



Integrated cross-border public services in EU: A case study

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A Roadmap for thesis submitted for the degree of

Master of Science (MSc) in e-Business and Digital Marketing

JANUARY 2021

THESSALONIKI – GREECE

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Abstract

This dissertation will be written as a part of the MSc in e-Business and Digital Marketing at the International Hellenic University.

By this Master Thesis we will try to prepare an analysis for identifying better services for cross-border evidence exchange. We will conduct research to define the basic attributes for every procedure and country that used for exchange of information. The main aim of the dissertation is to identify the data that needed for cross-border evidence exchange. The use case that we are going to work on is: Civil Status Certificates, especially in Birth Certificate. Moreover, we are going to conduct a basic analysis about and the challenges of digital public services during COVID-19 situation. Cross-border Public services in EU have changed the last years under the EU e-Government Action Plan 2016-2020. The Action Plan defined by EU to transform the public services to digital one. However, every Member State faces different challenges to build on Digital Public Services across EU. This Digital Transformation has become a major topic for research in order to achieve a more efficient type of services. A literature review will be conducted on the topic of integrated cross-border public services which include the criteria around a service as procedural requirements. Moreover, will be conducted key approaches for the Interoperability of Public Services for the specific use case of Civil Status Certificates.

This Master Thesis based on the proposed roadmap will be accomplished under the supervision and kind guidance of Dr. Ioannis Magnisalis, assistant Professor at the International Hellenic University, School of Science and Technology and other people in the university who is helping me as well, like PhD student Syed Iftikhar Hussain Shah.

Marios Ntinopoulos

13/07/2020

1.Introduction

In the introduction part, we will cover summarize contents of the key topics of our proposed research work e.g., integrated public services, interoperability of them in European Union. This section will also contain the major gaps in integrated cross-border Public Services in existing Markets of every Member State. Furthermore, digitalization and service delivery are a key part that we will cover. In the very first part of literature review, we will cover all the definitions that are necessary for a dissertation analysis of cross-border interoperability public services. After this part we will identify the meaning and the role of public services nowadays and its digital perspective as well. At this point, it is important to underline some basic pieces of evidence for Public administrations and Public Services at the European level. Public administrations are trying to extent their services with new technologies and digitalization. EU Digital Economy and Society Index, eGOV benchmark reports and an EU innovation Scoreboard are some examples of existing efforts for digitalization (European Commission, 2018). The emergency to the digital transformation of governments is a key factor to the success of the Single Market, helping to remove existing digital barriers, reduce administrative burdens, and improve the quality of interactions with the government. To pursue these objectives, the e-Gov Action Plan identifies three key areas (i. Modernizing public administrations using key digital enablers, ii. Enabling mobility of citizens and businesses by cross-border interoperability, iii. Facilitating digital interaction between administrations and users for high-quality public services). The Action Plan also operationalizes these priorities through concrete actions. It includes 20 actions at its launch, but new actions – proposed by citizens, businesses, and public administration – are added throughout its lifetime. Specifically, modernizing public administrations using key digital enablers is comprised of six concrete actions:

- Support the transition of EU countries towards full digitalization and use of contract registers.
- Accelerate the take-up of e-services, including eID and eSignature.
- Ensure the long-term stability of cross-border digital services infrastructure.
- Presentation of a revised version of the European Interoperability Framework and support its take-up by national administrations.

- Configure the creation of a prototype for a European Catalogue of ICT standards for public acquisition.
- The Commission will use the common building blocks such as CEF DSIs and follow the EIF. It will introduce the 'digital by default' and 'once-only' principles, e-Invoicing and eProcurement and assess the implication of a possible implementation of the 'no legacy' principle.

Furthermore, the second key area is the cross-border interoperability that includes 11 actions:

- Establish the European e-Justice Portal a one-stop-shop for information on European justice issues
- Submit approaches for a Single Digital Gateway
- Submit the electronic interconnection of insolvency registers
- Present an initiative to facilitate the use of digital solutions throughout businesses lifecycle
- Set up in cooperation with the all EU countries, the obligatory interconnection of all Member States' business registers
- Present a legislative proposal to help the Single Electronic Mechanism for registration and payment of VAT
- Launch a beta version of the Once Only Principle for business
- Establish a single window for reporting purposes in maritime transport and digitalize transport e-documents
- Complete the installation of the Electronic Exchange of Social Security Information
- Further develop the European Job Mobility portal
- Support Member States in the development of cross-border electronic health services

The third key area is about facilitating digital interaction between administrations and citizens or businesses for high-quality public services.

- Assess the possibility of applying the once-only principle for users in a interoperability content

- Accelerate the deployment and take-up of the INSPIRE Directive data infrastructure
- Transform its websites to support increasing engagement and participation of citizens and businesses in EU programs and policymaking.

The second part of our literature review is about the positives and the challenges of public services interoperability. It contains definitions, problems and key methods that European Union carries out or has scheduled to do. Except these, it includes also tables, diagrams, graphs and pies from European Union statistics that we will help us to improve our level of work. Moreover, this section involves our motivation to perform research work on a crucial topic of the Digital Single Market. Nowadays, it is important to create a secure digital interactive user interface environment. Develop strategies for implementing e-Government at all levels of local government. Understanding security and privacy protection protocol. The perspective of one-stop-shop for information and public documents of European public services is also a challenge. Furthermore, reducing the overall financial cost and save more time for the enterprises to invest in new ideas, new services, and products to offer. Visualization of the whole data allowing end-users checking the quality of coverage at a given place and will enable the data to be published on national and European open data portals. The European countries should continue to implement projects like these because they help all the countries to move on through the digital transformation era. Furthermore, young people are finding more easily jobs, when projects like these are implemented and take place in many countries at the same time. My recommendations are to be made many more projects so that every country to be able to deliver everything to its citizens in an easy, fast, and economic way. Everyone should have access to public documentations, to be able to express their opinion and to solve things, especially in the COVID-19 period. EU projects are very important for Europe and its citizens. Also, every country should need one at a time to get involved in these projects, to make the digital transformation more efficient. Apart from the recommendation that these kinds of projects need to be continued and the EU needs to have the leadership in digitalization and modernization, we would suggest the creation of one single source of information about all these initiatives. This way all projects with their deliverables and their key aspects will be under the same umbrella and all in one place reported. This will enable the interested parties to be fully informed and

up to date. Interoperability and cooperation through the countries will be increased. Furthermore, if all initiatives are more clearly published and all gathered at one website, maybe more partners will be involved. In some cases, for smaller countries, the lack of information may cause low involvement in the projects. At the next point of this section, we will underline the importance of ERP systems among EU countries and we will clarify if there is any connection between the systems of all EU members.

In the section on research methodology, we will focus on the way that we are going to make our contribution and the solutions to key problems as well. The purpose of this study is separated into two different research questions that I identified with the contribution of professor Ioannis Magnisalis and his PhD student Syed Iftikhar Hussain Shah. Our first research question was created from the current unprecedented situation of the COVID-19 pandemic. At this point, we will try to identify which are the main challenges during the pandemic situation that do not allow EU countries to have a main digital data set for every evidence exchange. This study will try to support the European Commission and the EU Member States in giving ideas and setting up theoretical solutions by providing recommendations on its semantic interoperability. It first identifies a list of problematic situations by national competent authorities for applying a series of administrative procedures at the pandemic period. In a second step, it scopes on the exploitation of existing untapped projects and cross-border procedures, as well as a list of reflections and approaches for future research and analysis. Based on this, the study provides also some recommendations for common semantic models, and displays theoretical solutions on possible extensions of the COVID-19 situation. The case study is full of elastic, advancing and adaptive architecture for EU Public Services, as well as for its combination with existing sectoral ambitions and interoperability systems. On our second research question, we will try to find how possible is to define a digital form with context for EU purposes and especially for birth evidence request. A birth certificate is a piece of evidence that European citizens requested to have in some main occasions of public services. As we meet in the paper ‘‘Advancing the Government Enterprise Architecture’’ there are some main steps that should be fulfilled to apply and get the certificate that we want. (Peristeras, 2004). First of all, when a citizen applies for a birth certificate it means that he wants to take an output of a Public Service. Usually, this output is necessary for businesses or Universities. But there also some special situations like a Driver’s License. On some occasions, a birth certificate is required for the marriage li-

cense process. Among European Union, birth certificate is required for passport purposes, as evidence of a citizen's name, date, and place of birth. Furthermore, establishing a date of birth and age are used from universities for registration forms. Moreover, qualifying for pension, social security or health insurance, obtaining work permits, voting, entering military service, proving the age of majority/minority in court and voting are also some uses of birth certificate. Finally, doing business abroad is another one usual case of birth evidence. It further includes a mix of data and tables related to the types of evidence relevant for cross- border exchange and produces a semantic mapping and gap analysis of the birth certificate request procedure. To make our process of searching more accurate and valuable, we will create a survey with some beta digital birth certificate forms and questionnaires. For our beta versions and questionnaires, we aim to 100 people of the data sample. Before we run the whole survey, we will run a pre-survey test to the 10% of the whole number of testers in order to get feedback about our questions and the structure of our forms.

After the section of analysis, it will follow the part of results and the conclusions. At this part we aim to have clear view of our research challenges in order to achieve a real contribution to the use case that we selected. Cross-border public services are a key part of European Union interaction and that was the reason that I selected to study my dissertation on this subject. We aim our theoretical and practical results will be helpful for every responsible project of the EU.

2.Literature review

2.1 Public Services

2.1.1 Definitions

This section includes definitions, types, sources, and main actors of Public Services.

Administrative integrated model: The different government levels interact strongly and local government exercises both their responsibilities and tasks delegated by the central government (Kuhlmann, 2014).

Procedure: is the number of actions that every E.U. citizen have to do to satisfy the requirements or to obtain from a component authority a decision in order to be able to exert their rights (European Commission, 2018).

E-Government: is the use of Information Communication Technology (ICT) for the purpose of providing electronically public services and information to citizens and businesses. Furthermore, eGovernment puts into practice intensive use of information, more advanced provision of services, a creative and extensive redesign of existing administrative processes, and innovative forms in assisting governance. (Nielsen, M. M. (2014), Traunmüller, R. (2003).

Evidence: Any type of document required by a competent authority to prove facts with procedural requirements (COMMISSION, 2018).

Evidence Exchange System: Any system that is based on IT and exchange attributes of public services across EU Members (European Commission, 2019).

Birth Certificate: Official document proving the Birth of a Person (European Commission, 2019).

Transparency: refers to which EU countries are transparent about the procedure of delivering services (European Commission, 2019).

Cross-border mobility: which citizens of EU can use the online services (European Commission, 2020).

Civil registration: is the system for registering all vital events such as births, deaths, marriages, divorces, and other events that a person encounters during his/her life (OAS, 2009).

Data model: Includes coalescent specifications regarding attribute-level constraints, cross-table relationships, and cardinality ([Institute, 1975](#)).

Local Government: It “consists of government units having a local sphere of competence (with the possible exception of social security units). Local governments typically provide a wide range of services to local residents, some of which may be financed out of grants from higher levels of government. Statistics for local government cover a wide variety of governmental units, such as counties, municipalities, cities, towns, townships, boroughs, school districts, and water or sanitation districts. Often local government units with different functional responsibilities have authority over the same geographic areas. For example, separate government units representing a town, a county, and a school district have authority over the same area. Besides, two or more contiguous local governments may organize a government unit with regional authority that is accountable to local governments. Such units are classified to the local government subsector” ([Eurostat, E. C. \(2013\)](#)).

Multi-level governance: The set of institutional arrangements which regulate the mutually dependent relationships (vertical, horizontal, or networked) between public actors situated at different levels of government” ([European Commission, 2011](#)).

Public Services: are the activities of public legal entities that aims to provide goods or services to the government to meet certain of their basic needs as defined by the legal order. However, public services defined as a term that is translated differently by EU member states. It refers sometimes to the fact that a service is provided to the public or that a service has been assigned a specific role in the public interest. It can also refer to the ownership or status of the entity providing the service ([Regular University Interviews for the Administration in Europe,2010](#)).

Life Events: Birth, Residence, Studying, Working, Moving, Retiring, Starting-Running-Closing a Business

Standards of European Commission: a) Proposes new laws b) Manages EU policies & allocates EU funding b) Enforces EU law c) Represents the EU internationally ([European Commission,2015](#))

Services of general interest: are services that public authorities of the EU member countries classify as being of general interest and, therefore, subject to specific public service obligations. They can be provided either by the country or by the private administration.

Examples of services of general interest include public transport, postal services, and healthcare (Colomb, C., & Santinha, G., 2014).

Isa2 Program: supports the creation of a digital solution that enables the public sector and users in Europe to benefit from cross-border interoperability of cross-border public services.

Core public administration: “Narrow definition of the public administration from the NACE statistics. Core administration includes enactment and judicial interpretation of laws and regulations, administration of government programs, legislative activities, taxation, defense, public order and safety, immigration services, foreign affairs, and compulsory social security. Activities such as teaching at schools or universities or health services activities are excluded, administration of these services is included” (Pitlik, H., Hölzl, W., Brandtner, C., & Steurs, G., 2012).

CPSV-AP: a commonly-agreed reference data model for creating harmonized, machine-readable, and semantically interoperable descriptions of business and life (Gerontas, 2018)

E-government: is the application of ICTs to functions and steps with the goal of increasing results, transparency and citizen participation (Palvia, S. C. J., & Sharma, S. S. (2007, December).

Goals & Benefits: The main goal of e-Government is to increase the quality of public services and improve processes and procedures in governmental tasks.

Public document: Documents issued by a public authority such as: documents emanating from a court or a court official, administrative documents, notarial acts, official certificates placed on private documents, diplomatic and consular documents.

A multilingual standard form is a translation aid designed to help the receiving authority to understand a public document that is in a language not accepted by the receiving EU country (Noble, W. B., Al-Bakr, F. T., & Moore, S. L. 2004).

Public administration: Producer of collective goods and services, ranging from the basic protective governmental functions like running a court system or providing police services, to the management of public infrastructures and the supply of educational institutions. A commonly accepted definition of 'public administration' does, however, not exist. In statistical terms, the public administration corresponds to the staff of the general government.”ⁱ Chandler, R. C., & Plano, J. C. (1988).

Public Sector: As in the case of public administration, no uniform definition of the public sector exists. In this report, public sector employment has been defined in three mainly publicly funded sectors public administration, health, and education (Lane, J. E., 2000).

User: User is anyone who is a citizen of the Union, a natural person residing in a Member State or, a legal person having its registered office in a Member State, and who accesses the information, the progress, the assistance or problem-solving services. (Ko, Andrew J.,2010).

Vocabulary: A summary of terms for a particular purpose. Vocabularies can range from simple, such as the widely used schemas or element sets, to complex vocabularies with a mix of terms, such as those used in healthcare to describe symptoms, diseases, and treatments. Vocabularies play a semantic role in linked data, specifically to help with data integration. For example, metadata vocabulary. The use of this term covered with that of ‘ontology’ (Nagy, W., & Scott, J., 2000).

COVID-19: is a virus that was confirmed by World Health Organization as a pandemic in 2020.COVID-19 spreads very fast and the cases of deaths after the first 11 months are 1.400.000 deaths¹ (World Health Organisation WHO) Coronavirus disease (COVID-19),11/2020). Moreover, the most famous aftereffect is the lockdown situation that is created many problems for the public and private sector (Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., & Agha, R., 2020).

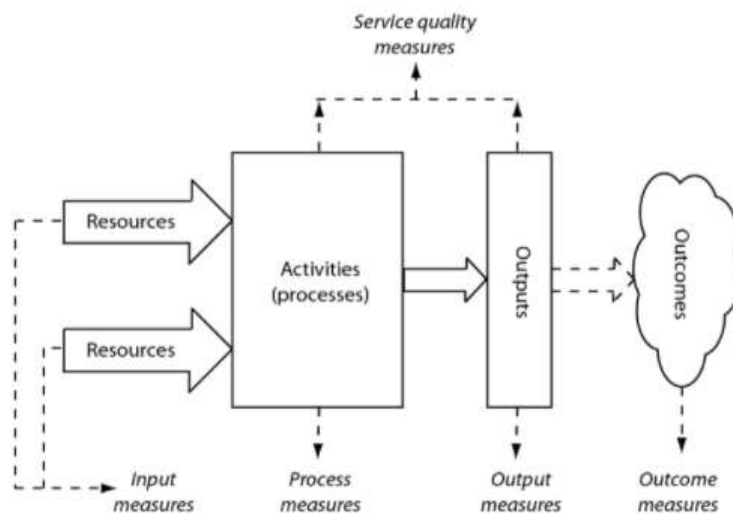
2.1.2 Public Services in EU level

According to the [European Parliament](#), “public service is an economic activity of general interest defined, created and controlled by the public authorities and subject, to varying degrees, to a special legal regime, irrespective of whether it is carried out by a public or private body”. Public services differentiate from other forms of state activities. It is designed to make sure that an activity will be continued since it is vital for the public good. However, it is significant to say that that a public service usually provides services without a direct cost. Generally, social, cultural, and other

¹ <https://experience.arcgis.com/experience/685d0ace521648f8a5beeeee1b9125cd>

kinds of goods delivered for free. This is the main difference between the private sector. Usually when a public service provides a service task then there are some exclusive obligations and rights in order to access the public service.

Principles: First of all, quality is one important part to provide a European service. Secondly, continuity must be provided on a regular basis. Adaption is also crucial because of the rapid technological changes (Pidd, M., 2012). However, the basic point of public services is to transfer successfully from the public resources to citizens and businesses the necessary outcome. The following graph is from the book of (Pidd et al., 2012) and shows exactly the correct structure and process of public service performance:



Structure & Process of public service performance

Variability of the content: Two main theories describe the content of public services. As the [European Parliament](#) underlines:

- undiluted liberalism in which the general interest, and consequently public service, is reduced to almost nothing; individual interests and private initiatives tend to fill the economic sphere:
- unmixed collectivism where virtually every individual's need is seen as being of general interest and thus likely to justify the creation of public service.

The content of public service would be different in the economic scale of society because in different levels of economic resources the goals are changed. The technical level also leads the creation of new public services e.g., Telephone and tele-

communications services. Last but not least the principles of the public service differentiate to the various sectors concerned. Responsibility of public services has also huge power to different public authorities like central government for national public services or federated States or local authorities.

How public services are managed: Public services are created by public authorities in order to manage the service. Sometimes also public authorities delegate the management to a public or private operator. In some cases, the public authority will define the mission of public services of the operator. When the operator is a public undertaking the delegation of public services can be done by unilateral decisions. If there is an agreement between authorities and operators then: a) the operator has a duty to set up the service b) the operator has to manage the service, the plant and the equipment being provided by the public authority. Secondly, in some occasions the operator is just a manager who rewarded by public authorities. Finally, some arrangements involve legislation between public sector and public service setting out detailed obligations.

