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MASTER'S THESIS

**AN ANALYSIS OF E-GOVERNMENT IMPLEMENTATION IN
SERBIA**

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LIST OF ABBREVIATIONS

AI – Artificial Intelligence

AEAD- Authenticated Encryption with Additional Data

CERT – Computer Emergency Response Team

DESI – The Digital Economy and Society Index

EGDI – E-Government Development Index

ENIC – European Network of Information Centres in the European Region

EPI – E-Participation Index

EU – European Union

EU 28+ – EU countries including Norway, Iceland, Switzerland, Montenegro, Serbia and Turkey

EUR – Euro

G2B – Government to Business

G2C – Government to Citizen

G2E – Government to Employee

G2G – Government to Government

GBDe – Global Business Dialogue on e-Society

GBP – Great British Pound

GCA – Global Cyber security Agenda

GCI – Global Cybersecurity Index

GNI – gross national income

HCI – Human Capital Index

ICT – Information and communications technology

IDI – ICT Development index

IT– Information Technology

ITU – The International Telecommunication Union

MDULS – Ministry of Public Administration and Local Self-Government

MUP – The Ministry of Internal Affairs of the Republic of Serbia

NALED – National Alliance for Local Economic Development

NARC – National Academic Recognition Information Centres in the European Union

National CERT – National Computer Emergency Response Team

OECD – Organization for Economic Co-operation and Development

OSI – Online Services Index

R&D – Research and Development

RATEL – Republic Agency for Electronic Communications and Postal Services

RGZ – Republic geodetic authority

RSD – Serbian Dinar

SMO – Government Service Bus

SSL – Secure Socket Layer

TII – Telecommunications Infrastructure Index

UN – United Nations

UNESCO – The United Nations Educational, Scientific and Cultural Organization

INTRODUCTION

E-government is the use of information and communication technologies (hereinafter: ICT) to improve public services and increase democratic participation (European Parliament, 2015). It helps fight against the bureaucracy by simplifying the work, increasing the efficiency and reduces the use of paper which benefits not just the stakeholders of e-Government (no need to print, store, bring papers, etc.) but it also helps when it comes to protecting the environment.

Serbia is in a good position for further development of e-Government. Numerous of the successful implementations have already been completed over the years. The adoption of the “Serbian Electronic Government Development Strategy 2015 – 2018” the Government has shown its intention and willingness to make growth in this area (NALED, 2016).

According to United Nations (hereinafter: UN) e-Government survey of 2016 Southern Europe has made the biggest strides towards the group of best-performing countries in e-Participation. Countries that mostly influenced that jump were Serbia, Slovenia, Croatia and Montenegro. Serbia has jumped from Top 50 performers in e-Participation to Top 25 performers in the last two years. Serbia also had a jump of 30 places when it comes to the ranking of e-Government. In 2014 it was ranked in the 81st and in 2016 it moved to the 39th spot on the list.

However, in Serbia, inefficient government bureaucracy is the second most problematic factor and corruption is the fourth most problematic factor for doing business in Serbia according to the Global Competitiveness Report (Schwab, et al., 2015). This is why the development of sustainable e-Government is so important. It will not just help its citizens but it will also allow Serbia to progress faster and be more competitive in the global market.

With many monthly changes being made the current situation is constantly shifting. In addition to this, it is hard to comprehend the whole picture, with the majority of up to date available information just being state plans. For the further understanding of Serbian e-Government, it needs to be looked at from a wider perspective. Not just to understand what has developed in a good manner or to simply compare e-Governments but to also to see if there are lessons/ways that could be taken from other countries in order to further sustainably develop its e-Government.

The purpose of this paper is to give a deeper insight into development of the Serbian e-Government. Serbia is currently trying to gain membership to the European Union there are many areas which it needs to improve or get at the European Union (hereinafter: EU) level. Currently, Serbia has 12 out of 34 negotiation chapters open (with only 2 resolved and closed), and most of them are assessed as moderately prepared. Therefore there is a lot

of room for improvement and making policies align with the European Unions. Although there are no official criteria for the level of e-Government needed for countries that want to enter the European Union there are numerous benefits of good implementation of it. Some of those benefits are that it improves government efficiency, increases its transparency and it increases its accessibility of services. Moreover, Serbian government is constantly announcing expansions and improvement of e-Government this paper will try to give clarity on what's already done and what needs to be done in the future.

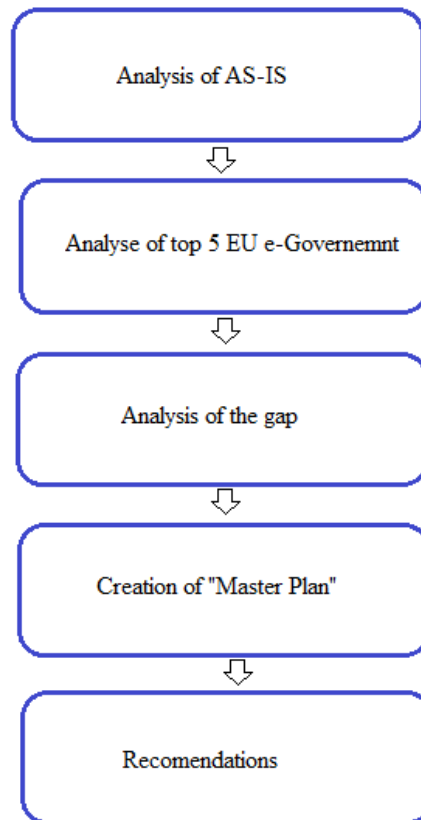
The Goal of this master thesis is first to evaluate what is the current state of e-Government in Serbia and where it wants to go. With this, we will be able to analyse the gap. The second goal is to develop an action plan for the next five years (from 2019 till 2024) and to predict possible challenges in that timeframe.

For this thesis, there was a systematic data collection. It was split into two parts. First, one being the collection of the data needed for the analysis of the current state and comparison between Serbians e-Government and top five EU e-Governments. Those five countries are the United Kingdom, Finland, Sweden, Netherlands and Denmark. These five countries are e-Government leaders with very high e-Government Development Index (hereinafter: EGDI) in Europe (UN Department of Economic and Social Affairs, 2016). This part combined primary and secondary research through analysis of different resources, reports, books, scientific articles and journals from different authors. And for the thorough analysis of Serbian e-Government, we used the documentation provided by the Office for Information Technology and E-Government of the Republic of Serbia.

The second part was comprised of interviews. The interviews were conducted with people from the government side who are using the e-Government (e.g. doctors, birth registry office employees, etc.), their interviews were supplemented with a questionnaire. Questions were provided both in Serbian and in English and contain both open-ended questions and multiple choice questions. For sample collection we used convenience and snowball sampling.

The analysis part of this paper will be following the logical path of firstly analysing the current situation of e-Government in Serbia. After that, the analysis of the top 5 EU e-Governments will be conducted. For this analysis, we need to gather extensive information about all of the selected countries and analyse what is helping them or hindering their e-Governments. Both of the analyses will give us further insight needed for figuring out what needs to be done in the future, we will be able to see what is the gap needed to be bridged. In the end, this will lead into the creation of the "Master Plan". This plan will contain what Serbia needs to complete in the period of five years from 2019 till 2024 to reach the EU levels (See Figure 1).

Figure 1: Logical path of the paper



Source: Own work.

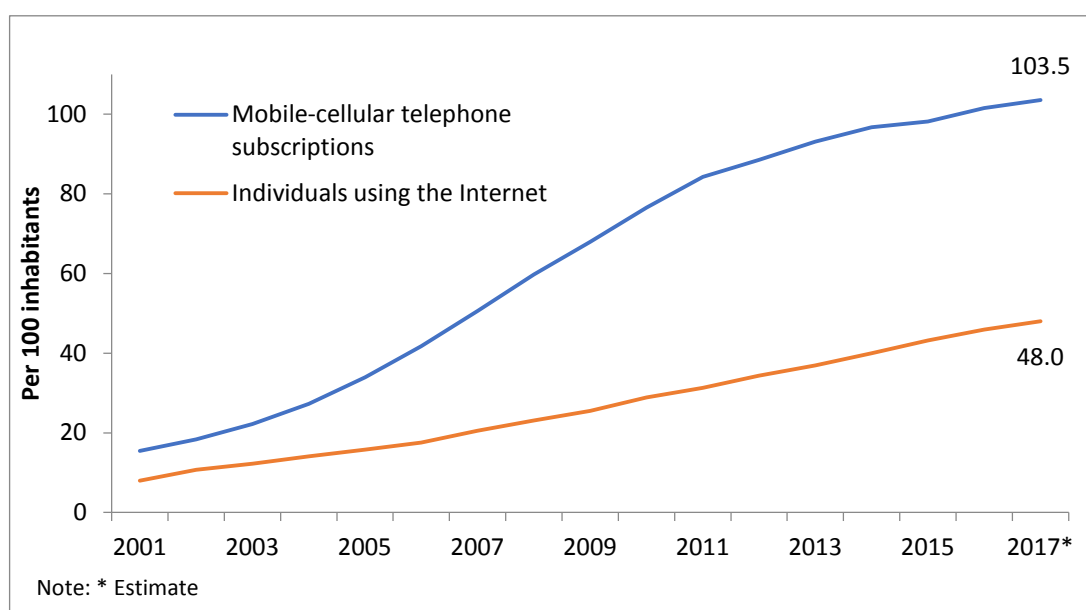
1 HISTORY OF E-GOVERNMENT

Governments all across the world are increasingly accepting and adopting the advantages of technological advances. According to the Assar et al. (2010), one of the first uses of information and communication technologies by a government happened in the United States in 1954 where a computer had accurately predicted the outcome of the presidential election (Assar et al., 2010, p. 1). One of the first literature on IT government appeared in 1970s (Kraemer et al., 1978; Andersen & Danziger, 2002).

Ho (2002) states that the literature from 1970s on IT government puts emphasis on the use of IT internally and having a managerial role. However, newer literature on e-Government concentrates more on the external use, how it can help in providing services to its users/citizens. This change happened due to the rise of the World Wide Web in the early 1990s. Internet enabled its users to have more flexibility and a cost-effective way to conduct any sort of a transaction at any time of the day with whomever you choose. This also increased the user expectations, where now they expect to have all they will possibly need from their government on the internet (Ho, 2002).

In recent years, there is increased conversations about the possibilities that mobile government so-called m-Government can offer. However, its purpose is not to replace e-Government but rather enhance it. According to the Deep and Sahoo (2011), m-Government greatly helps in reaching poorer parts of the community where more traditional e-Government has trouble reaching. One of the ways this can be achieved is through SMS alerts on for example natural disasters (Deep & Sahoo, 2011). More people still have mobile phones over people who have an internet connection (See Figure 2). Consequently, then internet availability would be not limitation.

*Figure 2: Global ICT developments, 2001-2017**



Source: ITU World Telecommunication (2017).

1.1 Definitions of e-Government

The availability and quality of the e-Government theory is a bit questionable. Some research has been done to examine the state of the offered theory. The results were varied. Flak, Sein and Sæbø (2007) claim that there is an increase in the quantity and quality of theory however there is a lack of shared meaning and understanding of basic concepts. Srivastava and Thompson (2007, p. 74) agree saying that majority of research has been done on the micro level analyzing a specific aspect of e-Government in a specific region or country. Grönlund (2010) thinks that the research available is greatly composed of many descriptive studies and also the theory often does not encompass both “electronic” and “government”. Bannister and Connolly (2015) found that e-Government is under theorized however they think that a comprehensive body of theory will never be possible in real life.

Grönlund (2010) also states that there is not one widely accepted theory of e-Government but rather many different definitions. They could be gathered into two distinct groups,

explicit and implicit ones. The explicit definitions are the ones that are used to limit what can go under the label/field of e-Government and implicit definitions are ones on more practical side explaining e-Government in research and in practice (Grönlund, 2010). On the other side, the Organization for Economic Co-operation and Development (hereinafter: OECD) has divided the definitions into three groups (See Table 1). Each of these groups of definitions gets progressively more detailed, starting from the broadest and simplified with the internet at its centre to the more enveloping and complex ones where the internet is just a means to the end.

Table 1: OECD groups of definitions

#	Who	Citation	Definition
1	OECD (1)	(Muller & Field, 2003)	“Internet (online) service delivery and other Internet-based activity such as e-consultation.”
2	OECD (2)	(Muller & Field, 2003)	“E-government is equated to the use of ICTs in government. While the focus is generally on the delivery of services and processing, the broadest definition encompasses all aspects of government activity.”
3	OECD (3)	(Muller & Field, 2003)	“Capacity to transform public administration through the use of ICTs or indeed is used to describe a new form of government built around ICTs. This aspect is usually linked to Internet use.”

Source: Own work.

In the Table 2 we can see some of the definitions provided by different institutions. Many of them are quite outdated being older than a decade. This poses the problem mostly due to the fact that the technology has changed tremendously from that period in time. In the early 2000s, it was rather hard to imagine all of the technologies that we have today at our disposal. Nevertheless, the essence of e-Government stays the same throughout all of the different definitions. There are not many major differences in definitions. The biggest ones are that they go in the different amount of detail. For example, the Global Business Dialogue on e-Society (hereinafter: GBDe) and United Nations look at e-Government in a simplified way as a digitalization for the better quality of service towards the public. While European Union, World Bank and UNESCO, also, put emphasis on the higher public participation and on the accountability of government. The OECD on the other side has the shortest but maybe most encompassing definition, giving us the leeway to judge what makes government better.

Table 2: e-Government definitions

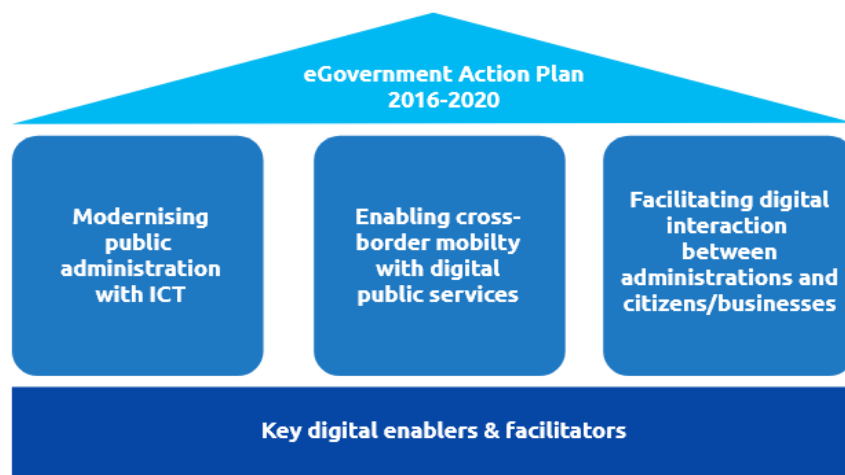
#	Who	Citation	Definition
1	European Union	(European Parliament, 2015)	“The application of information and communication technologies (ICTs) to improve public services and to increase citizen participation in democratic government. It puts the emphasis on user-centric services that can be integrated to support easy and efficient use of public services by citizens and businesses.”
2	GBDe	(Moriuchi, 2001)	“Refers to a situation in which administrative, legislative and judicial agencies (including both central and local governments) digitize their internal and external operations and utilize networked systems efficiently to realize better quality in the provision of public services.”
3	OECD Definition	(Muller & Field, 2003)	“The use of information and communication technologies, and particularly the Internet, as a tool to achieve better government.”
4	World Bank	(Panzardi, 2003)	“E-Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government... The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.”
5	UNESCO	(UNESCO, National Informatics Centre, 2005)	“E-government is the use of Information and Communication Technologies to promote more efficient and effective government, and make it more accessible and accountable to the citizens.”
6	United Nations	(United Nations, n.d.)	“Use of ICTs to more effectively and efficiently delivers government services to citizens and businesses. It is the application of ICT in government operations, achieving public ends by digital means.”

Source: Own work.

All of these theories although different hold a primary objective of e-Government. That objective was defined by Stephen A. Ronaghan (2002) as a means to give the citizens an alternative and efficient way of communication with providers of public services (Ronaghan, 2002, p. 8). Still, it would be best if we could have a more contemporary, yet widely accepted definition, due to technological changes that have happened in the past decade.

The most important understanding of e-Government from this paper comes from the European Commission who initiated yearly benchmark which was conducted by Capgemini et al. (2018). This benchmark has been measured since 2003 and it measures EU 28+ countries, which includes Norway, Iceland, Switzerland, Montenegro, Serbia and Turkey. Main idea is that countries have to utilise technologies maximise their governments potential. This benchmark shows us the current situation of User centricity, Transparency, Cross-Border Mobility, and Key Enablers. The results from this benchmark create the baseline against which effectiveness of implemented plans will be measured. Plans like e-Government Action Plan 2016-2020 which aims to modernise public administration, enable cross-border mobility and facilitate digital interaction (See Figure 3). However, since in 2016 the way this benchmark has been measured has changed we cannot compare more recent results directly (Capgemini et al., 2018).

Figure 3: E-Government Action Plan 2016-2020



Source: Capgemini et al. (2018).

