TALLINN UNIVERSITY OF TECHNOLOGY

Faculty of Social Sciences

Ragnar Nurkse School of Innovation and Governance

Gerli Aavik

THE ELECTRONIC IDENTIFICATION AND TRUST SERVICE REGULATION (EIDAS): AN ANALYSIS OF ITS COMPATIBILITY WITH THE ESTONIAN E-GOVERNMENT SYSTEM (EES)

Master's thesis

Supervisor: Professor Robert Krimmer

Tallinn 2015

Declaration: Hereby I declare that this master's thesis,

my original investigation and achievement,

submitted for the master's degree at Tallinn University of Technology,

has not been submitted for any other degree or examination.

Author Gerli Aavik

" ….. " …… 2015

The thesis is compatible with the current demands.

Supervisor: professor Robert Krimmer

" ..... " 2015

Allowed for defence: "..…" 2015

The head of defence commission: Veiko Lember

ABSTRACT

The electronic identification and trust service regulation (eIDAS) was adopted in 2014 to create a digital common market in the European Union (EU). Developing cross-border digital cooperation has also been one of the main goals of the Estonian e-government system (EES), but Estonia already has its own cross-border digital initiatives. The purpose of the given master's thesis is to understand whether the eIDAS complements or challenges domestic initiatives and goals of the EES, and whether it is in the interest of Estonia to contribute to the fast implementation of the eIDAS as the most effective measure for achieving cross-border use of e-services. To answer these research questions, content, context and process (CCP) analysis is used to map the EES and the eIDAS through questions *what, why, who, how* and *when.* Through analysing the dimensions of content, context and process, it can be concluded that even though the eIDAS creates some additional obligations for Estonia, overall the regulation supports Estonian e-government's goals and domestic cross-border initiatives. Also, as without supranational interference, it is highly unlikely to create digital open borders among 28 Member States, it is in Estonian interest to contribute to the fast implementation of the eIDAS.

Key words: e-government, information systems, cross-border e-services, eIDAS

TABLE OF CONTENTS

INTRODUCTION

The mobility of European Union (EU) citizens and open borders have created an increasing need for a secure and digital common market. To guarantee the four basic freedoms of the EU (the free movement of people, goods, services and capital), it is important that digital services would be evenly available. Even though the digital services of the EU Member States have derived from a common legal framework since 1999 (the basis has been Directive 99/93/EC[1]), in reality digital identities of the citizens of other Member States have not been acknowledged.

To improve the previously described situation, the Electronic identification and trust service regulation (eIDAS) was adopted in July 2014. The purpose of the eIDAS is to synchronise the quality and reliability of digital services and to create a digital common market in the EU. To fulfill this purpose reliable cross-border electronic identification measures are needed. The new regulation only establishes rules for the acceptance of cross-border electronic identification in the public sector, but it is expected that following the example of state institutions, the influence will also spread to the private sector. It was seen that the existing digital market of the EU is fragmented and creating a new framework could be a solution. (European Commission 2012, 9)

In the focus of this thesis are the eIDAS and the Estonian e-government system (EES) with its cross-border initiatives. The question here is whether the purpose of the eIDAS coincides with Estonian e-government's cross-border goals. As Estonia sees itself as a pioneer in cross-border cooperation (Sikkut 2015), having cross-border electronic initiatives such as SignWise, the e-residency and bilateral cross-border mutual recognition agreements[2], it can be questioned whether the eIDAS supports these measures or is it challenging the local initiatives. Through this research the compatibility of the eIDAS with the EES will be evaluated and the following research questions will be answered:

[1] Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures

[2] The concepts of SignWise, e-residency and bilateral cross-border agreements are introduced in paragraph 2.2.2.

- Are the changes introduced by the eIDAS complementing or challenging Estonian e-government's goals and domestic initiatives?
- Should Estonia contribute to the fast implementation of the eIDAS as the most effective measure for achieving cross-border use of e-services?

In order to answer these questions the key aspects of the EES, local cross-border initiatives and the eIDAS are mapped and the compatibility of the eIDAS with the EES is evaluated.

The paper consists of three parts – theoretical framework, empirical case study and discussion. The theoretical part gives an overview of the main theories used to evaluate information systems (IS) and gives a detailed overview of the theoretical framework – content, context and process analysis (CCP) – used in this research. The empirical part maps and analyses the content of the eIDAS and the EES, the contexts surrounding the changes introduced by the eIDAS and the process of change. The dimensions of content, context and process are analysed through questions *what, why, who, when* and *how*. The discussion part analyses through theoretical framework how context, content and process dimensions, mapped and analysed in the empirical part, are linked in the chosen case and answers to the previously presented research questions.

In addition to giving insight to the compatibility of the eIDAS with the EES, the case study also aims to improve the existing theoretical knowledge. The use of IS theories in the field of e-goverment research is increasing (Bernroider, et al. 2013, 75), but the given work aims to contribute to the understanding that ES can be evaluated as IS. As the field of IS is often questioned by other disciplines (Avgerou 2000, 4), it is important to strengthen the theoretical knowledge with new case studies.

1. EVALUATING E-GOVERNMENTS AS INFORMATION SYSTEMS (IS)

International academics have slightly different definitions for the concept of e-government, but the key here is the use of technology for offering public services. The European Commission (2003, 7) defines e-government as "the use of information and communication technologies in public administrations - combined with organisational change and new skills - to improve public services and democratic processes and to strengthen support to public policies". E-government research is a combination of different research fields, such as public administration, political sciences, computer sciences and IS (Heeks, Bailur 2007, 252). As the context of ES is complex and interdisciplinary, collaborative research is required (Hardy, Williams 2011, 405).

Comprehensive research has been conducted by several authors to give an overview of the e-governance literature. Heeks and Bailur (2007, 247) bring out that the perspectives regarding e-government can either be positive or negative. Cost savings and improved quality of public services are pointed out as positive effects and increased costs and deprivation of public accountability as negative. Also, a distinction between technological and social determinists is brought out. Technological determinists associate technology directly to its impacts, social determinists believe that it is the human choices within social structures that designate the impacts that using information and communication technology (ICT) can entail. (Ibid., 247) These perspectives are helpful in categorising positions of different authors and simplifying a complex reality (Ibid., 248).

Heeks and Bailur (2007, 255) bring out that models designed for e-government usually manage to give insight in what is happening, but fail to understand why. To give a more comprehensive overview, IS theories were chosen to find answers to the proposed research questions. Ralph D. Westfall (2012, 66) analysed diferent definitions of IS and reached to a description, which defined IS as a field that connects the non-technical employees and managers within the organisation with the technical employees, outside developers or service providers and ICT products, which are or will be used in a certain organisation. While Westfall's defintion of IS connects related components within one organisation, the given paper views the EES, which

combines several organisations and IS, as a single information system. While analysing the use of technology, it is important to distinguish between IS and ICT, as ICT does not include the non-technical factors. ICT refers to a broad range of technologies involved in information processing and handling, such as computer software and hardware, telecommunications and office information (Huff, Munro 1985, 37-328). Another important concept in analysing IS is interoperability, which makes it possible to achieve integration and synchronised information sharing with multiple partners with disparate systems (Zhao, Xia 2004, 273). The European interoperability framework for European public services (European Commission 2010, 2) defines the interoperability in the context of European public service delivery as "the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organisations, through the business processes they support, by means of the exchange of data between their respective ICT systems." In the given research the definition of European Commission is used.

1.1. Theories used for evaluating information systems (IS)

The field of IS is an essential part of e-governing, for that reason IS theories are often used for evaluating ES and e-services. Trends in public administration are affecting governments to reengineer the administration processes and to set higher requirements on accountability of ICT-based systems (Bernroider, et al. 2013, 75). Having close links with professional practitioners, the field of IS has developed knowledge about how ICT based information infrastructure is deployed and managed in organisations. Regardless of its importance, IS field does not fit lightly to the conventional scientific disciplines, and is often questioned by other disciplines. (Avgerou 2000, 4) In IS research five most important thematic areas can be distinguished: applications of ICT to support the functioning of an organisation; the process of systems development; IS management; the organisational value of IS and the societal impact of IS (Avgerou 2000, 5-6). To cover these topics, the most used theories are systems theory, organisational rationalism, social theory of structuration and critical theory. (Ibid., 13) These main theories are discussed briefly in the next section.

The concept of **systems theory** is to break down problems to small simple parts in effort to discover clear causality between the variables of these parts (Avgerou 2000, 13). As systems theory tries to unify all sciences into one conceptual model and allows researchers to use relevant knowledge from different disciplines, it is embraced by both social and biological scientists

(Kast, Rosenzweid 1972, 447-448) and it has been widely influential in designing ICT applications, but it is criticised for being over-simplifying (Avgerou 2000, 13). Another influencial theory is **organisational rationalism**, which combines different theories such as decision making theory, management theory, administration science, industrial and organisational psychology, and is committed to improving organisational efficiency. The main critique here is the over-dominance of organisational rationalism, which has made it hard to ask new and innovative research questions. (Avgerou 2000, 14) To provide linkages between IS research and more general studies by combining "hard" and "soft" sciences, **social theory of structuration** arose. As it is not developed specifically for IS and it deals with social phenomena at a high level of abstraction, the more specific context is often left out (Jones, Karsten 2008, 129). If the previously mentioned theories were mainly critiqued for the overgeneralisation and little innovativeness, the **critical theory** does the opposite. Avgerou (2000, 16) brings out that the critical theory challenged the idea that academic research is objective, neutral and impartial, and instead emphasised the influencial power relations in the society. Critical theory could be useful to overcome the narrowness of vision in the field of IS, but when desiring a comprehensive overview, critical theory alone can be too one-sided. (Avgerou 2000, 16)

These theories and frameworks offer a variety of options for analysis, but as e-government binds different spheres of research, more complex approach is needed. The work done in the e-government field has been criticised for lacking focus, having poor theoretical and methodological support and developing inaccurate models. (Hardy, Williams 2011, 405). Heeks and Bailur (2007, 248) also bring out that most authors are overly optimistic about the use of ICT in governments and the downsides of technology, such as the evidence about high costs, are being ignored. Also, it is stressed that less experienced researchers in the field of e-governance tend to be overly optimistic and subjective (Ibid., 249) and the control over Internet is not objectively assessed (Eriksson et al. 2009).

It is argued that in IS evaluation it is not sufficient to rely solely on technique - support is needed from multiple methods, and nonfinancial performance criterions need to be taken into account. As cost-centred arguments are easy to measure, they are often the ones used most vastly and the value side of ICT is often weakly supported. Still, simple cost-benefit analysis does not give sufficient information regarding contributions achieved by IS, leaving immaterial strategic effects aside. (Bernroider, et al. 2013, 75) IS are complex social objects, which are inseparable from the organisational context, history and human agents surrounding them (Symons 1991,

206). Consequently, theories which could take all different aspects of e-governing and IS into consideration are needed.

1.2. Content, context and process (CCP) framework

A variety of theories have been used in the field of IS, but as ES are complex and interdisciplinary, a more comprehensive overview is needed. Stockdale and Standing (2006, 1091) argue that one of the principal challenges for IS evaluation is developing frameworks which are detailed enough to provide effective guidance, but at the same time universal to be applicable to a wide range of applications that come across while evaluating IS. Evaluation is a complex procedure, and thus needs a multiple ways approach - **creating linkages between context, content and process allows to do so.** These three dimensions enable the researcher to ask questions both from the perspective of technology and people engaged (Stockdale, Standing 2006, 1091), ensuring that important variables will not be overlooked (Self. et al. 2007, 212). The CCP analysis is used in different research areas such as education (Begler 1993), psychology and psychotherapy (Vaughan 1979), biology (Primm, Clark 1996) and management (Ketchen et al. 1996). The CCP model was first introduced in IS research by Symons (1991).

The CCP framework (see table 1) offers a high level of structure (Stockdale, Standing 2006, 1099), by breaking it into a number of elements – **purpose** (*why*), **subject** (*what*), **timeframe** (*when*), **methodologies** (*how*) and **people** (*who*) – allowing the researcher to recognise a wide scope of interrelated factors (Song, Letch 2012, 278). The CCP framework allows the researcher to ask the right questions and explore a wide range of influences, by inherently including social, political, cultural and economic factors (Stockdale, Standing 2006, 1100). In the following sections the dimensions of content, context and process are explained in more detail.

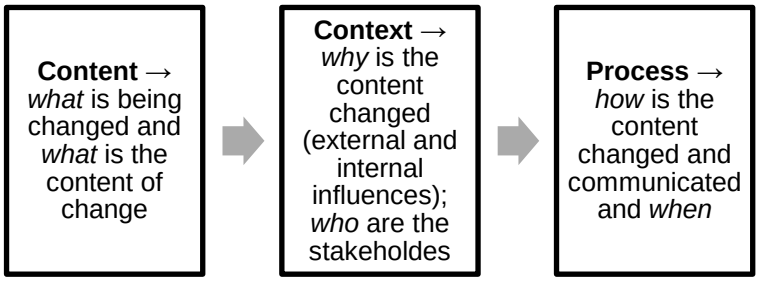

Figure 1. CCP framework through the defining questions. Own figure.

1.2.1. Content dimension. Substance of change

The content dimension focuses on the **subject** of change, asking **what** is being decided, changed or evaluated (Ketchen et al. 1996, 231; Devos et al 2007, 609; Song 2012, 277). In the content dimension, policies or changes are described, and this descriptive information can be later used to evaluate the aptitute of this content in a given context (Primm, Clark 1996, 1038). Content dimension should also include the criterions that are used to assess the IS (Song, Letch 2012, 277). While setting up the criteria for measurements, the possible impact IS can have on social, economic, management and organisational terms, needs to be taken into account (Stockdale, Standing 2006, 1092). The most frequently applied criterions to evaluate content are effectiveness and efficiency measures (Song 212, 277), but Symons (1991, 207) underlines that it is essential not to emphasise on the criteria of efficiency at the expense of effectiveness, and **understanding of the context should be used as additional criteria** instead. Complex innovations create special administrative problems, requiring regular interaction and systematic analysis among managers with specific expertise. When content is changed, it should be re-evaluated from all related perspectives – possible reactions must be anticipated, communication strategies have to be worked out and financial issues dealt with. (Miller et al. 1988, 551)

In the public sector a simple cost/benefit analysis is not sufficient, but the economy, efficiency and effectiveness of the policy or project, need to be evaluated. With a successful change, maximum output is achieved with a given set of resource input, or a certain quality of services is achieved with minimum input. A clear distinction should be made between effectiveness and efficiency, as doing things right versus doing the right things. (Symons 1991, 207) The content of change can also be expressed through the impact on those who are affected (Self. et al. 2007, 213), and that exact content can influence attitudes towards the change itself. Small-scale changes, which do not affect the core of organisations, cause smaller employee resistance, than the large-scale changes, where the core is affected (Devos et al 2007, 610).

