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Author:	InterPARES Trust Project
Writer(s):	Hrvoje Stancic, Faculty of Humanities and Social Sciences, University of Zagreb Hrvoje Brzica, Financial Agency (FINA) and GRA, Faculty of Humanities and Social Sciences, University of Zagreb Ivan Adzaga, Ana Garic, Maritna Poljicak Susec, Kristina Presecki, Ana Stankovic, GRAs, Faculty of Humanities and Social Sciences, University of Zagreb
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INTRODUCTION

IntePARES Trust project approved a comparative analysis of selected governmental electronic services (e-services) offered through the Internet in Croatia and abroad focusing on aspects which might be important for their implementation as trusted e-services.

Research timeline: 15 January to 15 July 2014.

This research involved six graduate research assistants – two PhD students and four graduate level students.

Project results were disseminated:

1. **Workshop** of Croatian InterPARES Trust Team organized by project partner Digital Information-documentation Office of the Government of the Republic of Croatia, 28th March 2014, Zagreb, Croatia

2. Stančić, Hrvoje, **Comparative Analysis of Implemented Governmental e-Services**, Symposium *Trust and Digital Records in an Increasingly Networked Society,* 14th May 2014, Stockholm, Sweden

3. Garić, Ana; Presečki, Kristina; Stančić, Hrvoje, **Trust in governmental e-services**, Conference *Information Technology and Journalism 2014 (ITJ 19)*, 28th -30th May 2014, Dubrovnik, Croatia

4. Stančić, Hrvoje, **Report on the InterPARES Trust Project**, in: Babić, Silvija (Ed.), Dostupnost arhivskoga gradiva, Hrvatsko arhivističko društvo, Vinkovci, 2014, pp. 521-527 (published paper presented at the 47th Symposium of Croatian Archival Society, **Availability of archival material**, 22th-24th October 2014, Vinkovci, Croatia)

5. InterPARES Trust **visibility event** - **Presentation of InterPARES Trust research results**, organised by project partner Faculty of Humanities and Social Sciences, University of Zagreb, Croatia, 21th November 2014

6. Stančić, Hrvoje, **Project InterPARES Trust – project activities**, 18th seminar Archives, Libraries, Museums – possibilities of cooperation in environment of global information infrastructure, 26th-28th November 2014, Rovinj, Croatia

RESEARCH

Research methodology

The research was divided in four stages: (1) Identification, (2) Data acquisition, (3) Analysis, and (4) Interpretation. The research was limited to the EU region.

1. Identification

Firstly, a literary review was done in order to identify which relevant studies were done so far. At the EU level a number of relevant documents and studies were found which helped direct further research. Then, the environmental scan was done, i.e. relevant governmental e-services were identified by EU country. The matrix of existing e-services by country was created. Further, the research focused on eight European countries: Belgium, Croatia, Denmark, Estonia, Germany, Lithuania, Sweden and United Kingdom. The Croatia was chosen for comparison because the research was done in Croatia, because of the availability of needed materials, and the possibility to compare Croatia's development with the other countries' development. The other seven countries were chosen on the basis of the best online availability of the materials needed for the research.

The research of e-government services adopted the "representative basket of 20 services" as described in *Digitizing Public Services in Europe: Putting ambition into action*, a 9th Benchmark Measurement by European Commission from December 2010. This document divides e-services into two main groups – e-services for citizens, or G2C (Government to Citizens, 12 services), and e-services for businesses, or G2B (Government to Business, 8 services) as follows:

e-Services for Citizens (C1-C12)

1. Income taxes
2. Job search
3. Social security benefits
4. Personal documents
5. Car registration
6. Application for building permission
7. Declaration to the police
8. Public libraries
9. Birth and marriage certificates
10. Enrolment in higher education
11. Announcement of moving
12. Health-related services

e-Services for Businesses (B1-B8)

1. Social contribution for employees
2. Corporate tax
3. VAT (Value Added Tax)
4. Registration of a new company
5. Submission of data to the statistical office
6. Custom declaration

7. Environment-related permits
8. Public procurement

The research was limited to G2C and G2B e-services. The business to business (B2B), business to citizens (B2C), and citizens to citizens (C2C) e-services were not analyzed because they are not considered as governmental e-services.

The identified G2C and G2B e-services were analysed in each of the eight countries in order to determine the key service components. This was used to create the governmental e-service questionnaire. It consisted of 52 questions divided into 6 categories as follows:

1. Basic service information (11 questions)
2. Users (7 questions)
3. Business optimization (4 questions)
4. Technological solutions (14 questions)
5. Storage and long-term content availability (10 questions)
6. System operation transparency (6 questions)

The questions were:

1. Basic service information	
1.	Service URL
2.	Service category
3.	Category/type of institution authorized for the e-service
4.	Start of service development/implementation
5.	Level of informatization
6.	Is the service connected with any other governmental services and, If yes, which?
7.	Comparison of official and actual development of the e-service
8.	Are there limitations to the service's work schedule? If yes, what are they?
9.	Short description of the service
10.	A screenshot of the service
11.	Does the service do what it is described to do?
2. Users	
12.	Is using the service mandatory for a certain category of users? If yes, which category of users is it mandatory for?
13.	Are there different groups of users?
14.	How many users are there per user group?
15.	Percentage of users who use the service electronically
16.	Which age groups are prevalent in using the service?
17.	Is the service adapted for users with disabilities?
18.	Users' satisfaction
3. Business optimization	
19.	Are there positive financial indicators for e-service (for the institution responsible for service and for users)?
20.	Has there been a decrease in time required to process user applications?
21.	How did the service affect the organisation of work processes in the responsible organization in terms of the required number of workers?
22.	What are the plans for upgrading and expanding the service in the future?

4. Technological solutions	
23.	Type of authentication
24.	Is the communication between the server and client station encrypted (SSL, some other protocol)?
25.	Does the service use eID? If yes, which one (list all if more than one eID exists)?
26.	Does the electronic signature use digital certificates?
27.	If yes, which format of electronic signatures is used?
28.	In what way does the user fill in and send data?
29.	Do the users send attachments with the filled in data? If yes, in what way?
30.	Do the users have predetermined types of document formats while sending out data? If yes, which ones?
31.	Is the service implemented through open-source or commercial technologies? Which technologies are being used?
32.	What type of application is used on the client side?
33.	Through which channel(s) is the service available?
34.	Is the service hosted within the responsible institution?
35.	If the responsible institution is hosting the service, does it have the required certificates?
36.	If the service or any of its parts is hosted outside the responsible institution, does it use the Cloud? Is the Cloud/Data centre located within the same country?
5. Storage and long-term content availability	
37.	What is the retention period for the data in the system?
38.	Is the retention period defined by a law/regulation or some other act? If yes, which one?
39.	Are the data deleted after the retention period expires?
40.	What is the preferred long-term preservation format(s)?
41.	Does the service use a method of materialisation of data (conversion from digital to analogue format, e.g. printing, microfilming etc.)?
42.	Does the service comply with any of the long-term preservation standards? If yes, which one?
43.	Does the service offer use of an electronic archive as an additional service? Are there electronic document safe services?
44.	Are the data received through the service stored within the responsible institution's information system?
45.	Does the responsible institution possess the required certificates that guarantee security of the stored data?
46.	If the data are at least partially stored outside the responsible institution, does it use Data Cloud? Is the Cloud/Data centre located within the same country as the responsible institution?
6. System operation transparency	
47.	Is there a defined service use policy?
48.	Are there any proclaimed technological measures guaranteeing the users that their data are only used for the defined purpose?
49.	Are the employees required to sign a non-disclosure agreement?
50.	Can users access and view their data through the service?

51.	Can users correct or update any of their data within the service? If yes, can the request for correction be sent electronically?
52.	Can users monitor status of their application?

The key question, by which it was determined whether to proceed with the analysis of an e-service or not, was the question number 5 – determination of the level of informatization. In order to proceed, the e-service being analysed needed to be at a maturity level 2 or higher. If it was lower, it was not considered as an e-service. The maturity ranking that was used was the following:

Maturity level	Level	Description
0	No information available	Information is not available online or service provider does not have web page.
1	Information	Only information about the service is available online (e.g. description of a procedure).
2	One-way interaction	Downloadable forms available online. Empty forms could be filled in using computer or could be printed.
3	Two-way interaction	Forms could be filled in online for which authentication is needed. By submitting online form a service is initiated.
4	Transaction	A complete service is available online – fillable online forms, authentication, payment, delivery or other types of complete services.
5	Iteration	Iterative services (e.g. obligatory statistical reporting) which are automatically initiated, and are creating automatic reports on a service being completed.

Motivation

The set of 52 questions divided into 6 categories was considered as sufficient to provide enough information on an e-service in order for the users to consider the e-service as responsible, reliable, accurate, secure, transparent and trustworthy as well as that it considers privacy issues, duties to remember (i.e. digital preservation), and the right to be forgotten (i.e. safe deletion). The research team believe that the developed questionnaire can on one side provide guidance for the users and on the other side function as guidelines for the e-service providers on what information about the e-service should be put online.

2. Data acquisition

In the second phase the developed questionnaire was used to gather information on 12 G2C and 8 G2B e-services in 8 countries. The questionnaire was filled by the researchers during the online investigation. The total of 8,320 questions were (tried to be) answered. Of course,

some questions were unanswered due to different reasons (mentioned later in detail) like technology-related problems or unavailability of online information.

3. Analysis

This phase followed the data acquisition phase and was, during certain period of time, overlapping with it. Filled in questionnaires on governmental e-services were firstly analysed by country and then comparatively by e-service (12+8) across countries (8). The detailed results are given later in this report.

4. Interpretation

In the last phase the results of the analysis were interpreted and the recommendations were formulated. The results of this phase are incorporated in the results given below. They are organized by e-services and each e-service is interpreted through the 6 categories of the questionnaire questions aggregating and comparatively presenting the results from all analysed countries. But, before giving those, rather extensive results in the next two sections, here is the highest level of aggregation and interpretation, or summary of the overall results by the categories.

1. Basic service information

The e-services of the same type were initiated at different years but all of them in the last 15 years. The most important years of the development are falling within the last decade. The most developed ones, like the Danish e-service in the category of income taxes are already at the highest maturity level 5. Therefore, earlier adoption of e-service concepts does not necessarily mean the highest maturity level.

During the data acquisition and analysis, sometimes it was hard to determine the exact level of informatization because there was no information available, because of the language problem or problems with the technology that the service was built upon (e.g. e-services that used Flash technology were not suitable for automatic translation of the interface and contents). Also, there were situations when the maturity level of an e-service could not be clearly determined because part of the service was at the lower level and, usually smaller, part at a higher level. Examples of this situation could be found in Estonia and United Kingdom where e-services in the category of personal documents are between the maturity levels 3 and 4.

2. Users

During the analysis it was noticed that there are two types of users of e-services – external and internal users. External users are citizens or businesses as the designated communities, while internal users are employees who use e-services as a part of their everyday business activities and who process, analyse and store the e-services' data (e.g. citizens as patients vs. doctors as health care workers or employees vs. employers).

The e-services in all countries are generally not obligatory to use, and are functioning as an alternative way of service realization. There were only five services identified as obligatory, three from the G2C and two from the G2B category. They are (maturity level is indicated as well):

G2C

- Sweden (Social security benefits, 5)
- Estonia (Application for building permission, 3)
- Estonia (Health-related services, 4)

G2B

- Belgium and Croatia (Social contribution for employees, 3)

Further, 67% of investigated e-services could be used by users with disabilities because the possibilities of text resizing, using text synthesizers, using available information in sign language etc.

3. Business optimization

In this category the information on financial indicators for e-services was hard to find, but some services reported a decrease in time required to process user applications. For example, health-related services in Denmark save 50 minutes daily by using e-services and thus can process 10% more patients. United Kingdom, in the same category, has around 4,500 patients' visits to the doctors and around 8,000 phone calls less because of the use of e-services. In Croatia, the time to process applications of pension insurance is shortened from 7 days to 24 hours. Almost all countries reported some kind of positive effect related to the statistical reporting to the national bureaus of statistics.

Scarcely any information was found on the influence of the development of e-services to the organization of work processes in the responsible organization in terms of the required number of workers. Only in the Croatian bureau of statistics it was learned that the employees were redistributed to other workplaces within the organization.

4. Technological solutions

Users of e-services are usually authenticated by Smart Cards or e-ID cards, username and passwords, digital certificates etc. The communication between the server and client station is almost everywhere encrypted by using SSL or HTTPS protocols. XAdES is the prevalent format of electronic signatures, and XMLDSig is also used, but not so often. Web forms are the mostly used way of communication with e-services, and sometimes users are allowed or required to send attachments (e.g. income tax applications in Belgium, Croatia (.pdf) and United Kingdom (iXBRL or .pdf), or Estonia in the category of personal documents (.pdf or .jpg)). Further, the answer to the question whether the services are implemented using open-source or commercial technologies was not found at all. Also, it was not possible to found the answer where the e-services were hosted. Only in the case of social security benefits in Belgium the e-service is hosted within the responsible institution – the Crossroads Bank for Social Security. Regarding conformance to the ISO standards, only three

e-services (Germany – taxes, and United Kingdom – enrolment in higher education, and health-related services) provided information stating that IT Security is based on ISO 27001 (basic standard for managing IT security). Although no information on the questions whether the e-services are using cloud solutions and whether the hosting data centres are located in the same country was found, plenty information on the place where the received data are stored were found, as discussed in the next subsection.

5. Storage and long-term content availability

Retention periods for the data stored in the system of e-services differ based on the type of data being held, type of institution responsible for the data (e.g. Germany and United Kingdom – higher education and universities are required to keep the data for the period of studying +3 years), and on the legal regulations (e.g. Croatia and Sweden require the health care and social security records, created by e-services, to be preserved for at least 30 years). This is an important requirement in terms of long-term preservation, conversion, migration and preservation of authenticity, reliability, integrity and usability of the preserved records.

After the retention period expires the data are deleted or destroyed. This information was found in the available documentation of only seven e-services. Interesting procedure was found regarding the e-services used for declarations to the police in Denmark – the data are deleted after 30 days and in the case of the sensitive data – immediately.

Information on the preferred long-term preservation formats was found in case of only one e-service – the Lithuanian e-service for social contribution for employees which uses PDF/A and XAdES-A stored in the central Electronic Archival Information Service (EAIS).

It was interesting to see if any kind of materialization (e.g. microfilming, printing) was used with e-services either as a kind of relict from the analogue paradigm or as a kind of preservation method. Indeed, it was found that in United Kingdom users have to print the documents in case of e-service in the category of personal documents. Further, in Denmark's declaration to the police e-service the received e-mails are printed and then deleted from the system, especially in the case of sensitive data. Finally, in the case of submission of data to the statistical offices, there is an option to print a compiled statistical report as a proof of sending data.

No information on the compliance of e-services with the long-term preservation standards was found. Also, no information on the possible offering of use of an electronic archive as an additional service, e.g. electronic document safe service, was found either.

Although it was not possible to found the answer where the e-services were hosted, as mentioned earlier in the previous subsection, there were plenty information on the place where the received data are stored (the information was found in 19 occasions). The data are stored within the responsible institutions like those in the categories of job search, enrolment in higher education and submission of data to the statistical office, or outside of the information systems of the responsible institutions, e.g. declarations to the police in Denmark and Germany where the data are stored in the specially protected locations with authorized access only, or health-related services in Denmark and Estonia where the data are stored in a centralized, national database that all hospitals can access.

Although it was not possible to found the answer whether the e-services were using cloud solutions and whether the hosting data centres were located in the same country, as mentioned earlier in the previous subsection, the information on the usage of cloud solutions for storing the data was found in the category of social contribution for employees in four countries – Croatia, Estonia, Germany and Lithuania.