1.2 Difference between e-Government and e-Governance

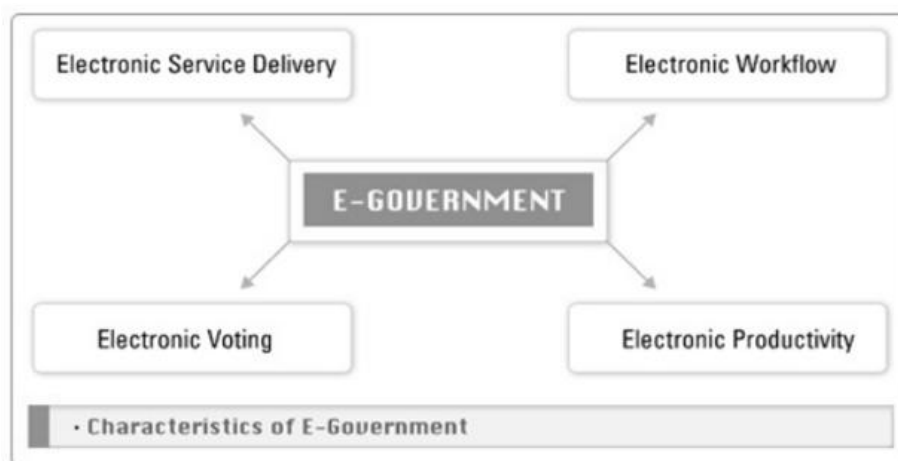
These two terms are greatly interlinked, because of that many people use them interchangeably as they think that they mean the same. However, there is a difference and it is important to be aware of it. The difference is similar to the one found in their non-electronic counterpart, government and governance. There, the government is a specialized institution that contributes to governing (Sahoo & Sahoo, 2016). Nye and Keohane (1974)

define e-Governance as the use of ICT to achieve greater participation and to increase the involvement in the decision making of citizens, the private sector, different institutions and NGOs. So the difference is that e-Government is aimed at the G2G, G2B and G2C activities of government while e-Governance allows the engagement in the policy-making process through ICT (2015).

UNESCO (2005) has outlined characteristics for both e-Government and e-Governance (See Figure 4 and Figure 5). For e-Government those characteristics are (Singh & Sharma, 2009): Electronic Service delivery here government communicates and makes transactions with public through electronic networks. This, however, has its limitations of privacy, confidentiality and security. Next one is Electronic Workflow, in every government department, there should be a set of rules that would govern all of the transactions with the goal of making the decisions and processing of the information a routine. The limitations of this are the same issues as with the previous one.

Electronic Voting is already up and running in some countries like India with the Electronic voting machine (hereinafter: EVM). The more developed the country is the higher concern for its electronic security, confidentiality and privacy are. Here the biggest hurdle is the trust of its citizens in the government, not just how to build it but also how to maintain it. Fourth and last characteristic of e-Government is Electronic Productivity. This characteristic holds the primary purpose of e-Government which is to bring higher efficiency at lower cost (Singh & Sharma, 2009).

Figure 4: Characteristic of E-Government

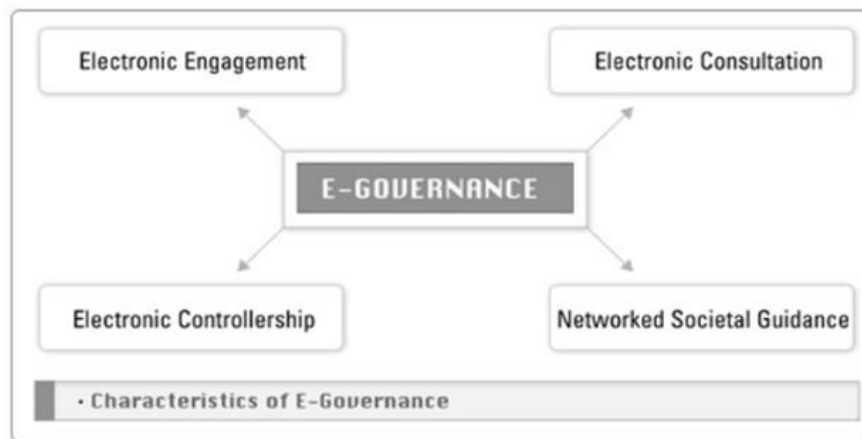


Source: UNESCO, National Informatics Centre (2005).

E-Governance characteristics according to the Sahoo and Sahoo (2016): Electronic Engagement is a prospect of the public to engage in the policy-making process. The intensity of involvement can change depending on the importance and size of each policy initiative. Electronic Consultation points to the interaction of public servants with different interest groups citizens. Electronic Controllorship has protocols which help manage the

performance, service and cost. They are placed on a network, therefore, you have to manage the network and its content. To reach the total benefits there has to be integration and optimization of hardware configuration and also of the software customization. Networked Societal Guidance is there in place so that no one side has the power without the accountability. One answer to this is the distribution of power and influence of media to inform the public on important issues, now with the rise of the internet public gets information at a much faster pace (Sahoo & Sahoo, 2016).

Figure 5: Characteristics of E-Governance



Source: UNESCO, National Informatics Centre (2005).

The goals of e-Government according to the National Institute for Smart Government (2012) are:

- Improved service to its citizens;
- Increased transparency and accountability;
- Empower people through information sharing;
- Increased efficiency within governments;
- Better interface with business and industry.

The services that e-Government provides could be divided into four primary types. Although some consider that there are more types (such as government-to-nonprofits) or they make a notable difference between government-to-customer and government-to-citizen. We will go through just the four widely accepted ones:

Government-to-Consumer / Citizen (hereinafter: G2C): As the name implies, deals with the interaction between government and its citizens. Under this relationship falls the majority of services that the government provides (Alshehri & Drew, 2010). Palvia and Sharma (2007) state that G2C allows the citizens to gain information and makes it more convenient for citizens to complete their obligations to the government (e.g. pay the taxes). This relationship is also important when it comes to informing the citizens about health and

safety issues, having disaster relief compensations and so on (Palvia & Sharma, 2007). The goal of this interaction is to help make the transactions less time consuming, more convenient and to increase citizen participation (UNESCO, National Informatics Centre, 2005).

Government-to-Government (hereinafter: G2G): According to Palvia and Sharma (2007) G2G refers to the relationship between different governments organizations/agencies. It can be done for example on a national, regional or local level. Its goal is in the end to improve government operations, increasing its efficiency and effectiveness (Palvia & Sharma, 2007). To achieve this there needs to be collaboration and cooperation among all of the government departments and agencies, which is greatly helped with online communication (Ndou, 2004).

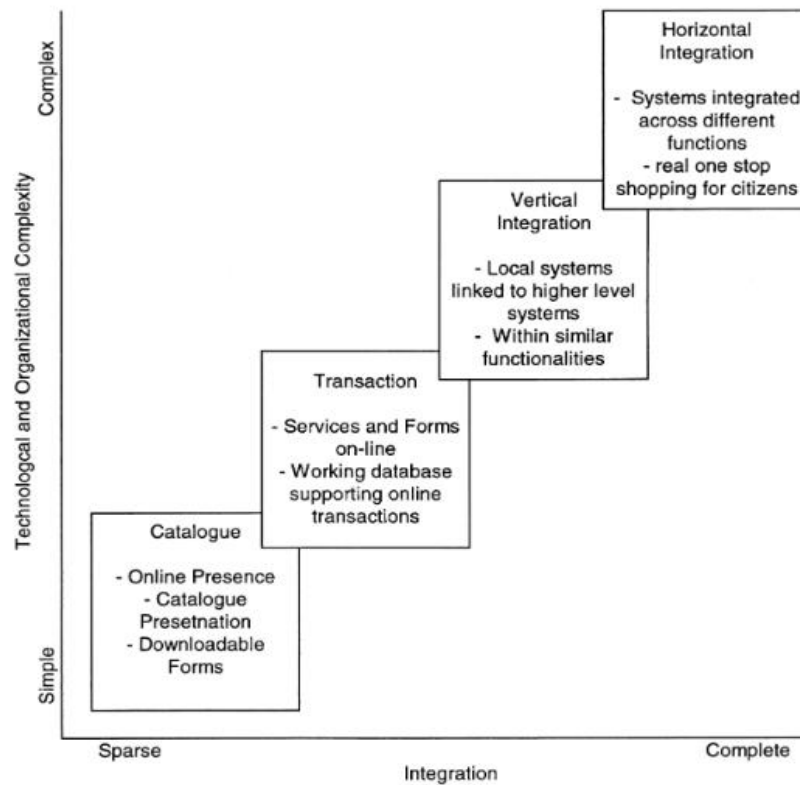
Government-to-Business (hereinafter: G2B): Here we have the relationship between government agencies and businesses. UNESCO (2005) states, that this relationship is established to improve efficiency in three ways. Firstly, it helps with the procurement of goods and services by the government from private companies. Secondly, the public can more easily and cheaply procure the government goods. Thirdly, this interaction also involves the issuing of licenses, various policies and taxation from the government side (UNESCO, National Informatics Centre, 2005). All of this helps drive down the trade barriers and cost making it more an even field for business to compete (Ndou, 2004).

Government-to-Employee (hereinafter: G2E): One of the biggest employers in any country is its government. Their interaction is a two-way street and it has to be fast and efficient (National Institute for Smart Government, 2012). Some of this interaction would be employment opportunities, regulations, work guidelines, welfare schemes and other (UNESCO, National Informatics Centre, 2005). G2E also helps in the implementation of government goals and programs, budgeting and human resource management (Riley, 2001).

1.3 Stages of development of e-Government

Development of successful e-Government is an enormous and complex task that has to be taken on in stages to have the most favourable result. Although there are many researchers who provide this answer, we chose to look into two of them, namely the Layne and Lees (2001) four stages and Ronaghan (2002) five stages. The Layne and Lee (2001) four stages are Cataloguing, Transaction, Vertical integration, and Horizontal integration (See Figure 6).

Figure 6: Dimensions and stages of e-Government development



Source: Layne & Lee (2001).

The cataloguing stage is named that because governments under the public pressure or their own accord start cataloguing all of the information and present it online. Firstly on indexed pages and then on one localized portal. The Transaction stage makes it possible for the public to transact with government through government connecting their internal systems to the online interfaces. In the ideal world, the transactions from the web should be directly connected with government internal systems which will lead to cutting down the redundancy and minimizing the need for staff assistance. Increasing use leads to the need to integrate. The Vertical Integration stage is basically the integration of government internal systems with other relevant government internal systems with its focus on transforming government services. Layne and Lee give the example of the driver's license system being linked with the national database of licensed truck drivers for cross-checking. The Horizontal Integrating stage integrates different services and functions. With this stage governments are able to reach the full potential of ICT (Layne & Lee, 2001).

There is also the model of development composed by the United Nations and American Society for Public Administrations (2002). This model defines five stages of development as a linear progression (See Table 3:).

Table 3: The stages of e-Government

Emerging:	An official government online presence is established
Enhanced:	Government sites increase; information becomes more dynamic
Interactive:	Users can actually pay for services and other transactions online
Transitional:	Full integration of e-services across administrative boundaries
Seamless:	Full integration of e-services across administrative boundaries

Source: Ronaghan (2002).

The first stage is the Emerging stage, which refers to the e-Government at the starting point. Governments are just establishing their online presence. The interactive ability at this stage is minimal. The Enhanced stage is improved version of the Emerging stage. Where the number of sites and services (such as downloading forms) provided is increased. These two stages could be compared with Layne and Lees (2001) Cataloguing stage. In the Interactive stage, the actual communication with the citizens is improved. Now people can communicate with government officials through web site and there is a further increase in what services are available. The Transactional offers its users to conduct online payments. This stage along with Interactive one would be equal to Transaction stage of Layne and Lee. The final stage is Seamless is presented as an ultimate goal of e-Government. Where not only citizens could just go online and find what they need but also the government's internal structures would allow for removal of administrative boundaries. There are two Laynes and Lees stages that correspond to this one and those are Vertical and Horizontal Integration stages.

Both of these models are more of classification models than actual stages of development that one country can follow. This happens because they are a bit too simplistic and presume that governments develop their online presence in an orderly linear fashion while in real life it is much more complicated. However, they do give a generalized sense of what is implemented first or last.

1.4 Advantages of e-Government

Some of the outlined benefits according to the National Institute for Smart Government (2012) and UNESCO (2005) are:

- Improved service delivery;
- Increased efficiency;

- Enhanced access to information;
- Better quality of information;
- Reach of government;
- Transparency of government;
- Accountability of government;
- Better communication.

National Institute for Smart Government (2012), states that the information that the government provides at the beginning is simple. Afterwards, it starts to develop and get more complex, going from forms and regulations, to reports and public databases. In addition to that, the ultimate goal of e-Government is to provide a person with every public service they will need from crib to the grave. Use of ICTs greatly simplifies and automates the processes removing the redundant ones making everything run smoother and faster, creating the environment for more accountable government (National Institute for Smart Government, 2012).

UNESCO (2005) noted that e-Government does not just promote efficiency and better quality, but also it fair access to services, giving the people from both rural and urban areas an equal opportunity in this matter. The e-Government makes everything more convenient for citizens and makes government more responsive. Sharing the information such as what are the procedures, regulations and such increases the transparency and accountability which in turn increases the trust in government (UNESCO, National Informatics Centre, 2005).

1.5 Disadvantages of e-Government

Some of the outlined disadvantages according to the Evansa and Yen (2005) and Joseph (2015) are:

- Cybercrime;
- Lack of trust;
- Lack of equal access to the internet;
- Flexibility of programs;
- Costly infrastructure.

Evansa and Yen (2005) point out that there is a huge concern about the government putting all of the information about its citizens in a single central registry. There are many who would want such information. Citizens need to be assured that no matter how extreme situation is (example 9-11) their data is safe and that there are safeguards in place so that no one from outside or inside government can disuse that information. Another problem concerns automating the outdated procedures and making the programs that automate the

process itself flexible and modifiable, in order to adapt them to any changes that might be required (Evans & Yen, 2005).

Joseph (2015) makes a remark that not all people have the same access to the internet nor they have the same knowledge to use the technology in such a way. This could be seen most prominently with the senior citizens, who might benefit the most from the convenience of e-Government, but actually might be excluded because they often lack digital literacy. She also points out that the good infrastructure is needed for citizens to have access to the internet. In addition to that government needs to have advanced servers and security plans all of that leads to high investment and that is out of reach for many developing countries (Joseph, 2015).

2 ANALYSIS OF E-GOVERNMENT IN SERBIA

2.1 General information about Serbia

Before we try and understand where e-Government is and where it can go it is important to know the information about the country and its ICT infrastructure.

Table 4: General information about Serbia

Name	Republic of Serbia
Capital	Belgrade
Population (excluding Kosovo)	7,040,272
Calling code	+381
Internet domain	.rs
Gross National Product for 2017	4,464.6 billion RSD (36.8 billion EUR)
Average monthly net earnings in 2017	47,893 RSD (394.7 EUR)
e-Government Portal	https://www.euprava.gov.rs/

Source: RATEL (2018).

2.1.1 Government structure

Serbia became an independent republic after the separation of Serbia and Montenegro in 2006. It has two autonomous provinces: Vojvodina and Kosovo. Serbia operates under a parliamentary system. Where the government is divided into three branches: legislative, executive and judiciary. President of the republic is the head of state and head of

government is prime minister. The current government was established on the 29th June 2017. The cabinet is composed of four deputy prime ministers and seventeen ministries from which three are ministers without portfolio. From 2013 up until 2017 development of e-Government was under Ministry of Public Administration and Local Self-Government as a subordinate agency called Directorate for E-Government. The director of it through its entire existence was Dušan Stojanović. The year of 2015 marked the beginning of serious dedication towards furthering the development of e-Government in Serbia (Vlada Republike Srbije, 2015). At the present time development of e-Government falls directly under the Serbian government as Office for Information Technology and E-Government.

2.1.2 The Office for Information Technology and E-Government

The current director of this office is Mihailo Jovanović and the deputy director is Zoran Mišić. The change from directorate to an office means that they will have higher authority and that now the office answers directly to the prime minister. In the interview that he gave for ITU News (2018), he states that the main for 2017 was the consolidation of state IT resources, ensuring connection of information systems and to provide support for the development of Serbian e-Government services. He also states that the progress of Serbian digitalisation can be best-seen through existence of domestic companies that are known worldwide like Nordeus (mobile game developer) or Seven Bridges (biomedical data analysis) and also by the fact that Microsoft has its fourth development centre located in Serbia (How Serbia plans to transition to a digital economy, 2018).

The office has five sectors (See Figure 7):

1. Sector for Development of Information Technologies and e-Government

Some of the jobs that fall under this sector are development and maintenance of e-Government portal, electronic document management system, service for identification and authorization of e-government users, design and development of information systems and registers of state bodies, making proposals and initiatives to improve the area of application of information technology and e-Government, etc. (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2017).

2. Sector for Information-communication Infrastructure

Some of the jobs that fall under this sector are designing, developing, constructing, protecting and securing the functioning of a singular information and communication network of state authorities, opening and administration of the official domains for state bodies, development and improvement of software tools for supporting the infrastructure, establishing and managing the Data Center and managing the Government Cloud, etc. (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2017).

3. Sector for Standardization and Certification

Some of the jobs that fall under this sector are identifying and defining priorities of strategic and planned activities in the field of ICT development and e-Government, issue off the electronic timestamp, analysis and monitoring of parameters for digitalization and e-Government development using accepted international methodologies, etc. (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2017).