1.2.2. Context dimension. Change agents and reasons for change

A relationship between the dimensions of content and process was attempted to be established, but as these efforts remained artificial, the dimension of context was integrated. Through several case studies, it was proved that content, context and process are the key constructs in explaining organisational phenomenons. (Ketchen et al. 1996, 232) Context can be seen as circumstances,

environment, background or settings which affect, constrain, specify or clarify the meaning of an event (Pollitt 2013, 133); as a set of environmental and organisational factors influencing organisational effectiveness (Self et al. 2007, 214) or as the economic and human constraints, opportunities and possibilities surrounding an organisation (Miller et al. 1988, 545).

Through questions *why* and *how*, the analysis of context enables to understand why given change initiatives have or have not been successful (Devos et al 2007, 610). The organisational context determines reasons for change and influences stakeholders have, seeking to increase value, measure success or recognise benefits. Trends and developments in the wider environment should be considered, as external influences can be significant. (Stockdale, Standing 2006, 1093) Organisational factors include actors such as structure, business strategies, management procedures (Song, Letch 2012, 277) and history of ICT development (Symons 1991, 211). Environmental factors consist of actors such as technologies, market structures, and government policies (Song, Letch 2012, 277).

When taking over techniques, organisational structures or programs, there is no set of general tools, which could be successfully transferred from one jurisdiction to another. With each transformation or borrowing, contexts have to be taken into account. (Pollitt 2003, 122) Even when techniques or models used are conceptually the same, they might turn out differently in dissimilar contexts. In the public sector, features such as cultures and political systems can have major impact on stability, change and understanding of good government. (Pollitt 2012,10) Context is especially important in the area of e-government, as it involves transformation of technology from one context into another, possibly causing a mismatch in the new context. To avoid mismatches, influential factors need to be identified. (Heeks 2005, 51) It is also important to understand that the organisational functions need to be supported by technology to simplify the work processes and help other areas of organisation to work better, not to be automated by it (Symons 1991, 210).

It has to be evaluated in each context which purposes the IS are designed to fulfill (Song, Letch 2012, 277) and how mature the IS are (Irani, Piotrovitz 2008, 9). Maturity can also be seen as a measure which enables organisations to evaluate their capabilities in a certain aspect or a problem area. Separation can be done between the maturity of processes, objects or technologies, and the people's capabilities. (Pöppelbuß et al. 507) Irani and Piotrovitz (2008, 9) argue that organisations with higher level of system usage are more able to implement new system modules. At the same time Mahmood and Becker (1985, 42) argue, based on Nolan's stage

model, that when IS reach the maturity phase, e-services have high quality, organisations are passive towards changes and new developments, and the emphasis is on controlling the existing system instead of changing it (Mahmood, Becker 1985, 42).

Stakeholders

Stakeholders are one of the key aspects in context dimension, as they create a platform for initiatives and changes to be implemented on. Contexts include political arena, weighing beliefs, values and cultural preferences against each other. Various participants can represent different belief systems, and try to influence policy problems to shape around their beliefs. (Primm, Clark 1996, 1039) Implementing changes in public sector IS is complex – focusing on universal strategies and best practices is not sufficient, and the political influences should not be underestimated. Ideally, public sector technologies should be designed to enable these systems to be carriers of the aims and goals of e-government policies. (Cordella, Lannacci 2010, 2)

The more inter-organisational IS are developed, the wider range of stakeholders needs to be recognised and included (Mishra, Mishra 2013, 257). These stakeholders can be divided into groups - those who initiate, who conduct the evaluation, users of the systems and other interested parties. Accordingly, when assessing a certain context, it is important to identify the main stakeholders and the effect they have on implemented policies. (Stockdale, Standing 2006, 1093) Symons (1991, 207) argues that it is important to assess which parties are directly related to the IS, and focus strictly on them. Within these units, aspects like fit between computing arrangement and organisational culture, equity between benefits received and costs beared and privacy of personal information should be analysed (Symons 1991, 207).

With e-government projects, identifying the related parties can be more complex, as different groups and actors create and maintain wider networks of aligned interests (Heeks 2005, 69, Pollitt 2003, 126), and the stakeholders directly related to the project cannot be distinguished as clearly. A particular organisation cannot be fully addressed without influencing other related programmes and organisations and comprehending the dynamics between different parties of networks. (Pollitt 2003, 126) The driving force within given e-government projects are the aligned networks, including the technological artefacts in themselves. These networks of interest will seek to have their interests inscribed into the ES or to fight against others having their interests inscribed, consequently being the drivers to a working ES or to a failure. E-government

networks can consist of senior politicians, the EU representatives, ambassadors, private sector parties or other counterparts. To avoid resistance, values of possible networks should be taken into account as much as possible while creating the content of a policy or program. (Heeks 2005, 69)

The context where change is being implemented is defined by wider networks of interests, but these networks consist of individual characters. The personality of the person in charge can have substantial influence on these networks and therefore to the entire context, especially in smaller organisations (Miller et al. 1988, 545). It is argued that complex innovation projects cannot be carried out in highly centralised, unspecialised and bureaucratic structures, as these structures overburden executive managers, leaving them too little time and assistance to initiate complex projects of innovation. Strict structures usually also lack the specific expertise needed to solve problems and conflicts which arise while implementing new products and processes. (Miller et al. 1988, 550) It can be concluded that the more charismatic the leader, and the more flexible the organisation, the easier it is to enforce complex projects and innovations.

E-government initiatives can be divided into three groups based on their outcome: initiatives that have failed totally by never implementing the initiatives or immediately abandoning it; partially failed initiatives, where the major goals of initiative were not attained and successful initiatives, where most of the stakeholders achieved their major goals. (Heeks 2005, 52) While analysing a possible e-government policy transfer, these previous outcomes should be taken into account. Analysing contextual dimensions lead Heeks (2005, 54-55) to a model which divides e-governments into seven dimensions – information (data stores, data flows, etc.); technology (both hardware and software); processes (the activities of users and others); objectives and values (the key dimension, through which factors such as culture and politics are manifest); staffing and skills (both the quantitative and qualitative aspects of competencies); management systems and structures and other resources (particularly time and money). These dimensions make it possible to map the contexts and to assess whether the changes are suitable for a given context or not. (Heeks 2005, 54-55)

If the contexts do not match and the systems cannot be adjusted according to the existing context, users must reject the system completely, or alter their context significantly by changing work processes and data flows, altering values and work cultures, developing new skills and implementing strategies. To avoid such drastic decisions, reality-supporting applications, which require less contextual components, are often used, especially since reality-based applications

have proved to be more successful. In case of voluntary changes, the content can be changed based on the context, but when the content of applications or programs is already set, the changes have to be made in the context dimension instead. (Ibid., 65-66)

1.2.3. Process dimension. *How* and *when* events and interactions evolve

The process part of the theory enables the evaluator to answer **how** and **when** changes evolve over time (Langley 1999, 692) and see the phases through which changes progress (Self et al. 2007, 213). Process data consists mainly of stories about events, activities and choices ordered over time. Process theories focus on understanding patterns in events to provide explanations about sequence of events leading to an outcome, and the possible interactions between these entities. (Langley 1999, 692) Also, actions, reactions, and interactions of the interested parties involved are analysed in the evaluation (Song, Letch 212, 277; Symons 1991, 210).

The key in process analysis is the **dynamics of informal relationships**, which support the social and political interactions through stakeholder perspectives. Conflicts of interest can emerge within or between stakeholder groups. It is important to examine how different interests are represented and how different groups can access informed opinions and relevant data. (Symons 1991, 211) As process is closely linked to the change agents, acceptance for the change among stakeholders is needed. To gain acceptance for the change and implement it successfully, organisational changes need to be communicated through shared vision and be justified through some main steps, such as persuasive communication, active participation and different forms of symbolism (Self et al. 2007, 213). When the purpose of change is properly communicated, it is more likely to be successful (Self et al. 2007, 213).

Strategy process literature tries to identify how individual, group and organisational factors influence strategy process and to what extent process influences performance. The studies have shown that the activities having the strongest impact on performance are **political activity** and **information usage**. Political activity refers to lobbying, coalition formation, conflict and bargaining. Information usage refers to the amount of the available data which can be used while making strategic decisions. It can be presumed that high levels of political activity can lead to poor performance and frequent information processing helps to manage complex issues, consequently leading to better performance. (Ketchen et al. 1996, 233) In policy process, the objectives are often multiple, conflicting and vague. The promoters of the program usually

claim, that all the objectives will be achieved, without recognising the possible trade-offs between these goals. To evaluate the process fairly, it is important that these trade-offs are noticed and the key objectives have been properly identified in the beginning of the process. (Pollitt 2003, 126)

Another important aspect in process dimension is the timing of change. Ongaro (2012, 3) brings out that the change process does not consist only of the static factors. The interaction of politico-administrative context and the administrative change over time have to be taken into account. When reforming public administration notions such as "early events", "path breaking" and "path-establishing" events, sequencing, reactive sequences, interaction and collision of trajectories, can prove to be useful. (Ibid., 3) Change and continuity are a matter of time, so revealing temporal patterns, causes, and movements from continuity to change and from change to continuity should be represented in all empirical cases where changes are being analysed (Pettigrew 1990, 272). It is important to understand that content and timing are integral part of every change, and the evolvements over time should be considered. The changing socioeconomic context impacts organisational and interest-group behaviour and phenomenas are sequentially interconnected. (Ongaro 2012, 4)

1.2.4. Linking content, context and process

While implementing external changes, there are several influential factors - complexity of the task itself, the institutional and cultural context into which the technology or program is introduced, and the complexity of the import process (Pollitt 2003, 126). When evaluating organisational performance or implementing changes, interactions between content, context and process are analysed, and the gained knowledge can be used in the implementation process (Symons 1991, 211). IS should be linked to broader goals and the implementation process should be viewed. A succesful IS strategy includes a clear definition of strategy and an underestanding how the use of ICT can support that strategy (Symons 1991, 211). This means that strategies cannot be sepparated from the contexts they are implemented in and from the implementation processes.

Ideally the strategic content and process should derive from the existing context (Miller et al. 1988, 545), but as in the international arena the policy content is often already set, this is not always the case. If the content has to be implemented in an unchanged way, the existing context

has to be changed instead (Ibid., 545) and this change needs to be supported with strong communication (Stockdale, Standing 2006, 1094). Changing the content according to the changes in the surrounding context can give the content a strong competitive advantage (Ketchen et al. 1996, 234). Contextual factors can be taken into account creating a well applicable policy and having as little resistance among users as possible (Heeks 2005).

Theoretical framework for evaluating compatibility of changes with the existing content

CCP framework enables the researcher to answer research questions, by mapping contents, contexts and processes through questions what, why, who, how and when (Stockdale, Standing 2006, 1091). Changes can be evaluated through measures such as effectiveness, efficiency and understanding of the context (Miller et al. 1988, 551), making it possible to assess whether the changes are compatible with the contexts they are implemented in. To assess the compatibility, contextual dimensions introduced by Heeks (2005, 54-55) are used. The main arguments are that changes are most likely to be accepted, when the core values of organisations are not impacted (Devos et al 2007, 610), there are little or no substantial mismatches between contextual dimensions (Heeks 2005, 65), acceptance among stakeholder is gained, there is thorough communication (Self et al. 2007, 213) and the timing is right (Ongaro 2012, 4).

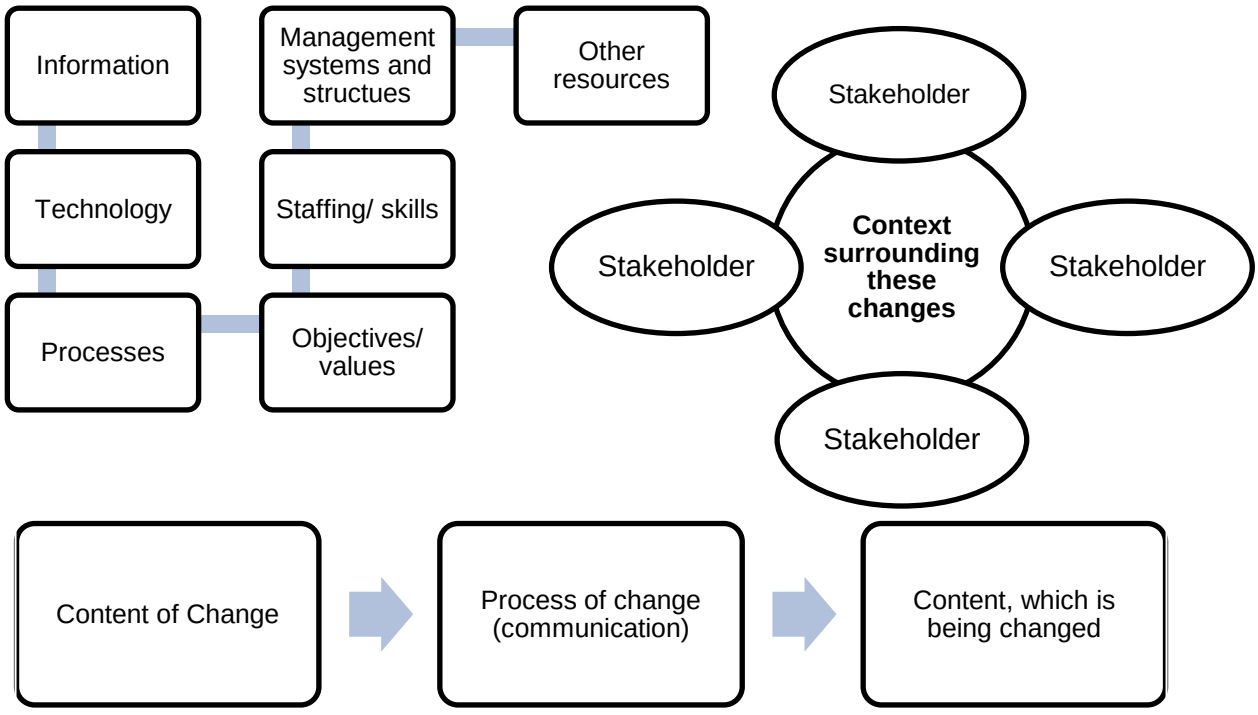

Figure 2. Linking CCP. Own figure.

