1				1	1				5
Collaboration	1			1					1	1			4
Production / Delivery			1	1				1					3
Business Models			1					1					2
Networking with Partners				1				1					2
Supplier & Partners			1					1					2
Agile Methods			1							1			2
Services			1									1	2
Data Management				1				1					2
Controlling / Continuous Improvement Proc.					1						1		2
Transformation Management	1												1
Communication				1									1
Production 4.0									1				1
Methods & Tools					1								1
Leadership						1							1
Competition							1						1
Value-added Chain				1									1
Standardization					1								1
Number of Maturity Levels	5	-	5	5	5	4	10	5	5	5	4	5	5,3

Table 1. Dimensions of the identified 12 maturity models

3. A “Vision” of a digitalized UAS

As already explained five grades of digitalization beginning with 0 (no digitalization up to minimal digital implementation) up to 4 (complete digitalization) were defined. So the question arises, what is meant by the highest score “complete digitalization”? One would think that it primarily aims at controlling the flow of processes by means of “digital technologies” – i.e. IT systems. That is only one part of the vision limited to an e-Government-perspective [22] which focuses more or less on the core processes of a UAS. Considering the whole organization, the research results of Digital Transformation [23] and working through all dimensions of the different maturity models, the

vision is a broader one. Our vision of a digitalized UAS is an organization which makes use of digital technologies to benefit in every aspect such as offering new and additional (e-)services to their customers as well as supporting and empowering their employees to do their work in an up-to-date way. Its goal is to speed up workflow processes, to give the employees more time to focus on important work and to provide them with the opportunity to be agile in order to meet new expectations, new requirements and new trends, to be able to act and to adapt to changing circumstances in order to fulfil their task in providing society and the economy with the strength for innovation through an up-to-date combination of science and practical orientation as well as excellent quality teaching and the transfer of knowledge.

To achieve this goal, each of the chosen dimensions is needed. For example digitalization needs cultural change. Several digital transformation projects are proof that digitalization focusing only on digital technologies does not meet the expected results as long as there is no digital culture. Analogue procedures are reproduced accurately in digital procedures, but a worse analogue procedure is a worse digital procedure. Behaviour patterns and ways of thinking, the people's mindset and their mental horizons need to be changed so that they "think and act" in a digital way. Only then can the benefits of digital transformation be derived. [11] This means i.e. that employees need digital abilities and recruiting employees need to consider this ability by selection processes. Additionally employees need to enhance their digital and non-digital competencies through an extensive education program to stay up-to date and to continually develop their abilities. [14,15,16,19]

4. Results and Discussion

Thirty-eight people took part in the questionnaire. This represents 63.3 percent of the sample. The whole of the results are shown in table 2. For the assessment we used the marking where each indicator was positioned on the scale from 0 to 4. The abbreviation "RG" stands for the average of each indicator as well as for its maturity level, Ø shows the maturity level of the dimension.

Dimension	Indicator	RG	Ø
Organizational structure	There is one person in charge of the digitalization of the administration	1,4	1,3
	Cross-departmental and cross-functional teams work on and drive the projects of digitalization.	1,3	
	The UAS provides personnel and financial resources for the digitalization of the administration.	1,7	
	The administration has the ability to react /to adapt to digital changes and its requirements.	0,8	
Information- and Communication Technology	ICT meets the expectations and needs of students, researchers, lecturers and employees.	1,7	1,3
	The IT-department offers and uses up-to date technology and is able to develop and implement it in short-term.	1,2	
	All IT-systems are connected and they exchange data in the sense of "once only"	1,1	
	There is a central data storage for customer data which can be used by all departments who need it.	1,3	
	Electronic file management is implemented throughout the whole organization.	0,7	
	IT-Infrastructure offers new possibilities and supports collaboration.	1,8	
Business Processes	Standardized processes are automated.	1,3	1,1
	Continuous improvement of digitalization and standardization is implemented.	1,1	
	Digitalized business processes - without any changes of media usage.	1,1	
	The business processes will be continuously improved.	1,4	
	The business processes are transparent and easy to understand.	0,9	
	The business processes are measured via key performance indicators.	1	
Customer Experience / Customer Perspectives	All communicational channels (e.g. email, sms, paper, face to face ...) are available for the customers to address their issues.	1,4	1,0

(students, lecturers, researchers, employees)	Information is tailored to the customers' needs.	1,2	
	User behavior is tracked and used to improve processes and services.	0,7	
	Feedback of customers is valued and analyzed to improve services and processes.	1,1	
	Customers are able to track the processing of their issues.	1,0	
	Customers are involved in process design and service development	0,9	
	New trends and technologies are used for communicating with customers.	0,9	
Culture	The administration knows that digitalization is a success factor for competition.	1,5	1,1
	The administration is ready for digital change and has the ability to drive digital change.	0,7	
	The administration has a culture of constructive criticism. Its zero-defect culture promotes dealing with errors actively and openly in order to benefit from potential improvements.	1,0	
	The UAS management encourages and promotes digital innovation in administration.	1,4	
	The management are prepared to take risks into account when it comes to digital innovation in existing business of the UAS.	0,9	
Service Delivery	Up-to date technology (e.g. customer relationship management systems) supports service delivery completely.	1,0	1,0
	All services offered by the administration are digitalized from customer back to customer.	0,9	
	Value added e-services are all well-known and transparent.	0,9	
	Customer feedback management is implemented.	1,0	
Strategy	The UAS has a vision of digitalized administration.	0,9	0,9
	A holistic and integrated strategy for digitalization of administration exists and is embedded in the Structural and Development Plan of the UAS.	1,1	
	All employees participate in the strategy development.	1,1	
	All employees know the digital strategy of administration.	0,6	
	The management of administration gives a good example when it comes to digitalization and they work on it.	0,9	
	All goals of the digital transformation are „SMART“ (specific, measurable, achievable, realistic, timed).	0,7	
	All actions to digitalize administration follow a concerted policy.	0,7	
The strategy of Digital Transformation is regularly checked and adapted to new trends and technology.	1,0		
Collaboration	Mobile devices support cross-departmental and cross-functional collaboration.	2,5	2,1
	All employees have the choice to work mobile.	2,4	
	Teams optimize their collaboration through mobile work.	2,1	
	The administration is connected and uses collaboration platforms.	1,8	
	New Work-methods and techniques are used to improve collaboration.	1,6	
Employees	The administration considers the digital ability of applicants in their recruiting procedures and selection processes.	1,5	1,4
	The administration offers an extensive education program focusing on digital competencies of their employees.	1,0	
	Employees are motivated, asked and urged to extend their digital ability.	1,4	
	The administration has a strategic HR development program to improve the digital ability of employees.	0,9	
	All employees actively use their digital ability, methods and techniques.	1,7	
	All employees express a strong interest in participation in the digital transformation of their UAS.	1,9	
	All employees of the administration use agile methods e.g. Scrum, Design Thinking, etc.	1,1	
Digital Maturity Level of the UAS administration			1,2

Table 2. Maturity levels of dimensions and its indicators

The results of the analysis show that the digital maturity level for the UAS administration is generally low with an average of 1.2. Figure 1 gives an idea of the overall status. The diagram makes it clear with the exception of the dimension “Cooperation” that all dimensions stand at level 1. Level 1 is defined as “It is recognized that digital transformation management is necessary” which means that although it has been recognized no concrete steps have been taken. It is worth noting that the dimension “cooperation” comes out above average with the digital maturity level of 2.1 compared with the other dimensions. It is also worth noting that the dimension “strategy” comes

out with the worst average of 0.9 compared with the others. This is all the more remarkable since at strategic thought and action is taught at the UAS.

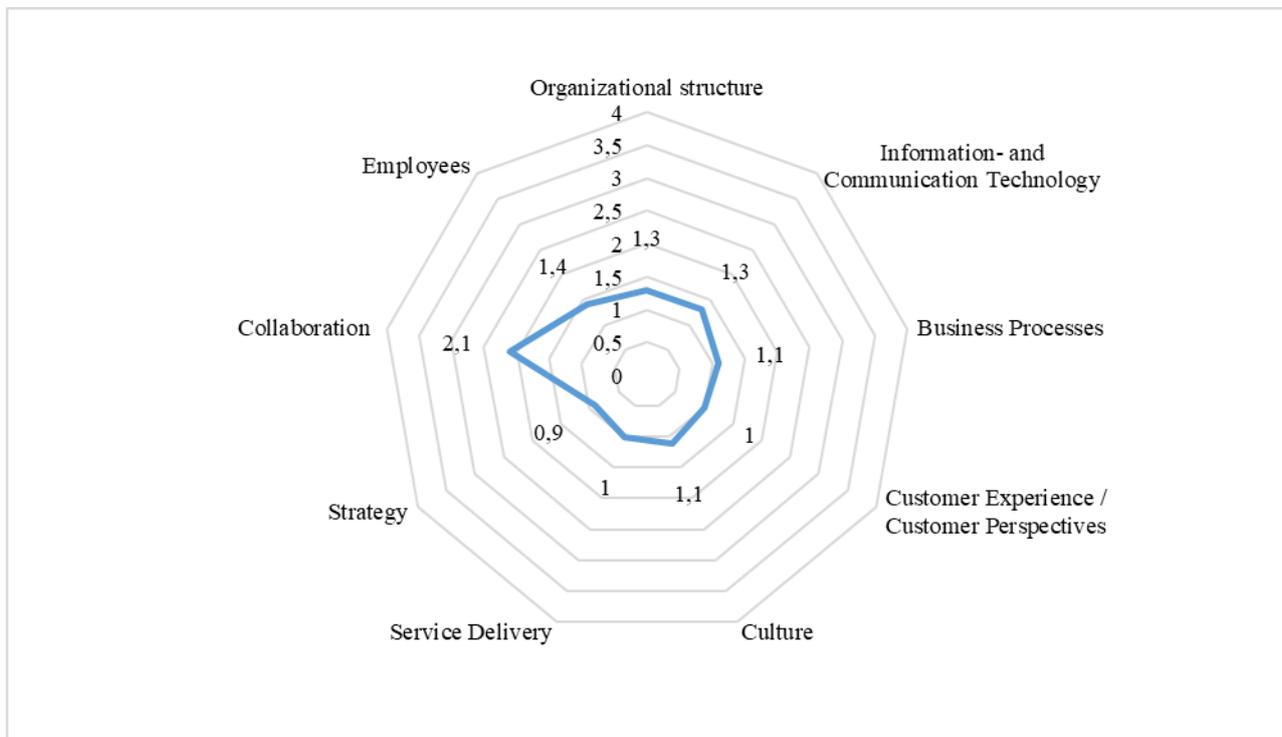


Figure 1. The Digital Maturity Level of the UAS [24]

The participants were particularly critical that the UAS is not able to react quickly to changing demands. This can be seen from the indicators “preparedness to be mobile” and “ability to change” as well as “ability to take a risk”. Above all the participants criticized the performance of the core processes, the lack of participation of clients while designing the business processes and the missing e-document management / e-archive. The possibility of mobile work which supports internal collaboration received a positively response. Additionally the participants commented that they would like to be involved in the process and implementation of Digital Transformation.

Looking at the results the question arises why digitalization caused profound changes only in the private sector and didn’t reach the administration of a UAS. This is all the more remarkable when we consider the fact that the UAS focuses on the subjects Economy, IT and Technique and therefore cooperates with the private sector to successfully fulfill its core responsibilities. Maybe the strength of their practical orientation of the UAS is limited to theoretical work in research and teaching. Maybe there is a border in transferring research findings and knowledge to the internal organization. When we searched for the digitalization strategies of the UAS, we could only find two UAS which had their strategy online and wrote about it.

Another explanation may offer the implementation of the digital strategy for Baden-Württemberg. Even if *strategy* emphasizes that business processes may be supported, the implementation focuses on research and teaching e.g. they started a new program for “e-Learning” which supports new teaching methods and materials and they initiated a network called “Hochschulnetzwerk Digitalisierung der Lehre in Baden-Württemberg”. [25] There are no action plans or activities focusing on campus management systems and the business processes connected to research and teaching.

The administration of UAS is hierarchically and traditionally organized like most of the public administration. Therefore they show little willingness to change anything, if the change is not driven by the management. The management drives change if they have to face competition or to meet financial deficits or to attract new employees in the time of demographic change. The pressure of change is not yet high enough. This is proved by their hesitant attitude to implement new software and drive digital transformation overall [26].

5. Summary

This paper addressed the question whether the Digital Transformation has only found its way into teaching and research as a topic but not into the administration of UAS. Considering the results of the study the question can be answered with “no”. The digital maturity of the chosen University of Applied Sciences is 1.2 on a scale ranging from 0 to 4. The lowest score of the nine analyzed dimensions (organizational structure, information and communication technology, business processes, customer experiences and perspectives, culture, service delivery, strategy, collaboration and employees) could be found in *strategy* with 0.9. This is surprising because each University of Applied Sciences has to publish annually a so-called “Structural and Development Plan” which is examined by the Ministry of Education, Science and Culture of Baden-Württemberg.

Based on the hypothesis that the chosen UAS represents all UAS in Baden-Württemberg alarm bells should be ringing in times of Digital Transformation. The results show that the UAS administration is not aware of the importance of digital change, nor willing, and therefore not prepared to drive the digital change. Following the statement of Prof. Scheer [27] who said: “Only if the administration is innovative, the areas of teaching and research are able to proceed in the digital future.” this underlines the necessity to drive the Digital Transformation in all areas of a UAS: research, teaching, further education *and* administration.

The study was limited to one faculty of one of the biggest UAS in Baden-Württemberg. So the conclusions of the results are limited and can only be seen as an indication. Additionally the majority of participants represented the customer perspective, not the perspective of administration. Therefore, to verify the findings, further research is necessary with a bigger sample.

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RESEARCH DATA IN THE CONTEXT OF OPEN SCIENCE: CASE STUDY OF THE REPUBLIC OF MOLDOVA

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Abstract

At present, there are important changes in scientific research, changes that concern both the organization, realization and evaluation of research, as well as the use and dissemination of scientific results. These changes that are characteristic to the Open Science phenomenon are determined by the development of new technologies, by increasing the social role of scientific research in an institutional and political context. The Open Science concept represents a new approach to the way in which scientific research based on cooperation and new ways of disseminating knowledge is carried out and organized, using new digital technologies, new tools for collaboration, and RDI infrastructure to ensure open access to research data.

The paper presents the results of the study on mapping research data in the Republic of Moldova. The study is based on results of two surveys conducted in January-February 2016 and May-July 2018. The research has highlighted the general concern of RDI actors about the retention and use of scientific data. A new challenge is needed to solve scientific data issues by creating new type of infrastructure to ensure data archiving, broad access for the purpose of their dissemination and reuse, and thus creating new research opportunities based on research data.

1. Introduction

Open Science is a challenging phenomenon that is emerging around the world. Open Science brings social, economic, cultural, political and technological change, based on openness and connectivity, on how research is designed, performed, used, assessed, and preserved. Open access platforms, open infrastructures, open data tools, open educational resources, open evaluation methods, open collaboration, or open citizen science activities are irreversible trends that are impacting all

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scientific actors and have the potential to accelerate the research cycle [14]. By increasing access to publications and data, universities, research institutions, firms and individuals may use and re-use scientific outputs to produce new products and services.

One of the key elements of open science is open access to research data. In a research context, there is a growing opinion that most research data should be open, particularly data from publicly funded projects. This point of view is driven especially by research funder requirements for sharing and re-use data, upon principles regarding research data such as to be findable, accessible, interoperable and re-usable (FAIR principles). The research data are made open for two purposes: to provide evidence that the research was conducted properly and to provide data for reuse and the generation of further findings and outputs [3].

Open research data is research data that combines the characteristics of open data and the types of research data [8].

As World Bank mentioned in his report [16, ch.1] data is considered the new gold, or the new oil, and like oil, unprocessed data has relatively little value and needs to be mined, refined, stored, and sold on to create value.

According to the Engineering and Physical Sciences Research Council [7] “**Research data** is defined as **recorded factual material commonly retained by and accepted in the scientific community as necessary to validate research findings**; although the majority of such data is created in digital format, all research data is included irrespective of the format in which it is created”.

Research data can be generated for different purposes and through different processes [10]:

- **Observational:** data captured in real-time, usually irreplaceable. For example, sensor data, survey data, sample data, neuroimages.
- **Experimental:** data from lab equipment, often reproducible, but can be expensive. For example, gene sequences, chromatograms, toroid magnetic field data.
- **Simulation:** data generated from test models where model and metadata are more important than output data. For example, climate models, economic models.
- **Derived or compiled:** data is reproducible but expensive. For example, text and data mining, compiled database, 3D models.
- **Reference or canonical:** a (static or organic) conglomeration or collection of smaller (peer reviewed) datasets, most probably published and curated. For example, gene sequence databanks, chemical structures, or spatial data portals.

Scientists are particularly interested in data collection, and the success of each experiment is determined by the new data generated, which can contribute to advancing scientific knowledge. Any scientific research involves performing an observation, generating a hypothesis, running an experiment, and collecting data. Traditionally, for any research, the amount of data collected by scientists was not very extensive, and its analysis did not require the use of technology. Previously, for scientists, technology was used in a very limited way, and data evaluation was not done using algorithms or software. However, significant changes have taken place over the past two decades,

and changes in software and tools have made data acquisition and analysis a very important part of research.

At present, scientists and research are subject to a paradigm shift [1, 2, 15]. Various developments in data-based statistical software, tools and science, such as computational biology and computational chemistry, have led to a new generation of scientists focusing on the analysis and interpretation of the data obtained. Research projects, such as the Large Hadron Collider, the Hubble Telescope, and the Human Genome Project, are evidence of how science has become dependent on data computation and extraction. Thus, the outcome of various advances in technology has transformed the field of science. Scientists now have the ability to perform high performance experiments, which are basically intensive data projects that allow researchers to accumulate and store huge amounts of data.

In late years some studies have been conducted that were focused on researchers' attitude toward openness, access, sharing and re-use of research data among others [5, 9, 11, 12].

Thus, the Open Data survey [9] found that the attitude toward data sharing is generally positive, but open data is not yet a reality for most researchers. A global online survey of 1,200 researchers found that many perceive data as personally owned. Public data sharing primarily occurs through the current publishing system; less than 15% of researchers share data in a data repository. At the same time, 69% of survey respondents said sharing research data is important for doing research in their field. The survey also revealed that when researchers share their data directly, most of them (>80%) share with direct collaborators. Although data sharing seems to have a global benefit, cultural and national factors pose a significant challenge to a one-size-fits-all approach. Regardless of the benefits, deciding what kind of data can be shared, how it should be shared, and making it usable by others requires additional effort, training, and resources. Furthermore, freeing up data for reuse and sharing depends on accommodation or coordination of disciplinary, cultural, and local differences with respect to data privacy and licensing.

In another large surveys on research data [11], have found widespread data sharing associated with published works and a desire from researchers that their data are discoverable. The survey confirms and extends recent findings on general data sharing attitude and behaviour. Thus, 76% of researchers rated the importance of making their data discoverable highly – with an average rating of 7.3 out of 10 and the most popular rating being 10 out of 10 (25%). The main challenge to data sharing was identified by respondents as „Organising data in a presentable and useful way” (46%), with other challenges generally rated: „Unsure about copyright and licensing” - 37%; „Not knowing which repository to use” - 33%; „Lack of time to deposit data” - 26%; „Costs of sharing data” - 19%.

Figshare's annual report, *The State of Open Data Report 2018* [6], looks at global attitude toward open data. The report is the third in the series and the survey results continue to show encouraging progress that open data is becoming more embedded in the research community. The key finding is that open data has become more embedded in the research community – 64% of survey respondents reveal they made their data openly available in 2018. The percentage of respondents in support of national mandates for open data is higher at 63% than in 2017 (55%). 80% of respondents stated that they were aware of open data to reuse. However, a surprising number of respondents (60%) had never heard of the FAIR principles, a guideline to enhance the reusability of academic data.

In order to map the situation regarding generation, gathering, use, sharing and preservation of research data obtained within research projects carried out in the Republic of Moldova, Information Society

Development Institute conducted two surveys: in January-February 2016 and May-July 2018. Some of the surveys' results are presented in the book *Open Science in the Republic of Moldova* [4].

Thus, the *goal* of the present paper is to investigate how data is used and managed by the research community of the Republic of Moldova and how the use and management of research data evolve in time in the Moldovan academia.

2. Methodology

The study is based on responses of two surveys.

The first survey was conducted under the context of the Research and Development Strategy of the Republic of Moldova 2020 (Gov. Dec. no 920 of 07.11.2014) and National Strategy for information society development "Digital Moldova 2020" (Gov. Dec. no 857 of 31.10.2013), within the national project *The pilot platform for quality assurance and visualization of digital scientific content in the Republic of Moldova* (SCIFORM) (<https://idsi.md/en/sciform>) [13].

The survey's *main objectives* were:

- to map the existing digital scientific content;
- to assess the needs for the transposition of national scientific content in digital format;
- to find out the opinion of Moldovan academia vis-à-vis openness of publications and research data;
- to catch the attitude of leadership of research institutions, project managers and journals' editorial boards regarding open access policies.

Responses were collected from 39 representatives of R&D institutions (75% success rate); 48 editions of scientific journals (success rate: 63%); 83 managers of national research projects (success rate: 34%); 23 libraries (success rate: 71%).

The second survey on the mapping of the research data ecosystem in the Republic of Moldova was carried out within the framework of the project *Elaboration of conceptual and methodological framework for e-Infrastructure of data in the RDI field of the Republic of Moldova* (e-IDSM) (<https://idsi.md/md/e-idsm>). Unlike the previous survey this one *was focused* exclusively on research data.

The *main goal* of this study was to identify the needs of the RDI community in the Republic of Moldova on the management of scientific data over their lifecycle (creation, processing / analysis, storage / preservation, sharing / access and use). The specific objectives of the survey were:

- to identify the types / formats and sources of research data;
- to find out the modes of storing and preservation of the research data;
- to discover the ways the research data are processed and analyzed;

- to learn the procedures of the research data management;
- to determine methods of sharing, access and use of the research data.

Responses were collected from 48 RDI institutions (92% success rate), including 13 higher education institutions. Respondents with various positions within these institutions participated in the survey, including: 25 heads of RDI institutions (12.3%); 42 project managers (20.7%), 65 laboratory / research group managers (32%), 34 scientists (16.7%), 23 university teachers (11.3%), 4 PhD students (2%), other positions (10 - 5%).

The authors were members of the research projects' teams and have participated in the design of the surveys, collection and aggregation of the results.

3. Results and Discussions

Both surveys highlighted the need to improve the circulation of knowledge and access to research data. Thus, the respondents of the first survey totally or partially agreed that data obtained from research funded exclusively from public funds as well as those that are partly funded from public and partly from private funds should be available for reuse and free on the Internet (figure 1).

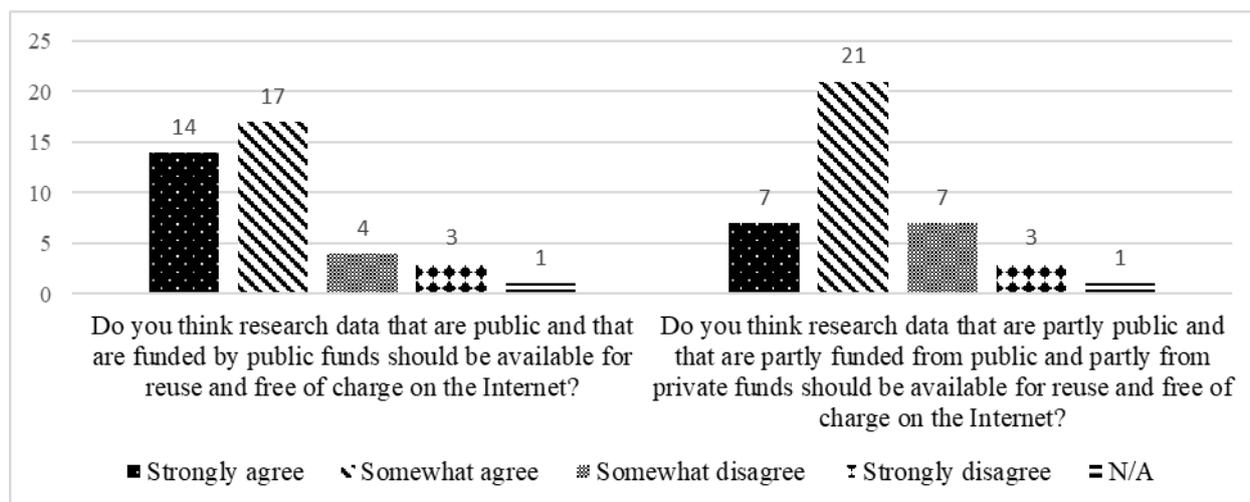


Figure 1. RDI institutions' opinion on open access to research data funded exclusively or partly from public funds

The comparative analysis of both surveys' answers shows that the rate of respondents who unconditionally accept open access to research data obtained from public funds decreased from 50% in 2016 to 28% in 2018. At the same time, those who accept conditional open access increased twice, from 23% to 45%. However, the rate of those who do not support open access to research data did not change significantly (10% in the first survey and 12.4% in the second survey) (figure 2).

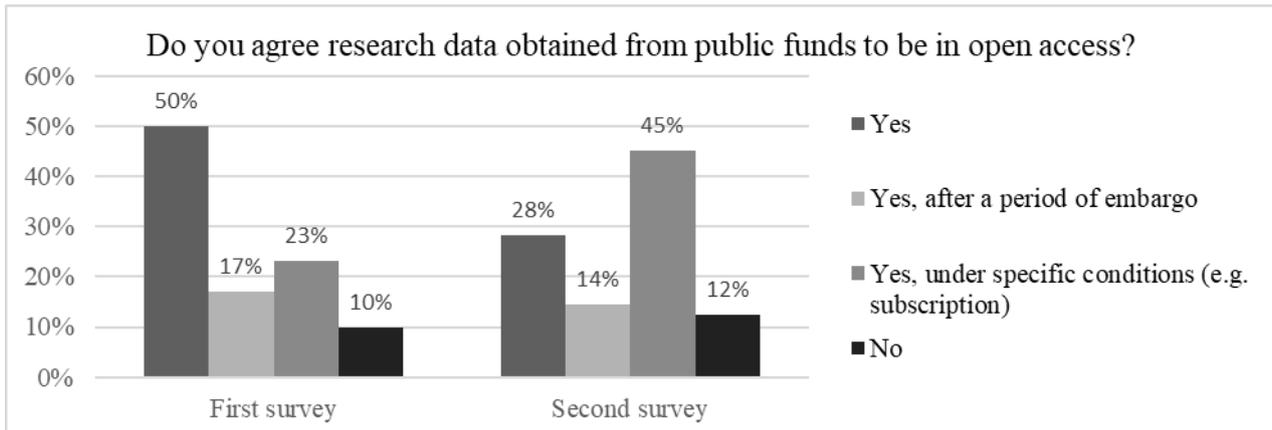


Figure 2. Moldovan academia's opinion on open access to research data obtained from public funds

At the same time, 2018' survey participants have specified that research data must be accessible to colleagues, scientific community, PhD students, decision-makers, educational institutions and other users, and one of the primary conditions for using research data is to cite the source. Also, it was mentioned that some data banks are not accessible to the public, and researchers do not have sufficient skills in managing research data.

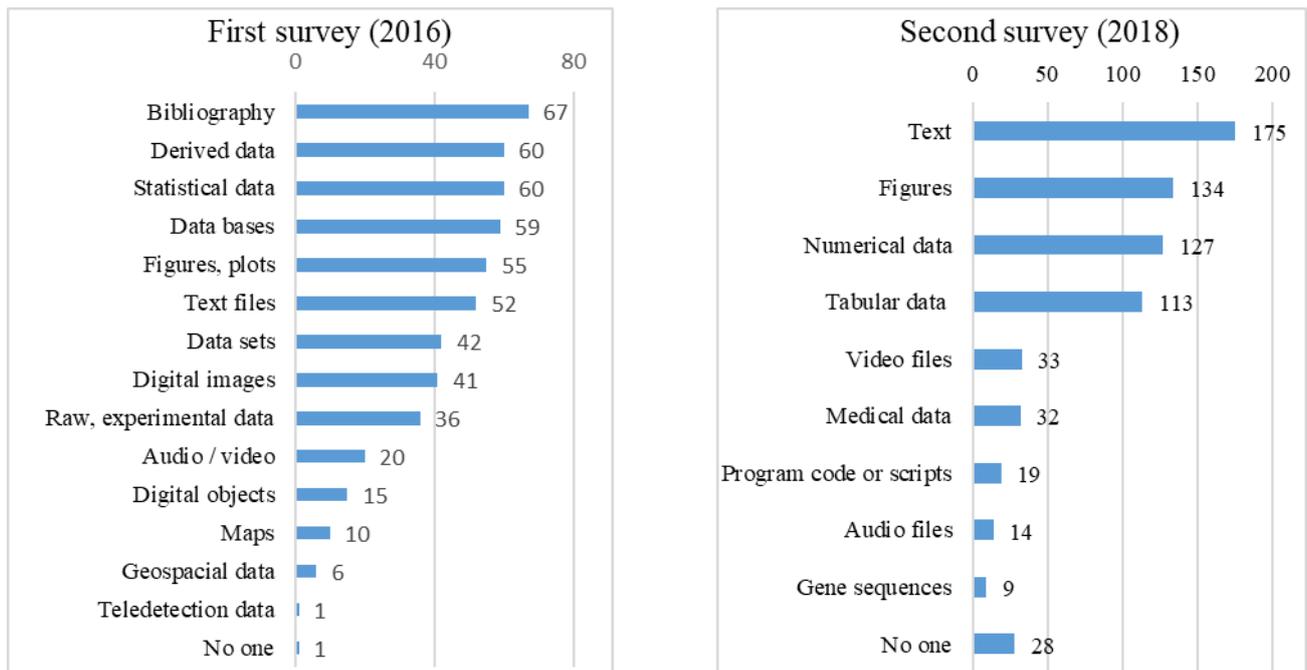


Figure 3. Types of digital data produced / generated for research

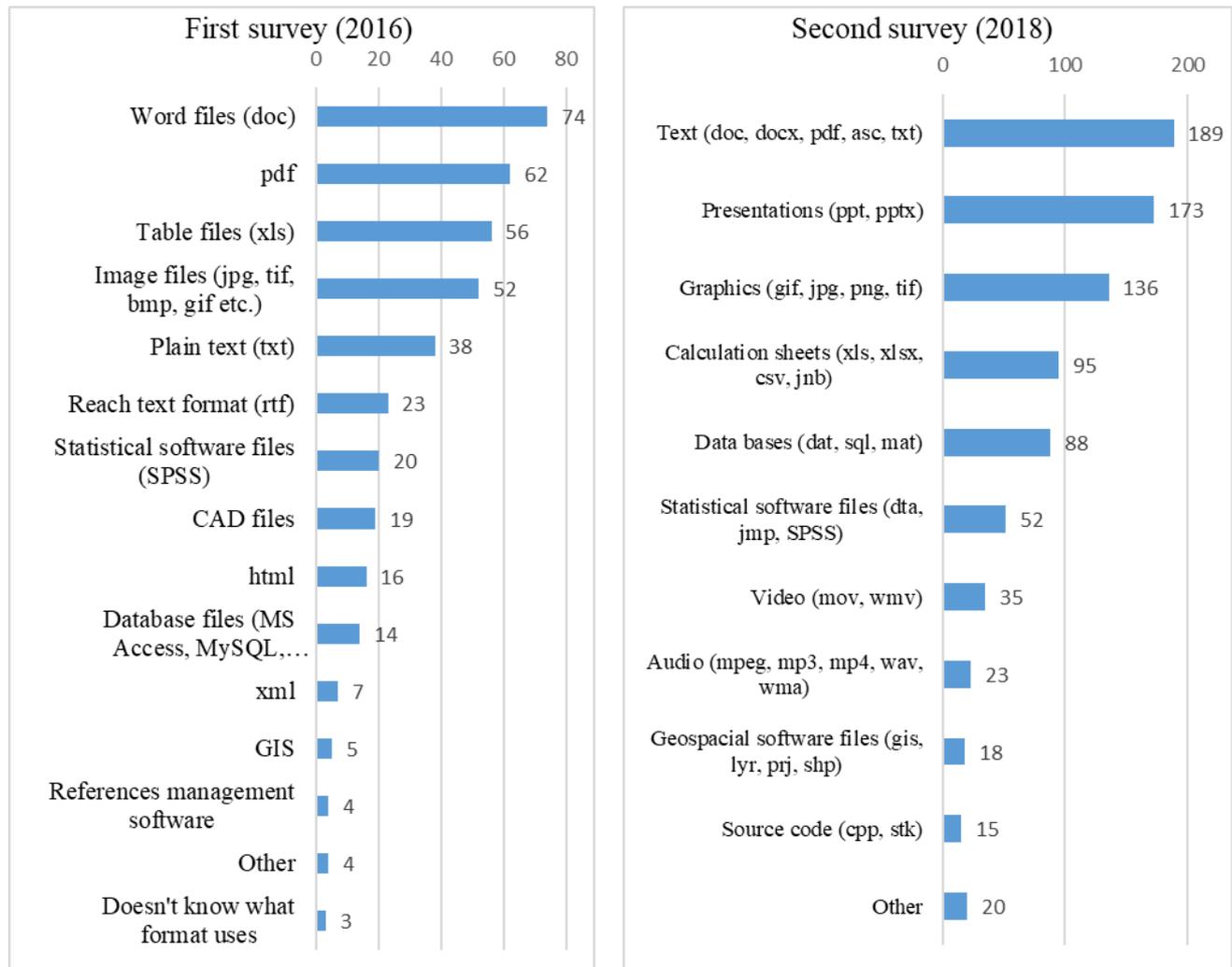


Figure 4. Types of generated / collected data formats

Regarding types of research data produced by Moldovan academia, answers obtained within two surveys show that in 2016 more bibliographic and derived data were produced in comparison with 2018 when more figures and numerical data prevailed (figure 3).

The data obtained from surveys regarding formats of data produced for research, revealed that the most popular formats are texts, tables, graphics, presentations (figure 4).

Taking into account data formats used by researchers, as well as the needs described by them in the second survey, Moldovan researchers can be divided into two categories:

- Researchers using relatively widespread software tools in the academic and research environment, such as: Microsoft Office, SPSS, Adobe FineReader, and others.
- Researchers using research-specific software solutions such as: ArGIS, Geoportal, Mathematica, FoxPro, Endnote, 1C, EViews, GAMESS, Gaussian09 and others.

For data management, it is important to have Data Management Plans for institutional data management policies or procedures as well as for research projects. The results of the second survey

revealed that 107 respondents, which make up more than 50% of the survey participants, do not know or believe that there are no institutional policies and procedures regarding the management of research data (Figure 5). With regard to the development of the data management plan for research projects, only 21 respondents (10.3%) stated that funding agencies had requested such a plan (Figure 6).

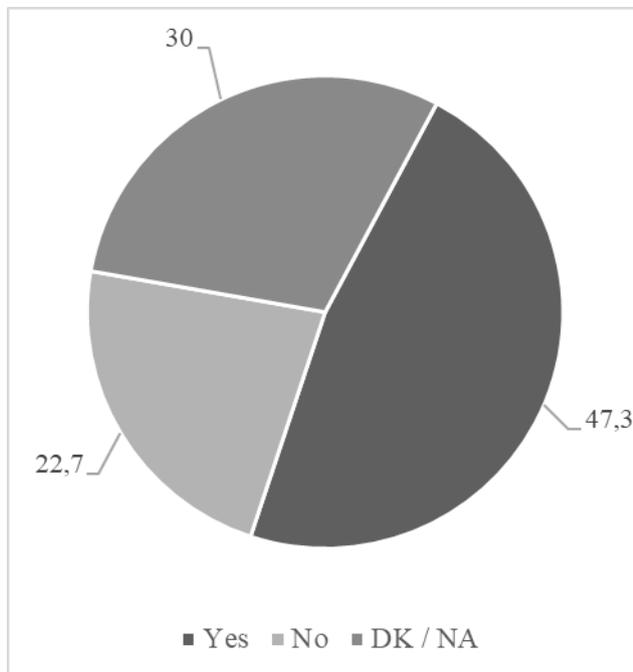


Figure 5. Existence of institutional management data policies and procedures

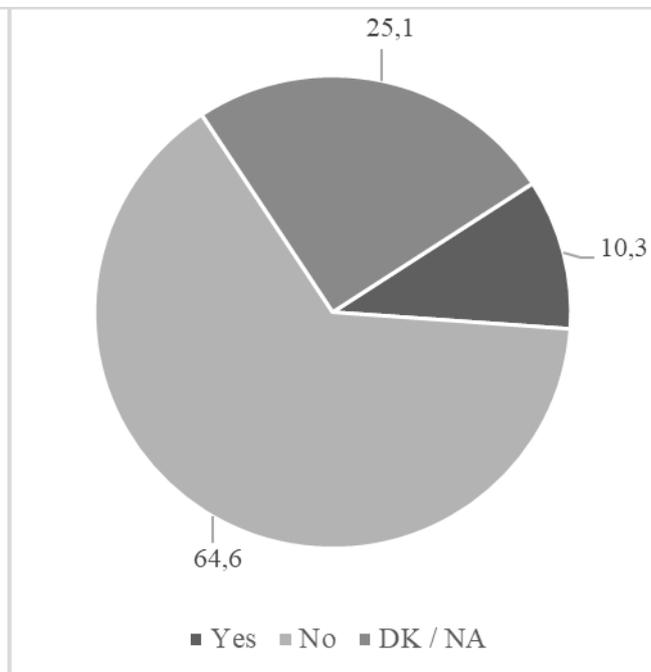


Figure 6. Request from financial agencies of Data Management Plan

Although only 96 respondents (47.3%) know about the existence of institutional data management policies and procedures, they noted that there are various policies and procedures in place to protect, store, archive, share research data, among which: privacy policy, data storage policy, institutional policy on open access, institutional policy on intellectual property and technology transfer, primary data verification policy, old data removal policy, strict journaling of records, experiments' and tests' registries, contracts with organizations, non-disclosure agreements, internal networks specifying data access rights, etc.

However, it should be noted that the majority of survey participants (170 respondents – 83.7%) believes that training on research data management is needed. Respondents emphasized the necessity of training researchers from different fields on research data management technologies.

4. Conclusions and Recommendations

In conclusion, we can mention that Moldovan academia is ready to provide access to research data. Most of researchers use digital media to access research data, but prefer to use traditional data storage formats (Word, Excel, PDF, etc.). Only some researchers use modern and innovative tools to process, access, store and archive research data. One of the main issues that discourages research data sharing is the issue of copyright protection. There are some concerns about the loss of property rights and copyright infringement in case of sharing and open access to research data. At the same time, in RDI institutions of the Republic of Moldova, the management of research data management

is not implemented. There are problems related to long-term preservation, storage, sharing and access to research data.

Concluding results of these studies, the following recommendations can be made:

- Continuous analysis of the tendencies in research data management.
- Analysis of the international experience in the field of research data management.
- Establishment and approval of policies on research data management in research projects and / or research institutions.
- Training and familiarization of Moldovan academia in different fields of research data management.
- Training researchers in the Republic of Moldova on open source solutions that could be used in the research process as well as in the special case of research data management.
- Establishing rules / procedures / customs for research data management to be known to researchers, to be adopted by researchers and addressing all stages of research data management.
- Organization of round tables or other activities for presentation of solutions used in the field, as well as for exchange of views and experience in the field of research data management.

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ECONOMICS OF OPEN SOURCE TOOLS FOR OPEN DATA AND OPEN SCIENCE IN THE DIGITAL MOLDOVA

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Abstract

The research results data in the Internet era have become a valuable resource, similar to natural mineral resources in Industrial era. In a tendency to save resources (financial, human, time, etc.), academia, governments and businesses around the world are increasingly adopting Open Source solutions.

In Moldova there is a range of academic research institutions that have been collecting large amounts of data in their many years of research. On one hand, there is lack of tools able to process and reuse such data; on the other hand, it is very unlikely that research institutions will acquire modern and performing tools for using this data. Collaboration between academia, business and government should be a “must” principle in this synergic process. The governance of all these aspects is the key in thriving the potential of an open digital society through the collaboration with all stakeholders.

This paper explores the opportunities of the use of open source software for the re-evaluation of the open research data in Moldova. We will address this issue in the context of the ongoing State program on scientific data infrastructure, examine benefits of open source Economics and finally, analyze incentives that could contribute to the Open Data commitment for Open Science in the Digital Moldova environment.

1. Introduction

Nowadays, more than half of the world is online [8], and open source software (OSS) has attracted the attention of not only hobbyists and academia, but also that of the proprietary software companies and Venture Capitalists (VC). Much of this interest is due to the network effect of the Internet that allows users to generate and share data (and innovation). Mankind now has the opportunity to use the principle of openness, especially in the field of innovation and science, by using open source tools and open data for a better future. Openness is a better solution especially for developing countries, if they aspire to foster the status of more economically advanced countries. In the context of the EU vision of building an European data economy, the estimates underline that a free flow of data holds for a tremendous economic growth potential. This growth potential is even more significant, knowing that the value of the EU *data economy* is expected to rise up to EUR 739 billion by 2020 (4% of the EU GDP) as estimated by the European Data Market Study in May

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2017. However, the 2017 report shows a relatively modest development in terms of the economic impact of Open Data from 51% in 2016 to 54% in 2017 [7].

Along with other data, the *research results data* in the Internet era have become a valuable resource, similar to natural mineral resources from old mines that are now becoming valuable again, with the invention of modern extracting technologies. Opening the existing research data creates new opportunities for their mining, reuse and interpretation, as well as obtaining new results due to modern technologies. Open Research Data (ORD) is a type of open data focusing on making the results and the observations of research activities public and available to anyone for analysis and reuse. The ORD pool has been actively promoted since the 1950s, and with the development of the Internet network has significantly reduced the cost and time needed to publish or obtain the data.

ORD refers to scientific data freely available for reuse beyond the purpose for which it was originally collected. Open research data contributes to new findings, making research much more cost-effective and reliable. Open research data is a part of a wider change: data-based science as the foundation of open science. Data are distinct parts of information, usually obtained in a specific way. Research data is data collected, observed, or created for analysis purposes to produce original research results. Open data (especially in the era of data revolution) must be discoverable, and there should be sufficient tools for such data to be (re)used. International practices in use of open standards and open source software for the research data provide an opportunity to minimize costs, which is of major importance for countries with insufficient financial resources for research. A wider use of these instruments in the Republic of Moldova would be an important incentive in implementing the Open science concept, which may catalyze the development of the emerging digital economy and society.

The easy access to research data creates new opportunities for obtaining new results reusing the collected data. For obtaining new results the new tools for research data analysis are being developed all over the world.

Over the past 5 years, there has been a significant increase in the use of OSS and interest in open source tools for research data analysis. Growth rates and search volumes are much higher than those of proprietary software vendors. This is a convincing sign about the future of the open source software market for processing research data.

Open Source Software is a type of software for which the source code is provided and which under certain conditions (licenses) can be studied, modified and improved by the user. OSS is usually developed in a public manner and anyone who wants can contribute to the development and improvement of software [13].

The study *The economic and social impact of software & services on competitiveness and innovation (SMART 2015/0015)* states „**Open source** has become a relevant part of the software industry and a number of software ecosystems. It has become an alternative to commercial software in various areas and is already included in many commercial software products. The relevance of open source software has also increased since 2010 due to the rise of Linux, Apache and open source middleware as well as the use of open source software for the creation of cloud computing environments (private and public cloud), Big Data usage (Hadoop) and mobile devices proliferation (Android)”[5].

The study recommends „supporting open source software in all sectors of the economy and public administration. OSS has the potential to become a unique force of the European software industry if it is properly supported. Although open source software is well suited for applications including commercial, European companies, public administrations, and users, they do not yet know enough of its benefits. Thus, the study recommends focusing on policy actions that strengthen the OSS knowledge base and the exchange of good practices between private and public organizations [5].

In a tendency to save resources, but also based on the clear IT development strategies of local IT companies, governments around the world are increasingly adopting Open Source solutions.

In 2017, the European Commission stated that „EU institutions should become themselves OSS users to a greater extent than at present” and OSS is listed as one of the 9 key innovation drivers together with Big Data, Mobility, Cloud computing, and Internet of Things (IoT) [5].

2. Open Source Software for Open Research Data: Challenges for Moldova

In the Republic of Moldova, the National Strategy „Digital Moldova 2020” states for „promoting the use of open software and free tools for creation, dissemination and use of digital content” [5], and the Interoperability Framework, as a part of e-government program states for „a simple, understandable, accessible, easy-to-use solution based on open standards and a uniform interface”, and „wide use of open standards will simplify and optimize the process to connect to the platform and ensure a sustainable platform development”[9].

Republic of Moldova has joined UN Agenda 2030 which provides „the dissemination of relevant open access to scientific publications generated around the world”. To use the opportunities for the access to research data, the relevant tools are required for capture, processing, and analysis, and one of these could be open-source software.

The importance of promoting the openness is reflected in the „Declaration on Open Science in the Republic of Moldova” adopted in November 2018 in which the research community „...recognize the strategic importance of Open Science. ... want to contribute to ..., address the challenges of openness throughout the entire research cycle: Open Access; Open scientific data; Open Methodology; Open Education; Open rating; Open licences; *Open source software*; Open and Shared Infrastructures; Citizen's science; Open, reusable and reproducible research” [10].

However, within the research, innovation and development institutions as well as in the governmental and non-governmental institutions of the Republic of Moldova, although some emphasis is on the use of OSS, the reality is slightly different.

For the research activities and for obtaining valuable research data it is important to have enough funding. Unfortunately, Moldova, with GDP \$2,289 [15] (PPP \$5,698) [16] per capita in 2017 and only 0,37% allocated for R&D doesn't have a favorable position compared to the developed and neighboring countries (Figure 1). Moreover, only 0,6% of the R&D expenditures are allocated for software procurement [1].