Differentiation of public services: When we need to differentiate the public services and public procurement the situations are two:

1) As [European Commission \(2020\)](#) underlines “in public procurement the public authority buys goods (vehicles, office equipment, etc.) or services (studies, leasing of equipment, etc.) primarily to meet its own operational requirements”. The most vital issue is the best use of public money and consequently there are precise procedures for the award of contracts and public calls for tenders to ensure that the authority selects the firm which makes the lowest bid. In order to achieve successfully this important issue there are many and strict rules from the contextually government.

2) Moreover, [European Commission \(2020\)](#) identifies that in the delegation of a public service, the authority does not normally buy anything but delegates to the co-contractor responsibility for providing a service to the public sometimes for a long period. Usually that means that the authority has complete freedom of choice of its co-contractor. Nowadays, however, to enforce some prior publicity requirements to ensure a degree of competition between interested firms.

The future of Public Services in European Union: This section is about the contribution of Public Services in EU level and the cooperation of them in the future. The

EU Commission is trying to digitalize the public services with innovative ways between public administration-businesses-citizens. The most famous attempt at this level is the e-government procedure for better public services. However, there are many challenges that every EU member faces in cross-border public services. All EU governments faces problems like managing health care costs, pensions crisis, high demands in educations, changing family structures and declining union membership. On 2020 occurred also the pandemic COVID-19 situation. The ramifications of the lockdowns around the EU countries has increased the necessity for drastic results at the digital perspective. It is a fact that European Union have putted a lot of effort to build high-quality public services the last years. For instance, the Commission's Digital Single Market for Europe adopted in 2015 and the main goal was to create online technologies and cross-border interoperability in order to modernize the public services. Finally, increasing cost-efficiencies and quality of services is also a part of Digital Single Market.

2.2 Public Services Interoperability

2.2.1 Definitions

In this section we will define the ability of Public Services to work together across Europe and we will set the basic terminology for our subject. Public Services Interoperability is about the utility of digital channels and the public availability of a service catalogue (Gottschalk, P. ,2009). European Public services usually requires a mix of different public administrations and operations in order to cover user's needs. Legal instruments, organization business processes, information exchange, services and components that support European public services is a continuous task, as interoperability is regularly disrupted by changes to the environment. Integrated public services includes organizational structures, roles, responsibilities and the decision-making process for the stakeholders involved, the enforcement of requirements for: aspects of interoperability including quality, scalability and availability of reusable building blocks including information sources and other interconnected services, external services, translated into clear service level agreements ,a change management plan, to define the processes and proce-

dures needed to deal with and control changes, a business rebound plan to ensure that digital public services and their building blocks continue to work in a range of situations, e.g. cyberattacks or the failure of building blocks.

Legal Interoperability: Every EU member has its own public service system with national legal framework. The main goal is to ensure that organizations operating under different legal frameworks, policies and strategies are able to work together. This requires that legislation does not block the establishment of European public services within and between Member States and that there are clear agreements about how to deal with differences in legislation across borders, including the way of putting new set of laws. The first step is to perform 'interoperability checks' by screening existing legislation to identify interoperability barriers: sectoral or geographical restrictions in the use and storage of data, different and not distinct data license models, over-restrictive requirements to use semantic digital technologies or delivery modes to provide public services, contradictory requirements for the identical or similar business processes, outdated security and data protection needs, etc. Continuity between legislation, in view of ensuring interoperability, should be assessed before adoption and through evaluating their performance regularly once they are put into relevance. Bearing in mind that European public services are clearly meant to be provided from digital channels, ICT must be considered as early as possible in the law-making process. In particular, proposed legislation should undergo a 'digital check: to ensure that it suits not only the physical but also the digital world (e.g., the internet) to identify any difficulties to digital exchange and to set up and evaluate its ICT impact on stakeholders.

Organizational Interoperability: Public administrations aim to align business processes and information exchanged. Moreover, aim to cover the requirements of users in the field of services. Organizational relationships also must be crystal clear between service providers and service consumers.

Semantic interoperability is about what data is exchanged and understood between parties. The semantic effect refers to the meaning of data elements and the relationship between them. Includes vocabularies and schemata in order to describe data exchanges. The syntactic aspect describes the type of the information to be exchanged in grammar.

Technical Interoperability: includes interface detailed descriptions, cross-border services, data integration services, data presentation and exchange, and secure communica-

tion protocols. Legacy systems create an additional interoperability barrier in the technical layer. Moreover, should be checked via the use of formal technical specifications. Nowadays, EU public administrations have an essential level of interoperability maturity of digital public services. Citizens and businesses should be able to use efficiently services and procedures of European Internal market about their rights. The way of public services interoperability gives the information should be clear and understandable to users. Easy searching-finding-understanding of information are the main key attributes that Digital Public services struggles to achieve. Every kind of information like birth certification should be provided under Union law concerning national rules.

Interoperability governance: is about the decisions on interoperability frameworks, institutional arrangements, organizational roles responsibilities and structures, policies and agreements main parts of interoperability governance at EU level are the European Interoperability framework, the Interoperability Action Plan and the European interoperability architecture. Interoperability governance brings together all the instruments needed to apply it. Local, regional, national and EU level of public administrations demands interoperability agreements. The European Commission via the ISA2 program supports a National Interoperability Framework Observatory (Renda, A., Simonelli, F., Iacob, N., & Campmas, A. ,2019). This is about helping public administrations to support transparency. Moreover, it defines frameworks, policies, strategies, guidelines and action plans on interoperability in a Member state. Interoperability based on standards and specifications. There are some steps to managing them:

- identifying candidate standards and specifications based upon exclusive needs and requirements,
- assessing candidate standards and specifications using standardized,
- transparent,
- fair and non-discriminatory ways,
- implementing the standards and specifications according to plans and practical guidelines,
- monitoring compliance with the standards and specifications,
- managing change with appropriate procedures,
- documenting standards and specifications, in open catalogues, using a basic description.

Standards and detailed descriptions can be mapped in the European interoperability cartography (EIC). Public administrations may find that no standards are available for a specific need in a standard domain. Active involvement in the standardization process alleviates concerns about delays, demonstrates the alignment of standards and specifications with public area needs and can help governments keep pace with technological innovation. In particular, in order to provide services to businesses, they must be able to offer their services and sell their products throughout Europe through easy-to-use electronic procurement and through efficient implementation of the services offered by the single service centers of the states for the interaction of the enterprises with the public administration. Also, in many of the services provided, it is necessary to identify and authenticate the natural or legal person to whom the service is to be delivered. Cross-border services should use electronic identification and authentication methods that are more efficient and secure than those used to date. To this end, Member States should develop cross-border services based on the results of Large-Scale Pilots (LSPs)², SPOCS (Simple Procedures Online for Cross-border Services)³, PEPPOL (Pan-European Public Procurement Online)⁴, STORK 2.0 (Secure Identity Across Borders Linked eID)⁵, e-CODEX (justice Communication via Online Data EXchange)⁶.

Integrated Public Services Provision: Integrated public services demand planning, development, operation and maintenance by EU members. Public administrations should identify, negotiate and agree on a common approach to interconnecting service components. This will be achieved at different national administrative levels according to each country's organizational set-up. Access boundaries for services and information should be defined through interfaces and conditions of access. Implementing the used technical solutions at EU level will require concerted efforts by public administrations, including common or compatible models, standards and agreements on common infrastructure. The coordination function aims to identify the needs and the appropriate operations for a European public service. The first step contains the understanding of needs that citi-

² <https://european-iot-pilots.eu>

³ <https://joinup.ec.europa.eu/collection/simple-procedures-online-cross-border-services-spocs>

⁴ <https://peppol.eu>

⁵ <https://joinup.ec.europa.eu/collection/secure-identity-across-borders-linked-stork/about>

⁶ <https://www.e-codex.eu/>

zens and businesses request. The second step is to plan which sources and information catalogues will be used for every exclusive user need. Third step is to collect and exchange information, applying business rules and accept or reject the requested service to citizens or businesses. In the final step the feedback of users is collected and evaluate. Public administrations should foster policies for sharing services and information sources. First of all, should be to identify whether existing services and information sources can be reused. Secondly, new services and information sources or revising existing ones, reusable services and information sources should be made available to others for reuse. Finally, services and information sources should be aggregated to form an integrated service provision process. Moreover, to avoid duplication of effort, extra costs and further interoperability problems, while increasing the quality of services offered, the conceptual model features two types of reuse.

Reuse of services: Several kinds of services can be reused. For example, issuing a birth certificate, and shared services like electronic identification and electronic signature. These types of services may be provided by the public sector, the private sector or in public- private partnership (PPP) models.

Reuse of information: Public administrations already store huge amounts of data with a potential for reuse. For example, master data from base registries as authoritative data used by multiple applications and systems; open data under open use licenses published by public organizations; other types of authoritative data validated and managed under the aegis of public authorities (Wollmann, H., & Marcou, G. (Eds.),2010). Moreover, text and catalogues are also reusable resources for businesses and citizens to find information. For example, directories of services, open data portals, metadata catalogues, specifications and guidelines are some various types. The most famous type of European Commission's is (EIC) European Interoperability Cartography.

Security level: Public services and public administration information and communication technology contain high-risk data. As a matter of this the cyber level of security should be also high. Public administrations should ensure a high level of privacy and security approach to secure their infrastructure and building blocks (Akimov, O., Troschinsky, V., Karpa, M., Ventsel, V., & Akimova, L. ,2020). Furthermore, they must follow the legal requirements and obligations regarding data protection and privacy. Services should not vulnerable to attacks which might interrupt their operation and cause damage of data. Data protection legislation should cover also risk management

plans in order to identify risks. Assessing potential impacts and planning responses will help also to ensure the level of security. Back up recovery plans and business continuity plans required for difficult operations. A plan of data access and authorization is required also in order to secure privacy. Moreover, trust services are necessary for integrity, authenticity and confidentiality. When public administrations and exchange official information, the data should be transferred, depending on security requirements, via a secure, harmonized, managed and controlled network. Transfer mechanisms should facilitate information exchanges between administrations, businesses and citizens like:

- registered and verified, so that both applicant and receiver have been identified and authenticated through agreed procedures and mechanisms,
- encrypted, so that the confidentiality of the exchanged data is ensured
- time stamped, to maintain accurate time of electronic records' transfer and access
- logged, for electronic records to be archived, thus ensuring a legal audit trail.

Appropriate mechanisms should allow secure exchange of electronically verified messages, records, forms and other kinds of information between the different systems; should handle specific security requirements and electronic identification and trust services (e.g. electronic signatures creation and verification) and should monitor traffic to detect intrusions, changes of data and other type of attacks.

Moreover, information should be suitably protected during transmission, processing and storage by different security processes such as:

- defining and applying security policies
- security training and awareness
- physical security (including access control)
- security in development
- security in operations (including security monitoring, incident handling, vulnerability management)
- security reviews (including audits and technical checks) ([Commission, E., 2017](#)).

As data from different Member States may be subject to different data protection implementation approaches, common requirements for data protection should be agreed

before providing aggregated services. The provision of secure data exchange also requires several management functions, including: service management to oversee all communications on identification, authentication, authorization, data transport, etc., including access authorizations, revocation and audit, service registration to provide, subject to proper authorization, access to available services through prior localization and verification that the service is trustworthy, service logging to ensure that all swapped information is logged for future reference and archived when necessary.

Digitalization and service delivery: All of the 28 EU Member States confirmed and illustrated a wide range of initiatives and programs in the area of service and digitalization. In order to increase the efficiency and quality of public services and enhance the business environment the digitalization is necessary. The EU project DigitalEurope4ALL have already suggested some important interoperability solutions on European level. For example, the perspective of Vocabulary. This terminology refers to a mix of attributes that playing an important role in linked data in order people can share data in different domains. The type which are available are RDF or XML resources (Heath, T., & Bizer, C. ,2011). In the next table we can recognize the indicators and the sources related to digital public services that coming from the European Commission's Digital Economy and Society Index (DESI,2020). Guidance for achieving interoperability in the context of pan-European HD services should focus on open standards. To qualify as an "open" standard, the specifications and accompanying documents must meet the following minimum characteristics:

- The standard has been adopted and will be maintained by a non-profit organization, and continuous development is based on an open decision-making process that is accessible to all stakeholders.
- The template has been published and the standard specification document is available either freely or for a nominal fee. Everyone should be allowed to copy, distribute and use it freely or for a token fee.
- Intellectual property - that is, patents that may exist - and relating to either the entire model or parts becomes irrevocably available on a tax-free basis.
- There are no restrictions on the re-use of the standards.

Subsidiarity:

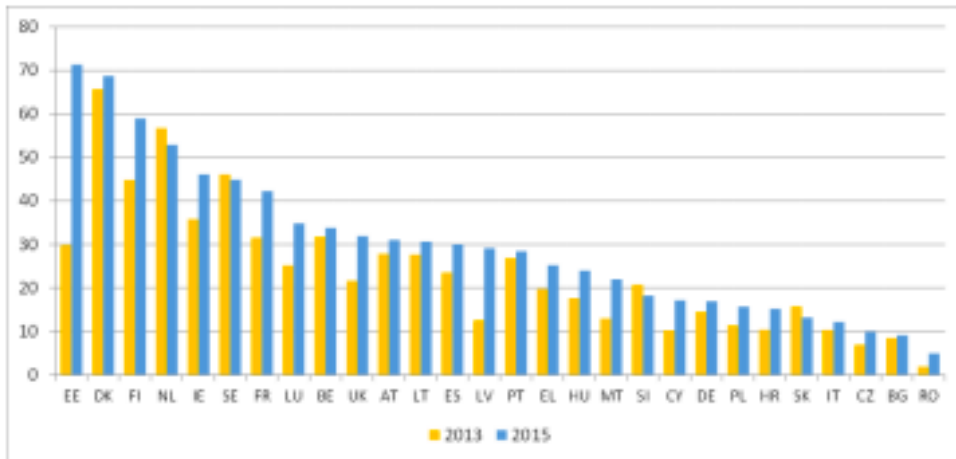
The guidance provided by the European Interoperability Framework concerns only the pan-European level of services. According to its principle of subsidiarity, guidance does not affect the internal functioning of EU administrations and institutions. Each EU Member State and institution should take the necessary steps to ensure interoperability at pan-European level. (Tsiafoulis,2015)

Digitalization **& Service de-** **livery**

Indicator	Source
Online services	UN e-government Index
E-government users	European Commission-Digital Economy and Society Index
Pre-filled forms	European Commission-Digital Economy and Society Index
Online service completion	European Commission-Digital Economy and Society Index
Barriers to public sector innovation	European Public Sector Innovation Scoreboard 2013
Ease of doing business	World Bank-Easeof doing Business
Services to businesses	Eurobarometer 417

This table summarizes related indicators on Europe’s digital performance and considers the development of EU Member States in digital competitiveness based on different dimensions.

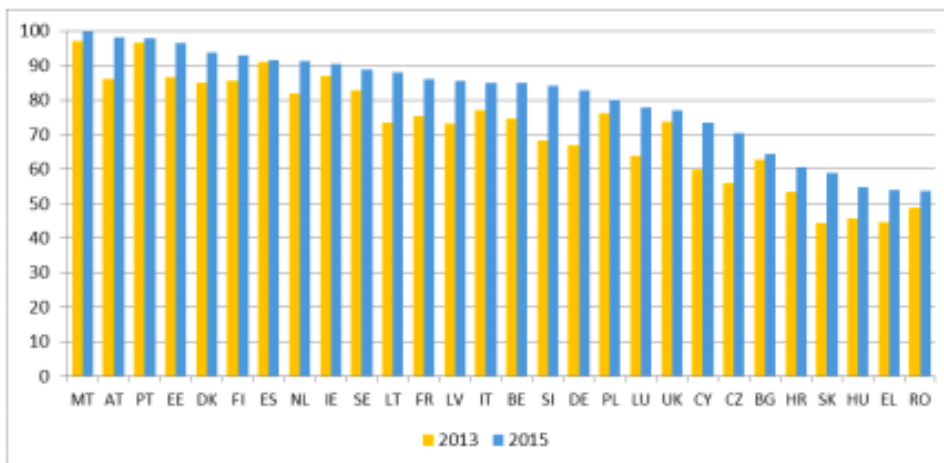
The following graph is based on data of Eurostat Community survey on ICT usage in households. The countries are ranked according to the share of e-government users. The number of percentages describes the individual’s age. (Eurostat, I. C. T. ,2010).



Source: European Commission Digital Economy and Society Index

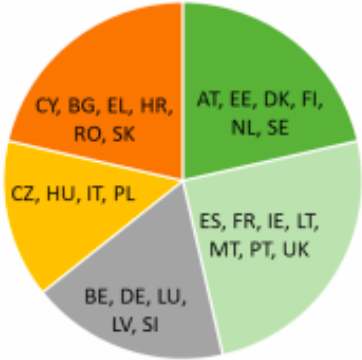
As we can see there is a digital evolution to the majority of the countries. The graph also confirms a huge dynamic and progress in the area of e-government.

In the same level is the percentages of share of steps in a public service life event that can be completed online. The following graph comes from European Commissions e-government benchmarking reports. Moreover, the e-government benchmark methods include a web-based user survey.



Source: European Commission Digital Economy and Society Index

In the next pie the number of the EU members are included in 5 pieces according to their aggregated ranking based on the 7 indicators. All the data shows the overall digitalization and service delivery capacity and performance of every member.



EU pie about their ranking on the 7 indicators of digitalization & service delivery

2.2.2 Positives

The vision to have a cross-border and cross-sectoral public services in a digital way will give the advantage of faster diffusion of information. The project that European Commission run for this reason is ISA2 ⁷. The main goal of the project is to have less bureaucracy in public services of EU projects. ISA2 have already many packages about semantic interoperability, data sharing, open data supporting instruments for public services, e-Procurement and e-Invoicing. As we can understand public services interoperability is EU offers already solutions in significant challenges of bureaucracy. Furthermore, the open government data gives the opportunity of use and reuse public data of everyone unless restrictions apply (e.g.GTPR) .This open data technologies and products can save costs and support the requirements of businesses. Moreover, the interoperability context enables visibility and availability on interfaces of public administrations. This operation helps businesses, citizens and public administrations to learn and use the administrative processes and rules. Moreover, digital technologies can provide a wide variety of benefits for governments and businesses. It can increase efficiency, transparency and openness. As we can see in the next table e-Government users, Pre-

⁷ https://ec.europa.eu/isa2/home_en

filled forms, online service completion, Digital public services for business and open data has increased rapidly the last two years.