In the following chapter, CCP framework is used to assess the compatibility of the eIDAS with the EES. First, the methodology and research design are introduced, after which the EES and the eIDAS are mapped and analysed through the dimensions of content, context and process. Based on the theory, content of change and the content where that change is implemented are compared, placed in the context of the EES and the process of these changes is outlined. Through analysing dimensions of content, context and process, it is evaluated whether the eIDAS complements or challenges the initiatives and goals of the EES, and whether Estonia should contribute to the fast implementation of the eIDAS as the most effective measure for achieving cross-border use of electronic state services.

2. COMPATIBILITY OF THE EIDAS WITH THE ESTONIAN E-GOVERNMENT SYSTEM (EES)

2.1. Used methodology

In the focus of the empirical analysis is the compatibility of the eIDAS with the EES, which is analysed through CCP framework. By mapping and analysing the dimensions of content, context and content, it is evaluated whether the changes introduced by the eIDAS complement or challenge the goals and domestic initiatives of the EES, and whether Estonia should contribute to the fast implementation of the eIDAS as the most effective measure for achieving cross-border use of e-services.

2.1.1. Research design

Deductive approach is used, moving from a general theory to an explorative single case study (Yin, 2003b). Qualitative research design is used to analyse **linkages between causally relevant factors** (Mahoney and Goertz 2006, 234) and map causal paths in a given situation (Ibid., 237). Yin (2003b,1) argues that when contemporary phenomenons are analysed in real-life contexts, case studies are the most appropriate design to use. The core of qualitative research is the explanation of outcomes in the example of specific cases (Mahoney and Goertz 2006, 230), assessing the importance of data and evidence in the light of a chosen theory, focusing on the key influences and analysing the data in depth (Ibid., 241). The main focus here is causation, more specifically the question whether the causes under observation are necessary and/or sufficient (Ibid., 232).

Case studies can involve around single or multiple cases, but in a current research, the EES is chosen as the centre of a single case analysis. Case study research strategy focuses on understanding the dynamics within a single setting. (Eisenhardt 1989, 534) Even though it can be argued that in a single case study generalisability is limited, it can also be said that the single case design brings out the contrast between case studies and the statistical analysis the clearest

(Mariotto et al 2014, 359). Assuming that a case study is the most suitable strategy in a given topic, it can be expected to bring out the strengths of the design the best. Qualitative analysis allows the researcher to show, that in the context of a given theory some cases can be more important than others, and individual cases can legitimately test a theory. (Mahoney and Goertz 2006, 242)

For a single case study to be valid, it is essential to establish a clear chain of evidence, allowing readers to comprehend how the researcher amounted from the initial research question to the final conclusions (Mariotto et al 2014, 360). In a current research CCP analysis is chosen to include key aspects of the observed case and IS in change, creating clear causal paths and explaining how the conclusions were reached to.

2.1.2. Limitations

It is argued that qualitative research can be too narrow and the generalisability is low, but qualitative researchers believe that if the population size is increased, the key causal relationships can be missed (Mahoney and Goertz 2006, 238). Consecuently, focusing on a single case and causalities in the context of the EES, has been a conscious choice. Another limitation can be the fast development of the digital market. As the market is rapidly evolving, it might be difficult to assess the impact of one concrete regulation. To minimise the false conclusions, multi-dimensional framework and qualitative method are used to take all the influencing factors into consideration. As the change is not in its implementation phase, there can also be a problem with the lack of necessary information available. Expert interviews have substantial impact here, but it is important to monitor that the structure of questions would enable the interviewee to give as informative and concrete answers as possible. The focus would be on obtaining only the information that is not available through document analysis. (Rubin, Rubin 1995, 197-198)

Many of the authors criticise the use of case studies. When using case studies, one of the main dangers is focusing only on descriptions and therefore not amounting to analysis. Strong theoretical framework can help to overcome this problem by determining how to structure and analyse the data. (Yin 2003a, 23-24). Another deficit is that as case studies lack generalisability, the scientific credibility is lower. It is argued that it is not possible to test hypothesis or create a theory on the basis of a single case. In reality, analysing single cases can give researchers a

variety of valuable information and can be argued to be more credible than analysing a large sample of cases. (Flyvbjerg 2006, 225)

2.1.3. Data collection

Empirical data for the case study was gathered through document analysis and expert interviews. For describing the eIDAS and the EES, legal documents, reports, impact analysis, written expert opinions, notes from presentations, news articles and academic articles were used.

For a more comprehensive overview, six semi-structured expert interviews were carried out. The possible refusal of an interview was taken into account, so 11 leading experts of Estonian e-government field were contacted through e-mail and phone from different ministries, agencies and the private sector. Two interviewees were unable to contribute due to lack of time, three did not reply and face to face interviews were conducted with six people (see appendix 1). As these six interviewees represent the main stakeholder viewpoints from the Estonian governmental sector, the private sector and e-government critics, six interviews were estimated to be sufficient, and additional experts were not contacted. Also, it was clear from the interviews (I1-I6) that the network of the EES is small and integrated, so the people interviewed also managed to introduce the positions of other stakeholders. The interviews aimed to map the EES and the eIDAS, based on the dimension and contextual divisions introduced by CCP framework. A list of core questions (see appendix 2) was worked out, but more specific questions were asked based on the expertise of the interviewees.

2.2. Content dimension

The content dimension looks at the substance of the eIDAS and the EES and will be mapped through question *what*.

2.2.1. The eIDAS regulation as the content of change

The content dimension allows the researcher to see the substance of a planned change (Ketchen et al. 1996, 231), and in the given research the eIDAS is looked as that content. The current e-

Signature Directive[3] has been in place over 15 years. As the directive has substantial gaps, such as undefined obligations for the national supervision of service providers, and legal and technical cross-border interoperability issues (European Commission 2012), new framework was needed and after thorough discussions new regulation was adopted.

The new legislative solution was proposed in 2012 and adopted in 2014[4]. Large scale pilots, such as STORK[5], E-CODEX[6] and SPOCS[7], were succesfully conducted to test the interoperability and the legality of the new framework. (Galler 2013) Based on the previously held discussions and conducted pilot projects, new regulation was introduced to develop mutual recognition of electronic identification, cross-border electronic trust services and cross-border electronic documents. The eIDAS was adopted in 2014, voluntary recognition is planned for 2015, trust service rules should be applied by 2016 and the mandatory recognition of eIDs of all Member States is planned by 2018 (see figure 3). (Servida 2015)

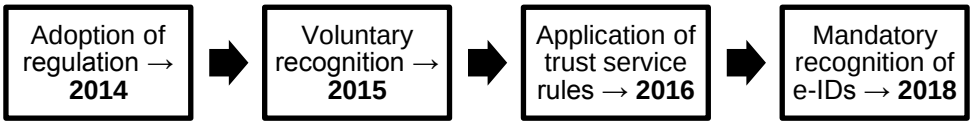

Figure 3. Implementation process of the eIDAS. Own figure.

Some of the main ideas introduced with the eIDAS are enhancing trust in electronic transactions by providing a common foundation for secure cross-border electronic actions[8]; providing key

[3] Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures.
[4] Regulation (EU) No 910/2014 Of the European Parliament and of The Council.
[5] STORK is a set of pilot projects, which aims to establish a European eID interoperability platform by testing the interoperability of the existing technical solutions. First pilot have successfully proved the interoperability between participants. (STORK 2012)
[6] e-CODEX is a functionary, which attempts to provide easier ways to digitally exchange legal information between the Member States of the EU. The goal of e-CODEX is to improve the cross-border access of citizens and businesses to legal means and to improve interoperability between legal authorities within the EU. (e-CODEX 2014)
[7] SPOCS is a large-scale pilot attempting to provide seamless electronic procedures by building cross-border solutions which are interoperable with the existing systems. The goal is to help businesses of EU Member States to overcome complications with apllying for licenses and permits, and completing other administrative procedures. (SPOCS 2012)
[8] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 2.

enablers across borders such as electronic ID-s, documents, signatures and delivery services[9]; creating public key infrastructure at pan-European level[10]; identifying different assurance levels to characterise the degree of confidence of a party being identified[11] and establishing a general legal framework for the use of trust services[12]. It is important to emphasise that the regulation is technology-neutral[13] and does not seek to intervene with the electronic ID management systems and related infrastructures, which are established in Member States[14].

While the compatibility of the eIDAS and the EES is evaluated, it should be noted that the existing regulation has not adopted its implementation acts, which means that the practical content of the new regulation is still unknown (I5, I6) and most of the discussion is on the speculative level (I3). Also, the new regulation prescribes that access to electronic system needs to be ensured, but the actual services Member States need to offer are not described in the regulation, creating a critical loophole. The Member States, which currently do not have the services, will probably not create new ones only because of the eIDAS. It has to be noted that the eIDAS without its implementation acts is very general. (I1) Still, it does set the direction for Member State policies and technologies (I4) and is thus worth analysing.

2.2.2. Estonian e-government system (EES) and the local initiatives for cross-border cooperation

As Estonia has a working ES with remarkably high usage, the Estonian case is chosen for analysis. It is important to note that the innovative services and the image of an e-state do not hold a high value in itself, unless it is visible to citizens and services needed by citizens are actually delivered. Services like e-tax office and e-banking have significantly improved the convience of Estonian citizens (Reinsalu 2006, 256), and they are used on daily bases. According to the United Nations e-government survey of 2014 (United Nations 2014, 15), Estonia is ranked 15th in the list of world e-government leaders and 8th in the list of the European countries, being one of the 25 countries ranked as very-high-EGDI[15]. Interestingly, Estonia is one of the few

[9] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 6.
[10] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 7.
[11] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 16.
[12] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 21.
[13] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 27.
[14] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 12.
[15] e-government development index (EGDI) is an index, which aims to view e-government development and reflect relative knowledge of best practices by analysing three dimensions of e-government – provision of online services, telecommunication connectivity and human capacity (United Nations 2014, 13).

countries who increased their level of e-government spending even during the financial crises, showing that e-government implementation is seen as a key strategic tool to achieve wider public governance goals (Ibid., 31). Estonia is also among top 20 countries in the online service delivery, being one of the six European countries in that list (Ibid., 47), and among top 25 performers in e-participation (Ibid., 65).

One of the reasons for Estonia's relative success is the strong cooperation between the public and private sector. Public private partnership is often just a fashionable slogan, but for the EES, this has actually been the key to success (I3). It has been understood that collaboration is useful for both parties, and the resources have therefore been combined to obtain efficiency (I2, I3). The governmental sector has had the ideological, and the private sector the technical role (I3), but it is important to note that much of the initiative has come from the private sector, banks and telecommunication companies in particular (I1).

For a small state, Estonia has managed to create a remarkable image of an e-state (I3, I4, I6). While there are certainly Member States with more successful sectors of ES, Estonia with its integrated infrastructure is a unique case (I3). The idea has been to create one system which could be used for all e-services, enabling to create usable e-services with low costs. X-road solution[16], electronic ID[17] card and data protection acts are seen as the solid building blocks of the system. (I6)

Possibilities for cross-border digital cooperation

Estonian domestic e-services can be praised or criticued, but regarding cross-border digital cooperation, Estonia is unquestionably one of the pioneers (I3, I4, I6). From Estonian perspective, four possible options for cross-border cooperation can be separated. While analysing the conformity of the eIDAS with the EES, all four options need to be looked at and therefore these possible options are discussed in following paragraphs.

[16] X-road is the most important environment in Estonian e-government system, connecting different public and private e-service databases, and making the services interoperable (e-Estonia 2015a). The end user is identified with an ID card or via Internet bank. Public and private sector enterprises and institutions can connect their own electronic environment with data exchange layer of x-road, and make data exchange more effective. (EISA 2013a)

[17] Elctronic ID card is a smart card, which can be used for authentication of the card holder and for giving digitial signatures and encrypt documents. Digital IDs are issued to citizens and residents of Estonia. (CC 2015b)

The first option (see figure 4) is forming **bilateral agreements between Member States** to cooperate digitally across national borders. An example here would be the cooperation agreement between the tax offices of Finland and Estonia (EISA 2013b), which began in 2013 with the first digitally signed intergovernmental contract (Estonian Government Communication Unit 2013).

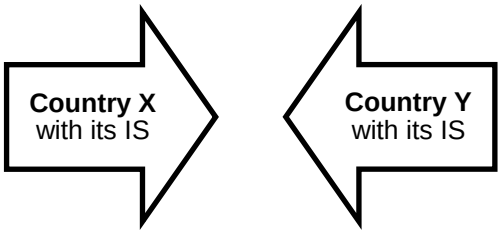

Figure 4. Forming bilateral agreements. Own figure.

The Estonian e-residency project, which enables non-residents to access same electronic benefits as the residents of Estonia, can be seen as the second option (see figure 5). The parliament's e-residency conception (2014, 3) brings out that Estonian aim was to be the first country to start issuing e-residency. It was believed that accessibility of digital services should not be dependable on the person's residency or citizenship. With digital residency, new e-residents (both from the EU and outside) receive a digital ID with an identical smart card to Estonian electronic ID certificate, which can be used in the digital environment to identify a person and give digital signatures, using the same software as the citizens do with their ID-cards. (Parliament of Estonia 2014, 4)

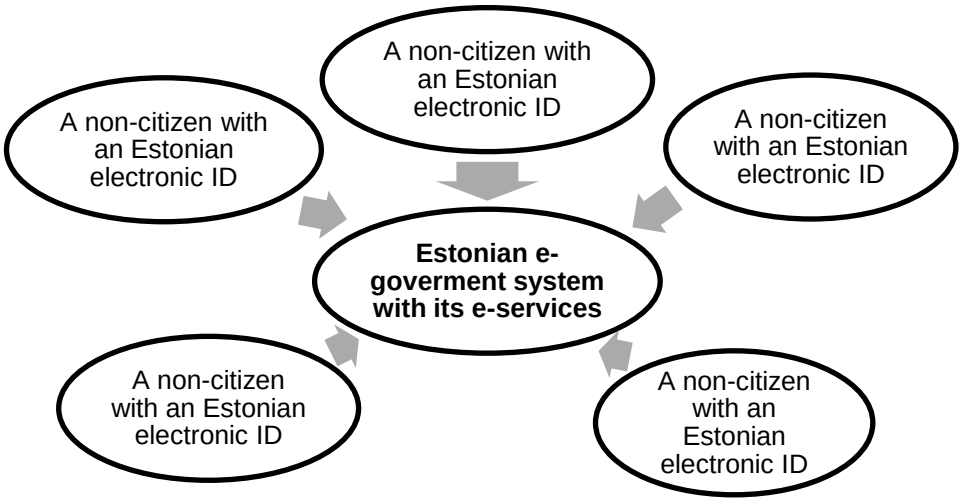

Figure 5. Enabling non-citizens to access the national e-state and use e-services. Own figure.