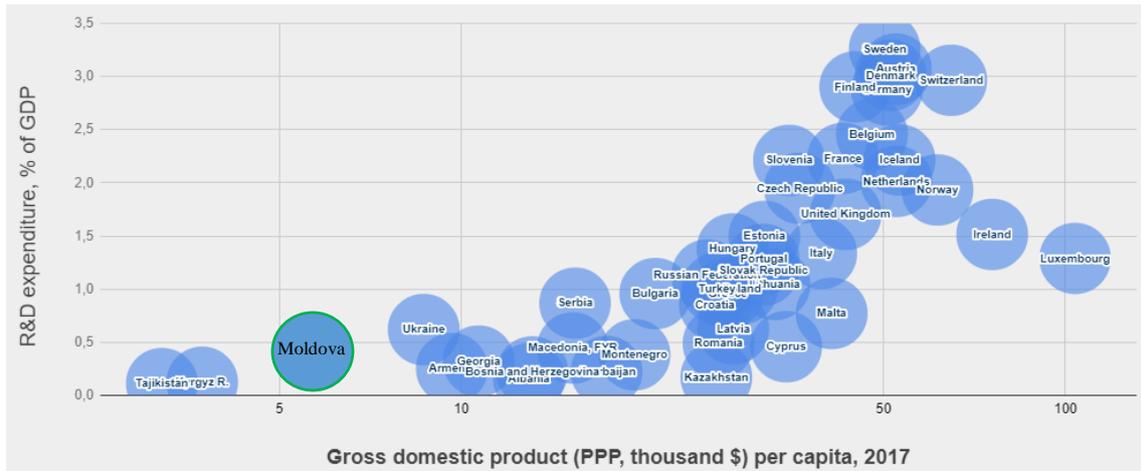


Figure 1. R&D expenditures depending on GDP
 Source: Authors, based on World Bank Group data [15,16]

The lack of money for research activities and relevant instruments for procurement is pushing researchers to find other alternatives and cheaper solutions for necessary software tools - i.e. some of them use Open Source, or - since many of them are not aware about the relevant open source solutions, or are not prepared to use them - (in Moldova more than 41% of researchers are older than 55 [1]) are using the unlicensed solutions. The rate of unlicensed software installation in Moldova is 83%, the second position in the region (Figure 2).

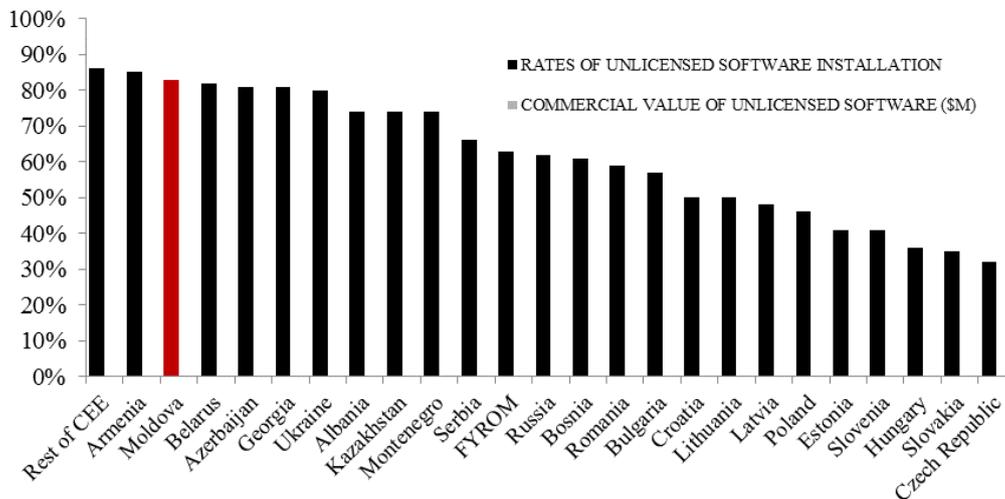


Figure 2. Rates and commercial values of unlicensed PC software installations. Central and Eastern Europe, 2017.
 Source: Authors, based on the 2018 BSA Global Software Survey [2]

3. Studies/Surveys’ Findings

Recently, the Information Society Development Institute has undertaken several studies/surveys within the research and development institutions⁴: Study on Open Access in Nov. 2015 -Feb. 2016 and the Survey conducted within the e-IDS project [14] in May 2018 were focused on identifying the needs of the Research, Development and Innovation (RDI) community in the Republic of

⁴[3] pages 98-117

Moldova regarding the management of scientific data over their lifecycle (creation, processing / analysis, storage / preservation, sharing / access and use)⁵.

The first Survey, involving 39 representatives of research institutions, concluded, that in Moldova there is no culture of research data sharing and there is no specific infrastructure for data retention and sharing. The main recommendations suggested by participants:

- it is necessary to open all data funded from public money; there is a strong need for modernization of the tools used for the data creation, communication and information exchange networks;
- it is necessary to store scientific information in a way that ensures an enhanced level of data protection;
- it is important to formulate appropriate policies regarding the safe storage of the research data; and ensure public access that will preserve data authenticity and prevent intellectual theft, etc.

The second Survey (2018) gathered responses from 48 RDI institutions (92% success rate), including 13 higher education institutions. Respondents with various positions within these institutions participated in the survey, including: heads of RDI institutions (25-12.3%), project directors (42 - 20.7%), laboratory / sector managers (65) - 32%), scientists (34 - 16.7%), teachers (23 - 11.3%), doctoral students (4 - 2%), other positions (10 - 5%).

Data obtained revealed that there are different types of research data produced and generated. Most of the respondents mentioned that they produce or generate the following types of data for research: text (86.2%), images (66%), numerical data (62.6%) and tabular data (55.7%). Only 13.8% of respondents indicated that they do not produce or generate any type of research data. Other types of data have also been mentioned, including: DICOM images, archive quotes, technical drawings, nanopowders, nanocomposites, software in the equipment, teacher's praxis, protocols, algorithms, programs, maps, etc.

Regarding the format of the data generated or collected, the survey participants indicated that they use different formats for scientific data. However, research data is mainly generated and collected in the following formats: text (93.1%), presentations (83.2%), graphics (67%), spreadsheets (46.8%), databases (43.3%) and software for statistical analysis (25.6%).

Survey participants referred to the following ways of producing and generating research data: scientific publications (72.8%), outcomes of the observations (72.3%), results of experiments (69.3%), statistical sources (52%) and survey results (33.7%). For some areas of research, data can be obtained from social media, sensory data, archive files, own calculations, demographic forecasts, bilateral and international projects, media, scientific forums, weather stations data, medical imaging, etc.

Procedures for storing and preserving research data are very important not only for the long-term archiving of research results but also for ensuring the integrity of these data. Thus, 102 (50.2%) of the respondents mentioned that they are taking measures to preserve the data, 61 (30%) of respondents said they did not take measures to preserve the data, and 40 (19.7%) of them said that „I do not know if data preservation measures are being applied in the respective research projects”.

⁵[3] pages 109-117

Among the specified methods of storing research data, the researchers indicated two large categories:

- locally, on the personal computer (96.6%) and / or on physical support, on paper (72.9%), on CD, USB stick, or external HDD (63.5%) etc.;
- on-line databases, specialized repositories in research institutions or laboratories (24.6%), the institution computer network (32%) and / or internationally, Dropbox, Google Drive (30.5%), etc.

Considering the data formats used by the researchers, as well as the needs indicated by them in the questionnaire replies, it can be noticed that the Moldovan researchers can be divided into two categories:

- 1) Researchers using relatively widespread proprietary software tools in the academic and research environment, such as: Microsoft Office, Windows, SPSS, Adobe FineReader, and others.
- 2) Researchers using special research-specific software solutions such as: ArGIS, Geoportal, Mathematica, FoxPro, Endnote, 1C, EViews, GAMESS, Gaussian09 and others.

It is important to have data management plans in place and institutional data management policies or procedures for research projects.

The majority of researchers (177 respondents) believe it is necessary to open the data obtained from research funded by public money. 57 respondents (28.2%) opted for unconditional open access; 29 respondents (14.4%) were in favor of granted open access after an embargo, and access under certain conditions was supported by 91 survey participants (45%). Only 25 researchers (12.4%) do not support the opening of data obtained from public funded research.

In conclusion, it can be mentioned that both national research project managers and R&D institutions accept the open source concept and are ready to provide access to research data. Most researchers use digital media to access research data, but prefer to use traditional data storage formats (Word, Excel, PDF, etc.). Few researchers are using modern and innovative tools to process, access, store and archive research data. One of the main issues that discourage research data sharing is the copyright protection. There are some concerns about the loss of ownership and copyright infringement in case of sharing and open access to research data.

In the Republic of Moldova, the majority of large universities are using Moodle - online learning platform (used by 10 universities) - Table 1 [3]. The Open Educational Resources Coalition initiated in 2016 by Educational Centre PRO-DIDACTICA was signed already by 16 entities (public authorities, NGO, companies, etc.).

Name	Type of tool	Description	Web page	The institution where it is applied
Drupal	Open source content management platform	Official page Application for research Application libraries	https://idsi.md/en/home	IDSi
DSpace, protocol OAI-PMH	DSpace is an OSS package used to create open access databases for scientific materials	Digital repositories for university. The catalog LibUnivCatalog	http://primo.libuniv.md/	USM, ASEM UTM, USARB UASM, UPS USMFM
Moodle	Learning Management System	Used for learning platform & plagiarism detection	https://vle.ase.md/cms/index.php/en/web-services-en/antiplag-system-en/	ASEM
Open-Stack middleware on Ubuntu Server 14.04 LTS	Basic Operational System for all nodes and one latest version and OpenStackrelease „Juno”	Federative access to Cloud Infrastructure Computing	https://slideheaven.com/scientificcomputing-infrastructure-and-servicesin-moldova.html	RENAM
GIMP	Image Editor	Similar Adobe Photoshop, can be used to create, edit and manipulate images.	https://www.gimp.org/	UTM
Government open data portal	Open Data	To 1000 sets of data from Moldova, collected from many governmental sources, can be freely accessible for use.	http://data.gov.md/	Government of Moldova

Table 1. Examples of open source software products widely used in Moldova [3]

There has been a slight decrease in software piracy in the last years (from 90 to 83%) [1], mostly due to the awareness of the risks of using the pirated software within local business environment. However, Republic of Moldova remains one of the countries where indicators of unlicensed software installation remain high and it is important to stress that still insufficient knowledge and promotion of OSS and its benefits may be one of the key reasons of the low popularity of OSS.

The ongoing State Program on e-Infrastructure for Research Data is aimed at developing a Concept as well as rules and models for data handling. It is imperative that scientific data be interoperable and easy to understand, and the use of OSS could serve as a support for achieving this goal.

4. The State Program on e-Infrastructure for Research Data: a step forward

The purpose of the State Program „Development of e-Infrastructure of Data from Research, Development and Innovation in the Republic of Moldova” [4] is to carry out fundamental and applicative scientific research, to develop new concepts and models of computer data and services that will aim at the creation at a national level of a new model of infrastructure (e-Infrastructure) of scientific data that will ensure:

- the virtual integration of fragmented and heterogeneous scientific data into a unique information research space of Republic of Moldova;
- the interoperability of research data content;
- expanding the scope of scientific data through data-based research;
- deepening scientific research based on inter-institutional and interdisciplinary data;
- making research institutions more efficient.

The ongoing project „Elaboration of conceptual and methodological framework for e-data infrastructure in the field of RDI in the Republic of Moldova” undertaken by IDSI within this State Program aims at creating a new conceptual infrastructure model, based on theoretical research and best practices from European and international experience and e-Infrastructure of scientific data. This model will ensure the interoperability of data and make data exchanges more efficient through better organization and communication of scientific information. It will also facilitate interinstitutional, interdisciplinary and national efforts for preservation, management and use of research data. The project will enhance the efficiency of the research act and ease the creation of new data based research opportunities in the concept of Open Science in Moldova.

As mentioned above, the Survey identified the necessity in training the researchers in Moldova on the use of Open Source Solutions which could be implemented in the research process as well as in the special case of research data management [3], that may be an important tool for achieving the program objectives.

5. Economics: why OSS may be the right choice?

In general, the measurement of the economical impact of the openness is a very challenging task. In the digital world, open access has an impact in three major areas: academic, economic and social.

A UK case study shows that the total expenditure on research relating to cancer in the period 1970–2009 was 15 billion GBP, while the benefit (net-monetized quality-adjusted life years) was estimated at 124 billion GBP. Only 17% of the net-monetary benefit was estimated to be attributable to research performed in the UK, and the other 83% is attributable to research from non-UK sources [7].

For open source, the top three reasons for using it are innovation, cost-savings and competitiveness. With no costs for license there are considerable savings. „The average saving is £30,146 per project” stated in Rackspace report „The State of Open Source” [14]. The report informs that no respondent said that moving to open source had ended up costing them more than using commercial software, which is good news for open source proponents.

According to „The 2018 Open Source Program Management Survey”, performed by the TODO Group, more than half (53%) of the companies surveyed said their organization has an OSS program or has plans to establish one within the next year. Additionally, 1/3 of respondents which use Open Source mentioned “Lower support costs” as one of benefits to use Open Source, and 42% of the respondents mentioned also “Lower licensing costs” as a benefit (Figure 3) [11].

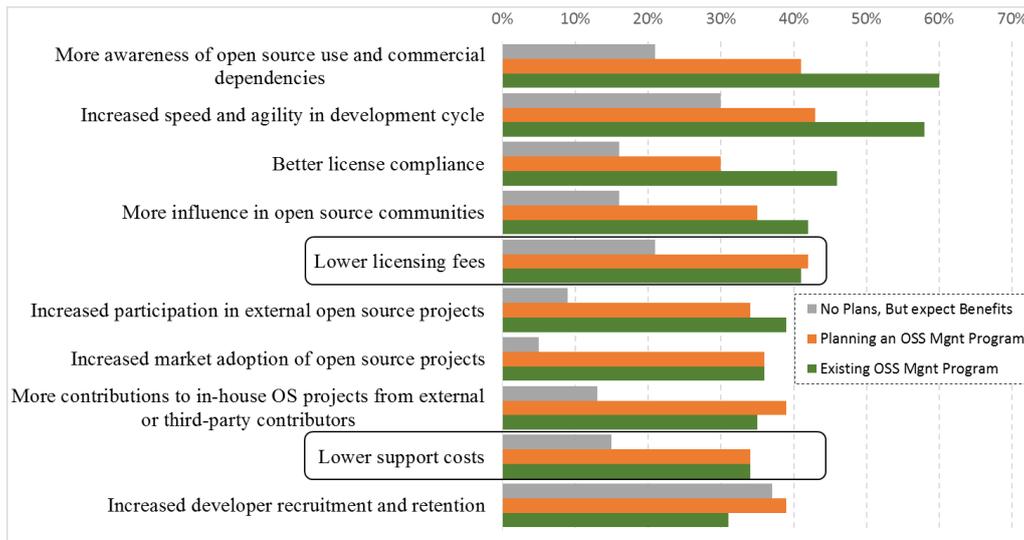


Figure 3. Benefits of Open Source Programs

Source: „The 2018 Open Source Program Management Survey” [11].

But fundamentally, OSS is not free. Usually, many people want software to be free and continuously developed by highly skilled professional developers, but only a few of them are ready to pay for it. The economics of this situation is unsustainable and broken. And the right question will be: “who pays for OSS, who motivates the volunteer’s workforce?” And we can see three huge stakeholders:

- Hobbyists – what pay with their time;
- Internet mega-companies are subsidizing OSS with their primary revenue;
- Infrastructure computing startups – financed by Venture Capitalists.

It is important to note that other than hobbyist and true altruists, the Internet companies and VCs all have ulterior motives for releasing OSS [12].

If there are in-house capabilities and technical expertise to maintain the software, and resources to implement, train and provide support to staff, then open source may be most cost-effective for the scientific organization. However, the long-term costs of implementation, innovation, providing support, and investing in infrastructure as the institution evolves, technology changes, and the needs grow involve additional costs. For Moldova, research institutions under the umbrella of the Ministry of Education, Culture and Research (19 institutions), the existing "Academica" infrastructure, can serve as starting point for the implementation of relevant OSS tools for research data. This approach could help avoid charging for extras like add-ons, integration, and additional services, which can negate any cost-saving advantages of OSS.

Nowadays, the economic impact research could be obtained by applying approaches used for the Circular Economy (production, consumption and reuse) or the platform economy as a standard in online economy.

Finally, the emerging research area for the economics of Open Source for Open Science will improve understanding of all benefits for stakeholders.

For the Republic of Moldova, when it will try to understand or to estimate the economics of openness the national aspects should be taken into consideration:

- Business does not invest in Research & Development;
- The only source for R&D and software tools implementation is public financing;
- There is a lack of resources allocated for R&D and especially for software procurement (0,37% of GDP allocated for R&D and only 0,6% of these expenditures are spent for software);

6. Conclusions and recommendations

Moldova has embarked in the process of implementation of Open Science approach: The „Declaration on Open Science in the Republic of Moldova” adopted by the first Conference on Open Science in 2018 is supporting the Open Science, Open Data, Open Source Software, etc. by the research community [10].

The State Program on „Development of e-Infrastructure of Data from Research, Development and Innovation in the Republic of Moldova” is in the process of implementation [4].

Although several policies and other documents are emphasizing the importance of the use of Open Source Software in Moldova [9], in our opinion, OSS is supported and promoted at insufficient level.

In the authors’ opinion, among the causes of high level of the unlicensed software installation and low use of OSS in the country are:

- low level of R&D funding;
- insufficient funding for software procurement;
- insufficient level of awareness on existing OSS tools for research data discovering, analysis, storing, sharing;
- high percentage of aged researchers, which are not ready to use new software tools and especially OSS;
- in the case of low-GDP countries (such as the Republic of Moldova), the use of proprietary software for the research data is may not be feasible, being too expensive reported to the amount of undertaken research. Finally, the relative costs (ROI) are very high for low-GDP countries (ex.Moldova) compared to developed countries, for example the UK - for which relative costs are lower.

Based on international experience and findings for the Republic of Moldova, related to Open Tools for Open Data and Open Science, we consider relevant the following:

- Open source shall be the preferred solution for choosing the software;
- Develop and establish policies for the management of research data in research projects and / or research institutions;
- Establish rules / procedures / customs for research data management; motivate researchers to know these rules, adopt them and address all stages of research data management;
- Create awareness and train the researchers in the Republic of Moldova on open source solutions/tools;
- Organize activities presenting and promoting solutions and best practices used in the field, as well as exchange of views and experience in the field of research data management etc.;
- Include open source subjects in the curricula.

Further, suggestions on the use of OSS at national level are:

- Enhance adoption of OSS by public and research institutions; promote initiatives to reduce the level of piracy and offer open source incentives;
- Develop the local IT industry and increase competitiveness of national companies through their intensive involvement in public research projects;
- Stimulate the legal use of computer programs (as stated in the National Intellectual Property Strategy 2020);
- Develop public information systems, preferably based on OSS platforms;
- Conduct periodical national surveys on the use and benefits of Open Source in public institutions (central and local public authorities, educational, research, health, culture, institutions, etc.).

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COLLECTIVE INTELLIGENCE FOR MORE INCLUSIVE COMMUNITIES

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Abstract

Urban development strategies are more and more centred on citizens' needs and requirements. In this regard, collective intelligence can be understood as a fundamental element in enhancing the creation and development of more inclusive communities. This paper aims to present various ways in which collective intelligence can contribute to develop smart urban areas, formed by strong inclusive communities, giving as example different cities that have implemented this concept. The methodology used to carry out this research is both bibliographic – opting here to study the work of specialists in the field, authors from Romania and abroad, and empirical – formed by a case study on various smart cities around the world that use the concept mentioned. This type of intelligence is starting to be a very important issue in smart cities' evolution, improving the relationship between government and citizens. Even though technology is a significant element, citizens and public institutions' capability and will to collaborate for finding and implementing the best solutions for communities' problems should also be considered.

1. Introduction

The World Bank reported that over 50% of the world's population lives today in cities and, by 2045, this percentage will manifest a growth, with a total number of 6 billion people living in urban areas. Moreover, by 2050, the planet Earth will have urban residents representing 68% of the world's population [34].

With this in mind, we need to understand that rigorous policy coordination and investment choices are two important elements in the process of creating or developing cities that have a safe, inclusive, resilient and sustainable nature. In this context, governments from local and national level play an important role in shaping the future of the cities' development and creating opportunities for their residents [34].

Urbanization has become a keyword for today's development changes, therefore an efficient urban growth management is necessary for having a sustainable development, being linked with its economic, environmental and social dimensions [38].

It should be mentioned that urban development is the integration into cities, towns or small neighbourhoods of various planning activities carried out by different categories of individuals, such as: project managers, architects, civil and design engineers, evaluators and environmental planners. Urban development is thus a system of residential enlargement that creates cities, taking place in unpopulated areas or areas that need to be renovated [3].

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Specialists consider that there are some key approaches in addressing urban challenges, namely [1]:

- *Stakeholder partnerships* – for information exchanging, building capacities, increasing the level of resources and revenues, cities form partnerships with the private sector, organizations or even other cities;
- *Formulation of city development strategies* – based on SWOT analyses and long-term visions, cities formulate development strategies;
- *Inter-local cooperation* – in this context, rural and urban areas connections are becoming more valued than the rise of city-regions or multi-modal metropolitan areas;
- *Cities as ecosystems* – nowadays cities are being viewed as living ecosystems in which there is a need to have an equilibrium state between issues of economic, social and environmental nature;
- *City leaders as economic managers* – first, city leaders used to have only a political orientation, but now they adopt entrepreneurial and economic management methods.

At the European level, important progress is made through the Urban Development Network, which is formed by more than 500 cities or urban areas, these being accountable for putting into practice various integrated actions and solutions centred on strategies of sustainable urban development [7]. In the period of time between 2014 and 2020, these actions are being funded by the European Regional Development Fund (ERDF) [26].

We can see that many cities around the globe have started developing or implementing smart cities projects [40] and most of these projects are oriented on developing the technological aspect of the cities. “The focus on the technology [makes] cities ‘smart’, rather than the people, neglects the importance of citizen participation in urban policy-making, and de-prioritizes what local residents really want and need” [19]. However, “we are not saying that technology should not be a part of the smart city, but rather that ‘smart’ cities should not be defined by technology alone. Instead, the ‘smart’ city concept should address innovation from a more holistic perspective, promoting smart, participatory approaches to challenging urban problems that use technology, among other things, as an enabler of change, rather than as the change itself” [9].

By this, we can understand that cities need to be a nest for more inclusive communities, thus smart cities initiatives have to be indeed focused on people, but not only – they also have to be co-created by every actor of the community [10].

In order for a city to be a successful inclusive one, some objectives must be achieved [15]:

- *The importance of leadership and vision* – this aspect should not be neglected and it refers to the fact that leadership should focus on making urban areas and services more inclusive, accessible, user and environmentally-friendly;
- *Know the facts* – quantitative and qualitative data is needed in cities and also the creation of smart city strategies for solving social problems;

- *Be adapted and adaptable* – smart city planning and initiatives should be adjusted to the individuals' specific needs and requirements and also be adaptable;
- *Increase citizen participation* – for ensuring inclusivity, this aspect is fundamental and it can be understood through the active participation of all stakeholders in a community;
- *Tackle digital exclusion* – when creating a smart city strategy, governments should make sure that every person is involved in the process of changing into a digital city; in this case, introducing a public ICT education and assistance would be helpful, with the help of libraries, community centres and NGOs and other trusted public institutions;
- *Prioritize people* – inclusive and smart are not the same thing in a city, therefore actors involved in the community should make efforts to create new smart city apps which can ensure inclusive development and to adapt the old ones to change.

2. Collective intelligence as a factor for more inclusive communities

In today's cities, a new culture is evolving, a culture in which citizens and communities are starting to collaborate with institutions and organizations that before were using systems of polarization, but now are focused on inclusion. This integration approach gives individuals a sense of belonging and connectedness, thus people with different visions and perspectives feel empowered to contribute to a greater purpose [28], one that makes their city become smarter, more inclusive and sustainable.

In this regard, collective intelligence is seen as “a new ROI (Return on Investment) for inclusion” [28]. In his book *Big mind – How collective intelligence can change our world*, Geoff Mulgan states that “collective intelligence is as old as civilization” [17]. Other authors state the same, giving as examples different groups of individuals (such as: families, business teams, armies) that have always showed fluctuating degrees of collective intelligence. They also say that this concept can be visible even in groups of animals (for example, flocks of birds can gather information from individual group members in order to find food and nesting places) [5].

Collective intelligence can be understood as the ability of various groups to make good decisions, by joining human and machine skills [17]. Moreover, the social, technological and cognitive requirements for having a case of collective intelligence are the following [2]:

- *cognitive predisposition* → allows humans to form shared intentions;
- *presence of cultural artefacts* → allows time and space co-ordination;
- *interaction with digital tools* → incorporates practices of social nature;
- *existence of governance systems* → supports the free transformation of knowledge.

Successful smart cities solutions need to use a citizen-centric approach which takes into consideration their needs and requirements. Thus, collective intelligence can be considered as a key factor for successful smart cities [8] as it contributes to enhancing the creation and development of more inclusive communities.

3. Study case: cities that have implemented the collective intelligence concept

There are many initiatives for using digital platforms in order to mobilise large groups of individuals and use their knowledge for finding solutions to challenges in all areas of society [18].

In this regard, NESTA has created, in 2018, a Centre for Collective Intelligence Design, which aims to discover how intelligence, of both human and machine nature, can be joined in order to benefit collective knowledge and help generate and develop innovative solutions that are efficient for meeting today's social challenges [18].

The centre is based both on the existing work of the global innovation foundation NESTA and on different researcher centres and specialists' visions, such as: The MIT Center for Collective Intelligence [32], The MIT Quest for Intelligence [33], The Alan Turing Institute [31], The Collective Intelligence Unit at Copenhagen Business School [4] and many others. The centre also collaborates with university researchers, government policymakers, start-ups, service leaders and large firms [18].

In her book *The Death and Life of Great American Cities*, the great urban theorist Jane Jacobs stated that "cities have the capability of providing something for everybody, only because, and only when, they are created by everybody" [12]. With this quote in mind, we will further present some successful examples of cities in which the concept of collective intelligence has started to be implemented.

As a first example of collective intelligence achieved through crowdsourced contributions, we can mention the project *Zooniverse*, with headquarters in Oxford, UK and Chicago, USA, it being the world's largest and most popular platform for research powered by people, volunteers all around the world that assist professional researchers, this research resulting in new discoveries made accessible in various publications [43] and datasets that are useful to the research community [41]. Until today, it gathered 1,724,040 registered volunteers and more than 1000 classifications per day, arriving at a total of 398,671,597 classifications so far. It all started in July 2007, with *Galaxy Zoo* which is now the world's best-known online citizen science project, Zooniverse being its hosting project.

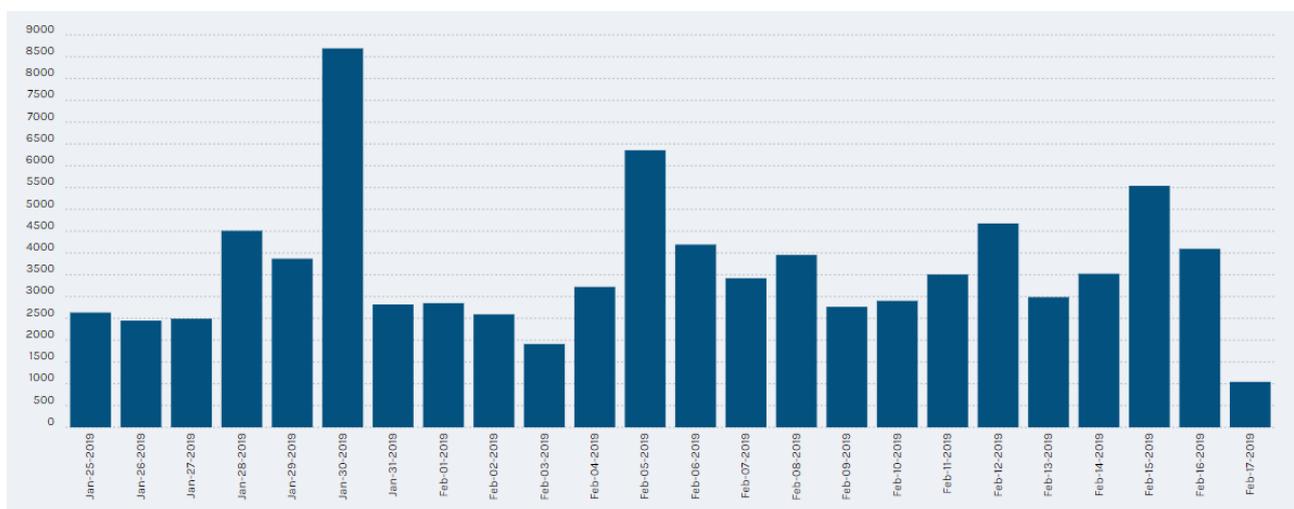


Figure 1. Classification stats (January 25, 2019 – February 17, 2019)

Source: [42]

As we can see in the figure above, the project has gathered much data from volunteers, making, for instance, 2632 classifications on January 25, 2019, fluctuating over the months until February 17, 2019, when it gathered 1042 classifications, the most classifications being gathered on January 30, 2019, precisely 8691.

Another successful example is given by the city of Lisbon, Portugal, through the online platform *Patient Innovation*, a place where caregivers and patients worldwide can connect and thus share know-how, search for already existing solutions from individuals with similar challenges and implicitly create solutions developed by themselves or through collaborations, ideas that can meet problems related to the health sector. The platform was founded in 2014, it gathered over 800 solutions coming from more than 50 countries [25].

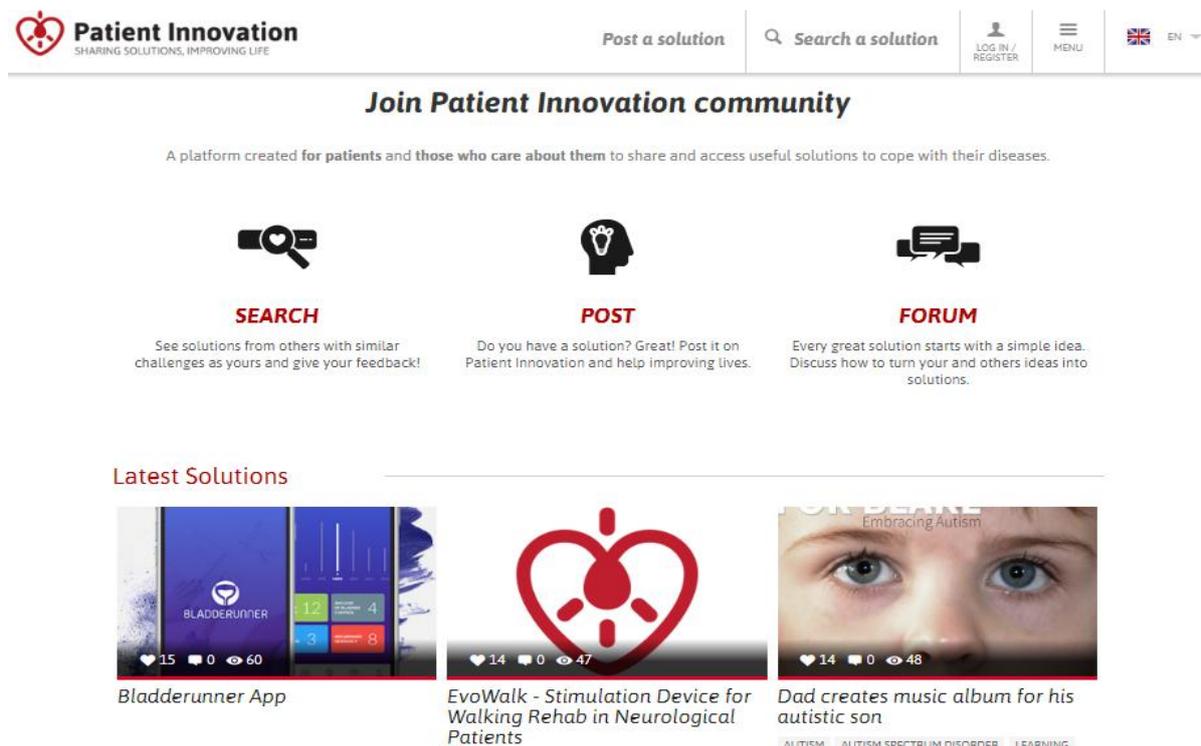


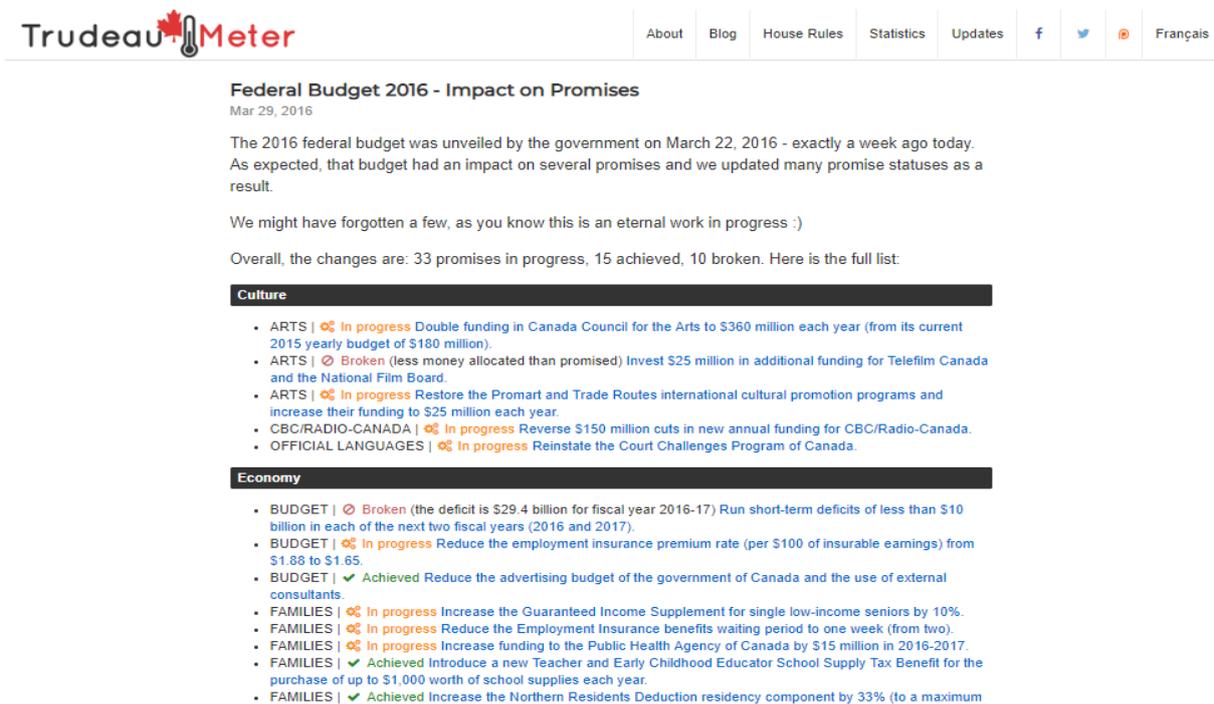
Figure 2. Patient Innovation platform

Source: [24]

About this project, Sir Richard Roberts, chief scientist at New England Biolabs, Nobel laureate in physiology or medicine in 1993 and Patient Innovation advisory board member, said it is „an outstanding social media use that should help many disadvantaged people”, a project that won, among other important prizes, the title „Non-Profit Start-up of The Year 2016“ in London, at an event promoted by the HealthCare Society in London, where over 1000 start-ups were taken into account and 50 were on the finalists‘ list [23].

For facilitating the process of collaborative decision-making, we can mention *Loomio*, an open source software, created in 2011 in Aotearoa, New Zealand, having the purpose of demolishing the obstacles that arise in the decision-making participation process at every level: in neighbourhoods, community organisations, businesses, social movements, local and national governance [13]. This social enterprise is part of the *Enspiral Network*, a collective system of people and groups, working together across the world in order to achieve their purposes. It too is based in New Zealand, but in the city of Auckland, being founded in 2010 [6].

In October 2015, in Canada was created the open platform *TrudeauMeter*, which allows citizens to track if their national politicians deliver what they promised or not, based on evidence, such as: news articles, official government documents and so on. Being user-friendly, simple, collaborative and impartial, it empowers the idea of what living in a democratic society means, transparency being an important issue in this context [36].



TrudeauMeter

About | Blog | House Rules | Statistics | Updates | f | | | Français

Federal Budget 2016 - Impact on Promises

Mar 29, 2016

The 2016 federal budget was unveiled by the government on March 22, 2016 - exactly a week ago today. As expected, that budget had an impact on several promises and we updated many promise statuses as a result.

We might have forgotten a few, as you know this is an eternal work in progress :)

Overall, the changes are: 33 promises in progress, 15 achieved, 10 broken. Here is the full list:

Culture

- ARTS | 🔄 **In progress** Double funding in Canada Council for the Arts to \$360 million each year (from its current 2015 yearly budget of \$180 million).
- ARTS | 🚫 **Broken** (less money allocated than promised) Invest \$25 million in additional funding for Telefilm Canada and the National Film Board.
- ARTS | 🔄 **In progress** Restore the Promart and Trade Routes international cultural promotion programs and increase their funding to \$25 million each year.
- CBC/RADIO-CANADA | 🔄 **In progress** Reverse \$150 million cuts in new annual funding for CBC/Radio-Canada.
- OFFICIAL LANGUAGES | 🔄 **In progress** Reinstate the Court Challenges Program of Canada.

Economy

- BUDGET | 🚫 **Broken** (the deficit is \$29.4 billion for fiscal year 2016-17) Run short-term deficits of less than \$10 billion in each of the next two fiscal years (2016 and 2017).
- BUDGET | 🔄 **In progress** Reduce the employment insurance premium rate (per \$100 of insurable earnings) from \$1.88 to \$1.65.
- BUDGET | ✅ **Achieved** Reduce the advertising budget of the government of Canada and the use of external consultants.
- FAMILIES | 🔄 **In progress** Increase the Guaranteed Income Supplement for single low-income seniors by 10%.
- FAMILIES | 🔄 **In progress** Reduce the Employment Insurance benefits waiting period to one week (from two).
- FAMILIES | 🔄 **In progress** Increase funding to the Public Health Agency of Canada by \$15 million in 2016-2017.
- FAMILIES | ✅ **Achieved** Introduce a new Teacher and Early Childhood Educator School Supply Tax Benefit for the purchase of up to \$1,000 worth of school supplies each year.
- FAMILIES | ✅ **Achieved** Increase the Northern Residents Deduction residency component by 33% (to a maximum

Figure 3. TurdeauMeter news example

Source: [37]

As we can see in the figure 3, a news example provided by the platform is regarding the federal budget for 2016, it offering its users the exact number of politicians' promises in progress (33), achieved ones (15) and the ones that were not accomplished (10), these promises regarding issues of culture, economy, environment, government, indigenous peoples and security.

In Santander, Spain, there is a project called *SmartSantander*, created in 2009, which involves using a number of 20,000 sensors that can measure noise, temperature, traffic flow, pollution etc. Its purpose is to transform the city into a smart one by making use of new technologies in order to improve the public services' delivery and enhance citizens' participation [39].

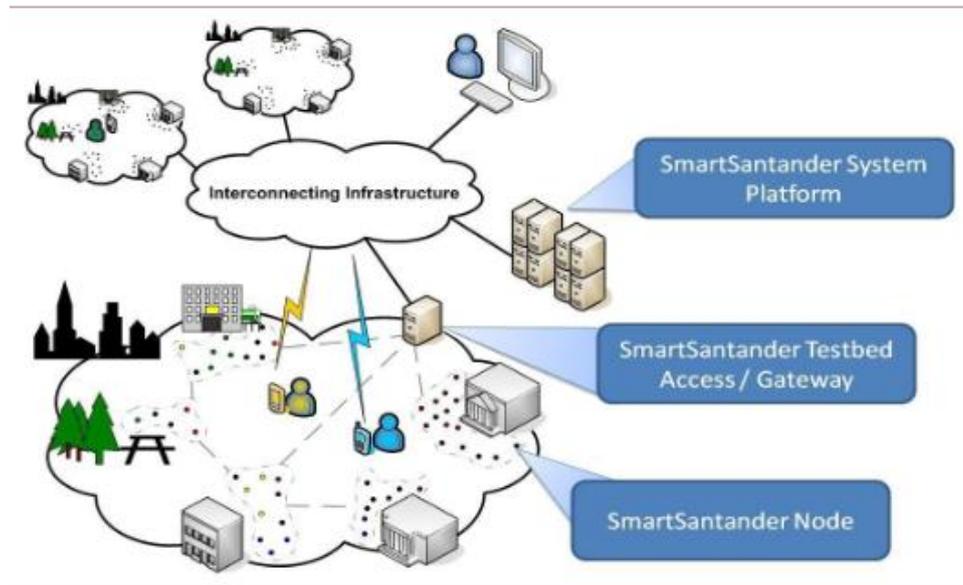


Figure 4. SmartSantander infrastructure

Source: [29]

As we can see from the figure above, we are talking about an experimental facility, through which the project addresses the main requirements of a real-world IoT platform, by identifying, planning and implementing various building blocks necessary in this context. The experimental facility has thus an architecture that depends on the existing components and also on the building blocks to be created. The platform's key functions are the following: a) to validate approaches to the IoT architectural model; b) to evaluate the main building blocks of the IoT architecture, interaction, management protocols, mechanisms, device technologies and main support services (discovery, identity management, security); c) to evaluate social acceptance of IoT technologies and services [29].

An app was also created, *SmartSantanderRA* [30], which turns users' smartphones into sensors, thus citizens becoming both testers and extensions of the project's capacities [29]. Moreover, we can say that the "seamless city" is now focused on citizens, this meaning that it will use not only technological sensors, but also human sensors and living sensors of their environment [16].

When it comes to the case of Finland, we can mention the *Open Citizen Science project*, which took place between August 2016 and January 2017, being created by the non-profit association Open Knowledge Finland (OKFI) [21], founded in 2012, which gathered more than 500 members from all areas of interest, including organizations, citizens and various companies. The project was commissioned by the Finnish Ministry of Education and Culture, through its initiative of open science and research [22] and it focused on researching two main topics: citizen science and open science, creating discussion opportunities regarding these topics and how, by being connected, they can be fostered and promoted in Finland, thus providing recommendations for national level policy action. The Open Citizen Science project had the target of involving citizens in scientific research, this implicitly meaning that they will gain knowledge and understanding of concepts that are important to them and that can help them get involved in the decision making process and in finding solutions to their problems or requirements [20].

Another successful example created by Open Knowledge Finland is *ResponsiveOrg Finland*, a community that aims to act as the central hub for responsive thinkers and practitioners, creating an

open network through which individuals can explore and support various practices for capacity building and impact creation. The role of the non-profit association is thus to share information, organize meetings and provide different services, activities that can make change possible [27].

Therefore, even if we talk about projects that are aiming citizen collaboration and contribution to the health issue, the decision-making process, transparent politicians' actions, various environmental polluters or just their involvement in research activities, such successful examples demonstrate that all actors which are a part of an urban community must be included in the process of thinking, collecting ideas, generating solutions and making decisions. This means that all people must be included in the creation or development model of a smart city, collective intelligence being a significant element in this context.

4. Conclusions

As the managing partner of Bee Smart City, Bart Gorynski, said, "we need to leverage collective intelligence across the many different layers and subgroups of society, encouraging us all to become participative 'bees' in the 'hive' that is the modern city. Only through multi-stakeholder approaches, focused on the needs of the people, will we implement really effective 'smart' initiatives that change our cities for the better" [11]. Thus, we can understand that collective intelligence is starting to be a very important aspect in the development of smart cities, redefining and improving the government-citizens relationship.

By taking into consideration the successful examples of collective intelligence use from all over the world, urban areas can be formed by smarter communities, using new technologies that will help them create social innovations, sustain development and be more inclusive.

Social networks' tools are supporting citizens to have a creative and innovative way of thinking. By taking into consideration the technological approach, it can be understood that activities of collective intelligence contribute to shaping societies and cultural aspects, being useful for creating smarter, stronger communities [14]. Moreover, cases of collective intelligence use highlight the fact that sharing information, communication, collaboration, problem-solving approaches adopted by citizens and all actors of a community lead to a greater involvement of them.

However, even though technology is a significant element, citizens and public institutions' capability and will to collaborate for finding and implementing the best solutions for communities' problems should also be considered. The interaction between individuals should still exist, thus there must be found an equilibrium between using both traditional methods and digital technologies to perform various activities [35].

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PUBLIC INSTITUTIONS IN THE SOCIAL MEDIA ARENA: SEARCHING FOR CITIZENS' ATTENTION. ZOOM ON ROMANIA'S PARTICULARITIES

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Abstract

Social media is taking up increasingly more space in the government's media toolbox. In Romania, both local and central public organizations are getting savvier in communicating through these channels, intuitively thought of as the playground of teens and startups. By analyzing the social media pages of some of the more active (on social media) Romanian public institutions, and by interviewing the people in charge with their online communication, we tried to find the amount of importance these new forms of communication are given by the public sector - usually seen as more cumbersome and slower to adapt to changing media landscapes. One other goal was to find out how formalized the role of 'online media communicator' is in the Romanian public administration.

Keywords: social media, local sector, Romania

1. Introduction

State institutions communicate a lot. They make use of a great number of communication channels, from traditional media (newspapers, magazines, radio, and television stations), billboards and posters, to emergency messaging systems. It comes as no surprise that the new communication channels offered by the internet were quickly colonized by government agencies, universities, and local public institutions. This was not so hard at first because the type of communication (one-to-many) was something public institutions were accustomed to. Websites were, in their first iterations, little more than online notice boards.

This changed with the advent of online services, e-government, and web 2.0. The interactions between public institutions, citizens, and companies became increasingly complex, and this complexity was no longer properly served by the mostly unidirectional communication channels available. One possible solution for this communication asymmetry can be given by social media tools.

In Romania, more and more public organizations use social media tools (for example, all 40 city halls in county seats have an official or semi-official Facebook page), for a number of purposes. Two-way communication between public officials and citizens is still fairly limited, but pressure to adopt more dialogue is mounting. Aside from this, the Facebook pages are sometimes used to communicate with other public institutions, somewhat akin to the twitter arguments happening in the United States this last few years.