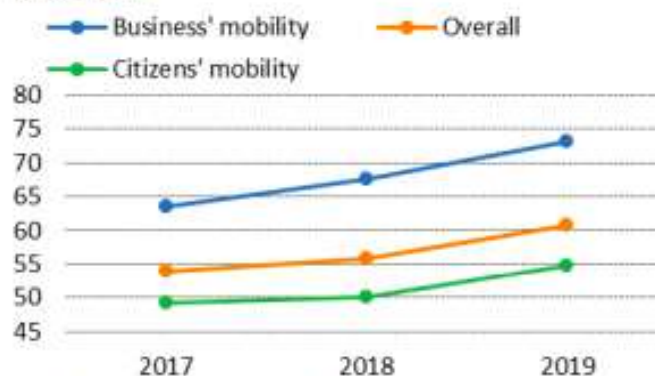
Table 1 Digital public services indicators in DESI

	EU	
	DESI 2018	DESI 2020
5a1 e-Government users % internet users needing to submit forms	58% 2017	67% 2019
5a2 Pre-filled forms Score (0 to 100)	53 2017	59 2019
5a3 Online service completion Score (0 to 100)	85 2017	90 2019
5a4 Digital public services for businesses Score (0 to 100) - including domestic and cross-border	83 2017	89 2019
5a5 Open data % of maximum score	NA	66% 2019

Source: DESI 2020, European Commission.

Cross-border mobility is also one vital part of public services interoperability. Online availability, usability, eID and eDocuments are very usable for people who lives abroad. As we can see in the next figure of eGovernment Benchmark, cross-border availability and usability of public services is much more advanced than directed public services. (Capgemini, R. E., & IDC, S. 2014). (EGovernment Benchmark,2020 insight report)

Figure 14 Cross-border mobility (Score 0-100), 2017-2019



Source: eGovernment Benchmark, Capgemini.

Finally, Interoperability of public services ensures long-term accessibility at most of the electronic records including preservation of associated electronic signatures or seals. A message transmission between public administrations and users is already available at a wide range around European Union (Gladney, H. (2009). This occasion has already transformed to digitally as the most of data preparation for preservation can be accomplished using available content and metadata editing programs. Furthermore, the European Union has created the e-signature model that is a mix of services, tools and evi-

dences that are used from public sector and businesses in order to verify electronic signatures that have validity in all EU countries. To sum up, ISA2, document storage systems, cross-border mobility and e-signatures are some existing programs that helps European Union to upgrade the digital perspective of public services.

2.2.3 Challenges

On the other hand, the EU lacks of effectiveness in some public services because of the bureaucracy at a national level. Most of the EU members have very different policies that creates heterogeneity and lack of interoperability. Public administrations utilize an enormous amount of data in very different ways in every country. This fact put at risk the digital single market.

At the point of reusability, public services have to do more steps to improve interoperability. Many EU interoperability standards for addresses or roads should be applied more widely at a technical, organizational and legal levels. Still now users are not able to use a multi-channel service delivery and they only have access to different public operations. The main disadvantage in this occasion is that elderly people or people with disabilities have problems to use public services.

There is a gap also in citizens' and businesses' privacy when they interact with public administrations. Security is not guaranteed and the privacy framework has to do more progress. The concept of a one-stop-shop online government is not a future project anymore (Lambrinouidakis, C., Gritzalis, S., Dridi, F., & Pernul, G. (2003). It would be shared widely across all EU members.

Another one negative of public services interoperability is the lack of multilingualism. EU citizens when using digital public services do not have the option to use their native language. This problem creates another challenge which is the necessity of different digital interfaces for every language and every public service. Multilingualism service should afford also all the different options of data in an electronic database.

At the part of operation public services sometimes have many disfunctions. First of all, in many EU members public businesses producing low-quality services because there is no competition to threaten them. Moreover, decisions and processes become slow. Therefore, the staff members face difficulties to manage the demand for services and

the governments suffer from misuse of their power. The problems with this kind of monopolies don't stop here. Often the public services which are delivered have no focus on customer needs.

Furthermore, the ERP system of public services is obsolete and problematic. It is significant to say that the ERP system of digital public services is a key factor for the digital transformation of EU Members. From first point of view, it is crystal clear that ERP systems among EU countries must change existing business processes (Wood B., 2010). The following bullets are some of the main reasons that ERP public systems should change their business processes:

- Lack of education and user training (Bhatti, R. 2005). At the first decades of using ERP systems employees didn't take the necessary education and training of the public systems. The management support is very crucial in order to achieve the objectives of education and training.
- User reactance. The main challenge of the training is how to provide basic concepts and attributes of the ERP system to the user (Bhatti, R. 2005).
- Bad choices in the selection of ERP systems and vendors. External support of vendors is a vital issue that must be taken into account (Bhatti, R. 2005).
- Lack of data accuracy Technical, economic, financial and strategic business are critical factors towards ERP implementation success story (Vineets, D. K.,2006)
- Lack of interest in managing cultural issues. Hardwick defined user involvement as ‘A psychological state of the individual, and as the importance and personal relevance of a system to a user’ (Motwani, J., Subramanian, R., and Gopalakrishna, P., 2005)
- Unrealistic expectations It is crucial to define which are the responsibilities of employees and why the ERP system is being implemented (Syed Iftikhar, H., Shah and Shabbir Hassan, 2008)
- Lack of organizational commitment that ultimately slows down the implementation process (Zhang K., Lee, A. and Zhang, Z., 2002). The organizational culture is defined as “a pattern of shared basic assumptions that the group learned as it solved its problems of external adaption and internal integration, that has worked well enough to be considered valid and therefore to be taught to new numbers as the correct way to perceive think, and feel in relation to those prob-

lems” (Schein, E.H. ,1992). The culture of an organization concerns organization workflows, employees’ personal values, skills, attitude and decision-making processes. Organizational culture plays an important role during the implementation of ERP systems and consequently its success (Zhang K., Lee, A. and Zhang, Z., 2002)

- Poor cost estimation and scheduling leading to over budgeting and delayed implementation of ERP (Lindley, T. J., Topping, S., and Lindley, T. L. ,2008)

GDPR perspective is another important issue for cross-border public services. Citizens and Businesses need to trust the resources that they give their personal and sensitive data. Especially at COVID-19 period more and more infringes found out in internet community (CISA US Department of Homeland Security’s Cyber security and Infrastructure Security Agency). Hackers are capitalizing on advances in technology to launch more-advanced and destructive attacks that are even harder to detect. Cloud-based architectures have reduced IT challenges and provided new opportunities of dynamic provisioning, monitoring and handling resources by providing immediate access to resources, enabling the easy scaling up of services. GDPR defined as “the main legal aspect measures relate to how well the Public Administration has implemented data protection law”. Especially in the delivery of digital public services is an essential part of interoperability maturity. Actually, there are 4 levels of GDPR that have already established and should be improved at the near future of COVID-19 situation:

- Clear compliance issue: high risk of trouble if data protection authority investigates
- Paper compliance or low compliance: risk of trouble if data protection authority investigates, but the most essential things have been taking care of, although significant gaps exist compared to best practice
- Medium compliance: low risk of trouble if data protection authority investigates, concepts have been applied both formally and in an acceptable manner in practice
- Full compliance: near to no risk if data protection authority investigates, GDPR has been fully implemented according to best practices

However, it needs to be ensured that the private work environment also keeps any accessed and processed data as secure as in a corporate office. With the dangerous Covid-19 situation forcing all members of a family to stay at home wherever possible, each individual environment has to be evaluated. It's all too tempting to allow the family to use a work laptop, or to use it for casual private browsing. On the other hand, security risks can also be presented in a different way – if private devices that might not be equipped with security tools are used for work purposes. Organizations must also revisit their security position to provide a safe remote-working experience that prevents data breaches. Not only should they address vulnerabilities to their own networks and the physical storage of data, they will have to face the fact that remote workers will inevitably have to move data between the corporate network, the cloud and the personal laptop. To protect sensitive personal information in transit from one location to another, GDPR suggests encryption to protect privacy and security and prevent leakage. Five-step plan Not all of an organization's employees will be accessing sensitive personal information while they are working from home. The changes needed are more granular and, first and foremost, an organization has to figure out which employees are dealing with sensitive information.

- Step 1: Reopen the Data Protection Impact Assessments⁸. The first step for an organization is figuring out where you need to apply this remote working policy. That means a DPIA has to be reopened to identify the impact of the new environment of digital working. During this process the organization can gain insight into which employees access sensitive personal information while working from home, and subsequently create various risk categories for the remote workforce.
- Step 2: Ascertaining the physical requirements of the home office. Based on the impact of the DPIA mentioned above, new controls may need to be applied specifically for that identified category of employees dealing with sensitive information while working remotely. Organizations have to figure out what the home office has to look like for the different categories of remote workers. When looking at the physical security of a remote workplace, organizations

⁸https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/obligations/when-data-protection-impact-assessment-dpia-required_en

have to take different measures into account based on the risk categorization. That might start with having a separate room at home that can be locked at the lighter end of the scale, and range up to video surveillance for the highest security category.

- Step 3: IT cybersecurity for the home office. The most important challenge in a remote office scenario is arguably maintaining visibility into the data traffic and devices so as to stop threats. Both data controllers and data processors have to implement appropriate technical and organizational measures to ensure the same level of security in the home office environment as in the corporate office, and which is also appropriate to the risk categorization level. At a minimum, remote employees will require secure access to the resources they need in the corporate datacenter or the cloud. Additionally, data governance has to be applied to make sure that the information stays where it is supposed to stay and is not copied totally.
- Step 4: User awareness of distant working principle. All of these measures until now will be for nothing if companies do not ensure that their remote employees are informed and conscious of the business's acceptable use policies. Keeping data privacy an ongoing cultural aspect of distant working is key factor. All those employees dealing with sensitive information must ensure that nobody else in the family deals with the devices that access or process any of this data. Consistent reminders of this fact may seem like nagging, but without this awareness the whole system falls apart.
- Step 5: Training employees. Last but not least, the pandemic situation calls for an urgent rethinking of general security training. In the past few months, we've seen bad actors attempting to capitalize on these times of uncertainty and fear to spread new malware campaigns and take advantage of the remote working situation. Organizations should switch up their security training as well. Open and frequent communication with staff around their security responsibilities is a key when staff are not in the corporate office.⁹

⁹ Regulation, G. D. P. (2018). General data protection regulation (GDPR). Intersoft Consulting, Accessed in October 24

2.2.4 Countries

In this section, we will mention the key attributes of public services of each EU member in the use case of Birth Certificate.

The Regulation on Public Documents which was adopted by the European Union in 2016 aimed to simplify the transparency of certain public documents among EU members. Every authority of an EU country should accept the public documents of another EU country without any authentication stamp. Moreover, citizens can provide a public document in a multilingual form available in all EU languages. The multilingual standard forms can be including types like: birth certificate, a person being alive, death, marriage, registered partnership, domicile residence, absence of a criminal record.

The Birth Certification can be applied by parents or children. For example, in Portugal and Sweden, the age limit for a kid to apply is 14-16 years old. In Bulgaria, Italy, Malta there is no age limit for birth registration. The rest of the EU members do not regulate the issue of children under 18 years old. The only country that we didn't take into account was the United Kingdom as the situation of BREXIT does not let us to research clear the occasions of birth certificate Request. Actually, during the period that we handle the dissertation, the BREXIT was at the final step that means the United Kingdom remains on the European Union just typically.

In the following section, we run research for every EU member about the necessary evidences that required from public sector in order to apply for a copy of the birth certificate. At this point of research, we used resources from governmental portals, platforms and services in order to identify the key attributes. It is significant to say that due to COVID -19 period more and more EU Countries tried to format digital services as a matter of increased demand.

Austria: The required documents are: photo, passport or ID, Address,

Belgium: Accepted 4 different languages for administrative matters like a Birth certificate because of the 4 different regions which they have. Required documents: An extract of a civil status certificate is a summarized version for certificates like birth, death, recognition or nationality. A literal copy, also called complete copy, certified copy or full copy, gives the entire contents of the certificate.

The certified copy of a certificate/judgment often takes the form of a true certified photocopy of this certificate. Finally, it's obligatory an ID document and in the case of a third party apply its obligatory a copy of the identity document.

Bulgaria: Place and date of birth, place of the certificate issue, surname, first name and patronymic, sex and nationality. Data of parents: names, dates of birth, nationality, identification numbers, Seal of the registry office. The process of the publishing for Birth certificates internally of Bulgaria is prepared rapidly.

Croatia: A valid photo of both parents, proof of Croatian citizenship at least of one parent. If someone cannot be physically in Croatia then can authorize a person with a certified permission.

Cyprus: Copies of parents' passports, marriage certificate of the applicant's parents (if the applicant is married), photocopy of the applicant's passport, copy of proof of fees paid 20EUR, a stamp worth 8.54EUR attached to the application.

Czechia: Proof of Czech citizenship Proof of Czech citizenship of the applicant either (a) a certificate of Czech citizenship, (b) valid passport or (c) valid national ID card

Denmark: Applicant must provide passport or driver license, address, an application form or two of these: Utility bills, Bank statements, Vehicle registration, Income tax return, Personal Check w/ address, A previously issued vital record, Letter from government agency requesting the record (DHHS, WIC), Department of Corrections I.D. card, Social Security Card, Hospital; birth worksheet License/rental agreement, Voter Registration card, Disability award from SSA

Estonia: Valid ID and Written request for the certificate.

Finland: Name, former names, date of birth, municipality of residence at birth, country of birth, citizenship and municipality of residence. The certificate also includes your parents' names, dates of birth, municipalities of birth, countries of birth and nationalities. If parents were born before 1953, the parents' personal data it is not available in the population information system and cannot be included in the certificate. There is also a possibility to include the personal identity code on the certificate.

France: Must include name, surname, the applicant's time, date and place of birth, father's and mother's full name including middle names. The petition must be accompanied by a self-addressed stamped.

Germany: The record of birth, signed by the midwife or doctor, Valid IDs, such

as passports, for both parents (not a driver's license), Marriage certificate (if married), Acknowledgement of paternity (if unmarried - see below), Both parents' birth certificates (if unmarried)

Greece: Full name, date and place of birth, the name of parents and passport.

Hungary: Proof of identity (passport) and an address card (if available). The marriage certificate must be officially translated into Hungarian (if available) official translations can be obtained from the National Office for Translation and Attestation.

Ireland: Full birth name, date of birth, address, place of birth, gender, father's full name, mother's full birth name.

Italy: A copy of the photo ID, a self-addressed, stamped return envelope, application form, address, full name, passport.

Latvia: Name, surname, personal identity number, address of the place of residence, contact phone, e-mail, address of the applicant, a justification for the need of the document, the date and the place of birth.

Lithuania: full name, address, identity, city of birth, father's and mother's full name, contact telephone, a signature of the applicant, mail address.

Luxembourg: The date, time and place of birth, gender; the name and the first name(s), the names, first names, gender and domicile of the parents, and the places and dates of their birth, if known, marginal entries (marriage, divorce, adoption, change of name, etc.).

Malta: ID card, name, surname, locality of birth, date of birth, parent's name.

Netherlands: Full name, date and place of birth, postal address, the reason that you make the request, signature, a photocopy of a valid ID.

Poland: An application submitted at the Polish Civil Registry Offices or Consular Section, a valid ID or a valid proof of identity, the documents confirming the relationship to the person for whom a certificate is to be issued, Consular fee, Retrieval of Birth Certificate Application.

Portugal: E-mail, phone number, address, full name, a cover letter explaining the service that you make the request.

Romania: First Name, Surname, Sex, Date of Birth, Place of Birth, parent's full name.

Slovakia: Identity documents, proof of eligibility, birth certificate application

form.

Slovenia: Name, Surname, Address, an application, Parents name, place and date of birth.

Spain: National identification card of the person requesting the certificate, indication of the full name, date and location of the birth of the citizen who requests the certificate.

Sweden: Personal identity number, address, place and date of birth.

In the following table, we have summarized every attribute that is common in birth certificate requests of each country and which of these attributes are obligatory or not. Moreover, we summarized the type that every country asked for any attribute. The capital letters C.C. means Country Code, ATTR is for attributes and the symbol (*) is for obligatory attributes, the symbol (-) means that this attribute does not include in the specific birth certificate form and the symbol (>>) appears when an attribute is the same with the previous one.

As we can noticed, there are many commons attributes between EU countries that we could exploit for our birth certificate form. For example, we noticed that date of birth and place of birth are requested in exactly the same way at all of EU members. However, there are many data that we should categorize in specific formats because of the variety of EU birth certificate forms.

<u>C.C/ATTR.</u>	<u>First name</u>	<u>Last name</u>	<u>Email Address</u>	<u>Date of Birth</u>	<u>Place of Birth</u>	<u>Sex</u>	<u>Father's full name</u>	<u>Mother's full name</u>	<u>ID</u>	<u>Address</u>	<u>Reason of request</u>	<u>Nationality</u>
AT	First Name*	Family Name*	-	Date of Birth*	Place of Birth*	-	Father's full name*	Mother's full name*	ID*	Address*	Reason of request	Nationality*
BE	>>*	Last name*	-	>>	>>	-	>>*	>>*	>>	Address	Reason of request*	>>
BG	>>*	Surname*	E-mail*	>>	>>	Sex*	Patronymic*	>>*	>>*	Address*	Reason of request*	>>
HR	>>*	Last Name*	-	>>*	>>*	-	-	-	>>*	>>*	>>*	>>*
CY	>>*	>>*	-	>>*	>>*	Sex*	Father's full name*	Mother's full name	-	-	-	-
DK	>>*	>>*	-	>>*	>>*	-	-	-	ID*	Address*	-	-
DE	>>*	>>*	-	>>*	>>*	-	Father's full name*	Mother's full name	-	-	-	-
EE	>>*	Surname*	-	>>*	>>*	Gender*	Father's full name*	Mother's full name	ID*	-	-	-
GR	>>*	Last name*	E-mail*	>>*	>>*	Sex*	Father's full name*	Mother's full name	-	-	-	Nationality*
FR	Name*	Surname*	-	>>*	>>*	-	Father's full name*	Mother's full name*	-	-	-	-
ES	>>*	>>*	-	>>*	>>*	-	-	-	ID*	Address*	-	-
IE	Name*	Surname*	-	>>*	-	Sex*	Father's full name*	Mother's full name*	-	Address*	-	-

CZ	>>*	>>*	-	>>*	>>*	>>*	>>*	>>*	>>*	>>*	Reason of request*	Nationality*
IT	>>*	>>*	-	>>*	>>*	>>*	>>*	>>*	>>*	>>*	-	-
LV	>>*	>>*	E-mail*	>>*	>>*	-	>>*	>>*	>>*	>>*	-	-
LT	>>*	>>*	>>*	>>*	>>*	-	>>*	>>*	>>*	>>*	-	-
LU	>>*	>>*	-	>>*	>>*	-	>>*	>>*	-	>>*	Reason of request*	-
HU	>>*	Last Name*	-	>>*	>>*	-	>>*	>>*	ID*	>>*	-	Nationality*
MT	>>*	Surname*	-	>>*	>>*	Gender*	>>*	>>*	-	-	-	-
NL	>>*	Last Name*	-	>>*	>>*	-	>>	>>	ID*	Address*	-	-
PL	>>*	>>*	-	>>*	>>*	-	-	-	>>*	-	-	Nationality*
PT	>>*	>>*	E-mail*	>>*	>>*	-	Father's full name	Mother's full name	>>*	Address*	-	-
RO	>>*	Surname*	-	>>*	>>*	Sex*	Father's full name*	Mother's full name*	-	-	Reason of request*	-
SL	>>*	Surname*	-	>>*	>>*	-	>>*	>>*	-	Address*	-	-
SK	>>*	Last Name*	-	>>*	>>*	-	Father's full name*	Father's full name*	ID*	-	-	Nationality*

FI	>>*	Surname*	-	>>*	Country of Birth*	Sex*	>>*	>>*	>>*	-	-	> > *
SE	>>*	>>*	-	>>*	Place of Birth*	-	>>*	>>*	>>*	Address*	-	-

2.2.5 Procedures

This part mainly refers to the presentation and analysis of the key procedures of cross-border public services for every EU member. We identified that will be important for our research to find out how businesses and citizens utilize the public services still now and especially birth certificate requests. After our research process, we noticed that most of the requests for Birth Certificates are done physically. For our dissertation process, this observation is really significant in order to understand the challenges of digital transformation. In the following section, we record the basic steps required in every EU country for a Birth Certificate request. Moreover, this part includes a table with three basic columns about the type of procedures, method of issue and place of request for all the EU countries. The most common types of procedure are the “fill in a form” and the “order” for a birth certificate request. About the methods of issue, the cases are “digitally”, “physically” and via “phone or fax”. Lastly, public agencies and Governmental portals (e.g websites or e-services of Governments) are the most common locations for birth certificate request.