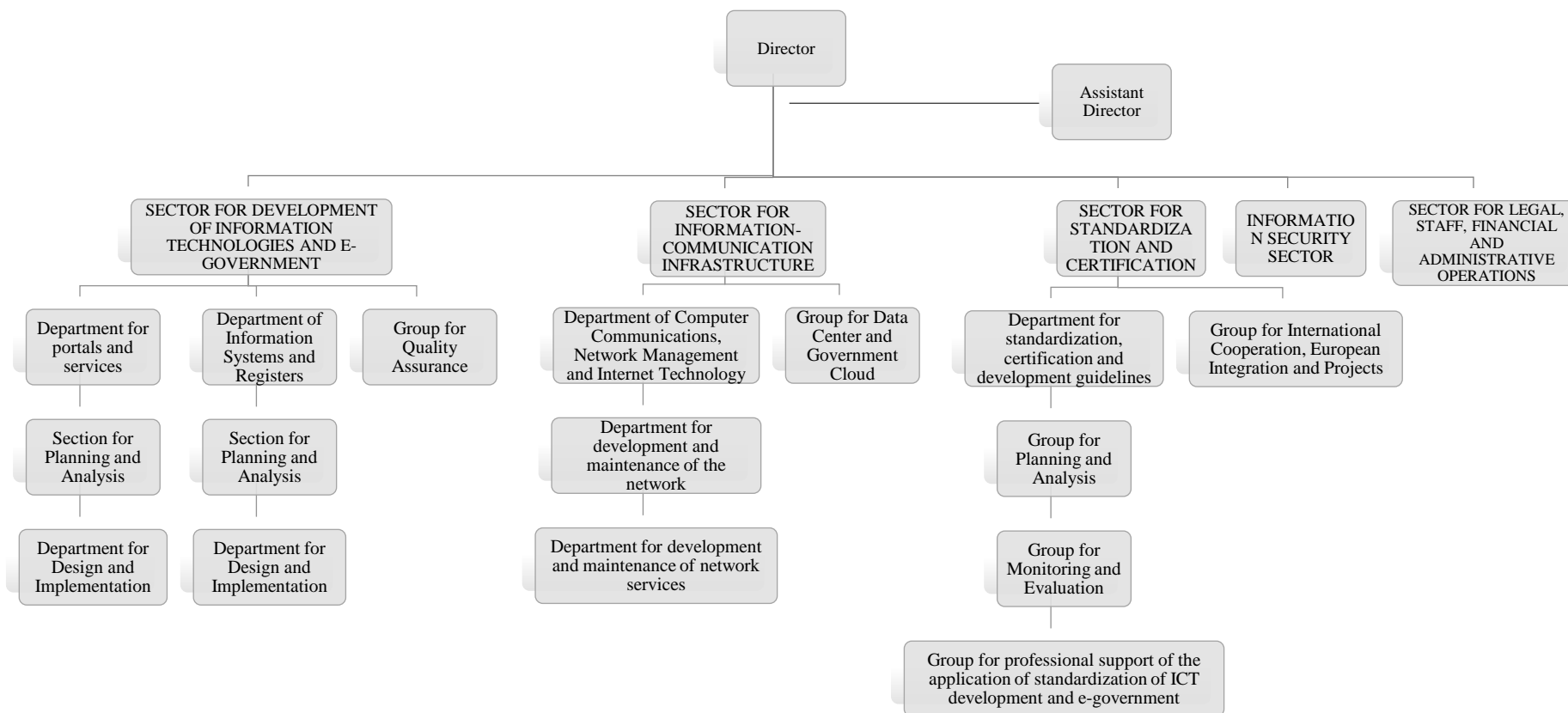
4. Sector for Information Security

Some of the jobs that fall under this sector are coordination of prevention and protection against security risks in the information and communication systems of the state bodies, identification of potential threats to information and communication systems, application of international and national standards in the field of protection, cooperation and exchange of information with the National CERT and CERT teams of other state institutions, etc. (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2017)..

5. Sector for Legal, Staff, Financial and Administrative operations

Performs jobs relating to the legal, human resources, financial, accounting and public security services within the work of the Office, protection of personal data, planning and reporting work of the Office, etc. (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2017).

Figure 7: Organization scheme



Source: Kancelarija za informacione tehnologije i elektronsku upravu, Vlada Republike Srbije(2017).

2.2 Analysis of the state of ICT infrastructure in Serbia

To help us better understand where Serbian ICT development is we will be looking at three different indexes. Along with that we will be looking also at the coverage and investments all of this will help us obtain a clearer picture.

2.2.1 Digital economy and society index (hereinafter: DESI)

DESI is index composed by European Commission (2018a) and it shows the progress of EU countries towards a digital economy and society. It uses 34 key indicators (some of them are 4G coverage, banking, cloud, open data, etc.) grouped into five principle policy areas (See Table 5). It is measured every year starting in 2014 (European Commission, 2018a).

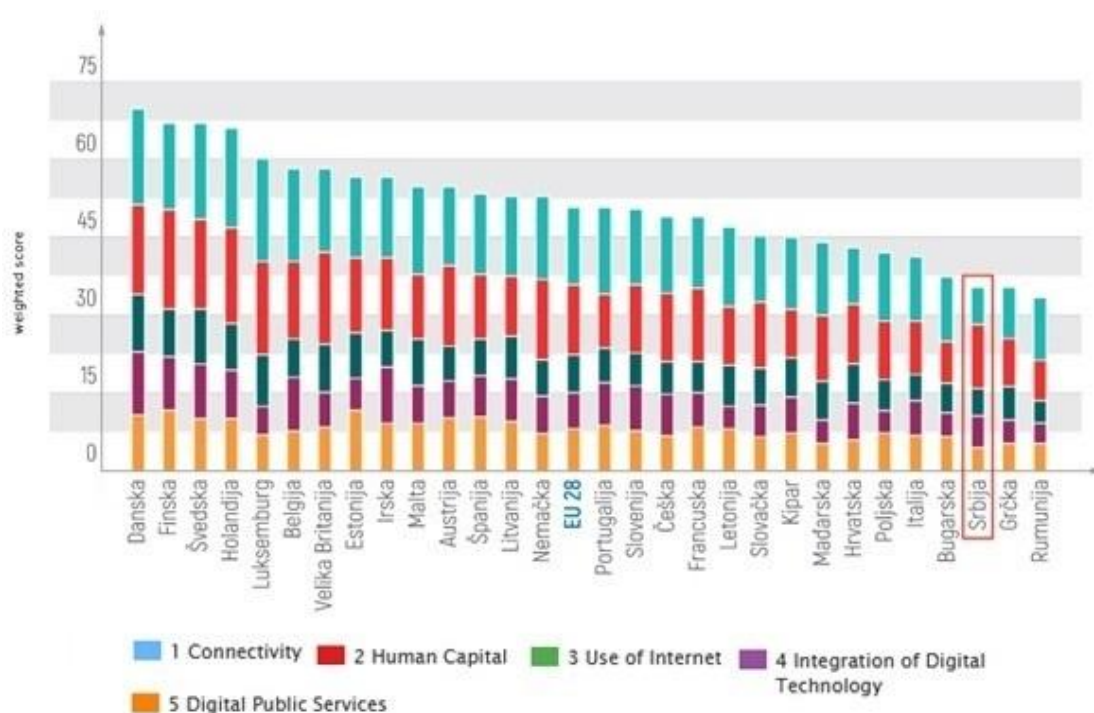
Table 5: Five policies

Policy area	What it covers
Digital public services	e-Government and e-Health
Integration of digital technology	Business digitization and e-commerce
Use of internet service	Citizens' use of content, communication and online transactions
Human capital	Basic skills and internet use, advanced skills and development
Connectivity	Fixed broadband, mobile broadband, fast and ultrafast broadband and broadband prices

Source: European Commission, Directorate-General for Communications Networks, Content and Technology (2018a).

DESI was calculated in 2017 for Serbia. There is still a quite noticeable gap between the countries (see Figure 8). Serbia is in 27th place, which shows us that Serbia is one of the lower performing countries when compared with EU. Areas where Serbia is most deficient (ranked last or second to last) are connectivity, internet usage and digital public services (RATEL, 2018).

Figure 8: DESI index in EU countries and Serbia for 2017¹



Source: RATEL (2018).

2.2.2 ICT Development Index (hereinafter: IDI)

IDI was developed by the United Nations International Telecommunication Union (hereinafter: ITU) and is measured annually since 2009. It is a global composite index, combining eleven indicators helping countries measure their progress (International Telecommunication Union, n.d.). After researching Serbian's IDI ranking, we noticed that there is the discrepancy between ITU and Republic Agency for Electronic Communications and Postal Services (hereinafter: RATEL) numbers. According to ITU (2017) Serbian IDI value for 2017 is 6.61 ranking it at the 34th regional place, however, according to the RATEL (2018) IDI value is 6.94 (See Table 6). For the calculation of IDI value, ITU uses figures given by the official sources from the select country and for Serbia that source would be RATEL. That is why we have chosen to use RATEL numbers for this paper.

¹ Denmark, Finland, Sweden, Nederland, Luxemburg, Belgium, United Kingdom, Estonia, Ireland, Malta, Austria, Spain, Lithuania, Germany, EU 28, Portugal, Slovenia, Czech Republic, France, Latvia, Slovakia, Cyprus, Hungary, Croatia, Poland, Italy, Bulgaria, Serbia, Greece, Romania.

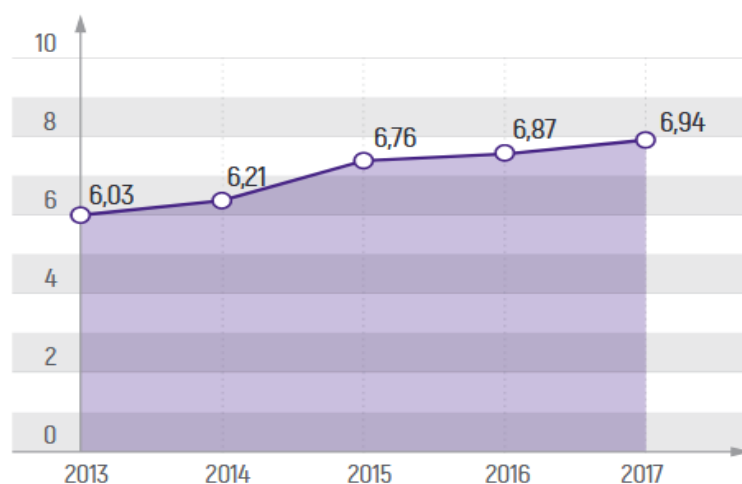
Table 6: Serbian IDI for 2017

Regional IDI 2017 Rank	31	
IDI 2017 Value	6.94	
IDI ACCESS SUB-INDEX	7.6	Normalized value
Fixed-telephone subscriptions per 100 inhabitants	37.07	0.62
Mobile-cellular telephone subscriptions per 100	122.46	1.02
International internet bandwidth per Internet user(Bit/s)	115107	0.80
Percentage of households with computer	68.10	0.68
Percentage of households with Internet access	68	0.68
IDI USE SUB-INDEX	5.9	Normalized value
Percentage of individuals using the Internet	67.70	0.68
Fixed (wired)-broadband subscriptions per 100 inhabitants	21.03	0.35
Active mobile-broadband subscriptions per 100 inhabitants	76.08	0.76
IDI SKILLS SUB-INDEX	7.7	Normalized value
Mean years of schooling	14.60	0.97
Secondary gross enrolment ratio	88.20	0.88
Tertiary gross enrolment ratio	48.40	0.48

Source: RATEL (2018).

Serbia is on 31st place out of 40 regional places. The area where Serbia is most lacking and has most room for the improvement is fixed broadband subscriptions with only 0.35 of normalized value. However, there is room for the improved in almost every area. Through the years even though Serbia has marked a slow but steady increase of IDI (See Figure 9) it is still below the European average for 2017 of 7.50 (Telecommunication Development Bureau of ITU, 2017).

Figure 9: Movement of IDI in Serbia



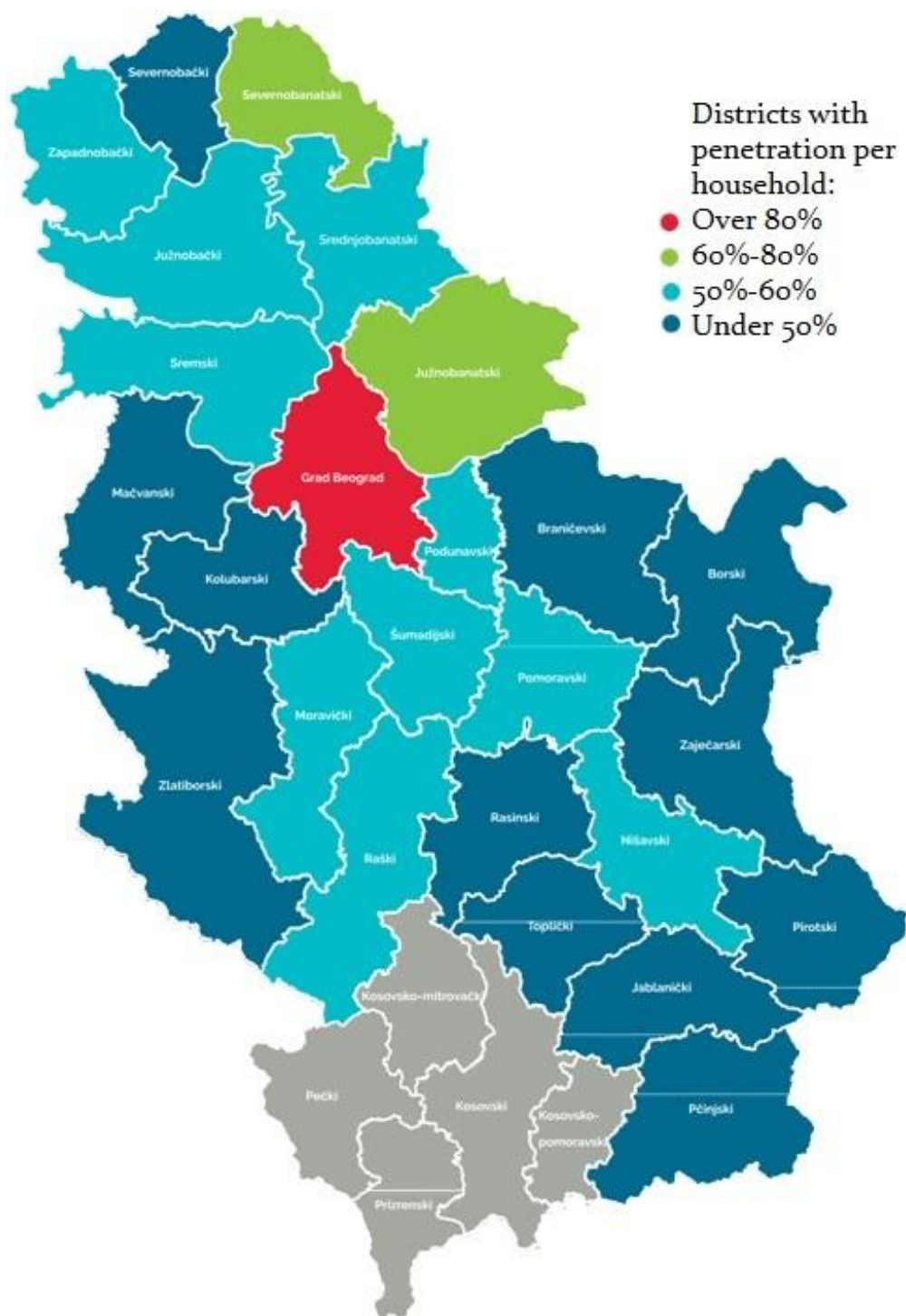
Source: RATEL (2018).

2.2.3 Coverage and investments

RATEL (2018) states that total investment in the electronic communication sector for the year 2017 was 32.8 billion RSD (270.7 million EUR). Out of it the biggest investment was made in fixed and mobile telephone networks of 21.5 billion RSD (177.5 million EUR) and the investment in access to broadband internet was around 4.4 billion RSD (36.8 million EUR). In the government program of the Republic of Serbia (2017), it is stated that the priorities of the digitalization are reducing the digital divide, increasing the use of ICT, smart cities, etc.

In the figure below (See Figure 10) we can see that majority of districts have less than 60% internet coverage with the city of Belgrade having the most coverage with 83.86% and Zaječarski district having the lowest one with 38.90% (RATEL, 2018). According to the RATEL (2018), there are 135 operators which are providing internet services in Serbia. The biggest provider is by far are Telekom with 44.16% and Serbia Broadband better known as SBB with 32.28% of market participation. Currently, Serbia has only 6,500 km of optical network available (Brnabić, 2017).

Figure 10: Representation of Internet access by the districts



Source: RATEL (2018).

2.2.4 Cybersecurity in Serbia

The ITU (2017) has created this index to measure and help us understand the commitment of a country to their cybersecurity. This index is based on the ITU Global Cybersecurity Agenda (hereinafter: GCA) which has five pillars (legal, organizational, technical, capacity building and cooperation). There are three stages of the Global Cybersecurity Index (hereinafter: GCI) development (initial, maturing and leading stage) and Serbia falls under the maturing stage along with many ex-Yugoslavian countries. Serbia takes the 89th spot on the global ranking and the 37th spot on regional ranking with GCI index of 0.311. This makes Serbia lowest ranking country at the maturity stage (International Telecommunication Union, 2017).

According to Abusara, et al. (2016) Serbian legal mechanism against cybercrime is in place and is in accordance with the Council of Europe and European Union legal frameworks. Special prosecutor's office for High-Tech Crime has been established however it is understaffed and people need further specialized training. Inter-agency cooperation is at the beginning stages and communication between the special prosecutor's office the police is improving (Abusara, et al., 2016). In Table 7 we can see the state of existence of the key elements of cyber security in Serbia.

Table 7: Cyber security environment in Serbia

	Existence
Cybersecurity law	Yes
Cybercrime (in) law	Yes
Cybersecurity strategy	At least basics are in place
National CERT	Yes
Substantial Public-Private partnership	No
Cybersecurity education	No

Source: Abusara et al. (2016).

Serbia has, the same as all over the world, seen an increase in cybercrime in the past decade (See Table 8). In the year 2017, there were not any major threats to Serbians ICT security. However, there were 2371 filed criminal charges for other less serious incidents (RATEL, 2018).