6. System operation transparency

The majority of e-services have service use policies available online. Less than 50% of G2C e- and around 80% of G2B e-services have use policies accessible. United Kingdom is the most advanced regarding this. In the case of 12 e-services the proclaimed technological measures guaranteeing the users that their data are only used for the defined purpose were found – most of them in United Kingdom.

Information about the non-disclosure measurements were found only in health-related e-services in United Kingdom and overall in statistical e-services where non-disclosure is regulated by the law.

In most cases users can access personal data stored in e-services. Corrections and changes are possible, although not directly by the users but only upon request.

In the case of G2C e-services around 50% of them offer the possibility to monitor the status of application while in the case of G2B services the majority offer the same possibility. This possibility depends on the type of e-service and the need for it.

GOVERNMENTAL E-SERVICES FOR CITIZENS

C01 Income taxes: declaration, notification of assessment,
[B02 Corporate tax: declaration, notification]
[B03 VAT: declaration, notification]

Because most e-services in the categories of *Income taxes* for citizens and *Corporate tax* and *VAT declaration/notification* for business/corporate users share the same basic service, they will all be covered in this section. The exception to these is the case of Belgium, where Tax-on-web is used for citizens, while BizTax is used for businesses. For Denmark, there are also different services for different types of users – TastSelv for citizens and Årsopgørelsen for businesses, though both are regulated by SKAT. Only TastSelv was studied in detail, while Årsopgørelsen was analysed only partially. However, due to a similar infrastructure and the fact that they share the same authority, the results for TastSelv can easily be applied to Årsopgørelsen.

1. Basic service information

All e-services in the income taxes category share the same highest authority, which is the Central Government of the country or region. Other than the Central Government, most e-services have a designated department, agency or board responsible for supporting and maintaining it.

Regarding the start of implementation, the date varies greatly from country to country. Some of the services of this category were developed during the 2000s, while others were developed earlier – during the 1990s. In the case of Belgium, Tax-on-web was implemented in 2007. In the case of Sweden, Mustansar and Zulfiqar (2010) acknowledge that e-tax in Sweden started functioning in December 1996 under the domain name www.rsv.se, which was changed to www.skatteverket.se in January, 2004. Other e-services were already being developed and put in use in the 90s, which is the case in Denmark and Germany. In Denmark, TastSelv started in 1995, making CCTA a pioneer in eGovernment. Information on the start of implementation in the case of Germany was gathered from website statistics and does not necessarily represent the true start of implementation. In the case of Croatia and the UK, information on the exact date/year of implementation is unknown.

By reviewing the e-services in the category of income taxes, it was reasonable to expect that all of the e-services would be Maturity level 5. However, this information is not completely

verifiable unless access is gained. Still, information found on the websites of the services provided enough information to safely assume the services boast the highest Maturity level.

The researched e-services in this category mostly encompass more than one category of e-services. Some e-services provide services for both private and corporate users, while others focus mostly on corporate/business users. Denmark, Estonia and the UK include *Customs declaration* within the same e-service, while all researched countries had at least *Corporate tax* and *VAT declaration* on the same service. Except for Belgium, all other researched countries had the same service for citizens' and business' income taxes declaration. Gov.uk connects to the largest number of different categories of e-services, though most of them are not directly connected on their own. They do, however, appear to share the same infrastructure. Tax-on-web is the only service targeted specifically to citizens.

By comparing the official and actual development of the e-services, it is difficult to determine any differences between the official and actual development for most countries in this category. There is a persistent lack of reports suggesting any difference in official and actual development. The exception here is Denmark, where TastSelv is recognized as a great success according to a survey done by SKAT[1].

None of the e-services in the category of *Income tax* appear to have any limitations to their working schedule. However, it is worth noting that user support lines usually have limited work hours. Due to a lack of access it was not possible to fully determine whether or not the services do what they are described to do. However, by analysing various reports and by examining the level of development of each service, it is clear that all of the services in question fulfil their stated tasks.

2. Users

There was no information about mandatory use of analysed e-services of this category for most countries. In Belgium, the use of Tax-on-web is not mandatory and is presented as an alternative. In Denmark and Germany the use of the e-service is not mandatory for private users, but its use is emphasized, if not mandatory for business and corporate users. The e-services in this category are mostly divided into sections for private and for business users (except with Tax-on-web, which was only built for private users). Tax-on-web further classifies different groups of users according to their status. However, there is no information on concrete groups of users with different rights of access on the website. Questions about the number of users, electronic use of the service and most frequent age groups of the users provided little to no information. The only partial exception is Denmark's e-service TastSelv, which states that they have contact with around 4.6 million out of almost 5.4 million (2005)[2] and Belgium with 3 million users.

[1] http://www.itdweb.org/documents/public/denmark.TASTSELV%20-%20the%20automated%20tax%20administration.pdf (20.6.2014.)
[2] Ibid.

Considering the fact that all e-services of this category are accessed through a web browser, we could argue that they are immediately adapted for users with disabilities since web browsers can change font size, have text-to-speech plugins etc. However, only in the case of BizTax does the e-service give the option to increase font size.

Users' satisfaction was difficult to come across. Only in the case of Denmark's TastSelv and Sweden's Skatteverket could there be found any surveys at all. Denmark's survey, however, mostly covers the success of the service in general, but deals little with the users' satisfaction with the service other than stating that 56% of users are familiar with the service and use it regularly (data from 2005)[3]. In addition, only SKAT's TastSelv, a service for private users, was covered while Årsopgørelsen (annual report) was not covered by this study. It is thus important to note that the business side of SKAT's e-services does not provide a good answer to this question. Skatteverket showed more concrete results - a majority agreed on good usability, adaptability, security and information with the exception of immigrants (complicated use due to language issues) and/or the elderly (who aren't always accustomed to certain technological solutions). Users thought the advantages were the ease and quickness of use, transparency, faster returns, ability to use the service despite address change and reduced errors. Some disadvantages pointed out by the users were the lack of a multi-language option, difficult use for non-regular internet users, problematic codes, lack of control over users' tax affairs, declaring without understanding the implications and the fact that deductions cannot be made[4].

3. Business optimisation

Regarding positive financial indicators, only a survey on SKAT's e-service TastSelv claims that there have been positive financial indicators for the e-service, both for the citizens and the administration[5]. However, exact figures are missing. Other e-services in this category provided no information on this subject.

There is no available information on decreases made to the time required to process user applications for any analysed service of this category. It is logical to assume, however, that a decrease in time required to process applications did occur because that is one of the main reasons for starting an e-service.

Information on work process organization was only provided by TastSelv[6], where a reassessment of work processes and resources occurred after introducing the e-service. There is no information on the change of required number of workers, however. Other e-services of this category provided no information regarding work process organization.

[3] http://www.itdweb.org/documents/public/denmark.TASTSELV%20-%20the%20automated%20tax%20administration.pdf (2005) (20.6.2014.)
[4] http://oru.diva-portal.org/smash/get/diva2:425220/FULLTEXT03.pdf (2011) (20.6.2014.)
[5] http://www.itdweb.org/documents/public/denmark.TASTSELV%20-%20the%20automated%20tax%20administration.pdf (20.6.2014.)
[6] Ibid.

The only information regarding plans for upgrading and expanding the e-services of this category are provided by the Belgian and Swedish e-services. The Belgian e-service BizTax plans on becoming mandatory for use, while Sweden only has "big plans to become the leading internet nation by 2015"[7], which could imply further improvements to the e-service. Other researched e-services provided no information regarding their plans.

4. Technological solutions

Authentication for e-services in this category is done through several means depending on the country – in the case of Belgium's Tax-on-web users can login via e-ID or token. Croatia's ePorezna uses a Digital Certificate, while Denmark's e-service uses NemID or an E-tax password (where SKAT recommends e-ID). In Lithuania, login can be done through external systems, through STI (username and password) or with an electronic signature. Estonia gives the option of logging in through Mobil-ID, ID-card or through one of the internet banks in Estonia. Declaring taxes in Sweden can be done by personal security codes or e-ID, SMS, or a telephone call (using their personal security code). It is important to note that the "SMS" and call "alternatives" only allow citizens to confirm the information on the pre-printed tax form sent from the tax board. In cases of changes personal e-ID must be used. In Germany, login is possible through three different mechanisms: the free ELSTERBasis certificate (login via Certificate file), the ELSTERSpezial certificate (41 Euro, login via Safety Stick – a special USB stick) or the ELSTERPlus certificate (50 to 140 Euro, login via Signature Card). The mechanisms also include security questions and e-mail as means of confirming identity. In the UK, login is done with a User ID and password. It is an interesting fact and worthy of note that mechanisms of authentication are very different in most countries and the approach towards identifying and granting access to users varies greatly.

For all analysed e-services of this category the communication between the server and client station is encrypted with the SSL/HTTPS protocol, while all e-services of this category use some form of e-ID except Croatia and UK (at the time of research).

Only e-services in Belgium, Denmark, Lithuania, Estonia and Sweden provided some information on electronic signatures for their authentication systems, leading to understand that digital certificates are used for electronic signatures. Croatia and Germany provided insufficient information to form a single answer, while the UK provided no information at all about electronic signatures. XAdES is the prevalent format of electronic signatures, though information on this could only be found in the case Belgium, Lithuania, Estonia and Sweden. Belgium and Lithuania also mention XMLDSig, and Estonia mentions ASiC along with XAdES. Other countries provided little to no information on electronic signatures.

Judging by information provided by e-services of this category, it is safe to assume that all e-services provide web forms as a way to fill out and send data. Only e-services in Croatia,

[7] http://oru.diva-portal.org/smash/get/diva2:425220/FULLTEXT03.pdf (20.6.2014.)

Belgium and the UK provide information on sending out attachments, however, judging by the nature of the e-services of this category, this option is most probably available with all e-services of this kind. According to available information it is only known that users in UK must attach their computations in iXBRL (inline XBRL) or .pdf format (if the computations template is not used). In Croatia and Belgium[8] users can attach additional documents in .pdf format.

There is no information whatsoever on the kinds of technologies used for development of the e-services in the category of income tax. All analysed e-services of this category use a web browser as means of accessing the service. In Croatia, Denmark and Germany Java is required for certain elements on the websites (ID authentication etc.). All analysed e-services are available for access on any device with access to the Internet.

Regarding the question on whether or not the services are hosted within their responsible institutions, no information was found for any of the e-services in this category, or on the possession of any required certificates. Only the German e-service provided information stating that IT Security is based on ISO 27001 (basic standard for managing IT security). There was no available information, for any of the analysed e-services of this category, on the use of the Cloud.

5. Storage and long-term content availability

No answers were available for questions in this category except for the case of Belgium's Tax-on-web. In Belgium, The retention period is 1 year.[9] On October 8, 2013, a Royal Decree was published completing the transposition of the EU Data Retention Directive 2006/24/EC (the "Data Retention Directive") into Belgian law. The Royal Decree was adopted on September 19, 2013.[10] No other information is available for this group of questions.

6. System operation transparency

According to available information, service use policies are found only for e-services in Germany and the UK. There is a link on the web-page of the German e-service (Elster Online) "Datenschutz", where users can find information about the Privacy policy, Accessibility, Data and IT Security at Elster Online and information which can help users with registration and FAQ. In the UK, there are general documents (Terms and Conditions and Privacy Policy) available on the web-page of HM Revenue & Customs, institution which is authorized for the e-service.

[8] https://eservices.minfin.fgov.be/taxonweb/static/fr/help_simu/powerpoint_1.ppt - slide 29 (20.6.2014.)
[9] https://www.huntonprivacyblog.com/2013/10/articles/belgium-transposes-data-retention-directive/ (20.6.2014.)
[10] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:105:0054:01:EN:HTML (20.6.2014.)

There was no available information assuring the users that their data are only used for the defined purpose for any of the analysed e-services of this category. There was also no information showing that the employees are required to sign a non-disclosure agreement.

Users can access and view their data throughout all analysed e-services of this category, and can also correct or update their data and monitor the status of their applications.

C02 Job search services by labour offices

1. Basic service information

Most e-services in this category, other than responsible institutions, share the common Central Government of the country as the highest authority over the e-service. The exception in this case is Belgium; Belgium has Regional Governments in charge of job search services in their respective regions.

Some of the e-services in this category do not have details on the start of their implementation. Croatia's e-service is the most recent, launched through the recently-released gov.hr portal. Lithuania's e-service appears to have been started in 2008, according to copyright information on the website, while Estonia's e-service was started in 2009. Sweden's e-service for this category appears to be the oldest, registered as ams.se in 1995. A search of the web has led to information with some e-services, but other services would require a thorough search of the histories of local news and reports, as well as a knowledge of the local language, to find the correct answer to the question of when each service was started/implemented.

All e-services in this category have the approximate Maturity level of 3, or "Two-way interaction". This is expected of job search services as they mostly do not require any sort of financial transaction. The e-services in this category are also mostly independent from other e-services, and are thus not connected with them. The only possible exception worth noting is UK's job search service Universal Jobmatch, which shares the Gov.uk domain with most other e-services, though the service itself is not directly connected with any of them.

It was difficult to determine any differences between the official and actual development of the e-services in this category. There is a persistent lack of reports suggesting any difference in official and actual development. None of the e-services in this category appear to have any limitations to their working schedule. However, it is worth noting that user support lines usually have limited work hours. Due to a lack of access it was not possible to fully determine whether or not the services do what they are described to do. However, by analysing various reports and by examining the level of development of each service, it is clear that all of the services in question fulfil their stated tasks.

2. Users

All services in this category are presented as an alternative and quicker way to search and apply for jobs or look for potential employees. This means that none of these services are mandatory for any category of users. All of the job search services have two main categories of users – job seekers and employers. Au travail, the Belgian e-service, further specifies the different types of users. There, employers are divided into three groups – public sector,

private sector and local government, while job seekers are divided into several groups – such as job seekers with full unemployment compensation, employed, dismissed without personal fault, student, pensioner etc. However, there was no information for user groups regarding different levels of access and authorization. There is very little information on the exact number of users in general, let alone per group. Only the Croatian and Danish job search services provide an exact current number of users on their website's front page. However, this number does not reflect on the total number of job seekers or employers.

A percentage of users who use the service electronically in this category can only be derived in the case of Croatia's Burza Rada e-service. During the making of this document there were 301,273 people registered as unemployed in Croatia and 123,964 users registered on the site. The number of unemployed people cannot be compared to the number of registered users on the website considering the fact that many of those users could, in fact, already have a job. Therefore, determining an exact percentage of users in the case of job search services requires more thorough research.

There was a lack of information that would give any insight into the age groups of users for e-services in this category. This is a reasonable expectation considering there is little information on the very number of users to begin with.

Considering the fact that all e-services in this category are accessed through a web browser, it could be argued that they are immediately adapted for users with disabilities since web browsers can change font size, have text-to-speech plugins etc. However, only Estonia, Sweden and Germany have truly implemented their own aids for users with disabilities – such as aids for the partially sighted, sign language options, listening options or easy/plain language options. Such initiative and effort usually echoes very positively among users and ensures a level of trust. On the other hand, there were no available public opinion polls that would provide data on users' satisfaction regarding e-services in this category.

3. Business optimisation

No concrete data was available in the Business optimisation category for job search services. In the case of Lithuania, the website only states the number of employees and a male/female ratio, but no reports on effects on organization could be found. As far as plans for upgrading the service in the future goes – Sweden only has "big plans to become the leading internet nation by 2015", which could mean further improvements to the e-service.

4. Technological solutions

All e-services use either a form of e-ID or a username/password login. In the case of Belgium, e-ID is also used for employer/employee advertising, though employers can also use their username and password. Lithuania has two options - registering on the website and login via

username and password or registering through the Electronic Government Portal, where they can register through their Bank, as E-mail signature users or through their Identity card (which requires Java). In Sweden, both jobseekers and employers can login via username and password, but jobseekers are encouraged to log in with their BankID, Telie, E-legitimation, Mobilt, BankID or ID-matris for higher security and better performance.