Austria: The procedures to get a copy of the birth certificate must be submitted in person or in writing or electronically. In case of electronic submission, there is an electronic form that can be downloaded. The certificate must be taken in person and it's a fast procedure.

Belgium: There is a possibility to have a birth certificate via e-mail or at the desk, an extract from the certificates of civil status is a certified copy of the certificate (e.g. birth, marriage, death, nationality) or judgment (e.g. divorce, adoption or descent) transcribed into the records of the Civil Registry. The documents are taken out from the registry office in which they were signed up. The application methods are the following: I) At the e-Desk, Via the Application App. The re-

quirement is an electronic version of ID card and you have to enter the PIN code of the card. II) By e-mail: Write an application with the required documents. The next step is to send the application for the extract of your civil certificate by mail to the address provided in the office and locations below. Apply in person at the counter: Visit the Administrative Centre of the City of Brussels and the liaison offices of Laeken and Neder-Over-Heembeek to make the application personally. Produce all the required documents, which will be verified and ascertained by an assisting officer. The next level is the verification, the requested document will be processed and issued immediately.

Bulgaria: The original document issued only once and the copies of it are for personal use. To order the duplicate certificate of birth in Bulgaria the Bulgarian citizen should contact by e-mail, phone or skype the operators.

Croatia: The birth certificate in Croatia is available to the e-citizen system. First of all, you should register and be up to 15 years old and complete the online form.

Cyprus: To get a birth certificate in Cyprus is necessary to fill a form that can be taken from the local Citizen Service Center or any District Administration Office. The form is also available electronically in English and Greek.

Czechia: The procedure is to fill a form electronically on the Embassy of the Czech Republic, attaching all the required documents.

Denmark: For a copy of a Danish birth certificate the applicant should contact the church where the birth was registered. If there is no chance to get it from church (e.g. living abroad) then it can be done remotely via www.borker.dk.

Estonia: The procedure for a copy of the birth certificate is available physically and remotely. To obtain it in person is necessary to go to the local vital statistics office and complete the application form. The cost is about 10EUR and the certificate will be issued the same day. The online request is submitted via Riiigiportal. First of all, the applicant should make registration and then submit the digital request. The application will be ready in 5 days.

Finland: Via a Finnish e-service or at a Finnish Embassy.

France: Via the office of the Mayor at the place of birth. There is no charge for a copy of the birth certificate.

Germany: To acquire a birth certificate from the Federal Republic of Germany, the consumer must contact the competent German agency. The order should be

addressed to the Registrar's Office of the place (Village, Township, City) where is the place of birth.

Greece: The request for copies is available in person or electronically. In the first case, the citizen submits the request at the Registry Office. On the second occasion, the citizen can apply electronically to "egov.gr" for its certificate.

Hungary: Applying in person (Hungary embassy) or downloaded the application form electronically.

Ireland: Online or in person at any civil registration service.

Italy: The request is available only by e-mail.

Latvia: Using the website of the Latvian state and fill in the form.

Lithuania: Complete the required form. In person at registry offices. It is free.

Luxembourg: I in person: to the civil registrar's office, upon presentation of a valid ID card, electronically: by submitting an application online, by post, by phone (during the opening hours of the communal administration).

Malta: Ordered online on certifikati.gov.mt and may be sent by post or picked up from the public registry office.

Netherlands: Find the municipality or contact them, order the birth certificate in person or electronically.

Poland: Obtained from the Vital Statistics Office of the appropriate locality. The record can be obtained also from the Communal Vital Statistics Office established for the community.

Portugal: Available only by postal mail.

Romania: Request by phone or fax on Public agency. There is no cost.

Slovakia: Free of charge, in person at a Slovak Registry local insurance office in your area of residence.

Slovenia: An extract of birth at the Registry Office is available in a form version. If the application is for another person, you need his/her written authorization. Note: The authorization must contain information about the authorizing person as well as information on the authorized person and authorizing a person's signature.

Spain: The certificate can be ordered by post or online and it is free.

Sweden: Via the office of the Swedish tax agency in the municipality of the place of birth.

EU Countries	Type of Procedure	Method of Issue	Location of Request
Austria	Form	Digitally & Physically	Gov portal & Public agency
Belgium	Form	Digitally	Gov portal
Bulgaria	Form & Order	Digitally & Physically	Gov portal & Public agency
Croatia	Form	Digitally	Gov portal
Cyprus	Form	Digitally & Physically	Gov portal & Public agency
Czechia	Form	Digitally	Gov portal
Denmark	Form & Order	Digitally & Physically	Gov portal & Church
Estonia	Form	Digitally & Physically	Gov portal & Public agency
Finland	Form	Digitally	Gov portal & Embassy
France	Form	Physically	Public agency
Germany	Form & Order	Digitally & Physically	Public agency
Greece	Form	Digitally & Physically	Gov portal & Public agency
Hungary	Form	Digitally & Physically	Gov portal & Public agency
Ireland	Form	Digitally & Physically	Gov portal & Public agency
Italy	Order	Digitally	Gov portal
Latvia	Form	Digitally	Gov portal
Lithuania	Form	Physically	Public agency
Luxembourg	Form	Digitally & Physically	Gov portal & Public agency
Malta	Form & Order	Digitally & Physically	Gov portal & Public agency
Netherlands	Order	Digitally & Physically	Gov portal & Public agency
Poland	Order	Physically	Public agency
Portugal	Order	Digitally	Public agency
Romania	Order	Phone or Fax	Public agency
Slovakia	Form	Physically	Public agency

Slovenia	Form & Order	Physically	Public agency
Spain	Order	Digitally & Physically	Gov portal & Public agency
Sweden	Form	Physically	Public agency

2.3 Problem Definition & Research Questions

In this section, we will focus on the key Research Questions of this Master Thesis. Nowadays, digital transformation is the key part to the user's journey in public services. Citizens are trying to avoid physical stores for their procedures in public services. Several reasons like lack of time, bureaucracy and inefficient procedures for common services are some of the factors that citizens and businesses want to perform online. Moreover, the current situation with COVID-19 has created many challenges and opportunities for the public sector of all EU members. First of all, we will try to identify the key challenges of public services nowadays and then we will try to identify the perspectives and the solutions for cross-border public services in general and specific cases. Then we will research for theoretical or practical solutions and the possibility to implement them in real life and in EU countries.

2.3.1 How could the EU cross-border public services be improved at covid-19 situation?

Nowadays it is more vital than ever to transform digitally public services among the European Union. Governments are trying to find effective solutions for agility and resilience (Drechsler and Kattel,2020). The public sector and services are usually defined as a mix of capabilities that focused on stability (Piening,2013). The Pandemic situation has created many difficult situations that do not let citizens and businesses to collaborate with the public sector physically. Government users want to trust safe authentication methods and the security of government websites because of the sensitive data that provide to them. Situations like moving abroad, studying abroad or working in other EU countries demand high-quality cross-border services. Covid-19 created also the necessity of collaboration between EU nations in order to manage this crisis (Mazzucato, M., & Kattel, R. ,2020).

While the COVID-19 responses have shown how vital are digital public services, many EU countries are still having problems with this cross-border adoption. In the last decades the transformation of public services was on the top of reforms for every EU country, but without any positive outcome (Simonet,2011). Rather, they have led to a simplification of procedures and not on satisfying citizen or business needs (Cottam,2018).

In 2006, Dunleavy et al. compared a range of countries in order to understand the capacity to govern data and digital platforms. The results were particularly poor in exploiting digitalization on public services. Nowadays, governments are creating platforms with huge potentials for the efficiency of public issues (Cordella and Palletti,2019). However, most of these data remains unexploited for digital public issues. There are many smart examples that European governments could use to improve public services. For instance, applications like University portals, Google or Facebook used the majority of attributes that a digital platform of public services demands.

As pandemic crisis seems that would be part of our future life EU Countries should shape responsible and stable long-term solutions. On a basic level, the digitalization of society should be undergirded by adapting our social contracts for the digital era with new, adequate rights and new governance structures to uphold them (Bria, 2020). As we analyzed before the European Union is trying to digitally transform all the public services via eGovernment. Many of these services are already available to a selection of centralized websites, but not available in every EU nation. Moreover, cost and time minimization are on top of the improvement list. Despite this, the current e-government structure should also change in order to be acceptable to citizens. After research that we have made in EU Portals, European Commission and EU countries webpages we defined the following goals for cross-border public services improvement.

One first attempt for improvement of digital public services at the pandemic period could be the outsourcing or privatizing government services. The goal here is to “discharge” the public sector of many EU countries and transfer a number of services to the private sector. Moreover, costs are usually lower and consumer choices are increased. As Panu Poutvaara underlines “Public Outsourcing could result in quality deterioration for services because their utility is difficult or impossible for consumers to ascertain but empirical evidences show that does not only quality decline but also increased” (Poutvaara, P. 2014). At this point is important to emphasize that only some activities for digital public services would be beneficial. But, in order to be at a remark-

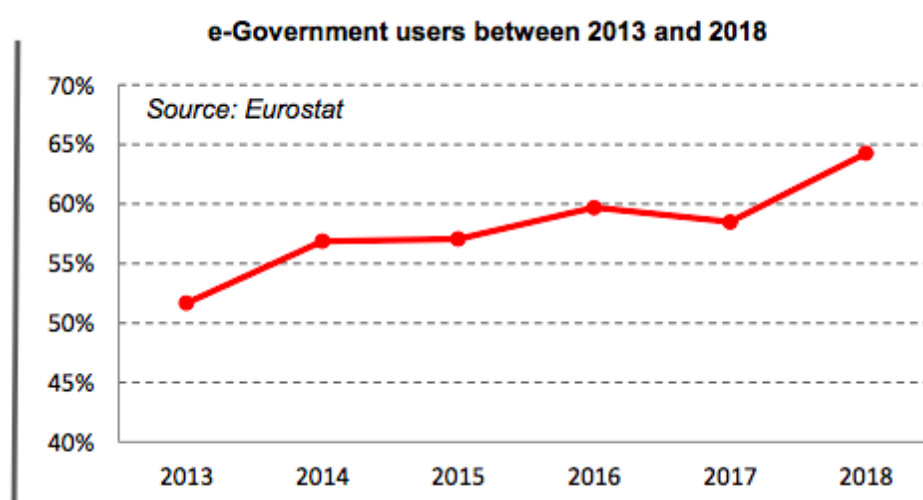
able level to identify these cases we should run all of them during the COVID-19 period. In 2001 Dewenter, K. L and P.H. Malatesta have found that “privately owned firms are more productive than public sector because they have lower labor intensity, and use less leverage” (Dewenter, K. L., & Malatesta, P. H. ,2001). However, the privatization itself cannot be recognized as the principal reason behind the productivity advantage. Rather, governmental companies are restructured before privatization, which makes them more profitable.

EU researchers should create methods and tools to help public administrations across the European Union for the catholic digitalization of all public services. Furthermore, after the research that we have made these months, we identified that some digital public services are used more by businesses and citizens. Some of the findings of previous years have shown that Business start-ups, regular business operations, losing and finding a job, studying, family, starting a small claims procedure, owning and driving a car and moving are some of the most crucial areas that have used cross-border public services the previous years. One of the attempts for instrumental e-government across EU has created during our research for solutions. The existing EU-funded CITADEL¹⁰ (Empowering Citizens to TrAnsform European PubLic Administrations) project has been investing more in digital public services after COVID-19. The researchers of this project have created methods and tools to provide public administrations with practical solutions for improving their digital services. CITADEL is a combination of Hirschman (Albert O. Hirschman. 1970) and Rokkan (Stein Rokkan. 1974) models, hugely influential across the social sciences, as the schemes to face the challenge of knowing how engaged members in an organization are. Moreover, it is about how likely they are to remain members and when they might cease to be a member. Furthermore, the reason why they have not yet become members is one extra challenge for CITADEL. In order to achieve its objectives, the CITADEL ecosystem will mix and share a set of technologies like semantics, mobile, analytics, sentiment analysis, open linked data to increase the engagement of citizens and other factors (e.g., the private sector). This is a kind of co-creation that includes activities through which different stakeholders, government-industry and a group of individual citizens work actively and directly together towards public services (Escalante, M., & Sedrakyan, G. 2017). The benefits of co-creation are

¹⁰ <https://www.citadel-h2020.eu>

both in high or low involvement services, because users may enjoy increased participation and control over the service delivery process and additional opportunities (B. Schneider and D. E. Bowen,1995).

Another one key solution at this strange situation of COVID-19 can be the utilization of EU projects that are focused on digital security and safety (e.g. Cybersecurity, trust and safety). It is more important than ever for citizens and businesses to be able to trust the networks and the systems of cross-border public services. With so much time taking online individuals and businesses are attacked in every level of connectivity. Except for the time that cross-border public services reduce, there is no other way in pandemic for people to use the public administrations and this encourages them to learn more about it. As we can easily understand at procedures of public services the evidences are really sensitive and they need more and more support from security systems. The CEF Telecom¹¹ is “a key EU instrument to facilitate cross-border interaction between public administrations, businesses and citizens, by deploying digital service infrastructures (DSIs) and broadband networks” (Iglésias Franch, D. ,2020). When this project was established at the first time its goal was to support projects contributes to the creation of a European ecosystem of interoperable and interconnected digital services that sustain the Digital Single Market. This aim seems to be more demanding than ever as we are in the middle of this pandemic. As we found out from research on the use of Digital Public Services from citizens and businesses the results are the following¹² :



¹¹ <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-telecom>

¹² <https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi>

The number of 64% was for the year 2018 about the users of digital public services.

This overall performance before pandemic seems to be increased nowadays. As the eGovernment Benchmark 2020 underlines the overall performance today stands at 68%. Currently, almost 80% of public services can be completed digitally. These numbers make crystal clear our very first thought for cybersecurity on public services interoperability. With cybersecurity is possible the high protection of computer systems and networks from hackers and damages on electronic data (Schatz, Daniel; Bashroush, Rabih; Wall, Julie,2017).

The existing project of the European Union (CEF Telecom) has been created for digital services of the Digital Single Market. The grants under CEF Telecom will help the European public sector and businesses to link with the main platforms of the digital services that are the object of the calls. However, Cybersecurity remains a major challenge, only 20% of all government websites URLs meet basic security criteria. The take-up of e-identity is also lagging behind expectations with citizens being able to use their national eID for only 9% of the services from other countries.¹³

Another important issue on this huge challenge of COVID-19 challenge could be electronic identification and trust services for secure cross-border electronic transactions and central building blocks. The electronic services regulations should be broadened more and more as public administration gain a huge number of citizens and businesses data. Moreover, Internal Market Commissioner Thierry Breton¹⁴ noticed: “This crisis has shown how much citizens rely on online public services and procedures. While more and more governments are following these trends, we must take it into consideration and work together for a secure European electronic environment” (E-Government Benchmark, 2020).

¹³https://www.eureporter.co/frontpage/2020/09/24/egovernment-commission-report-shows-digital-public-services-improved-across-europe/?__cf_chl_jschl_tk__=934ce1c2768518166fcf3f1bddb0526683c34a1c-1605123691-0-AWWB9Fzpqwjacs56aW1g1ZsDJb_yrWele4Datnd7LrHzFlnk1CICYz4515C91n1Sn1_ddnj3c1Aq6NFAYFSi4ke5s11NDtTbpg2fOImpNOetcuSPtIvTwBmRkaAYHjmNZHThxam37th9Y4-LCUBQPcJlNm4y_pKSBCkhFyFCUY7YuEU5DMPdP2-WxVoRAeZBrTY528sHXDpUb89rwd2ztk_wr-710ujbvqe_5f3Tdq_n_7Q3QVmsHkxOdzboardiCMZp-TNCZpYMOt052IsCpMFUN6wR2IF1XtxQhkzLfugshrCN0yrNUR0PeZKl43Iew_gpc3LusbXYtTCxtnqyrMMDQb6C66f3CharBEVsK9VR3T9JXPtV5bMsSBE5Rs3x1q4y9tw271-pDZGiE_Y0ms5xHzOxFGIcZbdgDG-S50aB

¹⁴ https://ec.europa.eu/commission/commissioners/2019-2024/breton_en

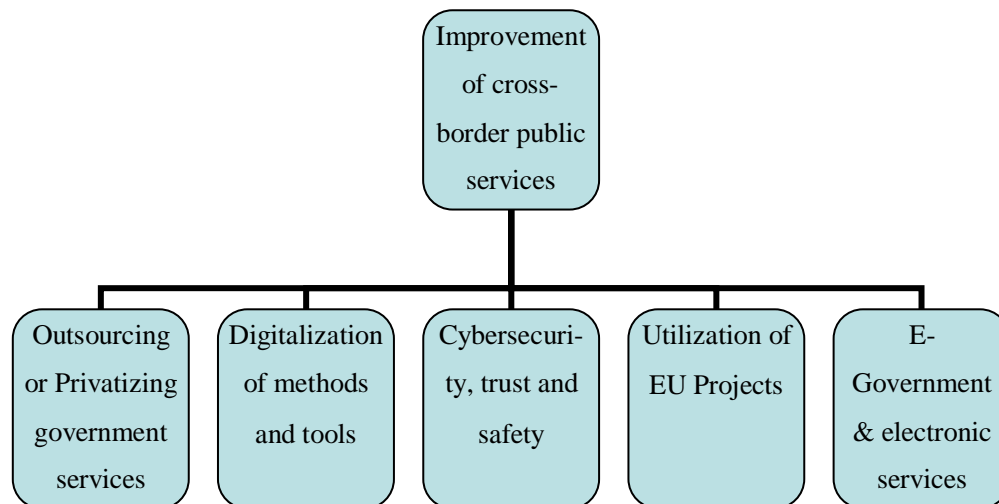
The last but not least action that we identify for improvement of cross-border public services is to make more efficient the existing digital aspects of e-government and e-services in all EU Members. In this way, it works one EU project the DIGIMAT model. The main goal of DIGIMAT is to help public services to improve their digital aspects. The difficulty of this effort is that every EU member is at a different level on digital public skills (Escalante, M., & Sedrakyan, G. 2017). At this point is very important to underline that the new digital government demands digital skills from the personnel who works at public services. In our research, we did not find any EU project that is suitable for personnel in order to upgrade their digital skills. But except for the upgrade of people who works in Public Administration it is vital to be educated the citizens and the businesses that want to use the cross-border public services. Moreover, is very important to find a solution for clients/citizens who are aged 65+ and there are not so familiarized with digital platforms especially in this period. As Citadel Project defined offline offices may help citizens make the step towards online service use. The mobile Age project funded by the EU, helps people to access public services digitally but still it needs a lot of improvement in order to be open up to all EU members.¹⁵

Finally, Artificial Intelligence should be a key part of the European Union during this pandemic period. As we are in the second wave of COVID-19 across all of Europe it is vital to strain the efforts of commission at this investment. The Commission will also support the development of an "AI-on-demand platform" that will provide access to relevant AI resources in the EU for all users (Brattberg, E., Csernaton, R., & Rugova, V. 2020). Because of the rapid news at COVID-19 situation, we suggest future research in this section of AI.