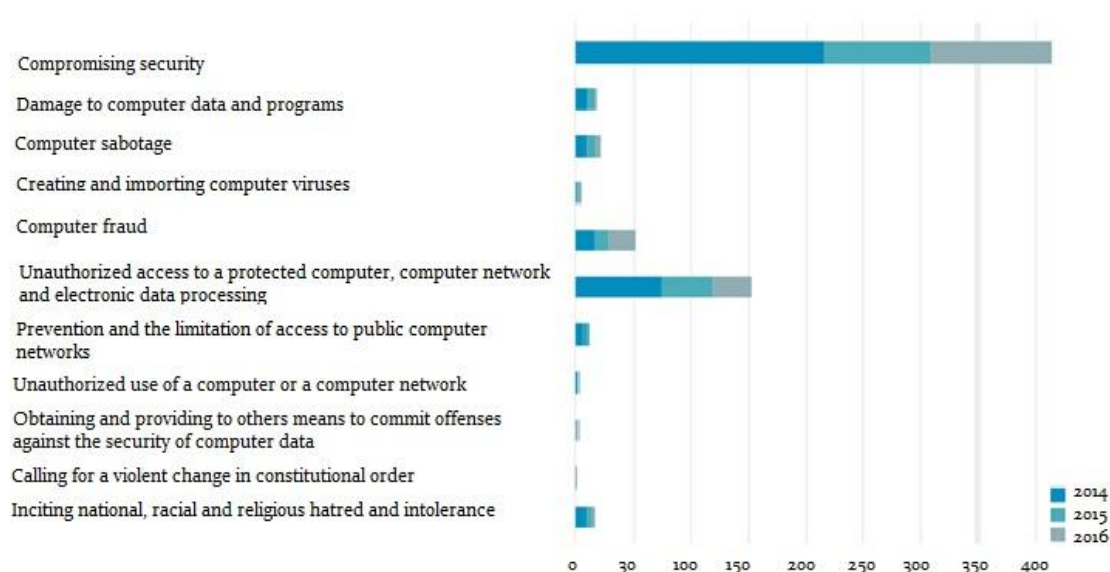
Table 8: Received cybercrime reports in Serbia

Year	Known perpetrators	Unknown perpetrators	Different applications	Total
2006	19	/	/	19
2007	75	11	68	154
2008	110	14	60	184
2009	91	42	114	247
2010	116	13	443	572
2011	130	28	502	660
2012	114	65	609	788
2013	160	243	558	961
2014	294	352	770	1416
2015	198	570	1306	2078
2016	240	580	1237	2058
Total	1547	1918	5667	9132

Source: Stamenković et al. (2017).

The highest number of high-tech criminal offences was compromising security (See Figure 11). This is because here we are looking at cybercrime in a narrow and broader sense. Consequently, any crime that was compromising somebody's security with the use of the computer is considered cybercrime. We can notice that the numbers are falling with 2014 having almost the same number of criminal offences in this category as in 2015 and 2016 together. Second notable cybercrime is unauthorised access which also follows the downward trend. However, the crime of computer fraud is on the rise.

Figure 11: Statistics of high-tech criminal offenses



Source: Krivokapić, et al. (2016).

Starting from 2016 Serbia has taken first steps towards managing the risks that are exposed to their network and information systems by passing the Information Security law. National Computer Emergency Response Team (hereinafter: National CERT) was established. National CERT (2018) states, that RATEL is responsible for their coordination and implementation of their work. They are supervised by the Ministry of Trade, Tourism and Telecommunications. Some of the National CERT responsibilities are collecting and exchanging the information in regards to the information security risks, to alert and advice ICT management teams and general the public. It will also monitor and analyze reported incidents (Nacionalni CERT Republike Srbije, 2018). Fundamentally National CERT services could be are grouped into three categories: prevention, reaction and education (Krivokapić, et al., 2016).

2.3 Analysis of E-Government in Serbia

Serbia has been actively developing its e-Government in the last decade. This is also reflected in the fact that numerous laws have been passed on this subject since 2016. Some of these new laws are Law about e-Government (regulates the performance of jobs done by government bodies), Law covering electronic document, electronic identification and trust services in electronic commerce (equalizes paper document and electronic one among other things) and Law on information security (dealing with ICT system security). Prime minister of Serbia (2017) has put the digitization of public administration and making provided services to citizens efficient as a top priority. There were around 6.7 million documents transformed in the process of digitalization from paper form to electronic one. However, there is no single registry that contains and describes all of the official records (Brnabić, 2017).

National Alliance for Local Economic Development (hereinafter: NALED) (2018) found that even though the majority of documents made today are in digital form there are still around 90% of documents archived in paper form. Fiscal bills are kept for three years, invoices for ten years, financial reports for twenty years and personnel documentation is kept indefinitely (NALED, 2018). This documentation is not only inefficient in regards to retrieving data and it takes up too much space (even corridors) but also a lot of documentation is compromised. For example, fiscal bills that are saved for three years fade after three to six months.

2.3.1 European Commission e-Government benchmark

In the European Commission report of e-Government benchmark by Capgemini et al. (2017) the progress of EU 28+ countries, e-Government is measured with five benchmarks (See Table 9). Serbia has been participating in measuring this benchmark since 2013 (Capgemini et al., 2017). The results from the table below were measured biennially in 2016 and 2017. Looking at Serbian User Centricity we can see that online availability is at

61% making it a bit above the level of just providing information online with a similar level of mobile-friendliness at 52%. However, the user support is high with 82% which is close to EU average.

For the transparency benchmark we can see that both transparency in service delivery and transparency of personal data are quite low (14% and 31% respectively). Transparency of Public organisation is relatively high at 64%, however, all three parts of transparency benchmark need to be increased to have good e-Government. Citizens and Businesses Cross Border Mobility measures to what extent EU citizen or business can use the services of another country. Since Serbia is currently not part of the EU we can disregard these benchmarks for this analysis. Score for the Key Enablers benchmark is the lowest. This is because digital post (only digital communication with citizens) is nonexistent. Furthermore the ability to use eID, the amount of eDocuments and authentic sources is quite low (25%, 37% and 48% respectively).

Table 9: e-Government performance across policy priorities

Score		EU 28+	SERBIA
USER CENTRICITY	Overall Scores	82%	64%
	Online availability	83%	61%
	Usability	88%	82%
	Mobile Friendliness	62%	52%
TRANSPARENCY	Overall Scores	59%	37%
	Service delivery	52%	14%
	Public organizations	71%	64%
	Personal data	54%	32%
CITIZEN CROSS BORDER MOBILITY	Overall Scores	48%	28%
	Online availability	59%	31%
	Usability	64%	50%
	e-ID Cross Borders	6%	0%
	e-Documents Cross Borders	13%	0%
BUSINESS CROSS BORDER MOBILITY	Overall Scores	61%	35%
	Online availability	72%	40%
	Usability	72%	50%
	e-ID Cross Borders	18%	0%
	e-Documents Cross Borders	35%	0%
KEY ENABLERS	Overall Scores	54%	21%
	Authentic sources	51%	48%
	e-Documents	63%	37%
	e-ID	53%	25%
	Digital Post	51%	0%

Source: Capgemini et al. (2018).

A similar story is with Serbian performance of Life events (See Table 10). The generally most developed benchmark is User Centricity. And the most developed life event is Moving event which covers deregistration from the old place to the registration to the new place and also notifying the relevant authorities.

Table 10: e-Government performance of Life Events (Domains)

Life Event		User Centricity	Transparency	Cross Border Mobility	Key Enablers
Business Start-up (2016)	EU 28+	84%	63%	65%	62%
	Serbia	61%	38%	33%	67%
Family Life (2016)	EU 28+	73%	49%	Not measured	37%
	Serbia	60%	29%	Not measured	5%
Losing & Finding a Job (2016)	EU 28+	81%	62%	Not measured	56%
	Serbia	52%	42%	Not measured	0%
Studying (2016)	EU 28+	83%	60%	61%	52%
	Serbia	58%	14%	20%	0%
Regular business operations (2017)	EU 28+	93%	69%	56%	67%
	Serbia	84%	42%	37%	32%
Moving (2017)	EU 28+	87%	65%	49%	66%
	Serbia	73%	56%	49%	38%
Owning and driving a car (2017)	EU 28+	77%	51%	44%	47%
	Serbia	74%	37%	33%	29%
Starting a small claims procedure (2017)	EU 28+	78%	50%	36%	41%
	Serbia	52%	34%	9%	0%

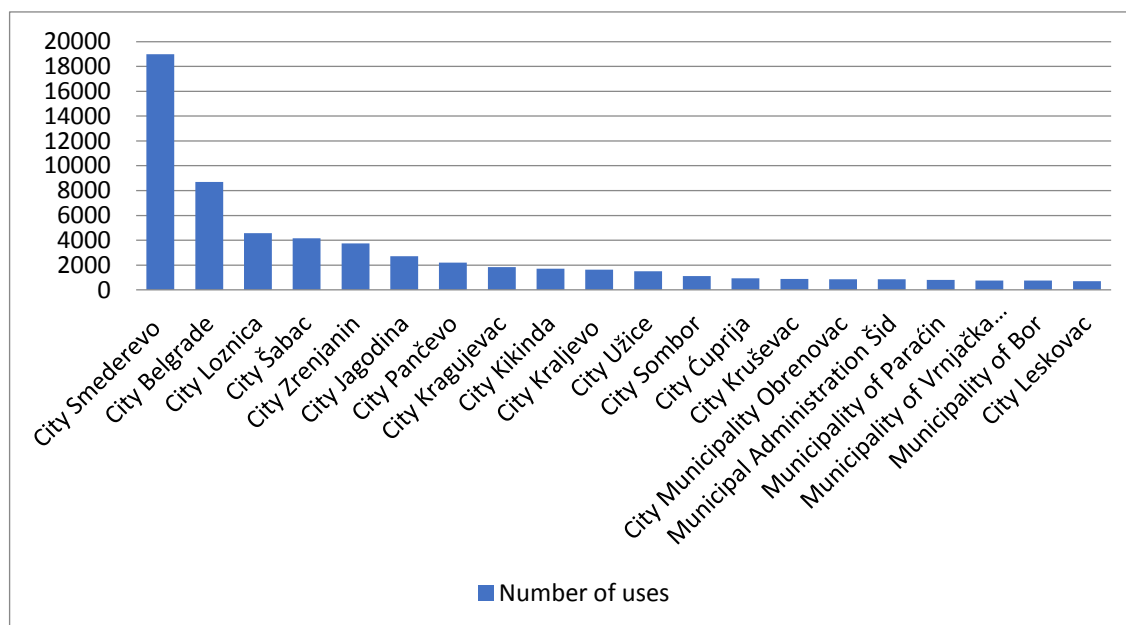
Source: Capgemini et al. (2018).

2.3.2 Newest developed information systems and other projects

E-ZUP is an information system for electronic exchange of data from all of the public administration bodies (Ministarstvo državne uprave i lokalne samouprave, Republike Srbije, n.d.). Office for Information Technology and Electronic Administration (2018a) states that over three hundred and twenty public institutions use e-ZUP and it is estimated that it has saved the government of Serbia tens of millions RSD in the past year. E-ZUP has connected twenty-two databases from eight biggest Serbian institutions: Ministry of Public Administration and Local Self-Government (hereinafter: MDULS), Ministry of Justice, Republic Geodetic Authority (hereinafter: RGZ), Ministry of Internal Affairs (hereinafter: MUP), Tax Administration, Pension Fund, National Employment Service and the Central Registry of Compulsory Social Insurance (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2018a). City Smederevo is the biggest user of e-ZUP

when it comes to the number of accesses made. This is probably due to the fact that Smederevo houses the biggest Serbian industrial complex and it is currently the biggest exporter from Serbia (See Figure 12).

Figure 12: Most active users of e-ZUP



Source: Kancelarija za Informacione Tehnologije i Elektronsku Upravu (2018b).

E-Inspector is an information system for communication and coordination work inspections in Serbia. It will give business sector insight into the work of inspections. To see when and how often were the inspectors in the company. There will be more than seventy sector regulations harmonized to align with the Inspection Supervision Act. This information system is not yet available but it should be available from 1st January of 2019 (International Telecommunication Union, 2018).

Government Data Centre is the first Government Data Centre. It stores the most important communication infrastructure and information, providing Serbia with saving millions of Euros (International Telecommunication Union, 2018). According to the Office for Information Technology and Electronic Administration (2018a), this is the most modern facility of its kind in the region. It meets Uptime Institutes four tier level at tier 3+ level, with ISO 2701 security, ISO 9001 quality and ISO 20000 quality of service standards. The building uses three independent sources of electricity (diesel-electronic aggregators and an uninterruptible power supply system) this gives the building up to 48 hours of independent power (Kancelarija za Informacione Tehnologije i Elektronsku Upravu, 2018a).

National Open Data Portal was a project that lasted for two years with being made available to the public in 2017 (Portal Otvorenih Podataka, Republike Srbije, 2018). Nine

state bodies fill it with frothy-five datasets (International Telecommunication Union, 2018). By the European Commission estimate, open data in Serbia will open the market worth yearly 40 billion Euros (Brnabić, 2017).

Baby Welcome to the World is an information system that allows parents of a new baby to do administrative duties of registering baby free of charge in few minutes without even exiting the hospital. All they need is the name of the baby and their own ID cards. The form is then automatically sent to three separate databases (Birth registry office, health insurance application and application for child allowance). Registration of residence is also done in the hospital but with the paper form which is then sent to Birth registry office who then forward it to the Police.

The program is not flexible enough because the only mother can receive newly issued documents and if the mistake is made it is harder to fix it because even though one form is sent for three databases you will need to fix it in all three databases separately because they are not connected. It would be easier if there was only one merged form that parents have to fill and then the Birth registry office should, after checking, forward the form to the other four institutions.

2.3.3 Analysis of e-Government Portal eUprava

For this analysis we used official information provided by the Serbian government and we will look in more detail the e-Government site to see how optimal the site is for use. E-Government portal (<https://www.euprava.gov.rs/>) has the following applications/systems integrated with it: e-Baby, Government Service Bus (hereinafter: SMO), e-ZUP, vehicle registration, school for passing a traffic exam system, e-Payment, e-Kindergarten, e-Reminder² and e-Participation (Mišić, 2018). Prime Minister Brnabić (2017) states, that the e-portal has over eight hundred electronic services from many different state bodies. The number of active users is around 750,000 and they have used electronic services over 3.5 million times in 2017 (Brnabić, 2017).

According to the Mišić (2018), current solution for e-Government portal was made using Microsoft technology stack. This solution was implemented using .NET Framework version 4.5. and for the web application ASP.NET WebForms was used. For developing of the user interface they used WebForms, HTML, CSS and JavaScript. Communication with the external system was made by SOAP and REST server. For the storage of data, they used Microsoft SQL Server 2008R2 (Mišić, 2018).

E-Government portal home page has e-Services, news, e-Participations, help and contacts. E-Services page has three ways of looking for needed service; by the life area, by starting

² Till the end of 2018 we couldn't find any evidence that support that e-Remainder is in place outside government claims.

the letter and by the responsible body and it also contains documents from government bodies and how to use the services. E-Participation page contains an archive of public hearings and information about the work of different ministries.

The Portal is not really optimized for its use. Its interface is not intuitive so you have to read the instructions for even the basic things. The site is not optimized for mobile either. Help page contains only information on how to sign up for e-Government, nothing more. There is also a dead YouTube video that should further explain how to log in. In addition, the page does not contain even an email address to whom to write if there are problems. On the contact page, there is information that should be on the help page and also the information on how to fill in the form for the health card.

Homepage and e-Services pages are the same which makes one of them redundant. As previously stated you have three options on how to look for what you need. First one is searching by the life area (See Figure 13) this is problematic because people do not know where to go to find what they need. What if a parent needs to check what vaccines his/hers child needs for starting the school, where would they look in the family category or in the health category or even in school category. This will cause in unneeded wandering through the portal in search of the information. Also for some reason, they decided to include the city of Belgrade as life area.

Figure 13: Search options on Serbian e-Government portal



Source: Home (2018).

Searching by starting letter leads you to the long page with all services available. Here the biggest problem is that the user needs to know in advance how the thing they are searching for is called. And since it is not sorted by anything other than starting letter of a service people will have to go through the extensive list to find what they need. Searching by the responsible body is not sorted properly. For example, in the list of responsible bodies you have the city of Belgrade and then next to it is (Belgrade's) city municipality Zvezdara. It would be much better if they organized them by city and then when you open page for a given city you can look for the municipality you need. Because most people when they see their searched city, on the list, do not go and search for their municipality further down on the list.

When you log in with your personal account you have nine personalized pages (my profile, my content, my news, my requests, authorized person, my notifications, my calendars and my documents). My content page (See Figure 14) contains content (news) from privately owned companies like B92 or Blic. This is an unneeded feature for e-Government site. However, even if you wanted to use this page it is completely non-functional. Whatever you click it does not respond.

Figure 14: My content page



Source: Moji Sadržaj(2018).

My request page holds only requests made on the eUprava portal. They are not connected to any other e-Government service that is provided on any other site. Same goes for the *my calendar* page, which does not contain any information on regarding personal document's expiration dates. My documents page allows you to save documents from the list of attached documentation and the list of processed documentation. Also, you can upload any of your documents up to 6MB for safe storing. This is an interesting concept but people are not usually that comfortable with just uploading their personal documents on the government site. If the government really wanted to provide cloud service to its citizens for unrelated documents it should be done as a separate website so that users can get all of the benefits of a cloud.

For the security analysis of e-government portal eUprava we used an Analysis of Secure Sockets Layer (hereinafter: SSL). The SSL is a security protocol used to secure data between two machines through encryption. For the analysis of the SSL for the e-Government portal, we used Qualys SSL Labs site (<https://www.ssllabs.com/>). The analysis is made in four categories: certificate, protocol support, key exchange and cipher strength. Adding those categories together produces a final ranking.

The eUprava portal has only one server and it should have a minimum of two. This is done in order to prevent system failure issues- if one server crashes, there needs to be at least one as a backup. Also, since government wants to increase the number of users of this portal, it would be good to prevent portal crashing due to the user overload.

Figure 15: Analysis of SSL



Source: Qualys SSL labs (n.d.).

Serbian eUprava portal gets the overall rating of C (See Figure 15). The site scores high marks when it comes to certificates³ and key exchange⁴. The cipher strength⁵ does not support authentication encryption (hereinafter: AEAD) cipher suites (it checks the integrity of cipher text and any additional unencrypted authenticated data). Protocol support⁶ has the lowest value because the server only supports older protocols it doesn't support the current best protocol version TLS 1.2.

³ Act as an online ID card, purchased from SSL authority.

⁴ The server can recognize key from a computer and know who it is.

⁵ Strength of encryption (number of bits used to encrypt data).

⁶ Protocol allows safe and private device communication.