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Mergel and Breitschneider have proposed a three-stage model for the adoption of social media tools for communication in the public sector [10]. The first one is experimentation, often outside official communication procedures, with the initiatives usually coming from individuals working inside the organization, interested and knowledgeable in these technologies. As this communication channel becomes more and more often employed, institutions enter the second stage, in which they feel the need for some rules and procedures, and officially support the communication happening on social media. The third stage usually comes with separate departments responsible with this type of communication, clear rules and procedures (for example, the types of subjects suitable for social media), clear accountability rules, and integration of social media in the day-to-day media mix. In other words, social media channels end being a novelty.

In order for organizations to benefit from social media communication, organizations must invest resources in the following: time, personnel, and money. It also helps if there is a clear vision of what social media could bring to the organization that the other communication channels are unable to offer.

The public sector consists of a wide array of institutions, which fulfill different purposes and have different objectives in their media communications. We selected three public organizations, specifically a city hall, a county council, and a university, to see how much their social media strategy, resource allocation, and results differ. In Romania, social media is almost synonymous with Facebook, especially in the public sector. Very few institutions use other social networks (Twitter, Instagram, LinkedIn), so the vast majority of this type of communication happens on Mark Zuckerberg's platform.

2. Literature review

The study of the use of social networks by public institutions is no longer a niche field of study. There is increased recognition among researchers that, despite the evident pitfalls (lack of control over the development and management of the platforms, limited access to users' data, little control over information distortions), public organizations have to use the social media platforms popular among citizens (they may differ from country to country). There were attempts to establish social networks controlled by the government (for example the consultations for a new constitution in Iceland) (Landemore, 2015), and private networks of public servants can exist and thrive, but for communicating with citizens commercial social networks proved much more successful for a number of reasons: it's what the citizens already use; not being there does not mean that the conversation – for example about the quality of public services – is not happening, but that institutions have no way of influencing it; an increasing number of people take their news from social networks, as opposed to traditional media, etc.

Like almost any new technology introduced in public institutions, expectations for beneficial effects were inflated, and actual results are more nuanced and less susceptible to generalizations. Reviewing the literature, Picazo-Vela et al. found a gap between expectations (increased participation, increased openness) and the reality of using social media channels to push information towards citizens [12]. Eom et al found that there is a gap of unfulfilled expectations between what the theory says social media effects should be (more openness, increased participation, and enhanced accountability) and what the empirical studies show it is happening [3]. This can be attributed to a period of adaptation of public officials with the new tools at their disposal.

Mergel contends that social media drives organizational changes before reaping benefits. Interviews with public servants show that these changes lead to routinization and then to the institutionalization of the new technologies [9]. These different results are also the consequence of understanding the purpose of social media in the public sector. A study in South Korea finds that people's perception of their satisfaction differs if they use e-government services as opposed to social media. They are more satisfied when using social media, probably because citizens expect different things from these offerings (online services as opposed to information services) [13].

From our experience, in Romania, government agencies start using social media pages thinking about their potential in fostering dialogue with citizens and not expecting fast results. This is in line with research findings in other countries [11]. For example, social media use in local governments boomed between 2011 and 2013 in the US. Their overall strategy was one of "build it and they will come" type, with the expectation that positive effects will appear in due time.

An increasing body of research shows that this seems to be the case, albeit more slowly than the cheerleaders of social media adoption in the public sector would like. Researchers found out that high level of social media use is correlated with increased transparency and decreased corruption perception [6], [5]. Local governments in the EU use social media to increase transparency, although the effects are only slowly emerging [2] and can help fostering a culture of openness and transparency [1]. The findings of Maria del Mar Gálvez-Rodríguez et al suggest that starting a dialogue with citizens via social media has positive influences on citizens' online engagement, a useful strategy for increasing democratic participation [4].

Social media communicators from public institutions are also stymied by the double headwinds of rules and regulations, which have not kept up with the rapid technological and societal developments, and the steep learning curve and constant adaptations necessary for using the social media accounts at their full potential. Fostering two-way communication is hampered by the propensity of public institutions to redistribute (when they do that at all) of messages from established sources (mainly traditional media). This is understandable, but it is another obstacle in leveraging all the potential of social media [16]. There is also a general lack of measurement practices for social media interaction. Many agencies are reluctant or unable to measure their online interactions [8]

The role of social media is different from the digitalization of public services that e-government initiatives are tasked to. The inclusion of these new tools in the quiver of public institutions has more to do with opening new channels of communication than with delivering services to citizens and companies; for now, at least. It is a simple reaction of public institutions to fundamental shifts in the way that citizens access information, and to the modification of the news diet of young people. More than 67% of Romanians use social media as a source of news, and the number is growing, even as television stations' role in the news ecosystem is decreasing (in 2017 it was at 82% and falling) [14].

3. Research

In trying to better understand the way in which Romanian public institutions use their social media accounts, we selected three different organizations; Cluj-Napoca City Hall, Cluj County Council, and "Babeş-Bolyai" University. In Romania, social media in public institutions equates with Facebook pages for now. There are almost 10 million Romanians who use Facebook at least once a month and almost 8 million do so on a daily basis. Of the other social networks, only YouTube

comes close, with 7 million daily users, but adoption is low among public organizations (one of the reasons could be that producing good quality videos is much harder than taking a picture or writing a line of text). Twitter is not used in Romania (there are around 20 thousand active users), while Instagram is popular chiefly among high schoolers at the moment, and much less among the usual target groups of public institutions.

The research consists of two parts. In the first we conducted a quantitative type of research of the messages posted by the three organizations on their Facebook official pages. Data was collected using FacePager, and analyzed with Microsoft Excel and Tableau. We analyzed messages posted between January 1st, 2018, and December 31st, 2018. The second part of our research was a qualitative one. We interviewed the social-media managers of the three institutions using the elite interviewing technique detailed by D. Richards [15]. It was a semi-structured interview, followed by a number of phone calls to clarify some of the responses.

4. Findings

During our research, we added to the quantitative research the Facebook page of Emil Boc, the mayor of Cluj-Napoca. He is a well-known political figure in Romania (mayor of the second largest city in Romania 3 times, former prime-minister of Romania) and his Facebook page was used until recently as the official page of the Cluj-Napoca City Hall. The reasons why a number of Romanian mayors of big cities use their Facebook fan pages in lieu of institutional pages are manifold: the position of mayor is highly visible, and, many times, the whole local administration is personified in the minds of citizens by the mayor; the Facebook pages were usually created during the electoral campaign (Romanian mayors are elected) and they are loath to abandon them and move their communication to an institutional page with a much lower number of followers; or the Facebook pages of the city halls were non-existent and had to be created and nurtured. This personalization of local institutions is not specific only to Romania: the mayor is seen as a bridge between different clusters of citizens and public officials in other countries, also (Eom, Hwang și Kim 2018). In terms of followers or fans, the page of Emil Boc is much more followed than all the other pages surveyed:

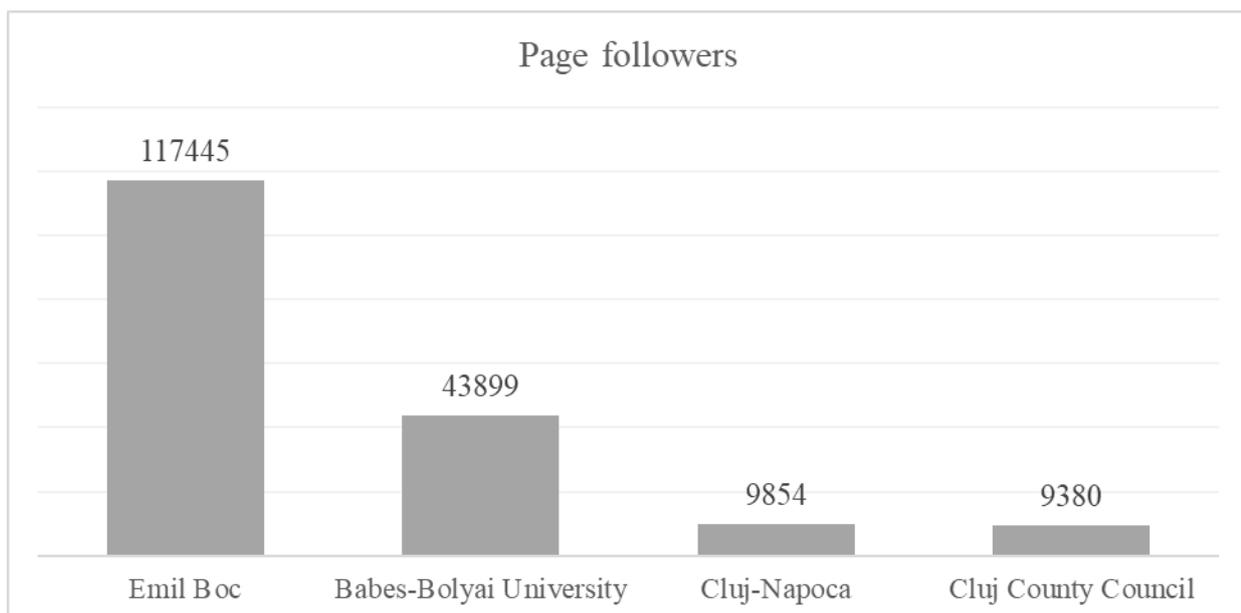


Chart 1. The number of followers in January 2019.

The following chart shows the types of messages posted by all the pages in 2018.

Page	Total posts	Video	Photo	Status	Links
Cluj County Council	732	8	722	0	2
Emil Boc	381	120	256	4	1
Babeş-Bolyai University	245	10	177	43	15
Cluj-Napoca	236	48	173	2	13

Table 1. Types of messages posted in 2018.

To measure the success of the Facebook pages, we used two composite numbers. The first metric by which most researchers judge the success of Facebook communication is the engagement rate. This consists of the total number of interactions (likes, comments and shares) per number of followers or fans. A score of 1 is generally considered a good result, while one over 0.5 gets a passing grade [7]. The following chart shows the engagement rate of the four Facebook pages examined.

Page	Total posts	Engagement rate
Cluj County Council	732	0.25%
Emil Boc	381	1.24%
Babes-Bolyai University	245	0.22%
Cluj-Napoca	236	1.44%

Table 2. Total number of posts and engagement rate.

As we can see, the pages managed by the city hall have good scores, but those of the County Council and the university are not faring quite so well. In the case of the County Council, the reason could be that the services they offer are not aimed so clearly at the citizens (most people will never deal with the County Council directly), and so, even if they post a lot (twice a day on average) the engagement is lower. For the University, the reasons could be an inflation of institutional pages (a student should follow and interact with the University's page, her own College's page and the Department's page – engagement is likely to be higher with the Facebook page that is closer to the student).

The engagement rate, however useful, is a pretty rough instrument, especially because we have neither access to data related to the reach of the messages posted on the pages, nor any reliable information about the underpinnings of the Facebook algorithms that decide the reach of those messages and the relative importance of, for example, the type of message (status update, text, photo, video, or event). We know, for example, that a video is more extensively circulated, but we don't have any hard numbers. As such, researchers have tried to construct other metrics for scrutinizing the success of a Facebook page. One of them was created by the social media analytics company Unmetric. It is called an Engagement score, and it aims to evaluate more accurately the overall success of a Facebook page. Their formula is:

engagement score

$$= \frac{(\text{number of likes} + 5 \times \text{number of comments} + 10 \times \text{number of shares}) \times 10000}{(\text{number of followers or fans})^{0.8}}$$

Their rationale for the modifiers for comments and shares is that these interactions are much more valuable than passive likes, because they start a conversation. The power of 0.8 to the number of fans comes from the company's experience in dealing with a social media analytics and accounts for the fact that the greater the number of fans a page has, the smaller percentage of them will that receive its messages. This modifier is created, in effect, so as not to penalize successful Facebook pages for being successful. In order for the results to be comparable, the score is than normalized (so all results are distributed between 0 and 1000).

The following charts show the overall Engagement score for 2018:

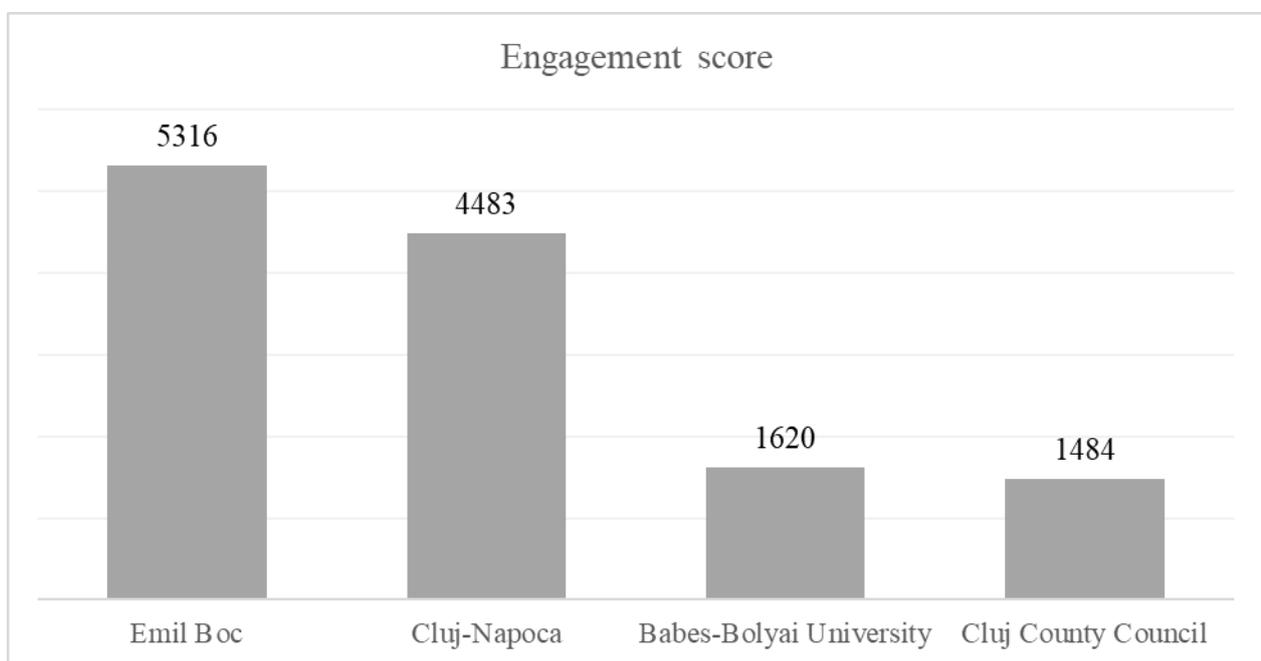


Chart 2. Engagement score for 2018.

For all pages, the engagement was much higher for videos posted than for any other type of message (photo, link, status update). As opposed to our research studies in previous years, we noticed that posts containing photos are little different in terms of engagement than text-based messages (status updates, for example). Increasingly, followers think that having a photo in your posting is normal; video is now novelty and more share-worthy.

After we looked at some hard numbers, we aimed to find the reasons behind those numbers: the decisions taken by social media managers in this organizations.

5. Cluj-Napoca City Hall institutional account

Cluj-Napoca is the second largest city in Romania, after Bucharest. Its population is growing and counts, at present (2018), probably in excess of 400,000 people. As home to one of the largest ITC centers in Central and Eastern Europe, Cluj-Napoca local public organizations, and especially the

city hall, is expected to be a trailblazer in Romania in using all technological tools, social media included.

Diana Apan is responsible for the Cluj-Napoca institutional Facebook page, as well as the Emil Boc's fan page. She leads the marketing Strategies Department inside the City Hall, which was created in 2016. It is a 7 people team; they collaborate with the people in the photo/video team of the City Hall, but they take care of a lot more than just the social media pages of the institution.

Facebook is the main social media channel, supplemented by YouTube and Instagram. Twitter was used and abandoned because of disappointing results; the same with Forsquare; Snapchat was considered and has been rejected at this time. The main page is the one of the City Hall (PrimariaClujNapocaRomania), the content posted online is created in-house, and they chose not to share content from other pages (but they do have cross-posting between the pages administered by them).

They calibrate their social media communication to the public likelier to be reached through social networks. They are now trying to make the institutional page more visible and transfer trust from Emil Boc's fan page (117,000 followers) to the City Hall page (10,000 followers) and are now in a phase in which reach is more important for them than engagement. This is part of a bigger strategy that aims to segment the City Hall communication in different channels that serve different purposes. For example, they did not insist on the institutional page until the MyCluj app was up and running. This app allows citizens to report problems or offer suggestions (which were previously handled by third-party platforms or social media pages) and integrate them with the internal document management system of the institutions, so complaints directly reach the public servants in charge of solving them.

Diana Apan told me that her department routinely conducts testing and pilot programs on social media pages (communication tone and voice, for example). As a direct result of messages on social media (in the past) and now on MyCluj, changes inside the institution did and do happen, but more in an ad-hoc manner and not driven by any internal procedures. In dealing with the avalanche of messages on the Facebook pages, they try to send complaints and the like to the MyCluj application and not answer them on the Facebook page. They try to remove inappropriate comments and report them to Facebook (hate speech, slurs, unfitting language), but it is a low priority task. They also try to eliminate copycats (there are a number of pages that pose as City Hall pages).

They have a lot more to do in formalizing procedures (access, page management, legal requirements, data protection, crisis management, and security). They say they do not have taboo subjects, but on sensitive matters they take advice from the Mass-Media and Juridical bureaus. An objective for 2019 is a more structured monitoring strategy (campaign results, the success of different types of messages, mentions of the institution on other pages).

6. Cluj County Council Page

Romania is divided into 41 counties. They represent the country's NUTS-3 (Nomenclature of Territorial Units for Statistics – Level 3) statistical subdivisions within the European Union, and each of them serves as the local level of government within its borders. Each county has a county seat, which is the largest city inside the county. Cluj-Napoca is the county seat of Cluj County, for example. In Romania, most administrative services are offered by city halls and not by county councils, so the interaction of ordinary citizens with the latter is fairly limited.

Alin Iuga is the head of the Communication Bureau team of 7 people that is in charge, among many other things (organizing events, handling all media communication, international relations, FOIA requests, and relations with civil society), with the social media pages of the Cluj County Council.

The Facebook page started as an experiment of the communications team and they enjoy autonomy in the day-to-day running of it. They are aware that messages should be adapted for social media, but do not usually have the resources to do it. The best things about Facebook, in their opinion, are that it is a complete communication channel (text, photo, and video), and that citizens are used to using it. The Twitter account proved to be a drain of resources for little gain, so it was abandoned.

The County Council's communication on Facebook is reactive or a "spur-of-the-moment" type of initiative. There is a lack of planning and monitoring of results, mainly because of lack of time. They too emphasize *reach* as opposed to *engagement*, also because the type of messages are more suited to this (more information than dialogue). Taboo subjects do exist: they steer away from political messages or entering into heated debates. They do not share posts from other pages, not even other local institutions.

There is a lack of procedures for crisis management or page management; no one realized until now that there was such a need. Some of the complaints posted on the Facebook page are transformed into official complaints and they enter the administrative workflow, but, also because of a lack of resources, there is no formal procedure for this. Exchanging good practices with other public institutions is considered important, and every opportunity for this (for example, courses to which public servants from other organizations participate, even if they are not experts on this particular topic) is used. They did not have problems with copycat pages until recently, but they are beginning to be pestered by them and they will probably report them to Facebook.

7. Babeş-Bolyai University Page

Babeş-Bolyai University (BBU) is the largest university in Romania, with almost 45,000 students at all levels (BA, MA, Ph.D, life-long learning). Social media plays an increasingly important role in young people's media diet, so any educational institution that wants to remain relevant should make use of the platforms colonized by students.

Laura Irimieş is the University's spokeswoman and she is in charge of the social media pages of the institution. The Facebook page is also the most important page on social networks, but it is supplemented by a YouTube, Twitter, and Instagram accounts.

The most important thing in social media communication for the University is community building. Traditional mass-media does not offer the same level of control over the recipients of the messages conveyed. It is essential to become more informal (although, since the University is such a complex organization, the level at which this necessary change of tone is understood varies widely). The focus has recently been changed from building the community (reach) to increasing engagement.

Another aspect that is appreciated is the way in which calls to action can be easily transmitted through the social media pages and the increased interaction tools built-in into these pages (such interactions are much harder to achieve through a website, for example).

On social media, different tools are used for different purposes: Facebook is used in talking to students, Twitter is more successful in the conversation with alumni, while Instagram is used for

reaching high schoolers, and prospective candidates. The looming danger, on all these platforms, is the high potential that discussions stray from the subject pretty quickly. The strategy for the future development of all social media pages plans for a more lively and multimedia activity on Facebook and the testing of Snapchat). The sharing policy is limited mainly to posts from other pages inside the University (for example, department pages). They try to answer to as many comments as possible, usually within 24 hours. They also try not to delete any messages, with the exception of hate speech and swear words. In a small number of cases, repeating offenders were reported to Facebook.

BBU also suffers from the lack of formalized procedures in how to use social media, and a need for them is increasingly felt. The results of the communication, or of the different campaigns, are monitored in a less structured manner, for now; this is one of the issues to improve in 2019. Dealing with impersonator pages is cumbersome (so far three such pages were taken down by Facebook, but each such process took months).

8. Conclusions

Like any other channel, social media has strengths and weaknesses. After the initial experiments and false starts, public institutions are generally eager to add another arrow in their quiver. But using these new platforms well is a process. Simply putting up on Facebook the same communiqués posted on their webpage is no longer enough. Romanian public organizations understand, by and large, how this new channel should be used (with all its declinations, depending on the platform used), but are hampered by a lack of resources, especially human resources. People in charge are generally knowledgeable and understand the importance of social media in connecting especially with the young, and are gradually moving toward a professionalization of the field. But the promise of social media creating an online democracy agora are still a distant prospect, for reasons both objective (like I said, lack of resources, the tendency of online debates to quickly veer of course) and subjective (public institutions need time to adjust to the increasing scrutiny that online transparency and participation bring into the equation).

The cases presented and the quantitative results show that a strong and programmatic presence online can yield good engagement results (the case of both pages used by the Cluj-Napoca City Hall). In the case of the University page, the recent shift from a strategy that favored reach to one that looks for engagement is too recent to be visible in the numbers. The Cluj County Council presence on Facebook is one that aims to inform more than to foster debate, and the large number of posts with relatively low engagement is consistent with this approach.

The picture presented in the paper is necessarily limited. A wider and more numerous selection of institutions would paint a more accurate picture. This study is meant to be a proof-of-concept for a more comprehensive research and the starting point for a comparative project on the use of social media in the public sector in countries from Central and Eastern Europe.

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THE HASHTAG AS A TOOL TO SET UP A GOVERNMENTAL AGENDA

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Abstract

ICTs are accelerators and amplifiers of change. They are redefining how we interact with each other and the world around us, a specific application is social media, which facilitate real-time communications, data exchange and immediate feedback by institutions to stakeholders and vice-versa. In order to apply the principle of inclusiveness, the current Ecuadorian administration, with 18 months in the power, has adopted the slogan "the government of all" to spread their activities through the public administration institutions. One of its main communication channels is social media through the microblogging platform of Twitter. Where public institutions and political leaders are sharing their daily activities through posts, videos, images and so on.

The main purpose of this paper is to identify in Twitter during the period of 30 days (October 2018) how often is used the hashtag #ElGobiernoDeTodos (translation, The government of All) for which Ecuadorian institutions, in what contexts, and in what type of themes. As well as recognize if there are persistent themes into the analyzed posts to assume whether there is an agenda through that or it is just an individual effort from every institution to fulfill their communications need for sharing information.

Keywords: hashtag, social media, Twitter

1. Introduction

The accelerated increase of the Internet's users has generated more and diverse analysis about whether and how digital platforms as Social Media networks, have any impact in the political sphere. The role of the Internet and communication technologies (ICT) in modern society cannot be understated. Individuals and institutions around the world are trying to increase public engagement by utilizing Web 2.0, Bertot et al., 2010; Lorenzi et al., 2014 (cited Yaqub et al., 2017). This provides a quick and cost-effective platform to political actors and state institutions to communicate quickly and directly with the public, Heverin & Zach, 2010 (cited Yaqub et al., 2017).

Ecuador is part of the Ibero-American Charter² on Electronic Government (2007), in which "Electronic Government" and "Electronic Administration" are understood as synonyms to define the use of ICT in the Public Administration system to improve the information and services offered to citizens, guide the effectiveness and efficiency of public management and increase transparency of

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² The charter embraces the commitments made in the Johannesburg declaration and plan of action, the Monterrey Consensus and the Geneva Declaration of Principles, the Ibero-American Code of Good Governance and the relevant resolutions of other Summits, especially with regard to the Millennium Development Goals.

the public sector and citizen participation, the last point is relevant in the sense, the electronic services shall be focused on the citizens' rights.

The improvements of the technological infrastructure, accessibility, the development of the Electronic Government Plan³ and the execution of public policy in this regard, the communication through online platforms have become an integral part of public discourse and communication in the contemporary Ecuadorian society. In this context, it is imperative to highlight the fast use and development of social media, which has caused major changes pertaining the way people find groups of individuals with similar interests, the nature of information, the available news sources, or the possibility to require and share ideas (Stieglitz, Dang-Xuan, 2012). With the increasing relevance of communication through social media comes a change in the way the public administration exercise their public communication. Public institution, politicians, representatives from the civil society, citizens and other actors communicate and make visible their activities, opinions, and claims into social media, which has become a tool for all those groups in their political communication strategies. Specifically, for this case study, the inputs are through Twitter.

The total population of Ecuador is 16,714,929 inhabitants, from them the 50.75% have activated cellphone: from which the 26.83% have a smartphone and the 25.28% use social media networks. According to the data of the Institute of Statistics and Census of Ecuador more than one million people have a twitter account which represent the 8.5% of the population and the 20.4% of the incidence into the twitter users group.

All institutions into the Ecuadorian Public Administration have a social media accounts, most of them are Twitter accounts which can be used as an active or as a sporadic communication tool, depending on each communication strategy. The Executive Function has 22 institutions (ministries, secretaries, etc.) plus the presidency and vice presidency. The Legislative Function has the National Assembly. The Judiciary Function is made of four institutions. The Electoral Function have two institutions. The Transparency Function is composing by eight institutions and 20 Public Enterprises.

Although digital communication is institutionalized in the Latin American public sector, it has not reached all its potential for interaction in social media networks. Politicians and entities do not use at all social networks to interact with citizens, but more as unidirectional diffusion channel. They do not necessarily touch the issues that citizens demand, and only one in ten mayors' responds to the citizen through Twitter. (Riorda & Valenti, 2015).

The 85.4 percent of Latin American public entities⁴ have a Twitter account. In the case of Ecuador, the public institutions have started to open their Twitter's account since 2009. As the case of The Secretary of Communication and the National Assembly. In 2010-2011 were opened the Presidency account and the main ministries accounts from the Executive function, and so on in the case of the other public institutions. The representatives of each ministry, some deputies from the National Assembly and other political actors have their own twitter's account as well.

³ Currently the Ministry of Telecommunications is following the precepts of the E-Government National Plan 2018-2021

⁴ This research led by the Inter-American Development Bank about the profile of the Latin American Governor User includes an analysis of 407 social network accounts that include governors and subnational public entities of 61 Latin American cities.

Another issue to understand and take into consideration is the transfer of what is considered or seen as public, understood as a place for sharing and exchanging debates, which is not anymore just the public squares or the traditional media communications “*the sum of these structural and cultural changes is often referred to as a shift from a mass-mediated public sphere to a networked public sphere*” (Kersey, 2011).

Politicians around the world are sharing and announcing their public policies, political decisions, intended activities and so on in Twitter, their information is taken by their followers but also for the mass media communication to spread it to the other segments of the population, who do not have access or participation into social media channels. It does not mean, the social media channels replace the traditional media as such it is just a newly opened space for informing and getting in touch with people, in an immediate and direct manner. Jenkins exposes in his book ‘Convergence Culture’ that we ‘are facing a cultural change that he calls the culture of convergence “*where old and new media collide (...) where popular media intersect with corporate media, where the power of the media producer and consumer interact each other in unpredictable ways*” [Jenkins 2006, p.14]. Likewise, the author suggests that convergence occurs individually in each participant and in social interaction with others at the same time. In this convergence culture arises new forms of community defined by voluntary, temporary and tactical affiliations, reaffirmed by virtue of intellectual enterprises and common emotional investments. Members can change groups when their interests and needs vary and can belong to more than one community at the time. These communities, however, remain united through mutual production and reciprocal exchange of knowledge. [Jenkins 2006, p. 37]

This environment of shared knowledge or collective intelligence, as the author calls it, on the part of the communities in social networks is related to discussions, debates, and points of view around an event, topic, service, political conjuncture and even errors by organizations. This generation of knowledge is generating an alternative source of power to these people that, when it is used in an organized way, could have an impact on the daily life of people and organizations, not only digitally but also in the physical reality. The difference between both media types can be identified in terms of time and closeness, in this context, a tweet can be sent and received in real time without intermediary, this last role was performed mostly by the mass media communication enterprises just two decades ago, currently they still play this role but not as the main character anymore.

The current Ecuadorian government has started its activities in May 2017. In September was created the slogan #ElGobiernoDeTodos (The Government of all) with the purpose to highlight a dialogue policy where all the civil society groups could fit and express their ideas for continuing the decision making process. Why is relevant this hashtag? It is because, the previous Ecuadorian administration used to create emotional and patriotic slogans with a certain populist approach, some examples of that: *La patria ya es de todos* (The homeland is already of all), *Avanzamos patria* (We advance homeland), *La patria vuelve* (The homeland returns). Those slogans were diffused in all the governmental political campaigns through of traditional and mass media communication platforms, the institution into the public administration was aligned to use and reproduce those slogans in their communicational products and channels to get in touch with the citizens.

After a month of the launched slogan, the aim of this study is to what extend there is an active participation of the Ecuadorian Public Institutions in Twitter, during the period of 30 days (October

2018), through the hashtag⁵ #ElGobiernoDeTodos (translated means the government of all) which is the slogan of the current Ecuadorian government, and it is used in all the communicational campaigns. As well as identify the positive or negative sentiment into the messages.

2. Methodology

The study units are all the tweets posted into the hashtag #ElGobiernoDeTodos (government of all) during the time period from October 1-October 31, 2018. For tracking the tweets was used the Keyhole tool which gives some structured categories as date, user, number of comments, number of retweets, number favorites and the text message. The other part of the categorization process was made manually to classify the data into themes and tweet's sentiment analysis.

For the specific activity of sentiment analysis was used the tool: SentiStrength, an algorithm, which provides two values per each text analyzed: one measures the intensity of the positive feeling and the other the intensity of the negative feeling, based in a given sentiment corpora data set in Spanish. Also called polarity. Both indexes vary from 1 to 5. Positive sentiment strength ranges from 1 (not positive) to 5 (extremely positive) and negative sentiment strength from -1 (not negative) to -5 (extremely negative). This double measure corresponds to the presence of different emotions combined in the same expression, which is suggested by empirical studies in the field of psychology. Berrios, Totterdell, and Kellett (2015 cited by Baviera, 2016)

3. Findings

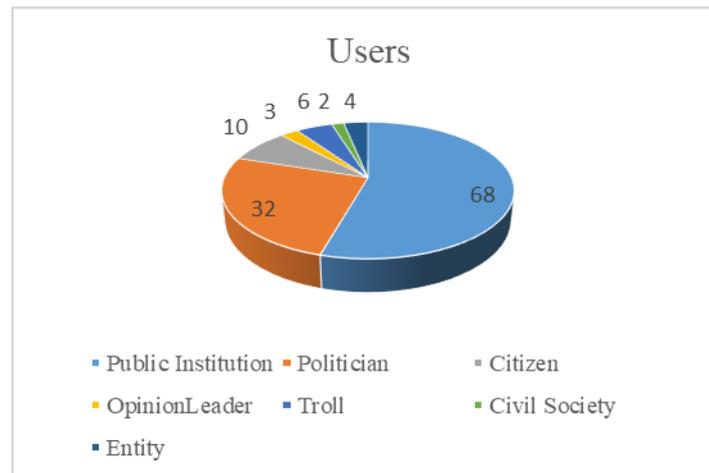
Into the hashtag #ElGobiernoDeTodos (The Government of All) during the time period from October 1-October 31, 2018 was posted a total of 125 tweets from 68 different users (Table 1) the 54% of the users correspond to Public Institutions followed by the politicians with the 25.6%. In average, there are 9.8 comments per tweet, but the tweets with more than 300 comments are from the messages written by the President of Ecuador, i.e. there some tweet without any comment. (Graphic 1).

General Results	
# of Posts	125
#Users	68
Comments	1.237
Retweets	10.104
Favorites	8.949

Table 1.

Source: Own Elaboration

⁵ According to Twitter a hashtag, written with a # symbol, is used to index keywords or topics on Twitter. This function was created on Twitter and allows people to easily follow topics they are interested in. Hashtags can be included anywhere in a Tweet. Hashtagged words that become very popular are often Trending Topics.

**Graphic 1.**

Source: Own Elaboration

The data was analyzed by tweet groups according to certain categories to simplify the understanding of their content since every tweet has a different topic and focus. The main identified themes were regards to general messages (27), activities done by the institutions or through their representatives or team members (26), informal, protocol and work meetings (17) and general comments about public affairs (14). (Table 2)

Themes	
Activity	26
Agreement	3
Comment	14
National Dialogue	3
Event	9
Infrastructure	6
Meeting	17
Message	27
News	9
Quotation	8
Story	1
Summary Report	2
Total	125

Table 2.

Source: Own Elaboration

As a result of the Sentimental Analysis of the 125 tweets; 61 tweets are not positive/not negative which means they are neutral. 17 tweets are positive/not negative which means they are purely positive messages. 9 tweets are extremely positive/not negative. (Table 3)

governmental agenda or strategy in the use of this hashtag, not just for the number of tweets and interactions but for the number of public institutions, no more than 30 including regional and local government level, who are participating in this period of time. All institutions produce content month by month but they do not use this hashtag for positioning the political slogan often.

According to the results of the sentiment analysis, the hashtag #ElGobiernoDeTodos has a neutral environment, more than the 50% of the publications in there not have any positive or negative connotation, which means the created hashtag keeps an informative line mostly about the daily activities or projects done by the institutions and the politicians, i.e. the confirmation about the public institutions use Twitter as unidirectional communication channel, which can be supported by the number of comments per tweet, which are not more than 9.8 in the best case with the exception of the President activities.

The short time period analysis could not reflect a deep understanding of the hashtag use because the slim segment of impact but it identifies the low level of engagement by the public institutions after a year of the launched hashtag. The slogan itself is a speech strategy to call the action of inclusion and collaboration from the society to the current government administration, nevertheless as a tool for social media channels does not have enough use and impulse by the time in the long term.

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THE ROLE OF SOCIAL MEDIA IN THE ARAB SPRING UPRISINGS

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Abstract

This Research seeks to answer several questions as follows: Did social media play a key role in the Arab Spring uprisings? The significance of the research is linked to the novelty of the topic which is globally yet debatable. Few serious issues are taken into consideration in this research including; social media, new technology and the nature of its role in the Arab uprisings. Social media tools were a good medium of electronic communication among protesters in MENA region. Furthermore, it was a vital medium for spreading information such as photos, videos and documents about the revolution for national, regional and international spheres. This research seeks to find out about the link and impact of social media on the Arab Uprisings. Based on controversial scholars' arguments, this study appeals that social media can have both positive and negative influences on the 'Arab uprisings'

Keywords: Social Media, Arab Spring, New Technology, Online Uprising.

1. Introduction

The years 2010- 2011 can be considered as the golden years for social media or 'New media', as well as for a number of Arab countries. New media changed its role from spreading information about events in the world to a significant facilitator that plays a serious role in the political actions against governments in the Arab world. It has been suggested that social media played a vital role in toppling down authoritarian governments in the Arab World. As, Revolution spreads to other states in the region and it is claimed that many of these have been activated by the social media².

Concerning, "the term of 'Arab Spring' came from the American media and was first used by *Foreign Policy Magazine* and then adopted by journalists and activists in the U.S. as a way to brand the revolution that has been transforming the Middle East and North Africa (MENA³) region." [1]. Importantly, Tunisia was the catalyst for the Arab Spring. People joined demonstrations and many young people in different countries in the region followed the uprisings through social media.

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2. (Boyd and Ellison, 2007) define social networking sites (SNS) as "web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system."

3. MENA Region: The Middle East and North Africa (MENA) is a region encompassing approximately 22 countries in the Middle East and North Africa.

Accordingly, "in December 2010, a man in Tunisia burned himself to death in protest at his treatment by police. What followed was an extraordinary year as pro-democracy rebellions erupted across the Middle East." [2]. Likewise, in 2011 The Telegraph reported that on 17th December 2010 in Tunisia, the Arab Spring was born and after approximately one month of demonstrations, Zine El Abidine Ben Ali⁴, who ruled the country for 24 years, escaped the country. Soon after, on 11th February 2011 the uprisings moved to Egypt and protesters broke down Hosni Mubarak's⁵ regime in a month; Mubarak had led the country for 30 years. Then, on 15th February 2011, the revolution started in Libya against the Muammar Gaddafi⁶ regime and it spread to Bahrain on 14th March 2011. The Kingdom of Saudi Arabia and Gulf States sent troops into Bahrain to support the Sunni Sheikh Hamad bin Isa⁷ Al Khalifah kingship after a revolt by the kingdom's subjugated Shia majority. Subsequently, Syria was the fifth Arab country in the region that continues to face strong demonstrations from the Syrian public. On 18th March 2011, troops loyal to President Bashar al-Assad⁸ killed five demonstrators in the southern city of Deraa and the revolt has not reached its purpose yet. Finally, Yemen was the last country in the region to join the Arab Spring. On 3rd June 2011, Yemenis started the uprising against President Ali Abdullah Saleh⁹; on the same day he was injured in a bomb attack on his palace in the capital of the country Sana'a. The attack came after the killing of hundreds of protesters by his troops.

Hintler explains in recent years, social media has become popular everywhere. As such, it has an impact on social lives because it has achieved an important position in social life. Through social media, people connect with each other and transfer and share information. Before the end of 2012, people, in most countries used social media like Facebook for entertainment and business. In line with this, Samuel in his thesis in 2012 focuses on the role of Facebook and Twitter in the Egyptian uprising. [3]

There are locations where Facebook has become the means for building mobilisation and arranging activities against political systems in the Arab world, for instance in Egypt. Furthermore, Hintler indicates that today, social media has a greater influence on audiences than old-media and it is assisted by new technology because new social media keeps in touch with the new developments in the world. The Internet can be used to access all kinds of mass media like radio, newspapers, magazines and television, for example, protesters used social media because they could upload videos, photos, documents, audios and posts. Moreover, "the Arab Spring has been covered by ordinary citizens via social media and it was more effective than the mainstream media, and

4. Zine al-Abidine Ben Ali led Tunisia for 23 years before stepping down in January 2011 amid an unprecedented wave of street protests.

5. Hosni Mubarak ruled Egypt for almost 30 years until he was swept from power in a wave of mass protests in February 2011.

6. Muammar Gaddafi has been Africa's and the Arab world's longest-ruling, most erratic, most grimly fascinating leader - for 42 years of Libya. On June 27, the brutal actions of the government were referred to the International Criminal Court, and an arrest warrant for Gaddafi was issued for crimes against humanity.

7. Sheikh Ḥamad ibn 'Isā Āl Khalīfah, (born Jan. 28, 1950, Rifā', Bahrain), king of Bahrain from 2002, previously emir of Bahrain (1999–2002). Ḥamad became head of state as the emir of Bahrain after the 1999 death of his father, Sheikh 'Isā ibn Sulmān Āl Khalīfah, and then proclaimed himself king in 2002.

8. Syrian President Bashar al-Assad inherited power in July 2000, a month after his father, military strongman Hafez al-Assad died. But since March 2011, his rule over Syria has been under threat.

9. Ali Abdullah Saleh has proved to be one of the Arab world's most tenacious leaders, projecting a statesman-like, even affable, image in the face of popular opposition, in sharp contrast to some of his counterparts during the "Arab spring".

according to the Arab Social Media Report, 2011, 88% of Egyptians gain their news from social media tools." [4].

2. The Impact of Social Media in Middle Eastern Political Changes

Many scholars believe that social media tools were the main factors for collapsing a number of Arab regimes like in the case of Egypt and Tunisia; however, others do not agree with this view.

In his book *The Net Delusion* Evgeny Morozov states that several countries in the world just want to promote democracy and freedom via online methods, but it is not a real platform for giving freedom to the people, as some countries use the Internet to conduct surveillance of their people. He thus believes that authoritarians use the Internet, particularly social media, for spying instead of giving freedom. In essence, his negative view comes from his country of origin, Belarus, because he strongly believes that non-democratic countries do not allow people or internet corporations to give freedom via online methods. For example, Belarus and Russian governments have arrested number of youth during the protests in the past and the important point is that they knew everything about their activities. In other words, authoritarian governments can benefit from using social media than ordinary people because they conduct surveillance of the users especially at the time of uprisings. [5].

So far throughout the course of all revolutions, there is no conflict about the reasons of the revolutions anywhere in the world. The main factors are economic or political. He argues that the modern revolutions are different, as mostly they depend on new means. Communications and information technology was the most effective factors in the modern revolutions in countries like Tunisia and Egypt. Those means were used to communicate the political issues.

More importantly, the power of social media has great impact in many cases in history. Sometimes protesters' success, such as in Spain in 2004, when an organised demonstration was fostered by text messaging, which led to a rapid ousting of Spanish Prime Minister José María Aznar, who inaccurately blamed the Madrid transit bombings on Basque Separatists. In many cases, technological devices such as mobile phones are the reason for a fall of a party or a regime, for example the situation in 2009 when the Communist party lost power in Moldova, while the public protests were organised by text messages.[Ibid].

Moreover, shedding a light on the June 2009 uprising of the Green Movement in Iran, in which protesters and activists had used many technological devices for coordinating a protest against the miscounting of the votes for Mir Hossein Mousavi. When social media presents a demonstrable threat to government, and leading parties, the protests were cracked down violently in Iran similar to the case in Syria. As, "mobile phone is another activities tool that has not been subjected to thorough security analysis. While it has been rightly heralded as the key tool for organising, especially in countries where access to the internet and computers is prohibitively expensive, little has been told about the risks inherent to most 'mobile activism' although, the governments can shut down mobile networks whenever they find it politically expedient." [6].

Regarding the role of social media in the recent Arab Spring various thoughts have been stated in the literature. Considering the role of Facebook in the Egyptian revolution was not just gathering people but was raising more awareness among people, in which angry people wakened others about the political and economic situation in the country. In one way or another, the internet can be an effective social media tool for fostering a pan-Arab broadcasting process in the Arab world. An

interesting case is Facebook, which was first introduced in Arabic Language in March 2009 and quickly, the number of Facebook users in Egypt grew up to five million users. And, following, the protests aggravated. It is worth mentioning the essential factor that made Facebook popular among dissidents was that it allowed them to spread the videos they captured and at the same time see what other people published on Facebook walls. Therefore, Facebook was a platform where many protesters could watch current events, besides a place where everyone gets information via friends. [7].

To some extent, social media has become the most influential coordinating tool for many political movements in the world. That is why many governments are working to get power to control the Internet access. People everywhere can get access to the Internet easily, and almost all people can use it. As it is illustrated, nowadays social media is used by many people as a means for commerce and social life. Many authoritarian regimes have tried to restrict communications in their communities since they are afraid of the public reaction, as the public mostly reacts rapidly in many cases. Further, the communicative power is very influential for political freedom; however, some governments do oppose it. At present, the main tool for communication in the world is the Internet in which understanding local protests are hard for outsiders. [8]. Fortunately, throughout the Middle East the main place where many civilians could express their anger was on Facebook. In some cases, in the Middle East people engaged in using the Internet in protests, that "the Internet is more important and disruptive than [its greatest advocates] have previously theorised". Actually, the way the protests were organised in Egypt was effective in gathering people, and transmitting information via Facebook and other social media tools. The protest organisers were leaders of the revolution, in a way they could use influential strategies in leading and forming groups on Facebook to participate in the revolution. Significantly, the true skill of leadership has been used in Facebook for changing Mubarak's regime. In this context, it is not strange to see Twitter and Facebook as new tools for political movements in the Middle East, as in the present century many people are continually using social media and it is the easiest channel for getting information. [9].

Even though the regimes have also power to control the Internet and social media outlets access, this had given a reason for regimes to take precautions in risk management. That was why many Internet companies were forced to shut down when the protest aggravated. That means social media was a realistic threat and the Egyptian government wanted to mitigate it. The formulation of the revolution inspired many people to take part because this gave normal people the opportunity to take part equally.

Social Media and the democratisation process have nearly gone together, and the power of social media is parallel with the invention of technology, referring back to technological tools that have been used in the past such as telegraph and radio. These were the main tools for social communications and the main factor for transferring information in communities. These tools have been used in political actions in the past.

In his argument, the German philosopher Jürgen Habermas in his 1962 book, *The Structural Transformation of the Public Sphere*, said that the printing press helped democratise Europe by providing space for discussion and agreement among politically engaged citizens, often before the state had fully democratised.). Indeed, the interlink between political freedom and mass media is an attractive issue, as the sociologists Elihu Katz and Paul Lazarsfeld revealed, the mass media alone does not have enough power to change the public mind-set, but they further concentrate on a two-step process. [10].

Apparently, people can use the Internet and social media; however, not like the government, as people have the power to use technology but the governments can use the power of law. The government is capable and in place to ban the Internet access in many countries. For example Chinese and Russian governments have announced the Internet-search services as a "strategic industry" like energy and other economic resources in which the governments have the right to ban foreign companies.

Furthermore, "the Internet does not play an essential role in Middle Eastern democratic revolutions compared with other factors, like the new procedures that the new leaders do take, such as the new constitution and the principles of the previous government." Consequently, the dispute about the social media is a further negative since the Internet or social media may have a limited effect on revolutions. The main factor that pushes people to revolt is the economic factor; people use the social media to cast their grieves and social problems and to let the world know about their suffering. Social media lets the revolutionary events take place in a short time; this was a very fast way of revolting against a government in power. [Ibid].