On the following graph, we summarize the most important factors for the improvement of interoperability public services that aroused from our research study. Outsourcing and Privatizing government services, Digitalization of methods and tools, Cybersecurity trust, safety and E-Government & electronic services are the key areas that could help

¹⁵ (Deliverable 2.2 Initial recommendations for transforming the public sector and services) https://www.citadel-h2020.eu/sites/citadel.drupal.pulsartecnia.com/files/documents/D2.2%20Initial%20recommendations%20for%20transforming%20the%20public%20sector%20processes%20and%20services_v1.0_20180930.pdf

European Union to transform successfully its procedures and services at COVID-19 period.



Key factors about the improvement of interoperability public services

2.3.2 How could we tackle the lack of automatically request of every EU country in order to make an evidence available to all of them?

In this Research Question, we will try to identify via the EU projects the possibility of creating a digital interoperability form for public services. The EU Strategy includes thematic projects and actions in order to tackle the Interoperability Challenges that every member face in order to make automatically request of official evidences. Digital Single Market, Interoperability and Standards, Trust and Security, Research and Innovation, enhancing e-Skills, and ICT for Social Challenge are some of the attempts of EU in order to adopt effective systems and content for European citizens via the internet. As we can understand there are many different protocols in every EU member that makes the exchange of certificates difficult. In our opinion, the challenge is to use a specific

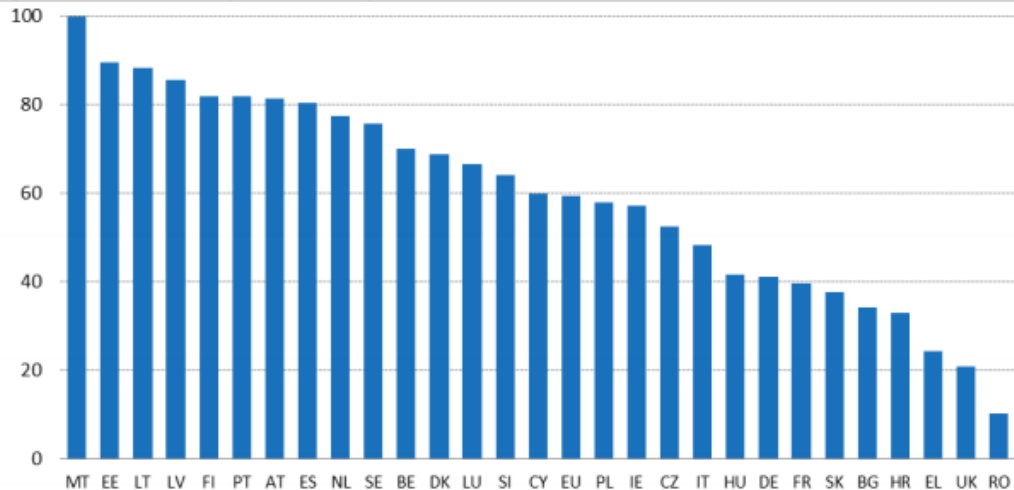
attribute of all EU countries' data systems in order to define a general way of public services interoperability, without referring to any specific systems. First of all, we should find which "strong" attribute is common in every EU state. The main idea is every third party having the opportunity to identify and use trusted services via the platform of the EU. In order to achieve this, we should use also the key attributes of European projects like DE4A, TOOP Project, etc. Nowadays there are many projects that EU Member states are launching to solve this challenge. One of them is the Single Digital Gateway Regulation¹⁶ that aims to help businesses and citizens to exchange procedures online and safe. This regulation includes also the birth certificate procedure. Moreover, the TOOP project is the main project that has focused to solve this challenge. It began in 2018 to implement the provisions of the Single Digital Gateway Regulation in order to build a pan-European level of infrastructure. There are many significant procedures of the TOOP project that would help the effort of Single Digital Gateway Regulation. For instance, e-delivery is an electronic platform of the TOOP project that helps to exchange electronic data and documents. Our idea for a digital online form for birth certificates was created from the existing data of TOOP¹⁷ project.

Moreover, we noticed that during 2019 most of the EU countries increased their scores when compared to 2018 in terms of e-Government use, pre-filled forms, online service completion, digital public services for businesses and open data. Especially in our case (pre-filled forms) the following results are at the graphic:

¹⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017PC0256>

¹⁷ <https://toop.eu/info>

Figure 4 Pre-filled forms (Score 0 to 100), 2019



Source: eGovernment Benchmark, Capgemini.

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So, we identified that would be useful to create a kind of pre-filled form because of the huge amount of people and businesses that use it. Apart from the main goal that is to create a birth certificate online form, there is a second positive dimension. Our pre-filled form includes semantic personal and sensitive data of the user that would not be obligatory to resubmit when it is requested from other digital services of public administration. In addition, the utility of our effort could be really valuable for the European Union during the pandemic crisis because of the absence of physical procedures. For instance, the physical issuance of a birth certificate at the COVID-19 period is absolutely impossible. So nowadays a blend of digital public services and procedures seems the only effective way. However, the majority of the data would have adhered to the legal rules of the European Union. More information about the structure and the online version of our pre-filled form is available in the Appendix.

About the details that the online form includes it is significant to say that the 27 countries of the EU have systems to record a birth certificate when a child is born, but in some countries birth certificates are preserved by different resources. In almost all countries birth certificates includes the child's name, place of birth, mother's age, mother's address and father's age, Birth order, birth weight, multiple of singleton, as well as name and occupation of the mother and the father. There are

¹⁸ <https://www.capgemini.com/news/egovernment-benchmark-2019/>

many countries that register data on the formal written statement itself, such as declaration number, registration area, register date.

Information of the person who makes the statement of birth are not widely registered. In 16 countries (Austria, Belgium, Czech Republic, Germany, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Spain, Slovakia), the declaring person's name is on the declaration. There are 11 of these countries that a person's address is registered as well apart from the declaration. A few countries record further characteristics of the declaring person, such as date of birth (Italy, Luxembourg, Poland and Slovakia), place of birth (Italy, Netherlands, Norway, Poland and Slovakia) and occupation (Latvia). However, 14 countries (Belgium, Czech Republic, Denmark, Germany, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Sweden) do not register any of these details. As mentioned above, surname, name, gender, date of birth, place of birth, birth order, birth weight of the child and whether the child is from a multiple or a single birth are registered on the written statement of birth in most countries. Some extra characteristics and data about the child are mentioned by a smaller number of countries. Legitimacy, born alive or stillborn, multiple or singleton and birth order are frequently registered characteristics. In 14 countries (Austria, Bulgaria, Cyprus, Czech Republic, Estonia, Finland, Greece, Iceland, Latvia, Luxembourg, Norway, Poland, Romania and Slovenia), all four of these characteristics are registered on the birth certificate.

Austria, Bulgaria, Czech Republic, Estonia, Finland, Germany, Latvia and Slovakia register birth weight and length at birth. In Greece, Ireland, Poland, Romania and Spain, birth weight is included in the written statement of birth, but length at birth is not. However, Hungary is the only country where length at birth is registered and birth weight is not. The rest of the countries that were not mentioned before register neither birth weight nor length at birth.¹⁹

After our research in the evidences that every EU country request for the birth certificate we can use the diagram of the SDG-sandbox in order to identify how could be a data model for this occasion. On the following table, there are the entities that should exist in order to have an official birth certificate. Furthermore, in every

¹⁹ <https://ec.europa.eu/eurostat/data/database>

column we record the key characteristics which are essential in every official document:

Key characteristics for every official document

Attributes	Birth Certificate	Birth	Person	Address	Public Organization
Identifying symbol	YES	NO	YES	NO	NO
Issuing date	YES	NO	NO	NO	NO
Issuing authority	YES	NO	NO	NO	NO
Issuing place	YES	NO	NO	NO	NO
Parent 1	NO	YES	NO	NO	NO
Parent 2	NO	YES	NO	NO	NO
Child	NO	YES	NO	NO	NO
Given name	NO	NO	YES	NO	NO
Family name	NO	NO	YES	NO	NO
Date of Birth	NO	NO	YES	NO	NO
Gender	NO	NO	YES	NO	NO
Citizenship	NO	NO	YES	NO	NO
Place of Birth	NO	NO	YES	NO	NO
Label	NO	NO	NO	NO	YES
Postal code	NO	NO	NO	YES	NO
Geographical name	NO	NO	NO	NO	NO

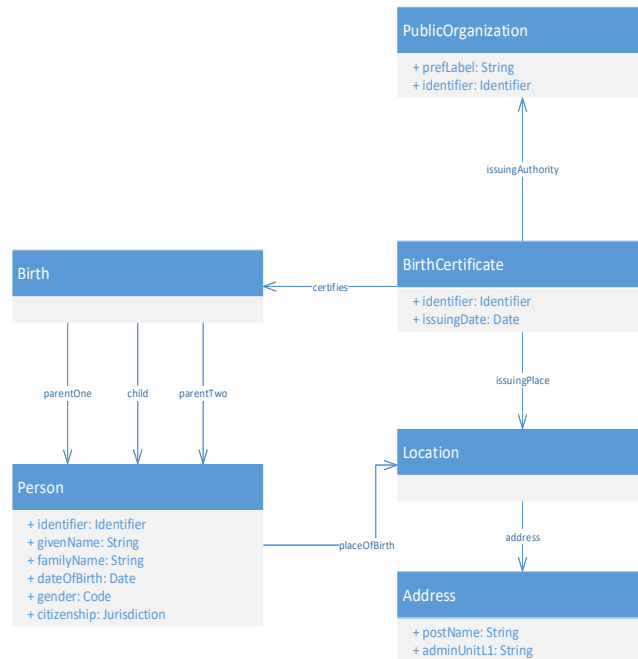
On the following graphs are available a kind of procedure for birth certification request. This kind of graphs will help us to identify differences between the qualitative data of them. Qualitative analysis usually helps us for a fuller understanding of the meaning of data. Moreover, research material demands the active involvement of the researcher, mainly with the material / text in front of him (internal reference point) without introducing theoretical / interpretive concepts terms outside the data in order to make sense of them (from the scientific bibliography). On the other hand, it is recognized that the prior knowledge and assumptions of the researcher play an important role in understanding the material and data (Willig, C., 2017). A kind of production of an interpretation in a qualitative analysis based on "suspicion" and having an external reference point is available on the analysis of research question 1. As we can see, the main goals to both of them is the production of birth certificates. However, the way that they are following is different. The main difference is in the type of evidences that every procedure demands. About our form that we will create in the section of Analysis and Findings we will try to use a mix of points.

As we can see in the first diagram (Brumberg, H.L.; Dozor, D.; Golombek, S.G., 2012) every request for birth certificate demand:

- The given name of the identifier
- The family name of the identifier
- The date of birth
- Gender
- Citizenship

These 5 categories seem to be the most important for every birth certificate request in all of European Union countries. However, there is some subcategories about the place of birth, the issuing authority and the issuing place. First of all, every place of birth demand, a location with address and post name. Every issuing authority demands the specific public organization of each country. Finally, every issuing place demand the specific location of a place of birth.

Graph 1:

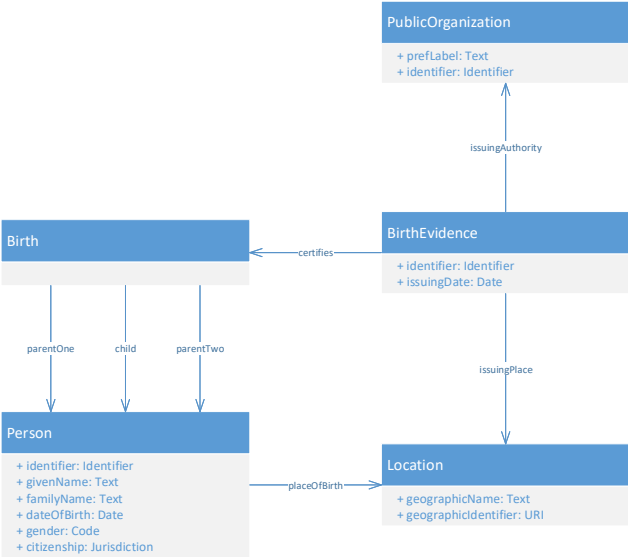


As we can see in the second diagram (Brumberg, H.L.; Dozor, D.; Golombek, S.G., 2012) every request for birth certificate demand:

- The given name of identifier
- The family name of identifier
- The date of birth
- Gender
- Citizenship
- Geographic evidences

The subcategories in this data model are almost the same with the previous one with only one difference. Instead of the subcategory address, every information about the place of birth saved on location.

Graph 2:



3 Research methodology

Research is the application of systematic techniques and methods in order to find the answers to questions. Qualitative and quantitative research paradigms are the options for a research methodology. Quantitative research is viewed as objective while qualitative research is said to take a subjective viewpoint. In a broader spectrum, one may say that qualitative research involves an analysis of words whereas quantitative research involves analysis of numerical data 1.(Syed Iftikhar, H., Shah and Shabbir Hassan, 2008). At the outset of planning a piece of research work, the most important decision on the part of a researcher is to choose appropriate research method(s) or approaches that best suits the research question or idea that he/she is likely to address (Flower, J.F., 1998). Every research strategy collects and analyzes with different ways empirical evidences; however, each strategy has its own limitations (Syed Iftikhar Hussain Shah,2008). Researchers underline that research strategy, such as case studies are only appropriate for an exploratory study of investigation whereas, surveys are more appropriate for the descriptive study (Yin, R. K.,1994). The researcher should have a clear understanding of the problem that needs to be answered. If the phenomena under study can be measured in some way then a quantitative study seems to be more appropriate (Yin, R. K.,1994).

Each type of empirical research has a research design which is the logical sequence that connects the empirical data to a study's initial research questions and ultimately to its conclusion (Yin, R. K.,1994). The research design guides a researcher in the process of collecting, analyzing and interpreting his observations. It allows finding casual relations among the variables under investigations (Frankfopt-Nachmias, C. ,1992) Our research goal is to identify which type of digital form is more suitable and efficient for EU citizens. Because of our research question 2 we decided to use the survey-oriented research methodology. It's a way to collect information by asking people questions and their answers constitute the data to be analyzed. The survey method does not restrict to study the phenomena in a single organization but provides means of collecting information from people in different organizations in order to find answers to questions for a quantitative analysis leading to conclusions (Syed Iftikhar, H., Shah and Shabbir Hassan, 2008).

In the research methodology section, we will define: a) the meanings of the key elements b) the content validity, c) the evidence and the specific criteria of them and d) the selected research approach. Moreover, includes the data information needed for cross-border evidence exchange.

A) The definitions of our key elements are the following:

Birth certificate: a document recording a baby's birth including such information as name, time, place, and parents (Brumberg, H.L.; Dozor, D.; Golombek, S.G. (June 2012).

Online form: is a digital version of these documents that is accessible and editable in a web browser

First Name: a name that given to individuals upon birth and baptism and is mostly used for identification (Bruck, Gabriele vom; Bodenhorn, Barbara, eds. ,2009)

Last Name: represents the family and is common to other members of the family (Arai, M., & Skogman Thoursie, P. 2009)

Email Address: a series of letters, numbers, and symbols used to send and receive an email (Newman, M. E., Forrest, S., & Balthrop, J. ,2002)

Date of Birth: the day you were born, shown in numbers, or words and numbers (Crawford, C., Dearden, L., & Meghir, C. (2007).

Place of Birth: the place where a person was born (Park, Y., Neckerman, K. M., Quinn, J., Weiss, C., & Rundle, A., 2008)

Sex: Whichever of the two main categories (male and female) into that humans and most other living things are divided on the basis of their reproductive functions (Guttek, B. A. ,1985)

Father's Full Name: A Father's whole name, including their first name and surname, and often any middle names (Olivares-Delgado, F., Pinillos-Laffón, A., & Benlloch-Osuna, M. T. ,2016)

Mother's Full Name: A Mother's whole name, including their first name and surname, and often any middle names (Arai, M., & Skogman Thoursie, P. 2009).

ID Number: a numeral or string of numerals that is used for identification (Lyon, D. ,2009).

Address: the number of the house, name of the road, and name of the town where a person lives or works, and where letters can be sent

Nationality: the official right to belong to a particular country (Cesarani, D., & Fulbrook, M. (1996).