The third option is offering **cross-border services through a neutral non-governmental body** (see figure 6). This has been done by a private sector initiative SignWise, which is a cloud-based digital identification service, enabling people and businesses[18] to digitally sign documents across borders by providing trusted and secure cross-border infrastructure for authentication and validation (Signwise 2015).

Figure 6. Enabling people and companies to digitally sign documents across borders by providing secure infrastructure. Own figure.

The fourth option is **a supranational framework** (see figure 7) where, based on a principle of subsidiarity[19], transnational interference is seen as the most effective and efficient solution. The example here is the eIDAS, which aims to create a system of mutual recognition of Member States' national identification systems, through creating a comprehensive legal framework for both the electronic identification and authentication services (Stibbe 2014).

[18] The services can currently be used by Swiss, Belgian, Finnish, Estonian, Latvian, Lithuanian and Azerbaijani state issued e-Identity owners, but the goal is to be available through Europe, Middle-East and Africa by the end of 2015.
[19] It is argued that the EU level of decision-making should only be used when it is the most effective solution and brings added value (O'Brien 2013, 12). The contradiction here is that actions made on lower levels are preferred, but larger bodies with better competencies can logically do things more efficiently (Barber 2005, 312). The question here is whether the competences existent on the EU level should be used or should the decision process be allocated to the national levels (Barber 2005, 308). The concept of comparative efficiency states that, when Member States cannot achieve the goals satisfactorily, the interferences from the EU level are justified (Vandenbruwaene 2012, 326, O'Brien 2013, 13).

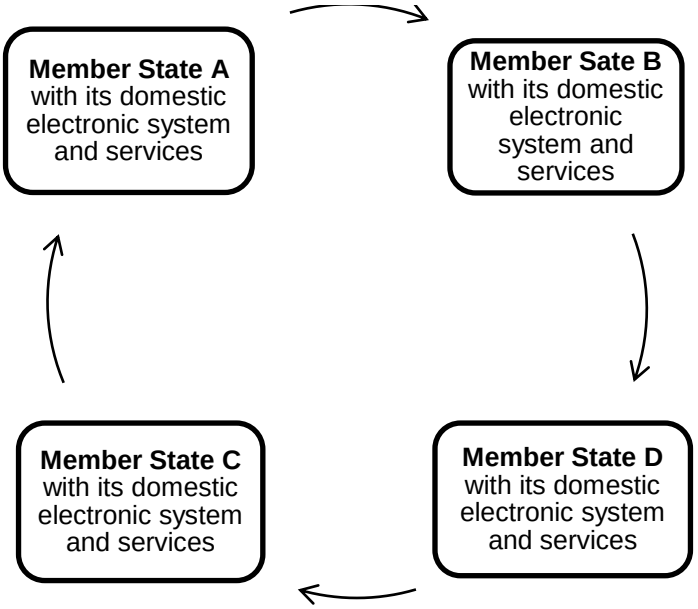

Figure 7. Supranational framework where all Member States recognise each others digital identities. Own figure.

2.3. Context dimension

E-government applications are often looked as isolated technical artefacts, but it is important to understand that contents are always used in certain contexts (Heeks 2005, 51). The contexts surrounding these changes need to be taken into account with each change (Pollit 2002, 122). In the following sections, reasons behind the adoption of new regulation and the involved stakeholders are analysed through questions *why* and *who*, taking both external and internal context into account. The EES with its policy directions, organisations, values and stakeholders is seen as the internal context and the EU level with its legislative procedures, institutions, values and involved stakeholders as the external. In the following sections the stakeholders are identified, changes in contextual divisions described and finally, the reasons for accepting or rejecting these changes analysed.

2.3.1. Stakeholders in the external and internal context

Stakeholders create the platform for initiatives and changes to be implemented on (Primm, Clark 1996, 1039) and hold an essential value in any case study. On the EU level, the main external stakeholders in adopting the IDAS are the EU institutions, such as the European Parliament, the

European Commission and the European Council (Galler 2013); informal expert groups formed from the representatives of all Member States; technical sub groups formed by voluntary participants (Servida 2015); private sector parties (I6); civil society activists and other interested parties (I5). While the external stakeholders need to be identified, they do not hold significant importance in the context of given case study, so the main focus will be on the internal stakeholders. In the next sections, the key stakeholders in the EES are identified and the importance of these stakeholders is looked in more detail.

The direction in the EES is to empower those with the actual competences. This means that a bottom-up system is used, where each minister is responsible for the ICT system and e-services of their field. Ministers consult public and private sector stakeholders, and based on the collected information, proposals are then presented to the national central level. (I6) As the eIDAS requirements are set by the EU, the bottom-up system in that sense cannot be used. Here, the responsible network is formed by three systematic counterparts (see figure 8) – Ministry of Interior (MI), who is responsible for all identity questions, including e-ID; the Estonian Information System Authority (EISA), who deals with all the technical issuses together with the Ministry of Economic Affairs and Communications (MEAC), who is included on the side of policy design and the Certification Centre (CC), who is responsible for the actual operating of the system and its interoperability with the eIDAS requirements (I4, I6). While the previously named are the main organisations involved, close cooperation with private sector needs to be emphasised[20] (I3) – electronic identity was developed clearly on the initiative of banks and telecommunication companies (I1, I3), certification services are provided solely by the private-owned SC, and most ICT services are bought in from the private sector (I3). Also, Estonian officials in the EU need to be mentioned, as important advocators of domestic interests on the international level, and auditors, as the stakeholders whose importance will increase in the implementation phase of the eIDAS (I4).

[20] While CC is also private-owned, it is important to emphasise that the role of private sector is substantial, and the influence does not come purely from CC, but also from other private counterparts (I3, I6).

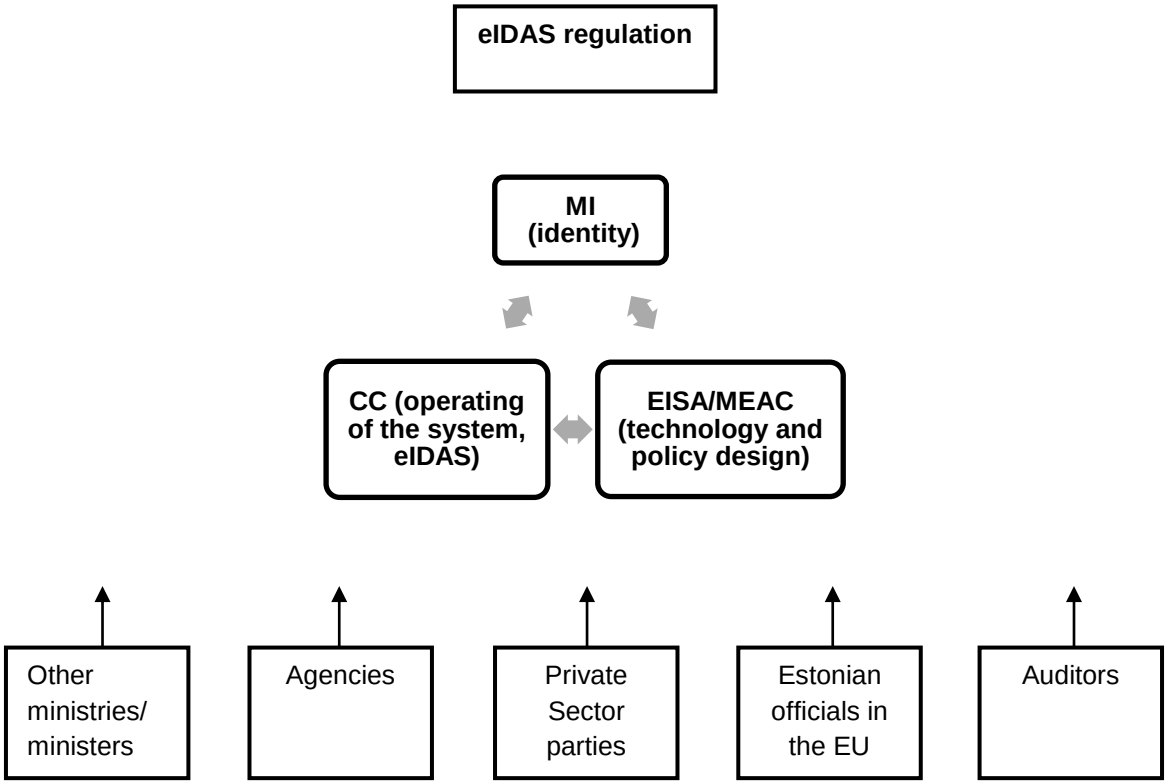

Figure 8. Stakeholders related to the eIDAS in the EES. Own figure.

The circle of people dealing with IS in the EES is rather small and specific knowledge is needed. Accordingly, personal opinions and characteristics of individuals are very important. Ideologies are often carried on from one individual to another, forming a symbiosis between personal opinions and organisational views. (I6) From early on, there were pioneers who wanted to develop cross-border e-cooperation, which meant that when the discussions about the eIDAS started, the question was not whether to do it but how (I4, I6). Charismatic leadership can be helpful for supporting a clear vision and mission, but critics (Vaarik 2014, I5) bring out that this can also lead to people following ideas blindly, as they do not actually understand the technical part of these solutions. The more extensive involvement of ICT people and critics into discussions could be a solution here (I5). While Pihl (2015) acknowledges that idea, it has to be noted that as the topics are specific, it is very difficult to get perspectives from different people, and it is not a matter of not wanting to take more opinions into consideration (I1, I4).

2.3.2. Categorising contextual divisions

Contextual divisions (information, technology, processes, objectives and values, staffing and skills, management and structures and other resources) introduced by Heeks (2005) are used here

to map and compare the EES and requirements introduced with the eIDAS. These divisions enable to comprehend the scope of changes for the EES.

Information

The eIDAS sets several new requirements for data exchange. For example, new regulation states that information about supervision activities and best practices should be exchanged[21]; any security risks need to be reported[22]; electronic identification schemes together with assurance levels and identification means need to be available for all Member States and information about entities holding data[23] and providing trust services need to be public[24]. Also, requirements are set on the preservation of information for electronic signatures and seals to be valid[25]. Privacy measures in the EU tend to be more regulated and strict, which means that implementation of the eIDAS can mean that Estonia needs to re-evaluate its data regulations and policies (I5, I6).

Technology

The eIDAS aims to be technology-neutral[26]. This means that even though minimal technical requirements are set, specific national technical solutions are not discriminated. In reality, making technologies interoperable requires some Member States to rebuild their systems. The hope is that as Estonia was one of the Member States participating in the pilot project STORK, the technological side will not be a problem (I6). Still, even though it is argued that the only thing needed is a secure gateway which would give identified users safe access to the EES, the reality is not that simple. The current systems have been created and secured for the internal market[27], and when the number of users multiples, systems need to be rebuilt accordingly. Also, the EES is highly integrated, which means that any changes done influence other components of the system. As integrated databases have grown and the whole system is dependent on change, renovating systems cannot be based on pure enthusiasm like it was 15 years ago. (I4)

[21] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 34.
[22] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 38.
[23] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Article 9, Section 1.
[24] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Article 22.
[25] Regulation (EU) No 910/2014 Of the European Parliament and of The Council. Introductory remark 61.
[26] Regulation (EU) No 910/2014 of the European Parliament and of The Council. Article 12, Section 3.
[27] As an example, many services today are accessible with a bank link, which would not be considered as a secure measure for an internationally available state service, and allowing people to access the national system with such a low security control could put the EES under great risk. (Pihl 2015)

Processes

It is believed that the eIDAS does not cause extensive changes in the existing processes. Certification Centre has to change its processes the most, as they will have to start coordinating with other certification centres[28](I6). The auditing functions need to be added to strengthen the e-governing process (I4), but it can be argued whether these functions should be contracted from private sector (I1) or developed in the governmental agencies (I4). As cross-border digital signing is one of the big goals of Estonian e-government, many of the activities of relevant government officials have already been reorganised to achieve cross-border goals better (I6). At the same time, critics (Vaarik 2014, I5) hope that some of the processes, such as the involvement of people with technical knowledge in all phases, will be re-evaluated, prompted by the eIDAS (Vaarik 2014, I5).

Objectives and values

Digital agenda of Estonia 2020 (MEAC 2014) highlights that cross-border digital signing and the availability of cross-border e-services is one of the main objectives in Estonia's digital agenda, as it would simplify the work of Estonian enterprises and help save money (I6). It can be said that the goals of the eIDAS coincide with the objectives and values of Estonian digital policies (I3, I4, I6), so there is a strong political willingness to support implementation of the eIDAS (I6). At the same time it needs to be recognised that the purpose of the eIDAS is not to fulfill Estonian, but the EU goals and so some of the requirements surely create additional obligations and are therefore burdaining Estonian system. Any cross-border cooperation process has its own threaths, but the solutions should not be found from closing the digital borders, but through making these communications secure. (I4)

Staffing and skills

Estonia is a small state, and therefore the lack of specific resources is seen as one the main problems (I3, I4, I6). Coordination of certification centres increases the scope of technical work required substantially (I6). Existing organisations get additional workload (I6) and the resources are already scarce (I4). The main issue is having too few people, but the competencies of the

[28] Additional coordination tasks also create a demand for additional resources, and as human resources are lacking, a need for some re-organisation (Sikkut 2015).

existing people also need to be developed (I4, I6). There are only very few people who actually have a strong technical knowledge, so fulfilling the eIDAS requirements requires a substantial rise both in the amount of people and the competencies (I4, I5). Where legal knowledge is concerned, there is only one person in Estonia, who has in-depth knowledge regarding the eIDAS. So, developing more legal knowledge is necessary, as having these competencies on the level of EU is not sufficient (I4). A need to increase competencies and deal with deficits can actually be considered positive, as there are several issues which have long had a need to be dealt with, but before the eIDAS and e-residency they were not prioritised. (I4, I5) Others (I5, I3, I6) are more optimistic and do not see a significant need for the increase of competencies. Some additional tasks will be created for auditing, but these competencies are existent in the private sector, so these tasks can be fulfilled through partnership (I1).