The view that have shown that in Egypt the government was not capable to control Facebook or ban it, since civilians had the desire to engage in protests and to know about what happened and what will happen as a next step. That was the way communication continued i.e. via Facebook pages, using mobile phone and other devices. Subsequently, Facebook become a platform for political discussions for many people, the online protesters were much more interested in spreading videos, which showed violent action against human beings, such as torture, abuse, human right violations. Compared to the Tunisian protest, the Egyptian physical protesters were fewer in number. [11].

3. The Role of Online Communication via Social Media and the mainstream media

To put it simply, the current age is known as a digital era, which changes the style of modern life, and their activities particularly in some parts of the world in which democracy does not exist. Thus, media and modern tools of social communication played a vital role in political life, supporting democracy and loyalty to freedom of expression. Moreover, social media such as Facebook and Twitter encouraged people and prepared masses to join the uprisings, for example in the cases of Egypt and Tunisia, and short mobile messages have played a great role in moving the revolt in Yemen. Modern technology has a significant role in progressing revolts because it assisted young people to turn on Facebook via their smart phones and upload live posts, pictures and videos among the protesters particularly in Egypt. [12].

Moreover, the role of social media has changed since 2011. Owing to its role in uprisings in the Arab world, the social media was a decent tool for protesters, as they arranged activities against regimes and thereby changed some government systems with the help of social media. On the other hand, 2011 was an excellent year for social media from Tunisia to Egypt, Libya, Yemen, Bahrain and finally Syria because of the "Arab Spring". [13]. Contrariwise, in the Egyptian revolt Twitter played an essential role as it was used outside of Egypt to spread information about the uprising; and other types of media like radio and TV such as Al Jazeera and Ham radio have affected the Arab spring uprisings. Above all, the demonstrations were continuing after shutting down online communication via social media and mobile phones because the protesters have an offline tool: the mosques; however, there are misgivings about the facility of activists. Postill states that "Both old and new, analogue and digital – from Twitter and Facebook to graffiti and leaflets through broadcast media such as radio and television. Social media appears to have been important tool

during the preparation and launching of the Day of Anger (25 Jan), but they were so alongside email, mobile phones, leaflets, television, radio, print media and face-to-face." [Ibid].

Worth mentioning that all kinds of social media had an effective role during the uprisings such as in Tunisia, Twitter had a crucial role and over 30,000 videos have been uploaded on YouTube about the revolutions. Basically, the demonstrators depend on social media, for instance Facebook and Twitter, to spread information about events and to motivate people to participate in the revolutions. In Tunisia people have created a Facebook page to write about the revolts motto "Ben Ali, out", they choose Facebook as a main step for starting the uprising against Ben Ali. [14]. Adding, "Facebook was the drive of this revolution. Everybody was on Facebook, if these protests started five years ago, they would have died." [15]. Indeed, "the number of tweets from Egypt went from 2,300 to 230,000 in the week leading to the resignation of President Hosni Mubarak." [16].

The regimes did not predict the power of social media until the protesters used it against them. In an effort to explain, Shane argues that dictators use the traditional tools to stay in power but the protestors have been using the modern tools of communication against regimes in the Arab world to defeat them as they did in Egypt and Tunisia. Hence, President Hosni Mubarak believed that Facebook and Twitter might empower his enemies. Additionally, Shane believes that using social media during the Arab Spring uprisings is more helpful than using force because protestors televised the revolutions by themselves and the world can see the dark side of dictators in the Arab world. [17].

However, some experts consider that social media has been just a tool that protesters used to communicate with each other. In this concern, some Egyptian protestors were cautious about using the social media especially Facebook and Twitter because they feared that their enemies could use social media as anonymous to identify the activists and that is why they preferred to use photocopies and e-mails as well. [18]. In line with this, social media assisted the Arabs to discover that revolutions were starting in countries like Tunisia, Egypt and Libya. [19]. Doctor Hisham Gheriani in his clinic in Benghazi said that social media like Facebook was really helpful because it made Arabs overseas realise what was going on in their home countries and some returned home to help the revolution. Whereas, the social media was important but not all-important because, it does not make the uprisings, but influenced some real things like unemployment and the violence of police with the protestors has a great impact on uprisings too.

4. How important was the Role Social Media played in the Arab Spring?

The golden argument of this paper is 'what role did social media play in the Arab spring?' At this point, an attempt will be made to try and explain the nature of the Arab Spring and its characteristics. It anticipates that some distinguishing points of this matter are as follows: it is occurring in the age of the technology and information; it occurs against local and national authorities –not foreign authorities, and some of the main motivations are the gap between the new and old generation, the cases of human rights and the issues of the economy and corruption. Moreover, there is global interest and universal support for the Arab uprisings and the role of the universal channels is considerable.

In this manner, the role of social media will be explained, for instance Facebook and Twitter in the Arab Spring. It is claimed that the social media can be an effective tool for activism, in particular, when combined with other digital technologies. Besides, it can be beneficial for individuals and small groups with few resources, as well as organisations and coalitions that are large or well-

funded. It facilitates such activities as educating the public and media, raising money, forming coalitions across geographical boundaries, distributing petitions and action alerts, and planning and coordinating events on a regional or international level. [20].

In other words, that the debates about the effect of social media would be greatly overrated if held responsible for initiating the civil unrest and demonstrations in Egypt. What it did, was enable the organic nature of non-hierarchical leadership to emerge in a highly visible manner. Civil unrest and episodic protests in Egypt existed before. Social media is a lightening-speed communication tool, and permits the immediate and simultaneous dissemination of information for like-minded groups of individuals. The opportunity to influence the opinions and actions of others occurs at an unparalleled rate of speed. But technology is a tool, a way for mobilising movements, not the reason for civil upheaval. Besides, several conditions-social, political and economic - converged to ignite the discontent of the citizens of Egypt. The technologically savvy leaders were tuned into the times, accurately read the emotional state of the public and seized the opportunity to channel the ever-growing discontent into a massive protest. [21].

Leadership in the information age will have to use the available tools to communicate meaning and equip others to engage in constructive problem solving. Even though, some users can misuse the power of the Internet; therefore, the leaders have to be clear about what it means to be constructive in communicating. Accordingly, Scott does not believe that social networking will put a leader in power. Interestingly, everyone is able to post something on the Internet, as in reality the Internet, particularly social media, is a tool that brings about opinions, discussions, and proposals. Since leaders of small groups may find the Internet useful, whereas the leaders of countries do only enjoy the Internet to listen to the public or, "the readiness of a group or culture to act". Nevertheless, Preston states that in a letter to Mark Zuckerberg, Facebook's chief executive, Senator Richard J. Durbin, Democrat of Illinois, mentioned that the events in Egypt and Tunisia had highlighted the advantages and disadvantages of social tools for democracy and human rights advocates. "I am concerned that the company does not have sufficient safeguards in place for protecting human rights besides to avoid being exploited by repressive governments." [22]. And, Elliot Schrage, the vice president for global communications, publicity and marketing at Facebook, declined to discuss Facebook's role in the recent tumult and what it might mean for the company's services. For Schrage, the brave people of all ages come together to effect a profound change in their countries, and technology has been just a tool for assisting the events.

To evaluate the recent Arab upheaval without the character of social media, predominantly Facebook and Twitter, would lead it definitely one-sided. Above all, according to ibnlive.in.com "it is possible that in the commencement of the revolution, the Egyptian youths could not talk about making uprising against the regime but after what happened in Tunisia, they created Facebook pages and groups. They also tried to gather people in order to join the demonstrations because poverty and unemployment were the main reasons for a group of four people to set themselves on fire. [23]. Moreover, the Egyptians created some Facebook pages and most of the page slogans were about poverty and unemployment such as "The day of the uprising against poverty", "dishonesty and Agony" hence before the day of the revolution more than 80,000 people promised through Facebook to join the demonstrations against Mubarak's regime. [24].

Predominantly, another viewpoint was social media did not emancipate people to collaborate but helped the public to communicate. In particular, the educated people in Egypt to utter their words about the revolution. Actually, social media is a revolutionary tool in today's world that brought up new voices and ideas to the world. Moreover, as it's a factor for changing the political and social

arenas in many countries. On the other hand, Francis Fukuyama, political scientist scholar, states "the Egyptian community was very brave to work on changing the rigid political system of the regime, and did bravely protest and demonstrate, while they could not continue for having a candidate or leader to take part in the election in the country." Thus, Friedman considers social media as a sharp movement in Egypt but that they could not get an outstanding outcome from it. [25].

5. The Role of the New Technology in the Arab Spring

Alongside with social media, new technology like the mobile phone played an important role in the recent Arab uprisings. As, every activist carried mobile phones and in every corner in Tahrir square protesters used phones for taking photos of the demonstration, and the mobile users has grown rapidly to 80% in Egypt in the past years. As well, millions of Egyptians filmed the uprisings, and some of satellite channels used that footage. [26]. There is no doubt that we are at a pivotal moment in history, in which technological devices had improved rapidly as can be seen in Egyptian case. Mobile phones became a documentary device that could gather information and record events of the revolution in the MENA region. In addition, protestors for exchange of information easily and properly used mobile phones as a technological device and protestors did contact each other via phones. Additionally, transferring news to the outside world was made by mobile phones mostly; therefore Facebook becomes a dominant host in Egypt. No matter how good technological devices are, still there are many people who do believe that social media was not too effective in the Arab spring particularly in Egyptian case. [27]

While, authority had restricted assessing the Internet and mobile phones, the protesters have used their hacking capacity for hacking the web pages and network connections to reach each other and publish information on the events. More interestingly, "Anonymous" group published a warning message over the networks which mentioned that the Egypt government had to let people have access to the Internet, otherwise the group would hack the governmental web pages. As a result, after five days, many people had a chance to get back their net access.

In addition to the mentioned views "the youth groups could get benefit from new technology and technical services including social media, besides an organising mechanism for the group of protesters, mobile phones could be used as a device for photo taking and connections. Besides, reference to the previous revolutions and uprisings of political parties in which newspapers and publications were the only devices for organising their revolutions, like in the Palestine revolution. Besides, the new methods and procedures that new technology does provide people with everywhere without considering the geographical locations is more effective and faster than ever. This fast and easy access of technology helped the public to have connections with revolts, and organisers of revolutions and gave them a global framework in terms of participation, gathering and transfer of information and making connections. [28].

Most importantly, Malath Aumran, a Syrian citizen journalist, told the Christian Science Monitor. "We are telling the regime that if you shoot and kill people the pictures will be online and on television five minutes later." In accordance with this, every day a lot of Syrian people risked their lives to take pictures and films of uprisings by their mobile phones and then upload pictures on social media websites such as Facebook, Twitter and YouTube to show their difficult situation to the world. As the government prevented foreign journalists entering the country. Besides, the regimes fear the social media because last year it helped protestors to defeat dictators in the region, for example in Tunisia and Egypt. [29].

6. Conclusions

On the basis of the aforementioned factors regarding the use of social media and new technology in the recent Arab Uprisings, this study concludes that social media has negative and positive roles in the recent Arab uprisings in the MENA region. An important conclusion is; People have used social media tools like Facebook, particularly in the Egyptian revolution, to collapse former regimes in the region. The users got more advantages than governments because they could not control the revolution as the activists had more than just online resources; for example, they depended on the street and mosques as well.

Another interesting finding of this study is that young people who have high educational level joined the uprisings against regimes and they have used social media as a tool to exchange information and send news, videos and photos of uprisings to the world.

To summarise, it can be said that social media tools such as Facebook and Twitter were the most significant tools for demonstrators for spreading and exchanging information and sending their messages to the world. Conversely, it does not make a revolution alone because it was just a tool, and other factors pushed youths to explore the situation and to make revolutions in the region.

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LIBREOFFICE IN PUBLIC SERVICE: FIRST IMPRESSIONS OF THE FUTURE USERS

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Abstract

There are definite intentions and efforts for spreading open source office software in the Hungarian public service. However, LibreOffice offers almost the same functionality than Microsoft Office, document compatibility may be problematic, and both the appearance and the access to a part of functions are different. Even a partial changeover raises several challenges concerning technical issues, system safety, and users' education.

This paper investigates the users' opinions about LibreOffice Writer. The target audience is the higher education students as the future users of the software. The research method includes a (1) preliminary survey about the computer usage habits, (2) preparing a two-page document including typing, text-formatting, tables and diagrams, (3) and a final evaluation survey about the experiences. The goal of the study is collecting information about the opinions and impressions about working with LibreOffice Writer. Exploring the user profiles and the critical issues are important for establishing effective training programs.

Results show that the involved students feel using LibreOffice more difficult than Microsoft Word. However, the similar surface and functions are available, the deviation from the usual increases the time need and decreases personal satisfaction. Targeted training is necessary for supporting the implementation intentions including developing higher education programs.

1. Introduction

Nowadays, information and communication technologies (ICTs) are key elements of supporting the growth of e-government initiatives [8]. There is a common issue of the participants of public administration actions: information flow. However, several office cases can be managed through a menu structure in an online system, direct communication between the citizens and the public administration service provider is still inevitable. Preparing a document, like appendixes of submissions or applications, CV-s, learning materials etc. is usually managed by a word processor software regardless of the format (electronic or paper-based appearance) of the document. Microsoft Word can be considered as the etalon of word processors, although, more solutions are available. The question emerges, which word processor software should be used? Interoperability with IT systems and other software ([11], [13]), easy to use user interface, additional services available, problem-free operation ([14], [17]) are equally critical challenges. Software selection requires a comprehensive approach (Figure 1).

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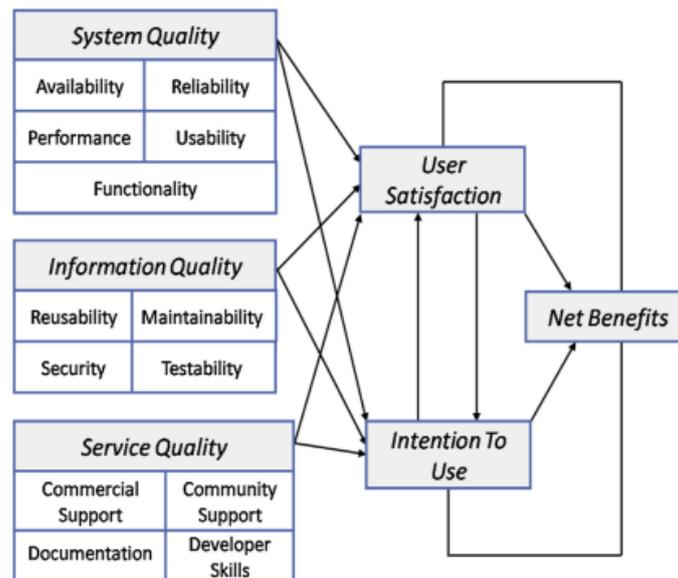


Figure 1. IT success model with added components of each dimension [15]

There is a competition between the commercial and the (free) open source software ((F)OSS). Although an indisputable benefit of free software is the cost-free access to the software, a broader approach is required: time need and effort of installing, maintaining the software, learning and teaching the use raise costs. Assuring interoperability with other systems may also need development actions. Rab [13] mentions the case of Bristol where the saving has been achieved 1.4 million euro, however, the costs of the change-over process were twice as much as an upgrade of the former solution.

Beyond cost, there are other considerations [17]:

- Due to the public accountability of governments to all its citizens and the underpinning philosophy of open source software (OSS) is congruent with this approach and changing to these could benefit all.
- OSS has the potential to avoid the monopoly of software providers.
- Reliability and customizability can be enhanced through OSS software.

Beyond the reasons mentioned above, users' competencies and willingness to use need to be dealt with (see e.g. [5]) as well as users' satisfaction through perceived benefits [7]. If using a software leads to stress, it may have an unfavorable impact on the work-performance as well. We believe that users' dissatisfaction can mainly be traced back to misunderstandings and the lack of knowledge. Developing the intention to use is just as important as practicing.

2. Research design

2.1. Research goal

This research is inspired by the initiation that the Hungarian public administration encourages using LibreOffice. National University of Public Services (NUPS, Budapest, Hungary) aims to adjust the

related courses to this initiation. According to effective and efficient utilization, the question raises whether users are ready and able to use the software. Besides software installation and other technical issues, users' preparedness cannot be neglected. Both knowledge and motivation are key influencing factors. Assuming that the students will use LibreOffice during the daily work in the future, *mutatis mutandis* their education has a top priority. Exploring the premises, impressions and the opinions of the (potential) users may help to develop a targeted education program.

The study collects information about the opinions and impressions about working with LibreOffice Writer. Exploring the user profiles and the critical issues are important for establishing effective training programs. According to our assumption that the Microsoft Word is a more popular word processor than LibreOffice Writer and the functions and commands of the former one are decisive, exploring the critical opinions is an essential challenge. Using the experience of the study in curricula development may accelerate the process of change including developing further learning materials and tutorials.

2.2. Research method

LibreOffice has a long history. Its predecessor, the OpenOffice was launched in 2001 and the project became one of the important office software [6]. Despite the long history, we found that most of the higher education students do not have any experience with it.

The research focuses on LibreOffice Writer. The method includes a systematic set of surveys and a task:

- includes a former survey about general ICT issues and related competencies [3],
- includes a preliminary and a follow-up survey measuring the habits and the level of satisfaction, opinions about free software, experiences with Libre Office Writer.
- a 2-page document (available in pdf format) for practicing LibreOffice Writer functions including text formatting, headings, tables, graphs etc.

The task allows collecting experience with the software and established a more valid evaluation of the features and usability.

Moreover, the survey collects additional information including experiences of the software installation process and general opinions about free software. However, additional issues are out of the scope and competencies of word processing tasks but allow a better understanding of the personal opinions and approaches.

2.3. Research sample and limitations

The paper deals with the pilot run of the research. There were 9 bachelor level, full-time students of the Nation University of Public Service involved. Their feedback is important for refining the methodology and running more extensive research among public administration and other students. The limitations of the interpretation can be traced back to the sample size and its pilot nature. There are no general conclusions allowed based on the results.

5 of the 9 participants are first-year students. According to their own declaration, they can use word processor and presentation maker quite well, spreadsheet moderately and database manager or programming is out of their knowledge (Figure 2 summarizes the results of the total sample).

The participants are critical to their opportunities for computer work. All of them is dissatisfied with the performance of their own computer, rather dissatisfied with the internet speed and the available space for working.

IT education in elementary school is evaluated rather poor, and 5 of them thinks it excellent in higher education. There is no significant correlation between the evaluation results by different levels of education.

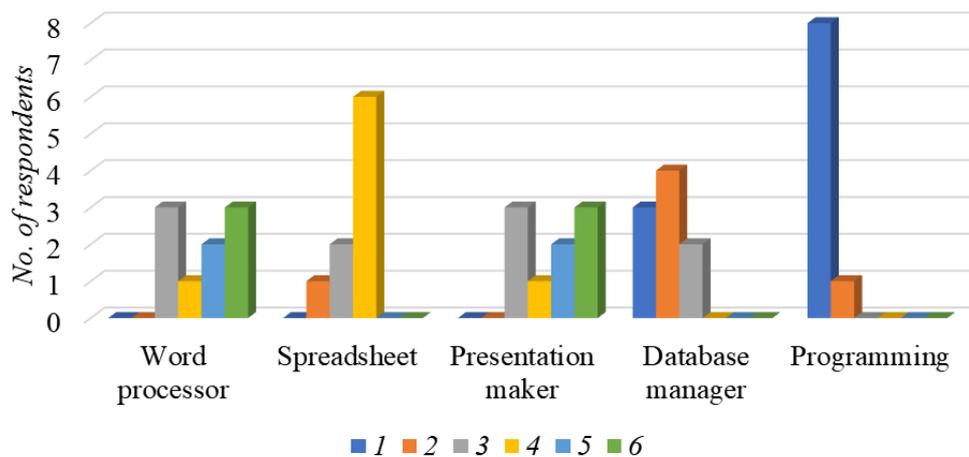


Figure 2. Self-declarations about software competencies (1: not at all, 6: I do almost any task in it)

3. Results and discussion

3.1. Software use

The respondents are not well informed about the availability and service of word processors. Microsoft Word is mentioned as the used one by each respondent and LibreOffice Writer in one case. No other software is mentioned as a known one. It was the first experience with LibreOffice for 6 of 9 students. Although the differences are not significant based on the results of a cross-tabulation analysis, the results show that these students are more satisfied with Writer than ones who have former experiences (Figure 3). However, 4 of them marked definitely not to use the software in the future, 4 of them maybe and only 1 yes.

The participants were asked to download and install LibreOffice to their own computers and review its interface and functions before preparing the task of the research. Figure 3. shows the average satisfaction of the respondents.

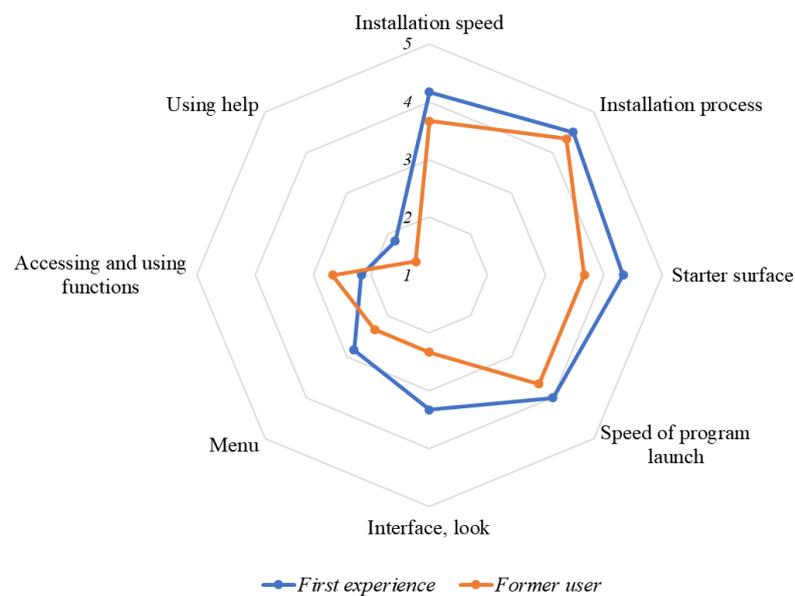


Figure 3. Satisfaction with LibreOffice Writer (1: very dissatisfied, 5: very satisfied)

As a part of the final evaluation survey, the participants were asked to compare Writer and Word. The results obviously show that Word is favored:

- the interface of the Word is preferred to Writer by 6 students (66.7%),
- usability is evaluated alike by 1 student (11.1%), 4 (44.4%) feels Word better and 4 (44.4%) much better.
- available functions are evaluated equally great by 4 (44.4%), while 2 of them (22.2%) feels Word better and 3 of them (33.3%) much better.

3.2 Evaluation of the task

The word processing task required 40-180 minutes to perform. 6 of 9 students finished it within 65 minutes; beyond that 123, 130 and 180 minutes are marked.

The survey lists the dedicated tasks for evaluation including text formatting, managing headings, listing and inserting pictures that were found less challenging by most of the students. Figure 4 highlights the results by the level of experiences. Pagination, tablet formatting, and built-in chart maker were more serious tasks, the patterns by experiences are similar.

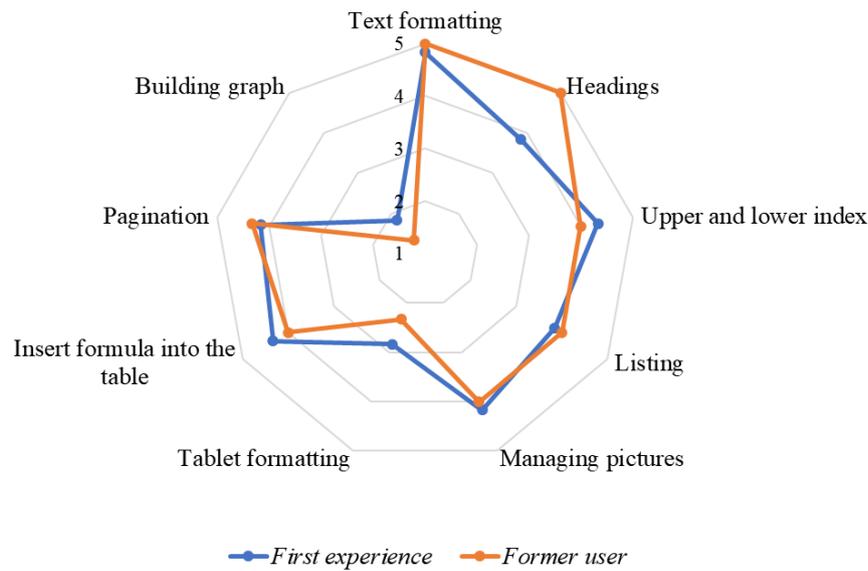


Figure 4. Evaluation of tasks (1: very difficult to do, 5: simple to do)

The following can be highlighted based on the discussion of the experiences:

- built-in spreadsheet solutions are liked by the students,
- the participants feel that the LibreOffice Writer is up-to-date and professional,
- access some everyday functions (e.g. set up margins) are less clear than usual (i.e. in Word),
- some functions and options have more complex setting options than expected.

3.3 Opinions about free software

During a job, the word processor can be considered as an enabler, employees usually do not have any influence on software selection or the installation process. Despite this fact, we consider it important to collect additional information. Opinions about free software as well as the experiences of the installation process give important background information. The participants of the pilot survey have diverse opinions about free software (Figure 5). They are the most critical of personal data protection. Furthermore, the analysis of correlation (2-tailed Pearson-correlation) shows that problem-free operation positively correlates with the statement that these are reasonable alternatives to paid software ($P.corr=.731$, $sig=.025$) and the safety of personal data ($P.corr=.693$, $sig=.038$). Correlation between being an alternative for paid software regular use of free software is remarkable ($P.corr=.809$, $sig=.008$).

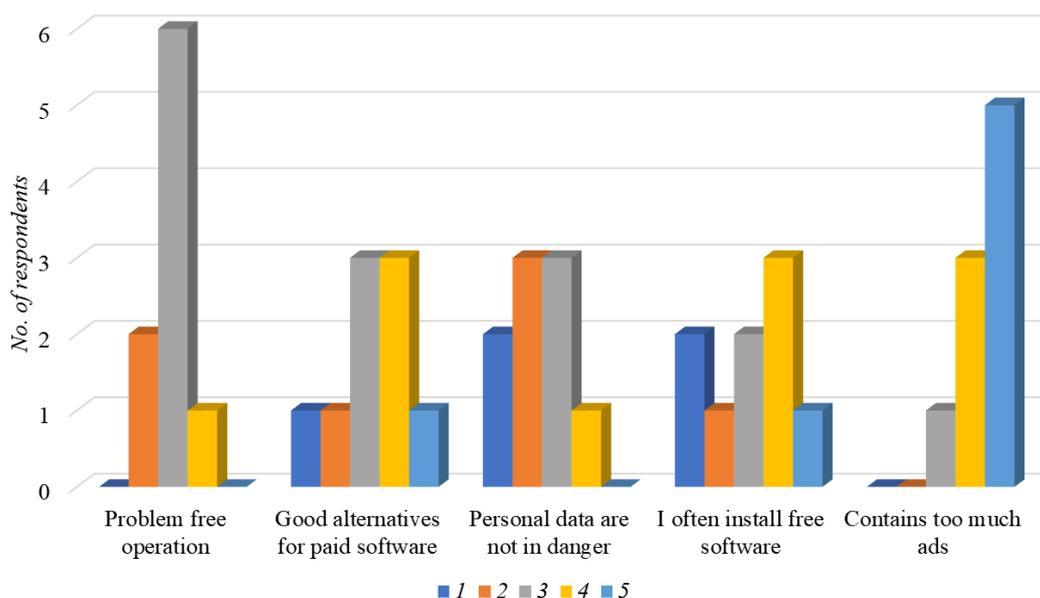


Figure 5. Evaluation of free software (1: I do not agree at all, 5: I fully agree)

The results are encouraging in the sense that students do not reject free software solutions and keep them rather reasonable alternatives. The business model that leads to the problem of ads is known but out of the scope of the present study. Worry about personal data clearly confirms the development of consciousness about cyber safety.

4. Conclusions

4.1. Experiences of the research

Solving the word processing task did not give an impossible challenge to any of the participants, the main experience of the research is that LibreOffice is less known among the selected higher education students. However, functional competencies were available mainly learned with Microsoft Office Word, and the task was done within an acceptable time period, using software out of the comfort zone led to stress and dissatisfaction. Results of first-time users show a higher level of satisfaction about LibreOffice Writer than in the case of ones with former experiences. Word is remarkably preferred in most functions to Writer among the respondents.

It is to note, that openness to free software is encouraging. However, it raises programming issues, from a cyber security viewpoint it confirms the international and national aspirations to improving cyber consciousness, including the effort of our research community [1], [4], [9], [10], [16].

LibreOffice Writer seems to be suitable for most text-editing and formatting tasks of everyday life. We believe that targeted information and support, especially positive communication may increase trust in using it.

According to the product lifecycle mode [2], OpenOffice/LibreOffice has a long take-off period while Word is on the top. Based on its features it should be a mature product or serve as a substitute software of Microsoft Office, “commercialization” is still missing. Our research shows that the actual penetration of Microsoft Office allows limited possibilities to others including online

solutions as well (e.g. Google Docs), in consequence, the changeover process may be slow and quite uncertain.

4.2. Further challenges

Based on the observations of the pilot survey we concluded that task that asks for preparing a document is an effective part of the research as well as pre- and after task surveys must be kept, but the content of the surveys can be refined. Extending the survey is necessary for establishing statistically relevant results in the field.

Furthermore, the experiences of the research clearly point out the accelerating the education of LibreOffice may lead to increased confidence through the knowledge to use the software. This includes developing targeted learning materials. Considering the governmental intentions for the presence of a higher proportion of (F)OSS software in public administration, this challenge has a high priority and requires a systematic approach [12].

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CHALLENGES IN THE COMPARATIVE ANALYSIS OF DEVELOPMENTS OF THE PUBLIC ADMINISTRATIONS – THE CASE OF HUNGARY

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Abstract

Several reforms were introduced in the Hungarian public administration in the last decade that reshaped both the local and central governance levels. A well-functioning administration with embedded institutions enables the formulation of a competitive environment that favorably effects the country's economic growth. The projects of the reform program are partly financed by the European Union's Cohesion Funds through the Hungarian Public Administration and Civil Service Development Operation Programme. Hungary is committed to attain a good state through good governance and devoted to implement a results-oriented approach in its policy cycles. The international indexes providing comparisons among public administrations of different countries cannot fully and in detail reflect the results and impact of executed projects. As a response to the need for continuous monitoring based on data, the Hungarian Government introduced a unique pilot evidence-based assessment framework connected to the selected projects of the Hungarian Public Administration and Civil Service Development Operation Programme. The institutional framework is provided by the National University of Public Service, utilizing the advantage of its research and professional expertise. The results and impacts are measured and continuously monitored both at project and national levels. The steady monitoring and data gathering provides a good basis for a comprehensive evaluation and further policy-making.

1. Introduction

As a response to the challenges of the 21st century's wicked issues and the financial crisis, the Hungarian Government have introduced several reforms since 2010. The territorial administration was completely restructured. Governmental offices were established in the capital and in the counties. The reform of the local government (2011) included the division of services between the local and central government. Instead of the regions the Hungarian counties became the coordinator of the developmental programs. As a part of the reforms of the human resource management of civil servants, the National University of Public Service was established. The main aim of the Magyary Programme is to develop an efficient public administration in Hungary that is result-oriented, economic, effective, secure, controllable and adaptable. Hungary's Public Administration and Public Service Development Strategy 2014-2020 [1] (was assessed by the OECD [2]) is built on the basis of the Magyary Programme, still emphasizes the importance of enhancing the competitiveness of the Hungarian economy by providing a well-functioning and citizen-centric public administration and increasing the efficiency of public operations.

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According to the Magyary Programme 12.0, introduced in 2012, “a state may be regarded as good if it serves the needs of individuals, communities and businesses in the interest and within the boundaries of the common good³, in the best possible way.” [3] Accordingly the Good Government and State Research is also committed to reveal the basis of best forms and tools of governance. As the author, Kiss states: “good public administration is a prerequisite for good governance”. [4]. However, there is no common understanding of what constitutes good public administration. Efficient functioning may be viewed as one of the desired objectives, consumer friendliness and easy availability are other demanded characteristics. The international claim for a transparently and democratically functioning public administration is the 16th goal of the Sustainable Development Goals (Agenda 2030): “Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all level.” [5]. If there is no exact definition of what constitutes a good administration then it is difficult to measure, compare and evaluate the different systems, its reforms and developments, even in the member states of the European Union. Nevertheless, digitalization and the introduction of e-governmental developments in the public administration sector are widely discussed issues nowadays. Using the available Cohesion Funds provided by the European Union, Hungary decided to reshape and improve the services and the efficiency of its public administration. An additional program, the Public Administration and Civil Development Operative Programme (PACDOP) has been approved and under implementation.

This paper does not aim to review the extensive literature and methodology of impact assessment (IA), it intends to draw the applied innovative framework and integrate it into a broader context. However, we attempted to discover the borderline between the international comparative indicator systems and the national monitoring evaluating system of public administration developmental programme. We summarized the applicable international indicator systems evaluating the various public administrations.

2. The Public Administration and the Civil Development Operative Programme (PACDOP)

The Europe 2020 [6] was accepted as a comprehensive developmental programme for the European Union for the period of 2014-2020. It emphasises the priorities of sustainability, intelligence and inclusiveness.

As the Seventh Cohesion Report states [7] “high quality institutions can be defined as those which feature an absence of corruption, a workable approach to competition and procurement policy, an effective legal environment, and an independent and efficient judicial system, [...] strong institutional and administrative capacity, reducing the administrative burden and improving the quality of legislation”. The cohesion policy 2014-2020 consists of 11 priorities, the last one among them stresses the importance of improving the efficiency of public administration.

³In this sense “the common good” means that The State creates a lawful and equitable balance between a number of interests and needs, allowing the enforcement of claims and providing protection in this way. The State proceeds with due responsibility in the interest of the protection and preservation of the nation’s natural and cultural heritage. The only self-interest of the State is that it should, under all circumstances, be able to effectively enforce the above two elements of the common good; in other words, the State should create an effective rule of law, and therefore should ensure the functioning of its institutions, and honour and guarantee accountability for maintaining individual and collective rights.” [3]

The Hungarian Government is planning to spend more than 935 million euros⁴ through the PACDOP to improve the services provided by the public authorities. Its core objective is to improve the country's competitiveness through a well-functioning public administration. One of its goals is to decrease the administrative burden and increase its efficiency. It is committed to improve the e-governmental systems, information database improvement for local and central governments. Various forms of interventions can be observed such as back office developments, front office improvements, expanding database interoperability etc.

In the reform of the cohesion policy the incorporation of the result-oriented agenda appears as an emphasized principle of the latest planning period. [8] The common evaluation of results is encumbered the fact that there is still a debate about the terms of "outcome" and "impact"[9]. The national monitoring and evaluation system and the international ranking indicator systems can be viewed as supplementary. The first one provides a more detailed, complex, personalised and up to date information source, the second presents the international comparisons. It can draw attention to the best practices that are worth considering to implement.

3. International comparisons

Nowadays around 93 different comparative governance indicator system can be distinguished around the world. [10]

Every state has a unique public administration system adopted to local demands and circumstances. However, several international comparison systems try to grasp the similarities of public administration systems and compile a state-based ranking list reflecting their predominant, homogenous premises. Some lists does not rank Hungary making it difficult to compare the Hungarian performance (e.g. WASEDA Ranking 2018 [11])

The United Nations compiles the e-Government Development Index biannually[12]. The main disadvantage of the system is that its detailed methodology is not available to the public, making it difficult for researchers and policy-makers to evaluate its results.

As a consequence of the above-mentioned difficulties, the following internationally measured and published indicators can be selected to make interpretable not only the outcomes and outputs of the implemented projects but even its impact. We are aware of the fact that it is a long and time-consuming task but a well-structured and built framework based on evidences can contribute to an effective and well-formulated impact assessment. Not to mention the real goal of an efficient, well-functioning, citizen-centric public administration.

The implemented development can be divided into two main categories: competitiveness and e-development. A well-functioning public administration improves the competitiveness of a country, as appears in the worldwide competitiveness reports, such as the Global Competitiveness Report published by the World Economic Forum and also in the IMD World Competitiveness Book. The World Bank annually publishes the Report of "Ease of Doing Business" since 2003. It ranks the performance of 190 countries on 10 topics. From our point of view, we should focus on the indicators of the following topics:

⁴ https://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/hungary/2014hu05m3op001

- starting a business
- dealing with construction permits
- registering property
- paying taxes

As a response to the increasing importance of e-government, the European Union introduced its own evaluation and ranking system from which we should mention the following indicators:

- indicators from the eGovernment Benchmark
 - user-centricity
 - transparency
 - citizen and business cross-border mobility
 - key enablers
- indicators contained by the Digital Economy and Society Index (DESI)
 - e-government users
 - pre-filled forms
 - online service completion
 - open data

These elements of the measurement system can grasp the main characteristics of the implemented developments of the Hungarian public administration founded by the PACDOP. However, there are some impacts that are out of sight of the previously introduced indicators. Their results are also affected by other circumstances that are out of the monitored projects' scope. The innovative tool introduced in Hungary is described in the following sections, closely connected to the monitoring and reporting phase of the policy cycle. It provides adequate data for the evaluation phase. A well-functioning monitoring and reporting system must be based on evidence and must fulfil the requirement of objectiveness, comprehensiveness and independence.

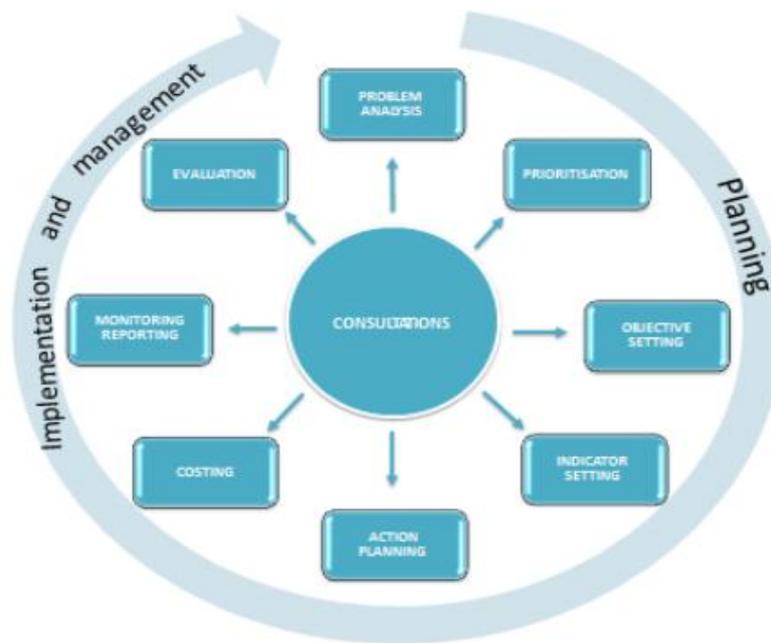


Figure 1. The strategy process phases [13]

4. The applied monitoring and reporting system – Pilot in Hungary

4.1. An innovative impact assessment tool

The impact assessment (IA) of public policies in a rapidly changing environment is facing challenges of different governance approaches, emerging demand for transparency and deliver more efficiency in public finances, that applies for public reform programmes. The Government of Hungary introduced a unique pilot evidence-based impact assessment framework connected to the developmental projects of the Hungarian Public Administration and Civil Service Development Operation Programme.

As mentioned above the theory of IA is not going to be discussed, however it is important to specify that impact assessments are carried out in almost any area of government interventions, initiatives, or even on any activity of a policy measurement (for example, in order to deal with market failures, or to examine inequalities in society). Developmental impact evaluations slightly differ from traditional impact assessments, especially in EU Cohesion Policy. In general, all interventions aim to develop social indicators, and development policy (actions to develop social indicators) should be less considered a separate public policy, rather a horizontal one, that involves all of them.

This innovative impact assessment tool introduced in Hungary is an ex-post and midterm (ex dure) developmental impact evaluation instrument to evaluate an EU Cohesion funded national operational programme and its individual developmental projects. The results and impacts of the projects are measured and continuously monitored both in project and national levels. The initiative is called the *Good State (and Governance) Indicators System (GSGIS)* and it originates from the

Good Governance Research⁵ carried out at the National University of Public Service (NUPS) in Budapest. The incentive is not only a conceptual framework, but an existing practice with an IT monitoring and reporting system, and a university unit carrying out various consultancy and administrative activities.

4.2. Evaluation methodology and process

The essence of the incentive is to individually explore all relevant, measurable outputs and expected results that can cause impact in the assessment framework (so called impact matrix) designed for the operational programme and its objectives in order to evaluate impacts on a more general level (see table 1).

The matrix aims to present development results or outputs (contents) in an impact-based structure. The outputs and results identified are measurable, have great importance in the development and in drawing conclusions for the future evaluation and interpretation of its expected (social) impact. This outcome approach overview also shows where, how and what improvements are aimed to be delivered to public administration in which target groups and seeks to find stakeholder benefits as well. Possible measurement points and methods are also identified.

		Impact dimensions				
		Reducing timescales	Reducing cost	Increasing access to services and procedures, reducing access barriers	Increasing service and procedure development related enabling and competence building	Increasing satisfaction and/or consumption
Target groups	Citizens					
	Businesses					
	Public bodies – public administration					
	My organization					

Table 1. Impact matrix exploring expected outputs and results on project level

⁵ The Good Governance Research is a flagship research focusing on developing and measuring state effectiveness and efficiency indicators related to state capacities and governance capabilities. This innovative work resulted in a unique governance performance measurement framework and the annually published (since 2015) Good State and Governance Report [14]. The Report was not created with the aim of repeating and adhering to the normative perspective of international rankings and the competitive and comparative approach. Instead, it is built upon the approach taken by international evaluations of performance, whereby government performance is inseparable from the given country's socio-economic position, as well as its special attributes and problems. Therefore, it is able to provide a reliable benchmark for the comprehensive measurement of government performance. It intends to be a tool supporting the governmental decision-making. For this reason, its primary target audiences are the policy actors and public bodies. The aim is to broaden and deepen the research's in-depth analysis of international methodologies, enhancing the corporate and territorial dimensions, and make data and analysis available online. Further purpose is to get acquainted with user feedbacks, and gain detailed knowledge about similar international practices in order to channel and embed them into the research.

In the matrix, the impact dimensions in each columns refer to different aspects of expected developmental project impacts based on public administration and operational program strategies and policy papers (reducing timescales and cost, increasing accessibility, increasing level of service, and increasing satisfaction). In the rows four impact target groups are highlighted for future analysis (citizens, businesses, public bodies – public administration, project recipient organization).

The matrix step is followed by the methodology development that aims at designing measurement methods and process fulfilling the criteria for being appropriate, valid, reliable and possibly inextricably linked to the goals, strategy and quality management of the project recipient organisation. Based on the completed matrix after a series of consultations an agreement is made on the measurements, on the indicators to be measured and on the methodology of the way to measure them among the recipient, the sponsor and the external (methodology) consultant.

Another key specificity of the methodology is target commitment which means that all developmental project recipient shall set proportionate and realistic targets to achieve for their performance measurements. This is where the preparatory phase of the process ends.

After the measurement methods comes the implementation phase. Recipient projects are responsible for measurement management and data presentation, that is supervised during the monitoring process. Since implementations often face the challenges of change management, measurement monitoring require to react with a decent flexibility to deadlines and indicator methodology as well. Therefore, an online monitoring IT system has been designed to track monitoring process, record measurement results and provide reports. It also supports the management of modification requests, external and internal task management, regular data presentations and executive information demands.

The final stage of the impact assessment method is the processing of received data, individual and aggregated evaluation of the measured results and inclusion of policy and national opinion surveys.

5. Conclusions

The operation programmes, as well as international and national strategies, aim to develop social, economic and administrative subsystems that are not project-level targets. The objectives of the public service development operational programme are implemented by public service organizations in the form of particular projects. The interventions of the not so numerous 50 projects set tasks and targets in order to achieve several goals. The common objective is to increase competitiveness of the country by spending less time on administration and shortening legal procedures.

The innovative measurement incentive, the system of the Good State (and Governance) Indicators is both a developmental impact assessment system and a performance monitoring system at the same time, in some aspects closer to the first, and in other aspects to the second.

It is important to distinguish impact assessments from (cost-)efficiency measurements. Good State Indicators do not primarily measure efficiency but impact of the project results, where outputs and inputs could be separately examined. There are limits to measuring efficiency because of the following constraints:

- Efficiency measurement is based on the direct relation between outcomes and inputs. How results and outcomes are generated from inputs and what factors contribute or hinder the outcomes requires separate analysis.
- Process constraints lead to numerous items being excluded from the outcomes/inputs quotient, like unintended outcomes and unexpected additional costs.
- Efficiency evaluation often requires comparative information and benchmark: what could have been developed with the same cost, or how much spending would have led to the same outcome.
- Despite the number of developmental projects is limited to approx. 50, the heterogeneity of their developments, their preparedness to develop and evaluate often cause difficulties to assessment process.
- Impact and benefit evaluation of developments require defining timescales and rate of returns, that could face several challenges in public sector. Like legal and institutional environment, parallel developments strengthening or weakening each other.

In conclusion, the incentive is a gap filler tool to ex-post and midterm evaluations and impact assessments. It enables deeper exploration of intended impacts of developmental projects and programmes in the public sector. It also provides information whether these developments make a significant contribution to the reduction of administrative burdens, to digital transformation of governance and to the competitiveness of the economy by increasing the Hungarian and European competitiveness and growth. It supplements the international indicator systems providing a more detailed impression of the implemented developmental project and their impacts.

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SMART CITIES 2.0 – CONNECTED CITY, OR HOW TO USE TECHNOLOGIC INFRASTRUCTURE FOR IMPROVING THE QUALITY OF LIFE

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Abstract

The concept of infrastructure related to the smart cities is being used to highlight the physical or social structures together with all the facilities that support the activities of a city helping it being functional. The concept itself refers to roads, railways, access points, buildings, distribution chains, water pipes and electricity lines, and, of course, digital networks. The article is focusing on the connection between the physical infrastructures with the digital ones, presenting, next to a bibliographic research made by the author, few technical solutions implemented successfully in the IoT field of development. In the same time there will be analyzed one of the biggest risks associated with the IoT, and that is related to privacy and security, risk that, due to the exponential growth of the numbers of equipment's that are nowadays connected to the Internet along with the reduced time left for the developers to release a new product, they are bigger and stronger. The vulnerabilities once discovered do allow hackers to infect the system causing damages that are very difficult to handle – and, like hackers are not enough, governments, as well as marketing companies, are also threatening our privacy.