The choice of our key elements was a result of a part of our research that we have made about common evidences for birth certificate requests among EU countries. In our searching process, we began with the identification of the challenges that face the European Union in order to digitalize the public services. As we noticed every country issued the form in a different language. They provided their information in the official language without giving the option to issue the evidences in a different language. This scenario creates a problem when somebody wants to move to other country and need to provide evidences. Automatic solutions are not a solution so the majority of them used a legal translation which has a cost to them. So, as we research Once-Only principle of EU projects we find out that many efforts are expressed in order to transform unstructured data to structure data. In order to avoid these illegal translations, we decide to create an online form in the official language of EU, in English. Many evidences type is required an agreement in the sense of regulations in order to be on a common data model for our research we took into consideration the scenarios that Birth Certificate is required among EU. So, the use cases are three:

- Birth Certificate request for Studying Abroad
- Birth Certificate request for Doing Business Abroad
- Birth Certificate request for Moving Abroad

B) The content validity of a questionnaire is the manner by which items are refined, so questionnaire should be clearly understandable. In order to improve the content validity reviews were carried out with the practitioners and experts. Their suggestions further refined the questionnaire in terms of the wording and flow of the items. Content validity reflects the items content domain. Content validity means how comprehensive the item's were in creating the scale (Hong, K., and Kim, Y., 2001). Construct validity is established by explaining, that the instrument measures the construct for which it is developed. Correlation and factor analysis are ways to examine construct validity. Construct validity is proportional to high correlation. It helps to examine the relative strength of the correlation between items mentioned in the instrument designed to measure the construct (Syed Iftikhar, H., Shah and Shabbir Hassan, 2008). The correlation among the items is calculated by using the sample collected from the survey. The detail is available in the next chapter.

C) The field of our survey was people that are living in any EU country and know what a birth certificate is about. Moreover, we used factor analysis to avoid attributes that may create misunderstandings to users. An exploratory factor analysis needs to be carried out to purify the instrument. After performing the Pilot survey, the questionnaire was validated using the factor analysis techniques in SPSS software. Factor analysis was used to purify our instrument consisting of 3 items (i.e. questions) initially designed. The data from 40 responses were included in doing factor analysis. After the extraction, several items were deleted. Cronbach Alpha value was calculated. Detailed discussion is available in the next chapter. A reliable instrument yields the same results every time. It is used to measure the same object assuming that the object itself has not changed. Reliability refers to the accuracy of the measuring instrument and the extent to which the respondents can answer the same or approximately the same questions the same way each time (Straub, 1989). The internal consistency reliability was also measured by calculating Cronbach's alpha and its value greater or equal to 0.7 is generally considered acceptable (Law and Ngai, 2007). The reliability results are presented in the next chapter.

D) A survey is a method of collecting information directly from people about their ideas and feelings. Surveys are a type of research that asking questions about some phenomena. Usually, in these kinds of approaches, there are some questionnaires that someone fills in. Questionnaire-based approach consists of a set of questionnaires that is prepared by the researcher in two phases. In the first phase, questionnaire is prepared and distributed for a pilot survey through any approachable means of communication.

The respondents provide answers against the questionnaire. The number of respondents in the pilot phase depends upon the size of the actual survey population which will be taken in the future. It is recommended that 20-30 percent of the whole survey population may be considered to conduct a pilot study. The pilot survey may help to dig out bugs if any in the questionnaire as well as the responses. It needs to be resolved first before taking the actual survey (Syed Iftikhar Hussain Shah,2008).

Moreover, the researcher's advice that the following considerations should be adopted during the preparation of a questionnaire (Flower, J.F., 1998. *Survey Research Method*, Sage Publications, USA)

- The questions should be prepared with an understandable structure in order the user can answer them easily

- Questionnaires are developed in a way that every question has the same meaning for everyone
- Closed questions may provide more clear response. (Flower, J.F., 1998. *Survey Research Method*, Sage Publications, USA)

The aim of our research methodology was to examine if the content of our digital forms is user-friendly and easy to use. However, to ensure that a comprehensive list of factors is included in the questionnaire, the past research findings of the critical success factors were reviewed. Efficiency, monitoring and feedback, user involvement, user experience and organization structure are some of the basic factors that we will be analyzed in the next section.

To collect individuals' opinions about their agreement or disagreement with the questionnaire items mentioning critical success factors for ERP systems implementation success, a five-point Likert-type scale ranging from 1 (Definitely Disagree) to 5 (Definitely agree) is used. The advantages of the Likert-Type scale are easy to use and interpret, and it gives the precise result (Shah, S. I. H., Bokhari, R. H., Hassan, S., Shah, M. H., & Shah, M. A. ,2011).

Likert-Type scale

Scale Number	Category 1	Category 2	Category 3
5	Extremely Satisfied	Extremely Difficult	Excellent
4	Very Satisfied	Somewhat Difficult	Above Average
3	Neither Satisfied or Dissatisfied	Neutral	Average
2	Somewhat Dissatisfied	Somewhat not Difficult	Below Average
1	Very Dissatisfied	Extremely not Difficult	Poor

4 Analysis and Findings

This is a chapter that we will analyze the main use case of the second research question for Civil Status Certificates (Birth Certificate). Our proposed analysis approach will be based on the following steps:

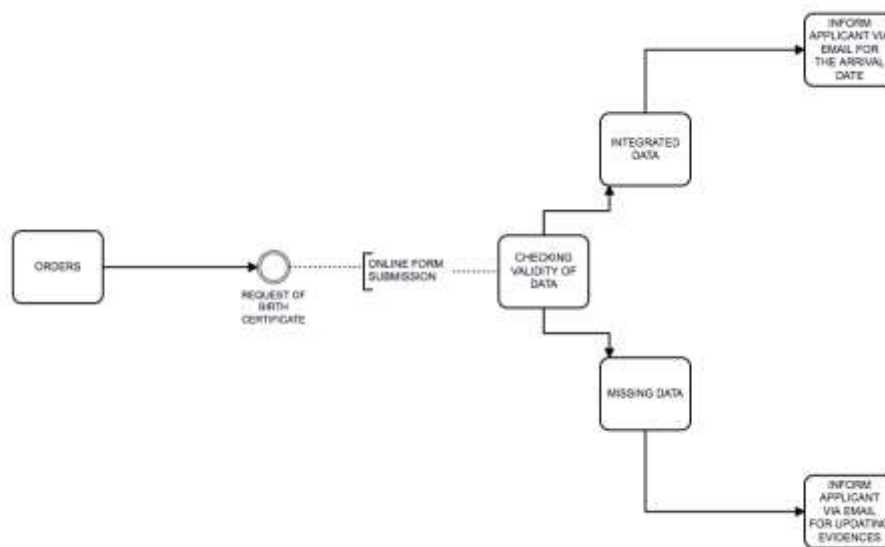
- Selection of Evidence
- Identification of Competent Authorities per type of evidence
- Definition of Attributes per Evidence
- Define a set of attributes per evidence
- Proposal data models per evidence

First of all, we will define the key elements that every EU country uses for their birth certificate (e.g. Name or Surname) and then we will create a data order with those that they use all of them. After our research for the requirements/procedures, we aim to conclude that it is possible to create an online form in order every EU citizen could take a birth certification with the same pieces of evidences. In our data structure, we will create a form via Microsoft Forms in order to achieve the goal of our research question.

As our second research question described, we will try to make an all-around Birth Certificate form that will be useful for any type of EU citizen or business (e.g. for moving abroad as a student). We will struggle to find the prescription that will allow every EU user to request a Birth Certificate online form from the main digital platform of EU public services. It is important to underline that the goal of this attempt is the reduction of activities in every public sector of the EU country.

4.1 Contribution:

At the part of the contribution, we will begin with a type of chronograph for the progress of every birth certificate request. In order applicants be able to track their requests, we create a diagram that measures the procedures. The schemas of rectangles are represented the basic steps of the whole procedure. Furthermore, are recorded the two available options about the progress of the application. The circle illustrates the acceptability of the user's request for a birth certificate.



A type of chronograph for the progress of birth certificate request

As we can see every EU citizen has access to track step by step the procedure of his/her request.

- First step: Confirmation of the request for birth certification
- Second step: Evaluation of data validity
- Third step: If the requesting form includes integrated data then the system will inform the applicant of the arrival date. If not, then the system informs via e-mail the applicant to edit the evidence of the request.

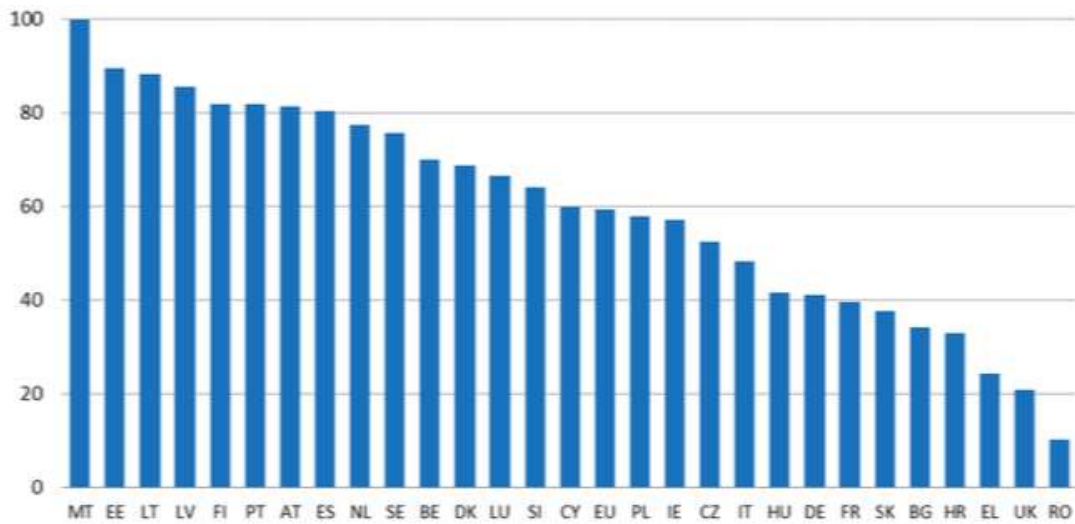
As our research questions required, we create a birth application form at the standards of the EU Commission. This form is part of the academic research in the framework of the dissertation of the postgraduate program e-Business & Digital Marketing of the International University of Greece, in Thessaloniki. The subject of this research is the integrated cross-border public services within the European Union and especially of Birth Certificate Request. In this research, the service that we analyzed is the digital process of getting a Birth Certificate Request within an EU Member State. The following form has been created for digital use and has emerged after a thorough study of digital and non-digital forms related to the redirection process in all the EU Members, as well as the sorting of common features found in them. The main objective of the research is to propose a form that combines common features from the countries under consideration to facilitate and enhance interoperability within the EU.

Firstly, we selected all the common evidences of every EU country form and then we tried to create user-friendly content with maximum 10 requirements. The main data that we asked the applicants to complete are the commons attributes of each member state about a national birth certificate. The key evidences are: Full name, E-mail Address, Date of birth, Place of birth, Sex(optional), Parent's Full Name, ID Number, Current Address, the Reason of Request and Nationality. As you can see, we selected to put optional the request of sex after the latest researches that we made on the second semester of the postgraduate program e-Business & Digital Marketing of the International Hellenic University. The findings of our work, after deeply studying the most recent bibliography have confirmed that there is inequality between genders when it comes to user experience. Gender should not be considered a dimension for segmentation, but the utter goal must be to achieve a gender-neutral environment in Human-Computer Interaction.

In order to value the efficiency of our digital form, we asked our applicants to answer also the Bulgarian online form for a birth certificate, because it seems to be one of the most complicated. The Bulgarian form consists Full name, Date of Birth, Place of birth, Sex, Municipality of Residence at Birth, Citizen's Nationality, ID Number, VAT Number, Father's Full Name, Mother's Full Name, Father's Date of Birth, Mother's Date of Birth, Father's ID Number, Mother's ID Number, Father's Municipality of Birth, Mother's Municipality of Birth, Father's Nationality, Mother's Nationality

Every applicant filled in our two forms without knowing which version is the Bulgarian or ours. The full version of the forms is available on the weblinks of the Appendix. After the integration of the digital form, the applicant was asked to fill in a questionnaire about the user experience. The main questions to answer were about: satisfaction of service, the difficulty of form's integration, rating the content, duration and the possibility to recommend to others our form. All of our questions are based on a bibliography that is founded on previous usability and user experience surveys.

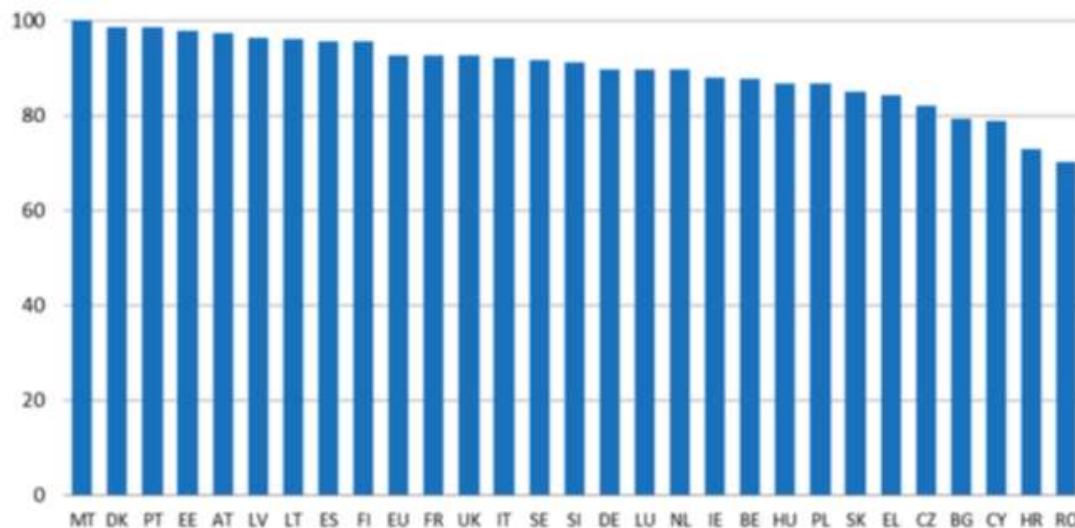
Our main idea was to create a pre-filled form with an online structure in order to make easier the applies for such requests. Our research on this idea showed that pre-filled forms are really useful for applicants. In the next diagram, we can measure the acceptance of citizens from EU countries at a range of scores 0-100 for the year 2019.



Source: eGovernment Benchmark, Capgemini.

(eGovernment Benchmark,2019)

In 2019, the majority of the countries improved their percentage on this measure when compared to 2018. Moreover, except for the structure of the form we have faced the challenge of online acceptance. Every online service demands various steps for dealing with public administration. For our research, we used the sources of eGovernment Benchmark. The results were crystal clear that has shown that almost every EU member has the necessary procedures to work digitally. In the next figure of 2019, we can measure the scores:



Source: eGovernment Benchmark, Capgemini.

(eGovernment Benchmark,2019)

As a beta version of the application form, we didn't request applicants to use real personal data in order to fill the forms. Our goal of this attempt was to identify which of the two versions is more acceptable and easier to apply. Moreover, we created questions with the main goal the simplicity and the accommodation of the user experience. Furthermore, we prepared our users with a pre-test note that we underlined the purposes of the forms. However, some of the participants did not react like they read correct the instructions and this point is something that we will discuss further in the conclusion section.

Our survey ran for 10 days (20 Sept. -30 Sept.) and most of the participants were academic students and people up to 40 years old. The final amount of replies that we took was 116 and the results are on the following section of descriptive statistics.

4.2 Descriptive Statistics:

Pie of gender

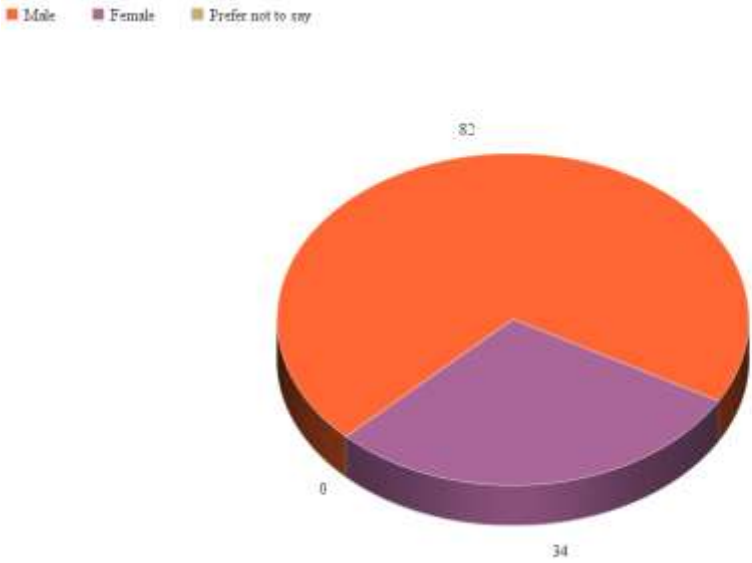
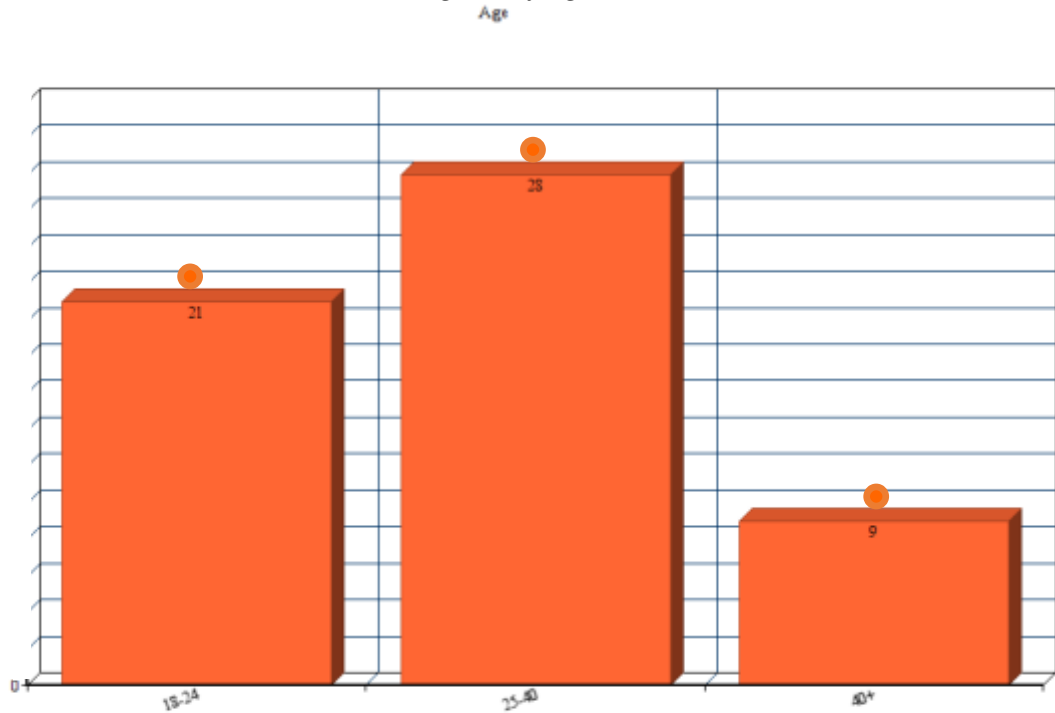


Diagram of age



The following table shows the results of the descriptive analysis from the excel datasheet:

Mean	28,2069
Standard Error	0,702268
Median	26
Mode	25
Standard Deviation	7,563663
Sample Variance	57,209
Kurtosis	-0,17121
Skewness	0,981919
Range	28
Minimum	18
Maximum	46

Sum	3272
Count	116

The age mean of our audience is 28,2 years old. Seems to be one of the most vital factors of our survey because at this range of age people used to take business, life or academic decisions in order to move abroad. As we analyzed in a previous part the cases that we aimed to identify the birth certificate request are: i) Moving Abroad ii) Studying Abroad iii) Doing Business Abroad. Our survey showed that people prefer the version that we created (online form 1) for these reasons with a generally degree of 7,8/10. In the section of comments, they let us know that the simplicity in the structure of our form, the proximations of the requirements and the cohesion of the context were some crucial factors for them. Moreover, the amount of time required to fill in was no more than 5 minutes on average which was also positive in the general user experience. As we can see in the previous graphs most of our testers were male and between 25-40 years old. It is crucial to say that our results are more accurate for people with these attributes. Of course, our data sample is not enough for the whole European Union but is enough for a safe beginning on the section of online birth certificates. Furthermore, it is significant to say that the lack of time was a crucial factor for our limited data samples.