2.3.4 Analysis of Government to Government in Serbia

Since out of all e-Government types, there is the least information available about the actual functioning of G2G, we have conducted interviews that will hopefully provide further insight into it. The interviews were conducted with 21 individuals from the public sector with varying professions and experience. These interviews contain multiple heads of departments from various professions. The questions for an interview were unstructured and questions for the survey were composed through the research in e-Government and Serbian e-Government.

When it comes to the years of experience, the least experienced interviewee had 1 year, and the highest one 39 years. Among the interviewees, there were six doctors, five people from the Office of vital records, three nurses, two economists, two people from MUP, one flight controller, one tax inspector and one statistician.

When asked to evaluate their ability to use computers, the slight majority (50%) said it was basic, while a second closes response (36.4%) was advanced. No one answered that they do not know how to use computers and all of the interviewed answered positively when asked whether they use some part of e-Government in their job. Everybody knew about e-Government however not everybody understood what exactly falls under it. The way they would define it would be that e-Government is a way for faster and more efficient work with clients. This is not incorrect but they were missing another important aspect of e-Government, which is the usage of ICT to facilitate communication.

The interviewees had generally a positive view of e-Government, and did not express fear in regards to it. Predominantly, they stated that they are not aware if there is resistance towards implementation of e-Government. However, as they pointed out, this may be for several reasons. One of the more prominent ones was the lack of knowledge and skills required to use the implemented programs, which in the end results in people not using e-Government services at all. Only around 50% of people interviewed were informed on why e-Government is being implemented. In addition to this, as far as we could find, many times only one person would actually be trained on how to use the programs and others would either learn from them or that person would solely be in charge of using it.

Another issue is the user's uncertainty as to whether they will be able to finish what they wanted. Often, programs installed are not functioning to their full extent, so people cannot use them exclusively. One example of this would be electronic medical records, which in theory should help doctors with, not just storing and sorting the records, but also with the security, the ability for any doctor-patient needs to have a quick and legible access to the information etc. However, in practise they only contain half of the information. The electronic record does not hold history prior to digitalization of patient's records nor does it hold the information on where the original is. So now doctors and patients have to waste time and search for the paper record.

As we can see lack of skill and lack of reliability require immediate addressing if the government wants to install the confidence in their employees and even citizens in the usefulness of the e-Government.

Some of the problems that e-Government created are a bad connection of computers with the network, which stops people from working, more than half of people questioned had reported falling of a system at certain times. They also report increased workload due to shortening deadlines, inadequate application of the programs by the users and programs that are not tailored for their use.

The problem of untailored programs can be seen in the following example: a surgeon wants to make an appointment for a follow-up. They have a program that does that and it is functioning, however, the program only allows the user to make an appointment at the first date available, regardless of the witch surgeon did the surgery. This results in the patients going for a follow-up to a completely new surgeon, who did not perform that operation and does not know what was exactly done during the operation which impact the level of service a surgeon is able to provide to a patient.

While examining the interviews, a pattern emerged regarding the way e-Government is being implemented. The government makes a program and installs it, regardless of whether it is fully operational. Then, it does not sufficiently train people who will use it. This down the line affects the end users of e-Government the citizens. However, there are also some positive signs, which indicate that e-Government is going to be more efficient in the future.

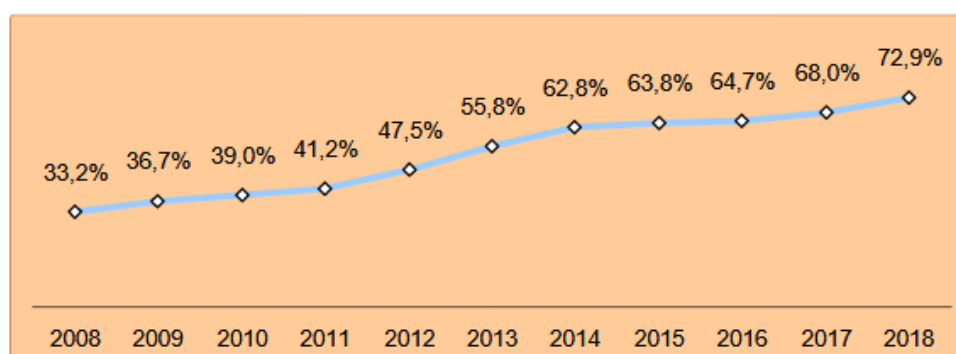
The positive side is that, even though Serbian e-Government has its flaws, the majority of interviews view it positively, and agree that even though not perfect, it makes their job easier. Also, the transition towards digitalization and e-Government is gradual which gives people time to grow accustom to it.

2.3.5 Analysis of Government to Citizen in Serbia

For the analysis of G2C we used the mix of the official data and also we will be looking at one complete service to try and understand what a citizen has to go trough to get an eService.

Kovačević et al. (2018) found that there is a positive trend when it comes to computer availability in households, increasing more than 30% in the last decade. With 78.2% of city households and 61.8% of other types of households owning a computer. This could be also seen in the percentage of households who have access to the internet (See Figure 16) (Kovačević et al., 2018).

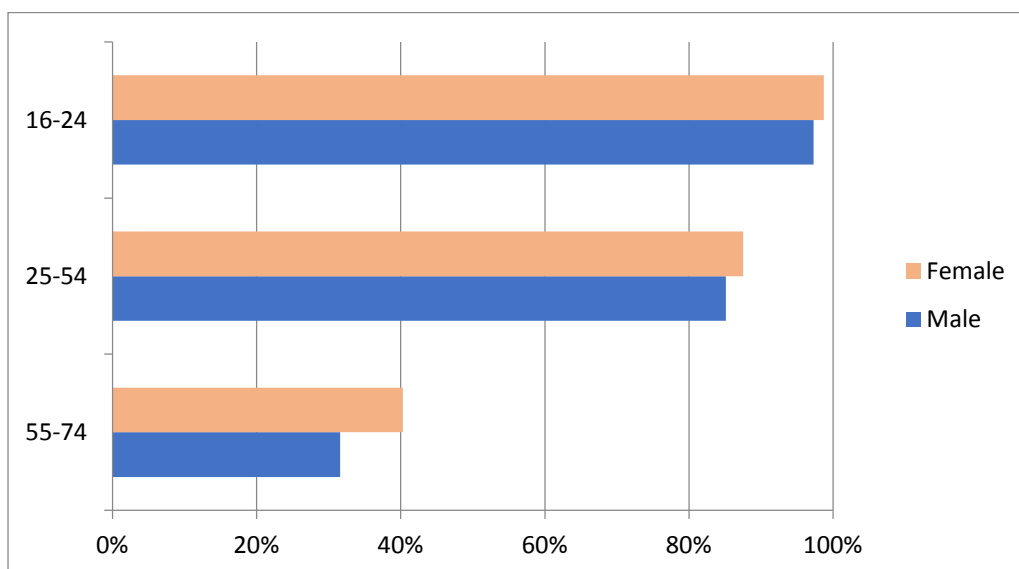
Figure 16: Percentage of households with access to the internet through a decade



Source: Kovačević et al. (2018).

The biggest determining factor of whether the person is using the internet or not is their age. Almost all of the teenagers and young adults are using the internet (See Figure 17). There is no noticeable difference between sexes in their respective age groups, except for a slight difference in the group aged 55-74 where the percentage of female users is 40% and of male users is 32%. This is in line with the government's plan to increase use of the internet to 100% however there still needs to be an outreach for older generations (Brnabić, 2017).

Figure 17: Users of the internet by age and by sex



Source: RATEL (2018).

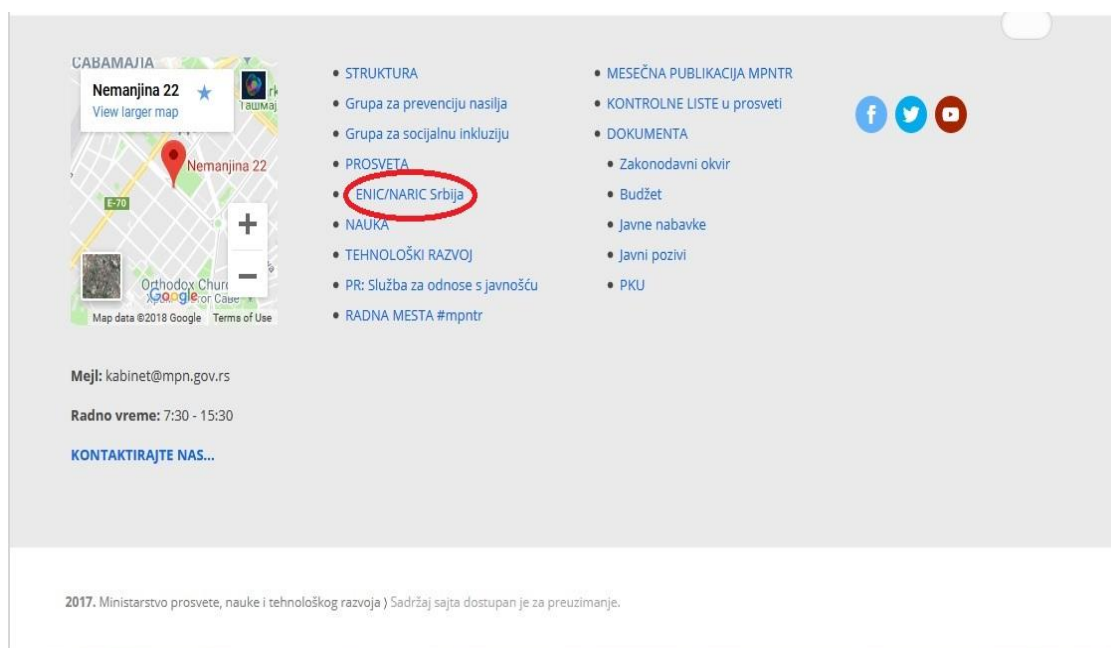
According to the Kovačević et al. (2018) around 35.5% of users of e-Government have used the internet for gaining the information from various public authorities, 21.7% of users have downloaded official forms from the e-Government site and 15.9% have submitted filled forms. The main reason on why people do not send filled forms through

the internet is that they were not required to send one at first place, and the second, much rarer reason, was the lack of skills on how to do it (Kovačević et al., 2018).

For further analysis we will look at an example of an entire e-Service. The eService which we will look at more closely is the validation of a university degree. This example will provide us with a clearer image of how e-Government in Serbia works. It cannot show us neither all of the benefits nor all of the faults of Serbian e-Government but it can give us the idea of what are reoccurring problems with it. The service was received on 23 August 2018.

This service is not on the e-Government site (eUprava) but on the site of the Ministry of Education, Science and Technological Development (<http://www.mpn.gov.rs/>). There is no information on eUprava site where you can verify your diploma and on the site of the ministry, the link for the needed page is at the bottom of the page (See Figure 18). For a user to find it they need to know for what abbreviations ENIC (European Network of Information Centres in the European Region) and NARC (National Academic Recognition Information Centres in the European Union) stand. If a person does not know that the only other way to find it would be to go through Google search engine.

Figure 18: Bottom of the webpage of Ministry of Education, Science and Technological Development



Source: Ministarstvo prosvete, nauke i tehnološkog (2017).

After finding the needed page, the procedure is relatively straightforward. For the verification of the diploma, a person needs ten documents (such as translated diploma, personal id, etc.), a printed and filled out online form, and a proof of paying the administrative tax (payment slip). The provided list of documents at the time of the service

was done a bit clumsily, with some of the needed documents being in fact incorrect. However, that was later corrected on the website itself. For the electronic form, the only language available is Serbian and you have to fill it out using Cyrillic alphabet, which could cause problems for foreigners (See Figure 19).

Figure 19: Electronic form for validation of diploma (first step)

Корак 1

Подаци о подносиоцу захтева

Ради стандардизације формата података који се уносе, поља обележена звездицом (*) се морају унети српским ћириличним писмом

Име *	Презиме *	Датум рођења
<input type="text"/>	<input type="text"/>	<input type="text"/>
Држава рођења	Место рођења	
<input type="text"/>	<input type="text"/>	
Адреса сталног боравка	Држављанство	
<input type="text"/>	<input type="text"/>	
Поштански број	Место боравка	Држава
<input type="text"/>	<input type="text"/>	<input type="text"/>
Адреса електронске поште	Контакт телефон	
<input type="text"/>	<input type="text"/>	

Неопходно је да подносиоц захтева донесе одштампану електронску апликацију и **потребну документацију** у термину који се унапред заказује

Датум термина за подношење пријаве	Време термина за подношење пријаве
<input type="text"/>	<input type="text"/>

Обавештавамо потенцијалне апликанте који су до сада већ аплицирали за признавање стране високошколске установе у Републици Србији и били су одбијени да немају право да аплицирају у ENIC/NARIC центру Србије.

☐ Изјављујем да нисам био одбијен при апликацији за признавање ове стране високошколске установе у Републици Србији

На следећи корак...

Source: Ministarstvo prosvete, nauke i tehnološkog (n.d.)

After filling out the form, you can choose when you want to submit the documentation. In the end, the applicant gets a confirmation email with PDF file, the number of your application, date and time for the submission of documents and where to submit the documents. After arriving at the location, we found that the information about office number (provided in confirmation email) was incorrect. The email said floor 1a office number 115 but in truth, it was floor 4a office 412. In the end, we were given satisfaction questionnaire in paper form with only one question: How are you satisfied with the service provided in the office? We were provided with answers from; not satisfied at all to the completely satisfied. Under the question, there was space for signing which is a problem since that means that your evaluation isn't anonymous, and is available to the very person that is processing you submitted diploma verification. This creates additional pressure to evaluate the service positively, which decreases the value of the evaluation itself. Also, having only one question in the questionnaire doesn't provide a feedback that's detailed enough, and it would be better if the questionnaire is sent with a confirmation email for

submitting the documents (which is not sent out). Furthermore, it is necessary to make it anonymous and with more questions so that the future improvements are better planned.

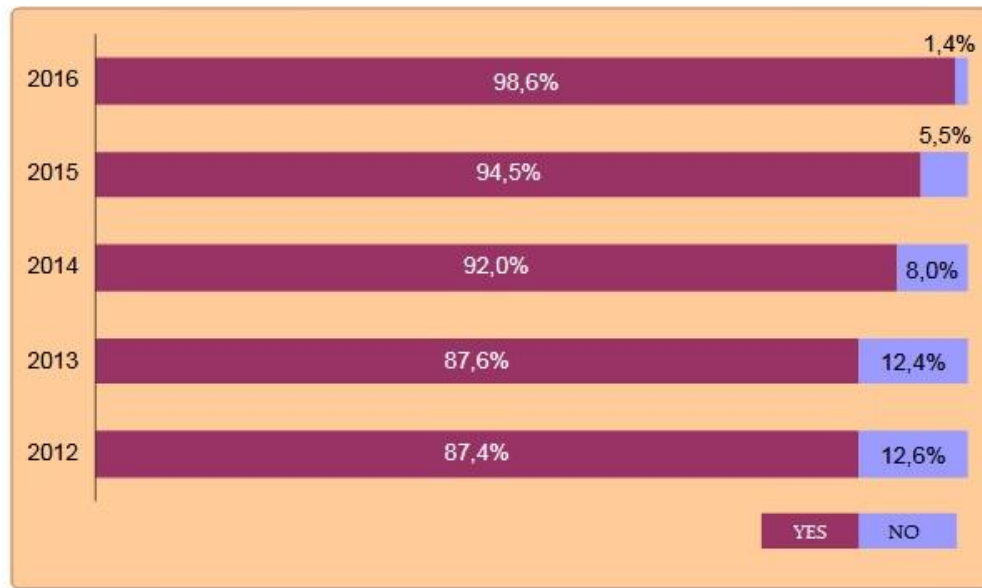
On the whole, having simple three things available online (e-form, list of documents and payment slip) makes the experience much easier and more predictable. Previously, in order to schedule documents and even to get the information regarding the required documents, one had to contact the Ministry of Education, Science and Technological Development directly. Additionally, the information that was obtained that way was often unreliable, since it was dependant on the reached official's procedures awareness, which wasn't uniform. Current situation is much better, although there is still room for improvement, for example regarding the location of the information on the site, and other procedures which seem to be redundant and unnecessarily burdening. (e.g. why do you have to scan your ID if you are from Serbia, why cannot you just bring your ID card with you, why cannot you pay online through e-Payment, etc). Taking these flaws into account, the improvements regarding this e-Service is really time-saving and makes the whole process more efficient, which is the end the main purpose of e-Government.

2.3.6 Analysis of Government to Business in Serbia

Statistical office of the Republic of Serbia provided us with sufficient data to look at the use of G2B. According to Kovačević et al. (2016), almost all of the companies in Serbia use the computer (99.3%) and internet (99.8%) in their business. However, only 20.7% of companies employ ICT experts in their own company (Kovačević et al., 2016).

Most companies also use e-Government services (See Figure 20). The reason for this could be that some of the services can be performed only through online means currently (e.g request for building permit). Serbian private sector is much more advanced then public in this regard. For example, banks have offered online payments for a few years now, but it was only made available in August 2018 for e-Government portal. Companies used e-Government for three services: filling the forms (96.6%), finding the information (96.2%) and returning filled forms (95.7%) (Kovačević et al., 2016).

Figure 20: Percentage of companies using e-Government services



Source: Kovačević et al. (2016).

2.3.7 United Nations e-Government index

The E-Government Development Index is an index made out of three dimensions important to the e-Government: online services index (hereinafter: OSI), telecommunications infrastructure index (hereinafter: TII) and human capital index (hereinafter: HCI) (UN Department of Economic and Social Affairs, 2018).

For the calculation of TII and HCI of a country UN (2018) has used many of the same categories as for calculating IDI (See Table 11). The numbers used for the calculation of HCI are a bit outdated since they were collected in 2015.