1. Introduction

In most countries, building up the infrastructure elements is a centralized activity, managed by the government which has, as its objective, sequentially solving the issues that the specific country has; such as constructing of a drinking water network pipes or similar for the sewerage system. Future infrastructure projects should also have anticipation components, for the medium and long term, of the global phenomena [1].

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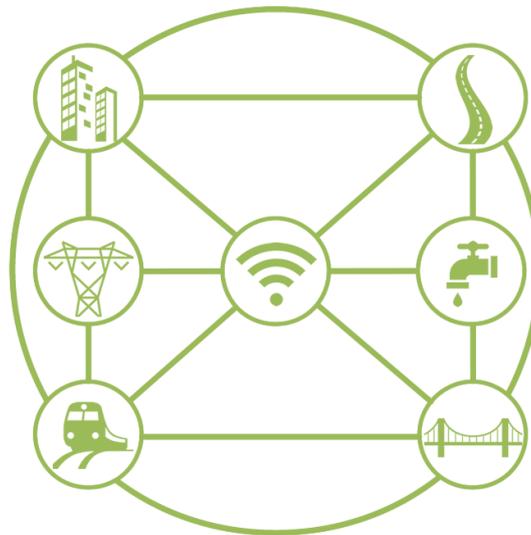


Figure 1. Infrastructure elements needed by a smart city

The urban infrastructure should be able to face pressures given both by the accelerated technical development – e.g. electricity grids should take into consideration the increased numbers of users that make use by their own solar panels, a situation that leads, on the long run, to diminishing consumption [2], as well as by the climate changes, which, due to increasing temperature differences between seasons and maybe an increasingly abundant rainfall, tend to cause large damage to the electricity transmission infrastructure [3].

2. Smart Infrastructure

Smart cities do need to isolate their infrastructure from events like those mentioned. They might need to build new kind of networks or to adjust the old ones in such a way as to meet the new challenges. Cambridge University – Center for Smart Infrastructure and Construction formulated one of the most comprehensive definitions of the concept, namely: Smart infrastructure is the result of combining physical and digital infrastructure with the aim of providing valuable information to help taking decisions faster and cheaper [4].

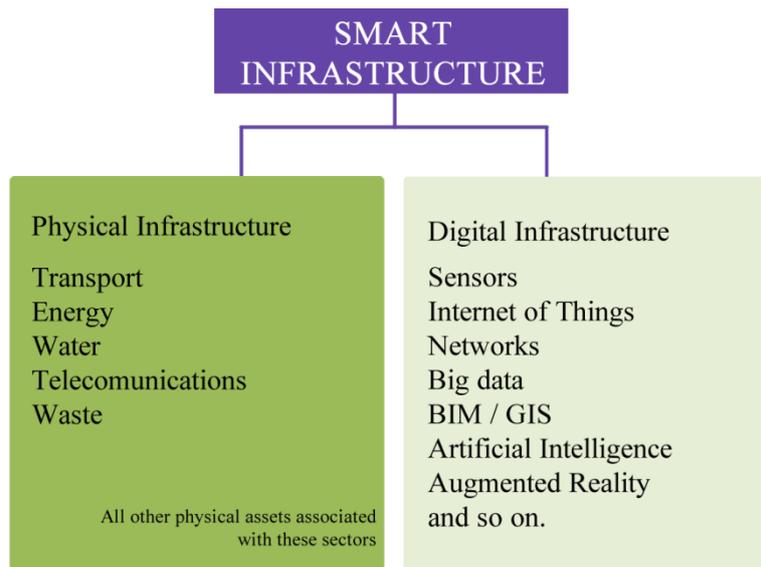


Figure 2. The relationship between the physical and digital infrastructure elements and components of smart infrastructure [4]

Data, by the fact that they build information, are the basis of an intelligent infrastructure [5]. An intelligent system uses the feedback received from different subsystems (like sensor networks, measurement and control equipment etc.) in the decision-making process. It can monitor, analyze, forward or even act based on the data collected from those subsystems [6].

We can imagine the road transport network in a city that, equipped with an intelligent traffic light sensing and traffic sensing systems, is designed to streamline car traffic by optimally changing the traffic lights or even signaling bypass routes in order to avoid congestion.

It is already known that investing in smart infrastructure brings social and economic benefits to public administrations at all levels [7], [8] – by that we mean more integrated, more efficient and resilient services. All this, however, means large investments. Songdo City of South Korea is one example of a smart city built from scratch. It enjoys the most modern infrastructure innovation: high-speed Wi-Fi, temperature monitors, power management consumption synchronized with the day light, a smart transport network, a waste collection system that ‘takes’ the garbage from the kitchens of the residents (for then, through a well-designed underground network it goes straight to the processing centers). All this, however, costs over 40 billion dollars [9] – nearly one fifth of Romania's GDP in 2018.

Cambridge Centre for Smart Infrastructure and Construction from Cambridge University has identified five weaknesses in infrastructure investment [4]:

1. Integration of digital elements. Many of the infrastructure projects do not foresee the integration of elements specific to modern technology such as sensors, actuators, etc.
2. Use of common industry standards. Infrastructure projects, if carried out at different times or if they belong to different industries, cannot be 100% interconnected because similar industrial standards have not been used.

3. Establish a common type of data and information. In order to maximize the benefits of smart infrastructures, investors need to consider using common data transfer protocols so that their synchronization does not get any difficulty.
4. The poor collaboration between the public environment – who wants to build up the infrastructure project, and the private one – which has the role of doing it. Often the experts of a camp fail to be understood by their counterparts in the other camp. The industrial environment and its operating mechanisms are different from the administrative / political one, which is why a deadlock can be reached. It is necessary for the teams of experts from the two camps to synchronize their vision and to use a common set of procedures and terms.
5. Security. What needs to be done in order to meet the growing demand for open (but not only) systems?

To minimize the effect of these weaknesses, we need to assess the opportunities that come from both technological and administrative environments, made with the utmost accuracy. Challenges must be understood and it should be measured the long-term impact of technology before the project starts. Cities need to be led on their way to becoming smart, they need a long-term vision in their intention to design smart infrastructures, and this is only possible through fruitful cooperation between all actors involved.

3. Internet of Things (IoT)

Clearly the Internet has undergone enormous transformations on most, if not all, levels of our society, starting from being technology driven up to being, nowadays, opportunity driven [10]. Therefore the split between the connectivity technologies from the wonderful applications able to run on top of it have been a painful [11], [12] but really instrumental shift in unlocking what is now often referred as the forth industrial revolution – also known as digital revolution [13]. Furthermore we will provide information about what is known as the best tool for building up smart infrastructure [14], [15] – Internet of Things (IoT).

The Internet of Things concept – known in the literature as IoT, is not as new as one might think. It first appeared in 1999 when Kevin Ashton – the British who created the RFID (Radio Frequency Identification) systems standards, used it to describe a system in which the Internet connects to the physical world through sensors [16], these having the role of collecting data for sending them over networks to servers. Since back then he described how the devices connected to the Internet will change our lives, which nowadays is already far from being science-fiction. We see everywhere around us either cars connected to the Internet (via GPS terminals installed on board), industrial or agricultural equipment remotely coordinated through the Internet, drones, even refrigerators and washing machines (the smart mobile phones, present in everyone's pocket, are the best proof of the development of this IT industry's segment).

In his article *Ten ways the Internet of Things is transforming our lives*, Chris Boorman - Head of Marketing for CA Technologies imagines the IoT in “silos” where sensor data make processes within a specific industry, vertical more efficient and effective [17]. He is giving ten examples of the use of IoT:

1. Smart cars
2. Smart clothing
3. Smart sports equipment
4. Smart lighting
5. Smart cities
6. Smart farming
7. Smart planes
8. Smart living spaces for the elderly
9. Smart security for the home
10. Smart traffic systems

What can be achieved when a smart car and a smart grid on a city level start “talking” to each other? A better traffic flow, for example. Instead of just having traffic lights set up on fixed timers, we will have smart traffic lights that can respond to changes in traffic flow. Traffic and street conditions will be communicated to drivers, rerouting them by the use of mobile apps [18] around areas that are congested.

There are now sensors monitoring and tracking all sorts of data; there are cloud-based apps translating that data into useful information and transmitting it to different sorts of computers, enabling real-time responses; and thus bridges become smart bridges, cars smart cars, and cities smart cities [19], [20].

3.1. Components of an IoT product

Sensors & cameras

Firstly, there are things that need to connect. These could be sensors, actuators, robots or any other technological equipment meant to act on human behalf – the most developed technological equipment is using sensors; and they are measuring everything: pollution, noise, acceleration, speed, temperature, humidity, light, pressure, torsion, tension, position, magnetic fields, electric fields etc. [21] – as we can see there is a large array of sensors available on the market. At the beginnings they used to be large and bulky and they were using a lot of energy to function [22]. Today they are almost invisible, energy efficient and their accuracy increased as well [23]. Moreover, this technology field is still evolving, miniaturization is trending and hopefully the Internet of Things by 2025 will be a complex mix of sensors measuring things and robots acting on the insights. If we are to look at statistics, today, the total number of connected equipment already reached 20.35 billion, with the prospect of reaching 75.44 billion in 2025 [24].

As well as sensors, video cameras today they are small enough to actually place them everywhere, to collect images – of course that this might be a subject of privacy issues but we will discuss this by the end of this article.

Connectivity

Secondly, just after sensors and actuators, there is a need to connect them, reliably, to the Internet. Nowadays, wireless connectivity is available everywhere and this is the key to the success of the IoT. Connecting all objects in the long-term future with cellular mobile phone technology is a matter of time since it is a technology which ensures availability, reliability and viability [10].

If we are to take into consideration the huge number of devices that are connected, it is easy to understand the energy consumption around the globe, that's why a lot of hardware developers are now focused on Low Power Wi-Fi [25] – an exciting class of Low Power Wide Area (known as LPWAN) networking technologies, is emerging, diversifying the connectivity portfolio [26] [56] [57].

Platform

Thirdly, the data collected by sensors and transmitted via networks needs to be stored and processed; this is known as the IoT platform, and typically it is using a cloud-based infrastructure [27] [55]. Therefore, it might:

1. Receive and send data via standardized interfaces, known as Application Programming Interface (API);
2. Store the data; and
3. Process the data.

Analytics

Data means nothing if it is not transformed into information [28], its value relies on the insights; therefore, data analytics needs to be applied to the data in order to make it the base for the decision making process. Big data analytics software stretch from simple statistical tools to more sophisticated machine learning approaches [29], with deep learning being the latest and top trend [30] – the AlphaZero computer build by DeepMind [31] as well as Watson from IBM [32] are the most notable examples.

User Interface

Finally, an important component is how the data / information is presented to the final users. There is an increased demand for the IoT products to have an appealing user interface, both web based as well as smart phone based due to the high numbers of people that are coming from non-tech areas but do want to use those products and services. Some developers found that a very well designed front-end do convinces clients to get in the IoT world [33].

In summary, the data collected by IoT devices undergoes a long journey. There is a data up-stream from the sensors, via the wireless networks, into the IoT platforms. After that the data meets the opportunities opened by the platforms allowing users to leverage Big Data opportunities. At the end, there is a data down-stream from the platforms back to the actuators or so on computer screens or smart phones [19].

When all components are found in the same system with the role to deliver services (and sometimes products), then we can really talk about added value created with the aim of developing citizens, the public and the private environment. A short example would be the smart devices that monitor the

evolution/involution of a chronic disease of a patient by transmitting real-time data to doctors who may intervene if the situation requires so.

3.2. IoT and Smart Cities

IoT applications and systems are organically developed – based on needs, but the impact they have on us depends on the degree of acceptance of new technologies by citizens, the public and the private sector [34].

The greatest risks that can arise from the extensive use of IoT come from the data security and cyber-attacks area. However, the laws of the economy must be understood, namely that the most trustworthy products and services will continue to be procured by the beneficiaries – demand and supply are strongly connected. The Statistic Portal tells us that the IoT market has exceeded a trillion dollar at the end of 2017, forecasting an evolution of up to 1.7 trillion dollar at the end of 2019 [20].

More and more cities in the world are experiencing the new dimension of sensor networks. Many are involved in pilot projects with the purpose of monitoring various activities in urban life, such as the level of noise or air pollution, parking management, health monitoring applications for persons suffering from chronic illnesses etc. **Thingful** is a search engine within this new dimension of the digital world. It contains indexes with the geographical positioning of all the fixed equipment connected in the world – a simple typing of a city's name can indicate on the map where different sensors are placed and what function they fulfil [24].

Thingful's goal is not just to provide a map of existing public or private equipment, but also to provide developers with solutions for smart cities to use these devices – of course, with the consent of the owners [24].

In Sibiu, Romania, was developed, thanks to the collaboration of „Lucian Blaga“ University of Sibiu with the University College of Southeast Norway, Norway, the project **A Mobile Platform for Environmental Monitoring** with the aim of producing an environmental map that provides all actors in the city's perimeter with information on air quality and noise pollution. The Faculty of Engineering within „Lucian Blaga“ University has developed hardware modules that can be placed on cars and which are meant to collect traffic data both when the car is in motion or in the parking areas, when the car is parked.

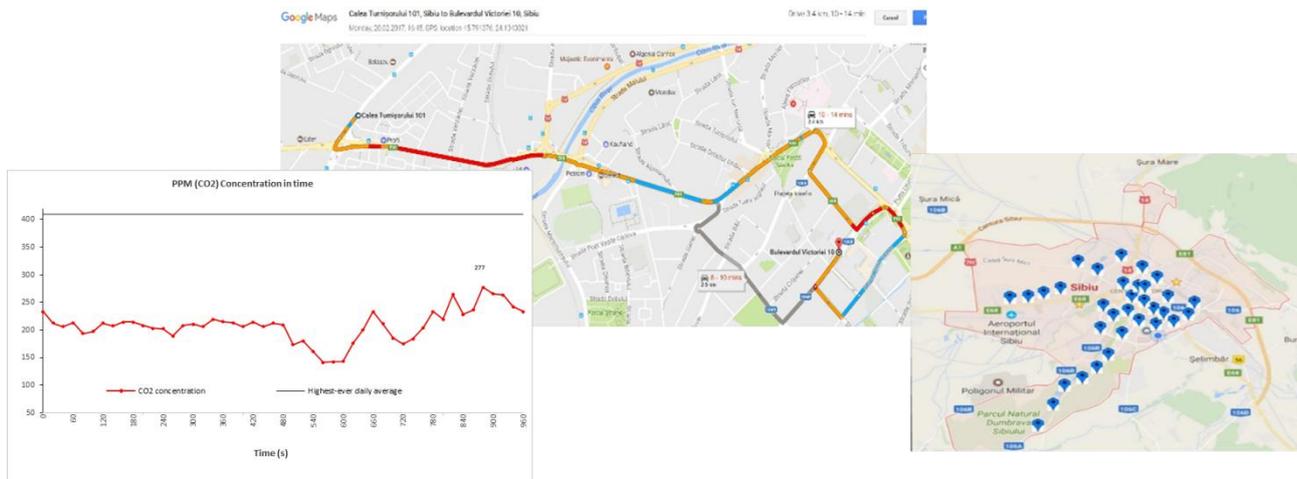


Figure 3. Data collected through mobile traffic platforms in Sibiu [35]

The collected data is transmitted via a GSM module combined with a GPS module implemented on the equipment to a server that has the role of storing them and providing them for analysis to the actors involved. Two prototypes of sensors were realized, the last of them (and the most advanced) being able to collect both data such as the CO₂, NO_x level as well as the amount of suspended solid particles. The project is still in the pilot phase, with only 16 cars equipped with such modules in the city, being completely functional, a number of approximately 100 units will be produced to be mounted on vehicles [36].

3.3. Privacy and the Internet of Things

Starting with the beginning of Web 2.0, Internet users generated a huge amount of data by themselves leaving behind a digital trace. Nowadays, due to the mobile apps, it is even worse – developing companies or the ISPs know where we are, what we buy and so on [37]. Like this wouldn't be enough, cities like London, New York or Shenzhen in China have huge numbers of CCTV cameras as well [38] – and those cameras are picking up every move of the citizens even if they don't use a smartphone.

Even though a lot of people feel anxious when they discover how much information they are leaving behind, there are advantages too. Collecting, sharing, mining of data offer citizens – IT users or not, services in a better way, it helps reducing crime and so on [40].

However, people will need more assurance that all this is being used fairly, that their privacy is respected and the data they generate isn't just being sold without they're seeing no benefit from it. Any other way won't bring the full benefits of this generation of technologies, which might give us a huge advance in social coordination, increasing the effectiveness of how our cities are run [19]. There are already many emerging signs of the scale of this potential backlash, the smart companies realize this, and they realize that we have to have an open dialogue [41] which shows people the benefits they can have by giving up some of their personal data [42]. More and more sensors monitor our lives, and, those sensors are becoming smarter and smarter [43], therefore, it must be taken into account citizens' degree of tolerance for the invasion of data collection equipment – as the number of equipment increases, the citizens feel more supervised [44].

EURODIG and SEEDIG are two of the major events in which stakeholders from the IT world, debate on the legislation that monitor individuals' communications [45], helping them fight against

companies and governments privacy aggression on one hand, and help them facing National Security threats on the other hand (EURODIG, SEEDIG). Being part of a completely connected society means that there will be implications on the economic wellbeing of our cities, so it's quite important to find the balance between privacy and security, so that citizens can continue to move forward enjoying in the same time a very safe society [46].

Therefore, regarding the Internet of Things users find themselves in a very interesting place, where, as the Internet connects everywhere it's very important that when they connect with all the pieces of technology they choose how much information they are prepared to give and how much they want to retain. It is particularly important that that choice is made implicit to the consumer / user / citizen and not taken for granted by any Internet of Things company [47].

The most common questions here are: (1) „Who produces and controls the equipment?“, (2) „What do they measure?“, and (3) „Who has access to the data?“. All these questions are important and answers to them must be available to every citizen in a language that is as easy to understand as possible so that there is no confusion.

Other questions such as those related to the purpose of collecting data, the changes that will follow from these operations and the benefits of citizens, the public and the private sector are also important [48]. Data storage management mechanisms (often software) are also commonly found in studies about IoT.

Many cities consider elements of security (obviously not only digital) and intimacy as key to sustainable and harmonious development. The level of trust and acceptance of the new by citizens is crucial in developing smart solutions. However, there is little written information on how citizens see these things.

Dan Gârlaşu, from Oracle Romania, warned IT users that in the future smart cities may be more vulnerable to hackers than smart computers and smartphones are today [49].

With billions of interconnected devices all over the world, cyber security challenges are increasingly addressing also the IoT dimension of the digital world. Often the media poses on the front page of the newspapers titles that refer to hacking actions of different types of equipment. In the summer of 2015, the car producer Fiat recalled 1.4 million vehicles for software updates due to the risks of the machine safety being affected [3]. At the end of 2017, a clip posted on YouTube featured two hackers who stole a luxurious car by remotely cloning the door opening device and starting the vehicle [24]. Shortly after the event, CNN tech has produced the „Watch thieves steal car by hacking keyless tech” material explaining each action of the hackers [50].

Cesar Cerrudo, Chief Technology Officer of IOActive – one of the most prestigious digital security consultancy corporations, stated for The Independent in the UK that „a malicious hacker could use the information to manipulate traffic lights to cause jams and alter speed limits” [51].

Danny Bradbury from The Guardian newspaper said: “I see an opportunity to pay a premium for retaining my own data, or at least guaranteeing that my data is de-attributed from me,” he said, adding that he'd happily pay his fitness wearable provider another \$1.99 (£1.33) a month not to sell his data somewhere else. [52]

4. The weakest link in IoT & Conclusions

“Addiction” and use of IoT technologies is even worse than losing privacy, and this is mostly because the users do agree to pay for the gadgets with their privacy, not paying attention to any risks – and these encourages developers not to pay attention too, and governments to be more intrusive. More or less it is the same with public speaking. Most of the people do feel nervous about using the words, paying attention to each of them and so on... It should be similar with the data that we share over the networks onto the digital space.

Many people find those technologies very compelling – smart phones for example, considering them as being “cool”, and by that they just sign the Terms and Conditions page without paying attention to anything, not seeing any risk.

If we are to take that a bit further, then we will see that people aren’t addicted to the technology itself, but to the comfort that this might bring, and this is very dangerous because, one way or another, everybody is struggling to increase their comfort bit by bit.

We started from the assumption that technology, and the whole infrastructure that comes with it, will help us increasing our life quality – this concept being difficult to define but usually used by researchers as an indicator [54] and we saw that, before long, critical infrastructure in our lives will be smarter, connected and will enable us to do all sorts of new and interesting things. It is a matter of time that most successful IoT stuff will just become normal – and that will be the mark of its success. Many of those technologies that once represented the top ones are today viewed as part of everyone’s life helping us to increase our comfort, satisfaction, level of independence, education, wealth and so many other things that we, as individuals, are doing regularly – this is what we might start thinking a `smart city 2.0` is.

However, the dimension of IoT is not just a goal to be achieved – often mayors, hearing the concept but not understanding it in its depth, want to invest in IoT sensors and equipment for their cities – it is a remarkable symbiosis between society and technology.

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RESEARCH ETHICS: REALITIES AND PERSPECTIVES (THE CASE OF THE REPUBLIC OF MOLDOVA)

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Abstract

Every scientific research activity involves responsibility on several levels: scientific, moral, social, political, etc. The researcher conducting a research is directly responsible for the results of the research. The central element of any ethics of scientific research activity is the researcher's responsibility towards his work, but above all the results of the scientific activity. The researcher must justify the research, justify the usefulness and validity of the results obtained, try to bring a benefit to society through his research. In view of these aspects, any scientific research should be subject to moral censorship.

In this context, this article aims to present the current situation in the field of ethics and deontology of scientific research in the Republic of Moldova, identifying the progress made by the country in this respect, the existing deficiencies in the field, as well as designing the solutions for the identified problems.

1. Research ethics and Responsible Conduct of Research

Research is based on the same ethical values that apply in everyday life, including honesty, fairness, objectivity, openness, trustworthiness, and respect for others. Over many centuries, researchers have developed professional standards designed to enhance the progress of science and to avoid or minimize the difficulties of research. Though these standards are rarely expressed in formal codes, they nevertheless establish widely accepted ways of doing research and interacting with others. Researchers expect that their colleagues will adhere to and promote these standards. Those who violate these standards will lose the respect of their peers and may even destroy their careers. Researchers have three sets of obligations that motivate their adherence to professional standards. First, researchers have an obligation to honor the trust that their colleagues place in them. Science is a cumulative enterprise in which new research builds on previous results. If research results are inaccurate, other researchers will waste time and resources trying to replicate or extend those results. Irresponsible actions can impede an entire field of research or send it in a wrong direction, and progress in that field may slow. Imbedded in this trust is a responsibility of researchers to mentor the next generation who will build their work on the current research discoveries. Second, researchers have an obligation to themselves. Irresponsible conduct in research can make it impossible to achieve a goal, whether that goal is earning a degree, renewing a grant, achieving tenure, or maintaining a reputation as a productive and honest researcher. Adhering to professional standards builds personal integrity in a research career. Third, because scientific results greatly

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influence society, researchers have an obligation to act in ways that serve the public. Some scientific results directly affect the health and well-being of individuals, as in the case of clinical trials or toxicological studies. Science also is used by policy makers and voters to make informed decisions on such pressing issues as climate change, stem cell research, and the mitigation of natural hazards. And even when scientific results have no immediate applications as when research reveals new information about the universe or the fundamental constituents of matter new knowledge speaks to our sense of wonder and paves the way for future advances. By considering all these obligations toward other researchers, toward oneself, and toward the public, a researcher is more likely to make responsible choices. When beginning researchers are learning these obligations and standards of science, the advising and mentoring of more-experienced scientists is essential. A “scientific standard” refers to the application of these values in the context of research. Examples are openness in sharing research materials, fairness in reviewing grant proposals, respect for one’s colleagues and students, and honesty in reporting research results. The most serious violations of standards have come to be known as “scientific misconduct” [9].

Standards apply throughout the research enterprise, but “scientific practices” can vary among disciplines or laboratories. Understanding both the underlying standards and the differing practices in research is important to working successfully with others.

Ethics are the moral principles that govern a person’s behavior. Research ethics may be referred to as doing what is morally and legally right in research. They are actually norms for conduct that distinguish between right and wrong, and acceptable and unacceptable behaviour. According to the Research Excellence Framework, 2014, research is “a process of investigation leading to new insights, effectively shared.” Research is a multi-stage process. Ethics are central to the research process [13]. Researchers need to take care of various ethical issues at different levels of this process. The reality is there can be ethical concerns at every step of the research process [1].

Even though few aspects of research ethics have been set out in legislation, moral values mostly govern the conduct of research. Ethical considerations have been gaining paramount importance across the research community. With an increase in the public concern about the limits of the inquiry and legislative changes in human rights and data protection, the ethical considerations have come to the forefront in social research. With the advent of technology, more and more ethical issues have been arising in the field of communication research. According to D.B. Resnik research ethics is the common denominator for responsible for the ethical conduct of their research. They have to take care of all the ethical issues at every stage of the research process [12].

In conclusion, researchers have to take the responsibility for the ethical conduct of their own research. Basically, we can state that ethics are researcher's responsibility. The foremost responsibility of a researcher is to take care of the safety, dignity, rights and well-being of the participants. Researchers have to take care of various other issues at different stages of the research process. Both the researcher and participants have an important role to play. Researchers have to take care of the participants’ right and must consider their research from participants' perspective.

1.1. Ethics Committees

Universities in the Republic of Moldova have **Ethics committees** established by the administrative structures (in cases of Universities - Senates) or at the disposal of the head of the institution – the case of the Academy of Sciences of Moldova (approved by its administrative structure). Ethics Committees deal especially with professional ethics and their meetings are organized ad hoc, in

case of necessity. In practice, these committees discuss public behavior of the employees and they function not properly.

The situation is different with "Nicolae Testimiteanu" State University of Medicine and Pharmaceutics. There are 2 Ethics committees in this university – one is dealing with professional ethics issues (as in other universities too) and the second one - the Ethic committee for research - is dealing with evaluation of research proposal. The Ethic committee for research is more organized as far as all the research proposals that were proposed for financing are evaluated for respecting the Ethics and Bioethics Code. At the same time, at the university functions a Chair on Philosophy and Bioethics and its professors gained their specialization in the USA, by means of MA and PhD programs.

The Ethics committee of the Academy of Sciences is composed of 7 persons (as far as in the structure of the ASM were 6 scientific sections – one representative per section and one person from the high hierarchy of the institution). Its members are academicians with reputation in the scientific community and society. Its meetings are organized also ad hoc, based on public information about misconducts in research or in case of somebody's/personal addressing the hierarchy of the institution. This committee was in charge to deal with all research community, at the moment it deals only with issues which arise within Academy's members. Usually, its meetings are closed for other participants. The national research institutes at the moment have no ethic committees. Also, researchers have to rely on their common sense to eliminate and minimize various crucial ethical issues.

Recently, the National Agency for Quality Evaluation in Education and Research approved the legal framework concerning professional deontology and ethics committees:

- The Code of Ethics and Professional Deontology of the Scientific and scientific-didactic staff.
- The Regulation on the organization and functioning of the Ethics Committee of the National Agency for Quality Evaluation in Education and Research in the field of attestation.

Therefore, there is a need for a common framework both at institutional, as well as national level, in addressing the ethical issues in our country. Keeping in mind the aforementioned concerns, the following suggestions may prove to be fruitful:

- The research institutes must establish properly functioning research ethics committees.
- The universities must have properly functioning research ethics committees at the departmental level or faculty level.
- These committees must be committed to high quality, transparent and accountable research ethics throughout the country.
- The committees have also to monitor the progress of the studies.
- Also, the researcher has to update the committees regarding the events and issues and status of the research.

- Rules of conduct have to be submitted to such committees for consideration, guidance, improvement and approval before the beginning of the study.
- At last, the thesis or the research papers have to be submitted for the examination of these committees. - We want to mention that the PhD theses are placed on-line in our country.

2. Current situation in the fields of research and innovation

The Republic of Moldova has engaged in a series of reforms at the moment, including the fields of research and innovation. This reform proposes streamlining the research and innovation system, in particular the process of allocating budget allocations for research and development, innovation and technology transfer projects and increasing the impact of research and innovation on the national economy. This reform also directly focuses on the process of modernization of the research and innovation system (mainly done through doctoral studies and postdoctoral programs). At the moment, PhD studies (3rd cycle) and postdoctoral programs take place in 46 doctoral schools, organized in 19 organization in the fields of research and innovation, some of which form consortia, national and international partnerships with other higher education institutions and scientific research institutions.

The number of enrolled doctoral students has remained relatively stable in the last decade, even with a slight increase in recent years (Figure 1.).

The moderate increase in the number of enrolled doctoral students, against the backdrop of the significant reduction in the total number of students in the Republic of Moldova, can be explained by the changes in the organization of doctoral studies, in maintaining the number of doctoral budget grants at a relatively steady level (the increased interest of the state in promoting young researchers) and the limitation of doctoral positions on the basis of tuition fees. Moreover, the need to meet the requirement for university lecturers to have a scientific degree, according to the provisions of the Code of Education No.152/2014, has also favoured increasing the interest in obtaining the scientific title and the attractiveness of certain areas and the autonomy of the institutions that organize the doctoral studies and the postdoctorate programmes [11].

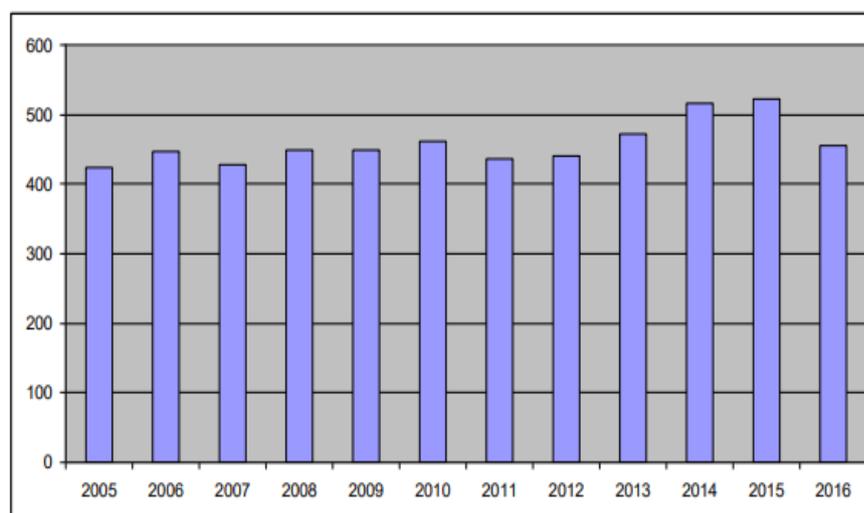


Figure 1. The number of enrolled doctoral students in the Republic of Moldova during 2005-2016

The initiated reform in the fields of research and innovation is aimed at redressing the binary research and educational system of the Republic of Moldova, where universities mostly focus on "teaching" and research institutes on "research". The circulation of knowledge and human resources in the country's public system is now more important than ever. Stimulating cooperation between universities (where younger generations are studying) and research institutes (with senior research staff) should be a driving force behind reforms and increasing the attractiveness of PhD.

Also, the fast review of the framework conditions for innovation through the implementation of a coherent set of public policy measures to create and stimulate an environment in which business involvement in research and innovation is supported, (a legal environment to support spin-offs and knowledge transfer, better funding opportunities for risky projects), and increased use of public funding for business research and innovation are necessary.

Doctoral studies represent a means of interconnecting research and education, reflecting these trends, one of the most important being *internationalization*. Institutions choose to internationalize their studies mainly for the following reasons:

- Increasing the quality of education and research;
- Effective preparation of students for life and professional activity in a dynamic economic environment;
- Increasing the international reputation and visibility of the institution;
- Creating strategic partnerships with internationally renowned institutions, thereby also enhancing the awareness of their own institution;
- Diversification of attracted financing sources;
- Attracting new partners from the economic environment (e.g. multinational companies), following the international openness of the institution [10].

The internationalization of doctoral studies is also of particular importance in European strategic documents. Among the many trends shaping the face of modern higher education few are as powerful and tangible in their impacts as internationalization [14]. The fact that internationalization of education has remained prominent on the global agenda is easily explainable taking into consideration the number of challenges it poses to national educational systems. One of the most obvious is connected with the by-effects of globalization. Accessibility and diversification of labour markets combined with the increased job and academic mobility stirred competition to an extent when "it is the market, not the state, that is the instrument for shaping educational values", spurring educational institutions into "interconnectedness and multi-level, multi-directional relationships" and bringing about the "culture of accountability" [6]. Also, the significance of curricula internationalization has long been recognized by scholars and a lot has been said about acute necessity of globally competent educators [6]. Curricular change is shown as a "powerful and practical way to bridge the gap between rhetoric and practice" [7].

Internationalization is an essential component for the development of research quality and doctoral education in research and innovation organizations. At the same time, international experience is

essential for the professional development of PhD students, regardless of their field and career [5]. Therefore, universities and research institutes should address the internationalization of PhD in a coherent and strategic way.

Doctoral studies/programs are seen as an important element in increasing the international attractiveness of European universities, and the promotion of international cooperation and doctoral mobility has become an integral part of institutional strategies. The ways in which internationalization is carried out are varied: joint doctoral programs, doctoral studies in fellowship, European doctoral studies, international and trans-sectoral mobility schemes, internal internationalization of European universities (more international staff, summer schools and international conferences, etc.)

As a result of the policies promoted, doctoral studies in developed countries are increasingly international. One in ten students at the master's or equivalent level is an international student in OECD countries, rising to one in four at the doctoral level. Almost 60% of international doctoral students in OECD countries are enrolled in science, engineering or agriculture. The United States hosts 38% of international students enrolled in a programme at the doctoral level in OECD countries. Luxembourg and Switzerland host the largest proportion of international students, who make up more than half of their total doctoral students. International master's and doctoral students tend to choose to study in countries investing substantial resources in research and development in tertiary educational institutions. Of all international students enrolled at the master's or doctoral level across OECD countries, the majority (53%) are from Asia, and 23% are from China alone [8]. The number of international PhD students who have obtained in the USA the degree in science and engineering has increased to 51% in 2003. Also, universities in the United States award more PhD degrees than those in any other country [2].

For the Republic of Moldova, the internationalization of doctoral studies is important, also in the context of the necessity of providing a critical mass of resources and competencies, especially in the context of the minimization of the number of local students. International experience shows that in order to increase the level of internationalization it is necessary to allocate more consistent resources for this purpose, financial and human, to conclude institutional agreements with universities from other countries, to stimulate international mobility through the process of assessment and accreditation of doctoral schools. All these activities should be carried out under an umbrella - a coherent and clear internationalization strategy that takes into account local specific (the risk of human resource emigration) and be linked to policies in related fields.

The participation of foreign experts in the evaluation of PhD thesis in the Republic of Moldova is another indicator that characterizes the internationalization of doctoral studies. During 2014-2017, 309 experts from abroad were included in the Specialized Scientific Councils (SSC), which represents 17.6% of all SSC members. In scientific fields, the share of foreign experts does not vary significantly, from 14.5% in natural sciences and agricultural sciences to 20% in engineering sciences and technology (Figure 2.).

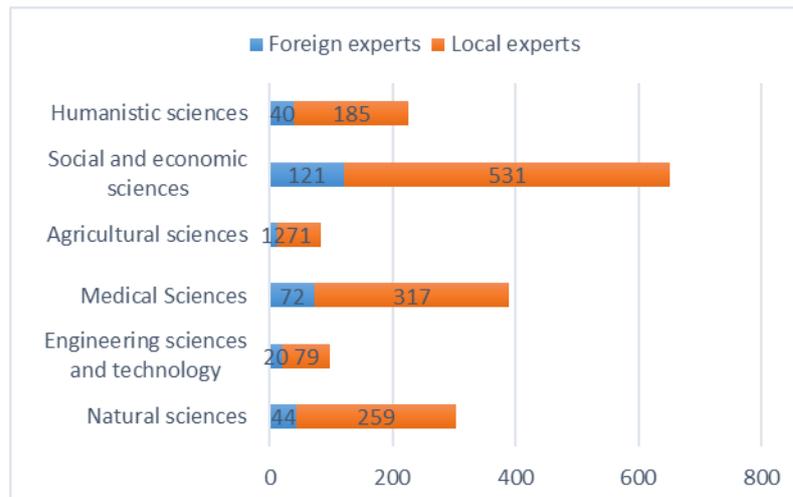


Figure 2. Number of foreign and local experts in the Doctoral Thesis Councils formed during 2014-2017, by fields of science

Experts represent 17 countries, most of them being from Romania (243 people), followed by Ukraine (30) and Russia (13). We find that during 2014-2017 the number of foreign experts is relatively high in the SSC and probably, no other evaluation of the scientific, educational or cultural activities in the Republic of Moldova implies such a massive involvement of external experts. They are included in almost all the activities connected to doctoral theses, the thesis of the prestigious scholars from abroad, but also in many other SSC. The involvement of experts from abroad is very important in the conditions of a small scientific community, such as the Republic of Moldova, where it is complicated to avoid conflicts of interest.

At the institutional level, the efforts to internationalize higher education suffer from insufficient financial and human resources and internationalization actions often happen at the initiative of foreign partners. Universities in the Republic of Moldova have not developed yet organizational and managerial capacities to discuss with peer-to-peer partners in international universities. At the individual level, admission as a doctoral student in a foreign university is the effort of the candidate himself; there are no formal mechanisms at the national level to support doctoral mobility. Signing agreements with partner institutions from other countries will allow PhD students from the Republic of Moldova to visit these institutions for a research period or in case of accepting to coordinate doctoral theses and will improve the quality of doctoral studies. In this case, the most important risk of internationalization is the risk of migration of talented and well-prepared human resources (brain-drain), but it could be managed [11].

From different activities of internationalization, organizations in the fields of research and innovation more often enter into partnership agreements with partner institutions and benefit from the mobility schemes offered by international programs, although the number of foreign students and teachers visiting the Republic of Moldova is not high. The reduced number of doctoral students from abroad (PhD students who are not Romanian speakers) does not stimulate the development of doctoral programs in international languages. In conclusion, we must mention that due to the initiated reforms in the fields of research and innovation, the organization and functioning of the doctoral studies have known a steady improvement. The experience of good international practices from different countries will increase the quality of doctoral programmes and studies and will decrease the cases of research misconduct due to Open Access to research data. In this context, it is necessary for the institutions which deal with the fields of research and innovation to follow

international standards in research ethics and integrity (ex. The European Code of Conduct for Research Integrity) and to adopt good practices of research conduct.

3. The shortcomings of the research system:

The poor quality of PhD thesis determined by:

- the concentration of decision-making in small groups of people, by appointing the same persons in different specialized scientific councils (SSC), regardless of the subject of the thesis, based only on tradition, local reputation or titles held;
- excessive formalism in establishing the composition of SSC, which make the defense of interdisciplinary, multidisciplinary theses or those in new specialties for the Republic of Moldova more difficult to defend;
- the participation of the SSC members and the reviewers in the repeated evaluations of the same thesis, as they are often also members of the relevant seminars, expert committees or the primary research unit;
- poorly qualified human resources in the PhD students' training, provided that the doctoral coordinators have a low performance;
- insufficient training of people in competitive scientific fields and in important fields for the country's economic and social development;
- the impossibility of conducting doctoral studies in some fields / specialties, also considering the fact that a scientific coordinator/supervisor can simultaneously guide no more than 5 doctoral students;
- inhibiting the creativity and critical thinking of the doctoral student in the conditions of the total dependence of the doctoral scientific coordinator/supervisor and the possibility of his / her abuses, with repercussions on the level of professional and transversal competencies of the doctoral students;
- conflicts of interest and breach of good conduct norms.
- the existence of ambiguous and contradictory provisions in the drafting of doctoral theses and in the evaluation methodology [3].

Plagiarism and other scientific frauds that manifest themselves through:

- tolerance of conflicts of interest / scientific frauds, determined by the limited size of the scientific community, the limited number of specialists in branches / scientific profiles and the lack of functioning of the reputational mechanisms in the Republic of Moldova;
- the existence of scientific domains / specialties in which the theses are defended "easier" - acceptance of plagiarized theses, written by other authors, without scientific novelty, appointment in the doctoral commissions of a small circle of "comfortable" people, marginalization of people with critical opinions ;

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- the reduced effectiveness of the thesis assessment system, especially in areas/domains where the number of the scientific degrees awarded over the last two decades has increased significantly;
 - the lack of a critical mass of researchers / decision-makers who would like the radical change of the situation;
 - emigration from the system of the best and most sophisticated researchers;
 - the degradation of the academic environment with unfavorable consequences on the way of governance in the Republic of Moldova
 - lack of a structure that would regulate the integrity and ethics of research [4].

4. Solutions for the improvement of the research system:

Achieving a knowledge-based society requires a large number of highly qualified employees, whose knowledge, skills and experience guarantee the society's continuing development and competitiveness. It is important to motivate higher education and research institutions to become more open and competitive. As a result, it will enhance capacity of the Republic of Moldova to hire highly qualified specialists from abroad, or train them here. This will significantly improve general research and innovation capacity.

The solutions for the improvement of research, development and innovation system are:

1. Improving the quality of higher education by supporting the employment of international teaching staff;
2. Expanding the pool of specialists holding PhDs by supporting the enrolment of talented international students in doctoral programmes of universities from the Republic of Moldova;
3. Facilitating international research cooperation by supporting short-term research projects of visiting doctoral students in the Republic of Moldova;
4. Developing international cooperation networks by supporting the mobility of doctoral students from the Republic of Moldova;
5. Supporting the participation of young researchers in the international exchange of knowledge;
6. Taking into account the scientific performance / competence and professional integrity (reputation, conduct) when selecting experts into different committees/councils;
7. Creating a national structure dealing with research ethics and integrity;
8. Establishing a legal framework concerning research ethics and integrity;
9. Ensuring effective and long-term access to publicly funded information and publications (promoting the Open Science concept and the transfer of information, knowledge and technology to the society and businesses).

10. The open access will maximize the access to research outputs, these being distributed online and will make research interconnected and networked. The open access will take ideas to the market and will bring solutions to societal challenges. Also, by means of Open Science scientific research, data and dissemination will be accessible to all levels of an inquiring society.
11. The new methodology of conferring and confirming scientific titles (project) elaborated by the National Agency for Quality Assurance in Education and Research in collaboration with the Ministry of Education, Culture and Research (2019) establishes new criteria of public defense for PhD theses. These criteria contribute to the transparency of the scientific results. They are available for the whole scientific community. In this way, the scientific community will help to foster better relationships among researchers who seek for the same goals and will establish standards of research conduct.
12. In the context of digitalization and electronic governance, the National Roadmap for the Integration of the Republic of Moldova into the European Research Area for 2019-2021 ensures open access to state-funded scientific outcomes through the introduction of digital technologies in all areas of the research and innovation system and encourages and promotes cooperation and knowledge transfer between science, business and society at national and international levels. This fact will be achieved by creating a register of scientific outcomes, by enhancing cooperation and improving the exchange of information between science, business and society and by ensuring effective and long-term access to publicly funded information and publications (promoting the Open Science concept) [15].

In conclusion, we would like to mention that it is important to respect ethical norms in research, as ethical norms **promote the** aims of research, such as knowledge, truth, forbidding fabricating, falsifying, or misrepresenting research data. Also, research involves cooperation and coordination among many people in different institutions and fields, ethical standards promote the **values that are essential to collaborative work**, such as trust, accountability, mutual respect, and fairness. Therefore, the norms of research promote a variety of important **moral and social values**, such as social responsibility, human rights, compliance with the law, and public health and safety.

Also, it is important to underline that communication of the results of research is an essential component of the research process; research can only progress by sharing the results, and the value of the research is maximized through wide use of its results. The Internet gives us the opportunity to bring this information to the audience and to use it in new, innovative ways. This has resulted in Open Access, as it is crucial in promoting the interests of researchers, scholars, students, businesses, and the public.

Additionally, we would like to point out that e-government deals with the development of online services to the citizen, and government to employee is the least sector of e-government in much e-government research. Some researchers consider it as an internal part of this sector and a successful way to provide e-learning, bringing researchers together and encouraging knowledge sharing among them.

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INTRODUCTION OF INTEGRITY IN HUNGARIAN PUBLIC ADMINISTRATION

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Abstract

The requirement of integrity is a new area of Hungarian public administration. Better to say, the precludes and principles could be found in administration before its actual legal institution by law.

In this paper I am going to analyse the antecedents of integrity in Hungary, then the areas of evolving of integrity will be shown step by step (e.g. acts, education, and preparation). Later, I will write about the actualities of integrity in Hungary.

At the end of my paper you can read about the results and possibilities of the introduction of integrity in the administration of Hungary.

1. Introduction

The integrity is a new institution of the administration in Hungary. This requirement appeared in different areas and stages in Hungary recently, for example in the administration, legislation, public life, and in law enforcement. We need to ask the question what is innovative in the existence of integrity in Hungary. The substantive content of integrity had always existed without the usage of this term (integrity) in many areas of law and acts in Hungary.

At first, I am going to analyse the question whether the introduction of integrity in Hungary has brought about any novelty.

Secondly, I am demonstrating the areas of integrity in Hungary. It involves lots of different stages in public life. It is worth considering the exposition of the acts which regulate the main rules of integrity. We face that these acts do not mention the term of integrity, but circumscribe its important elements. On the other hand, we realize that there are a few authorities for whom only a few actual elements of integrity are mandatory, but the integrity is a clear requirement and must have a full effect. It may seem a bit strange. Integrity affects administration, legislation, law enforcement and public life in Hungary. As a specialty I will show the realization of integrity in the case of law enforcement agencies, which have to accommodate the most requirements of integrity in their daily operations, but they are not obliged to employ integrity specialist. The integrity is a significant part of authorities in Hungary, the resilience of law enforcement organizations could be the next stage of integrity in Hungary.