The only immediately visible encryption with all e-services of this category is SSL/HTTPS. Any further details on encryption are scarce and not readily available information. All researched countries, except Germany and the UK, use some form of e-ID. In Belgium, the use of e-ID is optional and is used mostly for employer/employee advertising, while Sweden uses a wide array of various ID's. A trend of moving towards e-ID use is visible, though not yet implemented everywhere. As was expected, the services with e-ID all have some sort of electronic signature with digital certificates. Germany and UK provide little to no information regarding this subject. XAdES is the prevalent format of electronic signatures, though information on this could only be found in the case Lithuania, Estonia and Sweden. Lithuania also mentions XMLDSIG, and Estonia mentions ASiC along with XAdES. In the case of Belgium there are two certificates – one for electronic signatures and one for authentication, but its exact format is unknown. Denmark provides information on who provides the digital certificates, but no information as to the exact format.

All e-services in this category use web forms in the browser as the standard interface for letting users fill in and send out data. Forms are usually needed for users to fill out and edit their data during registration or to make changes to their user profile. The e-services in this category all allow some form of uploading attachments – with some e-services it was impossible to directly prove this. However, FAQs, guides and other documents on the services' respective websites all give solid evidence that documents can indeed be attached in some way. This is usually an option for uploading CVs or other attachments to the users' profiles and/or applications for jobs and job postings.

There is a high probability that all e-services in this category do have predetermined types of document formats that are acceptable for sending out data. However, only some of the countries researched provided information on exact formats on their websites. For some, registration and concrete use is required in order to know exactly which formats are accepted. It is reasonable to assume that .doc, .pdf or .rtf are represented and accepted everywhere, except where explicitly stated on the website. We could find very little information on the technologies used to develop the e-services. Gov.uk is the only service that led to assume that open-source was used "where appropriate" during development, as their Government IT Strategy clearly states[11].

The researched e-services in this category all use web forms in the browser to provide their services, though Java is needed in the case of Denmark for certain elements on the website. Java is mostly used for the NemID authentication in the case of Denmark's e-service, while

[11] https://www.gov.uk/service-manual/making-software/open-source.html (28.6.2014.)

services in other countries found different methods of authentication for their users. No e-services in this category showed any limitations to access regarding the channels through which they are available. The e-services are available on web browsers regardless of the channel, be it a PC, smartphone, tablet or any other channel through which access to the internet can be established.

As expected, no information whatsoever could be found on hosting for the e-services in this category. This also reflects the current issue of trust in the Cloud. Information on hosting should be available to users in some form in order to ensure trust that their data are safe.

5. Storage and long-term content availability

Questions regarding storage and data retention provided little-to-no answers in general. The partial exception here is Belgium, where the retention period is 1 year. Germany only provides information that user accounts will automatically be deleted after 10 months of not being accessed or used. Belgium is the only country that was relatively clear with this question. On October 8, 2013, a Royal Decree was published completing the transposition of the EU Data Retention Directive 2006/24/EC (the "Data Retention Directive") into Belgian law.[12][13] The Royal Decree was adopted on September 19, 2013. No information was found for other countries' e-services in this category.

No more detailed answers were found on the way data is handled after the retention period expires. The exception may be Germany, where user accounts are deleted after the retention period of 10 months without use. As a result, no information could be found on long-term preservation formats, methods of materialization or any other details regarding data retention. It is clear that some responsible institutions failed to take into account the fact that these questions might be asked by users and that providing answers to such questions strengthens trust and users' willingness to use the service.

Only Lithuania and Estonia's e-service provided information on where user data is stored and/or who has access to it.[14][15] This information may be partially available for other services as well, but it was very difficult to find. The two e-services that provide such information placed it on the bottom of the front page of the e-services' website.

No answers were found for questions regarding certificates guaranteeing data security and the Cloud. This is expected considering little information is available on data storage in general.

[12] https://www.huntonprivacyblog.com/2013/10/articles/belgium-transposes-data-retention-directive/ (28.6.2014.)
[13] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:105:0054:01:EN:HTML (28.6.2014.)
[14] https://www.ldb.lt/LDBPortal/Authentication/Logon.aspx?branch=js&page-ID=60c5ae4a-3d9e-4746-b9a3-241f7f16b635 (28.6.2014.)
[15] https://www.tootukassa.ee/content/isikuandmete-tootlemisest (28.6.2014.)

6. System operation transparency

When it comes to service use policies, Belgium's e-service only has a Privacy Policy[16] on their website. Denmark's e-service has a section called "Laws and regulations", encompassing Rights and duties, a Privacy policy and Rules, laws and regulations, while Estonia's e-service has a Terms of Use[17] section. E-services from other researched countries provide no apparent service use policy.

Guarantees to the use of users' data only exist in the case of Denmark and Estonia's e-service, however they are not so much proclamations of technological measures as they are "written guarantees". With Denmark's e-service the guarantee can be found in the Privacy policy[18], where the use of users' data is described. Estonia's e-service has a section called Processing of personal data[19], where the guarantee is located. Other e-services provided no information on this issue. No information could be found on whether or not employees are required to sign a non-disclosure agreement for any of the researched e-services in this category.

It was reasonable to expect that users can access, view and edit their data in e-services of this category. Users' status often changes when it comes to employment status, therefore it is important that users can update their data in this service. There is no need to send out requests for correction – any change to the users' profile made by the user is applied immediately.

Though it was not possible to determine whether or not users can monitor the status of their application, since an actual application for a job would be necessary to find the answer to this question, we can assume that users do have an insight into the status of the job application or job posting they applied for.

[16] http://www.autravail.be/web4/fot2web/index.do?method=cookies&language=fr&viewPoint=employee (28.6.2014.)
[17] https://www.tootukassa.ee/content/eesti-tootukassa-kodulehe-kasutustingimused (28.6.2014.)
[18] https://info.jobnet.dk/om+jobnet/politik+om+persondata (28.6.2014.)
[19] https://www.tootukassa.ee/content/isikuandmete-tootlemisest (28.6.2014.)

C03 Social security benefits

1. Basic service information

All analysed services in this category are generally under the jurisdiction of the Social Insurance Agency or Ministry of social security and labour. Regarding information on the start of service development/implementation for this category of e-services, the respective services were implemented in 2011 in Belgium, 2012 in Estonia and 2013 in Croatia. Other e-services provided no information on the start of service implementation.

Most e-services in this category have a Maturity level of 3. The exceptions are Sweden and Germany, with Sweden having a Maturity level of 5, and Germany having the lowest Maturity level of 2 for this category of e-services. In Germany, forms can be filled only on screen before being printed and sent out or delivered to the Labour Office. Sweden's e-service is fully automated – at the event of birth of a child the hospital gathers all the needed information from parents and initiates the procedure of regular, fully automated payment of child allowances.

Only Denmark's e-service provided any information related to connection to other governmental e-services – it is connected to TastSelv, Denmark's e-service for automated tax administration. Regarding official and actual development, only the Belgian e-service for this category released official development goals – mentioning usability, faster contacts between citizens, businesses and the SPF Finances, more transparency, public access and being open year-round. The service itself fulfils these goals. The Belgian way of publishing official goals of development could be used as an example in declaring development goals for other countries in the EU and their respective governmental e-services. None of the e-services appear to have any limitation to their working schedules. Due to a lack of access it was not possible to fully determine whether or not the services do what they are described to do. However, by analysing various reports and by examining the level of development of each service, it is clear that all of the services in question fulfil their stated tasks.

2. Users

Most of the e-services in this category do not appear be mandatory for use, with the exception of Sweden, though the service in question is already fully automated. There is no information on different categories of users, how many users there are per user group or on the percentage of users who use the service electronically. As expected, Belgium and Croatia's Pension application online provides information on prevalent age groups being 50-65, while Denmark and UK's Student grants e-services report ages 18-30 as being the most common.

Since all of these e-services are on the web, they are naturally adapted for users with disabilities as much as the web browser allows it. Sweden's e-service also contains adapted text and a synthetic speech function, while Denmark's e-service has highlighted symbols for users with impaired sight.

There was little to no information about user satisfaction. Intuitively, user satisfaction in Sweden can be derived from the fact that the service is fully automated, therefore probably higher than in other countries. However, no concrete data was found.

3. Business optimisation

No information could be found on positive financial indicators for the e-services in this category or their responsible institutions. Only for Croatia and Sweden's e-service is there some information on the decrease in time required to process user applications. In Croatia's case, there is the procedure of pre-filling through which users can save on the required processing time of their applications (by gathering the required documentation in time). For Sweden, the process is sped up as much as possible because it is fully automated and with no human interaction to decelerate the process.

There is no information about any of the services' implementation affecting the required number of workers in their respective institutions. There are also no visible plans of major upgrades or expansions to any of the services in this category.

4. Technological solutions

There are two types of authentication for analysed e-services in this category - username/password and e-ID. In Sweden, there is no need for authentication because the Social Insurance Agency pays allowances to the parents automatically using the fully automated e-service.

With all e-services, the communication between the server and the client station is encrypted and carries the standard SSL/HTTPS protocol. Regarding the use of e-ID, analysed e-services in Belgium, Croatia, Denmark, Lithuania and Estonia all use e-ID, while none of them except Estonia appear to use electronic signatures. There was no information on exactly which format of electronic signatures is used.

No information was provided for the use of open-source versus commercial technologies. All e-services in this category are web applications except Sweden's e-service. Most modern e-services are built through web technologies, the number of standalone/desktop applications are rare and on the decline. All services are available through any device with access to the internet, except in the case of Sweden where the e-service functions on the server-side, and not the client-side.

There was very little information on hosting for the analysed e-services. Only in the case of Belgium's e-service was there information that the service is hosted within its responsible institution – the Crossroads Bank for Social Security. There is little information in general about the hosting of governmental e-services, transparency should become a priority in the future.

5. Storage and long-term content availability

There is no information whatsoever regarding questions of storage and long-term content availability. Little is invested in these types of services in all analysed countries, except the fully automated e-service in Sweden, possibly because the services for citizens are used less than services for the business sector. The latter are also more sensitive in terms of conditions for long-term data-keeping.

6. System operation transparency

There is no information about defined service use policies, nor could one be found, except in the case of Croatia and UK's e-services in this category. In those two cases a service use policy could easily be found, while others did not provide such information transparently or they did not provide it at all. None of the services in this category provided any information on proclaimed technological measures guaranteeing the users that their data is only used for the defined purpose. There is also no information on whether or not employees are required to sign a non-disclosure agreement.

In most of the services in this category, users can access and view their data through the e-service. Sweden's e-service in this category is fully automated and therefore requires no user interface. Half of the analysed e-services offered users the ability to correct or update their data within the services themselves. Users can also monitor the status of their applications with most of the analysed e-services in this category.

C04 Personal documents: passport and driver's licence

1. Basic service information

At the time of this research, only Estonia and the UK provided a governmental e-service for this category. The Central Government is the highest authority for both e-services, the Police and Border Guard Board being responsible for the Estonia's and the Identity and Passport Service along with HM Passport Office being responsible for UK's e-service. No information could be found on the start of service development/implementation for either of the two services in this category.

A definitive Maturity level could not be determined for the two e-services. An estimate was made whereby both e-services were given Maturity levels between 3 and 4, meaning both have some elements of the higher Maturity level, but lack certain elements that would define them as such. UK's e-service sends the filled and signed declaration by post, which can be created through an online application that provides users with a username and password. The user can then log in to the service and retrieve and check the status of a submitted application. The element that gives the service a partial Maturity level of 4 is the payment feature. In Estonia, users can apply for a passport via e-mail ("if less than 2 years have passed since applying for the previous passport and capturing fingerprints") by filling up the application form in .pdf format and signing it digitally with their ID-card.

No information could be found on whether or not the analysed e-services in this category are in any way connected with other e-services. There was also no information that would compare the official and actual development of the mentioned e-services. Neither of the two services appear to have any limitations to their work schedules. Due to a lack of access it was not possible to fully determine whether or not the services do what they are described to do. However, by analysing various reports and by examining the level of development of each service, it is clear that all of the services in question fulfil their stated tasks.

2. Users

Both Estonia and the UK have more than one way for applying for a passport. In Estonia, an application for a passport can be made in the Service Offices of the Migration and Citizenship Bureau and in the foreign offices of the Republic of Estonia and, if less than 2 years have passed since the previous passport application and fingerprint capturing, application is also possible by post or e-mail. In the UK there are several ways for applying for a passport, depending on where a person is located at that moment (in the UK or overseas) and if they need it urgently or not.

According to information available on the web-pages of the analysed e-services, different groups of users could be identified. In the case Estonia's e-service, the groups are adults,

children and persons under guardianship, but for children and persons under guardianship an application for the passport must be submitted by their legal representatives. In the UK, application for the first adult passport is possible for ages 16 and over, and then only if the applicant is one of the following: a British citizen, a British overseas territories citizen, a British subject, a British national (overseas) and a British protected person.

No information could be found on how many users there are per user group or on the percentage of users who use the service electronically. There is also no information on which age groups are prevalent in using the analysed e-services, though the assumption is that adults are the most frequent users - managing both their personal and their children's documents.

In Estonia's case, applying for a passport online requires the use of e-mail, therefore it is the users' browser that affects how well the service is adapted for users with disabilities. Information is available in the UK on passport services for disabled users which refers to wheelchair access and issues with signing forms, impaired hearing or vision, however, these are not included within the e-service itself. The only available aid for disabled users in the service is for those with impaired vision, and includes the ability to change the size of letters on the screen.

No information is available on users' satisfaction for services in this category.

3. Business optimisation

There is very little information available on positive financial indicators, details regarding decrease in time required to process user applications or how the e-services implementation affected the organisation of work processes in their respective responsible institutions. The only information provided in this series of questions was the UK's plan on redesigning and improving of their e-service, including user feedback, while Estonia's e-service provided no information on future plans to improve the service.

4. Technological solutions

Regarding authentication, in the case Estonia’s e-service the users must digitally sign the required documents before sending them via e-mail. With UK’s e-service, username and password are used to access the user account if the user wants to retrieve an application and check its status. Since Estonia's e-service requires the use of e-mail, it is not possible to determine if the communication between the server and client station is encrypted. In the UK, the communication is encrypted with SSL/HTTPS. In Estonia’s case, documents are signed digitally with an ID card, however there was no information on whether or not the electronic signature uses digital certificates, nor is there information on the format of the electronic signature.

In Estonia's case, the users fill in the form in .pdf format and send it out via e-mail. In UK's case, the users fill in their data electronically through an application. The declaration is then printed, signed and sent out by post. The sending out of attachments is applicable only in the case of Estonia's e-service, where users can send all required documents through e-mail. Regarding predetermined document formats in Estonia, other than .pdf for forms, .jpg is used for images.

No information was provided about technologies (open-source or commercial) used in developing the analysed e-services in this category. Both services are web-applications, though the service in Estonia thoroughly uses e-mail. Both e-services use the web for access. No information whatsoever is available on the hosting of the services.

5. Storage and long-term content availability

Questions regarding storage and long-term content availability gave little to no answers. The only question where an answer could be found was the one regarding materialisation of data where in the UK documents have to be printed.

6. System operation transparency

Only UK's e-service has a defined service use policy and data sharing principles explaining how the users' data is used when it is shared through the e-service. There is no information on employees being required to sign a non-disclosure agreement.

Users can access and view their data only in the case of the UK's e-service, however, there is no information on the possibility of correction or updating of users' data within the covered services. Users can, however, monitor the status of their application with UK's e-service.