Management systems and structures

While some of the interviewees (I1, I3, I5) believe that there is no need to start building new management systems and infrastructures, others argue some changes might be needed (I2, I4, I6). The need for change in management systems and structures is highly dependable on the owners of other Member State's databases – every Member State is responsible for developing its e-services, and if the management competencies were proven to be insufficient, need for change might appear (I4). Sikkut (2015) believes that when these changes are needed, the EES is highly flexible and receptive towards change. Estonian official statement is to have a "no-legacy" policy, which means that when better solutions are introduced, there should be as little resistance as possible. The Estonian e-government sector is run with change management philosophies, not with technology management, which should also make it easier to adjust in change environment. (I6) Pihl (2015) is more critical here, saying that even if there is willingness to be flexible, the lack of resources makes it impossible. Currently, all the available resources the Estonian public service has are directed towards preparing Estonian presidency of the Council of EU, and contributing to another secondary task is therefore complicated. There is strong willingness in MEC and among lobbists, but the lack of resources certainly creates inflexibility, and when the resources are lacking, mental willingness is not sufficient. (I4)

Other resources

Changing the existing technologies and e-services is not only a question of willingness and flexibility, but at least to some extent, resources (both time and finances) have the key importance (I4, I6). This means that the existing resources need to be targeted effectively and conformity of different goals is essential (I6). Implementing eIDAS certainly creates additional tasks and financial obligations (I6), but the key here is in the effective use of resources (I4). Also, the EU provides financial support, which should ease the lack of resources (I3).

2.3.3. Reasons for the new regulation and for accepting or repulsing the change

When adopting and implementing changes, it needs to be asked why these changes are needed in the given contexts, and why are they accepted or repulsed (Irani, Piotrovitz 2008; Mahmood, Becker 1985). In the following sections, the reasons for accepting or rejecting the eIDAS in the EES are mapped and analysed. As the eIDAS is directly applicable, the adoption of it is mandatory for all Member States. Still, evaluating whether the changes are accepted among stakeholders makes it possible to see if the the eIDAS complements or challenges Estonian local e-government initiatives and goals, and whether the eIDAS should be seen as the most effective measure for achieving cross-border services.

The purpose of IS is to simplify the work, enabling organisations to work better (Symons 1991, 210). Here, a nation state is seen as an equivalent to an organisation, and the EES to an IS. In the public service, IS are used to provide for citizens faster, more conveniently and to reduce costs (Miyata 2011, 134). In the Estonian case, efficiency has been the core driver of rationale (I6). Estonia has paperless decision-making in the government cabinet since 2000, and most of the public sector services are available digitally (e-Estonia 2015c). Using digital signatures domestically has helped to save 3% of GDP and governmental stakeholders believe that this number could be even higher when digital IDs could be acknowledged throughout the EU (I6). The digital agenda of Estonia 2020 (MEAC 2014) states that 20 percent of the European people should use digital signatures by 2020 and that Estonia is motivated to support the development of cross-border cooperation.

The opinions regarding the influence of the EU on the EES differ substantially. While the interviewees (I1-I6) agree that the the EU has impacted the Estonian legislative framework, some (I1, I2) see the eIDAS as the first initiative which could have an actual impact on the EES

while others (I4) argue that the EU has had significant impact both financially and ideologically. While some (I2) argue that the influences have mainly been from the national level to supranational, others (I4) believe that without directive 1999/93/EC, many of the domestic solutions and cross-border initiatives could not have been possible. None of the interviewees saw the eIDAS and the EU interference in the national systems as something fundamentally negative. On the contrary, it is believed that the eIDAS is entirely in accordance with the goals of the EES (I3, I4, I6) and that the eIDAS can be an important pioneer in digital cooperation (I1, I2). Also, aligning after European principles could significantly strengthen the EES, as in the EU level there are stronger requirements on security, privacy, openness and data protection (I5).

Estonia does have its cross-border digital initiatives, but this does not necessarily mean that the eIDAS would be seen as a competing concept. It is clear that Estonian initiatives could not create open borders within 28 Member States. As local initiatives are used in fewer countries and they develop faster, a two-speed Europe could be an alternative here, but this would not be the most desirable option. As the eIDAS only sets the minimal requirements for cooperation and does not limit the existing cross-border systems, it is still possible to contribute to the fast implementation of the eIDAS, but to cooperate more with the most strategically important counterparts. (I6) So, the question in Estonia regarding developing cross-border e-services has not been whether to do it, but how to do it the best (I3, I4, I6).

The simultaneous implementation of the eIDAS and the e-residency was taken into account during the development phase, and therefore the fact that the EU market will be lost for the e-residency project, is not really a concern (I2, I6). The primary target for the e-residency is the non-EU countries (Parliament of Estonia 2014, 7), which means that interoperability between the EU Member States could actually increase the interest for the Estonian e-residency in the non-EU countries, as the eIDAS would make the e-residency an electronic gateway to all Member States (I2, I6). Still, the challenges should not be left unnoticed. The eIDAS creates an open market and if another country[29] was to duplicate a similar idea with a stronger technical content, these alternatives would probably be used instead of the Estonian e-residency (I5). While this possibility[30] is also recognised by the project manager of the e-residency (Korjus 2015), he argues that it is unlikely that other countries would start using the same concept. Overall, it can

[29] An example was described here on the example of Switzerland, who based on its better reputation would most likely be considered as a more credible service provider (I5).
[30] An example of UK was introduced and it was explained that if UK were to provide similar solution it would be easier for them to find users (I2).

be still be argued, that the existence of the e-residency project does not create substantial resistance towards implementing the eIDAS.

Another important aspect for accepting the eIDAS in the EEC is the fact that Estonia managed to defend its interests well while the content of regulation was worked out, especially regarding the electronic identification and the classification of Estonian identification system under the highest classification. This means that the content of regulation does not conflict with the goals of Estonian e-government. (I1) A couple of years ago, Estonian positions were clearly underrepresented, and there was a great risk that if the regulation would differ greatly from the system Estonia has today, systems would need serious rebuilding and large investments (I3). If more had to be changed, the resistance against the eIDAS would also be more likely (I1). Estonian representation in discussions has been increasingly stronger, which means that Estonia's domestic digital interests are represented – for example the eIDAS combines trustworthy identity with an highly integrated system, which is also the basis for the EES (I3). While, the eIDAS does not conflict with the EES, the question regarding the necessity of cross-border services could still be raised[31] (I1, I4). Most citizens probably do not need electronic state services of other countries, so the question here is whether the use of resources for rebuilding national e-systems is actually justified (I4).

2.4. Process dimension

In the following sections, the process of adopting changes introduces by the eIDAS, the communication of these changes and factors of timing are described and analysed through questions *how* and *when*.

2.4.1. Process of change

Many of the stakeholders in the EES believe that Estonia is an important driver in the e-government field, who has managed to impact the content of the eIDAS largely (I1, I3, I6). It is believed that Estonia has had more influence on the European digital policies than it would be assumed based on the size of the country (I4, I6). Whether the time spent on the current developments should be considered optimal, or have the developments been too slow, depends

[31] The question of necessity was raised for both eIDAS and e-residency (I1, I4).

on a viewpoint. The advantageous circumstances[32], Estonia has had should be taken into account. (I1) In the last five years the development of the ESS has slowed down and compared to some other countries, Estonia has not been particularly progressive (I2). Critics (Vaarik 2014, Vurma 2015, I5) also argue that the Estonian e-government initiatives need to be supported with stronger content, which means larger involvement of people with extensive technological knowledge. The Estonian success stories, such as electronic ID and x-road are 15 years old and in a rapidly developing environment, innovations are needed (Vurma 2015). The low cost of technological solutions is not necessarily a positive thing, as low price usually means using standard solutions, instead of the more secure and modernised ones. The x-road, which is one of the corner stones of the EES, has not gone under extensive technological renovations since its first introduction, and cryptographic solutions have not been integrated to the system, making the EES more vulnerable towards possible attacks. (I5)

The attitudes towards new regulation have been mainly positive (I4,I6). It was clear that the directive was not working (I4) and in order to develop cross-border cooperation, a new regulation was needed (I6). On the EU level there was a wider discussion regarding whether these changes should be introduced in the form of a new directive or regulation, but the support for the regulation became dominant (I4). Estonia participated actively in the developing process of the eIDAS and worked upon widening the scope, so it would not be just a digital signatures act, but would also contain trust services (I6). The idea has been to promote Estonia's existing solutions on the EU level, so that the change in Estonian domestic systems would be minimal. (I4) MI participated in as many discussions as possible and defended Estonian interests in the draft process. If Estonian interests had not been defended so well, the changes introduced by the eIDAS would be significantly more extensive for Estonia. (I1)

Another important aspect is the breakthrough in the past couple of years regarding digital identity. When the e-service discussions previously concerned mainly the technical solutions, the necessity of secure identification as the key to trustworthy services is now recognised. It has been understood, that it is not possible to develop usable electronic state services without trust and means of secure identification and authentication. (I3) There have been intense discussions on the EU level regarding the need for electronic identity through unique identifiers, and this has opened a debate about the necessity of electronic services, data protection, openness and security

[32] Here, good economic environment and little resistance in society, which enabled the occurrence of digital identity and personal identification code without a larger debate and criticism are seen as the advantageous circumstances (I1).

(I3, I5). This debate has been basically non-existent in Estonia (I5). Personal identification numbers were taken into use after regaining the independence and due to the socio-political disarrangement there was never a serious discussion or reluctance against it. In the many EU countries personal numeric identifiers are unthinkable due to historical, ideological, cultural or religious reasons[33], but unique identifiers are an integral part of secure digital identification, and countries without these systems do not have working electronic state services. In Estonian case personal identification numbers were created in 1992 and as they are already widely used by both private and public sector, the eIDAS does not create a need to build a new system. (I3)

The most important aspect of change process is communication, often determining the end result (Stockdale, Standing 2006, 1094). When domestic e-services were first introduced, targeted campaigns were used to promote individual services. Still, it can be argued that domestic communication has been moderate and the branding has been mainly targeted outside to have a global e-state image. (I6) There has been a lot of critique towards the communication processes of the EES, mainly as the branding has focused on the simple image of e-Estonia, instead of the content of e-services. It could be argued, that enough resources have not been used to help consumers understand the actual digital processes (I5), and to offer effective services, better communication is needed. The fact that the majority of people do not understand the technical processes behind electronic services and digital identification means, that it comes down to trust and therefore to communication and branding. (Vaarik 2014) To defend the previous statement, it should be stated that there is a lot of room for development in the communication strategies of e-services, but these changes are already happening. Communication used to align after international practices, and as everyone were talking about quantifiable indicators, such as the number of e-services, Estonia was doing the same. Today a new communication model, where the content of these services is properly communicated, is in creation. (I4)

For the eIDAS, there has not been a comprehensive domestic communication in Estonia (I3, I4, I5, I6). The EU has held awareness events for both public and private sector, where Estonian professionals have been participating in (I3). It has been criticised that on the domestic level, non-governmental critical opinions have not been actively included in discussions, which weakens the transparency of discussions (I5). It is important to note that open communication of mistakes and weaknesses is not necessarily a negative thing, as it makes the system more

[33] The largest influencer here is the heritage of World War II, which associates personal identification numbers to numbering victims of Holocaust. Some more sensitive countries also protest against showing sex, gender, age and other personal information in their unique identifiers. (I3)

transparent, flexible and trustworthy (Vaarik 2015). These critical viewpoints are defended with the argument that on the domestic level there has not been a need for a communication, as without implementation acts there is no content to communicate[34] (I3, I4, I6), and as there are not enough technically qualified people, there is no audience to communicate the earlier phases to (I4). The information flow in public service is rapid, and there is not enough time and competencies to analyse it all (I4), making it difficult to get input from officials, who are not directly responsible for adopting the eIDAS (I1). Wider communication is planned for the period of implementation (I6) and the EU will probably finance this process (I3).

2.4.2. Factors of timing

It has been an Estonian ambition to achieve cross-border identification measures and cross-border e-services as fast as possible. Even though the regulation is directly applicable, it is still clear that comprehensive changes, such as digital open borders, do not happen instantly. So, the question is whether to invest Estonian resources into fast application of the eIDAS or to the domestic initiatives which also seek to develop cross-border digital cooperation and availability of e-services. Sikkut (2015) and Korjus (2015) believe that the timing of the eIDAS has been good. If the eIDAS was designed and adopted earlier, local initiatives such as e-residency and SignWise might not have had a chance to develop, and Estonia had not had such a good starting position. As implementation of the eIDAS and the e-residency project are happening simultaneously, it is easier for Estonia to use its resources reasonably – same actions help to develop both. (I6) From the perspective of e-residency project it is positive that the eIDAS requirements can be taken into account while developing technological solutions for e-residents. Simultanious processes also create a better platform for communication, especially since the stakeholders in Estonia overlap greatly. (I2)

It can also be argued that it would have been useful for Estonia if the eIDAS was adopted earlier, as when the system gets older, it gets more complicated to implement changes (as the processes get more complex). The perfect timing would have been five years ago, when Estonia had managed to prove that it has a working ES. Pedak (2015) believes that there would not have been

[34] A parallel with Directive 99/93/EC, can be introduced here, as the directive stated that digital signatures of other Member States need to be recognized, but in reality, this has not happened. Previous experiences have made it evident, that there is not much meaning in communicating eIDAS to a larger audience before it is actually clear, what is going to change. (Pihl 2015)

any negative effect on the local initiatives, as the concept behind e-residency was worked out already in 2006-2007 and included in the legislative framework in 2009, but it was put on hold due to financial crises. The same apllies for SignWise, if the eIDAS would have been created earlier, the need for such a service would have been evident earlier. (I3) Pihl (2015) also states that when the timing would have been different there might be more flexibility, as the the Estonian presidency in the EU is certainly taking a lot of resources and attention. As the eIDAS is in strong accordance with Estonian digital goals, Estonia might have had more chances for self-promotion[35] (I4). At the same time, when resources are lacking, short timelines can be problematic (I6). Critics also emphasise that it is important not to seek fast implementation on the account of quality. The reason behind slow processes on the EU level is often the high requirement for transparency and security and when sustainable cross-border e-services are desired, these aspects cannot be overlooked. (I5)

[35] Pihl (2015) argues that as Estonia has an above average stating position, this strategic advantage could have been used more. For example, there was a possibility for Estonia to create a competency agency in Estonia for offering technological solutions required by eIDAS. As there was not enough political willingness to promote that idea, Estonia lost an opportunity to improve its reputation, get additional branding and save local resources.