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At the end of my paper I will write about the actualities of education of integrity in Hungary.

2. Is integrity a new concept in Hungary?

The usage of integrity in the heading of acts is new in Hungary. It started in 2012 [1]. The main rule of this Edict was not about integrity, but mentioned the requirement of integrity in the point of network services at a national stage.

The first laws about integrity came into force in 2013, so we can establish that the integrity as a special main area of legislation appeared at this time. The integrity became important requirement for all areas in state. For example, public administration [2], law enforcement [3], national defence [4], judges [5] and prosecution [6]. The relevancy of integrity can be detected in the Decision of Constitutional Court of Hungary [7], which partly destroyed the Integrity Policy of Mansion Court.

We can claim that integrity is a new phenomenon in Hungary, but it is not completely true. If we examine the legal system of Hungary, we will recognize that the main postulations are there in lots of acts in Hungary. The most important of them is the requirement of the anti-corruption, which is an old pillar in the law in Hungary. Other modules can be found in the legal system of Hungary.

Hungary joined the Criminal Law Convention on Corruption of the Council of Europe in 2002 [8]. There had been lots of acts containing requirements of anti-corruption in Hungary before the introduction of integrity, such as the area of procurement [9], economic competition [10] etc.

We have to ask the question whether the integrity is a new concept in Hungary. If we want to find the adequate answer, we must examine the essence of integration. If the integrity is the equivalent of the requirement of anti-corruption, then the integrity is not a new legal institution in Hungary. But we know that it is more than that. The requirement of anti-corruption is only one of the many parts of integrity. What is integrity in fact? What does integrity mean and when did it come to Hungary?

There was a survey in Hungary in the spring of 2011, which materialized in the Integrity Project [11]. This project was funded by the European Social Fund from 1 December 2009 to 30 April 2012. The aim of this project was the rollback of corruption in Hungary via the national adaptation of international methods, to increase the awareness in the area of identification and management of corruption risks [12]. This project resulted in a new approach in Hungary: integrity. The Hungarian participants expected the professionals from European Union to show new control methods, which were suitable for the confinement of corruption, but they started to talk about integrity (then new and unknown term in Hungary) [13]. The integrity is more than anti-corruption. "It contains the following values: incorruptibility, fairness, honesty, immediacy, neutrality, prudence, trustiness, detachment, customer-centricity, respect, decency. The civil servants have to strive to work and live for commonweal; the authorities must meet all of these values as well." [14]

The above statements show that the integrity has double content from the point of view of anti-corruption. The requirement of anti-corruption is a pillar of integrity, and integrity is a tool of fighting corruption.

The term of integrity is formulated by the EU General Data Protection Regulation (GDPR), it shows the relevance of integrity, and because one of the most importance areas is the protection of privacy

law uses the tool of integrity in European Union. The integrity is a requirement of personal data management [15].

In summary, we can state that integrity is a new legal term in Hungary.

3. The different areas of integrity in Hungary

Integrity, or rather, its main elements emerged and were able to exert broad effect in Hungary. The main requirements of integrity had been there in lots of public sectors previously, than the legislator started to use the concept of integrity and commenced legislation according to the new approach of integrity.

There are important legal postulations that the National Bank of Hungary recommends for the financial sector; The National Bank of Hungary informs the European Securities and Markets Authority about the protection of the integrity of the internal market and it introduces alternative financing forms [16]. The leader board of the loan bank is responsible for maintaining the integrity of accounting and financial reporting system [17].

The integrity is an essential requirement of administration. Integrity has three parts in the field of administration according to the act [18]; integrity management system, integrity risk, and corruption risk [19]. The offices have to employ an integrity consultant who works in this capacity [20] under the direct control of the manager of the office [21].

The public administration bodies must comply with the integrity. The integrity, as a new term and recommendation has become an important part of the total state governance. For example, home-defence, law enforcement agencies, judges, prosecution etc.

The relevancy of integrity is shown by the Decision of the Constitutional Court of Hungary [22]. This Decision was remarkable because the integrity policy of the courts was created by the president of the National Court Office. This policy was supervised and partly was annulled by the Constitutional Court. A judge presented a constitutional complaint because according to his opinion the policy was unconstitutional. They argued that the integrity concept of the integrity policy of judges was not precise enough because the president of the National Court Office had the right to define and broaden the integrity, so he applied for the destruction of the policy in full. The Constitutional Court of Hungary annulled only the part of policy which caused the inaccuracy in the term of integrity.

The fact that the Constitutional Court of Hungary was concerned with the field of integrity of courts shows the importance of integrity in Hungary.

4. Practice of the integrity in the field of law enforces agencies

If we start to examine the emergence of integrity in law enforcement organizations, we face an ambivalent aspect. The effect of the act [23] which regulates the integrity does not expand to the enforcement organizations [24], however they have to operate several parts of the integrity system in Hungary. The law enforcement organizations have to apply the reliability test on human resource level and the internal control system on organizational level [25]. The requirement of anticorruption is an essential prescription for the law enforcement organizations. All Ministers must frame up an

internal control system and the corruption prevention measure [26] by the Government Decision [27].

The integrity started to effect the law enforcement organizations; the legislator realized the significance of integrity, and they produced regulations about its obligatory application e.g. anti-corruption and monitoring of efficiency of integrity. Recently, the Ministry of Home Affairs of Hungary has gradually introduced parts of integrity in the law enforcement organizations. One of these could be the organizational resilience of law enforcement organizations.

5. What comes next after confirming organisational integrity management? The importance of organisational resilience at law enforcement organisations

At first it may seem awkward to talk about resilience in the case of law enforcement organisations. However, perceiving the potential challenges of future, we suppose that it is worth considering in order to achieve a process-oriented system which proves to be useful both in crises and in everyday situations.

Besides establishing a well-defined order and documental expectations of organisational integrity in public administration, it is necessary to examine the “soft factors” which are essential for improving the resistance capacity of organisations. One of these is the concept of resilience, which may be interpreted in different ways in organisations. Certain researchers [28] talk about resilient organisations if the majority of employees are resilient or behave in a resilient way. Several experts, however, claim that organisational resilience means more than just the sum of the resilience of the employees. Resilient organisations will take preventive measures to foreseeable problems, such as pre-practicing crisis management or preparing business plans and strategies for a case of recession [29]. The same is true for corruption-suspicious events. Therefore, precisely defined processes and structures may also contribute to organisational resilience. A communicational, network or managerial information system can improve the resistance capacity of the whole organisation as well.

5.1. How can organisational resilience be measured?

There are various tendencies for describing and analysing resilience. If resilience is regarded as a constant process (and not as an achievement or performance), then it is obvious that resilience results from a complex interaction of different factors. On one hand, from the individual resilience of co-workers, on the other hand, from resilient structures and processes (according to the organizational and operational rules), furthermore, from an organisational culture which provides a fertile soil for the presence and development of resilience. How these different forms of resilience interact has not yet been satisfyingly clarified by research. Soucek et al.'s [30] starting point is that organisational resilience cannot be described by a single score value, but has to be evaluated at least at three levels. Thus individual resilience (which can be divided into personal resources and resilient behaviour) affects not only the whole team but also influences the organisational level.

Resilience can only be measured at the time or after a crisis or some difficulty. Employees of organisations meeting the requirements of resilience but having not faced crisis, cannot be regarded as “resilient”. Besides, a crisis or disorder may be wide-ranging and may not be handled within the frames of occupational safety or emergency management only [31]. Crises and disorders should not be regarded as errors though, since there may be errors which do not cause problems to the whole system. In order to measure organisational resilience, it is necessary to analyse the reactions to

crises and disorders at various levels. Therefore the presence of resilience needs to be examined along technological operation areas. There are different tools for the analysis of resistance capacity.

5.2. ISO 22316 for organisational resilience

According to the definition of the norm: “Organisational resilience is the ability of an organisation to absorb and adapt in a changing environment to enable it to deliver its objectives and to survive and prosper. More resilient organisations can anticipate and respond to threats and opportunities, arising from sudden or gradual changes in their internal or external context.” (ISO 22316:2017) [32]. This definition clarifies that enterprises must currently calculate with crises or at least critical situations, from which the resulting experiences should be harnessed for development.

Both in the operational fields of Supply Chain Management and the high-reliability systems (e.g. fire service, nuclear power stations, emergency clinics) the main points of resilience have emerged [33]. The non-concealment, rather publication of “bad news”, with time, will always result in shorter reaction time. Early recognition of deviances and errors also can prevent more serious malfunctions. Beyond this, if decision making competences are there where events occur (and not somewhere in the hierarchy), then crises may be solved faster and more efficiently. These aspects can be found among the 9 elements of the ISO norm:

1. Shared vision and clarity of purpose
2. Understanding and influencing context
3. Effective and empowered leadership
4. A culture supportive of organisational resilience
5. Shared information and knowledge
6. Availability of resources
7. Development and coordination of management disciplines
8. Supporting continual improvement
9. Ability to anticipate and managing change

Evidence shows that the concept of resilience is often used in a rather abstract way. The present study has intended to be an introduction to understanding how an organisation can be enabled to enhance its own resilience. If we really understand the concept of resilience, it may appear and become developable in several law enforcement organisational areas.

6. Summary

We have demonstrated the status of integrity in Hungary from its initiation till recently. The integrity develops permanently; and it is prescribed by the EU. The legislator of Hungary created the main concepts of integrity for the administration and started to introduce several components of integrity for the law enforcement agencies. Both integrities are similar. The most significant

direction is the materialization of integrity in all sectors of Hungary, e.g. administration, government, etc.

The legislator faced another problem when he wanted to introduce the integrity in Hungary: the hiatus of integrity experts, so the National University of Public Service started to train the integrity experts. The training of integrity experts is an important part of qualification of civil servants, because there was a monitoring about efficiency of training of integrity experts in Hungary in 2016 [34].

With today's pervasive change and uncertainty it is no longer adequate to simply rely on security, risk and business continuity that often applies historical data to try and predict future shocks, catastrophes and crises along with their consequences [35]. The analyzing of organisational resilience is a good tool for decreasing of danger, which rises from fluctuation, and leaving of professions. The main aim is the planning of strategy, personal and organizational learning, making of integrated process maps about all of areas of office, creating of knowledge transfer between colleagues (leaders and juniors). The integrity is an excellent tool for driving of a good government in the future.

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DIGITAL COMPETENCES FOR THE POLICE – A NEW ECDL

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Abstract

In the last year topics, such as Big data, data analytics and GDPR became more and more popular. However, companies – especially SMEs - and also the public sector have difficulties in dealing with these topics, which on the one hand might change the daily operative business or even their whole business process.

Nevertheless digital competences are still not well spread among the citizen. The Austrian Computer Society (OCG) therefore tries to enhance digital skills by several activities. One of the most important initiatives is the European Computer Driving Licence (ECDL) or currently being renamed to European Certificate for Digital Literacy, which celebrated last years its 20th anniversary.

Since 2018 every upcoming police-man /woman will receive the ECDL certificate during his/her three years apprenticeship focussing on IT security, computational thinking and basic digital literacy knowledge

1. Introduction

As the European Union already stated 2016 [1] Europe is facing a huge gap in digital skills among their citizens. An average of 44% of the European citizens lack in digital competences as shown in Figure 1. This number is not changing much over the last decade although basic digital competences are becoming more and more mandatory in the work force. Several studies [2, 3] are predicting that within the next five years more than 90% of all jobs need at least basic digital skills. Hence, initiatives as the Digital Skills and Job Coalition have been founded by the European Union. This initiative – based on a partnership among different stakeholders – has one shared purpose to attract young people for ICT and to reduce the digital skills gap.

As depicted in Figure 1 there is still a great variety among the EU28 countries with respect to digital skills. To some extent there is a clear west/north to east/south decline. While countries as Denmark, Luxembourg or the Netherlands have a very good coverage of digital skills (above 77%) citizens of countries as Bulgaria or Romania lack more than 75% of basic skills.

In the EU28, in 2014 more than 8.9 million people have been working as ICT practitioner and ICT mechanics [2]. It is obvious that digital skills are an important asset for the whole workforce not only particular for the ICT sector, which is covering approximately 48%.

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In [2] it is further stated that 37% of all the labour force have no or only a low levels of digital skills. Figure 2 shows the estimated growing numbers of vacancies having e-skills in their portfolio. The study further emphasizes that approximately 750,000 more jobs could be generated if the needed skills were available. Especially the three big countries UK, Italy and Germany contribute for almost 60% of all vacancies in Europe.

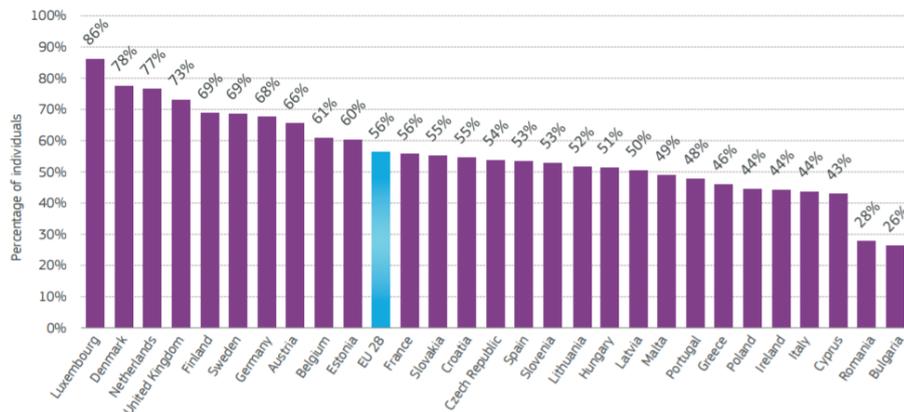


Figure 1. Basic digital skills within the European Union, European Commission paper for Digital Single Market [4]

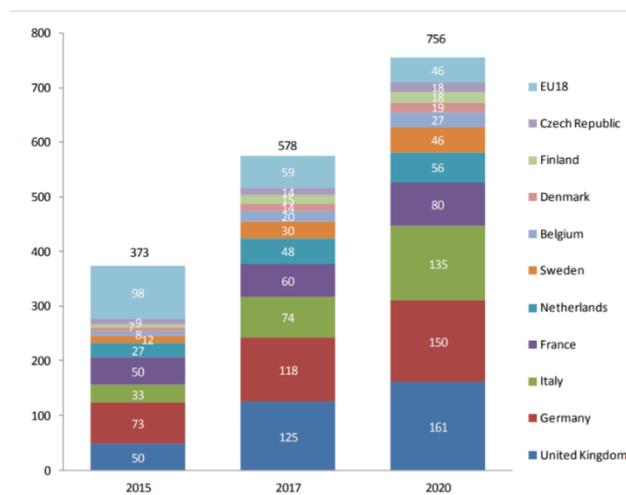


Figure 2. e-skills vacancies estimation (distribution of vacancies per country ('000s) [2]

The study concluded that in order to overcome this shortage of ICT professionals but also to have an effective e-leadership, people need strong ICT and digital skills. The whole European ICT ecosystem is urgently called upon to tackle this problem.

An OECD paper [6] stated that 95% of all workers in OECD countries in large businesses are using internet as part of their jobs. Due to such predictions it becomes even more important that governments react in time to start an action plan to enhance the digital skills among all citizens. Already in 2001 the European Union stressed specifically the need to develop digital skills in their Europe Action Plan.

There is the potential that increasingly a high number of tasks might be automated over the next few years [7]. However, only less than 10% of all jobs on average are at risk of being replaced by machines.

Another survey which shows the grade of digitalization is the so called DESI (Digital Economy and Society Index) which comprises the following topics:

- Connectivity
- Human capital
- Use of internet
- Integration of digitalization in companies
- Digitalization in public sector

The last survey [8] came to conclusion that still 43% of all Europeans do not have basic digital skills. On the other hand a slight increase in graduates among STEM (Science, Technology, Engineering and Mathematics) is visible (from 18.4% in 2013 up to 19.1% in 2015). Already Berger and Frey [9] stated 2016 that nowadays all jobs require ICT know how except two professions – dishwashing and food cooking. It is obvious that almost all workers (more than 90%) have access to and use the internet as part of their jobs.

The country specific results showed a slight improvement within the human capital in Austria. In the field of IT skilled personnel Austria increased its ranking from 10th (2016) to 8th (2017) while Austria lost one place (down from 3rd to 4th) in the numbers of graduates among STEM. Especially in the field of Informatics the graduates remained quiet stable over the last decade. There was no significant increase visible among Austrian universities.

Another survey asked (top) management in the IT sector of Austria on the required skills for the today's jobs. On the top of these requirements was across the board by far "IT know-how" followed by "expert knowledge". Within the top 5 needs there was also "programming know-how" [5].

Therefore people have to be well educated in digital skills and digital literacy. Facing all these circumstances, ICT competences – especially on a basic level – are becoming increasingly important for having better chances on the labour market. A lifelong learning attitude is a more and more important feature in order to stay competitive. The European Union has initiated an action plan for digital education aiming to increase digital basic skills along literacy, numeracy and problem solving. This action plan also implements computational thinking techniques which are an essential part of today's digital competences.

2. Digital Competences for everyone

A survey of adult skills - PIAAC, Programme for the International Assessment of Adult Competences - 2015 showed that the majority of people between 16 and 65 years have little or no knowledge in problem solving (see Figure 3). But such competences are becoming more and more

essential especially in technology rich environments. Due to the digital transformation a high percentage of jobs are nowadays dependent on a certain knowledge level of digital competences.

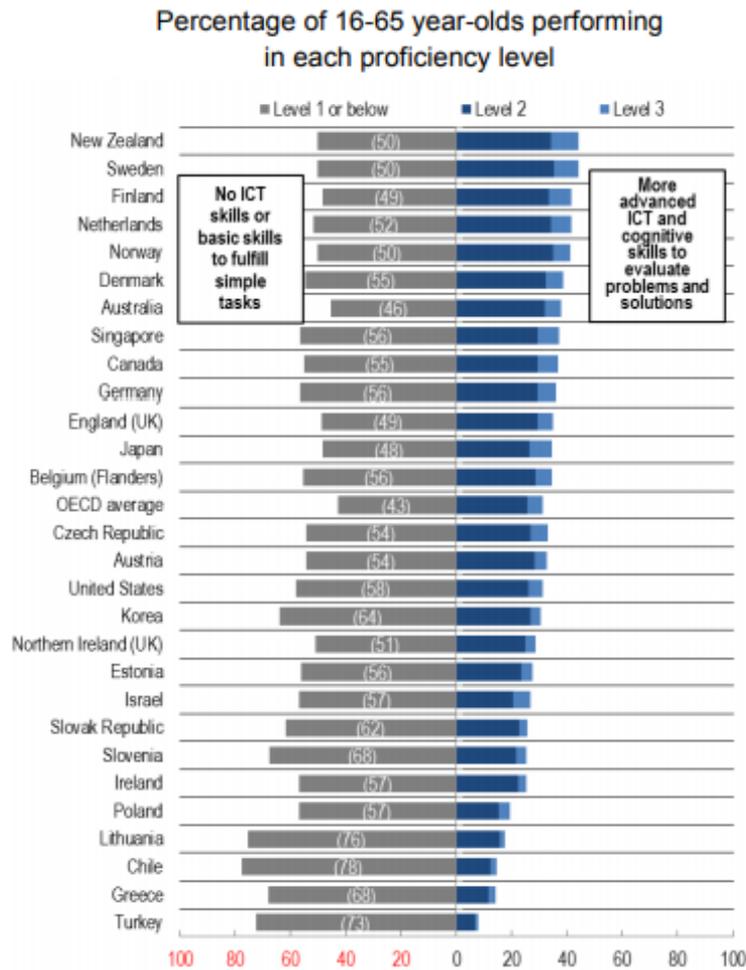


Figure 3. PIAAC and OECD survey regarding problem solving skills [6]. Note: Individuals in Level 2 or Level 3 have more advanced ICT and cognitive skills to evaluate problems and solutions than those in Level 1 or below.

The PIAAC study differs among three different levels of cognitive skills. Level 1 means no or only little ICT skills. People on this level can fulfill only simple digital tasks. Level 2 and 3 have already a more advanced ICT and cognitive skills to evaluate and solve problems.

It is alarming that people with at least level 2 or 3 according PIAAC study are a minority in all OECD countries, even in the best-ranked ones, such as New Zealand, Sweden or Finland as depicted in Figure 3. According to this survey more than 60% of all adult citizens show little or no basic ICT skills at the OECD average – even worse in Austria. Hence, governments as well as the educational sector are forced to implement an action plan to increase digital skills among its citizens. Although the study also shows a big gap between younger (25-34 years) and older (55-64 years) citizens it is obvious that even the younger generation have too few digital competences. An Austrian representative study [10] clearly showed a tremendous gap in digital skills between perception of one's own skills and real skill level. Through all generations a gap was visible while the biggest deviation was among the younger generation below 30 years. The so called digital natives thought at least to have a good coverage of digital literacy knowledge while the older ones already knew what they do not know with respect to digital literacy. The term "Digital Natives"

came up by Marc Prensky in 2001 [11]. The author described “Digital Natives” as young people who grew up surrounded by, and using computers, cell phones and other tools of the digital age. His explanation derives from the assumption that young people are all “native speakers” of the digital language. Although the younger people did slightly better than the older generation the gap between their actual competences and their perception was even larger compared with the ones above 50 years.

Such a tendency is not surprising. Digital skills are normally associated with modern, active and successful people. It is natural for most people to aspire to be a part of such a group. Due to the fact that people – and here especially young ones – are continuously busy with online tools and equipments they believe to be an experienced ICT user. However, that is a fallacy that several surveys have shown.

Such international digital literacy studies were conducted in countries such as Switzerland, Singapore, Denmark, Finland, India and Germany [12]. All these surveys can be summarized with a common result: there is a clear gap between self-perceived and actual levels of digital skills. The data indicate that people can not adequately assess their digital skills. In Austria 94% of all participants believed to have at least averaged or better computer skills. But the practical test showed a completely different result: only 39% scored above average. Even in high developed countries as Switzerland or Singapore the differences between actual skills and self-assessed skills deviate dramatically as depicted in Figure 4. While the perception was always far beyond 80% only half (in Singapore) or just a third (as in Switzerland) showed sufficient results.

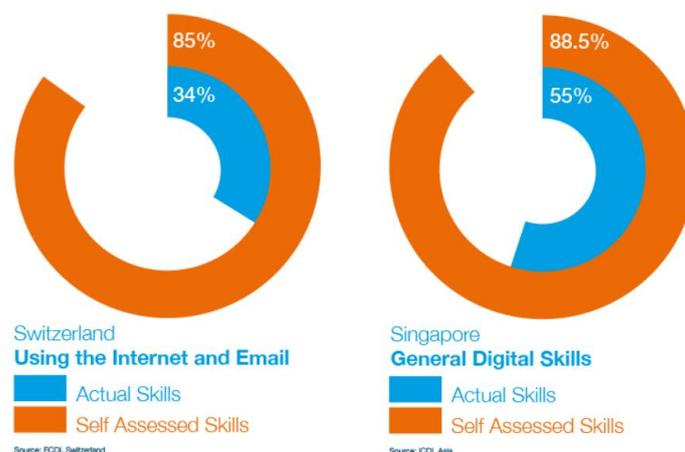


Figure 4. Digital Fallacy – Perception versus reality – A paper from the ECDL foundation [12].

Problem solving techniques become an essential feature for the current job descriptions. The founder of the so called Computational Thinking concept, J. Wing, already emphasized the importance of skills like problem solving and algorithm thinking [13]. Such competences are becoming a crucial skill for the today’s challenges. As J. Wing pointed out already back in 2006 “... To reading, writing, and arithmetic, we should add computational thinking to every child’s analytical ability...”.

Unfortunately, the number of students finishing computer science at the university is slightly declining since the last decade as mentioned in [2]. The peak of computer science students was reached in 2006 in Europe. In only a few countries, such as Germany and France, the number of

informatics students has increased over the last years while in other countries, such as the UK, a tremendous decline happened. In Austria the number of master students in informatics remained stable over the last decade.

Hence - as stated in the OECD report - the major key priorities in order to meet the challenges of a digital world are amongst others:

- Basic education in ICT skills and problem solving skills
- Faster adoption of current needs for education and training systems and
- Life long learning attitude among citizens

Therefore, OCG is trying to push all these factors within the Austrian educational sector. In 2015 OCG started an initiative “Education 4.0” aiming to enhance digital literacy and computational thinking among all citizens [14]. This initiative supported by several stakeholders is focusing on all the key priorities mentioned by the OECD report.

3. A new ECDL – an approach for all citizens

The European Computer Driving Licence (ECDL or ICDL) was founded 1997 by a couple of European computer societies with the goal to bring digital literacy competences to all of Europe. In the meantime – more than 20 years later – this initiative became the most successful and popular ICT certification over the world. No other product in the ICT domain remained so successful as the ECDL/ICDL certificate does. Currently ECDL/ICDL is spread over more than 140 countries and yearly more than 15 million people participate in such online tests.

In Austria the ECDL is a true success story. With more than 700.000 participants in over 800 schools per annum the ECDL program has set a standard. The national operator in Austria is the Austrian Computer Society which is responsible for the quality of the certification and is supervising more than 350 test centers. In 2018, Austria ranked second in the number of people doing a certificate test – worldwide and in absolute numbers! (seen in Figure 5). Only in Italy (a country with seven times the population of Austria) more people were doing an ECDL/ICDL test. Austria even overtook countries like Germany, France or Romania in absolute numbers already several years ago.

Recently the ECDL Foundation started to redesign the ECDL/ICDL. A renaming of the acronym should indicate a change in the ECDL/ICDL program. From the European Computer Driving Licence it will change to European / International Certificate for Digital Literacy. Furthermore, the ECDL certificate series is split into school sector and workforce. There are different target groups which need different digital skills for their work.

The European Union settled a framework of digital competences which describes what it means to be digitally competent for citizens [15]. This framework is based on five pillars as shown in Figure 6.

Certification Tests			
Territory	Region	Qtr 4 2018	Total Sales 2018
Italy	Europe	18 295	226 831
Austria	Europe	13 543	128 233
Egypt	Arab States	10 703	115 557
United Kingdom	Europe	9 740	72 449
Ireland	Europe	5 359	67 665
Romania	Europe	7 394	53 532
Germany	Europe	3 973	49 140
France	Europe	4 000	48 000
Switzerland	Europe	3 395	42 103

Figure 5. Statistic over the year 2018 of certification tests per country, source, ECDL Foundation Dublin

Competence area	Competences
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
2. Communication and collaboration	2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity
3. Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licenses 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

Figure 6. The DigComp 2.1 framework of the European Union [15].

Within this framework several proficiency levels are defined as foundation, intermediate, advanced and highly specialized. Last year, the Austrian government started an initiative aiming to bring all citizens towards a certain level using the DigComp framework of the EU. An UNESCO study [16] analyzed several ICT certifications with respect to the coverage of the DigComp framework of the EU to the particular syllabus of the certification (see Figure 7).

The ECDL/ICDL programme turned out to be by far the most effective certification which covers the most part of the Digcomp framework as it is depicted in Figure 7. The ICDL competences reach 177 points while the next best certificate program only achieves 107 points. Only in a few topics the ECDL/ICDL has not reached any points, such as “Engaging in citizenship through digital

technologies”, “Solving technical problems” and “Identifying need and technological responses”. With the new modules Information literacy and Computing all these missing topics are covered too. The polish ECDL national operator showed in an EU project that the minor shortcomings of the ECDL/ICDL towards this framework can be withdrawn by implementing a few additional components and questions.

Digital literacy frameworks	0	1	1.1	1.2	1.3	2	2.1	2.2	2.3	2.4	2.5	2.6	3	3.1	3.2	3.3	3.4	4	4.1	4.2	4.3	4.4	5	5.1	5.2	5.3	5.4	6	Total
Kenya Basic Education Curriculum Framework	5			2		4			3					5		2	3			2			2			2	2	6	38
Philippines ALS-K to 12 LS 6	7		19	1	6		3	4		1	4	2		19	4	3		4	1	6	5						3	6	98
India Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)	1		4		2	1	1	1	1					1															12
Costa Rica Student Performance Standards in Digital Technology-enhanced Learning	15		4	4	4		4	6	1	10	5			11		1	10	8	3	2	1			1	1	3	13		107
Chile SIMCE TIC Matrix of ICT Skills for Learning			2	2	2		1								3	1				1	1						1		14
British Columbia Digital Literacy Framework	8	1	13	4	1	5	3	2	4	2	7	5		6	3	5	4	1	3	4	8	1	4	5	2	3	2		106
IC3 Global Standard 5	16		16	1	14		5	3			2	1		14	2	1	1	1	5	4	3			1		1	3		94
ICDL Competences	21		22	5	19	1	5	2		4	3	1		41	10	2	3	2	8	6	3	1				2	12	4	177
Microsoft Digital Literacy Standard Curriculum Version 4	15		13	1	5		1				1			10	3	1			5	2	1						7	2	67
Total no. of instances mapped	88	1	93	20	53	11	23	18	9	17	22	9	0	107	25	16	21	16	25	27	22	2	6	7	3	14	46	12	

Figure 7. Mapping of selected digital literacy frameworks onto the DigComp 2.1 framework of the EU. (Note: underscored competence areas (0 and 6) are proposed additions to the existing DigComp 2.0 competence areas.) [16].

Furthermore, the ECDL/ICDL program was rebuilt in 2014 towards a life-long learning program aiming to keep his/her ECDL ID and giving the possibility to re-skill and up-skill one’s proficiencies. While the ECDL/ICDL was focusing mainly on digital literacy skills, new modules are dealing more and more with problem solving topics as for example the newly-launched computing module. This module on the one hand emphasises computational thinking concepts and on the other hand has first steps in coding. However, this module is not meant to educate programmers but to spread problem solving techniques among all people.

The syllabus of the computing module covers the following topics:

- Computing terms in general
- Computational thinking methods as problem solving, algorithms
- Starting to code (variables, data types, ...)
- Building and using code (logic, iteration, procedures, ...) and finally
- Test, debug and release

This new ECDL /ICDL module is a perfect solution to take people from level 3 to at least level 2 according the PIAAC levels explored in [7].

4. Austrian good practices

Therefore OCG is pleased that some regional Austrian governments have taken the ECDL as a mandatory tool for the educational careers of their civil servants. The dual academy of the Chamber of Commerce in Upper Austria for example has implemented the ECDL advanced modules in their career plan. And just very recently the Austrian Chamber of Commerce announced this approach as one of its five light house projects in their master plan for reducing the shortage of young. ICT experts.

The Ministry of Defence has relied on the ECDL program for a long time. In total more than 10.000 recruits have done the ECDL during their military service.

The Austrian police school included the ECDL program in its curricula. From 2018 onwards all future police men/women can do the ECDL certificate during their training. The Ministry of the Interior which is responsible for the education of future police officers, identified the ECDL as an important vehicle to improve the digital skills among the police force.

With this milestone the Ministry of the Interior established a good standard of digital skills among their police schools. In the following years the police will double their students from currently 2000 to almost 4000 students per year. Topics, such as IT security, data protection and especially learning computational thinking methods, are essential skills in today's world.

In the meantime OCG is further investigating new ECDL modules including Robotics and Artificial Intelligence, which will be implemented in the ECDL program in the next few years.

5. Summary

The most successful ICT certificate worldwide – the ECDL/ICDL program – is almost completely covering the DigComp framework of the European Union. With new ECDL modules like Computing and Data protection the ECDL program also remains up to date with the current developments.

OCG is proud that several ministries made a commitment to the ECDL program and from 2018 onwards all police students will pass the ECDL certificate during their education.

The OCG is further trying to be on the leading edge of education in digital competences. The ECDL Foundation and its members are looking to establish a new ECDL/ICDL within schools and the workforce with the aim to face emerging IT developments, such as Artificial Intelligence, Machine learning and Robotics.

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AN OVERVIEW OF INFORMATION SYSTEMS AND DATA HANDLING OF HUNGARIAN LIVING COMMUNITIES FROM THE PERSPECTIVE OF GENERAL DATA PROTECTION REGULATION REQUIREMENTS AND INFORMATION SECURITY

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Abstract

There are multiple challenges present in the daily lives of living communities regarding legal and organizational matters, as well as issues concerning information technology and informational security, which demand a constant search for appropriate solutions. Reviewing these issues is especially important in Hungary, where one-fifth of the population lives in facilities that are maintained by the community itself. Moreover, the trends of the current real estate market point towards a rise in these numbers. Throughout our research, we have examined current Hungarian legal practices regarding data handling and information security. The central focus of our inquiry was to determine the typical behaviour of Hungarian officials working with, handling, storing and processing data of the country's living communities. This study analyses market solutions for these condominium buildings to comply with the legal requirements and also reviews the legal and economic limitations of such practices. Special attention is devoted to the handling and processing of personal data, with an emphasis on forecasted trends of cyber threat in 2018.

The central subjects of our study, then, are legislative practices relevant for living communities, the protection of personal data, and information security issues in general. Thus, we examine the typical and most widespread software solutions deployed by resident managers, while also shedding light, with empirical research methods, on the level of data protection in such software packages. Since barrier-free access to information on condominium resident managers and communities themselves, as well as annual financial reports will be mandatory from January 1, 2019, resulting in the creation of a national register for resident managers, we extend our inquiry to the relationship between public administration bureaus and such living communities in the predictive section of our study.

1. Market factors determining the room for manoeuvring of the residents' association

Since 1924, increasingly more dwelling-houses were built in order to meet the demands for condominiums. Within these buildings, some of the premises are suitable for dwelling, while some are not. The whole building consists of different types of condominium units and parts, some of

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which are not private units. The whole area is the basis for the calculation of the ownership share, and the private ownership share is based on the whole area as well, which determines the later-discussed voting rights of persons concerned by data protection.

Not all condominium units of the building will be private property during the condominium registration, as there are parts of the building that are joint property. "Ownership of the same thing, by specific shares, can be claimed by two or more persons." [1]. The list of joint areas and private areas is included in the building's foundation document. The costs of the joint property are paid by the owners of the building. Joint property or jointly used areas occur in houses which operate as a condominium or in housing cooperative form. "A condominium is established when in a building at least two independent units for residential or non-residential purposes or at least one independent unit for residential and one for non-residential purposes defined in the bylaws and technically separated pass into the private ownership of condominium owners, whereas the building sections, building equipment, areas and flats, which are not owned individually, shall pass into the joint ownership of condominium owners." [2]

The rules of joint properties are described by the following laws:

1. Civil Code (Ptk.)
2. Act on condominiums (Tht.)
3. Act on housing cooperative (Lszt.)

The mentioned legal background forces the owners to decide during already the establishment, whose decision later determines the handling of data and the decision system. The system of building operation could be changed; thus, a condominium could be changed to a housing cooperative and a housing cooperative to a condominium. Buildings, which have six or less condominium units, can decide during the foundation whether they want to operate the building according to Ptk. or Tht.

According to a study by the Hungarian Central Statistical Office [3] there are 1.3 million condominiums in buildings which consist of four or more flats. The operation of these buildings is the following, according to the Office: 75% condominium, 13% housing cooperative and the remaining 12% cannot be classified. The importance of the topic is also shown in the fact that approx. 40% of the Hungarian population live in residential buildings operated as condominiums.

	Operation of the building		
<i>Types</i>	Condominium		Housing cooperative
<i>Subtypes</i>	6 or less than 6	above 7 units	-
<i>Foundation</i>	Foundation document		Statutes
<i>Laws</i>	Ptk	Tht	Lszt
<i>Decision-making body</i>	General meeting, Partial General meeting		Congress
<i>Representative</i>	Condominium Board President Syndicate		Directorate
<i>Decision formality</i>	Decision Organisational and operational rules (SzMSz)		Decision Bylaws
<i>Controlling</i>	Court	Audit Committee Settlement clerk Court	Supervisory board Court of registration

Table 1. Structural forms according to laws

Source: according to laws, own edition

As the first table shows, the main aspects of building operation are implemented based on a similar set of criteria. Thus, in order to facilitate understanding, hereinafter we will use the term 'condominium'. What condominiums have in common is that the joint representatives use software products, which they usually (as we observed) lease, for bookkeeping, accounting, and keeping the records of residents. Within the context of our research, we contacted major software suppliers whom we selected based on a survey inquiring the participants about the Information Technology (IT) systems (software applications) they use for condominium management. We identified the 6 most-common software applications in a separate survey. We also treat the cluster where data are processed by using IT devices and software applications but on a local Personal Computer (PC) as a separate category. Legislative changes, however, imply that paper-based data management, if there is still any, presumably disappears due to the disclosure obligation.

In summary, we can conclude that it is necessary to develop condominiums in order to ensure housing. Due to the large-scale involvement of condominium associations, it is worth performing the review investigation of the compliance of the applied IT systems with the General Data Protection Regulation (GDPR) and IT security requirements.

2. Organisational responsibilities and challenges of owners' associations

Among the organisational responsibilities, we would first look at software selection, as this will determine the structure community management. This choice means that the officers of the condominium can, without any direct influence from the owners, decide on the IT data protection within the condominium.

Representation of the condominium and in most cases also the administration is performed by the elected representative. Their election is performed at the general assembly, which is the main decision-making body [4]. Both the knowledge and preparedness of the elected persons and the organisational form of the activity can vary a lot, just like the software products applied and the responses given to data security issues. Within the context of our study, we contacted the suppliers of condominium software applications, and we tried to explore their services and especially their compliance with the GDPR and IT security requirements. According to Paragraph (1) of Section 5 of Act CXII of 2011 on the Right of Informational Self-determination and the Freedom of

Information (hereinafter referred to as Infotv.), personal data may, as a general rule, be processed based on the consent of the data subject or the law (including statutory authorization as well). According to Paragraph (3) of Section 7 of the Infotv., controllers shall protect data by means of suitable measures against unauthorized access.

Realization of data management

The administrative work of a condominium's owner also includes data management [5]. To perform the administration, it is necessary to manage the data of the occupiers (e.g. owners, tenants). The Tht. lays down the general guidelines of data management, but it refers mainly to the SzMSz (Organizational and Operational Rules) to regulate that. The SzMSz of the condominium may contain the list data to be provided by the owners (Section 22 of the Tht.), but it is not obligatory. Among the before mentioned condominium entities (Condominium Board President, Syndicate, Audit Committee), it is mainly the Condominium Board that deals with data management. Anyone might need access the files during the administration, in practice however, in most cases the members of the Audit Committee or the person responsible for auditing the accounts will check the data besides the Condominium Board President.

To manage personal data [6] is necessary in order to reach the goals of the condominium. For this it is necessary to comply the commitments of the owners and to practice their rights. However, this is a thin line, as handling data which is beyond the aim of the community could constitute a criminal offense. There are other important moments in a condominium regarding data management. After the establishment of the condominium the person who becomes an owner by an agreement expressed by conduct accepts that the elected representatives of the condominium will manage his data. No implied contract is necessary for this. Furthermore, if the General Assembly agrees, the appointed person may get authorization for data management without the consent of the concerned person. In practice it is realized in keeping registry of residents. Usually it is the Condominium Board President who has the registry. Data that has not been announced by a joint proprietor cannot be handled by the Condominium Board President, even if the representative has gotten authorization by the Assembly. Data of the tenant or data regarding the number of people living in one condominium unit can only be asked by the representative, if it is to be used for calculating the cost of utilities. Data regarding the tenants must be announced by the owner. Data could be reported by the tenants as well, but in that case the data management will be not legitimate.

The process to replace the authorized representation is also worth noting. There are no respective provisions of the Tht. that could apply on how the replaced Condominium Board President shall verify that he no longer possesses the data that have been handled by him. The Tht. does not regulate how the authorisation and/or data are passed to the new joint representative either. There is no such obligation to prove in practice; thusly the data management of the leaving Condominium Board President is not under control.

In summary, nor the form requirement neither the actual content of data management of the Condominium Board President is regulated by Tht., it is different in each condominium. Control varies depending on the general expectations of the owners' community and the efficiency of the controlling persons. According to the laws in force, data protection and data handing rules is expected to be written by such communities, where not data protection specialists are predominating. Controlling the principles of data protection is almost impossible upon the replacement of the Condominium Board President. We developed a questionnaire to compare the data-processing capabilities of the different software applications.

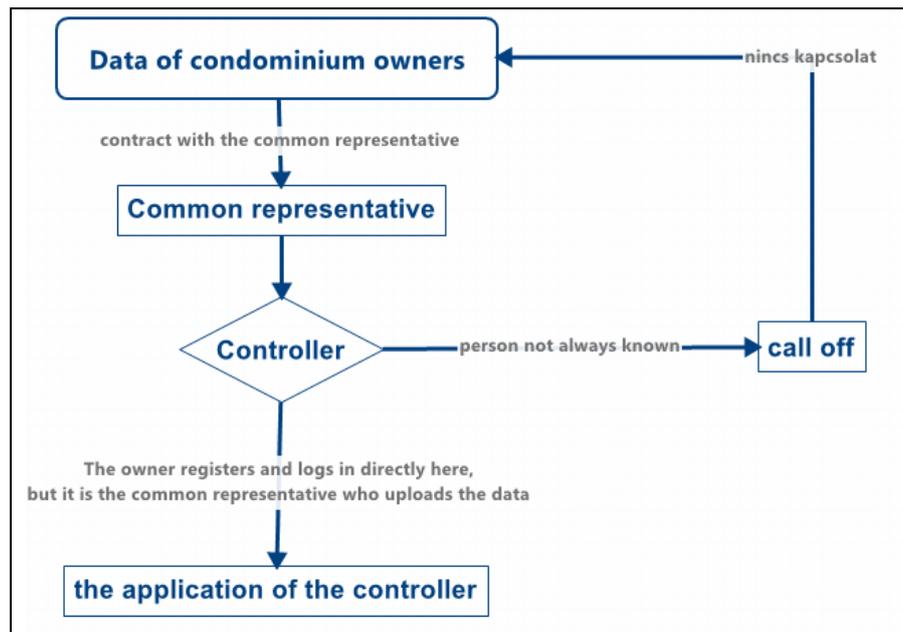


Figure 1. Processing the data of condominium owners

Source: own drawing

Hypotheses

- *H1*: The assumption is that GDPR compliance is a marketing feature for companies dealing with community data processing, allowing them to acquire data for the studies easily, because stressing and ensuring data security makes data-processing companies attractive.
- *H2*: The fact that the condominium management software is in the ownership of the joint representative does not serve the interests of the condominiums (i.e. the residents).
- *H3*: Condominium management programs better fit data-protection goals if they are owned by the residents' association.

3. Description of the research steps

In the second half of 2018, a group of 350 professionals was asked what software the joint representatives used to process condominium data. Based on the empiric observation, a portion of the potential answers were defined. Further software products could, however, also be named so that the decisions of the participants are not influenced. Based on the results, the study focused on 6 software products in total.

The next phase of the research defined and matched, based on the GDPR [7], the expectations that specify IT and IT security requirements specifically for community data processing.

In the third phase, we compiled a questionnaire for the software owners in which we formulated the questions in consideration of the typical operations based on the GDPR and we also paid attention to formulate the questions in consideration of the most-common non-industry-specific IT security “standards”.

Applied IT security standards

The most-common generally applicable standards provide a so-to-day “best practice” and they are MSZ ISO/IEC 27001:2014, NIST 800-53 R4, Act L of 2013 [8] and its implementing decree, Decree No. 41/2015. (VII. 15.) of the Minister of the Interior [9]. There are so-called cross-tables which make the standards consistent with each other or the GDPR requirements.

Association of the legal approach of the GDPR and IT security requirements

Association of legal and IT security requirements is necessary because it allows for the specification of the technical requirements a software application must meet, i.e. an instruction for the software developer (operator and other contributing party) to ensure compliance of the software product and its operation with the law. Community data processing also knows the term “Software as a service” (SaaS), because condominium management companies cannot, and probably not always want to, develop their own software applications. And the developer, as service provider, may also use further services (PaaS), see Table 3.

Szádeczky pointed out that “Current Hungarian IT security regulations are not uniform, and the areas which are regulated to different degrees are distinguishable and categorizable.” [10] Szádeczky saw that these findings are verified; the basis of the research projects is, therefore, the association made in Table 2 which is transparent and can be useful for future research projects as well.