C05 Car registration (new, used, imported cars)

1. Basic service information

Only Belgium, Denmark, Lithuania and the UK had a sufficient Maturity level for car registration e-services to be analysed within this research. In Belgium, the Federal Department of Mobility and Transport, Vehicles Registration Directorate which is under the Central Government, is authorised for this e-service. In Denmark, the Local government is the highest authority for the e-service. In Lithuania and the UK, the Central government is the highest authority; in Lithuania the State enterprise "Regitra" is responsible for the service while in the UK it is the Driver and Vehicle Licencing Agency (DVLA). No information was found on the start of service development/implementation for any of the analysed e-services in this category.

On the Maturity level scale of the e-services in this category, Denmark's e-service was difficult to pinpoint. The lack of available information and the language barrier proved to be issues in determining the exact Maturity level, resulting in an estimate of a Maturity level between 3 and 4. Belgium, Lithuania and UK's e-service showed the Maturity level of 4, respectively. According to available information, a conclusion can be drawn that Belgium's e-service in this category is connected to other governmental organizations. The Vehicle Registration Service (DIV) "keeps a databank for numerous organizations such as the police, the Finance FOD, insurance companies and so on. When you register with the DIV, you receive a certificate of registration and a license plate."[20] Other than that, no information could be found on any of the other services in this category being connected to other governmental e-services. There was also no information with which to compare the official and actual development of the e-services.

All e-services in this category appear to have no restrictions or limitations to their working schedule. Due to a lack of access it was not possible to fully determine whether or not the services do what they are described to do. However, by analysing various reports and by examining the level of development of each service, it is clear that all of the services in question fulfil their stated tasks.

2. Users

It was difficult to determine whether or not the e-services in this category are mandatory for use in the case of Denmark and Lithuania's e-services. The e-service in the UK is merely an option – there are alternative ways of accomplishing what the service provides; for example by post. Belgium's e-service appears to be mandatory for use, it states that every person who owns a vehicle has to register it. No alternative methods are provided, so the possibility

[20] Vehicle Registration Service (DIV): http://www.belgium.be/en/mobility/vehicle_registration_service/ (13.07.2014)

of mandatory use could be suggested. The registration can be done by an individual, insurance companies, brokers, agents and leasing companies.

Regarding groups of users, information was found for Belgium and Lithuania's e-service. In these cases, as mentioned, individuals, insurance companies, brokers, agents and leasing companies are treated as different groups of users. In the case of Lithuania's e-service, natural and legal persons are mentioned as two categories of users. While other services provided no information, Belgium's e-service states 7,500 users who use the service electronically. Adults are, logically, the prevalent group of users.

No features were found that would adapt any of the analysed e-services in this category for users with disabilities other than what the web browser allows for. There was also no information on users' satisfaction with any of the e-services.

3. Business optimisation

No information could be found for any of the questions in the Business optimisation group of questions for any of the analysed e-services in this category.

4. Technological solutions

As a method of authentication, Belgium's e-service uses a username and password authentication, while Denmark's e-service uses NemID or a digital signature. "NemID (literally: EasyID) is a common log-in solution for Danish Internet banks, government websites and some other private companies."[21] In Lithuania, users log in to the Driver's Portal via the e-Government Gateway and can sign in through any method available for identification/authentication purposes (Bank, Smart cart, USB, SIM, ID-card, Civil servant ID-card, EU-ID-card, Cross-border authentication). In the UK, users access the e-service via Government Gateway User ID and Password.

All e-services in this category have their server-client station communication encrypted with the SSL/HTTPS protocol, though this could not be confirmed for Belgium's e-service. All analysed e-services except Belgium's in this category use some form of e-ID, in Denmark it is the NemID, in Lithuania it can be any of the approved authentication methods (Bank, Smart card, ID-card etc.) and in the UK it is the Government Gateway User ID. No information is provided, however, on electronic signatures or digital certificates.

Due to a lack of information, the method of filling in and sending out data is unclear, however the assumption is that an electronic web form is used for filling in applications which are then sent out through the application.

[21] Wikipedia: NemID, http://en.wikipedia.org/wiki/NemID (13.07.2014)

There were no answers for questions regarding attachments and their predetermined formats. Also, no information was found on whether the services were developed using open-source or commercial technologies.

In all cases, the e-services are web applications available through any device with access to the internet. However, no answers could be found regarding the issue of hosting, or the use of Cloud for that matter.

5. Storage and long-term content availability

No answers could be found for the group of questions regarding storage and long-term content availability in any of the analysed e-services in this category.

6. System operation transparency

A service use policy was found only in the case of UK's e-service. In addition, no information could be found on proclaimed technical measures guaranteeing users that their data are only used for the defined purpose or if the employees are required to sign a non-disclosure agreement.

Regarding data visibility and control, users of e-services of this category in the UK and in Lithuania can view and update their data, though only with UK's e-service can users monitor the status of their applications. Belgium's e-service does not appear to allow users to correct or update any of their data within the service.

C06 Application for building permission

1. Basic service information

All e-services in this category appear to be under the authority of their respective local governments. The information on the start of service development/implementation was only available for Croatia, it being 6/1/2014, because the media coverage for it proved sufficiently recent. Most of the e-services in this category are estimated to be of Maturity level 3, with the exception of Denmark and Sweden's e-service who only have downloadable forms on the website (Maturity level 2). For this reason, they will not be reviewed in further analysis of this category. The highest Maturity level in this category is found with the UK's e-service, which provides payment options for expenses of building permits directly by using the service.

The information on the service connections to other e-services is only available for Estonia - it is connected to services such as application for cadastral unit division, construction project application, earthwork application, exemption from land tax etc. Perhaps other services provide the same, but information on this is unavailable without login.

Regarding the comparison of official and actual development of the e-services in this category, a loose answer is available only for Croatia, where the service was set to be released on 1st of January 2014, 5 months earlier than it was really published (information found in newspaper articles). There appear to be no limitations to any of the service's working schedules.

2. Users

In terms of mandatory use, only Estonia's e-service is mandatory for its citizens. Regarding different groups of users, they are split into citizens and businesses/planning professionals/project leaders and government officials. Exact numbers of users per group or users who use the services electronically were not available.

The services themselves are not adapted in any way to users with disabilities, though the users' browsers may provide ways to enhance interactivity for users with disabilities. There was also no information on user satisfaction with the services in this category.

3. Business optimisation

There was no information for questions regarding business optimisation for any of the analysed e-services in this category.

4. Technological solutions

Every analysed country has its own method of authentication for this category of e-services. With Croatia's e-service, login is done through the ID number of the object. In Lithuania, authentication is done through either a bank number, a Smart Cart or SIM, or by ID card. An ID number and token is used in Estonia, while UK's e-service uses a username and password.

The only concrete information on encryption of the communication between the server and the client station is visible with Estonia's e-service, it being SSL/TLS. UK's e-service provides information on there being an encryption, but lacks to mention exactly which one.

A form of e-ID is used with Croatia, Lithuania and Estonia's e-service: object ID, e-ID or mobile ID. Regarding electronic signatures and digital certificates, the only available information is for Estonia's e-service - digital certificates are used and the format of the electronic signatures is stated to be XMLDSig.

All e-services in this category use web forms for filling in and sending out data and allow the upload of attachments. Only with Croatia and Lithuania's e-service are there predetermined types of documents - .gml in Croatia and .pdf, .jpg, .gif, .tif and .png in Lithuania's e-service. Information for other countries' e-services could not be found due to a lack of access.

The e-services of this category in Croatia and Lithuania were implemented through open-source technologies. Estonia and the UK did not provide information on the types of technologies used.

All analysed services are accessed through a web browser, and can be accessed on any device with access to the internet. There was unfortunately no information on service hosting, in terms of location, possession of required certificates or the use of Cloud.

5. Storage and long-term content availability

The retention period for the data in the system in Croatia is 10 years for certificates that grant the building permit, while the permits themselves are permanent. This is regulated by the General records schedule. No information was found on any of the websites of other e-services. The information for Croatian standards was also not available on the service site itself, but was rather taken from a different source.

For most users, this type of information is not important, and the resulting lack of information is hardly surprising. However, this is no reason to not include information on data retention within the services themselves. No information was found for further questions regarding the use of electronic archives, responsible institutions' possession of required certificates and/or Cloud/Data centres being located in the same country as the services.

6. System operation transparency

A service use policy was found only in the case of UK's e-service. Questions regarding technological measures that guarantee proper use of users' data and non-disclosure agreements for employees provided no answers. In all cases, however, users can view and access their data through the service. In the case of UK's e-service users can also correct and update their data within the service, while in Lithuania a request can be sent to update the data. Information for Croatia and Estonia's e-service was not available.

For e-services of this category in Croatia, Lithuania and the UK, it is clearly stated that users can monitor the status of their application, while no information was provided for Estonia's e-service. The assumption is that this is possible, but a lack of access prevents confirmation.

C07 Declaration to the police (e.g. in case of theft)

1. Basic service information

The e-services in this category were developed and implemented mostly during the mid-2000s, with Denmark, Estonia and the UK implementing their e-service in 2005, while Lithuania implemented their service in 2009. Though it was difficult to determine without access, the Maturity levels vary for each e-service. With Belgium's e-service, the Maturity level is estimated to be between 3 and 4. With Denmark and Lithuania's e-service it is 3 (with Lithuania's e-service possibly being 4), while in Sweden, Germany and UK's case it is 2. Estonia's e-service in this category showed a Maturity level of 1, which cuts it from further research. None of the analysed e-services in this category appear to be connected to any other governmental e-services. No information was found on the official and actual development of the e-services. None of the e-services in this category appear to have any limitations to their work schedules.

2. Users

None of the analysed e-services in this category appear to be mandatory for use for any category of users, nor are there different groups of users defined for any of the services in this category. There was no information on the number of users, prevalent age groups, or the percentage who use the services electronically.

Lithuania and Sweden are the only countries whose e-services in this category have been adapted for users with disabilities, with options like Listen, Easy to read and Sign language in the case of Sweden, despite its Maturity level being 2. Others are adapted as much as the web browser allows it.

Regarding users' satisfaction, only Lithuania had a survey on its e-service with 88% being mostly satisfied.

3. Business optimisation

Regarding positive financial indicators, only UK's Crimestoppers e-service has provided their annual financial reports online, though there was little information on positive financial indicators for the e-service. No information was found on a decrease of time required to process user applications, or on the effect on the organisation of work processes in responsible institutions. None of the analysed e-services provided plans for upgrading or expanding the services in the future.

4. Technological solutions

Only Belgium and Lithuania provided some information on type of authentication. Belgium's e-service has e-ID and an account in the federal portal which can be used with or without tokens, while Lithuania's e-service can be used with e-mail, signature users and identity cards. The communication between the server and client station is encrypted with SSL/HTTPS in all cases. There was no further information on electronic signatures or digital certificates for any of the e-services in this category.

All e-services in this category use web forms as means of filling in and sending out data. In Lithuania users can fill the structural form and send it to epolicija@policija.lt. It is recommended to attach the electronically signed document, in order to confirm the user's identity and the integrity of the document. The predetermined type of documents in Denmark's e-service is .pdf, while in Lithuania's e-service it appears to be .doc. Regarding predetermined types of document formats for sending out data, the police in Denmark can immediately handle the following file formats: .doc, .dot, .txt, .rtf, .ppt, .mpp, .xls, .jpg, .jpeg, .gif, .bmp, .tiff, .vsd, .mid, .mp3 and .wav files can only be received through the police's secure mail addresses. In Lithuania, the documents can be sent in .doc format.

There was no information on the use of open-source vs commercial technologies for developing the e-services. All analysed e-services are available through the web and use web browsers for accessing the service. Lithuania and Sweden's e-service also requires plugins.

The services are all hosted within their responsible institutions except in the case of UK's e-service, for which there was no information. None of the e-services provided information on the possession of required certificates or hosting on the Cloud/Data centres.

5. Storage and long-term content availability

There was no information on retention periods for the data in the system. Regarding deletion of data after the retention period expires – Denmark's e-service provides the following information: "Case specific e-mail will be printed and logged receipt. If an e-mail contains sensitive or confidential information, it will immediately upon receipt be printed and deleted. If a secure e-mail is received, it will be deleted within 30 days of receipt. All other e-mails are deleted regularly."

No information was found on preferred long-term preservation formats, methods of materialisation, compliance with long-term preservation standards or the use of electronic archives. Regarding storage within the responsible institution's information system, only e-services in Denmark and Germany provided some information. Data are stored on specially protected services in the case Germany's e-service, where access is restricted to authorised persons who are involved in the technical, commercial or editorial maintenance of the service. Precautions are taken to ensure safety of the users' personal data, which is

conscientiously protected against loss, destruction, falsification, manipulation and unauthorized access or unauthorized disclosure.[22]

Only in UK's e-service is there some information on the possession of required certificates that guarantee the security of stored data: "ISO27001 Accreditation – Crimestoppers core business depends on upholding the highest standards of information security to protect the anonymity of the people who contact the charity. This year we will conclude work to achieve certification under the international standard ISO27001. This certification is particularly important with the growing number of corporate clients to whom we are delivering integrity line services. The work ensures we have the right risk based set-up to maintain the high level of security required."[23]

There was no information on data storage in the Cloud.

6. System operation transparency

Most of the e-services in this category have some sort of defined service use policies which can be found on their websites. Regarding proclaimed technological measures guaranteeing defined use of users' data – Belgium's e-service's web site claims: "Fedict and the police are obliged to take all appropriate technical and organizational measures to protect personal data against destruction, loss, unintentional changes, damage or disclosure. In order to guarantee this security, the data exchange between the server and your computer and data communications are encrypted to the police, among others."

UK's e-service claims the following in the Data protection statement: "At Crimestoppers we are committed to protecting your privacy and your anonymity. This statement is made in the light of the requirements of the Data Protection Act 1998 in order to alert valued contacts to the Crimestoppers data processing practices which will govern the processing of your data."[24]

There was no information on employees being required to sign non-disclosure agreements. Only Belgium and Sweden's e-services allows users to access and view their data. Belgium's website claims the following: "In accordance with the Data Protection Act you can see your data at any time and free of charge. Contact for this purpose Fedict or the police under the specified contact addresses." Sweden's e-service gives users the ability to change their data, while no information was found for other e-services. No information was found on the ability of users to monitor the statuses of their applications.

[22] http://www.berlin.de/wir-ueber-uns-be/agb/pp/20130515/ (11.4.2014.)
[23] https://crimestoppers-uk.org/media/50298/report-and-accounts-2013-vsigned.pdf (4.5.2014.)
[24] https://crimestoppers-uk.org/misc/privacy-policy/ (4.5.2014.)

C08 Public libraries (availability of catalogues, search tools)

Public libraries as e-services were not investigated in this research. They were considered as low priority in the research on e-services because they were usually below Maturity level 3 and therefore not considered as sufficiently developed e-services. In that sense public libraries were not considered as relevant for the issues of trust in e-services.

C09 Certificates (birth and marriage): request and delivery

1. Basic service information

No information could be found on the start of service development/implementation for any of the e-services in this category. Regarding Maturity level, the most advanced e-service analysed was Belgium's, with a Maturity level between 3 and 4. Sweden's e-service was estimated at Maturity level 3, Croatia, Denmark and UK's e-service share a Maturity level of 2 with insufficient information found for the rest of the e-services (except for Estonia where the presumption is the service has a Maturity level of 1).

Regarding connection to other governmental services, only Sweden's e-service in this category provided information on being connected with the Tax Agency. None of the services appear to have limitations to their respective working schedules except Sweden's e-service, which appears to be closed for maintenance on Mondays from 5:50AM to 6:10AM and from 8:00PM to 8:15PM.

2. Users

None of the services in this category appear to be mandatory for use. In addition, there are either no different categories of users or no information on them. There was no information for any of the other questions regarding users for any of the analysed e-services in this category.