3. DISCUSSION

The given case study aimed to answer two research questions: whether the changes introduced by the eIDAS are complementing or challenging the initiatives and goals of the EES, and whether Estonia should contribute to the fast implementation of the eIDAS, as the most effective measure for achieving cross-border use of e-services. The CCP framework was used here to map and analyse the key aspects of the chosen case. It can be said that CCP provides a sufficiently detailed framework for a single case study and enables answering the previously set research questions. Also, all the interviews, combined with a desk study, fulfilled their purpose and managed to provide a comprehensive overview of the chosen case. In the following sections the research questions are answered based on the theoretical framework and empirical findings.

Are the changes intoduced by the eIDAS complementing or challenging Estonian e-government's goals and domestic initiatives?

In the Estonian public sector, efficiency is seen as one of the core drivers of rational, and digital solutions are seen as a way to achieve it. On the domestic level around 3% of GDP is saved due to using digital signatures, and it is seen that if digital IDs were acknowledged across borders, the efficiency save could be even higher. (I6) The digital agenda of Estonia (MEAC 2014) constitutes as one of its main goals that by 2020, 20 percent of the Europeans should use digital signatures. The eIDAS certainly supports this goal, by creating a common digital market, where e-services could be used across borders. While the regulation does not have its implementation acts and the specific content is still unknown (I1, I3, I4, I5) it can still be evaluated whether the goals and directions are compatible with the EES.

It is important to note that the content of change influences the attitudes towards the change, meaning that when the core of the organisation is not affected, there is less resistance (Devos et al 2007, 610). The expert interviews showed, that as Estonia had managed to integrate its interests in the content of the regulation, the building blocks of the EES probably do not need to change substantially (I1, I6), leaving the core values untouched, and therefore not creating

resistance. As Estonia can be considered a mature system (I4), it can be expected that it would also be more reluctant towards the changes (Mahmood, Beckerargue 1985, 42). This can be seen through the efforts to influence the content of change, by strongly defending Estonian interests during the development of regulation (I1, I4), even though critics argue that Estonian system could use substantial renovations (Vurma 2015, I5). As the core values are currently not changed, the attitude towards the eIDAS is mainly positive, but if more were to be changed, the resistance would definitely be bigger (I1, I3, I4).

Pollit (2012, 10) argues that the mismatches between contextual features like cultures and political systems can cause extensive instability. In order to avoid instabilities the possible mismatch between contextual divisions – information, technology, processes, objectives and values, staffing and skills, management systems and structures and other resources – were evaluated (Heeks 2005, 51). If the contexts do not match, contents should be changed (Ibid., 66), but as in the current case the content under observation is directly applicable, the change of content was negotiable only in the development phase and if the needed changes were not pursued there, then in the case of mismatches the EES has to be changed instead. The analysis showed that in most divisions the mismatches were minor, but the mismatches were most substantial in the dimensions of information, technology, and staffing and skills. It is clear that the eIDAS brings a need for re-evaluation of data regulations and policies (I5, I6), developing additional competencies and rebuilding some of the technological solutions (I4). Still, as the neccessity of these changes is accepted (I4, I5, I6), major resistance should not be expected.

The second aspect under investigation was the compatibility of the eIDAS with the Estonian domestic cross-border initiatives. It can be said that the goals of the eIDAS and the EES are compatible, but it still needs to be considered that in a small state context, the resources are scarce, and therefore strategies are needed to decide where to direct these resources (I3, I6). One of the relieving circumstances for the changes introduced by the eIDAS is the fact that some of these changes are also required deriving from the domestic needs and goals, in particular to support the development of e-residency (I3, I4, I6). Based on the previous findings it can be reasoned, that even though the eIDAS was enforced to fulfill wider goals of the EU and not the EES, the eIDAS supports the development of local initiatives, by creating an open system (I3, I4, I6). As the content does not conflict significantly with the EES, the local initiatives can be developed simultaneously with the eIDAS. Still, it should be noted that while in the longer perspective, having open digital borders is benefitial for Estonia, the additional requirements

introduced by the eIDAS can create problems (I6), as both human and financial resources are lacking (I4).

Also, the eIDAS can be used as a motivator to improve the communication of the local initiatives (I6). It can be argued that the systematic branding has helped Estonia to create a strong image of e-state (I6), but as the technical content has not been communicated, the actual content is not understood by its users (I5). Estonia has all the prerequisites, to use the eIDAS as an enabler for its local cross-border initiatives, and to promote itself as the pioneer of cross-border digital services, but to do so successfully the existing technological solutions constantly need to be improved through open feedback and communication, use of best technical practices and creation of an actual transparent e-society. If the communication is not strategically planned and transparent from the user's perspective, it is likely that the eIDAS opens the market for digital competition and Estonia can easily lose its current position in e-governing. (Varik 2015, I5) Still, it can be said that overall, the eIDAS complements the development of the domestic e-government initiatives.

Should Estonia contribute to the fast implementation of the eIDAS, as the most effective measure for achieving cross-border use of e-services?

As the Directive 99/93/EC has proved to have substantial gaps (European Commission 2012), the eIDAS was introduced to develop secure mutual recognition of cross-border electronic identification, electronic trust services and electronic documents (Servida 2015). It is clear that developing cross-border e-services is in the interest of Estonia (I4), but as Estonia also has its own cross-border initiatives, it needs to be evaluated whether Estonia should contribute to the fast development of the eIDAS as the most effective solution.

One of the important arguments, introduced in the theoretical framework, is that with a successful change, maximum output should be achieved with minimum input (Symons 1991, 207). It could be argued that, as Estonia already has usable cross-border solutions, developing new system can be considered as a use of additional resources, conflicting with the minimum input requirement. At the same time even Estonian e-governance visionaries agree (I2, I3, I6), that without the eIDAS it would not be possible to develop a digital single market with a scope of 28 Member States and thus the use of the additional resources is justified (I6).

Another aspect is that with a supranational framework the impact can be larger, as the partners of the EU are also influenced (I4). For example when Directive 1999/93/EC was implemented, many of the neighbouring countries guided from it while developing their digital signature acts. Estonia is one the examples here, as Estonia passed its Digital Signature Act based on the directive, while not being a member of the EU. (I3) As businesses want to cooperate with the EU, the successful building of a digital common market could mean a possibility of expanding internationally. This could give a chance for the EU to create something innovative. The initiative stakeholders, such as the EES could have a chance to reach a significantly bigger market. Theoretically, the eIDAS could create a system where countries can use the best available e-services – for example the tax system created by one country, pension system by another and health register by the third – making e-governing remarkably more effective and cost-efficient. (I4)

When the purpose of change is properly communicated it is also more likely to be successful (Self et al. 2007, 213). While Estonia has been criticised for the lack of good communication (Vaarik 2015, I5), there was comprehensive and inclusive communication on the level of the EU (I1, I4). As larger bodies with better competencies can lead communication processes more efficiently (Barber 2005, 312), it can be assumed that the interference on a supranational level is more efficient. As Estonian context is lacking specific competencies and finances (I4, I5), it is in Estonian interest to contribute to the fast implementation of the eIDAS, as this gives Estonia access to additional resources (I4). Estonia has strong representatives, who are able to defend domestic interests on international level (I1, I2, I3, I4, I6), so supranational interference should not be discouraged (I5)

CONCLUSION

The open borders of the EU and the mobility of Member State's citizens have created a need to replace the fragmented digital market with a secure common market. As Directive 99/93/EC[36] did not manage to do so, new and more binding regulation was needed. The eIDAS was adopted in 2014 to synchronise the quality and reliability of digital services and to create a digital common market in the EU (European Commission 2012, 9).

In the focus of this thesis was the compatibility of the eIDAS with the EES. The CCP framework was used to create linkages between context, content and process, and to analyse the compatibility through questions *what*, *why*, *who*, *when* and *how*. Key aspects of the eIDAS and the EES were mapped and analysed to answer the research questions set for the given case study.

In the content dimension the substance of the eIDAS was mapped as the content of change, and the EES as the content, which was changed. Estonia was described as one of the pioneers of developing cross-border solutions (I4, I6) and the eIDAS as a framework which could support these cross-border electronic goals by making the cooperation between 28 Member States possible (I6). It was argued that as the core of the EES and the eIDAS coincide, there should not be significant resistance caused by the mismatch of contents.

In the context dimension the reasons behind the adoption of new regulation and the acceptance of resistance of it in the EES, and the functions and importance of stakeholders were discussed and analysed through questions *why* and *who*. The EU level with its legislative procedures, institutions, values and involved stakeholders was seen as external context, and the EES, with its policy directions, organisations, values and stakeholders as internal context. Estonia was described as a mature system (I1, I3, I4, I6), and as argued by Mahmood and Becker (1985, 42) this meant that the best efforts were used to maintain the current system as much as possible and that the extensive renovations could be avoided (I1). Still, as the core values were not changed, the attitude towards the eIDAS is mainly positive. It is also evident that as the circle of

[36] Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures

stakeholders in the EES is rather small, the individual opinions have significant importance and as there have been strong visionaries to promote the ideological level of the eIDAS, substantial differences of opinion have not occurred. The contextual divisions – information, technology, processes, objectives and values, staffing and skills, management systems and structures and other resources – were also evaluated and in most divisions the mismatches were minor, but in the dimensions of information, technology, and staffing and skills there were remarkable mismatches. As the eIDAS is directly applicable and the content of change therefore cannot be changed, the changes have to be done in the EES – data regulation and policies need to be re-evaluated, additional competencies developed and technologies strengthened (I4).

In the process dimension, the process of adopting the eIDAS and the communication of these changes were analysed through questions *how* and *when*. The empirical research show, that the communication of the eIDAS has been moderate and mainly existent in small circles of stakeholders (I1-I6). This can be explained with the fact that the practical content is still unknown, and therefore there is not much to communicate, as the substance of practical changes is unknown (I3, I4, I6). Still, it needs to be noted that the stakeholders have focused on defending Estonian interests on the international arena, and this has been done quite successfully (I1, I4). Regarding the aspects of timing, some believe that the timing was good, as if implemented earlier, the readiness might have not been there (I2, I6), while others say that if implemented earlier, it would have been easier to implement required changes and the flexibility might have been better (I3, I4).

Based on the previous findings, the following research questions were answered:

- Are the changes introduced by the the eIDAS complementing or challenging Estonian e-government's goals and domestic initiatives?
- Should Estonia contribute to the fast implementation of the eIDAS, as the most effective measure for achieving cross-border use of e-services?

Leaving some risks and additional obligations aside, it can be argued that the eIDAS is complementing Estonian e-government's goals and domestic initiatives, and it is in the interest of Estonia to contribute to the fast implementation of the eIDAS as the most effective measure for developing cross-border services.

Summary in Estonian

Euroopa Parlamendi ja Nõukogu määrus e-identimise ja e-tehingute jaoks vajalike usaldusteenuste kohta (eIDAS): sobivuse analüüs Eesti e-valitsemise süsteemis

Gerli Aavik

Resümee

Euroopa Liidu (EL) kodanike vaba liikumine ning avatud piirid on loonud vajaduse ühtse digitaalturu järele. Toetamaks inimeste, kaupade, teenuste ja kapitali vaba liikumist EL-is on vaja ka toimivaid piiriüleseid e-teenuseid. Kuna tänane EL-i digitaalturg on tugevalt killustunud ning 1999. aasta direktiiv ei ole suutnud piiriülest digitaalset koostööd tagada, võeti 2014. aastal vastu eIDAS määrus, mis regulleerib e-identimist ning e-teenuste jaoks vajalikke usaldusteenuseid. (European Commission 2012, 9)

Käesoleva magistritöö eesmärk on analüüsida uue eIDAS määruse sobivust Eesti e-valitsemise süsteemi. Eestit võib pidada piiriülese digitaalse koostöö valdkonnas üheks suunanäitajaks (Kirsipuu 2015, Sikkut 2015), mistõttu töö vaatleb, kas eIDAS määrus toetab Eesti e-valitsemise süsteemi eesmärke ning siseriiklikke piiriüleseid algatusi või on pigem väljakutseks. Lisaks annab töö hinnangu, kas Eesti huvides on panustada eIDAS määruse kiiresse rakendamisse kui kõige efektiivsemasse viisi piiriüleste e-teenuste saavutamiseks.

Magistritöö koosneb kolmest osast. Teoreeriline osa annab ülevaate infosüsteemide hindamiseks kasutatud teoreetilistest lähenemistest; põhjendab, miks kasutatakse e-valitsemise süsteemi analüüsimiseks just infosüsteemide hindamiseks välja töötatud lähenemisi ning annab ülevaate töös kasutusel olevast sisu, konteksti ja protsessi (CCP) raamistikust. Empiiriline analüüs kaardistab ja analüüsib Eesti e-valitsemise süsteemi ning eIDAS määrust küsimuste *mis, miks, kes, kuidas* ja *millal* kaudu ning vaatab eIDAS määruse sobivust Eesti e-valitsemise süsteemi. Diskussiooni osa arutleb juhtumianalüüsi leidude üle ning annab vastuse töös püstitatud uurimusküsimustele. Tervikliku ülevaate andmiseks kasutab töö uurimisdisainina kvalitatiivset

üksikjuhtumianalüüsi. Empiirilised andmed on kogutud dokumendianalüüsi ning poolstruktureeritud intervjuude läbiviimise teel.

Töös kasutatav CCP raamistik võimaldab mitmedimensioonilise lähenemise abil arvesse võtta nii tehnoloogilisi kui inimaspekte. Sisu, konteksti ja protsessi dimensioonide kaardistamine loob võimalused põhjaliku ülevaate andmiseks (Stockdale, Standing 2006, 1091) ning tagab, et infosüsteeme hinnates ei jää olulised aspektid arvesse võtmata (Self. et al. 2007, 212). Muutuste hindamiseks kasutatab uurimus mõõdikuid nagu tõhusus, mõjusus ja konteksti mõistmine (Miller et al. 1988, 551), võimaldades valitud mõõdikute kaudu hinnata, kas ja mil määral sobivad muudatused uuritavasse keskkonda. Muudatuste sobivuse hindamiseks kasutatakse Heeksi (2005, 65) poolt tutvustatud kontekstuaalseid määratlusi, mille abil infosüsteem jagatakse seitsmesse kategooriasse: informatsioon, tehnoloogia, protsessid, eesmärgid ja väärtused, personal ja kompetentsid, juhtimissüsteemid ja -struktuurid ning muud ressursid (eelkõige aeg ja finantsilised vahendid). Eelmainitud kategooriad võimaldavad uurijal hinnata, kas ja milliseid muutusi antud kategooriates teha on vaja. Mida suuremad on kontekstuaalsed erisused, seda tõenäolisemalt põhjustavad muudatused ka vastuseisu (Heeks 2005, 65). Määravaks on ka põhiväärtuste mõjutamine (Devos et al 2007, 610), võtmeisikute poolehoiu saamine tugeva kommunikatsiooni abil (Self et al. 2007, 213) ning muudatuste ajastus (Ongaro 2012, 4).