Table 11: TII and HCI for Serbia (used for calculating EDGI)

TII Serbia	
Fixed telephone subscriptions per 100 inhabitants	37.53
Mobile cellular telephone subscriptions per 100 inhabitants	130.24
Percentage of Individuals using the Internet	67.06
Fixed (wired) broadband subscriptions per 100 inhabitants	20.78
Active mobile-broadband subscriptions per 100 inhabitants	72.81
TII	0.6028
HCI Serbia	
Adult Literacy (%) Index Value	98.1
Gross Enrolment Ratio Index Value	85.21
Expected Year of Schooling Index Value	14.55
Mean Year of Schooling Index Value	10.8
HCI	0.7896

Source: UN Department of Economic and Social Affairs (2018).

It is important to note that EDGI uses normalized values, so if the country drops few positions, that does not necessarily mean that it has underperformed nor does the reverse always mean that country had the more desirable outcome (UN Department of Economic and Social Affairs, 2018). This could potentially be an explanation as to why has Serbia dropped ten ranks, from 39th place to 49th, even though it had made noticeable movement forward in the last two years (See Table 12).

Table 12: United Nations ranking EDGI

Indexes	Serbia	European average
OSI (2018)	0.7361 (high)	0.7946
TII (2018)	0.6028	0.6765
HCI	0.7896	0.8471
EGDI (2018)	0.7155 Rank 49 of 193	0.7727
EDGI (2016)	0.7131 Rank 39 of 193	0.7241
E-Participation Index	0.8146	0.8103
GNI per Capitals us dollars	13,700 (Upper middle income)	

Source: UN Department of Economic and Social Affairs (2018).

3 ANALYSIS OF THE GAP AND THE CREATION OF THE FIVE YEAR PLAN

3.1 Analysis of the gap between top five European e-Governments and Serbia

To better understand what are the countries doing to be at the top of e-Government in Europe, we will use their basic information namely, their four indexes (EDGI, DESI, IDI, and GCI) and analysis of their respective portals.

3.1.1 Top European e-Government countries in the year of 2016

3.1.1.1 United Kingdom

The UK is a constitutional monarchy with the legislative power held by the Parliament. The parliament has two houses; the House of Lords and the House of Commons. Head of the state is the Monarch but the executive power is in the hands of Government lead by Prime minister and Cabinet of United Kingdom.

Table 13: General information about the United Kingdom

Name	United Kingdom
Capital	London
Population 2017	65,808, 673
Internet domain	.uk
Gross National Product for 2017	2,325,520.4 million EUR
Average monthly net earnings in 2015	2,238.36 EUR
e-Government Portal	https://www.gov.uk/

Source: Joinup European Commission (2018).

One of the first government portals was created by the UK in 1994 originally it was open.gov.uk however it was later replaced for gov.uk a one-stop shop (ePractice European Commission, 2014).

European Commission (2018b) states that in 2015, UK has achieved complete broadband coverage. In 2017 UK government published a digital strategy that will facilitate the coverage of superfast internet and also the investment of 1 billion GBP for 5G and full fibre broadband. Regularly 93% of people use the internet in the UK, however, around 30% of the population lacks basic digital skills. The 2017 digital strategy will also tackle

the digital divide between sexes (only 17% of computer science students are female) and establishing strong collaboration between the public, voluntary and private sector. Adults in England that lack basic computer skills will be able to learn them through free courses provided by the government. The UK has a wide ranged computer curriculum during the education, and the government also invested 30 million GBP in Artificial Intelligence (hereinafter: AI).

Their citizens mostly used the internet for online shopping and for downloading the videos/games (86% and 80% respectively). To boost innovation and productivity, UK has allocated 13 million GBP for the creation of the private held Production-Council. UK citizens have expressed aversion towards government retaining their personal information, which could be the reason for the low availability of online forms. In the future UK will concentrate on how AI and biometrics can facilitate providing services (European Commission, 2018b).

Capgemini et al. (2017) highlight the UK and French cooperation in creating the report that will help both countries understand data revolution, how it can help in the cooperation between these two countries and how can it foster economic growth. This way, both countries can join their expertise experiences. They have grouped their recommendations in four groups: supporting data-driven innovation, increasing data literacy and skills, creating robust data infrastructures and strengthening citizens' confidence and empower them as well. People working on the business side of gov.uk have realised that their site was hard to navigate so they decided to improve that. In the end, they managed to decrease the number of pages needed to be clicked on before finding what you need by 5% and as the result, the number of "clicks" to the services people need for starting a business increased by 25% (Capgemini et al., 2017).

In ITU's (2017) report we found that UK has continued with its strategy of ensuring safety in the cyberspace, with the goal of making UK the safest country to do business in. Also, the country has collaborated with a home-grown company that deals with cybersecurity called Netcraft. It is reported that their collaboration stopped around 35, 000 attacks on government departments in the second half of 2016 (International Telecommunication Union, 2017).

3.1.1.2 Finland

Finland is a parliamentary republic. Executive power lies with the President and the Government (led by Prime Minister) and the legislative power lies with Parliament which is composed of 200 members.

Table 14: General information about Finland

Name	Republic of Finland
Capital	Helsinki
Population 2017	5,503,297
Internet domain	.fi
Gross Domestic Product for 2017	223,522 million EUR
Average monthly net earnings in 2016	1,868.58 EUR
e-Government Portal	https://www.suomi.fi/

Source: Joinup European Commission (2018).

The ePractice European Commission (2014) composed Finland's e-Government history consisting of important milestones. It is shown that Finland has been working on their e-Government since 1994, with the strategy for the information management in government. Since then, they have been adding and improving their digitalisation and e-Government every year, which allowed them to grow with the developing technology. They have been developing their e-Government portal (www.suomi.fi) since 2002 and completely renewed it in 2010, making it a one-stop portal (ePractice European Commission, 2014).

European Commission (2018b) has found that 97% of households in Finland are connected to the internet. Finland has made incentives for network companies to apply for the state aid hoping that this will result in a higher number of offers provided for a broadband connection. One of the bigger competitive advantages for Finland is the population's digital skills and an increased number of ICT specialists. To promote further digital education, they will be increasing digital learning environments in schools and also implement new approaches to pedagogy, such as modern simulators.

Digitalization is much more present in service sector than manufacturing. At the end of 2017, Finland has started its program for development of the AI hoping to be the leader in this area. The government services continue to make strides forward. They have put in place a Patient Record system where the patient can see their medical records and use prescription service. This database can also be used by doctors to view records and if needed to communicate with different parts of the healthcare system. Finland has made a point to make many of the life events services available not just in Finnish but also Swedish and English (European Commission, 2018b).

According to the Capgemini et al. (2017) Finland has found a way to tackle the problem of the immigrant population without bank account, who want to entry the labour market. Their immigration service has started giving out MONI-prepayment cards, which is used as a substitute for cash. This card helps asylum seekers keep their money safe, and allows

their employers to deposit their paycheck. However, it is important to note that, due to the way blockchains work, the immigration service now has a way to monitor immigrant money transactions. Finland also has a transparency site (www.tutkihankintoja.fi) where anybody can get the information on government spending. It is easy to use, it is available in different languages and everything can be personalized (filtered) according to what the user needs (Capgemini et al., 2017).

ITU (2017) notes that Finland collaborates with their native company Codenomicon in developing national intrusion detection system and automatic incident reporting service with Finnish Communications Regulatory Authority. The country is also part of Nordic National CERT Collaboration along with Denmark, Sweden, Iceland and Norway. They hold cybersecurity exercises with the goal to assess the current situation and find elements that need improvements. The improvements can range from better technical cooperation to improved information sharing in the region (International Telecommunication Union, 2017).

3.1.1.3 Sweden

Sweden is a constitutional monarchy with a parliamentary government. Monarch holds no actual power. Legislative power is held by the Parliament and executive power is with the Prime Minister and the Government. Parliament is composed of 349 members.

Table 15: General information about Sweden

Name	Kingdom of Sweden
Capital	Stockholm
Population 2017	9, 995,153
Internet domain	.se
Gross Domestic Product for 2017	477,857.5 million EUR
Average yearly net earnings in 2015	1,959.46 EUR
e-Government Portal	https://www.verksamta.se/

Source: Joinup European Commission (2018).

The Swedish government started their e-Government development in 1997 with the launch of the program Government e-Link which facilitates the exchange of the information among different government agencies and also between their customers (ePractice European Commission, 2014)

According to the European Commission (2018b), they are leaders of high-speed connectivity in Europe. Because remote areas are harder to connect Swedish government has simplified administrative procedures relevant to gaining the permit and allowed for the bigger public funding. Sweden has the second highest number of ICT specialists in the EU. However, that is still not enough, since it is predicted that Sweden will have a shortage of 70,000 ICT specialists in the next four years. Therefore, Sweden has implemented a strategy for developing digital skills in children. This will be done not just through informatics, but also through maths, civics and Swedish language classes. This way, the children will understand how to use the newly acquired skills, and how to translate them into concrete actions. Around 90% of Swedes use online banking and even the senior population regularly uses the internet.

Companies regularly use technologies in their business however, many small companies have trouble keeping up with rapid digitalisation which gives them a comparative disadvantage when pairing up with bigger competitors. When it comes to public services, many of the online forms come prefilled with the data that is already known to the government. Similarly to Denmark, they also have highly developed e-Health, with 99% of prescriptions being in the electronic form. They have started the initiative of creating an online list of all medication that was prescribed to a patient, which will be available to the patient, doctors and pharmacist inspection (European Commission, 2018b). When it comes to life events, Sweden has the strongest focus on the services related to business (Capgemini et al., 2017).

3.1.1.4 Netherlands

Netherland is a constitutional monarchy. Legislative power is held by the Parliament and executive power is held by the Government and Prime Minister (appointed by the monarch). Parliament is bicameral with First House composed of seventy-five members and Second House of hundred and fifty members. Head of the state is a monarch. However, this position is mostly ceremonial.

Table 16: General information about Netherlands

Name	Kingdom of the Netherlands
Capital	Amsterdam
Population 2017	17, 081,507
Internet domain	.nl
Gross Domestic Product for 2017	733,168.0 million EUR
Average monthly net earnings in 2016	2,192.18 EUR
e-Government Portal	https://www.overheid.nl/

Source: Joinup European Commission (2018).

The government of the Netherlands has been working on creating one-stop shop for the citizens since the late nineties, starting with the creation of the national portal (www.overheid.nl) in 1999 (ePractice European Commission, 2014).

According to the European Commission (2018b), the Netherlands is the leader in connectivity with broadband connectivity of 99.5%. Dutch government facilitates local authorities to make a desirable environment for network market through sharing knowledge and best practises so that there is no need for public funding. They are currently focusing on the application of 5G technology. Usage of the internet was the highest for online banking and watching videos/playing games (93% and 88% respectively).

When it comes to the digitalisation of the manufacturing industry, they have made thirty-two field laboratories, where companies can develop and test their ICT applications. These labs are financed partly by the private and partially by the public sector. E-Government has 90% of public services availability. However, the Netherlands performs below EU average in regards to the availability of services for foreign and domestic businesses (European Commission, 2018b).

Capgemini et al. (2017) have found that the Netherlands put a stronger emphasis on job and studying life events. Since 2017, the e-Invoicing from suppliers has become not only a default, but an only option. The reason behind this move is to save around 10 million EUR and to reduce bureaucracy as well (Capgemini et al., 2017). National Cyber Security Centre composes a yearly Cyber Security Assessment Netherlands report which allows recognition of patterns and allows timely action on possible threats or vulnerabilities (International Telecommunication Union, 2017).

3.1.1.5 Denmark

Denmark is a constitutional parliamentary monarchy. Legislative power is held by the Parliament and executive power by the Prime Minister and the Government. Prime Minister is appointed by the monarch and answers to the Parliament. Parliament has one hundred and seventy-nine members.

Table 17: General information about Denmark

Name	Kingdom of Denmark
Capital	Copenhagen
Population 2017	5,748,769
Internet domain	.dk
Gross Domestic Product for 2017	288,373.5 million EUR
Average monthly net earnings in 2015	2,023.08 EUR
e-Government Portal	https://www.borger.dk/

Source: Joinup European Commission (2018).

This is one of the first countries which have realized the potential of IT in government with first signs of digitalization showing in the early seventies (ePractice European Commission, 2014).

When it comes to connectivity, the European Commission (2018b) found that Denmark scores really high. Almost everybody is connected to the internet with 99.5% of households having broadband coverage. It overwhelmingly relies on private investment with a small input from national and EU funding. The government has committed itself to improving connectivity in rural areas, aiming to provide high-speed coverage by 2020. In the Human Capital dimension, 95% of Danes use the internet regularly with 71% having at least basic computer skills. Danish government makes their priority to create balance between skills needed and people providing them. Most Danes use internet for online banking and video games (92% and 90% respectively). Online shopping percentage of 82% and high online banking rates, show us that a high degree of trust has been established between users and online services.

Denmark is also leading when it comes to integration of digital technology. In their strategy for digital growth, they put an emphasis on small to medium enterprises and innovation. This strategy has seven pillars that are put in place to accelerate and support the use of new technologies, to build trust by strengthening cybersecurity and promote the collaborative economy. Denmark scores highest when it comes to availability of domestic and cross border online public services, with 86% of people using the internet to submit

forms online. The trait that characterizes their e-Government is a good and user-friendly service with a long-term consistent strategy and a digital welfare and life-event journey at its core (European Commission, 2018b).

Capgemini et al. (2017) highlight Denmark's pilot program for new generation of digital post-distribution. Currently, nine agencies are testing it, in hope that it will bring them a faster and more accurate distribution. The pilot will serve as a way to learn how to automate the processes and whether there will be higher correspondence with the increased metadata. Denmark is also taking part in Norway's digital diploma registry which collects people's results from their education and then shares them with educational institutions, potential employers and other relevant recipients. Sweden, Finland and Italy are also participating. This registry has many benefits from saving time and paper to the increasing credibility of people's diplomas (Capgemini et al., 2017).

3.1.2 Comparison of the Indexes

These five countries were top in 2016. In 2018, the ranking has changed slightly with the Netherlands dropping down in ranking and being replaced in the top 5 by France. For the purpose of this paper, we will use the ranking from the year 2016 (See Table 18).

When trying to find out can countries beneficially exploit ICT Capgemini et al. (2017) used penetration and digitalisation levels. Penetration is index composed of internet use (submitting completed forms) and percentage of individuals who need to submit official forms to the administrative authority. Digitalisation is calculated from averages of user-centric government, transparent government, citizen and business mobility and key enablers. Then the countries are put into four scenarios: Fruitful (full benefit of opportunities) for countries with high penetration and high digitalisation, Unexploited e-Government with high penetration and low digitalisation, Expandable e-Government with high digitalisation and low penetration and Non-consolidated e-Government (no benefit from opportunities) with low digitalisation and low penetration (Capgemini et al., 2017). We do not have the calculation for Serbia and we cannot fully calculate indexes since some of the numbers are missing. However, we can estimate with confidence that Serbia falls in non- consolidated e-Government.

We analysed all of the other e-Government portals in the same way as the analysis of Serbian portal. After the SSL server test was conducted we could clearly see that all of the top five countries have the rating of A or above. This rating shows us that the analysed site has all needed certificates, support the newest protocols, has good key exchange and strong cipher. High rating ensures good security for all parties involved, which why it should be unacceptable for a government portal to have a lower rating then A. Through the analysis we also noticed that only the UK and Netherlands have more than one server (8 and 2 respectively). Those two countries have the biggest population of the group but, as

previously stated, it is good to have two servers in order to alleviate the danger of a complete eService breakdown, due to the main and only server being out of service (i.e. crashing).

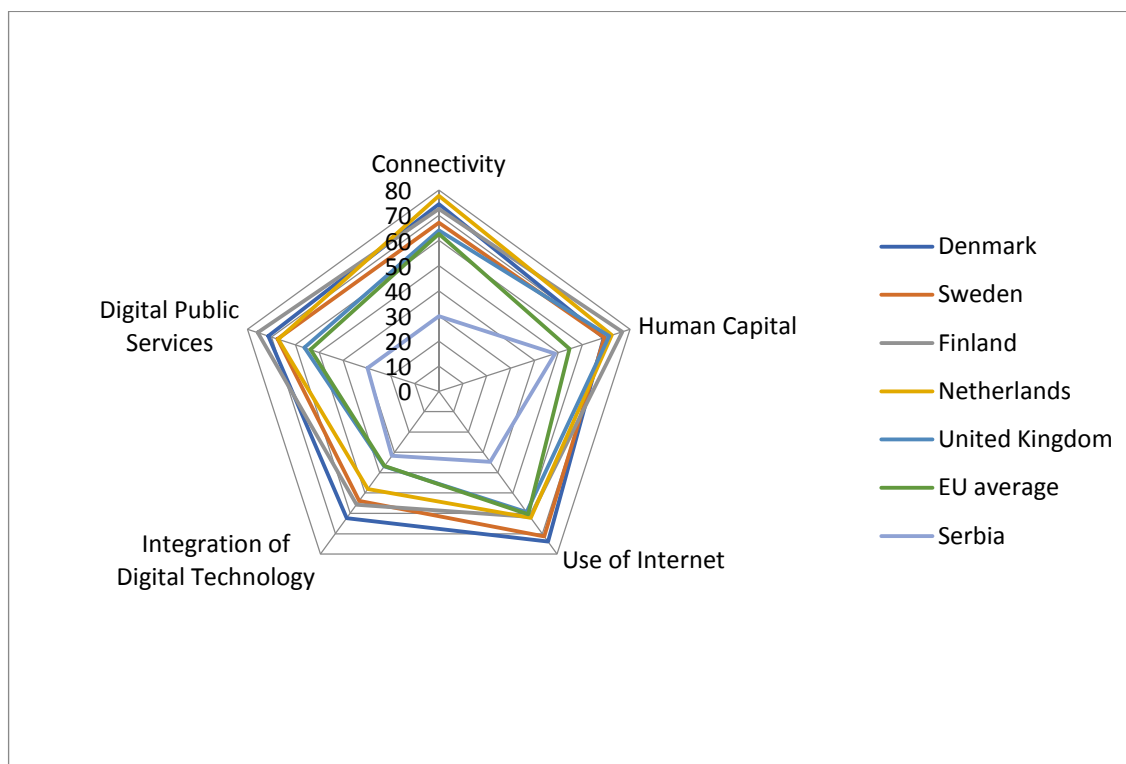
Table 18: Group of different indexes

Countries	EGDI	DESI	IDI	GCI	Scenarios	SSL Server Test
UK and Northern Ireland	0.9193 (1 st)	7 th	8.65 (5 th)	0.783 (12 th)	Unexplored	A+
Finland	0.8817 (5 th)	2 nd	7.88 (21 st)	0.714 (16 th)	Fruitful	A+
Sweden	0.8704 (6 th)	3 rd	8.41 (8 th)	0.733 (17 th)	Fruitful	A
Netherland	0.8659 (7 th)	4 th	8.49 (10 th)	0.760 (15 th)	Fruitful	A+
Denmark	0.8510 (9 st)	1 st	8.71 (3 rd)	0.617 (34 th)	Fruitful	A
Serbia	0.7131 (39 th)	27 th	6.94 (31 st)	0.311 (90 th)	est. Non-consolidated	C

Source: European Commission,(2018b), Capgemini et al.(2017), Telecommunication Development Bureau of ITU(2017), International Telecommunication Union(2017) Qualys SSL labs (n.d.), UN Department of Economic and Social Affairs (2018).