3. Business optimisation

Very little information was provided for this group of questions. Only Croatia's e-service provided some information about plans for upgrading and expanding the e-service in the future. The website of the e-service states: "Dynamics of the development and expanding of the services, which will be provided on this web page in the future, is depended on the adjustment of regulations which regulate this area with newly made conditions of e-management and of appliance of digital signature in practice."[25]

4. Technological solutions

Regarding types of authentication, Belgium's e-service requires e-ID with PIN and a SmartCard reader, Croatia's e-service requires the user's JMBG (Personal identification number - PIN) or OIB (the recently implemented PINs in a different format, slowly replacing

[25] https://e-uprava.apis-it.hr/igrast/servlet/PrikaziStranicu (5.5.2014.)

the original JMBG/PIN). Denmark's e-service uses its NemID, Sweden's e-service uses e-ID and the UK's e-service requires a username and password.

All researched e-services with a satisfactory Maturity level appear to have the communication between the server and client station encrypted with the SSL/HTTPS encryption. Belgium's e-service confirms this by stating on their website: "Your data are transmitted in encrypted form (https) to ensure they are totally secure."[26]

E-ID is used for e-services in Belgium, Denmark and Sweden, but no information was found on the use of electronic signatures and/or digital certificates. It is assumed that all e-services in question use a type of web form for users to fill in and send out data, though this could only be confirmed in the case of Croatia's e-service. Little to no information was found on sending out attachments with applications, with Croatia's e-service it is apparently not an option as it appears to be unnecessary. There was, therefore, no information to be found on predetermined types of formats used.

Croatia's e-service was made by the IT firm APIS IT d.o.o. There was no further information on the use of open-source or commercial technologies in the development of the e-services in this category. All analysed e-services in this category are web applications. Belgium's e-service also requires Java for complete usability. All analysed e-services in this category can be accessed through any device that allows access to the internet.

Regarding hosting, most of the services in this category appear to be hosted within their responsible institutions except in the case of Croatia's e-service, where the service appears to be hosted within APIS IT. No further information was provided for this group of questions, namely on the owned certificates and the use of Cloud.

5. Storage and long-term content availability

The only e-service that provided information on their data retention period is Denmark's e-service with the following information on their website: "On borger.dk we store messages and dialogs from our chat function for six months. We use it for statistical purposes and to improve borger.dk. Personal data such as name or e-mail address will not be disclosed to a third party. We always delete sensitive personal data such as social security numbers, before we answer e-mails."[27] However, no information was found on the exact law or regulation that regulates this.

There was no information on preferred long-term preservation formats, methods of materialisation, compliance with long-term preservation standards or any of the services offering an electronic archive as an additional service. Regarding storage, only Belgium and Sweden's e-service provided some information. In Belgium's case, the service claims that the

[26] http://www.bric.irisnet.be/en/our-solutions/software-solutions/irisbox-1/the-irisbox-platform (5.5.2014.)
[27] https://www.borger.dk/om-borger-dk/Sider/Anonymitet.aspx?NavigationTaxonomyId=584a2cef-359f-4524-965b-b696a48d1d67 (11.7.2014.)

data received from the users are stored in the CIRB files and used only to respond to the submitted request for information.[28] The e-service in Sweden states that all processing is done locally at the respective offices where data are recorded on the basis of birth registration, giving notice, notice of moving to Sweden, death certificates, etc.[29] No further information was found on the questions of the possession of required certificates for data security or the use of Data Cloud for storage.

6. System operation transparency

Only the e-services in Croatia and Sweden appear to have a defined service use policy. There is no information, however, on proclaimed technological measures guaranteeing the users that their data are only used for the defined purpose or on the requirement for employees to sign a non-disclosure agreement.

Only for Croatia's e-service could it be confirmed that the users can view their data through the service. Regarding correction or update of users' data – Belgium's e-service states the following: "In accordance with the law of 8 December 1992 on the protection of privacy with regard to the processing of personal data, you have the right to consult the data in question and, if necessary, have them corrected."[30] Croatia's e-service does not appear to allow user-side changes or updates. No information was found on the ability of users to monitor the status of their applications, with Croatia's e-service apparently not allowing this option.

[28] http://www.brussels.irisnet.be/legal-information (5.5.2014.)
[29] http://www.skatteverket.se/omoss/omskatteverket/personuppgifterpul/behandlingavpersonuppgifter.4.18e1b10334ebe8bc80005971.html (19.7.2014.)
[30] http://www.brussels.irisnet.be/legal-information (5.5.2014.)

C10 Enrolment in higher education/university

1. Basic service information

In all cases except Belgium and the UK the highest authority for the e-service is the Central Government. In the UK, the system is independent from the government, and in Belgium the community governments are the highest authority. A large difference is noticeable with the structure of higher education in terms of institutions responsible for the e-services. In the case of Belgium there are multiple independent services with little information on the start of implementation. In the case of other countries' e-services, most of them were implemented during the late 2000s and early 2010s. Only in the case of Estonia and UK's e-services was the exact start of implementation difficult to find.

All e-services in this category except Belgium's have the approximate Maturity level of 3, or "Two-way interaction". This is expected of this type of service considering there is no payment involved directly within the service itself. Since Belgium's Maturity level for this category is 1, it will not be taken into consideration for the rest of this analysis.

Regarding connection to other governmental e-services, the e-services in this category are mostly independent of other e-services, and are thus not connected with them. It was difficult to determine any differences between the official and actual development of the e-services in this category. There was a persistent lack of reports suggesting any difference between the official and actual development.

Regarding the question about limitations to the service's work schedule, considering the category of the e-service, the question is somewhat difficult to answer. None of the e-services in this category appear to have any limitations to their working schedule, however, some of the e-services' main functions of enrolling and applying for programmes (such as the case of Denmark and Croatia's e-service) only work during certain periods when application is possible. Other than that, all e-services are mostly available at all times, only with certain elements inaccessible for some e-services during certain periods. Due to a lack of access it was not possible to fully determine whether or not the services do what they are described to do. However, by analysing various reports and by examining the level of development of each service, it is clear that all of the services in question fulfil their stated tasks.

2. Users

Depending on the local higher education structure, some countries have these e-services as mandatory, while others have them merely as an alternative. However, some of these "alternatives" may be mandatory for certain universities, so it actually depends on what the candidates apply for. The service is mandatory in Croatia, Denmark, Lithuania and Sweden.

In Estonia, not all institutions are within the SAIS system so it appears to be optional, though this is uncertain. In Germany, there are lists[31] of types of users who do and users who don't have to use the service. In the UK, the service does not appear to be mandatory, however, as mentioned, some universities and higher education institutions may require UCAS for applications.

The services in this category did not provide a lot of information on different groups of users other than potential students/candidates for courses etc., except with UK's e-service where there appear to be Advisers and Institutions themselves who can register on the site. However, there was no information on groups regarding different levels of access to the site.

In the case of Croatia, Denmark, Lithuania and Sweden's e-services, all applicants have to use the service so the percentage is high. There are no exact figures, however. The case of Estonia and Germany's e-services is uncertain, because not all universities are available within Estonia's e-service, and Germany has the e-service mandatory only for certain types of users. In the case of the UK, no information is available due to the nature of the service. There is a lack of information that would give any insight into the age groups of users for e-services in this category. However, considering that the users in question are mostly applicants for higher education institutions and universities, the average age of most users is approximately 18-25. Taking into account the candidates for postgraduate programmes – the upper age limit virtually disappears.

Considering the fact that all e-services in this category are accessed through a web browser, we could argue that they are immediately adapted for users with disabilities since web browsers can change font size, have text-to-speech plugins etc. However, only UK's UCAS provided information for users on how to adapt the browser for disabilities such as visual impairments. Only in the case of UK's e-service was it possible to find a survey that analysed the opinions of advisers using the UCAS website. The vast majority responded very positively on their experiences with the site and gave input as to what things still remained problematic for them – though there weren't many of these issues.

3. Business optimisation

No concrete data whatsoever was available for questions regarding financial indicators and a decrease in time required to process user applications for this category. It is logical to assume, however, that there has indeed been a decrease in time required to process applications since this is one of the main reasons for starting an e-service in the first place.

For questions regarding change in the organisation of work processes, the only information provided out of all researched e-services is UCAS, though this information is only partial. UCAS claims to be a fast-growing company and that there are constant changes in their work

[31] http://www.hochschulstart.de/index.php?id=3369&L=1 (1.7.2014.)

organization with employees moving up and across the business ladder. It also states the current number of employees, numbering 400.

Regarding plans for upgrading the service, again, only in the case of UCAS are there concrete plans of improving and expanding the service. There exists a plan for upgrading and expanding the service up to 2015[32] in all areas, to make it more dynamic and flexible – including evaluation of current methods in order to improve them etc.

4. Technological solutions

The e-service of this category in Croatia uses Authentication and Authorization Infrastructure of Science and Higher Education in the Republic of Croatia (AAI@Edu.hr). All users receive their own username and password. Denmark and Estonia use e-ID. Additionally, in Denmark's case, partial login is available through e-mail. Sweden uses the Swedish personal identity number for users who have it, and e-mail for users who don't, and has an EduID for students currently in development. Other countries use a form of username/ID number and password. The only immediately visible encryption with all e-services of this category is SSL/HTTPS. Any further details on encryption are scarce and not readily available information.

The only e-services that use e-ID are Denmark and Estonia. Depending on how e-ID is defined, the Croatian AAI can be taken as a form of e-ID for students. For Lithuania and Sweden's case it is uncertain whether or not e-ID plays any role in user authentication for access would be required for certain elements, while there is insufficient information for Germany's e-service. The UK does not use e-ID for this service. As expected, the services with e-ID all have some sort of electronic signature with digital certificates, as is already visible from previous analysis of other e-services that include e-ID. XAdES is the prevalent format of electronic signatures, though information on this could only be found in the case of Denmark and Estonia's e-service. Others provided no information.

All e-services in this category use web forms in the browser as the standard interface for letting users fill in and send out data. Forms are usually needed for users to fill out and edit their data during registration or to make changes to their user profile. The e-services in this category mostly all allow some form of uploading attachments – though with some e-services it was impossible to directly prove this. Only Denmark and Sweden's e-service provided information on attaching enclosures, grades, test results etc. Access would be required to most services to give a complete answer to this question.

Only in the case of Denmark's e-service could clear information be found on document formats. Information on Sweden's e-service mentions .pdf, but only in the context of

[32] http://www.ucas.com/sites/default/files/corporate-strategy-2010-2015.pdf (1.7.2014.)

receiving acceptance letters, not upload. Other countries provided no information and access would be required to determine the exact formats for uploading documents.

Very little information was found on the technologies used to develop the e-services in this category. Germany's e-service is the only service that mentioned using the open-source software Piwik, used for advanced statistical analysis of visitor access. Other than that, no other information was available.

The researched e-services in this category all use web forms in the browser to provide their services. None of the e-services in this category showed any limitations to access regarding the channels through which they are available. The e-services are available on web browsers regardless of the channel, be it a PC, smartphone, tablet or any other channel through which access to the Internet can be established.

In the case of Croatia's e-service, it is hosted within the Croatian Academic and Research Network headquarters. In Germany's case, the service in this category is produced and maintained by SfH, which falls under German Federal public law so it is within the same interest sphere. UCAS in the UK hosts its service, while Lithuania and Estonia only hint to their e-services being hosted within the responsible institution – but provide no concrete information. No information was available for Denmark and Sweden's e-service.

Only Croatia's e-service provided information on the hosting institution's certificates, as CARNet also provides the certificates in question. In the case of the UK, ISO 27001 and the CCA Standard is mentioned. Other countries provided not information for their e-services.[33] As is the case with most e-services, there was no mention of the Cloud with the services in this category.

5. Storage and long-term content availability

The only countries that provided information on retention periods for the data in their e-services are Denmark, Germany and the UK. In Denmark, the retention period is one year for all telephone and internet data. In the case of Germany, the retention period is one year after technical conciliation, while in the case of approval or authorization of a service offer the retention period is five years. In the UK, however, the retention period for student's data is during the relationship with the University + 3 years. No information on retention periods for data could be found in other countries.

The laws and regulations for retention periods are only mentioned in the case of Denmark and the UK. In Denmark, the Danish data retention law was passed by parliament in June 2002, so there is no direct reference to the data retention directive. The specific rules were delayed until September 2006, with effect from 15 September 2007. In the UK, this is

[33] http://www.ucas.com/about-us/customer-service/quality-standards-and-awards (1.7.2014.)

governed by the Student Records Retention Policy.[34] The disposal of the data after the retention period expires is only defined in the case of Germany and the UK. In Germany the data is deleted, while in the UK the data is "destroyed confidentially". No other countries provided information for the disposal of data at the end of the retention period.

No more detailed answers were found about the way data are handled after the retention period expires. The exception may be Germany's e-service, where user accounts are deleted after the retention period of 10 months without use expires. As a result, no information was found on long-term preservation formats, methods of materialization or any other details regarding data retention. It is clear that some responsible institutions did not take into account that these questions may be asked by the users and that providing answers to such questions strengthens trust and users' willingness to use the service.

After analysing the e-services in this category, only Croatia, Germany and UK's e-services led to understand that the data received are indeed stored in the responsible institutions' respective information systems. In the case of Estonia's e-service this is probable, but not certain, while e-services in Denmark, Lithuania and Sweden provided no direct answer for this question. No concrete information was found on the certificates guaranteeing security of the stored data, though the certificates are most probably present in most cases. In the case of UK's e-service, ISO 27001 and the CCA Standard are mentioned. There was no information on the use of the Cloud in any of the researched countries.

6. System operation transparency

The only cases where there were no apparent policies on the e-service websites were Croatia and Sweden's e-service. Other countries' e-services provided at least some form of privacy policy, public procurement rules, terms of use etc.

Regarding assurance that users' data will be used only for the stated purpose, Estonia's e-service details this in their Terms of Use/Privacy Policy.[35] Germany's e-service uses Piwik, an open-source application for statistical analysis, which users can disable, and UK's e-service provides detailed information on cookies used on the site and ensures that the site doesn't collect statistical data. Lithuania's e-service doesn't provide any technological measures, though it does assure the users their data is only being used for the defined purpose. No data is available for e-services in Croatia, Denmark and Sweden. No information could be found on whether or not employees are required to sign a non-disclosure agreement with any of the researched e-services in this category.

It was reasonable to expect that users can access, view and edit their data in most e-services of this category. However, in the case of e-services in Lithuania and Estonia, the ability of correcting and updating the users' data may not be available due to the nature of the

[34] https://www.ljmu.ac.uk/administration/administration_docs/Student_Records_Retention_Template_.pdf (1.7.2014.)
[35] https://www.sais.ee/avalik/privaatsus_et.html (1.7.2014.)

services. Access is required to truly determine whether or not this is truly possible. In most of the e-services in this category the users can actively monitor the status of their applications. In the case of Lithuania, Estonia and Sweden, however, this is apparently not possible. Access to these e-services is required to fully determine this, however.

C11 Announcement of moving (change of address)

1. Basic service information

The highest authority for e-services in this category is, in most cases, the local government. The exception here is Sweden, where the Postal Agency is authorised for the e-service. The change of address is announced to the Postal Agency, upon which the address is changed and the document is sent back to the user for signing. After that, it is sent back to the Postal Agency. The new address is then processed by the Swedish Tax Agency and forwarded to the Swedish Social Insurance Administration, the Local Council Administrations etc. In Croatia and Germany documents can be downloaded from the web site, while in the UK the service is not relevant as it is not necessary to notify the authorities on the change of address. No access could be gained to Estonia's or Belgium's e-service in this category, however, a user manual was found for Belgium's e-service with detailed information on using of the service.