Empiiriline osa kaardistab ja analüüsib eelnevale raamistikule toetudes Eesti e-valitsemise süsteemi ning eIDAS määrust. Muudatuse sisuna (content) nähakse eIDAS raamistikku ning sisuna, mida muudetakse Eesti e-valitsemise süsteemi. eIDAS on uus otsekohalduv määrus, mille eesmärk on arendada vastastikust piiriülest elektrooniliste identiteetide tunnustamist, piiriüleseid usaldusteenuseid ning elektrooniliste dokumentide piiriülest kasutamist (Servida 2015). Eesti e-valitsemise süsteemi kirjeldatakse kui küpset ja toimivat süsteemi (I1, I6), mille edu peitub toimivates e-teenustes (Reinsalu 2006, 256) ning tugevas koostöös erasektoriga (I1, I3, I4). Empiirile osa kaardistab Eesti näite põhjal neli võimalikku lähenemist piiriüleseks koostööks – kahepoolsed koostöölepingud Eesti ja Soome maksuametite koostöö näitel, riiklikele süsteemidele ligipääsu andmine mittekodanikele e-residentsuse projekti näitel, valitsusvälise neutraalse vahelüli loomine SignWise näitel ning riikideülese raamistiku rakendamine eIDAS määruse näitel. Lisaks kaardistab töö määrust ümbritseva konteksti (Eesti e-valitsemise süsteemi koos peamiste võtmeisikutega ning EL-i mõjutused) ning analüüsib Heeksi (2005) mudeli põhjal erisusi kontekstuaalsetes kategooriates. Protsessi dimension vaatab eIDAS

määrusega seonduvate siseriiklike diskussioonide kujunemist, kommunikatsiooniprotsesse ning ajastuse võimalikku mõju eIDASe rakendamisele.

Diskussiooniosa arutleb eelnevalt tutvustatud teoreetilisele raamistikule toetuva juhtumianalüüsi tulemusi ning vastab töö alguses püstitatud uurimusküsimustele: kas eIDAS määrus toetab Eesti e-valitsemise süsteemi eesmärke ning siseriiklikke piiriüleseid algatusi või on pigem väljakutseks ning kas Eesti huvides on panustada eIDASe kiiresse rakendamisse kui kõige efektiivsemasse viisi piiriüleste e-teenuste saavutamiseks. Empiirilistele andmetele tuginedes järeldub analüüsist, et ehkki eIDAS loob Eesti jaoks mitmeid kohustusi ning nõuab täiendavaid ressursse, siis üldjoontes on eIDAS Eesti e-valitsemise eesmärkidega kooskõlas ning toetab ka siseriiklikke piiriülese koostöö algatusi. Seetõttu tuleks eIDAS määrust näha kui kõige mõjusamat vahendit piiriülese koostöö arendamiseks ning Eesti huvides on panustada eIDAS määruse kiiresse raknendamisse.

REFERENCES

Alas, A. (2012) Hulk kultuuriministri allkirju on kehtetud. Eesti Ekspress. Available: http://ekspress.delfi.ee/news/paevauudised/hulk-kultuuriministri-allkirju-on-kehtetud?id=65059352, accessed 29.04.2015.

Avgerou, C. (2000) Information Systems : What Sort of Science is it? London: LSE Research Online. Available: http://eprints.lse.ac.uk/2579

Barber, N. W. (2005) The Limited Modesty of Subsidiarity. *European Law Journal* 11(3): 308-325.

Begler, E. (1993) Wheels and Straw: Balancing Content, Process, and Context in Global Teacher Education. *Theory into Practice* 32(1): 14-20.

Bernroider, E. N.,Koch, S., Stix, V. (2013) A Comprehensive Framework Approach Using Content, Context Process Views to Combine Methods from Operations Research for IT Assessments. *Information Systems Management* 30(1), 75-88.

Cordella, A., Iannacci, F. (2010) Information Systems in the Public Sector: The e-Government Enactment Framework. *Journal of Strategic Information Systems* 19(1): 52-66.

Devos, G., Buelens, M., Bouckenooghe, D. (2007) Contribution of Content, Context, and Process to Understaning Openness to Organisational Change: Two Experimental Simulation Studies. *Journal of Social Psychology* 147(6), 607-630.

Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures. Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0093, accessed 29.04.2015.

e-CODEX (2014) About the project. Available: http://www.e-codex.eu/about-the-project.html, accessed 13.05.2015.

EISA (2013)a Data Exchange Layer x-road. Available: https://www.ria.ee/x-road/, accessed 13.05.2015.

EISA (2013)b Finland to create a data exchange layer on the example of the Estonian X-Road. Available: https://www.ria.ee/finland-to-create-a-data-exchange-layer-on-the-example-of-the-estonian-x-road/, accessed 13.05.2015.

European Commission (2003) "The Role of e-Government for Europe's Future", Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, European Commission, Brussels. Available: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2003:0567:FIN:EN:PDF, accessed 29.04.2015.

European Commission (2012) Commission Staff Working Paper. Impact Assessment Accompanying the Proposal for a Regulation of the European Parliament and of the Council on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market. Available: http://old.eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2012:0126:FIN:EN:PDF, accessed 27.04.2015.

European Commission (2012) European Interoperability Framework for European Public Services. Available: http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf, accessed 10.05.2015.

e-Estonia (2015)a Estonian e-residency. Available: https://e-estonia.com/e-residents/about/, accessed 29.04.2015.

e-Estonia (2015)b X-road. Available: https://e-estonia.com/component/x-road/, accessed

13.05.2015.

e-Estonia (2015)c e-Cabinet. Available: https://e-estonia.com/component/e-cabinet/, accessed 13.05.2015.

E-Governance Academy (2015) Mari Pedak. Available: http://ega.ee/people/mari-pedak/, accessed 29.04.2015.

Eisenhardt, K. M. (1989) Building Theories from Case Study Research. *Academy of Management Review* 14(4): 532-50.

Eriksson, J., Giacomello, G., Salhi, H., Cavelty, M.D., Singh, J. P., Franklin, M. I. (2009) Who Controls the Internet? Beyond the Obstinacy or Obsolescence of the State. *International Studies Review* 11(1): 205-230.

Estonian Government Communication Unit (2013). Estonian PM and Finnish PM Signed the World's First Digitally Signed International Agreement. Press release. Available: http://london.vm.ee/frontpage/news_events/news/newwin-middle50/aid-2235, accessed 12.04.2015.

Flyvbjerg, Bent. (2006) Five Misunderestandings About Case-Study Research. *Qualitative Inquiry* 12(2): 219-245.

Galler, G. (2013) Proposal for a Regulation on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market (eIDAS). Progress of the Legislative Process. Available: http://blogs.dlapiper.com/iasproject/files/2013/09/5.-IAS-Workshop-25-September-European-Commission-Status-update.pdf, accessed 29.04.2015.

Hardy, C. A., Williams, S.P. (2011) Assembling e-Government Research Designs: A Transdisciplinary View and Interactive. *Public Administration Review* 71(3): 405-413.

Heeks, R. (2005) e-Government as a Carrier of Context. *Journal of Public Policy* 25 (1): 51-74.

Heeks, R., & Bailur, S. (2007) Analyzing e-Government Research: Perspectives, Philosophies, Theories, Methods, and Practice. *Government Information Quarterly* 24(2), 243-265.

IOS Press. (2012) National e-Government Developments in Europe. *Journal of E-Governance* 35(4): 164-170.

Jones, M. R., Karsten, H. (2008) Giddens's Structuration Theory and Information Systems Research. *MIS Quarterly* 32(1): 127-157.

Kast, F. E., Rosenzweid, J. E. (1972) General Systems Theory: Applications for Organisation and Management. *The Academy of Management Journal* 15(4): 447-465.

Ketchen, Jr. D., Thomas J., McDaniel, Jr. R. (1996) Process, Content and Context: Synergistic Effects on Organisational Performance. *Journal of Management* 22(2): 231-257.

Langley, A. (1999) Strategies for Theorizing from Process Data. *Academy of Management Review* 24(4): 691-710.

Liive, R. (2015). Eesti Piraadipartei juhatuse liige häkkis e-valimisi. *Kiip*. Available: http://kiip.ee/eesti-piraadipartei-juhatuse-liige-hakkis-e-valimisi/, accessed 29.04.2015.

Mahmood M, Becker J. (1985) Effect of Organisational Maturity on End-Users' Satisfaction with Information Systems. *Journal Of Management Information Systems* 2(3): 37-64.

MEAC (2014) Digital Agenda 2020 for Estonia.

Available: https://e-estonia.com/wp-content/uploads/2014/04/Digital-Agenda-2020_Estonia_ENG.pdf, accessed 29.04.2015.

Mishra A, Mishra D. (2013) Applications of Stakeholder Theory in Information Systems and Technology. *Engineering Economics* 24(3):254-266.

Miyata, M. (2011) Measuring Impacts of e-Government Support in Least Developed Countries:

a Case Study of the Vehicle Registration Service in Bhutan. *Information Technology For Development* 17(2): 133-152.

Mahoney, J., Goertz, G. (2006) A Tale of Two Cultures: Contrasting Quantitative and Qualitative Research. *Political Analysis* 14: 227–249.

Mariotto, F., Zanni, P., De Moraes, G. (2014) What Is the Use of a Single-Case Study in Management Research? *RAE: Revista De Administração De Empresas* 54(4): 358-369.

Miller, D., Droge, C., Toulouse, J-M. (1988) Strategic Process and Content as Mediators Between Organisational Context and Structure. *The Academy of Management Journal* 31(3): 5.

O'Brien, R. (2013). Subsidiarity in Asia. *Journal Of International Business Ethics* 6(1/2): 11 18.

Ongaro, E. (2012) Explaining Contextual Influences on the Dynamics of Public Management Reforms: Reflections on Some Ways Forward. In: Retirement Workshop for Professor Christopher Pollit t, 29 - 30 March 2012, Catholic University of Leuven (K.U. Leuven), Belgium. (Unpublished) Available: http://soc.kuleuven.be/io/eng/research/Pollitt_em.htm, accessed 23.02.2015

Pettigrew, A. M. (1990) Longitudinal Field Research on Change: Theory and Practice. *Organisation Science* 1(3): 267-292.

Pirate Party (2015) Available: http://piraadipartei.ee/, accessed 29.04.3015.

Pollitt, C. (2013) *Context in Public Policy and Management: the Missing Link?* Cheltenham: Edward Elgar Publishing Limited.

Pollitt, C. (2012) Lacunae: Evaluating Public Management Reform. *Rassegna Italiana di Valutazione* 16(53/5): 9-18.

Pollitt, C. (2003) Public Management Reform: Reliable Knowledge and International

Experience. *OECD Journal on Budgeting* 3(3): 121-136.

Primm, S.A., Clark, T.W. (1996) Making Sense of the Policy Process for Carnivore Conservation. *Conservation Biology* 10(4): 1036-1045.

Pöppelbuß, J.; Niehaves, B.; Simons, A.; Becker, J. (2011) Maturity Models in Information Systems Research: Literature Search and Analysis. *Communications of the Association for Information Systems* 29: 505-532.

Regulation (EU) No 910/2014 of the European Parliament and of the Council Of 23 July 2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market and Repealing Directive 1999/93/EC. Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.257.01.0073.01.ENG, accessed 12.05.2015.

Reinsalu, K. (2006) Is Estonian Local e-Government Responsive to Citizens' Needs? The Case Study of Tartu. *Information Polity: The International Journal of Government & Democracy In The Information Age* 11(3/4): 255-272.

Government Office (2015) Available: https://riigikantselei.ee/et/kontakt, accessed 29.04.2015.

Parliament of Estonia (2014) Mitteresidentide digitaalse isikutunnistuse väljaandmine: e-residentsuse loomine. Kontseptsioon. Isikut tõendavate dokumentide seaduse ja riigilõivuseaduse muutmise seaduse eelnõu seletuskirja lisa 1.

Rubin, H. J. , Rubin I. S. (1995) Chapter 9: Topical Interviewing. In Qualitative Interviewing: The Art of Hearing Data. Thousand Oaks: Sage Publications. 196–225.

Self, D.R., Armenakis, A.A., Schraeder, M. (2007) Organisational Change Content, Process, and Context: A Simultaneous Analysis of Employee Reactions. *Journal of Change Management* 7(2): 211–229.

CC (2015a) Available: https://www.sk.ee/ettevottest/, accessed 29.04.2015.

CC (2015b) What is Digi-ID, How Can I Get it and What Can I Do With it. Available: http://www.id.ee/index.php?id=34410, accessed 13.05.2015.

Servida, A. (2015) IAS Study 2 - Stakeholders Workshop on Electronic Identification and Trust Services. Available: http://blogs.dlapiper.com/iasproject/files/2015/02/2.-IAS-Workshop-29-January-2015-Status-European-Commission.pdf, accessed 09.05.2015.

Signwise (2015) About SignWise. Available: https://www.signwise.me/EE/et/p/about/about, accessed 13.04.2015.

Sikkut, S. (2014) E-eestlased on tulekul. *Arengufondi mõtteraamat.* Available: http://motteraamat.arengufond.ee/artiklid/e-eestlased-on-tulekul, accessed 29.04.3015.

MI (2015). Available: https://www.siseministeerium.ee/et/kontakt, accessed 29.04.2015.

Song, X., Letch, N. (2012) Research on IT/IS Evaluation: A 25 Year Review. The *Electronic Journal Information Systems Evaluation* 15 (3): 276-287.

SPOCS (2012) About the project. Available: http://www.eu-spocs.eu/index.php?option=com_content&view=article&id=1&Itemid=42, accessed 13.05.2015

Stibbe (2014) The New Regulation on Electronic Identification and Trust Services – eIDAS. Available: http://www.stibbe.com/en/news/2014/december/benelux-ict-law-newsletter-50-new-regulation-on-e-identification, accessed 01.05.2015.

Stockdale, R., Standing, C. (2006) An Interpretive Approach to Evaluating Information Systems: A Content, Context, Process framework. *European Journal of Operational Research* 173(3): 1090–1102.

STORK (2012) Stork at a Glance. Available: https://www.eid-stork.eu/, accessed 27.04.2015.

Symons, V.J. (1991) A Review of Information Systems Evaluierung: Context Content and Process. *European Journal of Information Systems* 1(3): 205-212.