4.3 Inferential Statistics:

In this section, we identified which are the critical factors for our survey. A survey is a way of getting information directly from humans about their thoughts and feelings. The survey designed approach is asking questions about some situations. A basic factor of a survey is the questionnaire. The main procedures are to create a sample, prepare users for the whole content of the questionnaire, and let them know about the duration of the process, and other preparatory work is all in service of the engagement that takes place between researchers and respondents. Survey results depend absolutely on the questionnaire and the answers of the users (regardless of how desirable the results are mediated). To decrease response errors, questionnaires should be designed under the best methods. Suggestions about best methods from experienced users and general comments could give to the methodological research valuable feedback. In the following analysis of our

survey, we first identify the key phases for the pre-questionnaire session and then we will categorize the main architecture of our formal questionnaire. The architecture focusing mainly on the words used in questions, and then make further recommendations based on a review of the methodological research (focusing mainly on the structural features of questions). We begin our examination of the methodological literature by considering open and closed questions (e.g., asking to select in a number of choices among different categories (e.g., “how satisfied are you with the service of the form?”). Secondly, we included questions in a number of scale (e.g., “How likely are you to recommend the form?”). Moreover, we took also into consideration open questions for ascertaining feedback recommendations (e.g., “Is there any additional comment or questions that you would like to share?”). Next, we evaluated the design of rating levels. We noticed that the literature review on the optimal number of scale levels, consider whether some or all scale levels should be labeled with words or numbers, and examine the challenges of acquiescence response bias and methods for avoiding it. (Krosnick, J. A., 2018). Questionnaire-based approach consists of a set of questions that is prepared by the researcher in two phases. In the first phase, questionnaire is prepared and distributed for the pilot survey through any approachable means of communication. The respondents provide answers to the questionnaire. The number of respondents in the pilot phase depends upon the size of the actual survey population which will be taken in the future. It is recommended that 20-30 percent of the whole survey population may be considered to conduct the pilot study. The pilot survey may help to dig out bugs if any in the questionnaire as well as the responses. It needs to be resolved first before taking the actual survey (Syed, 2008). A survey can be a self-administered questionnaire that someone fills out alone or with some assistance. Critical Success Factor is a business term for an aspect that is obligatory for an organization or project to achieve its goal. (Pointo and Slevin (1987) mentioned project success as a function of critical factors. Finney and Corpett (2007) defined critical success factors as “a reference to any condition or element that was deemed necessary in order for the ERP implementation to occur successfully”. Critical factors may be limited in number (Rockart, 1979), however, these factors are frequent contributors to either a success or a failure of a system (Yogi, S. 1996). Critical Success Factors may be considered as the conditions that need to be met for assurance of success of a system (Poon, P. and C. Wagner, 2000). On our occasion, we

faced several problems to select critical factors but after the research on literature review, we end up with the following:

- **Organizational structure:** With this term, we tried to cover the satisfaction of users in the terms of service. It is very important for any online application form to be well-structured for users and to direct them to the right way of information.
- **Project scope and definition:** It is vital to identify why the online form system is being implemented and what critical citizens/business needs the system will address. It is important to set the objectives and goals before birth certificate online form implementation. There must also be clear definitions of goals and expectations. [Pointo and Slevin \(1996\)](#) graded clear goals and objectives as the third most critical success factor in his research study. For the successful online form implementation, project scope and definition are a critical success factor.
- **User involvement:** [Hartwick and Barki \(1994\)](#) defined user involvement as “A psychological state of the individual, and as the importance and personal relevance of a system to a user”. User involvement plays an important role in the online forms in order to make them feel ownership of the system. The user involvement will be helpful to get user requirements, a better quality of the system and increase system usage ([Esteves, J. and Pastor, K. ,2001](#)). The success of an online form depends on the use of the system after its successful implementation. [Zhang . \(2002\)](#) reported that user involvement at the initial stage is helpful for the user to understand the system and to provide valuable feedback.
- **Monitoring and feedback:** As monitoring, we assumed the systematic and routine collection of data during project implementation for the digital version of birth certificate request ([Casley, D. J., & Kumar, K. \(1989\)](#)). As feedback, we occurred the reaction to a product or service (our digital form) which is the basis for improvement. ([Andrew Ford,2010](#)).
- **Efficiency:** At this point, we tried to measure how useful is our effort. Citizens and businesses in many EU countries do not have to face again the option of a digital form for public services. Actually, this term will show how close we are to our goal.
- **User experience:** Nowadays, with the digital transformation of every product or service it is necessary to emphasize to user experience factors. So, we tried not to fulfill our form with redundant information or procedures. As user experi-

ence, we define the emotions and attitudes of a human when he is using a product, system or service. Moreover, it contains the purely practical, empirical, effective, and worthy features of human-computer interaction and product ownership (Law, E. L. C., Roto, V., Hassenzahl, M., Vermeeren, A. P., & Kort, J., (2009).

A pilot study is carried out to validate the instrument developed for our research. The detail of the questionnaire is available at Appendix. The questionnaire consisting of 15 questions related to success factors for the online birth certificate form that was built and sent to 116 testers from different fields of education level. However, the first 23 responses were included in our pre-survey session as we want it to have feedback for our structure of questionnaires. The sample is used in doing Factor Analysis. Statistical Program for Social Scientists (SPSS) is used to conduct factor analysis using the principal component method. The correspondence of the questions with our variables are in the following table:

Success Factors	Questions
Organizational Structure	Overall, how satisfied are you with the service of form?
Project Scope and Definition	Did you find the scope of form useful?
User Involvement	How likely are you to use in the future the service of form?
Monitoring and feedback	How would you rate the content of the online form?
Efficiency	How difficult was to find the required evidence on the form?
User Experience	How likely are you to recommend the form?

4.4 Factor Analysis (Reliability analysis):

Factor Analysis may be used as an expedient way of asserting the minimum hypothetical factors that may account for the observed variation and as a source of exploring for possible data reduction. An exploratory factor analysis needs to be carried out to purify the instrument. After performing the Pilot survey, the questionnaire was validated using the factor analysis techniques in SPSS software. Factor analysis was used to purify our instrument consisting of 15 questions initially designed. The data from 117 responses were included in doing factor analysis. After extraction 3 variables were deleted. Cronbach Alpha value was calculated. Every item with a Cronbach Alpha value > 0.70 is considered in our analysis. That means that these items are reliable for our analysis.

4.4.1 Research Findings:

The main goal of this research process was to identify if our critical factors affecting our digital form for EU procedures. Critical Success Factors are important to ensure that our effort is well-focused. A questionnaire consisting of 15 questions encompassing all the aspects mentioned in previous sections was developed to use in our pilot study. A pilot survey was conducted using this instrument. In our pilot study, we tried to test our critical factors. We used SPSS analysis in order to do factor analysis. As a limitless of time, we conducted only six variables for testing the critical factors. We assume that there more variables that could take into account as key critical factors. Despite the growing importance of digital transformation in developing countries of the EU, it is perhaps surprising that the literature to date is relatively sparse. However, most of the studies regarding cross-border interoperability have been conducted in Europe.

Efficiency and User Experience have been proved the most critical success factors for our digital forms by the empirical data. That factor has a critical influence on the implementation process and outcome. Moreover, Organisational Structure proved that was also an essential factor for the implementation of our digital form as Cronbach Alpha for this term was ,0769.

Form 1:

Component Matrix^a

	Component	
	1	2
Organisational Structure 1	,851	,211

Project Scope and Definition 1	,607	,087
User involvement 1	,786	,185
Monitoring and feedback 1	,732	,292
Efficiency 1	-,363	,914
User Experience 1	-,275	,946

The value of Cronbach Alpha for 3 items is observed as less than 0.70. These items were removed from the Key factors for online form 1 in our study. The detail is as under:

Communalities		
	Initial	Extraction
Organisational Structure 1	1,000	,769
Project Scope and Definition 1	1,000	,376
User involvement 1	1,000	,652
Monitoring and feedback 1	1,000	,621
Efficiency 1	1,000	,966
User Experience 1	1,000	,971

4.4.2 Construct Validity Analysis

The correlation matrix mentioned below represents the relationships among various success factors. The relative strength of the correlation between digital form 1 implementation success factors construct is quite interesting. The entire critical success factor is strongly correlated with each other in the implementation process. The following table shows the strong correlation between factors. The complete correlation matrix is placed in Appendix.

Correlation Matrix^a

		Organisational Structure 1	Project Scope and Definition 1	User involvement 1
Correlation	Organisational Structure 1	1,000	,443	,646
	Project Scope and Definition 1	,443	1,000	,278
	User involvement 1	,646	,278	1,000
	Monitoring and feedback 1	,562	,315	,507
	Efficiency 1	-,114	-,094	-,116
	User Experience 1	-,029	-,076	-,038
Sig. (1-tailed)	Organisational Structure 1		,000	,000
	Project Scope and Definition 1	,000		,001
	User involvement 1	,000	,001	
	Monitoring and feedback 1	,000	,000	,000
	Efficiency 1	,111	,157	,107
	User Experience 1	,379	,207	,344

Correlation Matrix^a

		Monitoring and feedback 1	Efficiency 1	User Experience 1
Correlation	Organisational Structure 1	,562	-,114	-,029
	Project Scope and Definition 1	,315	-,094	-,076
	User involvement 1	,507	-,116	-,038
	Monitoring and feedback 1	1,000	-,032	,055
	Efficiency 1	-,032	1,000	,938
	User Experience 1	,055	,938	1,000

Sig. (1-tailed)	Organisational Structure 1	,000	,111	,379
	Project Scope and Definition 1	,000	,157	,207
	User involvement 1	,000	,107	,344
	Monitoring and feedback 1		,368	,277
	Efficiency 1	,368		,000
	User Experience 1	,277	,000	

A total of six critical success factors related to digital forms implementation have been identified based on the review of past research findings. A questionnaire consisting of 15 questions encompassing all the aspects to use in our pilot study. A pilot survey was conducted using this instrument. In our pilot study, forty usable questionnaires were received and used for Factor Analysis. SPSS was used to do factor analysis. Among 6 items mentioned in the questionnaire, 3 items were discarded on the basis of the value of Cronbach alpha < 0.70. The list of items discarded is under:

Item detail	Cronbach Alpha < 0.70
Project Scope and Definition	.376
User Involvement	.652
Monitoring and Feedback	.621

After the beta-survey, a survey was conducted for our research. Key success Factors for implement a pan-European digital form are very complex so, a survey may be an ideal method for researchers. In our research findings showed user experience and efficiency as the topmost critical factors. Moreover, it is also observed that these two variables are strongly correlated ($r = 0.988$).

Organizational Structure, User Experience and Efficiency have been the most critical success factors for digital form implementation in the EU by the empirical data. These

factors have a critical influence on the implementation process and outcome. Of course, for the implementation of the online birth certificate form, there are many more successful key factors that may be analyzed.

For our survey, it is extremely important that we identified User Experience as a key success factor because that means our form fulfills the user's needs and concludes the whole experience for a birth certificate request as a positive one. Nowadays most of the public services among EU countries demand a lot of bureaucracy and it is really important to have one type of request that is delightful to interact with. In the field of efficiency, it is significant to underline time and cost perspectives. Using online forms reduces research costs. It saves money on postage and you don't have to allocate time and resources to enter the information into a database. Reactions are processed automatically and the outcomes are reachable at any time. The time span needed to complete an online form for public purposes is usually shorter than that of traditional public services methods. Because information is being gathered automatically, you don't have to wait for paper questionnaires to come back to you - response time is almost instant. Online marketing specialists underline that more than 50% of responses are granted within the first three days of the research project. Nowadays, the majority of citizens and businesses that have access to the Internet seems to prefer to use online services instead of using physical stores. With the online digital form, users can pick a moment that suits them best and the time needed to complete their work is much shorter. To sum up, an efficient digital form could help people and organizations who would like to conduct EU Public Services – it is less time consuming, cheaper, you get the results faster, and you can transfer and use the data in various applications for important issues.

Furthermore, when a digital form is efficient at the User Experience field it means that maximizes the user's pleasure, satisfaction motivation, and productivity. So, at the Covid-19 period it is very crucial feedback for our effort. Furthermore, through User Experience design, we can gain a better understanding of the problems we need to solve. By observing the way users interact with our cross-border public service, we can become aware of specific behaviors that provide a different perspective of the online forms' effectiveness. Having a direct user experience with the users may guarantees better consistency between their needs and your solution, increase users' trust, and improve the service's longevity. Moreover, when a form is user-friendly means that the whole organizational structure is also effective. Here comes the second success factor that

gave us positive results. It seems to have a functional attempt of a digital form that clarifies the goals of the Birth Certificate request and the common actions that the user may follow for it. When a kind of organizational structure answers to user's needs that means that is an effective one. We also suppose that our results are highly positive because of the diagram that we have analyzed at the very first contribution part. It seems that would be helpful to have a mapping about your progress of the birth certificate request. Each part is divided among a few specialized steps and they all carry out their tasks to help achieve the overall goal of the job in question. The job is typically broken down into some steps, either in sequence or parallel, and a different user is in charge of carrying out each step. Individual EU citizens or businesses, therefore, will specialize in doing certain parts of the online form, rather than the whole it.

4.5. Research questions findings and future work

About research question 1 we identified that:

- creating methods and tools would be important for the catholic digitalization of all public services
- the utilization of EU projects that are focused on digital security and safety is vital

It is important for future work on:

- outsourcing or privatizing government services
- electronic identification and trust services for secure cross-border electronic transactions and central building blocks
- make more efficient the existing digital aspects of e-government and e-services in all EU Members
- Utilization of Artificial Intelligence

About research question 2 we identified that:

- Efficiency and User Experience have been proved the most critical success factors for our digital forms by the empirical data.

- Organisational Structure proved that was also an essential factor for the implementation of our digital form as Cronbach Alpha for this term was ,0769

It is important for future work on:

- Project Scope and Definition
- User Involvement
- Monitoring and Feedback

5. Conclusion

The difficulties we faced among the systems and the procedures have created us some extra assumptions for the subject of integrated cross-border interoperability for public services. As the lack of time did not let us analyze them, we listing them in the following section.

Because of the rapid progress of COVID-19 during our dissertation and survey schedule, we conclude that digital public services are already at an efficient level of consumer support but there a lot of fields that should directly improve. For example, it is vital for all EU Members to give access to their citizens in digital public services. After the first wave of pandemic more and more procedures were available for EU citizens and businesses. However, it is still a gap for methods and tools that could help public administrations across Europe. Designing and delivering new digital services to improve Digital Interaction. Furthermore, as the e-Government Benchmark underlines ([European Commission,2020](#)) it is essential to measure which digital public services are used more during this period of pandemic crisis and then improve these specific areas. The pandemical issue is something that emergence the need for efficient digital resources. Some beta projects and not integrated procedures should be fastened up in order to face up these new obstacles in public services and generally in our life.

As we analyzed the findings of data models about the request for birth certificate is important to clarify the real possibilities of the project. First of all, it is significant to say that a cost model should be created. In paragraph 2.2.5 we assumed that some EU members demand a cost for issuing a birth certificate. Contrariwise, the EU commission struggles to offer free digital services to businesses and citizens. Some of the basic challenges that may be created in this part are connected with the budget of EU and EU Members. For example, many EU members are not willing to offer a huge amount of their budgets for interoperability and cross-border public services reasons. In order to solve these crucial cases, it's important to make future research.

Furthermore, our service could also help citizens and businesses in other procedures except from simply birth certificates request. It is offering a huge amount

of data about EU Citizens and Businesses that are really valuable also for other procedures of digital public services. Especially in this pandemic period that everyone is staying at home, an EU resource with basic personal data, and more is very vital in order to follow the current public liabilities. However, there are many important circumstances that the EU should take into account before sharing all this sensitive data. First of all, GDPR agreements should be taken from the users before filling in the forms. It is really significant to underline that every user that gives this data to an internet platform must feel safe about its personal evidence. Moreover, if it is a planned story for the EU to correlate with other public or private businesses from the data that gain of our birth certificate form, then it is also important to inform users about these actions. The easiest and more efficient way to achieve this is via special terms and conditions.

Another vital part that demands extra research is the innovative way that we should find out in order to engage with more feedback procedure. Except from the questionnaire and the survey that we conducted the past 6 months, another one efficient way to extract positive or negative feedback is to conduct social media polls. (What the brain 'Likes': neural correlates of providing feedback on social media) Nowadays, social media are in everyday life more than ever. So, it is really possible in this way to gain easier users' attention and receive more and more feedback. Moreover, after the searching for extra efficient ways for feedback procedures then it is significant to receive it fast, in order to adapt the changing need, pace, and ability to process information.

About our last part of survey implementation, it is significant to say that the major objective of this research was to suggest a more efficient digital way of a birth certificate request. Because of the limitless of time, the results of our critical factors are just one part of the catholic implementation success in EU digital forms. However, it is a vital data sample that the European Commission, the organizations, users, management, and system developers may take into account for their future projects.

5.1 Proposal for Further Research:

We observed that most of the bibliography focuses on the digital transformation of public services that help us to make more clear results in our part. We propose that a pan-European digital online form about birth certificates and other applications is something possible to be achieved next years. It demands a holistic effort of the European Commission in order to educate developers, attorneys, marketing specialists and public services experts. In fact, there are many EU projects that exist already and aim at the very same area of digital public services that could help each other for a really powerful change of cross-border public services. In addition, it is vital to investigate digital marketing practices in order to make the public sector more likable and friendly to users.