The analysed and implemented e-services in this category are at a high Maturity level. Belgium's e-service provided only a user manual which led to believe the service is at Maturity level 3, though it is possible that it is in fact Maturity level 4. No information could be found on the services in this category being connected to other governmental e-services or on the comparison of official and actual development of the e-services.

The analysed e-services in this category appear to have no limitation to their respective work schedules.

2. Users

Little information was found on whether or not the use of the services in this category is mandatory. The only available information was that in Belgium it is still possible to notify the change of address in paper form. The only category of users for services in this category are citizens, however, no information could be found on numbers of users per user group, the percentage of users who use the service electronically, or on the prevalent age groups of users using the service.

All e-services appear to be adapted for users with disabilities only as much as the browser allows it, with no separate aids added to the services' websites. Regarding users' satisfaction, only Denmark's e-service provided some information with 93% of users being satisfied with the service.

3. Business optimisation

No information was found for the group of questions regarding business optimisation for any of the analysed e-services in this category.

4. Technological solutions

Regarding type of authentication, Denmark's e-service uses NemID – a common solution for Denmark's government websites. All citizens in Denmark who are over 15 and have a CPR-Number are eligible for a NemID. An ID card is used for using the e-service in Belgium, while in Lithuania users can enter the service by using a bank number, a Smart Card or an ID Card.

Information on the encryption of the communication between the server and client station could only be found in the case of Lithuania's e-service, where the e-service is encrypted with the SSL/HTTPS protocol. The assumption is that this encryption is also present with other analysed e-services in this category, though it may not be immediately apparent.

All analysed e-services in this category use a form of e-ID, however only the e-service in Belgium provided information on the format of electronic signatures used (XAdES) and the use of digital certificates. All services in this category use web forms as means for users filling in and sending out data, though there was no information on the use of attachments.

The e-service in Lithuania uses open-source technologies, while the service in Belgium and Denmark provided no information on the use of open-source vs commercial technologies. All analysed e-services in this category use a web browser on the client side and are available through any channel that allows access to the internet. No information was available on service hosting or the use of the Cloud.

5. Storage and long-term content availability

No information was found for the group of questions regarding storage and long-term content availability for any of the analysed e-services in this category.

6. System operation transparency

No information was found for questions regarding a defined service use policy, technological measures guaranteeing users that their data will only be used for the defined purpose, or on the employees having to sign non-disclosure agreements. However, users can access and view, correct or update their data and monitor the status of their applications in all e-services in this category.

C12 Health related services (interactive advice on the availability of services in different hospitals; appointments for hospitals)

1. Basic service information

In Croatia there is still no electronic health records service implemented at a national level, although just recently (in May of 2014) a pilot project of using an m-EHR was introduced in one of the largest hospitals in Zagreb, Croatia. In this project, 50 doctors got a mobile phone and an access to an application which allowed them to access all of their medical patients' data 24/7 and to contact the medical personnel to give them instructions on how to treat a patient while they are not on duty, which is of great use in cases of emergency. Doctors were extremely satisfied and 82% of them found the project to be useful. Other than that, a lot of the doctors used the application outside of their working hours. This raises some questions about the security of this system. On the other hand, in order to protect health data of patients, the data is stored on a protected server of the hospital and not directly on the mobile device.

The highest authority for all analysed e-services in this category is the Central Government. The researched services were all implemented between 2003 (Belgium, Denmark) and 2014 (Croatia). Most of the services were estimated to be at Maturity level 3, with Estonia treading half-way into level 4 – by using their access portal patients can also download documents, update demographic data, book appointments for health care services and review the health record usage logs.

Information on connection to other governmental services was mostly not available. A possible reason for this is that these particular services are not connected to any other governmental services because of the sensitivity of data which should not be available to anyone outside of the healthcare sector or, in particular, the patient's doctor. Information was available only for Sweden's e-service, where the service is connected with other health-related services.

Little information is available on the comparison of official and actual development of the e-services in this category. Information was available only for UK's e-service, where it states that there is an obligation for GP's to open up access to records by 2015, since a very small percentage of general practitioners actually allows patients online access. There appear to be no limitations to the working schedule of the analysed e-services in this category. It is hard to estimate if the services do what they are described to do due to the impossibility of access without an e-ID, username, password etc. However, it can be argued that a high percentage of users of a service (e.g. electronic health records are now used by virtually all general practitioners in Denmark (i.e. 100% penetration), approximately 74% by full time specialists and all pharmacies (i.e. 100% penetration)) can indicate that the services are implemented well and that they do what they are described to.

2. Users

Regarding mandatory use, no information was available for e-services in Denmark, Lithuania or Sweden. In Belgium, Croatia and the UK the service is not mandatory and for Germany, which has not yet implemented the service, it is stated that once the service is implemented it will also not be mandatory for citizens. Only in Estonia it is stated that the health care service providers are obligated to use the EHR and to forward medical data to the EHR.

There are 2 different groups of users for this service: healthcare providers and citizens, although citizens do not usually use the same interface for accessing the medical data. In Croatia citizens can't access their data.

Regarding the number of users per group, this information was mostly not available. Information is available for Estonia where a high percentage of users is noticeable, especially among healthcare providers (which is a result of the service being mandatory for that group of users). Considering that the service is not mandatory for citizens, 47% penetration (in 2011) in this category of users can be considered a relatively high percentage. In Croatia the pilot project of using m-EHR was introduced in one hospital where 50 doctors were involved. Regarding the percentage of users who use the service electronically - there is little information for most countries' e-services. Information on the percentage of healthcare providers that use EHR can be found for Denmark (74%-100%) and for Estonia (more than 95%). There is also information on the percentage of citizens that use EHR in Estonia (47%) (percentages for Estonia are valid for 2011 and for Denmark for 2010). Although the information about the service being mandatory for a certain group of users in Denmark is not available, the high percentage of penetration could indicate that the service is actually mandatory for healthcare providers. The percentage of citizens using this service in Estonia is relatively high (47%) but they point out a slow uptake in numbers of citizens visiting the portal through which they view their medical data (in the first five months the portal was visited by 1% of the Estonian population). The reason for this lies in the poor promotion of the access. There has not yet been any publicity released directly by the government on how to use the portal. Rather, it has been doctors who have been informing their patients. There was no information on prevalent age groups of users using the services.

Adaptation of the services for users with disabilities is not explicitly stated except for Sweden, where the service is adapted for users with hearing disabilities. Users can download a program called Browsealoud that reads the content of the site to the user. Other than that, users can rely on their web browser's options and enhancements.

Concrete information on users' satisfaction is available only for e-services Sweden and Croatia. In one of the surveys in Sweden it is stated that healthcare providers (healthcare staff of the municipality of Örebro) are mostly satisfied with the service (9 out of 10) and 60% of them find it useful. In Croatia 82% of users of the m-EHR found it to be useful. For

Estonia there was no specific information, but it has been pointed out that by using the service the patients are better informed – resulting in higher compliance of patients and in higher patient satisfaction. The doctors apparently find the service to be very successful, especially because it allows them to access health related data in a quicker and easier way. They can access them outside of their working hours (e.g. in Croatia), which gives them a better overview of the patients' medical conditions.

3. Business optimisation

Regarding positive financial indicators, information is available only for Estonia's e-service, where in one research it is stated that that the estimated annual net benefit would be realised in 2010. From then on, the annual benefit would be even more substantial and increase every year, showing a strong and sustainable positive effect. The period of increasing costs and non-existing benefits up to 2010 can be explained through the need for a large initial investment and the necessary implementation activities of the applications. This period also included intense planning and development, which manifested itself in the high annual costs in the period up to 2008 (note that the service was officially implemented in 2008). From 2010 onwards the annual costs attained stability.

On the topic of a decrease in time required to process user applications, information was available only for Denmark, Estonia and the UK, where only for Denmark and UK was there some concrete data on a decrease in time to process user applications. It is important to note that, in this context, one cannot discuss the decrease in time for processing applications. It is, rather, more appropriate to talk about how using the EHR has decreased the time of dealing with health records in comparison to paper ones, thus affecting the efficiency of healthcare providers. In Denmark the use of EMRs has greatly increased efficiency, saving healthcare providers 50 minutes per day on average through reduced paperwork and faster communication. In work terms, this allows them to see 10% more patients. According to one research in the UK – if 30% of patients used it at least twice a year, a practice with 10,000 patients would save 4,680 doctor appointments and 7,950 telephone calls per year, which again results in greater efficiency. For Estonia's e-service information can be found on general benefits of using the service, one of which is decreased administrative bureaucracy for doctors – resulting in more time for dealing with patients. No information was found on the effect on work processes in terms of the required number of workers for any of the analysed e-services in this category.

Plans for future development can be generally categorised into several groups: 1) technical improvements (harmonisation of EHR standards in Belgium, development of an interconnected EHR system in Denmark and UK, development of a national, cross-sectoral e-ID solution in Sweden), 2) data management improvements (an enhancement of the quality and accuracy of the patient data in the EHR systems in Belgium, improved functionalities for

better personal health management in Estonia) and 3) education of healthcare providers (in Belgium).

4. Technological solutions

Most of the countries use Smart Cards or e-ID Cards, namely Belgium, Croatia, Denmark, Lithuania, Estonia, Sweden and, once their e-service is implemented, Germany. Only in the UK is a username and password used. Information could also be found on the registration of healthcare professionals – in the case of Denmark they are registered in a central national register which is available online and which is maintained by the National Board of Health. In Lithuania they are registered at the Lithuanian Ministry of Health.

Information about encryption is found for e-services in Belgium and Sweden, while for Germany plans for the future implementation can be found. In Belgium and Sweden the communication between the server and client station is encrypted, but the information the use of SSL could be found only with Sweden's e-service. The availability of this information could be important for users in order to ensure more trust in the service from the users' perspective.

The only country in this category that does not appear to use e-ID is the UK. Regarding digital certificates, information was found that Denmark and Estonia use digital certificates. Regarding formats of electronic signatures, Estonia's e-service was the only one to provide information that XAdES is used. Other countries provided no information.

It is unclear exactly how users fill in and send out data or if attachments are sent. Considering the category, it is logical to assume that web forms are used along with attachments in most cases. However, this could not be determined without access, and neither could information on predetermined types of document formats. The information on technologies used to develop the services in terms of open-source versus commercial technology was available only for Sweden which uses open-source software solutions.

All e-services in this category are web applications. In almost all countries citizens can access their e-health record by using any device with an access to the internet. This information was not available for Lithuania, due to difficulties accessing the service through the web.

Information on hosting was not available. This is important information for citizens, considering the fact that health records contain important and sensitive information. Users would find it useful to know if the service is hosted within its responsible institution. Information on used certificates was only available for Belgium and the UK. In Belgium they use an eHealth certificate and in UK they use ISO 27001 and ISO 9001 – important information for the user in order to assure trustworthiness in the service.

Information on the use of the Cloud was not available. This is to be expected, considering that this type of service (containing very sensitive data) should not find the use of Cloud appropriate due to many existing security issues with the Cloud.

5. Storage and long-term content availability

The information on data retention is available for the e-service in Sweden, where the Stockholm County Council Archives had decided that electronic patient medical records would be kept indefinitely. In the UK records should not ordinarily be kept for longer than 30 years. The retention period is most probably defined by a certain regulation/law in all of the countries, though no exact information was found at this point of the research.

After the retention period expires, in the UK the data is destroyed under confidential conditions. This information is important for the users considering the importance and sensitivity of health-related data. No information was found on this topic for other countries' e-services in this category.

No information was found on preferred long-term preservation formats, materialisation of data, long-term preservation standards or the use of an electronic archive as an additional service. Regarding data storage, in Denmark's case the data is stored in a national database and can be accessed by all hospitals. On the other hand, in Estonia the national database is not centralised. It actually retrieves data as needed from various providers, who may be using different systems, and presents it in a standard format. Estonia uses a countrywide data exchange platform, X-Road, which adopts a principle of using one integral set of user interfaces for organising communication with databases. Regarding required certificates, in Denmark all Danish public institutions have to comply with the Danish Information Security Management System, which is built around the ISO 27001 international standard. In the UK, the standard is ISO 27001 and ISO 9001. This information could also improve the trustworthiness of a service.

Regarding service use policies, information was available for the UK where it is stated that a person should sign a consent form to show that they understands what having access to health records entails. No information, on the other hand, was available on proclaimed technological measures guaranteeing the users that their data are only used for the defined purpose.

6. System operation transparency

Information on employees having to sign a non-disclosure agreement is available only for the UK where security expectations may be described within any combinations of contracts of employment, consultancy or service contract, honorary contracts, professional codes of practice etc. In the UK all individuals who work within, or under contract to, an NHS

organisation have a general responsibility for the security of information that they create or use in the performance of their duties. For almost all countries information was found that patients can access and view their data. In Estonia, an electronic patient record is automatically created if the citizen does not object to it. Thereby, patients have full access, though read-only, to their records. Patients can, however, be denied access for a period of a maximum of six months when the healthcare provider considers this necessary to protect the life and the health of the patient. On the other hand, healthcare providers automatically have access to personal data in the Health Information System for the conclusion and performance of their care; this is unless the patient has denied access to them. Furthermore, the patient has the right to request the healthcare provider to apply the access restrictions immediately. The same rules apply to emergency situations. In Sweden, patients can block certain data from being shared (with an exception in emergency cases or cases where the processing of the data is urgent).

Information on the users' ability to correct or update their data is available for Belgium, Estonia, Sweden and the UK. In Belgium, citizens can maintain and update data by adding information about problems that occurred when taking a certain drug, if they follow a homeopathic course of treatment, etc. In Estonia, patients are not entitled to alter the data but the Patient's Portal enables patients and their representatives to browse their health records, download documents, submit consent, update demographic data, book appointments for health care services and review the health record usage logs. In the UK, citizens cannot change anything that has been added to their records by a health or social care professional, but if they notice a mistake they can contact their record provider to correct it. In most of the countries users can monitor their health record in the form of audit trails (it is recorded when, how, and why the data was used which enables citizens to monitor who has viewed their health data). Monitoring of health records can also be accomplished through the right to set access restrictions to documents, cases of illness, and to all of their information in the e-health record. In the UK, for example, if any organisation (employer or an insurance company) asks to see information in somebody's health record, that person has to first agree to this in writing. Users can refuse to give access to their records, unless the law requires them to.

GOVERNMENTAL E-SERVICES FOR BUSINESSES

B01 Social contributions for employees

1. Basic service information

All analysed e-services in this category are under the Central Government's highest authority. Other than that, all services are generally under the jurisdiction of Social Insurance Agencies or Tax and Customs Boards. The start of service implementation was in 2000 in Estonia, 2006 in Croatia and 2008 in Lithuania. No information on the start of service implementation/development was available for other countries' e-services in this category.

All researched e-services in this category show the Maturity level of 3, with the exception of Estonia, where it is 4. Regarding connection to other governmental e-services, with Lithuania's e-service special attention is paid to electronic data exchanges between the Fund and other institutions and organisations. Agreements have been signed and automatic data exchanges have been organised with information systems of more than 150 institutions and organisations in the country.[36] Information was unavailable for other countries' e-services. Furthermore, no information was found on the comparison of official and actual development of the e-services.

The e-services in this category all appear to have no restrictions to their working schedules.

2. Users

The e-services in this category are mandatory for use in Belgium and Croatia for taxpayers with more than three employees. Regarding groups of users, only Croatia's e-service provided some information. There are two types of users: institute employees and personnel department employees. No information was found on how many users there are per user group.

Regarding the percentage of users who use the service electronically, only Belgium's e-service provided some information - the e-service is used by 78% of small companies, 93% of medium companies and 98% of large companies. The prevalent age group that uses the services is estimated to 18-65, which is the average age span of employed persons.

The e-services in this category do not appear to be specially adapted for users with disabilities. There was also almost no information on users' satisfaction.