Vaarik, D. (2014) Presentation. Available: http://p6drad-teel.net/~p6der/blackpaper.pdf, accessed 11.04.2015.

Vandenbruwaene, W. (2012) Multi-Tiered Political Questions: The ECJ's Mandate in Enforcing Subsidiarity. *Legisprudence: International Journal For The Study Of Legislation* 6(3): 321-346.

Vaughan, F. (1979) Transpersonal Psychoterapy: Context, Content and Process. *The Journal of Transpersonal Psychology* 11 (2): 101-110.

Vurma, S. (2015) e-riigi teine tulemine. Postimees 03.02.2015. Available: http://arvamus.postimees.ee/3078773/silja-vurma-e-riigi-teine-tulemine, accessed 11.04.2015.

Westfall, R. D. (2012) An Employment-Oriented Definition of the Information Systems Field: An Educator's View. *Journal of Information Systems Education* 23(1): 63-70.

Yin, R. K. (2003)a *The Role of Theory in Doing Case Studies.* In Applications of Case Study Research. Thousand Oaks: Sage Publications. 3–27.

Yin, R. K. (2003)b *Introduction*. In Case Study Research: Design and Methods. Thousand Oaks: Sage Publications. 1–17.

Zhao, K.; Xia, M. (2014) Forming Interoperability Through Interorganisational Systems Standards. *Journal of Management Information Systems* 30(4): 269-298.

Interviews:

I1. Kirsipuu, M. (interviewed 20.04.2015), audio recording and author's notes.

I2. Korjus, K. (interviewed 24.04.2015), audio recording and author's notes.

I3. Pedak, M. (interviewed *29.04.2015*), audio recording and author's notes.

I4. Pihl, K. (interviewed 24.04.2015), audio recording and author's notes.

I5. Põder, M (interviewed 15.04.2015), author's notes.

I6. Sikkut, S. (interviewed 13.04.2015), audio recording and author's notes.

The list of abbreviations

CC – (the) Estonian Certification Centre

CCP – content, context and process (analysis)

EES – Estonian e-government systems

eIDAS – Electronic identification and trust service regulation

EISA – (the) Estonian Information System Authority

ES – e-government system

EU – European Union

ICT – information and communication technology

IS – information systems

MEAC – (the) Ministry of Economic Affairs and Communications

MI – (the) Ministry of Interior

Appendix 1. List of interviewees

1. Mariann Kirsipuu

Mariann Kirsipuu is a citizenship and migration policy adviser in the MI (2015). As a representative of MI, Mariann is responsible for the questions regarding digital identification and has also been the advocater for Estonia's digital identification system in the discussions regarding the eIDAS (I1). She is also argued to be one the key stakeholders in the process of adopting the eIDAS and integrating Estonia's interests in it (I6).

2. Kaspar Korjus

Kaspar Korjus is the manager of the E-residency program. Kaspar and his team are making it possible for foreign citizens to access Estonian e-services by issuing them electronic residence (e-estonia 2015a).

3. Mari Pedak

Mari Pedak works in e-Governance Academy, being in charge of planning and implementing e-government and e-identity programme activities, participating in related international projects and consulting in the fields of e-government and e-identity both in Estonia and on the international arena. Mari was in the Estonian civil service for 22 years, and as Director General of the Citizenship and Migration Board she was and the digital identity card. Also, the ICT and Development Centre of the Ministry of the Interior (the largest ICT authority in the Estonian public sector) was created under her leadership. (e-Governance Academy 2015)

4. Kalev Pihl

Kalev Pihl is a board member of CC, which is Estonia's only certification authority, providing certificates for authentication and digital signing to national identity documents. CC also provides certification services to partners in Latvia, Lithuania and Denmark, and it is responsible for creating DigiDoc software, which is the basis for the use of Estonia's national electronic ID-card. (CC 2015a).

5. Märt Põder

Märt Põder is a member of Estonian Pirate Party, which aims to develop a free, democratic and cultural information society (Pirate Party 2015). Märt has been an active critic of Estonian e-state, managing to detect flaws in the current system, such as proving that several digital signatures of the Minister of Culture Rein Lang were invalid (Alas 2012) and that it is possible to violate the digital ballots (Liive 2015).

6. Siim Sikkut

Siim Sikkut is an ICT policy adviser in the strategy unit of the Republic of Estonia Government Office, therefore being reponsible for the coordination of Estonian ICT policy. (Government Office 2015) Siim has previously worked in the Estonian Development Fund and in the Ministry of Finance. Also, Siim was behind a development idea "10 million e-residents by 2025" which was the beginning for the e-residency project. (Sikkut 2014)

Appendix 2. Interview questions

1. In your opinion, how successful has Estonia been in the field of e-government?
2. Do you feel that the government's contribution to the development of e-services has been sufficient? What are the strongest and weakest aspects here and in which way could the national level contribute more?
3. How influencial have the EU directions been on the development of Estonian e-government?
4. How influencial have Estonian policies been towards the ES of the other EU countries?
5. How extensive changes is implementing the eIDAS in Estonian system going to cause?
6. Do you believe that all the requirements of the eIDAS can be carried out with the existing technologies and management systems, or is extensive restructuring needed?
7. Does Estonia have all the needed competencies in its organisations and agencies, or does the eIDAS create a need for additional people, skills and competencies? Also, does Estonia have the have time, money and other resources to implement these chances?
8. Do you feel that the objectives and values of the eIDAS coincide with the objectives and values of the EES?
9. How flexible is the EES today? Is it complicated to adopt new change initiatives?
10. How would you assess the timing of the eIDAS implementation from the Estonian perspective? Do You believe that the timing has impact on the possible results?
11. Who do you see as the main stakeholders in the EES? Who are the main influencers in Estonia concerning the eIDAS? How did the discussions regarding the eIDAS evolve – was there generally a consensus or did major differences of opinion arise?
12. What has the attitude towards the eIDAS been in your organisation and in the wider society? Have there been strong initiators in this regard?
13. How well have the changes, brought along by the eIDAS, been communicated? Has the eIDAS risen a political or cross-organisational debate? What influences has the good communication/miscommunication brought along?
14. In your opinion, is the eIDAS complementing or challenging the EES and the Estonian domestic initiative?
15. From the Estonian perspective, is the system introduced with the eIDAS the most efficient and effective use of resources? What are the main gains and losses for Estonia?

Appendix 3. Figures

Figure 1. CCP framework through the defining questions. Own figure.

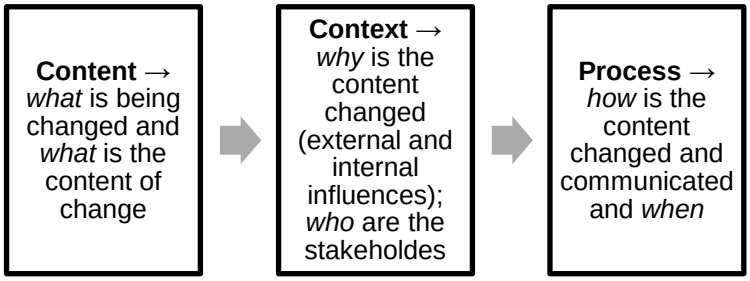

Figure 2. Linking CCP. Own figure.

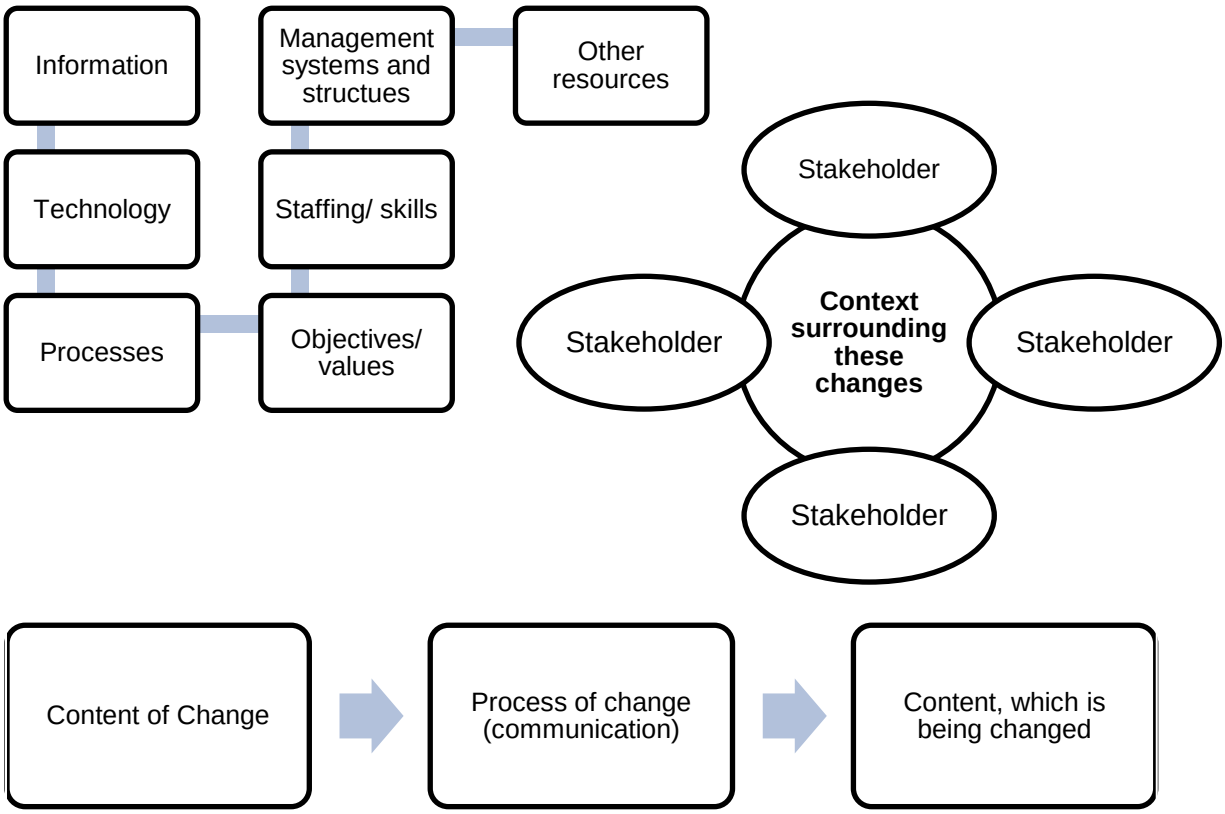

Figure 3. Implementation process of eIDAS. Own figure.

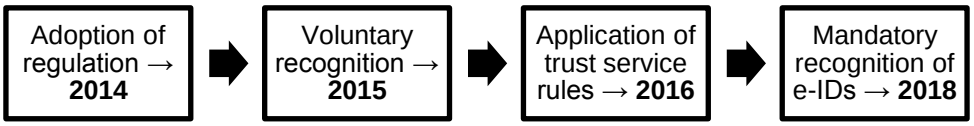

Figure 4. Forming bilateral agreements. Own figure.

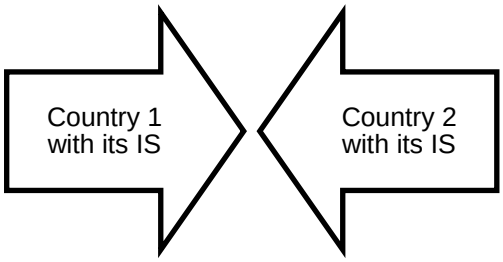

Figure 5. Enabling non-citizens to access the national e-state and use e-services. Own figure.

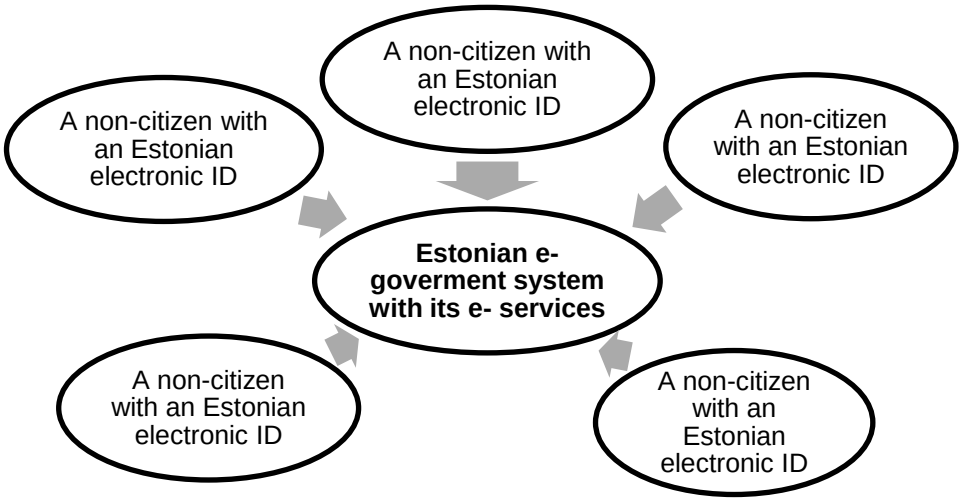

Figure 6. Enabling people and companies to sign documents digitally across borders by providing secure infrastructure. Own figure.

Figure 7. Supranational framework where all Member States recognise each others digital identities. Own figure.

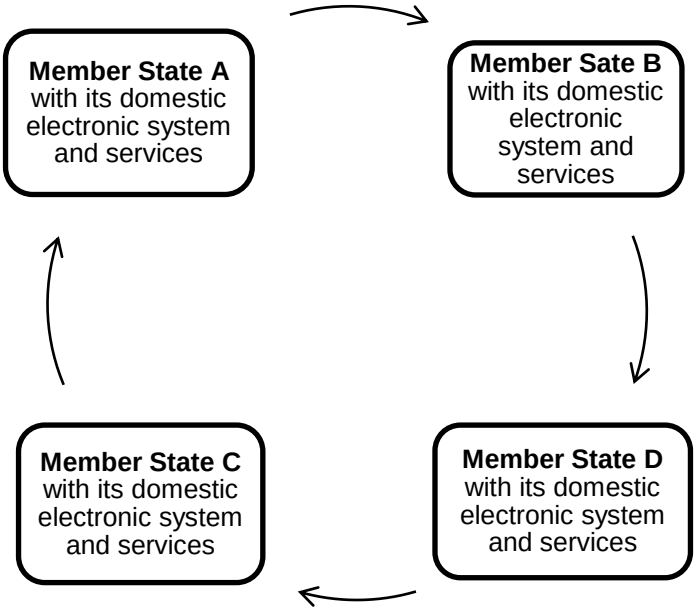

Figure 8. Stakeholders in Estonian e-government sector (eIDAS). Own figure.