Serbia is below EU average in all of the points of the DESI (See Figure 21). It is performing the best in the human capital category and in use of the internet. However, there is still a need for further improvements if Serbia wants to catch-up their e-Government at least with EU average. To achieve this, all of the DESI categories have to be improved, and not just the digital public services one.

Figure 21: Radar DESI chart of EU average, top five countries and Serbia for 2017



Source: European Commission (2018b), RATEL (2018).

3.2 Five year plan for improvement of e-Government in Serbia

Here we will discuss the steps that Serbia should take in the next five years in order to try and bridge the gap. This plan will encompass years from 2019 till 2022. It will be aligned with the end of the development strategy for the e-Government in Serbia for the period of 2015-2018. With a goal to at least reach EU average of e-Government by the end of it. The master plan was constructed with keeping in mind lessons learned from top five EU e-Governments and the analysis of Serbian ICT infrastructure and analysis of e-Government. The master plan is set up in such a way that the complexity of each year is ascending. The reason for this is that the many of the tasks will by their nature transfer to next year and some will continue even after this plan is done with.

3.2.1 Lessons learned from top five

E-Government improvement strategies must be more holistic. It needs to encompass not just the pure digitalisation and IT part but maybe more important social, political (will) and economic composition (Ronaghan, 2002). Improving these three elements will in turn help promote a healthy e-Government growth. This part was composed by looking at the way top five EU e-Governments are dealing with their respective e-Governments.

All of the projects should have a pilot run which would serve as a test ground to facilitate further improvements. That will help to find problems before the user count increases. Another important thing is to get proper feedback from the users themselves, and adjust the service to meet their requirements. There also needs to be a strong communication between different institutions and creators of software and programs. It would also be beneficial, to use a project management framework program, like SCRUM or Prince2 for the projects. In the end, it is very important to enable good communication and sharing the expertise with neighbouring countries. This will speed up the learning process and also make the whole region safer through group effort.

3.2.2 Master plan for the first year

It is important, especially for the first year, to keep in mind the importance of quality over quantity. That is why it is best to concentrate on fixing and finishing all of the already started projects and put them into operation. There is a great need for the complete overhaul of e-Government portal e-Uprava, not just from a functional perspective but also from the design one. Making it more logical and easy to navigate, so that user does not need instructions for every task they need to accomplish.

The government needs to set up continuous education and support system for their employees, which would enable them to use the e-Government for their respective job. This education needs to cover IT skills and how to use it in real life, for example, if there is a dilemma on how to solve certain case this education should help and provide solutions or personal guidance for solving them. This will consequently, stop the employees from having to making their own solutions and it will make the whole process more uniformed. This training and guiding should not end after first year but continue throughout the life of e-Government. Also, a feedback system needs to be put in place so that all of the users of e-Government can anonymously report the issues they have encountered and give their opinion its general functionality. The process of digitalisation of archives needs to be sped up and, where is possible, reference index for the exact location of the physical document should be put in digital one. This will help avoid confusion of where the actual physical document is (it often isn't in the same institution as the person who is looking for it) and it will shorten the time needed to search for the said document.

Furthermore, there is a huge need for spreading awareness about e-Government through extensive campaigns, which would help people understand what it actually consists of and how to use it effectively. What administrative tasks can they perform online and what steps are needed to finish the required task. The government also has to educate people on how to protect themselves when using digital means, both when dealing with e-Government but also with other similar activities. This will increase people's confidence in using digital means to conduct their business, and consequently, the usefulness of e-Government. Currently, the information available online on this matter is not sufficient for e-

Government to function smoothly, since the citizens are often unaware of the services available to them.

When it comes to the economy, the government needs to put in place incentives and restrictions, in order to promote digital use in companies. Restrictions should be done in terms of making certain actions available only through online means. On the other hand, the incentives should mainly help medium and small businesses integrate with new technologies, probably with some kind of monetary incentives, like a tax deductions. This would apply to domestic companies that are, either using state of the art technology that will benefit the environment (both business and natural) or domestic companies which have an active R&D department. It is also important to nurture young inventor's abilities, by giving them grants or involving them in start-up incubators. This should especially apply to those in the vibrant IT sector, which is more and more becoming an indistinguishable part of every industry, from taxi apps to digital pathology. It is important that this support should encompass all school children and young adults, regardless of what branch their invention is from. Here, Serbia has great potential. However, many young inventors are left to fend for themselves no matter how important or innovative their invention is.

3.2.3 Master plan for a second till fourth year

In the following years, it would be good if Serbia would intensively concentrate on improvement of the ICT connectivity throughout the entire country. Connectivity needs to improve in almost all districts, with the objective that the percentage of households connected to the internet should not fall under 80% in each of them. Partially, this is already being accomplished through new motorway constructions, which include laying kilometres of fibre optical cables underneath it that are to be connected to the already existing network.

Teaching IT skills in schools need to be rethought. Children in Serbia already have obligatory informatics classes in primary and secondary education. Even though high school curriculums do cover some advanced IT areas, like programming, it gives pupils very limited applicable real-life knowledge. We should keep in mind that it is important to help and nurture the different ways of thinking about computers, insisting that they are, not just a way to automate processes and make certain mundane tasks easier, but that their application is almost limitless, and that new technologies are spilling in all areas of our existence and have the possibility of completely rearranging the way we are living. This could be achieved through larger inclusion of technology in all aspects of education, not just those that are closely linked with IT (e.g. through smart blackboards). In this regard, Swedish example of incorporating teaching of ICT skills into all classes should serve as a model to follow.

Additionally, many sites, such as Portal for Open Data, need to be filled with more data and necessary information. It is best to do this after having a good base where the information needs to be uploaded. It means nothing, if the data is there but the users cannot find it or if the file that was uploaded cannot be processed. In the end good open data will increase knowledge sharing and government transparency.

In this three year period, it is a good time to work on the planned projects that were never really started. Projects like children security on the internet, e-Wallet, automated monitoring and reporting of potential security vulnerabilities, the introduction of a handwritten signature on electronic devices, introduction of two-step verification for electronic certificate and many other projects.

3.2.4 Master plan for the fifth year

In order for e-Government to continuously improve and always be up to date with new thinking and technology, it is important to develop a specific department for research and sector (hereinafter: R&D) Current practice is usually the one of copying other already established practices, which puts Serbia in the position of always trying to catch up and lagging behind. This could be mitigated by creating a R&D sector within the Office for Information Technology and E-Government. This sector should examine and possibly develop new technologies that could be used in e-Government. In addition to that, the department should try and find the most suitable way of implementing any changes in Serbian e-Government

Contingency planning is another important aspect of e-Government development, especially for a county like Serbia, which has experienced considerable turbulences in the past. Extensive plans need to be generated which would predict a course of action in case of extensive physical damage, natural disasters, loss of electricity, other technical failure sand any sort of cyber attacks.

CONCLUSION

The e-Government has been rapidly changing and developing in Serbia. Therefore we wanted to see how far that evolution has come and to offer a possible master plan for further development modelling it partly by the top five EU e-Governments (United Kingdom, Finland, Sweden, Netherlands and Denmark). We chose those countries for the reason that Serbia is currently trying to gain EU membership. We found that there is a specific office that deals with the development of e-Government called Office for Information Technology and E-Government.

Serbian ICT infrastructure is one of the lower ranked among the EU countries when looking at different indexes such as IDI and DESI. It would often be right next to Romania and Bulgaria. However, every year there is a significant steady positive progress forward. A better but similar situation is with the state of Serbian e-Government. We looked at it through three perspectives G2C, G2G and G2B. Firstly in G2C perspective we found that there are around 750,000 of the active e-Government users in the country with the population of 7 million people. In the G2G perspective we had an interview with 21 individuals who pointed to the lack of education, flexibility of programs and their reliability being the biggest programs. From the G2B perspective businesses are the biggest users with almost 100% of companies using e-Government. This could be due to the fact that certain things now can be done only through online means.

The analysis of Serbian e-Government portal we found that it is not easily navigable has many misplaced or non functioning parts on it. After the SSL analysis we got the grade C with good marks for certificates and key exchange and the weakest parts being chipper strength and protocol support. This is unacceptable result for an e-Government portal. All of this lead us to the logical conclusion that total overhaul of the web site is needed. Replacing the old web site with the more modern and functioning one.

Next we needed to see where Serbia is in regards of top five EU e-Governments and to see what we can learn from them. After examining top five we were able to see that to get to the top you need to aware of the needs of your country and address them accordingly. It is not enough just to look at what others are doing and mimic that. When comparing the Serbian DESI with the top five and the EU average we found that the human capital is closest to EU average but all of the other categories (connectivity, use of internet, integration of digital Technology and digital public services) need fast and thorough improvement.

The five year master plan was developed with DESI in mind and it was split into three main parts with each part cascading into the next one. The first year deals with fixing already implemented parts that have mistakes and also with finishing already started projects. Years from second till fourth deal with increasing of the infrastructure and increasing of the education of IT skills in schools even outside IT class. The fifth year

deals with looking at the future developing its own R&D department and making contingency plans.

In general, we can conclude that Serbian e-Government is in its beginning stages with quite a few problems ranging from big ones like poor ICT infrastructure to the many smaller ones like mistakes on official web pages. In short it leaves a lot of room for an improvement. However, Serbian e-Government has a good foundation and is showing constant noticeable strides forward. Furthermore, if this trend continues on the long term bases it can indicate a promising future for Serbian e-Government.

REFERENCE LIST

1. Abusara, A., Bega, E., Erceg, V., Klopfer, F., Minović, A., Radunović, V., & Tasevsk, P. (2016). *Cybersecurity in the Western Balkans: Policy gaps and cooperation opportunities*. Geneva: DiploFoundation.
2. Alshehri, M., & Drew, S. (2010). E-government fundamentals. In B. Gunila (Ed.), *The Multi Conference on Computer Science and Information Systems* (pp. 35-42). Brisbane: International Association for Development of the Information Society.
3. Andersen, K. V., & Danziger, J. N. (2002). The impacts of information technology on public administration: an analysis of empirical research from the “golden age” of transformation. *International Journal of Public Administration*, 25(5), 591-627.
4. Assar, S., Boughzala, I., & Boydens, I. (2010). Back to Practice, a Decade of Research in E-Government. In *Practical Studies in E-Government: Best Practices from Around the World* (pp. 1-11). New Yourk: Springer .
5. Bannister, F., & Connolly, R. (2015). The great theory hunt: Does e-government really have a problem? *Government Information Quarterly*, 32(1), 1-11.
6. Brnabić, A. (2017, Jun 28). Program Vlade Republike Srbije. Belgrade, Serbia: National Assembly of the Republic of Serbia. Retrieved December 10, 2018, from https://media.srbija.gov.rs/medsrp/dokumenti/ekspoze-mandatarke-ane-brnabic280617_cyr.pdf
7. Capgemini, International Data Corporation, Politecnico di Milano, & Sogeti. (2017). *e-Government Benchmark 2017: Taking stock of user-centric design and delivery of digital public services in Europe*. Luxembourg: Publications Office of the European Union.
8. Capgemini, International Data Corporation, Politecnico di Milano, & Sogeti. (2018). *eGovernment Benchmark Report 2018: Securing eGovernment for all*. Luxembourg: Publications Office of the European Union.
9. Deep, M. K., & Sahoo, G. (2011). m-Governance for better G2C service. *Journal of Internet Banking and Commerce*, 16(1), 1-5.
10. ePractice European Commission. (2014). *eGovernment in European Union Countries*. Deloitte Consulting. Retrieved October 18, 2018, from

<https://joinup.ec.europa.eu/collection/national-interoperability-framework-observatory-nifo/egovernment-factsheets-and-infographics>

11. European Commission. (2018a). Digital Economy and Society index: Methodological note. Directorate-General for Communications Networks, Content and Technology. European Commission. Retrieved November 20, 2018, from http://ec.europa.eu/information_society/newsroom/image/document/2018-20/desi-2018-methodology_E886EDCA-B32A-AEFB-07F5911DE975477B_52297.pdf
12. European Commission. (2018b). Digital Economy and Society Index 2018, Countries Report. Digital Economy and Skills. European Commission. Retrieved October 27, 2018, from <https://ec.europa.eu/digital-single-market/en/countries-performance-digitisation>
13. European Parliament. (2015). e-Government: Using technology to improve public services and democratic participation. Members' Research Service. Retrieved September 10, 2018, from https://ec.europa.eu/futurium/en/system/files/ged/eprs_ida2015565890_en.pdf
14. Evans, D., & Yen, D. C. (2005). E-government: An analysis for implementation: Framework for understanding cultural and social impact. *Government Information Quarterly*, 22(3), 354-373.
15. Flak, L. S., Sein, M. K., & Sæbø, Ø. (2007, September). Towards a cumulative tradition in e-government research: Going beyond the Gs and Cs. (Å. Grönlund, J. Scholl, & M. A. Wimmer, Eds.) *Electronic Government*, 4656, 13-22.
16. Grönlund, Å. (2010, August). Ten Years of E-Government: The 'End of History' and New Beginning. *Lecture Notes in Computer Science*, 6228, 13-24.
17. Ho, A. T.-K. (2002, July). Reinventing local governments and the e- government initiative. . *Public administration review*, 62(4), 434-444.
18. Home. Retrieved November 4, 2018, from <https://www.euprava.gov.rs/>
19. How Serbia plans to transition to a digital economy. (2018, February 27). Retrieved October 25, 2018, from ITU News: <https://news.itu.int/how-serbia-plans-transition-digital-economy/>
20. International Telecommunication Union. (n.d.). The ICT Development Index (IDI): Conceptual framework and methodology. Retrieved October 15, 2018, from <https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017/methodology.aspx>

21. International Telecommunication Union. (2017). Global Cybersecurity Index (GCI) 2017. Geneva: International Telecommunication Union (ITU).
22. International Telecommunication Union. (2018). WSIS Stocktaking, Success stories 2018. Geneva: International Telecommunication Union.
23. ITU World Telecommunication. (2017, July 12). Global ICT developments, 2001-2017. Retrieved September 29, 2018, from International Telecommunication Union: <https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx>
24. Joinup European Commission. (2018). eGovernment in European Union Countries. ISA Editorial Team, Wavestone Luxembourg S.A. Retrieved October 20, 2018, from <https://joinup.ec.europa.eu/collection/national-interoperability-framework-observatory-nifo/egovernment-factsheets-and-infographics>
25. Joseph, S. R. (2015). Advantages and disadvantages of E-government implementation: literature review. *International Journal of Marketing and Technology*, 5(9), 18-34.
26. Kancelarija za Informacione Tehnologije i Elektronsku Upravu. (2017, December 4). Informator o radu kancelarije za informacione tehnologije i elektronsku upravu. Belgrade, Serbia: Vlada Republike Srbije.
27. Kancelarija za Informacione Tehnologije i Elektronsku Upravu. (2018a). Aktualnosti. Retrieved October 25, 2018, from <http://www.ite.gov.rs/aktuelnosti.php#a130>
28. Kancelarija za Informacione Tehnologije i Elektronsku Upravu. (2018b). Slučajevi korišćenja e-ZUP - Vizuelizacija. Retrieved December 27, 2018, from Portal otvorenih podataka, Republike Srbije: <https://data.gov.rs/sr/reuses/sluchajevi-korishtshenja-ezup-vizuelizatsija/>
29. Kovačević, M., Pavlović, K., & Šutić, V. (2016). Upotreba Informaciono-Komunikacionih Tehnologija u Republici Srbiji 2016:Domaćinstva/pojedinci preduzeća. Belgrade: Republički zavod za statistiku Srbije.
30. Kovačević, M., Pavlović, K., & Šutić, V. (2018). Upotreba Informaciono-komunikacionih tehnologija u Republici Srbiji, 2018: Domaćinstva/pojedinci preduzeća. Belgrade: Republički zavod za statistiku Srbije.
31. Kraemer, K. L., Danziger, J. N., & King, J. L. (1978). Local government and information technology in the United States. *OECD Informatics Studies*, 12, 186-237.