[36] http://www.sodra.lt/get.php?f.3962

3. Business optimisation

Belgium is the only country that provided concrete information on positive financial indicators for their e-service in this category - Dimona has improved the Belgian government's ability to verify the payment of unemployment benefits. In 2006, RVA inspectors discovered 15,120 dossiers with irregularities - amounting to about €12.96 million in unlawfully received unemployment benefits.

Regarding a decrease in time required to process user applications, only Croatia's e-service provided information that the deadline for submission of applications on pension insurance is now 24 hours (the previous deadline being 7 days).[37]

No information was found on how the e-services in this category affected the organisation of work processes in their respective responsible organisations. The only plan for major upgrades or expansions of the services was found in Croatia, where the e-Pension service should be connected with the e-Tax service.[38]

4. Technological solutions

There are two types of authentication present in the analysed e-services in this category – e-ID/digital certificate and username/password. The communication between the server and client station in the case of all e-services in this category is SSL/HTTPS, with the second channel being EDI-based in the UK. All analysed service either use or have the option to use e-ID. All analysed e-services in this category use electronic signatures, except Estonia. Regarding information on the used formats of electronic signatures – XAdES is used in Lithuania, XMLdsig in Sweden and PKCS#7 is used in Croatia.

In all cases, users fill in and send out data through a web form. An electronic form is used in Croatia and Germany, where Germany published all electronic forms with detailed instructions on how to use them. The option to send out attachments is available in Belgium, Croatia and the UK's e-service. Regarding available information on predetermined types of document formats for sending out data – .pdf is used in Croatia and Germany.

Information on the use of open-source vs commercial technologies to develop and implement the e-services was available only for Croatia, where open-source technologies were used (Linux OS, open-source web server and database, Java, PHP).

All e-services in this category are web applications, while Germany and the UK also have a desktop application for their e-service. The services based on the web are available on any device with access to the internet.

[37] http://www.mirovinsko.hr/default.aspx?id=4157
[38] http://www.netokracija.com/lana-hzmo-open-source-63581

Little information was available on hosting. In Croatia, the e-service is not hosted within its responsible institution. Furthermore, the Cloud appears to have extensive use in Croatia.[39]

5. Storage and long-term content availability

Regarding information on data retention, in Croatia data is kept in the system for 30 years. It is regulated by the Law on Pension Insurance. The data is deleted after the retention period expires.[40][41]

Lithuania's e-service was the only one to provide information on long-term preservation formats and long-term preservation standards, those being PDF/A, and XAdES-A. Lithuania uses the EAIS system (Electronic Archival Information Service), which is the central electronic archive system.

In cases where information could be found, the data is stored outside the responsible institutions and the Data centres are usually located within the same country as the responsible institutions; the Cloud server for Croatia is located within the country[42], EAIS is within Lithuania, DEC is within Estonia and rvArchiv is within Germany.

6. System operation transparency

A defined service use policy was found with e-services in Belgium, Croatia, Germany and the UK. No information was found on guarantees that the users' data will only be used for the defined purpose or the requirement that employees sign a non-disclosure agreement.

Users can access and view their data throughout all services in this category. Most services also allow the correction or update of users' data and the ability to monitor the status of their application.

[39] Mreža, IT magazine, No. 2., p. 51, February 2014
[40] http://www.zakon.hr/z/91/Zakon-o-mirovinskom-osiguranju, Article 114.
[41] http://www.zakon.hr/z/91/Zakon-o-mirovinskom-osiguranju, Article 115.
[42] Mreža, IT magazine, No. 2., p. 51, February 2014.

B02 Corporate tax: declaration, notification

See ***C01 Income taxes: declaration, notification of assessment***

B03 VAT: declaration, notification

See ***C01 Income taxes: declaration, notification of assessment***

B04 Registration of a new company

1. Basic service information

All of the e-services in this category share the Central Government as the institution that has authority over them. The start of implementation date was available for only 3 e-services in this category. Belgium launched its e-service in 2006, Estonia in 2007. While the official date for Sweden's start of e-service implementation is 2004, it was initially only a starting point for people looking for public sector information and services and later on it matured into the e-service that it is today.

Belgium and Croatia both have e-services that are only available to notaries and not the general public. For this reason, research on these e-services was not conducted. Germany does not have an e-service in this category at all – the local courts handle the registration of a new company. Denmark, Estonia and Sweden's e-services all have the Maturity level of 4, the highest possible in this category since the e-service cannot reiterate itself – no further action is needed once a company is registered. Lithuania's e-service has the Maturity level of 2 and only has information and forms available for download on the site. Therefore, it has not been included in this research.

Denmark, Sweden and UK's e-services in this category are connected to other governmental services to a certain extent. Denmark and UK's e-services both feature links to e-services for Corporate tax and Vat declaration and only a single login is necessary. Sweden's e-service is connected with the Swedish Companies Registration House. Estonia's e-service is not connected with any other governmental services.

The official comparison of the development of the e-service was available only in Estonia and Sweden. Estonia's e-service's official info proclaims that while the registration takes only a few of hours, and that registering a company through the notary will take between 2 and 3 business days. Sweden's e-service's official information only refers to the 24-hour Public Administration Strategy which states that the country's e-services should be available 24 hours a day.

No e-service in this category has any limitations to its work schedule. The only minor exception here is Denmark's e-service, where there is information available suggesting that it is only available during workdays.

2. Users

The use of this category of e-services is mandatory in Denmark, where it is the only way to register a company. In Estonia and the UK the use of the e-service is not mandatory but it significantly reduces the time necessary to register a company. The data for mandatory use of the e-service was not available for Sweden. No data was available when researching

whether there are different user groups in e-services of this category. Since there was no available data for user groups there was also no data available on the demographics of user groups.

Of the e-services analysed, only the Estonian e-service was directly adapted for users with disabilities. While there was no available data on the UK and Denmark's e-service, Sweden's e-service states that it is not adapted. However, none of the services use Flash so they should be readable with screen readers for the visually impaired. There was also no available data for any of the e-services regarding users' satisfaction.

3. Business optimisation

No data was available for positive financial indicators of the analysed e-services. An exception here would be Sweden, which states that more significant political steering and financial solution are necessary for the full realisation of its e-Government. There was no available data that would suggest that there has been a decrease in time necessary to process user applications. Although, all of the e-services take significantly less time to register a company than their manual counterparts. There is no data available on the effect of the e-service on the organization of work processes in the responsible institution's organization, nor is there available information on plans for upgrade or expansion of the analysed e-services in this category.

4. Technological solutions

All of the e-services use some sort of e-ID. In Denmark users use their NemID that is used to access all the e-services in the country, while in Estonia users can log into the service with their ID card or mobile ID and a digital signature that they are assigned. Sweden's e-service uses BankID or Telia while in the UK users can log into the service using a digital certificate that they were previously assigned, or with a User ID issued by the National Gateway, along with a password of their own choosing. The communication between the server and client station is encrypted with the SSL protocol in the e-service in Denmark and the UK, while in Estonia and Sweden the communication between the server and client station is encrypted with the TLS protocol.

Denmark's e-service uses NemID, Estonia's uses its Mobile ID, Sweden has BankID and Telia while the UK uses a User ID issued by The National Gateway. All of the e-services, except Sweden where there was no data available, use digital certificates. The service in Sweden is not available in English and requires registration for insight into such information.

The exact format of the digital certificates used was not available for any of the e-services analysed. The only available information was that digital certificates used for Denmark's e-service were issued by TDC. The e-service in Sweden is not available in English. Users fill in

and send out data in a web form in the e-services in Denmark and the UK. There was no data available for Estonia and Sweden. There was no available data on the use of attachments. E-services in Sweden and Estonia require registration, so it was not possible to find the answer for this question.

There was no information whatsoever on the kinds of technologies used for development of the e-services in this category, except in Denmark where an emphasis is put on using open-source software where possible, but there was no data available for confirmation. In the UK the service is implemented thorough open-source, though underlying technologies remain unknown.

All analysed e-services of this category use a web browser as means of accessing the service and are available for access on any device with access to the internet. No information was found on service hosting or the use of the Cloud.

5. Storage and long-term content availability

In Denmark the retention period for the data in the system is one year while in the UK it is 90 days, after which all data is deleted. There was no information on retention periods for e-services in Sweden and Estonia. The retention period in Denmark is defined by The Act on Processing of Personal Data, but in other countries this information is not available. In Denmark and in the UK data are deleted after the retention period expires, while there was no available information for Estonia and Sweden.

No information could be found for the remaining questions for any of the e-services in this category.

6. System operation transparency

Service use policies were found with all analysed e-services of this category. There was no available information confirming the users that their data are only used for the defined purpose for any of the analysed e-services in this category. Also, there is no information that shows that the employees are required to sign a non-disclosure agreement.

According to available information, users can access and view their data in Denmark's e-service, as well as in the UK, but within 90 days of registering. In Estonia and Sweden's case this information was not available because the e-services require registration for full access.

According to available information users can correct or update their data in Denmark's e-service, while in the UK this is not possible, though users can monitor the status of their application in both cases. In Estonia and Sweden's case this information is not available because, as mentioned before, these e-services require registration.

B05 Submission of data to statistical offices

1. Basic service information

Examples of cooperation and exchange of data between various governmental organisations involved in collecting data needed for statistical surveys are evident (Croatia, Denmark, Germany, UK). In these countries services for collecting data for some statistical surveys are not necessarily authorised and/or hosted by a statistical office in the country. Examples are HM Revenue & Customs Intrastat survey in the UK and Intrastat in Croatia, which have established data exchange between the Customs agency and the statistical office in the country – in an effort to simplify data reporting for businesses. Also, the intention is to enable enterprises to submit data to one place, where the same data should be used in different governmental organizations. This is achieved by data exchange. In Germany there is an example of established data exchange between the Central Database Network and local statistical offices by using the infrastructure built for that purpose. There are also examples of countries where statistical offices are authorized for the service of collecting data from enterprises (Belgium, Croatia, Denmark, Lithuania, Estonia, Sweden and Germany) as well as all other functions involved in statistical surveys.

Countries who had the earliest start with G2B services of official statistics for collecting data from enterprises are Estonia, Denmark and Germany. Development of eSTAT in Estonia started in 2003, but the system is in a continuously evolving process. In Denmark, IDEP (Intrastat Data Entry Package) has been available since 1993 as an application that can be installed (initially from a floppy disc, later from CD and now via the internet) on the end-user's PC. In 2005 the statistical Offices of the Federation and the federal states jointly launched a project called eSTATISTIK.core, an automated data collection system in Germany, to relieve enterprises from statistical response burden. In the UK, HMRC has published overseas trade statistics, based on its customs activities, for over 300 years. Currently, the statistics are compiled using data collected through the monthly Intrastat survey. However, there were difficulties finding the exact year in which G2B service for Intrastat was established in the UK. Other countries have also participated in establishing G2B services for statistical reporting in their country and are improving their systems constantly to meet all requirements of modern governmental systems for collecting data from businesses.

Almost all services have a Maturity level of 5, providing a more or less automated service and delivery of data to NSO, using standardized file formats. The exceptions are the eUpitnik e-service in Croatia and eSTAT in Estonia which are level 4 services, providing for manual input of data in e-questionnaire using the internet. Other countries enable direct sending of data from accounting or ERP systems' datasets to a central database (uploading data) for the surveys of NSO.

Available services are in some cases connected to other institutions in researched countries, whether by data exchange or by same standard formats of data used (Belgium, Croatia –

G2B service, Denmark, Estonia, Sweden, Germany and UK). Data exchange facilitates simpler collection of data from enterprises (data are collected at one place and then exchanged where needed, e.g. Denmark, Croatia, Germany, UK). There is a lot of effort involved in using administrative registers in some of the observed countries (Denmark, Lithuania, Estonia and Sweden).

All of the observed e-services in this category are in production phases and they are being regularly used by enterprises to submit monthly data for statistical purposes. Some of the services were rewarded for their contribution to lessening the administrative burden on enterprises (Germany) and as best innovations (Estonia). For others (Croatia and the UK) there is accessible information about compliance to the plans and strategies set during the development phases of the services.

Most of the limitations of the services are working hours of involved technical employees or involved statistical methodologists at responsible organizations (usually working hours are 8:00-17:00). Some of the services have limited time-spans for data reporting for some statistical survey or periods when a service is unavailable because of data backup, restoring and other similar reasons. Furthermore, in Denmark, there is a notification if the server is overloaded with transactions. In these cases the user is informed about the next available period for job run to start.

2. Users

In all of the observed countries reporting units have a legal obligation to provide data for statistical surveys according to the Official Statistics Act in their country. They are responsible for the timeliness and accuracy of data. In Belgium, the general obligation of enterprises to reply is set by article 22 of the General Statistical Law. Enterprises that do not respond after several reminders can be fined up to €10,000 and are included again in the survey sample for the next year. In Germany, some 55% of the obligations are based on federal law. Another ~20% of obligations are the result of international or EU law, but have been broadened during their translation into national law (so-called “gold-plating”, e.g., supplementary specification of intervals for the transmission of information, of certain addresses and data requirements). Just around 25% of the information obligations derive from EU legal norms (as a rule, EU Regulations) or other international legal sources. In Denmark, in order to lessen the administrative burden on enterprises, there are examples where enterprises employing less than 10 persons are exempted from reporting (industrial commodities). Similarly, the smallest enterprises are exempted from reporting to Intrastat, as the only enterprises with annual arrivals of more than approx. €0.3 million, or dispatches of more than approx. €0.70 million are obliged to report. In addition, Statistics Denmark has as a “house policy” in which enterprises with less than 10 employees may only participate, as a maximum, in three statistics during one year. In the UK and other countries enterprises are responsible for the supply of accurate and complete data by the due date. Persistently

returning inaccurate or belated data may lead to incurring penalties. If they fail to submit their Intrastat Supplementary Declarations by their due date, or if they send data that is incomplete or inaccurate, they may be committing a criminal offence which could result in proceedings in the Magistrate's Court.

In Belgium, enterprises can submit data in paper form (2008). All enterprises with 50 employees or more are surveyed exhaustively. Other enterprises (SMEs) are included in a rotating sample. This method guarantees SMEs a minimal exemption of two years and spreads the burden optimally over all SMEs.

In Croatia, eUpitnik is not entirely mandatory – enterprises can submit data in paper form. Based on NACE – Statistical Classification of economic activities in the European Community – enterprises are involved in statistical surveys concerned with their NACE category. It is strongly recommended for enterprises to use the electronic means of submitting data for NSI.

In Croatia, the G2B service is mandatory, there is no other way of reporting data for Intrastat. There are 3 conditions for survey units obligated to report data for an Intrastat survey:

1. A business entity is liable for VAT.
2. A business entity is trading goods with EU member countries
3. Legal persons obligated to report for Intrastat survey are enterprises whose annual trade of goods with EU countries exceeds the threshold (import or export).

In Denmark, enterprises can submit data in paper form. Companies with less than five employees are excluded. For those with 5–49 employees, data are only collected from 10 to 50% of enterprises, while all companies with more than 50 employees must participate. 20% of all active enterprises report data in a given year within the non-financial sector.

In Lithuania, enterprises can submit data in paper form. The respondent considered to be included in the statistical sample for a certain statistical survey is responsible for providing the necessary report, i.e. data, for a certain fiscal period.

In Estonia, enterprises can submit data in paper form. eSTAT is designed for enterprises whom Statistics Estonia has informed of their obligation to submit official statistical reports within the framework of conducting official statistical surveys. In each economic activity within each enterprise size group, data are collected only from those enterprises that have been included in the sample. Such a list of enterprises is drawn up anew for each year.

In Sweden, automated data collection with SIE files is primarily a tool for the completion of the so-called SpecRR-questionnaire that is sent to a sample of approximately 16,500 enterprises each autumn.