<i>GDPR reference</i>	<i>Studied areas</i>
CHAPTER II Principles	
Article 5 Principles relating to processing of personal data	
1. Personal data shall be: (f) processed in a manner that ensures appropriate security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures (‘integrity and confidentiality’).	Security of internal communication Physical security Border control Access management ITS processes Security of external relationships Save Encryption Protection against harmful codes (virus protection)
CHAPTER III Rights of the data subject	
Section 2 Information and access to personal data	
Article 13 Information to be provided where personal data are collected from the data subject	
1. Where personal data relating to a data subject are collected from the data subject, the controller shall, at the time when personal data are obtained, provide the data subject with all of the following information: 2. In addition to the information referred to in paragraph 1, the controller shall, at the time when personal data are obtained, provide the data subject with the following further information necessary to ensure fair and transparent processing:	Application functionality

<i>GDPR reference</i>	<i>Studied areas</i>
<i>Section 3 Rectification and erasure</i>	
<i>Article 16 Right to rectification</i>	
The data subject shall have the right to obtain from the controller without undue delay the rectification of inaccurate personal data concerning him or her.	Application functionality Save Erasure procedures
<i>Article 17 Right to erasure ('right to be forgotten')</i>	
1. The controller shall have the obligation to erase personal data without undue delay	Application functionality Save Erasure procedures
<i>Article 20 Right to data portability</i>	
1. shall receive the personal data provided to a controller in a structured, commonly used and machine-readable format	Application functionality
<i>CHAPTER IV Controller and processor</i>	
<i>Section 1 General obligations</i>	
<i>Article 24 Responsibility of the data controller</i>	
1. shall implement appropriate technical and organisational measures to ensure and to be able to demonstrate that processing is performed in accordance with this Regulation	ITS processes
<i>Article 25 Data protection by design and by default</i>	
1. The controller shall ... implement appropriate technical and organisational measures, such as pseudonymisation, which are designed to integrate the necessary safeguards into the processing in order to meet the requirements of this Regulation and protect the rights of data subjects. 2. ... In particular, such measures shall ensure that by default personal data are not made accessible without the individual's intervention to an indefinite number of natural persons.	Application functionality security Access management Security testing (vulnerability test)
<i>Article 28 Processor</i>	
1. ... the controller shall use only processors providing sufficient guarantees to implement appropriate technical and organisational measures in such a manner that processing will meet the requirements of this Regulation and ensure the protection of the rights of the data subject.	Verification of compliance with relevant requirements at the processor as well Audit procedures (external, 3rd party)
<i>Section 2 Security of personal data</i>	
<i>Article 32 Security of processing</i>	
1. Taking into account the state of the art, the costs of implementation and the nature, scope, context and purposes of processing as well as the risk of varying likelihood and severity for the rights and freedoms of natural persons, the controller and the processor shall implement appropriate technical and organisational measures to ensure a level of security appropriate to the risk, including inter alia as appropriate: (a) the pseudonymisation and encryption of personal data; (b) the ability to ensure the ongoing confidentiality, integrity, availability and resilience of processing systems and services; (c) the ability to restore the availability and access to personal data in a timely manner in the event of a physical or technical	Pseudonymisation Audit procedures (external) Security of internal communication Physical security Border control Access management ITS processes Risk assessment Security of external relationships Save Security testing (vulnerability

<i>GDPR reference</i>	<i>Studied areas</i>
incident; (d) a process for regularly testing, assessing and evaluating the effectiveness of technical and organisational measures for ensuring the security of the processing. 2. account shall be taken in particular of the risks that are presented by processing, in particular from accidental or unlawful destruction, loss, alteration, unauthorised disclosure of, or access to personal data transmitted, stored or otherwise processed.	test) Encryption Protection against harmful codes (virus protection) Restoration
Article 33 Notification of a personal data breach to the supervisory authority	
3. (c) describe the likely consequences of the personal data breach; 5. The controller shall document any personal data breaches, comprising the facts relating to the personal data breach, its effects and the remedial action taken.	Records of data breaches Management of security breaches Log management, assessment Monitoring
Article 34 Communication of a personal data breach to the data subject	
3. The communication to the data subject shall not be required if any of the following conditions are met: (a) the controller has implemented appropriate technical and organisational protection measures, and those measures were applied to the personal data affected by the personal data breach, in particular those that render the personal data unintelligible to any person who is not authorised to access it, such as encryption;	Encryption
Article 35 Data protection impact assessment	
1. Where a type of processing in particular using new technologies, and taking into account the nature, scope, context and purposes of the processing, is likely to result in a high risk to the rights and freedoms of natural persons, the controller shall, prior to the processing, carry out an assessment of the impact of the envisaged processing operations on the protection of personal data.	Data-protection impact assessment Risk assessment

Table 2. Association of the legal approach of the GDPR and IT security requirements

Source: own edition

- *H1*: The assumption is that GDPR compliance is a marketing characteristic of companies dealing with community data processing, allowing them to acquire data for the studies easily, because stressing and ensuring data security makes data-processing companies attractive.

The study revealed that the companies concerned do not provide data and will not fill in the questionnaires sent to them either.

- *T1*: Stressing the GDPR does not generate any benefits for the marketing activities of the community data processing companies covered by the study. The non-provision of answers allowed us to conclude that the companies do not want to disclose their GDPR compliance, i.e. they do not think it is important to express this openly towards their customers.

After formulating Thesis 1 (T1), we continued our study based on data that are accessible without approval, i.e. by way of open collection of information.

Information collected during the observations

Information were studied in compliance with the requirements of the GDPR. The study found that 4 of the 6 examined websites had privacy statements. Only one of these privacy statements was dated, it was issued on 1 May 2016. There was another privacy statement, on a subpage of one of the websites, it was issued on 24.05.2018.

On the whole, it was hard, or even impossible, for us to find GDPR-relevant information; thus, taking the non-filling of the questionnaire into consideration, we are on the opinion that further studies and research of this topic would be justified. Due to the large-scale involvement of the communities.

The date is missing in many cases; this is important, because the service provider can also not prove when it uploaded the document to its website.

The IP address range revealed that the service providers are not located in Hungary in all the cases, implying that considerable conflicts of laws must be resolved in case of legal disputes.

Given that residential buildings having 6 or more apartments correspond to at least 39% of all the apartments in Hungary, we can say with great probability that the software products studied process the personal data of at least the same number of persons.

Partly based on the CEH exploration methodology, we examined the following factors regarding the websites concerned from open (i.e. publicly accessible on the Internet) sources of information.

8 service providers were examined in this phase of the research project; data stored on personal computers (i.e. in local databases) are not applicable; hence they were not examined.

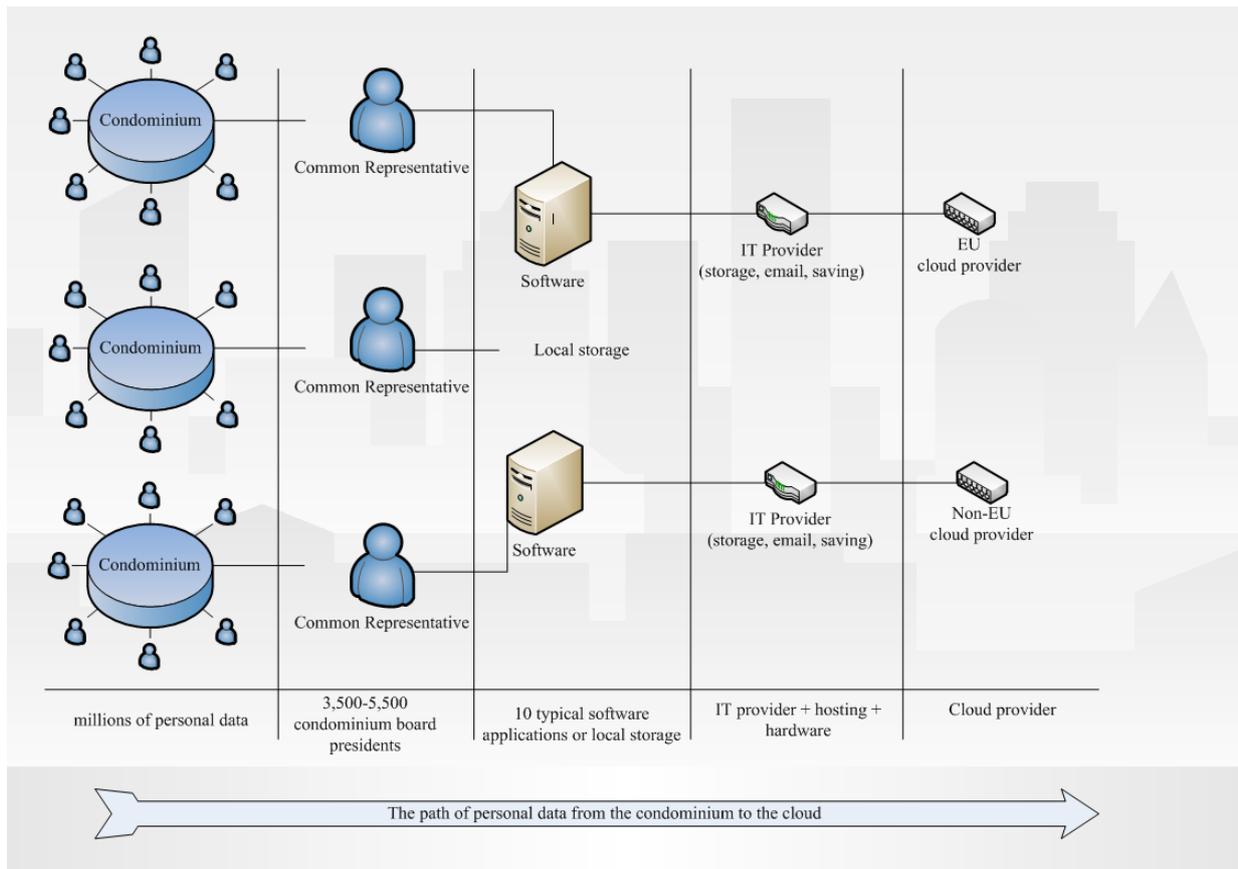


Figure 2. The path of personal data from the condominium to the cloud

Source: own drawing

In case of the service providers studied:

- in 50% of the cases, the site was accessible via http connection as well. This means that data traffic, login or personal information may be intercepted, or even stolen.
- The DNS and IP address queries allowed for the identification of hosting providers. This allows for the conclusion that these service providers use further service providers as well.
- 62.5% of the hosting providers are Hungarian companies; we, therefore, assume that data are physically stored in Hungary. For the rest, we assume the opposite, due to the involvement of foreign service providers. We can also presume that non-EU service providers are also involved.
- The mapping of mailing services (MX records) provided similar results. In other words, it is presumable that further service providers are involved. This is a relevant issue because the practice we studied included frequent adding of personal data to the correspondence.
- On 62.5% of the examined sites, we could find a notice related to data management; their respective contents were, however, up-to-date and dated in one case only. Despite the fact that in more than one third of the cases the mentioned sites had only form fields, data processing can be carried out easily, even by asking a single question.

- There are systems that allow for the uploading and storing of special personal data, e.g. photos or any other optional data.
- As we have observed, none of the sites applies multifactor authentication.
- Based on the opinions of the independent experts, each hold a CEH qualification, we asked, 75% of the sites in question are vulnerable to misuse or have potential attack vectors.

All that allows for the assumption that each examined service provider has involved one or more other service providers which (as data processors) they do not provide any information of. It can be seen, as a result of the research project, that large quantities of personal data are stored in a limited number of systems.

4. Summary, comparison of hypotheses and theses

We checked the software products named by professional users and we found that software owners are very reluctant to disclose any data. The research focused, therefore, on publicly accessible data.

Hypotheses and theses

- *H1*: The assumption is that GDPR compliance is a marketing feature for companies dealing with community data processing, allowing them to acquire data for the studies easily, because stressing and ensuring data security makes data-processing companies attractive.
- *T1*: Stressing the GDPR does not generate any benefits for the marketing activities of the community data processing companies covered by the study. The non-provision of answers allowed us to conclude that the companies do not want to disclose their GDPR compliance, i.e. they do not think it is important to express this openly towards their customers.
- *H2*: The fact that the condominium management software is in the ownership of the joint representative does not serve the interests of the condominiums.
- *T2*: The research project could neither refute nor verify this. Further study would be justified.
- *H3*: Condominium management programs better fit data-protection goals if they are owned by the residents' association.
- *T3*: The research project could neither refute nor verify this. Further study would be justified.

It was, against this background, justified that this is a current topic, and a great deal of personal data are processed. It was revealed that the service providers currently do not put any emphasis on disclosing their “GDPR compliance”. The absence of any market pressure can, presumably, contribute to this. These and similar issues and the hypotheses not proven in the foregoing justify further studies (research projects). Software products identified in the research project. We have prepared a table associating GDPR and IT security requirements. We used publicly accessible information to prepare the table comparing the software products identified, allowing for further conclusions concerning the storage of data and other GDPR- and IT-security-related compliance.

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ELECTRONIC SERVICES OR SMART CITIES – CURRENT EXPERIENCES AND PERSPECTIVES IN THE SLOVAK REPUBLIC

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Abstract

Smart City solutions are these days applied not only in big, but also in small and medium sized cities in a wide variety of countries worldwide. Also municipalities in the Slovak Republic are using to a different extent smart city solutions to improve the life of their people. The goal of this paper, based on the premises, that also small and medium sized cities can become Smart City, is to present and analyse good examples of Smart City solutions in the Slovak Republic. The focus will be on the city Kežmarok, which can be considered as a medium sized city and which by implementing existing Smart City solutions from third parties, but mainly by developing innovative solutions directly in the city, can be seen as good example and good practise in the respective field.

Keywords: *Smart City, Slovak Republic, Kežmarok, Development.*

1. Introduction

The importance of cities as of the socio-economic centres is increasing globally, mainly due to increasing urbanisation, which the cities confront with the need to become more and more smart and to be able to face the challenges of urban life complexity [28, 10]. Smart city concept reflects the vision of a city aiming to improve economy, mobility, environment, people, living standards and governance [19]. Many definitions take into account a widely accepted approach of understanding smart city which interconnects multiple areas, components and which is multifaceted and wide ranging [10, 2, 25, 15]. These areas and components have to communicate with each other, the system should not be static and immobile and should include all stakeholders into planning and decision making [24].

However, smart city does not represent a concept which could be applicable and usable only within large cities. On contrary, also small and medium sized cities can become smart city, and their size doesn't need to be a limit in this regard [3, 20]. Also the document „Smart cities. Ranking of European medium-sized cities“, which the theory refers to as to the one of the first documents focusing on smart city, is a document elaborated for the European Union in 2007, which deals with medium sized cities. In this document, smart city is characterized by smart activities in Economy, People, Governance, Mobility, Environment, Living [13]. At present, the definitions and explanations of smart city are much more sophisticated, there are studies, scientific articles and

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many literature on this subject. We have dealt with this topic in other articles: see for example [29, 28, 30]. Despite the knowledge of smart city theory, it makes sense to remind, that smart city can be defined by using 6 components [13], or group of five individual environments [34], or group of three pillars [2], or through actors involved [24].

It is anticipated, that the world population living in cities will increase in the coming years, with the European Parliament's estimates [11] pointing out, that by 2030 will six out of ten people live in a city and by 2050 will this number increase to seven out of ten people living in a city. As we have stated in the previous texts and we stick to the opinion [28], smart city approach is not only a summary of proposals for modern city development and city management, but in our opinion it is also a concept which can be used for flexible problem solving and setup of processes in city management, planning and policies. At the same time we believe, and we are again referring to the ideas from 2015 [28], that smart city is a normative, that expresses a certain idea, how a modern and efficient city should look like and cities are trying to get closer to this prototype with their everyday improvements.

According to the European Parliament [11], modern cities functioning based on the smart city principles can become a key strategy to face poverty, inequality, unemployment and energetic management. Continuing urbanisation is accompanied with a phenomenon, that the population is more concentrating into cities, but smaller cities are those where the majority of people are still living in. The transformation of small cities to smart cities is from our point of view associated with the question, when exactly such a city becomes smart city, what are the preconditions of this transformation and what are the accompanying phenomenon. It is possible to see nowadays, that some cities in the effort to become smart city are implementing electronic services, which they then claim as smart. In this regard it is important to name and distinguish between the application of the smart city concept and when the city is "only" using electronic tools characterized for the particular level of eGovernment. The aim of this paper, based on the premises that also small and medium sized cities can become smart city, is to present and analyse good examples of smart city solutions in the Slovak Republic.

According to the Statistical Office of the Slovak Republic [32, 33] in 2017 approximately 2,9 million people in the Slovak Republic were living in cities and 2,5 million people in the Slovak Republic were living in rural areas. Altogether in 2017 there were 2890 municipalities in the Slovak Republic, with the size distribution of these municipalities being particularly significant. Altogether 1999 or fewer inhabitants lived in 2459 municipalities (of which 137 municipalities had 99 or less inhabitants) and 2000 or more inhabitants lived in 431 municipalities. A similar situation can be found for example in Italy, where 47,5 % of the Italian population lives in cities with less than 20 thousand inhabitants and 31,3 % of the Italian population lives in cities with less than 10 thousand inhabitants [5].

The focus of this paper will be on the city Kežmarok, which can be seen as a medium sized city and which by implementing existing smart city solutions, but mainly developing innovative smart city solutions directly in the city, can be considered as a good example. The limitation of the basic assumption, that a small or medium sized city can become a smart city is, that a specification of precise city size categories would require a more extensive research in concrete municipality's conditions of a particular country. We do not assume, that every municipality can become a smart city, but it is not excluded that also small and medium sized municipalities can become one.

2. Smart City in the Slovak Republic

Smart city has become a topic discussed professionally, scientifically and also generally by the public in the Slovak Republic conditions, while more and more attention is being paid to this topic also from state sector, self-governments, private sector and non-governmental organisations. Systematization and coordination of the activities leading to smart city solutions is within the state sector concentrated to the Ministry of Economy of the Slovak Republic and to the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization. The Ministry of Economy of the Slovak Republic clearly pointed out, that smart cities should be considered not only due to the implementation of modern technological innovations, but also with the connection to social aspects. Smart city thus represents areas which are of a common interest of several ministries and other central state government organisations, as well as other public administration subjects on the central and decentralized level of public administration [23]. From the point of the private sector, represented by concrete private companies, it can be seen as the offering of “readymade” smart city solutions, which are offered to the municipalities for example in the form of a paid service or as a package of multiple services / solutions. Incentives for smart city solutions are also generated by the municipalities themselves, where they are developing as “in house” solutions with the potential to overlap beyond the city to other subject in the direct managing competence of the city, but also wider to other cities inspired by to approaches which can be applied also in their specific conditions. Smart city incentives and solutions can come also from the third, non-profit sector.

The Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization started new web pages focused on the smart city topic. The aim of introducing this online platform was to offer a portal, which would on one place offer all information about smart cities, which are mostly in the Slovak Republic conditions very fragmented. The goal is, that municipalities, private companies but also the general public could find information clarifying current smart city activities in the Slovak Republic, that municipalities and other eligible entities could have access to all calls for smart city financing projects at one place, that municipalities would have the opportunity to discover good examples of smart city solutions in the Slovak Republic and from abroad [26, 31]. It should be emphasized at this point, that the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization is also responsible for informatization and eGovernment strategies in the Slovak Republic. Some of the elected representatives at the municipality level thus identify smart city activities with overall informatization, respectively they do not perceive the difference when they are applying eGovernment procedures and when they are starting to move towards a smart city.

In 2018, the Ministry of Economy of the Slovak Republic supported smart city projects with a half of a million Euro in ten different Slovakian cities [22]. However, the role of the Ministry of Economy of the Slovak Republic is also conceptual and strategic, which was manifested in 2017 by publishing the strategic document Support of innovative solutions in Slovak cities, which aimed to become the fundamental strategic document supporting smart city solutions in Slovak Republic conditions. Besides the basics, principles, components, recommendations and suggestions regarding smart city solutions, the results of a survey relevant for smart city solutions in concrete Slovak Republic’s conditions have been also presented within this document. The survey was realized on a sample of 69 representatives of Slovak cities and 100 Slovak companies which are providing different smart city solutions. As a result of the survey within the cities, vast majority (83,3% of respondents) of the representatives involved in this survey do know the term smart city, while 68% consider smart city as beneficial for their city. On contrary, despite the positive perception of smart

city, up to 38,8% of the cities have not invested in any smart city solutions. From the perspective of future development, city representatives in the survey declared, that they are interested in investing in smart city (95,7% of respondents) and that they would welcome the opportunity to get to know positive examples of smart cities from abroad (91,3% of respondents). As a result of the survey carried out within companies, up to 60% of entrepreneurs would welcome the removal of legislative obstacles and 70% of entrepreneurs perceived the financial support from the state as significant / critically important. Legislative conditions for e-mobility, taxes and contributions and energetics have been pointed out as problem areas of significant importance, while qualified workforce was perceived as the least problematic topic for the companies [23]. This means, that Slovakian cities do know what smart city means, they are interested in investing into smart city and they want to know more about examples of smart city functioning from abroad, but many of them have not yet invested in smart city. Subsequently, companies operating in the segment of smart city do not have problems with the lack of skilled workers, but rather lack the appropriate business conditions, especially in the area of financial support from the state and overall business environment.

Companies are considered a driving force for innovations in the area of smart city solutions and within the application of these solutions in conditions of a concrete city. On the one hand they are using data coming from municipalities and subsequently on the other hand they are offering specific solutions to municipalities [23]. One of the companies that offers “readymade” solutions for municipalities in the Slovak Republic conditions is Datalan, which offers ready to use applications and ready to use solutions based on Cloud computing through the platform digitalnemesto.sk, while the main hardware and also security protection tools are covered by the company, not by the municipality itself [6, 8]. the portal offers today online services with a particular focus on mandatory information publishing, electronical auctions, digital municipal council, online forms, interactive municipal budget, mobile application. Altogether 113 municipalities in the Slovak Republic were registered at the platform digitalnemesto.sk by the time surveying it, with 111 of them using some of the services offered. In most cases, the registered municipalities were using just one service, mostly the service on mandatory information publishing (only 10 municipalities were using more than one service, while none of the municipalities were using all of the services offered) [7, 9]. Another example of smart city technology solutions offered by companies is the initiative “I want smart city” focused on the area of navigation, management, parking, waste management and city lights, which was created in the consortium of six Slovakian technological companies: Sygic, Sensoneo, Seak, GoSpaceTech, ALAM a MycroftMind [4]. The corporate view on smart city solutions always comes across a one-way view of the company profit orientation, while smart city has to be a concept that complexly addresses the problematic of strategic city management in a way, so that the resources are used effectively and so that the quality of life of residence and all of the other actors in a city would increase. In this regard, the ideas which are companies offering may not have the necessary extent of complexity, are not always strategically oriented and they are just partial problem solutions.

Besides the smart city initiatives from the state level, or the proposals for solutions generated from the private company sector, some municipalities are trying to develop and implement “in house” solutions, where the idea, implementation and realisation of a smart city measure is formed as a unique thing in conditions of a concrete self-government unit. City Kežmarok is in Slovak Republic’s conditions a good example of an innovator city in this regard.

3. Smart City Good Practices of Kežmarok City in the Slovak Republic

Kežmarok city is situated in the High Tatras region, in the North East of the Slovak Republic. It's average height is 626 metres above the sea level and altogether 15 832 people were living in the city in 2018 [18]. Targeted activities of the city Kežmarok aimed at implementation of smart city solutions have been reflected in systematic and strategic measures as well as in real steps. City Kežmarok, like all municipalities in the Slovak Republic, has developed its Program for Economic and Social Development of the City Kežmarok 2014-2020, which is a medium-term strategic development document of a city and which contains all relevant development goals and priorities of a city [1, 27]. In addition to this strategic development document has the city Kežmarok decided to address smart city topic also in a form of a special strategy Idea Concept Smart Green City Kežmarok, which is mainly focused on smart city solutions in governance, energetics, environment and shared economy, in specific city conditions [14].

City Kežmarok is using some smart city solutions, which are available on the market, but also designs own solutions within its interorganizational capacities and implements these “in house” solutions in practice. One of such an innovative solutions is the application MSP SOS, which was developed as a unique project in the city Kežmarok in close cooperation with a partner mobile application developer company from the private sector.

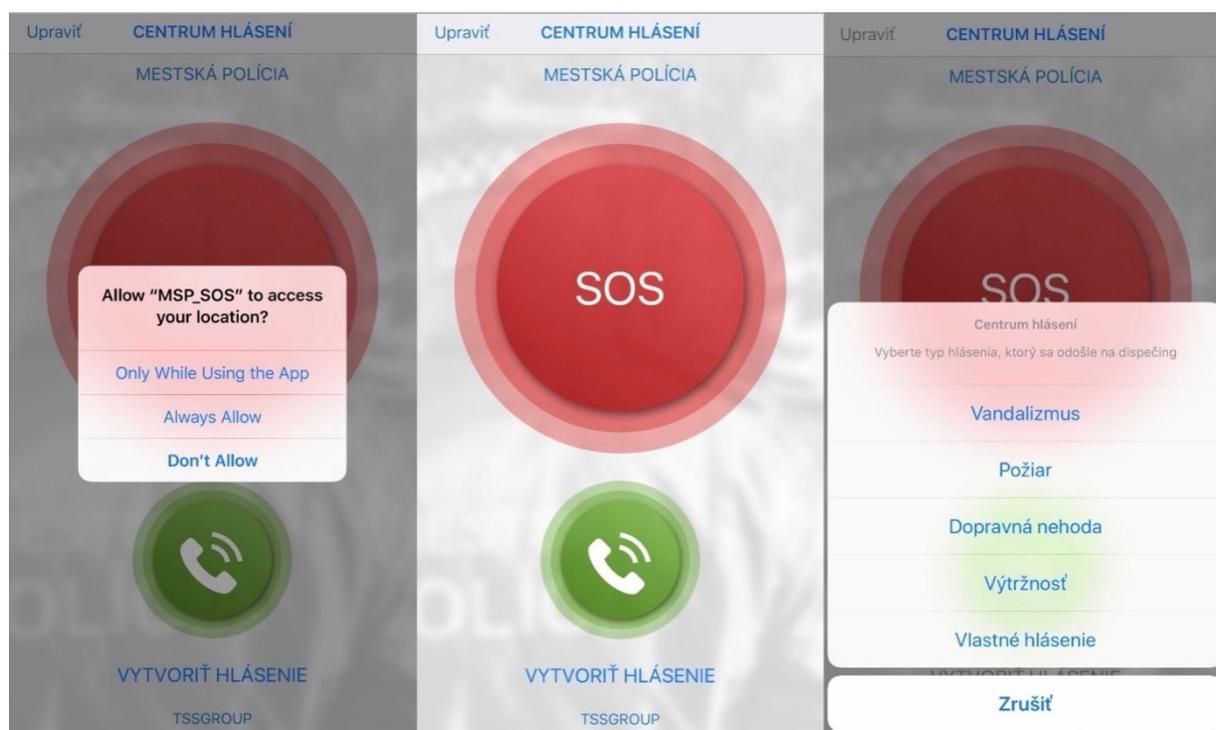


Figure 1. MSP SOS App (Source: [21])

The aim of the MSP SOS application is to increase the safety and comfort of living for the city inhabitants. The app is available for Android and Apple users, requires mobile internet connection or Wi-Fi connection, the user has to allow the app to access his location and a prerequisite is also user registration by entering first name, surname and phone number. The registration is used to

minimalize potential misuse of the app and the user can be blocked by the provider. Application has currently three functionalities:

1. SOS – after pushing it, the local city police will receive a message in a form of audible signal and the city police will also receive all information about the registered user. By using the location of the mobile device, city cameras can focus on the area, where is the user who have send the signal. After that, the operator of the city police will assess the situation and will decide about the next steps.
2. Feeling distressed – the user makes use of this functionality to indicate that he might be at risk, while a real treat hasn't happed yet. After using this functionality the city cameras, by using the location of the user, will automatically focus on the user and will track his movement for one minute.
3. Create a report – this functionality gives the user the possibility to report any of the anticipated situations, which are vandalism, fire, traffic accident, rioting, or to draw attention of the city police onto something else by using custom report [17, 12].

Another example of a smart city solution, which the city Kežmarok has initiated is a 2D and 3D geographic system mapping all the city's infrastructure. Data collection and development has been going on for four years and should be completed in the autumn of 2019. The aim is to completely map the infrastructure of the city, including all the buildings, roads, sidewalks, underground networks, fiber optic cables, greenery, parks and so on. The system also includes a precise mapping of the overall infrastructure by using GPS coordinates. City Kežmarok is expecting that the processes in the city can be faster and that the management can be improved. For example, with regards to the greenery, the aim of the city is to know where are all the trees, bushes and other greenery, including the information about their age and health condition. This could improve how the city will be able to plan greenery renewal or it will help the city to better communicate some activities for the people. Another positive example of this solution is, that if an accident happens, the repair and intervention wouldn't need to wait for the information where is the infrastructure underground. By using 2D and 3D map with GPS coordinates, all necessary work can be directed in a way that any other damages are prevented. The availability of the information from the 2D and 3D map will depend on the profession of each user. For example, an architect will have wider user privileges, through which he doesn't need to request information from the city office, what will optimize administrative activities at the city office and also of the user [16, 12].

By using these examples, our aim was to highlight possibilities also of the small or medium sized cities, which can develop and implement smart city solutions and thus become smart city. However, these solutions wouldn't be meaningful, if the people in the city wouldn't accept them and use them. Civic participation and cooperation is a fundamental precondition for every smart city. This also proves, that the interconnection of smart city's components is the foundation of a smart city and that without cooperation and interdependence this concept couldn't be implemented.

4. Conclusion

There is often a very thin dividing line between the application of specific smart city solutions and the implementation of selected electronic services as part of eGovernment. We assume, that if cities are implementing new, modern and innovative approaches leading to effectiveness and as a part of strategic management of the city, we can talk about smart city solutions. Investments into smart

city, which would only be a part of city's branding and not as a meaningful activity reflecting city strategy, can turn out to be a waste of resources [2]. Cities have to be careful not to become the victims of a profitable third-party motive in order to become a part of a smart city trend, but they have to have the improvement of the city's life always in mind in the first place.

Not everything that seems to be modern has to be smart. Likewise, not every solution using ICT and electronic approaches, has to be an expression of a smart city. Also, smart city doesn't need to be associated only with large cities, because also small or medium sized cities can effectively implement this concept, if it means using innovative solutions for increasing the quality of life in a city. Smart city solutions used in practice are a combination of state government's efforts and of the desire of a concrete city. The involvement of state government was shown at the Slovak Republic example, where the Ministry of Economy of the Slovak Republic and the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization are carrying out specific activities dedicated to support smart city projects, to create and run smart city portal summarizing all important information in one place. Some cities like to be marked as smart, because of marketing needs, but in reality they use only some of the smart city solutions and not the overall complex strategy as an approach for the entire city. We think, that regardless of the motivation leading to implementation of smart city solutions, always when it comes to improving the quality of people's life, it is beneficial.

City Kežmarok, representing a medium sized city is a good example, how limited resources of a city can be effectively used by implementing specific smart city innovative solutions to improve the life in the city. However, in the case of Kežmarok, this required not only taking on the national trends, or investing into readymade solutions offered by the private sector. City Kežmarok managed to build smart environment, which is based on a specific strategy created for the city and for the smart city solutions, which helped the people living in the city to feel more secure, which created conditions for the city and for the public to effectively use gathered geographic city data. Good example of the city Kežmarok is mainly based on innovative solutions generated within the city, which Kežmarok managed to move far beyond the use of electronic means that would only be an expression of eGovernment.

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DEATH OF “OPEN DATA”? HOW OPEN DATA HAS BEEN REALISING AND/OR NOT REALISING OPEN GOVERNMENT

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Abstract

Open government is a concept of governance, which holds that citizens have the right to access the documents and proceedings of the government to allow for effective public oversight. Some definitions specify the distinction between Open Data and Open Government: Open Government is defined in terms of service delivery and public accountability; and technology can be used to facilitate disclosure of information, but that the use of open data technologies does not necessarily equate accountability.

The paper analyses the relationship between Open Data and Open Government through a case study and tries to understand how the former affected the latter and the role of digital technology. The case is the open data policies and strategies of UK government, especially its application in sports and health related policies in recent years. The preliminary results show positive effect of open data policies on public service delivery, while limited improvement in accountability and mixed result in civic engagement.

1. Introduction: The OPEN Government Data Act

On 14th January 2019, the Open, Public, Electronic, and Necessary (OPEN) Government Data Act was signed into law in US. The Act was included in the Foundations for Evidence-Based Policymaking Act (Public Law 115-435) as Title II. The open data proposal will require federal agencies to publish their information online, using machine-readable data formats. The Open, Public, Electronic, and Necessary (OPEN) Government Data Act provides a sweeping, government-wide mandate for federal agencies to publish all their information as open data, using standardized, non-proprietary formats [11]. The Act builds on President Obama’s May 2013 Open Data Policy (M13-13) and makes its key aspects permanent.

On 15th November 2017, the OPEN Government Data Act passed the US House of Representatives. The House unanimously approved the bill under suspension of the rules. The Act is included as Title II in the Foundations for Evidence-Based Policymaking (FEBP) Act of 2017 (H.R. 4174).

Earlier in the 115th Congress, a slightly modified bill was introduced in both the House (H.R. 1770) and Senate (S. 760) on 29th March 2017, with identical text [9]. On 17th May 2017 the Senate Homeland Security and Governmental Affairs Committee unanimously approved the bill for

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consideration in the Senate. On September 28th 2017, the Senate passed a revised version of the OPEN Government Data Act as an amendment to Sen. John McCain's Fiscal Year 2018 National Defense Authorization Act (NDAA) (H.R. 2810). The measure was ultimately removed from the defence package in the joint conferencing committee process. The Data Coalition and numerous policy partners worked to convince the Senate to take renewed action on the House passed a version of the OPEN Government Data Act in the Speaker's FEBP package (H.R. 4174). On 19th December 2018, the Senate passed H.R. 4174 by unanimous consent, and on 21th December, the House voted on a motion to suspend the rules and passed the Senate amended version of H.R. 4147 by a voice vote of 356 to 17. On 14th January 2019, President Trump signed the FEBP Act (Public Law 115-435), which contained the OPEN Government Data Act, into law [11].

The OPEN Government Data Act sets an official presumption that "Government data assets made available by an agency shall be published as machine-readable data...in an open format, and...under open licenses." It would make a federal agency's failure to utilize open data legally questionable. The legislation will provide a powerful tool for open data reforms in every area of the government's information portfolio. Indeed, the Act also requires agencies to maintain, and publish, a comprehensive data inventory of all data assets. The data inventory will help agencies and open data advocates identify key government information resources and transform them from documents and siloed databases into open data [11].

The OPEN Government Data Act seeks followings:

- 1) Define open data without locking in yesterday's technology.
- 2) Create minimal standards for making federal government data available to the public.
- 3) Require the federal government to use open data to improve decision making.
- 4) Ensure accountability by requiring regular oversight.
- 5) Establish and formalize Chief Data Officers (CDO) at federal agencies with data governance and implementation responsibilities.

This US OPEN Government Data Act is one of the most recent and significant experiences regarding open data and open government; however, what open data and open government really mean is not an easy question and has divided authors as well as government institutions. Indeed, since OECD started to promote open government data [26] [33], many literatures have dedicated on this issue for years [12] [15] [36] [37] and numerous countries have introduced similar initiatives, policies, and acts [2] [22] [38]. The paper, thus, explores these questions, first through literature review and then, with a case study of UK government and its policies.

2. Methodology and Design of the Research

In order to understand open data and open government, there are several essential concepts to be explored. Furthermore, most of the literatures on the topic investigate in conceptual manner, while there are few empirical researches. Thus the paper first explores several concepts through literatures and then analyses a case of UK government. Regarding the case study, which is a qualitative research, the author examined government documents, including policy papers and national plans, while interviewing key actors. The author and her research partners conducted more than 20 semi-

structured interviews between November 2016 and November 2018. The interviews were conducted without recording but with detailed transcriptions, in order to encourage interviewees to express freely their opinions and views.

The aim of this research is to investigate whether Open Data improved policy making, service delivery, accountability, and participation. The research approach is a single case of the UK government [40]. Data were collected indeed from two sources: written documents available in the public domain and semi-structured interviews to key actors. Case study research is appropriate for this research as it makes use of multiple sources of evidence in order to create a picture of the phenomenon under investigation and is methodologically appropriate when exploring complex issues, those that occur over an extended time period [16] or when researchers have little or no influence on the event being studied [40] such as in this research. Document analysis is appropriate in this case based research as documents are rich source of data and in this instance they provided valuable primary data. Documentary analysis of strategic plans, policy documents, and government reports contributed to the understanding of the case study in three ways: first, the document analysis allowed the context for the case study to be understood, prior to the interviews and data collection; it also provided a historical account of the open data policy in UK; and finally, using document analysis also allowed for triangulation of data obtained through the interviews [29].

Information used in this paper is based on the interviews conducted to the followings among others conducted during the same period:

- 1) Fliss Bennée, Head of Data Governance, Department of Digital, Culture, Media, and Sport,
- 2) Mark O'Neill, former Chief Digital Officer, Department of Education,
- 3) Mike Rose, Head of Business Development, Open Data Institute,
- 4) Peter Fitzboydon, CEO, London Sport (at the time of interview in November 2016)
- 5) Emma Boggis, CEO, Sport and Recreation Alliance
- 6) Liz Nicholl, CEO, UK Sport

The paper is part of the results of a research on Big Data and Open Data in relation to evidence-based policy making in the area of sport policy, a research project awarded by Japan Society for the Promotion of Science (JSPS) entitled “Research on sport policy making based on Big Data: Olympic Games as a trigger” (Research ID: 18H00819 2018-2023) and those of the previously JSPS founded research project entitled “UK-Japan comparison on Olympic Game and Sport Policy (School sport policy and regional sport policy)” (Research ID: 16K13004 2016-2018).

3. Open Data and Open Government: Concepts and theoretical background

Why Open Data has become important for governments and in policy making? Before answering to this question, some key concepts should be clarified.

Data comprises facts, observations and raw information. Data are, indeed, forms of information. The concept of data is itself worthy of book-length explication [5]; however, in order to explore how data are created, used and understood, it might be enough to define it by examples, such as

facts, numbers, letters, and symbols [24]. Data itself has little meaning if it is not processed [23]. Indeed, first set of interviews conducted in 2016 and 2017 on the sport policy revealed that London Olympic ticketing data failed to be used in the way that various related institutions hoped, proving that data collected without clear design of usage proved to be useless as information [20], because of this characteristic. Information, indeed, consists of interpreted data and has discernible meaning. It describes and answers to questions like “who?”, “what?”, “when?”, and “how many?” [23].

Open Data refers to the principle according to which public data (gathered, maintained and used by government institutions) should be made available to be accessed and reused by citizens and businesses, while Big Data is used when the amount of data that an organization has to manage reaches a critical volume that requires new technological approaches in terms of storage, processing, and usage. Volume, speed, and variety are usually the three criteria used to qualify a database as Big Data [23]. Openness is a trend, which have changed relationship among stakeholders in all sectors [5]. Open models of government, standards, data, services, and collaborative production of knowledge have contributed to this transformation. Openness is claimed to promote the flow of information, the modularity of systems and services, and interoperability [5].

Open Government Data is a philosophy and increasingly a set of policies that promotes transparency, accountability and value creation by making government data available to all [26]. Public bodies produce and commission huge quantities of data and information. By making their datasets available, public institutions are believed to become more transparent and accountable to citizens. By encouraging the use, reuse and free distribution of datasets, governments are expected to promote business creation and innovative, citizen-centric services. Open Government Data has been introduced and promoted by OECD [26] [33]. The importance of data, especially Open Data in government is different from, for example, that in scientific community [5].

Data governance constitutes a framework of quality control for management and key information resource protection within an institution. Its mission is to ensure that the data is managed in accordance with values and convictions of the institution to oversee its quality and to put mechanism into place that monitor and maintain the quality. Data governance includes data management, oversight, quality evaluation, coherence, integrity and ICT resource security within an institution [23].

Open Data, Open Government, and Open Government Data have become important concepts in government institutions for the above mentioned, mostly empirical reasons. Theoretically, the importance of openness, especially that of data in government, can be explained from New Public Management (NPM) concept. Information and Communication Technology (ICT) is considered to be introduced in public administration along with other new managerial techniques, especially under the NPM concept in the Nineties. With NPM, the use of ICT started to focus on managerial process of public administration. Various managerial tools enabled by ICT were introduced to improve the speed and transparency of administrative procedure. Exchange of documents and elaboration through multiple actors became easier, thus improving interaction and collaboration among stakeholders. Not only the internal managerial issues, but also the public service delivery utilizing and benefitting from ICT, especially web-based technologies became popular. Many former counter services were transformed into on-line services, making citizen possible to access directly to information as well as public services [21].

E-Government has been challenged with “digital era governance”, which goes beyond the NPM. In this view, all stakeholders are related in public governance network. The introduction of New Public

Governance (NPG) in public service delivery is an important turning point as concept as well as practice [1] [18]. Citizens and communities are invited to participate not only in the decision-making process, but also the service delivery process, thus realizing co-design, co-creation, and co-production. They are redesigning the structure of service delivery [1].

Digital services of governments have become an importance aspect of technology and/or innovation driven public services. This concept as well as practice was enabled through various elements, including co-design and co-production with citizens and other stakeholders, digital technologies enabling data analytics, thus better designing services, based on data and evidences, NPG helped the realisation of co-production with citizens and other stakeholders, while NPG encouraged ICT to be an effective and efficient instrument of government [1] [19] [21]. Many of the digital services are not only a result of technological innovation and advancement, but also a product of institutional reform and revolution. ICT, per se, is not a solution, but could offer and become an opportunity.

In line with this theoretical evolution of public sector governance, Open Data, Open Government, and Open Government Data have become essential to government institutions, not only for their innovation [6] but also for the possible realisation of co-design and co-production with citizens and other stakeholders [21]. Indeed, the research focuses on this topic because of this very reason.

4. UK Approach to Open Data and Open Government: Case Study

The UK's third Open Government National Action Plan 2016-18 (NAP), published during the Prime Minister's Anti-Corruption Summit on 12th May 2016, builds on the first and second plans published in September 2011 and September 2013. It sets out 13 commitments in line with the Open Government Partnership values of access to information, civic participation, public accountability, and technology and innovation. The third NAP was developed in dialogue with the UK Open Government Network (OGN), a coalition of active citizens and civil society organisations committed to making government and other powerful institutions work better for people through enhanced transparency, participation and accountability.

The UK government is committed to Open Government, not just every two years when it publishes a new NAP, but as business as usual. The UK's fourth National Action Plan for 2018-2020 was launched in 2018 and was developed in collaboration with the UK's Open Government network. Commitments in the UK NAP include the followings:

- 1) The UK being the first G7 country to commit to the Open Contracting Data Standard (OCDS) for contracts administered by a central purchasing authority, the Crown Commercial Service. This means that the whole process of awarding public sector contracts - from bidding right through to building - was made public for the first time in 2016;
- 2) Leading the world in creating an open register of beneficial ownership so everyone can see who owns what in Britain;
- 3) The introduction of reusable unique identifiers to the UK's published government grants data and central procurement data. This represents a step change in how people can monitor how government is spending taxpayers' money.

Open Government National Action Plan has developed between 2016 and 2018 as follows.

The third UK Open Government National Action Plan was published in May 2016. This plan set out commitments to open government in the UK and the ambitions of the UK Government for the next two years. This updated version of the third Open Government National Action Plan includes new commitments from each of the devolved administrations: the Northern Ireland Executive, the Scottish Government and the Welsh Government. This plan has been co-created with members of civil society and active citizens, coordinated through our open government networks. The UK government is committed to continue to work with civil society to both implement and develop commitments in future.

The major steps and their related publications are the following:

- UK Open Government National Action Plan 2016 to 2018 (12 May 2016): policy paper
- United Kingdom National Action Plan Commitment 13 - Government and Civil Society Collaboration (7 October 2016): policy paper
- Commitment from the Scottish Government (7 December 2016): policy paper
- Commitments from the Welsh Government (7 December 2016): policy paper
- Commitments from the Northern Ireland Executive (7 December 2016): policy paper
- Open Government Partnership: UK national action plan 2015 launch (13 July 2015): speech

The UK government's second NAP, published at the OGP Summit in London in October 2013, and progress against delivery

- Open Government Partnership: UK National Action Plan 2013 (27 June 2013): consultation outcome
- OGP UK National Action Plan 2013 to 2015 (10 March 2015)
- Open Government Partnership National Action Plan 2013 to 2015: mid-term assessment (25 March 2015): consultation outcome
- Open Government Partnership: UK Government delivering greater transparency (14 October 2016): press release
- Open Government Partnership National Action Plan 2013-15 final report (14 October 2016): policy paper
- UK uses Open Government Partnership summit to make transparency a reality for citizens (31 October 2013): press release

From September 2012 to October 2013, the UK government was the lead co-chair of the OGP, culminating in the OGP summit in London in October 2013. Indeed, UK hosted Open Government Partnership Summit 2013, on 5th December 2013. Related to these initiatives, there are following publications:

- Open Government Partnership: UK co-chair vision (26 September 2012): policy paper
- The Open Government Partnership Summit (10 April 2014): case study

OGP UK 2011 National Action Plan was the first NAP published at the launch of the OGP in September 2011. The governments' self-assessment report provides an honest account of the UK's performance up to April 2013.

- UK Open Government National Action Plan 2011 to 2013 (20 September 2011): policy paper
- OGP UK 2011 National Action Plan (24 April 2013): consultation outcome

These policy papers and related reports have contributed to formulate the open government data in UK, which is another example.

The UK government has promoted various initiatives on open government data for all this period; however the outcome seems mixed, according to some of the interviewees. Open Data requires not only technology, but also and especially coordination among government institutions, which is not easy to achieve, mostly because of political and organizational reasons. Open Data initiatives, thus, need good design and long preparation in each institution and then among institutions. Often, some interviewees noted, institutions do not know what data they have and thus what to share.

One of the most interesting factors emerged from the interviews was the fact that Open Data Institute (ODI), one of the main institutions in charge of open data policies in UK, was instituted by bottom-up initiative [25]. Indeed, the ODI was co-founded in 2012 by the inventor of the web Sir Tim Berners-Lee and artificial intelligence expert Sir Nigel Shadbolt to show the value of open data, and to advocate for the innovative use of open data to affect positive change [25]. Indeed, ODI claims that they are "an independent, non-profit, non-partisan company" since its creation. ODI works with government to build an open, trustworthy data ecosystem. Their mission is to bring about sustainable behaviour change within companies and governments that hold and use data. They do this through three key activities: 1) Sector programmes - coordinating organisations to tackle a social or economic problem with data and an open approach; 2) Practical advocacy - working as a critical friend with businesses and government, and creating products they can use to support change; and 3) Peer networks - bringing together peers in similar situations to learn together. Indeed, the business model and the organizational structure of ODI reflect their idea of openness; it is a network, rather than a traditional institution. Co-design, co-creation, and co-production are part of the organizational culture as well as business model, which are parallel to the NPG model in government and have shown effective in some cases, but also very difficult in other occasions, both because of the model itself [19].

ODI advocates for and supports practices that increase trust and trustworthiness: building ethical considerations into how data is collected, managed and used; ensuring equity around who can access and use data; engaging widely with affected people and organisations. They help people identify and address how open data can be used effectively in their sector to improve decision making and processes, deliver more efficient and effective services and products, and fuel economic growth and productivity. They connect, equip and inspire people to innovate with data [25]. ODI offers: 1) Strategic advice – identifying how data can help to achieve programme goals and how to measure success; 2) Policy development and guidance – scrutinising the interaction between general data governance practices and sector norms; 3) Technology development – creating appropriate data

standards and the tools needed to support them; 4) Research – from creating case studies of the role of data in the sector to rigorous impact evaluation; 5) Training – including blended learning packages that combine face-to-face, eLearning and webinars; 6) Running competitions and acceleration programmes – to foster innovation in the sector; and 7) Building communities within the sector – and communicating clearly with them [25].