32. Krivokapić, Đ., Adamović, J., Kalezić, P., Krivokapić, D., Krivokapić, N., Malinović, S., . . . Petrovski, A. (2016). Monitoring of digital rights and freedoms in the Republic of Serbia. Share foundation. Retrieved October 3, 2018, from https://resursi.sharefoundation.info/wp-content/uploads/2018/10/share_yearly_monitoring_report_2016_eng_final.pdf
33. Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government information quarterly*, 18(2), 122-136.
34. Ministarstvo državne uprave i lokalne samouprave, Republike Srbije. (n.d.). Informacioni Sistem eZUP. Retrieved October 25, 2018, from <http://www.mduls.gov.rs/latinica/ezup.php>
35. Ministarstvo prosvete, nauke i tehnološkog razvoja. (n.d.). Formular za priznavanje strane visokoškolske isprave radi zapošljavanja. Retrieved August 23, 2018, from Ministarstvo prosvete, nauke i tehnološkog razvoja: <http://enicnaric.mpn.gov.rs/enicnaric/prijava/>
36. Ministarstvo prosvete, nauke i tehnološkog razvoja. (2017). Home page. Retrieved October 31, 2018, from <http://www.mpn.gov.rs/?lng=lat>
37. Mišić, Z. (2018, October 25). Digitalizacija- Sadašnjost i budućnost eUprave. Sinergija18. Belgrade: The Office For Information Technology And E-Government, Republic of Serbia.
38. Moji sadržaji. Retrieved November 4, 2018, from https://www.euprava.gov.rs/moja_euprava/mojisadrzaji/
39. Moriuchi, Y. (2001). Private Sector Recommendations to government on realization of egovernment. In *E-Government* (pp. 41-49). Global Business Dialogue on Electronic Commerce.
40. Muller, E., & Field, T. (2003). *The e-government imperative*. Paris: OECD Digital Government Studies.
41. Nacionalni CERT Republike Srbije. (2018). O Nacionalnom CERT-u. Retrieved October 17, 2018, from <https://www.cert.rs/rs/stranica/57-O+Nacionalnom+CERT-u.html>
42. NALED. (2016). A Framework for e-Government for the Republic of Serbia. NALED. Retrieved August 15, 2018, from http://naled.rs/en/images/preuzmite/Framework_for_E-Government_Serbia.pdf
43. NALED. (2018). Ka administraciji bez suvisnih papira. NALED. Retrieved October 29, 2018, from <http://www.pitajtekada.rs/vazna-dokumenta.php>

44. National Institute for Smart Government. (2012). e-Governance Project Lifecycle. Hyderabad: National Institute for Smart Government.
45. Ndou, V. D. (2004). E-Government for developing countries: opportunities and challenges. *The electronic journal of information systems in developing countries*, 18(1), 1-24.
46. Nye, J. S., & Keohane, R. O. (1974). Transgovernmental Relations and International Organisations. *World Politics*, 27(1), 39-62.
47. Palvia, S. C., & Sharma, S. S. (2007). E-Government and E-Governance: Definitions/Domain Framework and Status around the World. 5th International Conference on E-governance, 1-12.
48. Panzardi, R. (2003). Online Information Disclosure. LAC/PREM. The World Bank Group. Retrieved September 10, 2018, from <http://siteresources.worldbank.org/INTEGOVERNMENT/Resources/702478-1129947625190/panzardipresentation.doc>.
49. Portal Otvorenih Podataka, Republike Srbije. (2018). Otvoreni Podaci. Retrieved October 26, 2018, from <https://data.gov.rs/sr/discover/>
50. Qualys SSL labs. (n.d.). SSL Server Test. Retrieved October 30, 2018, from <https://www.ssllabs.com/ssltest/index.html>
51. RATEL. (2018). Pregled tržišta telekomunikacija i poštanskih usluga u republici Srbiji u 2017 godini. Belgrade: Republic Agency for Electronic Communications and Postal Services.
52. Riley, B. T. (2001). *Electronic Governance and Electronic Democracy: Living and Working In The Connected World (Vol. 2)*. Brisbane, Australia: Commonwealth Centre For Electronic Governance.
53. Ronaghan, S. A. (2002). Benchmarking e-government: a global perspective. Assessing the progress of the UN member states. United Nations Division for Public Economics and Public Administration & American Society for Public Administration. Retrieved September 20, 2018, from <https://publicadministration.un.org/egovkb/portals/egovkb/documents/un/english.pdf>
54. Sahoo, R., & Sahoo, G. (2016). *Infomatics Practices (Vol. 11)*. New Delhi: New Saraswati House.

55. Scholl, H. J. (2015). e-Government or e-Governance paradigm. In *E-Government: Information, Technology, and Transformation: Information, Technology, and Transformation* (pp. 52-71). New York: Routledge.
56. Schwab, K., Browne, C., Crott, R., Corrigan, G., Di Battista, A., Hanouz, M. D., . . . Gutknecht, T. (2015). *The Global Competitiveness Report 2015-2016*. Geneva: World Economic Forum.
57. Singh, A. K., & Sharma, V. (2009). e-Governance and e-Government: a study of some initiatives. *International journal of eBusiness and eGovernment studies*, 1(1), 1-14.
58. Srivastava, S. C., & Thompson, T. S. (2007). What facilitates e-government development? A cross-country analysis. *Electronic Government, An International Journal*, 23(4), 365-378.
59. Stamenković, B., Živanović, S., Paunovi, B., & Stevanović, I. (2017). *Vodič za sudije i tužioce na temu visokotehnološkog kriminala i zaštite maloletnih lica u Republici Srbiji*. Belgrade: Save the Children in North West Balkans.
60. Telecommunication Development Bureau of ITU. (2017). *Measuring the information society report 2017- Volume 1*. Geneva: International Telecommunication Union- ITU.
61. UN Department of Economic and Social Affairs. (2016). *E-Government Survey 2016: E-Government in Support of Sustainable Development*. New York: United Nations.
62. UN Department of Economic and Social Affairs. (2018). *E-Government survey 2018*. New York: United Nations.
63. UNESCO, National Informatics Centre. (2005). *E-government toolkit for developing countries*. New Delhi, India: UNESCO New Delhi.
64. United Nations. (n.d.). *Frequently Asked Questions*. Retrieved October 18, 2018, from UN E-Government Knowledge DataBase: <https://publicadministration.un.org/egovkb/en-us/About/UNeGovDD-Framework>
65. Vlada Republike Srbije. (2015). *Strategija razvoja elektronske uprave u republici srbiji za period od 2015-2018 godine i akcioni plan za sprovođenje strategije za period od 2015-2016 godine*. Official Gazette of the Republic of Serbia, 107.

APPENDIXES

Appendix 1: Povzetek (Summary in Slovene language)

Cilj magistrskega dela z naslovom Analiza implementacije elektronske uprave v Srbiji je ocena trenutnega stanja e-uprave v Srbiji in njenega načrtovanega razvoja. Na ta način lahko analiziramo vrzel med njima, da bi dobili podrobnejši vpogled v delo e-uprave in na podlagi tega smo razvili petletni akcijski načrt. S tem načrtom bomo predvideli možne izzive in smer, v kateri je treba napredovati za razvoj e-uprave.

Za raziskavo je bilo uporabljeno sistematično zbiranje podatkov, ki sta bila razdeljena na dva dela. Najprej gre za zbiranje podatkov, potrebnih za analizo trenutnega stanja in primerjavo srbske e-uprave in prvih petih e-vlad EU. Teh pet držav so Velika Britanija, Finska, Švedska, Nizozemska in Danska.

Drugi del je bil sestavljen iz intervjujev, dopolnjenin z vprašalnikom, ki so potekali z osebami, zaposlenimi v javnem sektorju- državni uslužbenci, ki uporabljajo e-upravo na svojih delovnih mestih.

V prvem poglavju magistrskega dela se bomo seznanili s splošnimi raziskavami o e-upravi, med drugim so njegova zgodovina, definicije, vrste, da bomo bolje razumeli, dobre in slabe strane ali morebitne probleme.

V drugem poglavju, naslovljenem „*Splošne informacije o Srbiji*“, bomo raziskali splošni pregled Srbije, kako deluje njena vlada in nas seznanili s Uradom za informacijsko tehnologijo in e-upravo.

V tretjem poglavju z naslovom „*Stanje infrastrukture IKT v Srbiji*“ se bomo potopili v srbsko infrastrukturo IKT, ki nam bo pomagala ugotoviti, kaj je Srbija že vzpostavila. To je izrednega pomena, saj je močno razvita IKT osnova vsake dobre e-uprave. Tukaj bomo pregledali tudi stanje srbske kibernetске varnosti. Za obe analizi bomo uporabili ustrezne indekse.

V četrtem poglavju z naslovom „*Analiza e-uprave v Srbiji*“ bomo analizirali e-vlado iz treh različnih perspektiv. Tri perspektive so med vladami, državljani in vladami in podjetji. Podatki, uporabljeni za perspektivo med vlado, so podatki, ki so bili zbrani z intervjuji z različnimi državnimi uslužbenci, za druga dva pa smo uporabili različne vladne statistike.

V petem poglavju z naslovom „*Analiza vrzeli med petimi največjimi evropskimi e-vladami in Srbijo*“ bo prikazano, zakaj so top five EU evropskih e-vlad – top five. Poleg tega bomo primerjali pet različnih dejavnikov vsake države s Srbijo (kot so varnost portala in indeksi). To nam bo omogočilo, da natančno določimo, na kaj se mora Srbija osredotočiti, da bo dosegla svoj cilj.

V šestem poglavju z naslovom „*Petletni načrt za izboljšanje e-uprave v Srbiji*“ bomo predstavili izkušnje petih evropskih e-vlad in predstavili glavni načrt, ki bi ga morala slediti Srbija za izboljšanje e-uprave da bo dosegla vsaj povprečje EU.

Načrt je razdeljen na tri dele: prvo leto, srednja leta in peto leto. V prvem letu se mora Srbija osredotočiti na zaključne stvari, ki so se že začele. Naslednje, leto od drugega do četrtega, se nanaša na povečanje infrastrukture IKT. Peto leto se ukvarja z gledanjem v prihodnost z oddelkom za raziskave in razvoj ter načrti ukrepov ob nepredvidljivih dogodkih.

V zaključku smo ugotovili, da je srbska e-uprava v začetni fazi z kar nekaj težavami, od slabe infrastrukture IKT do številnih manjših napak na uradnih spletnih straneh. Vendar ima srbska e-vlada dobre temelje in kaže stalne vidne korake naprej. Če se bo ta trend nadaljeval tudi na dolgi rok, bo to lahko pomenilo obetavno prihodnost srbske e-uprave.

Appendix 2: Master Thesis questionnaire given to the government employees

The questionnaire below is provided both in Serbian and English language.

Hvala što ste prihvatili da popunite ovaj upitnik koji se bavi boljim razumevanjem implementacije e-Uprave u Srbiji. Upitnik je anoniman. Prvo su napisana pitanja i ponuđeni odgovori na srpskom jeziku, a zatim je sve ponovljeno na engleskom. Odgovore dajete zaokruživanjem jedne od ponuđenih mogućnosti. Kod pitanja gde je potreban opširniji odgovor slobodno pišite na jeziku koji Vam više odgovara (tj. srpskom ili engleskom).

Thank you for accepting to fill in this questionnaire which is trying to provide better understanding of implementation of e-Government in Serbia. It is completely anonymous. Questions are firstly written in Serbian and then in English language. Answers are given by circling one of the offered answers. Questions which require you to write you can answer in whichever language it is suitable for you (namely Serbian or English)

Profesija (Profession): _____

Radni staž na sadašnjoj poziciji (*Lenght of experience at that position*): _____

1. Koji je vaš nivo znanja korišćenja kompjutera? *What is your of ability to use computers?*

- 1.1. Ne umem (I can't use them)
- 1.2. Osnovna (Basic)
- 1.3. Napredna (Advanced)
- 1.4. Ne želim da odgovorim (Don't want to answer)
- 1.5. Drugo (Other):

2. **Da li znate sta je e-Uprava?** *Do you know what e-government is?*

- 2.1. Da (Yes)
- 2.2. Nešto (Something)
- 2.3. Ne (No)
- 2.4. Ne želim da odgovorim (Don't want to answer)
- 2.5. Drugo (Other):

3. **Šta očekujete od e-Uprave?** *What do you expect from e-government?*

4. **Šta je vaše mišljenje kako će e-Uprava da utice na Vaš posao?** *How do you think e-Government will influence your job?*

- 4.1. Pozitivno (Positive influence)
- 4.2. Neutralno (Neutral influence)
- 4.3. Negativno (Negative influence)
- 4.4. Ne znam (Don't know)
- 4.5. Ne želim da odgovorim (Don't want to answer)
- 4.6. Drugo (Other):

5. **Da li mislite da će e-Uprava da ugrozi Vaš posao?** *Are concerned that e-Government will threaten your job?*

- 5.1. Da (Yes)
- 5.2. Ne (No)
- 5.3. Ne želim da odgovorim (Don't want to answer)
- 5.4. Drugo (Other):

6. **Da li vam je u zadnjih par godina uveden neki deo e-Uprave na Vašem random mestu?** *Did you have in the last few years implementation of any part of e-Government at your work place?*

- 6.1. Da (Yes)
- 6.2. Ne (No)
- 6.3. Ne znam (Don't know)
- 6.4. Ne želim da odgovorim (Don't want to answer)

6.5. Drugo (Other):

7. **Ako Vam je odgovor potvrđan: Koji je to deo, čemu služi? (npr. Zakazivanje sastanka vaših stranaka, nalaženje dokumenata...)?** *If your answer is affirmative then what was implemented and what is the use of it (ex. scheduling appointments, finding files...)?*

8. **Koliko često poslovno koristite e-Upravu?** *How often do you use e-Government?*

- 8.1. Svakodnevno (Daily)
- 8.2. Nedeljno (Weekly)
- 8.3. Mesečno (Monthly)
- 8.4. Godišnje (Yearly)
- 8.5. Ne znam (Don't know)
- 8.6. Ne želim da odgovorim (Don't want to answer)
- 8.7. Drugo (Other):

9. **Da li ste dobili obuku za deo e-Uprave koji ćete Vi da koristite?** *Did you get training for the part of e-Government you are going to use?*

- 9.1. Da (Yes)
- 9.2. Malo (Some)
- 9.3. Ne (No)
- 9.4. Ne znam (Don't know)
- 9.5. Ne želim da odgovorim (Don't want to answer)
- 9.6. Drugo (Other):

10. **Da li ste dobili neku informaciju zašto Vam je e-Uprava implementirana?** *Did you get information on why you are getting e-Government?*

- 10.1. Da (Yes)
- 10.2. Neku (Some)
- 10.3. Ne (No)
- 10.4. Ne znam (Don't know)
- 10.5. Ne želim da odgovorim (Don't want to answer)
- 10.6. Drugo (Other):

11. Ako jeste: Koja je bila ta informacija. *If yes then what was the information?*

12. Kako se desila tranzicija na e-Upravu? *Was the transition to e-Government sudden or gradual?*

- 12.1. *Odjednom (Sudden)*
- 12.2. *Postepeno (Gradual)*
- 12.3. *Ne znam (Don't know)*
- 12.4. *Ne želim da odgovorim (Don't want to answer)*
- 12.5. *Drugo (Other):*

13. Da li vam e-Uprava pojednostavljuje posao? *Dose it simplifies your work in regards to cutting trough bureaucracy?*

- 13.1. *Da (Yes)*
- 13.2. *Ponekad (Some)*
- 13.3. *Ne (No)*
- 13.4. *Ne znam (Don't know)*
- 13.5. *Ne želim da odgovorim (Don't want to answer)*
- 13.6. *Drugo (Other):*

14. Ako koristite kompjutere na poslu da li su novi ili stari? *If you are using computers at your job are they new or old?*

- 14.1. *Novi (New)*
- 14.2. *Mešavina (Mix)*
- 14.3. *Stari (Old)*
- 14.4. *Ne znam (Don't know)*
- 14.5. *Ne želim da odgovorim (Don't want to answer)*
- 14.6. *Drugo (Other):*

15. Da li znate da li postoji odbojnost prema e-Uprai? *Is there to your knowledge hostility towards e-Government?*

- 15.1. *Da (Yes)*
- 15.2. *Pomalo (Some)*
- 15.3. *Ne (No)*
- 15.4. *Ne znam (Don't know)*

- 15.5. Ne želim da odgovorim (Don't want to answer)
15.6. Drugo (Other):

16. Ako Vam je odgovor pozitivan: Šta je uzrok te odbojnosti? *If affirmative then what kind of hostility is it?*

17. Da li vam je e-Uprava kreirala neke probleme? *Did e-government create any problems?*

- 17.1. Da (Yes)
17.2. Ne (No)
17.3. Ne znam (Don't know)
17.4. Ne želim da odgovorim (Don't want to answer)
17.5. Drugo (Other):

18. Ako jeste: Koje? *If affirmative then which?*

19. Da li je system e-Uprave uvek funkcionalan (da li "pada sistem")? *Does the e-Government work properly?*

- 19.1. Da (Yes)
19.2. Ponekad (Sometimes)
19.3. Ne (No)
19.4. Ne znam (Don't know)
19.5. Ne želim da odgovorim (Don't want to answer)
19.6. Drugo (Other):

20. Kada naučite kako funkcionišu, da li možete da se snadete u programima e-Uprave? *Are the programs you are using easily navigable once you learn how to use them?*

- 20.1. Da (Yes)
20.2. Ne (No)

- 20.3. Ne znam (Don't know)
- 20.4. Ne želim da odgovorim (Don't want to answer)
- 20.5. Drugo (Other):

21. Da li možete da pomognete Vašim “klijentima” da koriste e-Upravu povezanu sa Vašim poslom (npr. zakazivanje pregleda kod lekara preko aplikacije)? *Do you know how to help your “clients” on how to use e-services related to your work? (Example: if you are doctor do you know how to make an appointment through an app)?*

- 21.1. Da (Yes)
- 21.2. Ne (No)
- 21.3. Na poslu ne radim sa ljudima (My work doesn't involve working with people)
- 21.4. Ne znam (Don't know)
- 21.5. Ne želim da odgovorim (Don't want to answer)
- 21.6. Drugo (Other):

22. Da li vidite neke pozitivne ili negativne promene, koje nisu obuhvaćene pitanjima postavljenim gore, prouzrokovane implementacijom e-Uprave? *Do you see any positive or negative changes/implications of e-government that weren't explored in this questionnaire?*

23. Vaše dodatne misli (opciono) *Your additional thoughts (optional):*