Reducing bureaucracy and easy access of citizens and businesses to public administration services will contribute to the growth and create new jobs. The use of ICT tools by the administrations of each Member State offers opportunities to improve the services provided. Furthermore, the provision of such services at a cross-border level will facilitate the achievement of the "single market" goal where citizens of all EU countries will be able to move and trade easily and efficiently with public services outside their countries. Interoperability between Member States public administrations is a prerequisite for the provision of cross-border services. Accessibility, multilingualism, cybersecurity, subsidiarity, the utility of open standards and the protection of personal information are the challenges on which the European Interoperability Framework was based. The interoperability of public administrations does not only concern technical interoperability but also legal interoperability, organizational interoperability as well as semantic interoperability. The aim of these policies should be to stimulate innovation and competitiveness through the wider assimilation and optimal use of ICT by citizens, governments and businesses, and in particular SMEs. Enabling citizens to cross-border electronic authentication is one of the key tools for enjoying the cross-border services offered in the European Digital Single Market. For this purpose, it is necessary to have a common interoperability platform that will "hide" the particularities of the systems of each state and allow these systems to communicate and exchange information. The STORK large-scale pilot

project implemented and installed an interoperability platform for the provision of cross-border services to citizens and businesses. An important issue that he analyzed and implemented through this platform is the cross-border user's data transfer in a secure and privacy-friendly manner. It must ensure also the authenticity of authentication, the user-centric policy followed with the user having full control over the sending and handling of his data provides the necessary security and privacy guarantees. Nevertheless, it is necessary to have a guide who will provide service providers with the necessary knowledge and methodology in a simple and understandable way, so that they can judge and select the most appropriate services with security. In particular, for the providers of identification and characteristics, the presence of a central body is necessary, which will supervise these providers regarding the observance of the necessary regulations and specifications for the protection of the privacy of the citizens as well as for the security in the transactions between them. The lack of users for the offered cross-border services, the attraction of new users and the maintenance, and improvement of the services implemented through the EU Large-Scale Pilot Projects, are among the most important problems faced by these Projects. Advertising and disseminating the services provided, strengthening public confidence, and providing incentives for the use of the services during the development period of the projects but also after their completion, are some of the actions that should be strengthened and improve. Unfortunately, it seems that the bureaucracy at the EU level is delaying the implementation of projects that offer these services, while it is almost impossible to monitor the needs of citizens and adapt projects to these needs. It would be very helpful to define the services offered in each project according to the real needs of the citizens, to simplify and speed up the procedures for the implementation of the projects so that they can follow the developments at the technological level, but also meet the different conditions and requirements that develop over time. The offer to the citizens and the companies of the services that they need and demand would also contribute to the solution of the problem of the lack of users of the services that is observed and is one of the most important disadvantages of the projects.

Moreover, it is notable to comment that our survey is only the beginning of this attempt. To have a clearer overview of this issue, it is necessary to test a wider crowd of people. Because of the limit of time that we had in our survey, we pro-

pose the continuators of this effort to share their testing forms on a larger scale of people among all the EU members. Furthermore, we suggest future research in order to check the possibility of creating some blockchains, contained data from every EU member with the same structure of evidence in order EU having exactly what they want from every country. Via an EU blockchain technology may collaborate all the EU countries under the loyalty and the credibility of the EU Commission. On broaden plans that could be used from every EU partner (countries, citizens, or businesses) that is requested for interoperability services. Moreover, we will suggest an idea of creating a Prototype for the exchange of shreds of evidence between member states related to offering cross-border digital services. The critical factors that we identified at first level could be the beginning of a progression with more critical factors. Finally, we propose a future use of the semantic interoperability solutions depending on the use case. Using, the GCCS (Generic Certified Communication System) rules in order to have a generic interface in every national/government system the server would be able to:

- Determine whether a destination domain is a GCCS or standard Internet email
- Identify the provider of a GCCS domain.
- Recognize the profile of the GCCS Provider (working evidences of timeouts, message, and notification format).
- Get public keys of any other GCCS provider.
- Acquire any e-mail addresses needed for the operational purpose (e.g., e-mail addresses for server-to-server acceptance notifications)
- Each CCS must publish its public key in the DNS
- The provider must publish its list of managed CCS domains (record TXT). A mail system also is a key feature of a generic CCS System.

Another important issue for future research is environmental awareness. As our case study is an effort of drastic activation on cross-border public services we can easily understand the different strands that created to environmental cases. This kind of effort could be really useful the help and cooperation with EU Projects (e.g., European Green Deal) or with eco-friendly organizations. For exam-

ple, the digital transformation of public services could save millions of stationeries. The action plan for environmental awareness should include many procedures of public services. For instance, the possibility to find out a way to an archive of documents on public sector.

Cross border interoperability is also a vital factor for the whole European Union's progress on public services. Our analysis shows that the functionality of digital public services could upgrade more during the next years. Nowadays, interoperability challenges are more than ever. We need to analyze the obstacles to cross-border cooperation and how possible is to establish an all-around network of digital functions. However, the increased amount of data and information let us resolve semantic conflicts and problems. Trust, democratic governance, equality of members, and royalty are also some key factors for successful interoperability in public services. Moreover, cross-border communications between the EU countries should be standardized in order to achieve better practices. At this point, it is significant to underline that governments and the whole European Union as a mass should work under the same rules and constructions for efficient results on cross border issues. Finally, we conclude our dissertation and research highlighting the benefits, risks, negative effects as well as consequences of cross-border technology on the European Union market. The transformation to digital technology in public sectors is increasing. Therefore, we believe that further critical research is needed to exploit its capabilities and understand the limitations when applied on a large scale.

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Appendix

About our analysis of our research question 2, we created a survey with 2 different birth certificate forms. The form 1 contains our perspective for Birth Certificate Request and the form 2 contains the evidences of Bulgarian form in a digital version. On the following weblink is available the digital version of the two pre-filled forms.

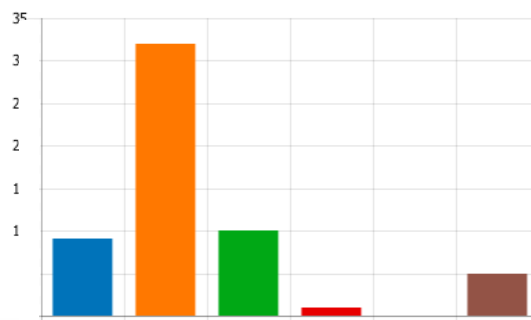
Form 1 & 2:

<https://forms.office.com/Pages/ResponsePage.aspx?id=swX9DbF-L0C8OL3VZteKESLQU39-YU5Gp5PCLRfhJYZUMDhXOVVFRIVFQVRZTTZBU1k2RDRRQzgyUC4u>

User Satisfaction on form 1:

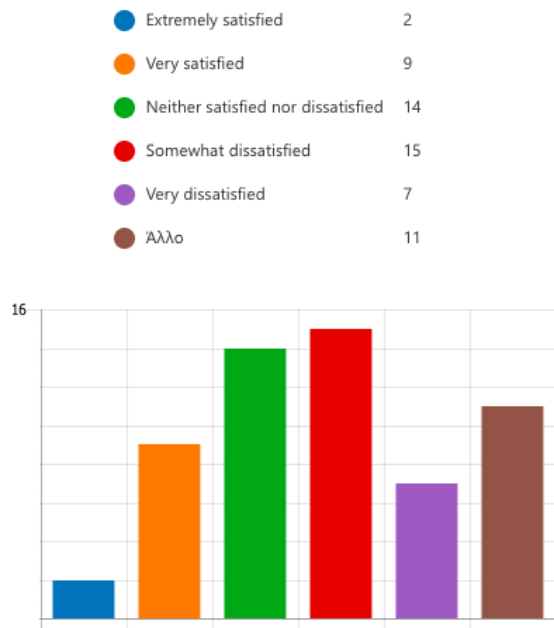
40 of the total amounts of testers answered that are more than satisfied of the general experience with the online birth certificate form 1. On the graphs below we can notice the results:

Extremely satisfied	9
Very satisfied	32
Neither satisfied nor dissatisfied	10
Somewhat dissatisfied	1
Very dissatisfied	0
Άλλο	5



User Satisfaction on form 2:

Contrariwise to form 1, the online form two took only 10 positive responses to user satisfaction case. As we can see there is a vital difference at the percentages of satisfaction between the two forms. 70% of user satisfaction and 17%



Difficulty to find the required evidences on form 1:

The second important issue of our questionnaire was how easily is for users to find the required evidences of our form. The majority of the testers (42 of 58) answered that it wasn't difficult to reach the evidences and only 7 people find it difficult.

● Extremely difficult	2
● Somewhat difficult	5
● Neutral	9
● Somewhat not difficult	20
● Extremely not difficult	22



Difficulty to find the required evidences on form 2: On the other side ,about the Bulgarian form, 31 of the users said that the required evidences of form 2 have fuddled them.

● Extremely difficult
● Somewhat difficult
● Neutral
● Somewhat not difficult
● Extremely not difficult



Content rate of form 1:

The 74% of the audience from our survey graded our form content above average or excellent.

- Excellent
- Above average
- Average
- Below average
- Poor



Content rate of form 2:

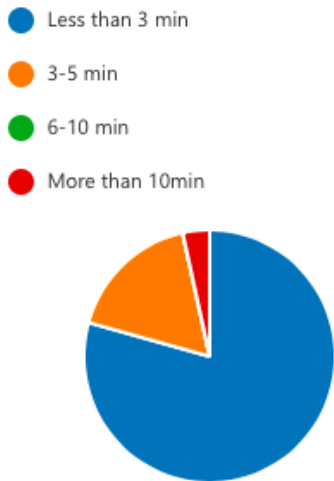
On the contrary, 45% of the users said that form 2 has also very good content.

- Excellent
- Above average
- Average
- Below average
- Poor



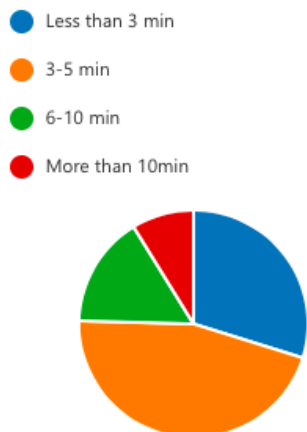
Duration to complete form 1:

Moreover, the duration to complete our form seems to be less than the second one , as the 79% answered it on no more than 3 minutes



Duration to complete form 2:

Only the 30% of the audience answered the questionnaire on less than 3 minutes.



Questionnaire: In order to test the quality of our online form we created an online questionnaire for the testers. The full version is available on the following weblink

<https://forms.office.com/Pages/ResponsePage.aspx?id=swX9DbF-L0C8OL3VZteKESLQU39-YU5Gp5PCLRfhJYZUNTNTSIQyVjBaUkQzRVVMWVpHSUNBUkNKMS4u>

The complete version of Factor Analysis:

GET DATA

/TYPE=XLSX

/FILE='C:\Users\user\Desktop\TESTING FORM 1.xlsx'

/SHEET=name 'Φύλλο1'

/CELLRANGE=FULL

/READNAMES=ON

/DATATYPEEMIN PERCENTAGE=95.0

/HIDDEN IGNORE=YES.

EXECUTE.

DATASET NAME DataSet1 WINDOW=FRONT.

FACTOR

/VARIABLES OrganisationalStructure1 ProjectScopeandDefinition1 Userinvolvement1

Monitoringandfeedback1 Efficiency1 UserExperience1

/MISSING LISTWISE

/ANALYSIS OrganisationalStructure1 ProjectScopeandDefinition1 Userinvolvement1

Monitoringandfeedback1 Efficiency1 UserExperience1

/PRINT INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION

/PLOT EIGEN

/CRITERIA MINEIGEN(1) ITERATE(25)

/EXTRACTION PC

/CRITERIA ITERATE(25) DELTA(0)

/ROTATION OBLIMIN

/METHOD=CORRELATION.

----- FACTOR ANALYSIS -----

Factor Analysis

Notes

Output Created		31-OCT-2020 19:53:49
Comments		
Input	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	116
Missing Handling	Value Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.

Syntax		<p>FACTOR</p> <p>/VARIABLES OrganisationalStructure1 ProjectScopeandDef- inition1 Userinvolve- ment1</p> <p>Monitoringand- feedback1 Efficiency1 UserExperience1</p> <p>/MISSING LIST- WISE</p> <p>/ANALYSIS Organi- sationalStructure1 ProjectScopeandDef- inition1 Userinvolve- ment1</p> <p>Monitoringand- feedback1 Efficiency1 UserExperience1</p> <p>/PRINT INITIAL CORRELATION SIG DET KMO EXTRAC- TION ROTATION</p> <p>/PLOT EIGEN</p> <p>/CRITERIA MINEIGEN(1) ITER- ATE(25)</p> <p>/EXTRACTION PC</p> <p>/CRITERIA ITER- ATE(25) DELTA(0)</p> <p>/ROTATION OBLIMIN</p> <p>/METHOD=CORREL ATION.</p>
Resources	Processor Time	00:00:01,47
	Elapsed Time	00:00:01,48
	Maximum Memory Required	5704 (5,570K) bytes

Correlation Matrix^a

		Organisational Structure 1	Project Scope and Definition 1	User involvement 1
Correlation	Organisational Structure 1	1,000	,443	,646
	Project Scope and Definition 1	,443	1,000	,278
	User involvement 1	,646	,278	1,000
	Monitoring and feedback 1	,562	,315	,507
	Efficiency 1	-,114	-,094	-,116
	User Experience 1	-,029	-,076	-,038
Sig. (1- tailed)	Organisational Structure 1		,000	,000
	Project Scope and Definition 1	,000		,001
	User involvement 1	,000	,001	
	Monitoring and feedback 1	,000	,000	,000
	Efficiency 1	,111	,157	,107
	User Experience 1	,379	,207	,344

Correlation Matrix^a

		Monitoring and feedback 1	Efficiency 1	User Experience 1
Correlation	Organisational Structure 1	,562	-,114	-,029
	Project Scope and Definition 1	,315	-,094	-,076
	User involvement 1	,507	-,116	-,038
	Monitoring and feedback 1	1,000	-,032	,055
	Efficiency 1	-,032	1,000	,938

	User Experience 1	,055	,938	1,000
Sig. (1-tailed)	Organisational Structure 1	,000	,111	,379
	Project Scope and Definition 1	,000	,157	,207
	User involvement 1	,000	,107	,344
	Monitoring and feedback 1		,368	,277
	Efficiency 1	,368		,000
	User Experience 1	,277	,000	

a. Determinant = ,033

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	,615
Bartlett's Test of Approx. Chi-Square	383,514
Sphericity	df
	15
	Sig.
	,000

Communalities

	Initial	Extraction
Organisational Structure 1	1,000	,769
Project Scope and Definition 1	1,000	,376
User involvement 1	1,000	,652
Monitoring and feedback 1	1,000	,621
Efficiency 1	1,000	,966
User Experience 1	1,000	,971

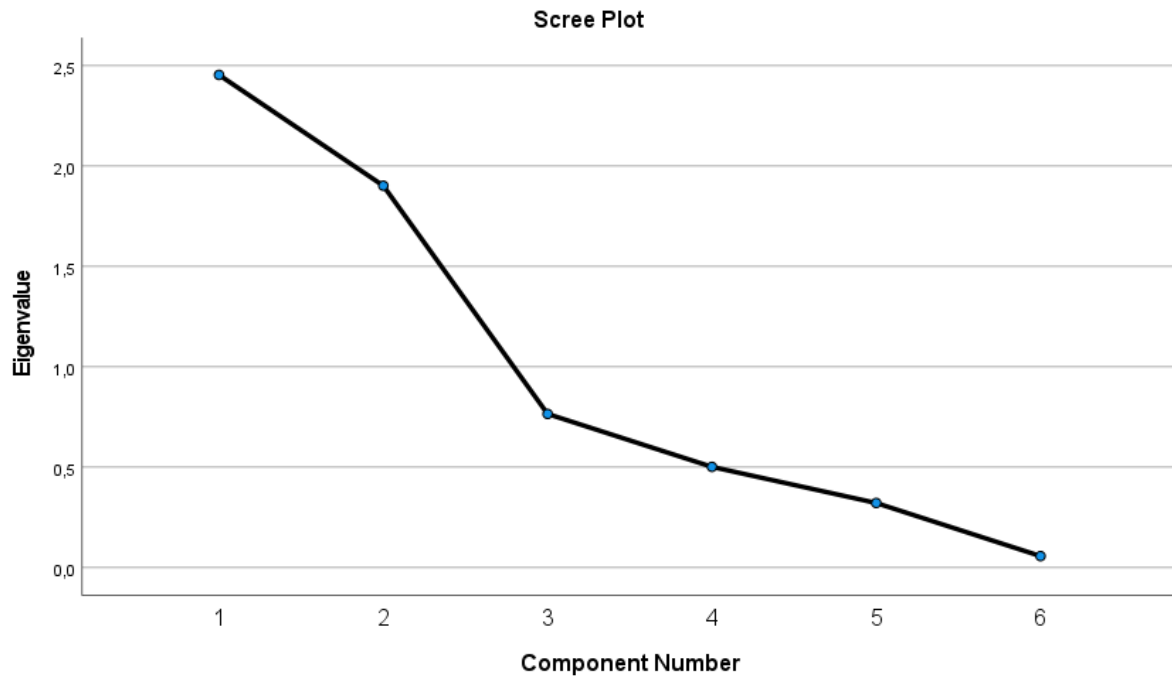
Extraction Method: Principal Component Analysis.

Component	Total Variance Explained			Extraction Sums of Squared Loadings	
	Total	Initial Eigenvalues		Total	% of Variance
		% of Variance	Cumulative %		
1	2,454	40,894	40,894	2,454	40,894
2	1,902	31,695	72,589	1,902	31,695
3	,765	12,749	85,338		
4	,501	8,357	93,695		
5	,321	5,356	99,051		
6	,057	,949	100,000		

Component	Total Variance Explained		Rotation Sums of Squared Loadings ^a Total
	Extraction Sums of Squared Loadings	Cumulative %	
72,589	1,959		

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



Component Matrix^a

	Component	
	1	2
Organisational Structure 1	,851	,211
Project Scope and Definition 1	,607	,087
User involvement 1	,786	,185
Monitoring and feedback 1	,732	,292
Efficiency 1	-,363	,914
User Experience 1	-,275	,946

Extraction Method: Principal Component Analysis.^a

a. 2 components extracted.

Pattern Matrix^a

	Component	
	1	2
Organisational Structure 1	,877	-,007
Project Scope and Definition 1	,604	-,066
User involvement 1	,806	-,016
Monitoring and feedback 1	,789	,101
Efficiency 1	-,049	,978
User Experience 1	,045	,988

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.^a

a. Rotation converged in 3 iterations.

Structure Matrix

	Component	
	1	2
Organisational Structure 1	,877	-,075
Project Scope and Definition 1	,609	-,113
User involvement 1	,807	-,078
Monitoring and feedback 1	,782	,040
Efficiency 1	-,124	,982
User Experience 1	-,032	,984

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2
1	1,000	-,077
2	-,077	1,000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.