Although it is an independent institution, ODI works with government and for various government policies as well as projects. Many of the staff members are former civil servants and they have extended personal network with former colleagues in the government and among business partners. Indeed, among the interviewees, many of those who work in private business are former civil servants and know their counterpart in the public sector. The revolving door system of UK favours this practice and has several advantages; however, from the transparency and accountability point of view, it also has several issues. Personal network does not necessary mean unethical behaviour or corruption, but winning the bid and working with former colleagues' projects sometimes raise ethical concerns. Co-production and accountability are, indeed, difficult to coexist.

The issues of Open Government Data are, according to the interviewees, are the following. First, institutions often do not know what data they have. Thus, to know what data they have is the first step. Second, data are not always updated and/or have the same quality, making difficult to use them together. Third, availability of data does not necessary lead to better governance, as institutions often have no idea how to utilise data. Forth, open data theoretically would contribute to transparency and accountability, but in practice, it is difficult to prove it. Lastly, open government data are believed to contribute to the policies as well as to the business, but the benefit to the latter has not been clear. The issues are related to the problem that data are neither information nor knowledge.

Some interviewees noted that this underuse of data was due to several reasons: first, the data gathering often started without clear ideas how to use them, thus had some fundamental issues from the beginning; second, in the policy making process, the data analysis has been done in fragmented way and not systematically, thus the potential of open data was not fully activated; third, various actors had different ideas for open data; and forth and most importantly, many actors have not realised the potential of the open data.

Data are, indeed, often ignored and not utilised, especially for policy making [20]. The interviewees pointed out the lack of awareness of the key actors, the lack of coordination among these, the difficulty of analysis, and the difficulty in interpretation of data and especially in translating into public policy. The last could be also explained from different points of view; research suggests that the understanding depend upon the information and the way information is presented [3] [10]. Indeed, more detailed content will negatively affect understanding [4] [7] [8] [32]. The existence of data and its openness per se does not guarantee better understanding of the fact [13] [30] and better policy making. The results of literature review and research results suggest that guaranteeing the access to data and thus information does not necessary mean that they understand it, because of cognitive constrains, according to the cognitive load theory [17] [31] [35].

It might be important to note that the open government data often is considered in relation to evidence-based policy-making (EBPM). This is based on the belief that more available open data could contribute to better policy making [34] [39]. However, interviews, literatures, and facts so far have proved this difficult.

5. Open Data, Open Government Data and Co-production

Since the aim of the paper is to explore Open Data, Open Government, and Open Government Data, the last part investigates what have been done and what would be the future plans.

Open Data and Open Government Data are based on co-production with civil society and among institutions. Theoretically, open data is in line with NPG and thus in line with public service delivery with co-production [1] and technological innovation [6] [21]. Open Government Data is aimed to improve transparency and accountability, thus, also from this point of view, is in line with other public sector reforms, especially that of NPM.

As open data would contribute to evidence-based policy-making (EBPM), literatures of EBPM should also be considered. One of the traditional areas of policy which has used EBPM is healthcare and healthcare services are indeed benefitting not only from open data, but also from the digital technology in general [39], especially in order to change behaviour of citizen. Healthcare services are turning toward preventive healthcare and, for example, social prescribing in UK is an example of using data and co-produce service with civil society and citizens [28]. Social Prescribing is a means of enabling general practitioners and other frontline healthcare professionals to refer patients to a link worker - to provide them with a face to face conversation during which they can learn about the possibilities and design their own personalised solutions, i.e. “co-produce” their “social prescription” - so that people with social, emotional or practical needs are empowered to find solutions which will improve their health and wellbeing, often using services provided by the voluntary and community sector. It is considered to be an innovative and growing movement, with the potential to reduce the financial burden on the NHS and particularly on primary care [28]. This is a typical benefit of co-production of, and through, open data and Open Government Data.

The issues of open government data are not necessary related to technological solutions, but more on institutional design, design of dataset, interpretation and use of data, and making policy using data. Thus, both theories and experiences of open data suggest that the issues are similar to those of EBPM [39]. Previous research of the author showed that availability of data does not guarantee information and knowledge [20]. Furthermore, policy areas like healthcare and environment, where data and EBPM are important as well as effective, behaviour change of the citizens is essential, which again requires data. Social Prescribing would be an interesting experiment to co-produce healthcare services with civil society and individuals.

6. Conclusion: Findings and limitations

This paper aims to explore the theories and current situation of Open Data, Open Government, and Open Government Data in relation to policy making, public service delivery, accountability, and citizen co-production.

Literature review shows conceptual objectives and benefits of Open Government Data, while the policies in various countries show that they mostly follow these concepts. Interviewees, however, pointed out the operational issues of Open Government Data, which are easy to guess from the literatures, but not so easy to resolve, because the issues are related to the governance of public organizations and to the very nature of data. Interviews also revealed that there are issues such as capacity development on data analysis and digital technology in general. There are also limitations in Open Government Data, mostly due to the availability and the quality of data, which affect

usability of data, thus, affect policy making using the data.

However, we already know that having data does not lead to better information or better understanding [20]. Availability of data, thus, does not guarantee better policy making based on data as many hoped in rather naïve way. However, there are still strong beliefs among governments and institutions that Open Government Data would improve policies and business [34].

The case study shows that Open Data has improved public service delivery and started to realise co-production, thus civic engagement, to a certain extent; however, it has shown little evidence of improved accountability and had difficulties to be transferred into policy making process. The results of the case study contribute to theoretical discussions, as they show empirical issues, which are not necessary explored in many literatures. The case also contributes to the co-production of public service delivery discussion as well, since it is an example of it. Furthermore, the case can be seen in the context of EBPM as well, which has strong connection to Open Government Data.

Given the limitation of one case study, the further research which will follow would be on several other governments, and compare those cases. Since Open Government Data and EBPM are related to each other, theoretical study on EBPM would be another step to complete the research, while theoretical explanation within co-production and NPG should be explored.

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MEASURING HUMAN RESOURCES PERFORMANCE USING PROCESS MINING

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Abstract

Performance of human resources is an important issue for managers in profit sector and public sector as well. Performance evaluation can be measured by numerous factors. Traditional approaches are often subjective, and based on descriptive indicators which are hard to measure. Since modern organizations use the information systems to record information about business processes and activities of human resources, it is possible to use this information utilizing process mining techniques to acquire objective information about employees' performance.

This paper reviews the literature and investigates the state of the art trends in human resource performance measuring using process mining, the indicators which are measured, methods, frameworks, main directions of development, and suggested future works.

1. Introduction

In day-to-day work, employees are involved in executing business processes and play a key role in creating value for the organization. Organizational managers need to evaluate the effectiveness of human resources, identify best practices, identify opportunities for improvement and make decisions [10]. They often have to make decisions based on subjective estimates, which can lead to wrong conclusions about success, ineffective development strategies, and missed opportunities for improvement. The basic idea of this research has been to explore the state-of-the-art trends in the human resource performance measuring using process mining, to find out what the methods, frameworks and main directions of development are as well as suggest further research.

Process mining is a relatively new research discipline that comes between computational intelligence and data mining on the one hand, and process modelling and analysis on the other hand [1]. The idea of process mining is to discover, monitor and improve real processes by extracting knowledge from event logs readily available in today's (information) systems. Process mining includes (automated) process discovery, conformance checking, social network/organizational mining, automated construction of simulation models, model extension, model repair, case prediction, and history-based recommendations [1]. Process mining provides an important bridge between data mining and business process modelling and analysis [1]. A starting point for process mining is an event log. All process mining techniques assume that it is possible to sequentially record events so that each event refers to an activity and is related to a particular case [2]. Event logs may store additional information such as the resource executing or initiating an activity, the timestamp of an event, or data elements recorded with an event [2].

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Resource behavior refers to the actions or reactions of a resource in relation to business process execution [4]. Resource behavior measure is highly relevant for the performance of processes, suggesting that comprehensive support for this is needed. Several important issues are related to resource behavior measure [4]. The problem of resource behavior measure can be approached in two ways [4]. According to one approach, it may use subjective estimates by observing resource behavior in business process execution [4]. According to the other approach, the use of process mining to measure resource behavior from event logs is possible [4]. Both methods may perform equally well [4]. Process outcomes depend on human resource behavior, which is considered to be the "most important element that can affect project success" [13].

CONTRIBUTION

This paper provides a literature review on process mining techniques adopted in order to capture the performance of human resources. To achieve this goal, the following research questions are formulated:

- A. What aspects of human resources behaviour can be measured using process mining?
- B. What are the main opportunities for future research and identified research areas?

The rest of the paper is structured as follows: the research methodology is described in Section 2, the main explanation of research results is presented in Section 3 and finally, concluding remarks in Section 4.

2. Research methodology

To gain an insight on process mining implemented in the security domain a literature review has been conducted according to the general systematic review steps proposed by Kitchenham [5]. The most common reasons for undertaking a systematic review are [5]: 1) To summarize the existing evidence concerning treatment or technology e.g. to summarize the empirical evidence of the benefits and limitations of a specific agile method; 2) to identify any gaps in current research in order to suggest areas for further investigation; 3) to provide a framework/background in order to appropriately position new research activities.

2.1. Literature search

The first step in literature research was to define the keywords which will be used in database search. The first keyword was "process mining", the second "performance", and the third "human resource" or "HR" as the general term which includes all the essential components. Consequently, the query is as follows: "process mining" AND performance and "human resource" or HR. For the purpose of this survey, only Google Scholar was used within the time span from 2010 to 2019.

The inclusion and exclusion criteria for article selection are presented in Table 1. Based on these Criteria all the articles have been selected. The whole research has been conducted in three phases. The first phase objective has been to rise query in Google Scholar database with defined keywords and titles. The articles matching the criteria have been selected. The second phase has taken into consideration the abstracts and duplicates. If the paper has matched criteria, the third phase has been performed – the full text analysis. The papers that have not matched the criteria have also been excluded from the research.

	PHASE 1	PHASE 2	PHASE 3
INCLUSION CRITERIA	Title indicates that the paper is about the process mining, performance measuring and human resource Keywords indicate that the paper is about the process mining performance measuring and human resource	Abstract of articles indicates that the paper is about the process mining, performance measuring and human resource	Topics on the process mining usage in performance measuring of human resources, examples of implementation The main indicators which are measured, methods, frameworks, main directions of development, and suggested future research
EXCLUSION CRITERIA	Title indicates that the paper is about another topic, it can include process mining but exclude human resource or performance measuring Keywords indicate that the paper is about another topic Book Chapter PhD or Master Thesis Patent	Abstract of articles indicates that the paper is not related to the topic No abstract available Duplicates excluded	There are no process mining techniques related to the performance measuring of human resources There are no performance measuring of human resources

Table 1. Paper inclusion and exclusion criteria

An initial search was performed during December 2018 and the initial number of 254 papers were discovered.

The first phase was performed by analysing titles and keywords, with exclusion criteria presented in Table 1 and 151 articles were selected.

The second selection was based on the analysis of the abstracts and removing duplicates. After the second phase 22 articles remained.

The third selection was performed by full text analysis and the final number of papers ready for analysis was 9.

At first glance, the final number of articles is small, but when research is put into the context that the field of research is just beginning to develop, then it is understandable that the number of articles is rather small.

3. Research Results

The analysis of 9 identified articles has revealed that from 2010 to 2018 only 6 articles were published in conference proceedings and 3 in scientific journals. Identified articles are the following:

- Analyzing Resource Behavior Using Process Mining [9],
- Resource behavior measure and application in business process management [4],
- An Extensible Framework for Analysing Resource Behaviour Using Event Logs [11],

- Implementing Closeness Centrality Measurements on Workflow-Supported Enterprise Social Networks [3],
- Retrieving Resource Availability Insights from Event Logs [7],
- Context-Aware Recommendation of Task Allocations in Service Systems [12],
- Mining resource profiles from event logs [10],
- A Comparative Evaluation of Log-Based Process Performance Analysis Techniques [8],
- Dynamic human resource selection for business process exceptions [6].

For the purpose of the analysis the main findings of the articles are presented in chronological order.

Nakatumba and van der Aalst put focus in their paper on the phenomenon of workload-dependent processing speeds and the analysis of that phenomenon [9]. They have presented an approach to quantify the relationship between workload and processing speed. The workload of a resource or a group of resources can be defined as either: (a) the number of work items waiting at the start of execution of an activity, i.e., the amount of work that has been scheduled for a given user or (b) the number of activities that have been executed over a particular period [9]. Authors have focused on the second option, to define "how busy" the resource has been [9]. This approach is based on regression analysis and is implemented as a new plug-in in ProM. The authors have identified aspects of resource behavior that are not captured in today's simulation tools. They point out that people do not work at constant speeds and their processing speeds are usually influenced by their workload [9]. The future research will aim at more powerful analysis techniques and a tight coupling between simulation and operational decision making. They want to make simulation more realistic by adequately modeling resources based on empirical data. Besides workload-dependent process times, it is necessary to take into account the facts that people are involved in multiple processes, they are available only part-time or they work in batches [9].

Huang et al. [4] have pointed out that the problem of resource behavior measure can be approached in two ways. According to one approach, it may use subjective estimates by observing resource behavior in business process execution. According to the other approach, it is possible to use of process mining to measure resource behavior from event. Both methods may perform equally well. Their approach of measuring resource behavior is based on four important perspectives, i.e., preference, availability, competence and cooperation, based on process mining the event logs as a basis on which they measure and apply resource behaviors in BPM context, i.e., what the typical behaviors of a resource are and how they are applied in business process management [4]. The authors address four applications of resource behavior measure: (1) resource similarity measure based on resource reference and competence measure, (2) resource network analysis based on resource cooperation measure, (3) resource dependent constraint detection based on resource cooperation measure and (4) work distribution recommendation based on resource preference, competence and availability measure [4]. Opportunities for future work are: the further research of discovery and extension issues, e.g., how to distribute work to appropriate resources with the performance consideration in business process execution, and how to handle the situation in which a group of resources work for an activity simultaneously. In these cases, resource behaviors should

be defined more precisely and their applications may remarkably improve the business process execution performance [4].

Pika et al [11] in 2014 proposed an extensible framework for extracting knowledge from event logs about the behavior of a human resource and for analyzing the dynamics of this behavior over time. The framework is fully automated and implements a predefined set of behavioral indicators for human resources research aims to make use of information recorded in event logs to extract knowledge about the behavior of a resource over time. For various dimensions of resource behavior, such as skills, utilization, preferences, productivity and collaboration, authors define a set of Resource Behavior Indicators (RBIs) which are discoverable from event logs. The framework enables the definition of new RBIs as necessary via Structured Query Language (SQL) statements. An extension of this work will be to combine several RBIs to a single performance measure. For this purpose, Data Envelopment Analysis – a non-parametric efficiency measurement method developed by Charnes et al. can be used [11]. Another possible extension of this work is using the results of the analysis to enrich event logs with knowledge about resource [11] .

Ahn et al. [3] have proposed and implemented the algorithm so as to be realized as a closeness centrality knowledge analyzer, and illustrate its run-time screen-shots with an operational example. The goal of the algorithm was to measure and calculate theoretically the degree of work-intimacy among workflow-performers involved in a workflow model or a workflow package (a group of inter-relevant workflow models) on a workflow-supported enterprise or organization. The authors have been trying to develop several sophisticated and diversified analysis techniques, such as centrality, prestige, disconnectedness, correspondence, structural equivalence, and affiliation, to be applied to workflow-supported enterprise social networks. Possibilities for further research are directly related with a converged issue of social networks analysis issue and its visualization issue [3].

Martin et al. [7] have focused on solving the problem of resources as a critical component of a business process as they execute the activities. These resources, especially human resources, are not permanently available and tend to be involved in multiple processes [7]. The goal of the paper was to retrieve resource availability in-sights from an event log. All information embedded in the event log is systematically used to obtain daily availability records, which express the resource's availability for the process under consideration [7]. The mined daily availability records are innovative as they are the first to take into account (i) the temporal dimension of availability, i.e. at which time of a day a resource is available, and (ii) intermediate availability interruptions caused by, e.g., a break or the allocation of source to another process [7]. Depending on the time horizon of the analysis period, a large number of daily availability records might be obtained. To describe resource availability on a more aggregated level, an extensible set of resource availability metrics is introduced: Total available time, Total unavailable time, Total idle time, Working day length, and Active time [7].

The goal of the Sindhgatta et al. [12] paper has been to present a context-aware collaborative filtering recommender system that predicts a worker's suitability for a task, in different contexts or situations. The context-aware recommender uses information on the performance of similar resources in similar contexts to predict a resource's suitability for a task [12]. Collaborative Filtering (CF) is a technology that has been widely used in e-commerce applications to produce personalized recommendations for users [12]. Functionally, CF builds a database of preferences or ratings done by distinct users on specific items [12]. A CF algorithm provides recommendations in following ways: (i) Prediction, a numeric value, expressing the predicted preference or rating of an

item for a user. This predicted value is within the same scale as the rating values provided by user. (ii) Recommendation, a list of items, that a user will like [12]. The recommended list is on items that have not been already rated by the user. The key in CF is to locate other users with similar profiles to that of the user for which the recommendations need to be provided (or the active user). These similar users are commonly referred to as 'neighbors' [12].

Pika et al. [10] have presented a framework for analyzing and valuating resource behavior through mining event logs. The framework provides (1) a method for extracting descriptive information about resource skills, utilization, preferences, productivity, and collaboration patterns; (2) a method for analyzing relationships between different resource behaviors and outcomes; and (3) a method for evaluating the overall resource productivity, tracking its changes over time, and comparing it to the productivity of other resources [10]. The framework consists of three modules. The goal of the first module, called Analyzing Resource Behavior, is to discover what resources have been doing - that is, to gain objective information about their skills, utilization, working preferences, productivity, and collaboration patterns [10]. The goal of the second module, called Quantifying the Outcome of Resource Behavior, is to help managers better understand the effects of resource behaviors on different process outcomes [10]. Finally, the goal of the Evaluating Resource Productivity module is to provide a method for evaluating the overall productivity of a resource by comparing it to the productivity of other resources and tracking its evolution over time [10].

Milani and Maggi [8] explore the effect of workload on service times based on historic data and by using regression analysis. They are introducing a framework for categorizing and selecting performance analysis approaches based on existing research of other authors such Pika et al. [11] or Huang et al. [4].

Lee et al. [6] propose a systematic approach that analyzes event logs to select suitable substitutes if the initial human resources become unavailable. The approach uses process mining and social network analysis (SNA) to derive a metric called degree of substitution, which measures how much the work experiences of the human resources overlap, from the two perspectives: task execution and transfer of work [6]. Along with the metric, suitable substitutes are also identified [6].

4. Conclusion

This research has discovered 9 articles dealing with measuring human resources behavior using process mining in the time span from 2010 to 2018. This is a rather small number of articles taking into consideration the initial number of 254 articles. One of the reasons for such a small number of articles is the fact that the process mining is a relatively new discipline and the human resource performance measuring within PM is even newer. However, this is a "hot" topic in the area, which develops fast. It can be expected that the number of research in this area will increase.

In this research two research questions have been formulated:

- A. What aspects of human resources behaviour can be measured using process mining?
- B. What are the main opportunities for future research and identified research areas?

The answer to the first research question is given in each of 9 articles. Nakumba and van der Aalst [9] quantify the relationship between workload and processing speed. The authors focus on the

definition of workload as the number of work items that have been executed over a particular period, but there are also workload definitions that can be used and can be explored.

Huang et al. [4] approach is based on measuring resource behavior from four important perspectives, i.e., preference, availability, competence and cooperation. Process mining techniques are used to mine the event logs as a basis on which resource behaviors in BPM context are measured and applied.

Pika et al [11] have proposed an extensible framework for extracting knowledge from event logs about the behavior of a human resource and for analyzing the dynamics of this behavior over time. For various dimensions of resource behavior, such as skills, utilization, preferences, productivity and collaboration, a set of Resource Behaviour Indicators (RBIs) which are discoverable from event logs are defined. The framework enables the definition of new RBIs using Structured Query Language (SQL) statements.

Ahn et al. [3] have been trying to develop several sophisticated and diversified analysis techniques, such as centrality, prestige, disconnectedness, correspondence, structural equivalence, and affiliation, to be applied to workflow-supported enterprise social networks. The goal of the algorithm was to measure and calculate theoretically the degree of work-intimacy among workflow-performers involved in a workflow model or a workflow package on a workflow-supported enterprise or organization.

Martin et al. [7] suggest a procedure to retrieve daily availability records from an event log. The daily availability records, potentially after post-processing, allow managers to gain insight in resource allocation to a particular process, the variation of this availability over several days and weeks, etc. An extensible set of resource availability metrics is introduced: Total available time, Total unavailable time, Total idle time, Working day length, Active time.

Sindhgatta et al. [12] present a context-aware collaborative filtering recommender system that predicts a worker's suitability for a task, in different contexts or situations. CF builds a database of preferences or ratings done by distinct users on specific items [12].

Pika et al. [10] present a framework for analyzing and valuating resource behavior through mining event logs. The framework consists of three modules: Analyzing Resource Behavior (gain objective information about skills, utilization, working preferences, productivity, and collaboration patterns); Quantifying the Outcome of Resource Behavior (to help managers better understand the effects of resource behaviors on different process outcomes); Evaluating Resource Productivity (to provide a method for evaluating the overall productivity of a resource by comparing it to the productivity of other resources and tracking its evolution over time) [10].

Lee et al. [6] propose a systematic approach that analyzes event logs to select suitable substitutes if the initial human resources become unavailable. The approach uses process mining and social network analysis (SNA) to derive a metric called degree of substitution, which measures how much the work experiences of the human resources overlap, from the two perspectives: task execution and transfer of work [6]. Along with the metric, suitable substitutes are also identified [6].

B. What are the main opportunities for future research and identified research areas?

Nakumba and van der Aalst [9] next research will aim at more powerful analysis techniques and a tight coupling between simulation and operational decision-making. They want to make simulation more realistic by adequately modelling resources based on empirical data. Besides workload-dependent process times, they also take into account the fact that people are involved in multiple processes, are available only part-time and work in batches.

Huang et al. [4] will further look into how to distribute work to appropriate resources with the performance consideration in business process execution, and how to handle the situation in which a group of resources work for an activity simultaneously.

Pika et al [11] have predicted an extension of this work to combine several RBIs to a single performance measure. For this purpose, Data Envelopment Analysis – a non-parametric efficiency measurement method developed by Charnes et al. can be used. Another possible extension of this work is using the results of the analysis to enrich event logs with knowledge about resource behaviour.

Ahn et al. [3] suggest future works directly related with a converged issue of social networks analysis issue and its visualization issue.

Lee et al. [6] suggests that other dimensions such as time, quality, or cost should also be considered to assess substitutability between human resources

The author's idea is to investigate the opportunity of further development of suggested Pika et al. [10] framework in order to extend the evaluation of resource productivity which currently uses DEA technique with Balanced Scorecard. It can be justified by the fact that every organization, which wants to be successful, must achieve its goals. The same principle is valid for human resource behavior performance. Connecting the Balanced Scorecard method and DEA method could enable not only the measurement of effectiveness but also the measurement of the efficiency. However, it is the topic to be additionally investigated in further research.

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"WHO CARES ABOUT DIGITAL LITERACY OF 54+ CITIZENS?!"

Robertina Zdjelar¹

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Abstract

Nowadays, information about mostly any social, commercial, public or cultural activity is available on the Internet. If it is not, it does not exist. The age of digital transformation, digital society and digital economy is characterised by e-activities, e-events and e-services. The focus of ICT developers and experts is on how to transform regular services to digital ones, as well as on how to develop protocols for communication machine to machine (Big Data for Smart City concepts). They succeeded; they found a way to apply those concepts to a wide area of social and commercial matters. But, what about citizens? Who cares about their ability to use all the e-services available today and the opportunity to be present at all e-events and e-activities? Availability of information and services to all citizens is a basic human right. The ability to use them and the chance to acquire that ability must also be an elementary human right. The author of this article wonders whether this really is the case. This article presents the facts about digital literacy and e-inclusion of 54+ citizens, especially senior citizens, which can be found in official statistical databases (EUROSTAT or the Croatian Bureau of Statistics). The author also talks about different approaches to raising the digital literacy rate of 54+ citizens. The third part focuses on public resources that could be used in the process of conducting a systematic programme and in making suggestions for further steps in achieving the general goal - increasing the number of users of e-services.

Keywords: 54+ citizens, digital literacy, e-inclusion, digital divide

1. Introduction

Terms like digital transformation, e-services or digital communication are around us every day. It is obvious that it is hard to find anything not related to them. Nowadays, the availability of e-services is on a high level. The choice of whether to use transformed digital services or the regular ones is on the users themselves. What is the difference between using digital or regular services and do all potential users know the advantages of the digital ones? These are the right questions. Furthermore, we need to ask ourselves who cares about solving the problem of the e-skills gap. This is what the users need to know when choosing the digital edition of e-services as well as how to use them.

Another important fact that drives the author of this article to research is the demographic issue concerning the aging of EU citizens. The number of 54+-year-olds is growing in EU countries, and life expectancy has risen too. Another important detail is that aging and retirement usually imply isolation from most social connections and possibility of education. In that sense, a systematic approach to motivation, education and inclusion of 54+-year-olds in the digital society is a significant point of research.

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Pečjak [22] divides the elderly into four age groups; those aged 50 to 60 are called as early-older ages, those aged 60 to 70 are called as middle-old ages; 70 to 80-year are called as old-old ages and those older than 80. In OECD terminology “elderly population” refers to persons aged 65 and older [20]. In this article the terms “54+ citizens” and “elderly” are not synonymous. When the rate of digital literacy of 54+ and 64+ - year-olds is compared, it can be noticed that their e-skills are not on the same level. When using the term elderly citizens the author of this article refers to 64+ - year-old citizens. In this article the digital literacy level of 10 years younger citizens (54 – 64) is also analysed in order to determine the need for e-skills courses for this age group. This step makes it possible for them to become members of the digital society sooner. The result are citizens included in the digital society, able to use e-services and able to take part in e-learning etc. when they are 64 and older.

Motivated by the previously mentioned dilemma, the author started to analyse the current state of the digital literacy rate published by EUROSTAT, based on an annual survey conducted in EU countries and some of results are presented in the next chapter.

The author used analyse to prove the importance of topic. The author used content analyse of project reports and articles published after performing projects mentioned in reference and synthesis to get common features when collecting data about conducted projects in different countries related to the topic and mentioned in this article. The content analyse was also applied to web pages of public institution related to the adult education.

Considering e-inclusion regarding human rights in this article the author wanted to emphasize who are the stakeholders in the process of raising awareness of e-inclusion of 54+. How to manage the link between global digital transformation and global demographic change must be solved by engagement of public authorities. So, the idea of the author was to present that public authorities need to assure the conditions (technical, organizational, institutional) to approve e-inclusion rate of 54+.

2. Numbers and facts regarding digital literacy and e-inclusion of 54+-year- old citizens

E-inclusion has been researched by many authors. Žajdela Hrustek [29] wrote a review of her research in her doctoral thesis under the title "Multidimensional and multiperspective approach to monitoring e-inclusion. Žajdela Hrustek did a research on e-inclusion in the whole population, whereas this article is focused on 54+-year-olds as a special societal group.

The current state of statistical research results in the field of digital literacy and e-inclusion of EU citizens was published by EUROSTAT on <http://ec.europa.eu/eurostat/data/database>. The used methodologies are stated in references [8], [9]. The target population consists of all individuals aged 16 to 74. The periodicity is annual, meaning the data is collected and compiled once per year. All data mentioned in this article regarding EUROSTAT source are taken on 21.01.2018. and are updated in the EUROSTAT database dated on 20.12.2017. The research is divided into following categories: ICT use in households and by individuals; ICT use in companies, e-skills, ICT sector and digital economy and society (historical data). The EUROSTAT survey covers the issues stated in the following table.

Internet access and computer usage	Internet usage	Digital skills
Use of equipment to access Internet	Internet use	Level of e-skills of individuals
Frequency of computer use	Frequency of computer use	Level of e-skills in computer use
Mobile Internet access	Location of Internet use	Level of Internet skills of individuals
Computer use	Activities on the Internet	Methods of acquiring e-skills
	Using solutions in the "Cloud"	New computer courses
	Internet use on Smart TVs	Reasons for not attending computer skills courses
	Economy of cooperation	Level of digital skills of individuals

Table 1. Internet usage in households and by individuals

The criteria by which the author did the research and organised the data is "type of individual"; namely "all individuals" (16 – 74 years old), "individuals between 54 and 74 years old"; "males aged 55 to 74"; "females aged 55 to 74", "non-ICT professionals", "retired and other inactive individuals" [8]. Some of the most relevant data that prove the fact that the digital literacy rate of 54+-year-olds is low are presented below.

Category	Country	All examinees	55+	Retired	Non-ICT professionals
Examinees who acquired e-skills on their own, on courses and in centres for adult education	Germany	32%	28%	22%	38%
	France	3%	5%	4%	3%
	Romania	5%	1%	1%	7%
	Croatia	7%	3%	3%	12%
	EU (28 countries)	13%	12%	9%	16%.
Examinees who acquired e-skills by using literature (books, CDs...)	Norway	38%	35%	35%	39%
	Estonia	48%	24%	23%	55%
	Greece	6%	1%	1%	8%
	Croatia	22%	6%	6%	31%
	EU (28 countries)	21%	13%	10%	25%
Examinees who acquired e-skills with the help of relatives or friends	Sweden	89%	76%	71%	93%
	Ireland	22%	16%	17%	25%
	Bulgaria	28%	13%	10%	38%
	Greece	29%	10%	13%	39%
	Croatia	39%	13%	14%	52%
	EU (28 countries)	51%	33%	31%	60%

Table 2. The rate of users of e-skills in 2011 (by EUROSTAT)

Source: made by the author, based on EUROSTAT's database, <http://ec.europa.eu/eurostat/data/database>, accessed February 4th 2018.

The values in Table 2 show that retired citizens have the lowest level of digital literacy in almost all EU countries. The question is what measures to take to boost their digital literacy in all EU countries.

Huesing and Selhofer wrote about the Digital Divide as a modern version of the knowledge gap theory established in 2000. It implies the gap between citizens from different socio-economic backgrounds and with regard to their opportunities and abilities to access and use information and communication technologies. The gap is commonly regarded as a potential barrier to participation in the information society [14]. In December 2015 the European Parliament published a document about the Digital Divide in the EU [19]. It mentions two aspects of it: "The first gap considers mainly the division between those who have access to ICT such as computers and the internet and those who do not. This type of scope often refers to the urban-rural divide, the latter having slower internet speeds, prices, and technological choice. The second gap refers to different types and levels of internet use, motivation and skills: looking at what uses and benefits people enjoy, once they have access to the internet." [19] Except implementing broadband and measuring the progress in fast and ultra-fast broadband, the progress in bridging the Digital Divide in Internet use in the EU was also measured and presented. The number of 54+ citizens in the whole population is growing, so the importance of their inclusion in Internet use is much more important than before.

According to the EUROSTAT survey [9] activities on the Internet with an additional value for retirees and other inactive people consists of: Find information on education, workshops and courses; Online courses on any topic; Receiving and sending e-mail; Telephony and video calls; Write social and instant messaging postings; Participating in social networks (creating profiles, writing messages and contributing to facebook, twitter, etc.); Participation in social and professional networks; Creating web pages or blogs; Transfer your own content to the web to share material; Finding information for goods and services; Read and download online news / news; Downloading the program; Consultation on wikipedias; Reading online news / newspapers and magazines; Playing and downloading games, pictures, movies and music; Listen to a radio empire or watch web TV; Playing online games with other people; Listen to web radio; Internet banking; Travel and accommodation; Sale of goods and services; Looking for work or sending inquiries; Participation in a professional network; Meetings through the web; Searching for Health Information; Reading and Writing about Citizens' and Political Issues on the Web; Civil or political involvement; Learning From Online Materials; Communication between students and teachers; Any activity related to learning; Downloading games; Listening music; Watching TV or video direct streaming over the Internet; Watching TV Direct Broadcasting over the Internet; Watching video on demand through commercial services; Watching video content through shared services; Watching video content through shared or commercial services; Playing / downloading games, listening to music, or watching videos; Playing / downloading games, listening to music, or watching TV or video directly; Financial account management for payment of goods or services ordered via the Internet.

The author has researched data from period 2008-2017: Receiving and sending e-mail; Telephony and video calls; Reading online news / newspapers and magazines; Internet banking; Sale of goods and services; Searching for Health Information; Financial account management for payment of goods or services ordered via the Internet. For example, it can be emphasized that in 2017 the lowest rates of usage of Receiving and sending e-mail were noted in Romania (17% od 54+), Croatia (22%), Poland (27%), and the highest rates were noted in Denmark (87%), Netherlands and Iceland (86%) and in Norway (84%). The EU average is 52%.

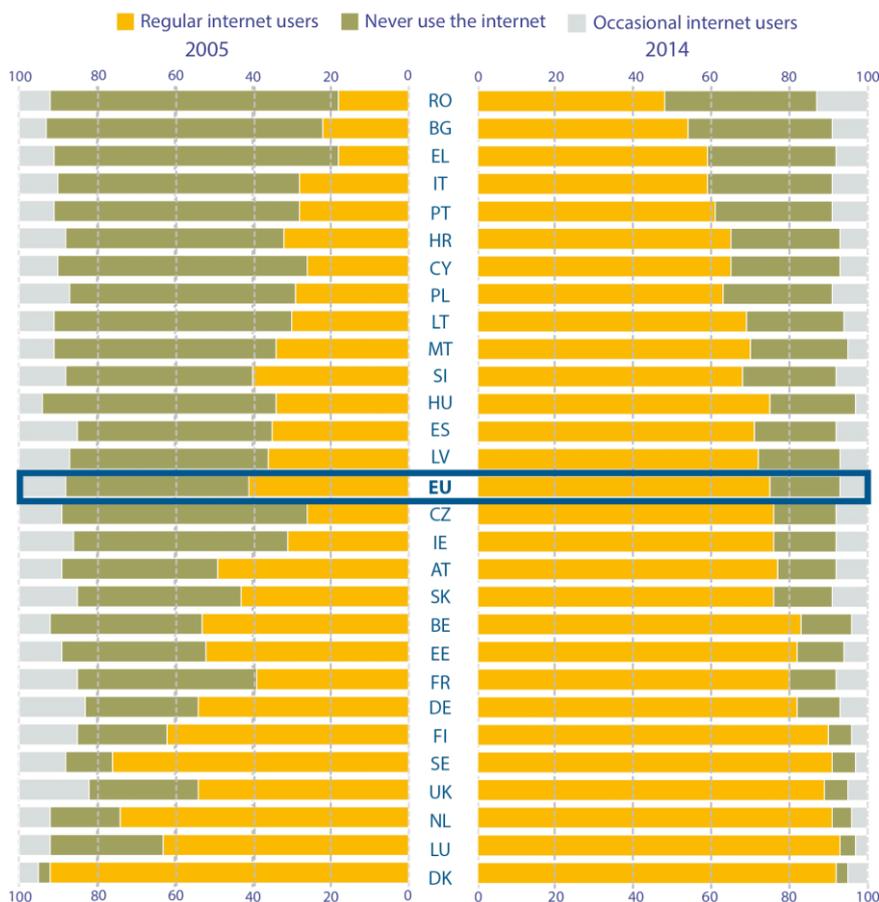


Figure 1. Progress in regular internet use and on internet non-users

FR, BG and RO: earliest available data is from 2006; HR; from 2007. Source: Eurostat.

Source: [19] [http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/573884/EPRS_BRI\(2015\)573884_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/573884/EPRS_BRI(2015)573884_EN.pdf);

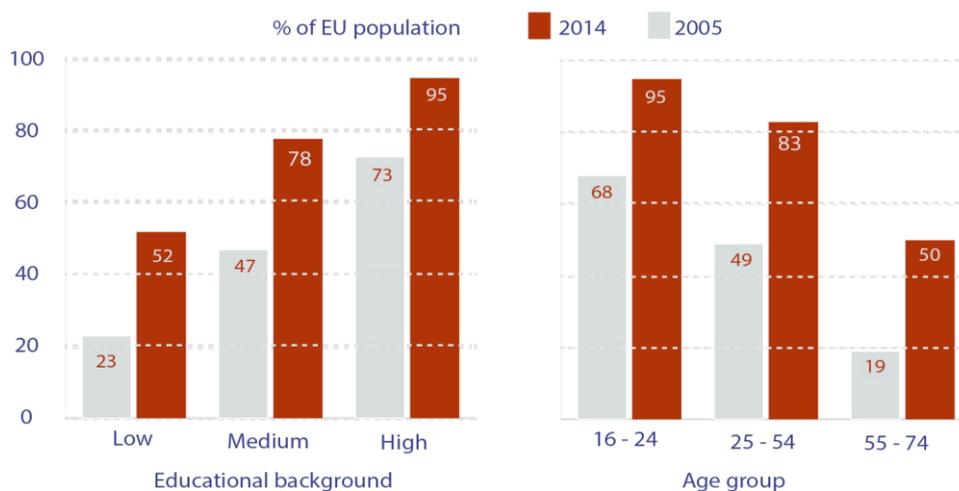


Figure 2. Progress in internet regular use according to age groups (% of the EU population)

Source: [19]

[http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/573884/EPRS_BRI\(2015\)573884_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/573884/EPRS_BRI(2015)573884_EN.pdf);

3. Approaches to raising digital literacy rate of 54+

The author has recently analysed different approaches to raising the digital literacy level of senior citizens. In the last ten years politicians in many countries carried out different kinds of projects for raising awareness of digital literacy of the elderly. The author has analysed many projects focused on solving the problem of Digital Divide which the elderly are facing [1], [4], [10], [11], [12], [13], [15], [16], [20], [21], [22], [23], [24], [25], [26], [28]. Even though the projects were carried out in different parts of the world and at a different time, all of them suggest how to boost the digital literacy of senior citizens. The research primarily focused on their habits and on how to boost their digital skills to include them in the digital society and digital economy. The projects were mostly carried out as pilot projects, so the results achieved in them were not widely implemented. Along with other challenges the answer to the question “why” is one additional challenge to the author.

All projects took the competences for acquiring e-skills into consideration. The European Digital Competence Framework for Citizens was established and published by the European Union in 2016 [5]. The competences were clearly set and the levels defined. The author wonders how the EU citizens who are 54+ -year old and are not on the labour market any more will benefit from that [5]. A systematic review of the citizens' digital competences gives a complete insight into an average citizen's the need for knowledge and skills [9].

Another important part of the projects was motivating the elderly to take part in the project. Motivation was also the part of proposed general theoretical conceptual model of e-inclusion suggested by Žajdela-Hrustek [29]. Use of ICT and e-services depends on motivation. The value of e-service is a motivational factor for being e-included, and that value differs from user to user. The famous scientist Maslow was elaborated the motivation and personality in 1954 [18]. His Theory of Motivation inspires most of scientists because the theory is based on essentials of human beings psychology.

Quality of life (QoL) has been the topic of many researches, observed from many points of view and in many sciences like social science, psychology, economics and medical science. Martinis researched the perception of QoL depending on age [17]. The quality of life diminishes with age. Different domains are significant in different periods of life. It is very individual what makes one a satisfied person. Still, we can say that not being bothered by any troubles and obligations can be a trigger and motivational factor for doing activities that result in personal satisfaction and a better quality of life.

QoL as a societal issue is probably the most related to the Digital Divide issue. The social and economy inclusion is a part of the EU Digital single market strategy.

4. Public institutions and resources for raising the level of e-inclusion

Driven by the necessity arising from a growing number of 54+-year-olds in the population, the low level of their digital literacy, accessible e-services, digital transformation, the expectations of investors in the development of e-services and lifelong learning, the author turned to institutions for adult education. In Croatia, adult education is mostly organised in three different ways: by regular high schools (managed by county governments), libraries (managed by local governments) and public open universities (mostly governed by local governments), which exist only in some towns. The public open universities (POUs) in Croatia were established by Bazala in 1907 [2].

The mentioned institutions do not have the same mission; actually they differ regarding the areas they cover. In terms of raising the level of e-skills of 54+-year-olds, a minus point of public open universities is that they are not accessible in rural areas. In that case, there is the possibility to include primary schools. In Croatia, mostly all of these institutions are users of their founders' budget, except for public open universities, which are in some cases established as non-profit organisations, their founder being the local government. Other EU countries have different institutional support for adult education [3]. In the era when lifelong learning is seen as a model of education, there are many theories on who has the right competences to educate adults and what exactly are the right competences. The difference between the education of pupils and adults can be viewed from different angles [3]. The national systems of qualifications and standards for adult learners and trainers are different across EU countries.

In the case of Croatia, which is the focus of the author's research, public open universities (POUs) and libraries are the main institutions providing adult education and lifelong learning projects. At the time when such institutions were first established, the problem was basic literacy and numeracy, so POUs gave courses to this purpose. Nowadays, the general problem is digital literacy. As the numbers in chapter 2 of this article suggest, 54+ -year-old citizens are the most threatened group. In Croatia, public institutions such as POUs and libraries provide courses for the elderly, as the information published on their official websites suggests. The research about libraries and public open universities as government budget users in Croatia was conducted based on the list of institutions found online (published on <http://www.mfin.hr/hr/registar>, accessed on February 2nd 2017). The author checked the accessibility of their official web pages, if they existed. Another step was to find out information about e-skills courses for 54+-year-olds - how often they took place and how many users participated. There were just few exceptions regarding the fact that the public open universities in some town are not government budget users, but are registered as non-profit organisations even though they were founded by the local government (Ivanec, Varaždin, Bjelovar, Daruvar, Rijeka, Zadar, Osijek, Šibenik, Trogir, Sinj, Pula, Čakovec, Zagreb). So, the total number of registered POUs is 61. The number of government budget users is 45, and the rest are non-profit organisations. As they were all founded by the local government, they have to function in the public interest. E-inclusion of the elderly is one of the societal issues of today.

Here are the results of POUs' official websites analysis:

- 50 out of 61 POUs have a developed system of dynamic websites, 13 out of 50 have programmes published on the website, 10 out of 50 have news only and 27 out of 50 present all the content in a dynamic version
- 4 out of 61 POUs have no official websites
- 5 out of 61 POU websites could not be found
- 1 out of 61 websites is not in function, and 1 is under construction

The author found the following information regarding the programmes and projects for developing e-skills of senior citizens:

- 23 institutions published general programmes for developing e-skills
- 22 institutions published no information about such programmes

- the information of 4 institutions is not accessible because they have no official website
- 10 institutions have different kinds of e-skills courses for 54+-year-olds and for retired citizens
- 2 have no functional websites

It is useful to point out that on some POU's official websites the information about e-skills courses for the elderly are specially positioned in order to find them more easily.

For example, the POU's in Bjelovar, Zagreb, Umag, Ogulin, Križevci, Osijek, Rijeka, Varaždin and Dugo Selo specially highlight the information, which gives the visitors the feeling that they pay a lot of attention to that vulnerable group of citizens who strive to be a member of the digital society and digital economy.

Libraries were analysed in the same way; there are 172 registered in Croatia. 162 of them have no published information about the courses they provide for users. Even when there is one, it is usually taught one on one and is not for groups. Here are the statistics for library websites:

- 131 out of 172 libraries have a website (1 is under construction; 46 are static and just list contacts; 84 have a dynamic website, where the news and other contents are often updated)
- 48 libraries have no official website and the contents are published on the founder's website
- 17 libraries have information about e-skills courses for 54+-year-old citizens (some even for 65+-year-olds) on their website

The public libraries that have published the information about the possibility of acquiring and practicing e-skills are in the following towns: Dugo Selo, Zaprešić, Popovača, Sisak, Karlovac, Senj, Grubišno Polje, Mali Lošinj, Zadar, Osijek, Vodice, Ilok, Vinkovci, Vukovar, Kaštel Sućurac, Split and Zagreb.

The problems detected regarding the organised e-skills courses presented on the official websites of POU's that the author wants to stress are: the programmes are not standardised so the results of the course and the acquired competences cannot be measured, there are no set measuring methods, the duration of the courses is not standardised, the acquired competencies are not standardised and finally, lecturers and trainers have different competences too.

As public institutions, POU's and libraries can be a generator of Economy of cooperation, based on the cross-generational approach to solving the problem of Digital Divide of elderly and the problem of unemployment of young people.

5. Conclusions and suggestions

Anyone has a basic human right to choose to be or not to be e-included. The campaigns and activities directed to the motivation of citizens to be e-included and to raise awareness are the most important roles that public authorities need to take.

When we talk about digital literacy as a skill, it can be compared to the skill of driving a car. Both of them can be developed on several levels, both of them can be acquired in different institutions

and with the help of different kinds of educational support. The most important difference between e-skills and driving a car is in the level of danger when the user does not follow the rules and does not use the technique correctly. Actually, driving skills are more complex than e-skills. So, if a driving instructor (not necessarily an andragogist) can teach one to drive a car, why is it impossible to expect that volunteers (also not necessarily andragogists) can help adults acquire basic e-skills? Why is it important to raise the number of citizens included in the digital society and digital economy? The answer is to achieve the profitability of e-services and lowest prices. On the other hand, this measure would lower the cost of maintaining the infrastructure necessary for providing the service in its usual form, as the demand for this type of service would decrease too.

All the facts mentioned in this article suggest that it is vital to find a systematic approach to solving the general problem of motivating the 54+ year old population to become a part of the digital society and to become a customer in the digital economy. The approach should focus on how to motivate the people to acquire e-skills and hence improve their quality of life. It should use the competences for e-inclusion determined in [10] and determine how the level of acquisition of these competencies should be measured. The cross-generational cooperation in teaching e-skills to the elderly should also be researched [6].

Finally, the environment (society services, economy..., health, culture) is ready; it is getting smarter more and more – but what about citizens [30]? Solving this problem will trigger many positive processes in the context of the usability and cost-effectiveness of e-services and solving the consequences of low e-inclusion.

So, who should take care about digital literacy of 54+? The lights are turned to the:

- Government organizations on EU, state, regional and local level, by supporting coordination of activities oriented to solve the problem and offering grants for that kind of activities
- POU and libraries, that have enough technical resources, bought by public money; also their mission was to take care about general literacy of adults in the past, so now they have to be leader in solving problems of Digital Divide
- Non-profit organizations of the elderly who take care about interests of older people
- Volunteers, who pass previously tested competences for providing e-courses, who are for example unemployed.

Conducting such kind of cooperation can give the expected results of raising the rate of digital literacy of 54+.

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