In Germany, eStatistik.core is mandatory for enterprises obliged to report data for a certain statistical survey covered by this system.

In Germany, the IDEV way of data transmission should be compulsory for public agencies (of the 10,500 or so information obligations identified).

In the UK, the amount of information required from an enterprise depends on whether the value of their Arrivals (purchases or imports) or Dispatches (sales or exports) exceeds the annual Intrastat exemption threshold/s. All VAT-registered businesses must show the total value of goods dispatched to other EU member states and the total arrivals of goods acquired from other EU member states. In addition, those who trade in the EU above the Intrastat exemption threshold in force during the year must also complete a monthly Supplementary Declaration (SD), etc.

All services are designed to be used by internal and external users, serving various purposes and uses. A well-made overview of possibilities provided to different user groups is presented in the Estonian case: Resulting from the functionality, eSTAT is used by different units within Statistics Estonia. Methodologists or similar specialists physically describe statistical reports by rows and columns in the system, define controls to them, link concrete questions with necessary classifications from the metadata base, etc. As, after a statistical report has been described in the system, there also exists a data entry programme for that report, the data from statistical reports received by Statistics Estonia on paper are keyed into the eSTAT-assisted digital format by the data collection unit. The same unit also follows the inflow of reports and records contacts with respondents. The subject matter statisticians mainly receive raw data from the system, but may also get reports on the inflow of statistical reports or overviews, and record contacts with respondents.

In Belgium:

1. Enterprises, Legal Units, Establishment (local unit) – provide the data
2. Regulators – collect the data
3. Analysts – use the data

In Lithuania:

1. Businesses
2. SL specialists (can create different reports)

In Estonia:

1. Internal users (methodologists, data collection unit, subject matter statisticians)
2. External users (enterprises, state and local government agencies, non-profit organisations, sole proprietors)

In Sweden:

1. Enterprises obliged to report for statistical survey
2. Administrators of the system
3. Employees of SCB in Sweden

In the UK the system for electronic submission is designed to be used by:

1. Agents
2. Traders
3. Individual branches of larger companies who submit data independently from their head offices.

Services with the largest number of users are IDEV in Germany and the system for Intrastat Electronic Submission in the UK. Other countries are in the range of 6 000 - 30 000 users. On the other hand, there was no information about the approx. number of users of the services in Croatia.

Some of the services are mandatory, which means that the only way of submitting data is electronically (Croatia-Intrastat, Sweden, Germany and Intrastat – UK). Others still accept paper submission for the surveys which are, at the same time, supported by electronic submission (Belgium, Lithuania and Estonia). For Denmark, a Strategy document for 2015 implies that almost all data should be reported digitally in Denmark by the end of the period.

Information about the age of users of observed services is not something transparently stated in the documentation or in other available sources. However, it is logical that users of electronic systems for business and accounting data submission from enterprises are over 18 years old. There was no available information concerning adaptability of the service for users with disabilities.

The most valuable contribution to raising user satisfaction is the possibility of using enterprise BMS' data import for statistical purposes (Belgium, Croatia-Intrastat, Denmark, Lithuania, Germany and UK). In Belgium, user's satisfaction is high – users wanted a simpler channel for data submission and now they use it extensively. In Croatia, users of eUpitnik are satisfied with the modernisation of statistical surveys, and this is evident in the raise of the number of users submitting data to NSI electronically (>90%). In Denmark, IDEP is available in Danish and in English, as well as all other useful information and links. In Lithuania, user's satisfaction has shown a constant increase between 2005 and 2010. The service recipients are informed about deadlines for the submission of statistical reports, acceptance status, new tasks, and various updates to the system. The system also informs users through system messages, email and/or SMS. Continuous consultations and feedback has been maintained with users to evaluate user satisfaction level. In Estonia, the Contact Centre is a part of the Data Collection Department. Respondents can call the general telephone number and send e-mails to the general e-mail address set up for questions and enquiries about any questionnaire to be submitted by economic entities irrespective of the domain (e.g. construction, trade, agriculture, wages and salaries, etc.). In Sweden, an advantage of using SIE files in the data collection is that enterprises are supported especially when filling in the specification for external costs. Information and instructions on SIE files (files for data import) worked fine. Most of the enterprises that used the SIE alternative found that file transfer made the provision of data easier. None of the respondents expressed that the data

provision was more difficult or time consuming. All asked respondents would use the SIE alternative again. Some users claimed that this was an improvement that made data provision easier. In Germany, corporate respondents using eStatistik.core will never need to manually complete questionnaires, sending the data by mail (to several statistical offices, if required) will no longer be necessary. That means that all enterprises can save time and money, when using eStatistik.core. In Germany, IDEV offers many support functions which considerably reduce the work and time required from the respondents. In the UK, HMRC has shown evidence of good practice in its user engagement which is reflected in a positive response from consulting users.

3. Business optimisation

There are evident positive financial indicators for analysed e-services in most of the countries. Some countries have shown exact amounts in investments saved, and others are aware of savings connected to less resources being used for data processing. In all cases, financial benefits relate to enterprises as well as to statistical offices.

Electronic data collection accelerates the whole process of data collection – it usually brings manual input to a minimum level, which also improves data quality. In conclusion, all of this has an impact on contributing to faster data processing and valuable reuse of collected data (in standardised format) for different purposes.

To relieve enterprises from the administrative burden involving submission of data for statistical offices, a solution had to be found that meets the demands of enterprises; on the one hand to rationalise internal and external business economic reporting (and by authorities and other users), and on the other hand to protect the quality of received data – whilst also limiting the total incurred costs. While previously an entire team was needed to ensure the input and correction of paper questionnaires, the amount of work has been reduced drastically by the success of the electronic declaration. Consequently, more than half of the staff is now assigned other tasks in many cases. In Estonia's case, however, there were some negative repercussions as well: for data checking purposes, each statistical department had to keep specialised staff for calling the respondents and specifying the data. So it happened that there was a considerable amount of second-level user support. On the other hand, the building of electronic instruments is done centrally by the Methodology Department. Due to that, a great amount of standardisation and simplification has been done.

All observed countries aim towards further developing e-services for submission of data to statistical offices. The main direction of development is towards standardisation and integration of available and developing systems, as well as organizing single-flow systems which would further simplify data collecting and exchange between offices. Statistics Estonia plans to sell their system for data collection and primary analysis of collected data to

interested organisations. All researched countries are dedicated to saving money and resources when using modern G2B services for businesses.

4. Technological solutions

Most of the countries use username and password for e-service authentication. In Croatia, G2B for Intrastat and IDEP.web in Denmark use digital certificates. Lithuania has a rich set of authentication methods which are being used in its e-service for the submission of data to statistical offices. Estonia's case is interesting, because it uses an ID card, as well as Internet Bank services for authentication of users.

Communication between the client and the server is usually encrypted. However, this information is not always transparently proclaimed and there were problems with finding exact information about protocols used in Croatia for eUpitnik and in Denmark, Lithuania and Sweden.

Estonia uses e-ID as well as mID for the e-service. Digital certificates are used for electronic signatures in Croatia (G2B service), Denmark and Estonia. For other countries, this information was not available, as well as for the formats of the electronic signatures.

In most cases, users are using an application or a web form, where they upload data from a file previously created using an application for extraction of data from corporate accounting systems or a BMS system. After that, the users fill in the remaining data that could not be filled in from the available information in the file for data upload. There can also be a possibility of electronic data interchange or manual input without automated retrieval from the file.

Attachments are uploaded using a specialised application, file upload on the form or by using electronic data interchange. Types of documents used are predetermined and the data in the documents goes through data validation and different checks.

The analysed e-services in this category use combinations of commercial and open-source software. Usually, companies have to invest in specialised applications for preparing formatted files for data submission in an automated way. Files used for data submission usually are in some open standard (.xml, .xbrl). However, many services use .csv file formats – which are commercial.

Some of the e-services require specialized applications (Croatia G2B Intrastat and eStatistik.core in Germany). Other countries provide the service through a web browser. All services are available through most devices with access to the internet. Germany has set up a private government network for data exchange, called TESTA-DOI. A similar example is the one in Estonia, where in case of government administrative registers, which are more widely used within the statistical office or from which data is taken more often, automatic

extraction of detailed personalised data takes place using X-road (national data exchange layer).

In Croatia Customs Administration is responsible for data collection for Intrastat. Collected data are afterwards transmitted to CBS, which is responsible for statistical methodology and dissemination of the results of the Intrastat survey. In the UK, data are collected within HM Revenue and Customs and afterwards transferred to the statistical office. For other countries, there was no publicly available information about residence of data and infrastructure for the service.

Among observed countries, Lithuania's statistical office has the ISO 9001:2000 standard certificate. Statistics Lithuania (2007) was awarded Quality Management System with a certification on the conformity with the requirements of the ISO 9001:2000 standard. The scope – organisation of statistical surveys, preparation and dissemination of statistical information. There was no information on use of Cloud services for any of the analysed countries' e-services in this category.

5. Storage and long-term content availability

The only information on data retention in the system could be found for the UK, where paper and electronic Intrastat records are kept for 6 years. Retention periods are defined by laws (EU or national) and are different for various statistical surveys and countries. In Croatia, there is a list concerning Intrastat survey available publicly:

European Law on Community statistics relating to the trading of goods between Member States and repealing Council Regulation:

- Regulation (EC) No 638/2004, No 222/2009, 1982/2004, 1915/2005, 91/2010, 96/2010, 1093/2013

National Legislation:

- Official Statistics Act Croatia Official Gazette, No. 103/03, 75/09, 59/12
- Annual Implementing Plan
- Programme of Statistical Activities of the Republic of Croatia for 2013-2017 (Official Gazette 69/13)

Internal Code of Practice – Rulebook from 2012 for protection of archival materials of CBS aligned to Official Statistics Act and other national and EU legislation for data concerned.

No information was found on whether or not the data is deleted after the retention period expires.

All raw data are stored in a database and are used as input for statistical surveys. Additionally, reports are usually made automatically using available data from the services in

.pdf format. Some of the available services enable users to print out paper copies of compiled statistical reports as evidence of submission. These reports are usually archived and accessible through the e-services.

Some of the services provide users with a browsing facility where users can browse through their current and archived submissions. All the information is stored in the institution's information system and is being used as input for statistical surveys.

6. System operation transparency

In the case of e-services in this category, it is common to have defined service use policies. In the case of Croatia's eUpitnik e-service, a person has to be registered in the system. Furthermore, for using G2B service in Croatia, a person has to be registered for Intrastat reporting in order to be able to authenticate themselves for using the service and has to have certificates for signing documents for a specific enterprise.

In Denmark, users are informed about the terms of use of the portal virk.dk, which considers user agreements, a personal data policy, and the use of cookies.

In Estonia, although the respondent is an enterprise, only a private person has the right to log on to eSTAT. One person (a contact person) can submit reports for several respondents (e.g. an accountant working with an accounting company) and reports of one respondent may be submitted by several persons (e.g. an accountant, personnel executive and company manager complete different reports). An official representative of an enterprise determines who can submit and amend statistical reports on the behalf of a particular enterprise. In order to enable the contact person of an enterprise to submit data via eSTAT, Statistics Estonia creates the so-called "main user" for the enterprise. The main user, in turn, has the right to create other users.

In Germany, only approved persons can download the eStatistik.core application. In the UK, there are available Terms of use for HMRC's uktradeinfo website on their own website.

To protect data confidentiality, only authorised persons have access to databases. Usually statistical offices make use of statistical disclosure control methods to assure data confidentiality. These methods involve data annonimisation and/or data masking methods. Data annonimisation usually means elimination of identifying variables from the dataset, whereas data masking methods are concerned with alteration of data (perturbations and similar) to avoid individual record recognition.

In the UK's case, the following statement stands on the Intrastat Electronic Submission webpage: "Information collected is used for internal review, to improve or customise the content and/or layout of the site, and to provide information services to the site users. It is not shared with other organisations for commercial purposes."

Employees of National Statistical Offices (NSOs) are obliged to keep data confidentiality during and after their employment at NSO and this is accompanied with signing a non-disclosure agreement. The examples of laws regulating statistical data confidentiality are:

- In Belgium, Article 15 of General Statistical Law on confidentiality
- In Croatia, Official Statistics Act Croatia Official Gazette, No. 103/03, 75/09, 59/12
- In Lithuania: The Law on Statistics of the Republic of Lithuania, Regulations of Statistics Lithuania approved by the Government of the Republic of Lithuania, Specific legislation (Government resolutions related to Statistics, etc.), Orders of institutions managing official statistics regulating data collection, processing and dissemination, EU legal acts.

Users can view their data through the service. Users can usually browse through archived and current submissions. In Croatia, users can see the Sent, Received and Archived Folders with documents. In Lithuania, on the portal, respondents will be able to view the history of submission of their statistical reports, reporting calendar, etc.

In Estonia users:

- administer users (create, change and cancel rights)
- accept or correct one's contact information
- look at all earlier statistical reports submitted to Statistics Estonia via eSTAT by a respondent

In Germany, by using eStatistik.core, users can access the Collection Network Database and import the reported data for processing or view image files of documents that have been read. The inspection of a DatML/RAW file, performed in the KonVertCenter, is recorded in a DatML/RES file. Such inspection protocols contain not only lists of unique error codes but also lists of the points in the DatML/RAW document where the errors occur.

In Germany in the IDEV form, edit checks can be carried out before data transmission to avoid queries. The specialised unit is responsible for defining the type and scope of edit checks. If, after submitting Intrastat Data, a user discovers an error or finds some of the information to be incorrect, they can provide the accurate data by using the On-line Amendment Form.

In the UK, users can see current and archived submissions.

All services, except G2B and eUpitnik, provide users with the possibility of updating, i.e. making corrections to reported data and sending them electronically. eUpitnik provides possibility to change some contact information, but for corrections to the submitted data a contact person at CBS has to be contacted and consulted.

Users can usually monitor the status of their application. In Belgium, the follow-up system contains the list of forms that an enterprise has to fill in. Next to each form is the status of the form that is to be filled in. This can be “not filled”, “partially filled” or “completed”. In

Croatia, the Intrastat G2B service response unit has to check for the status of the document after sending .xml file. The statuses can be “indefinitely”, “rejected” or “approved”. In Denmark, the import log shows the result of an import Job after it has finished. The result of any import (including older imports) can be obtained by clicking on the Success or Failure status of an item in the list of Ongoing Jobs. In Lithuania, if the report meets all the requirements it is accepted, otherwise it is rejected. The service recipients will be informed about deadlines for the submission of statistical reports, acceptance status, new tasks, and various updates to the system. The system will also inform users through system messages, email and/or SMS. For Lithuania’s system this is not a relevant issue for the service. The Data Collection Department does not validate the data they collect. They simply have to bring the data into the office. All required checks are made by the subject-matter departments. For eStatistik.core in Germany, respondents may view and download the inspection protocols compiled for their data reports. In the UK, the confirmation of receipt of submission is sent to users.

B06 Customs declaration

1. Basic service information

Information on the start of service development/implementation was available for Germany (2002), Estonia (2006), Belgium (2008), and Croatia (2011). Most of the services in this category have the highest Maturity level, except Lithuania where it is 1. Belgium, Denmark and UK's e-service have elements of level 5, but cannot be fully placed on that level. Croatia's e-service is level 4. The UK's e-service CHIEF provides:

- direct trader access to electronic processing of imports and exports - including the calculation of duties, currency and quantity conversions and the automatic clearance of consignments
- identification of goods which require documentary or physical examination making use of a highly sophisticated risk profiling system
- information for the production of the UK's external trade statistics
- a means of electronic communication between customs and business users
- validation of the accuracy of data input - CHIEF advises the users of any errors
- recording, monitoring and accounting for duties and taxes incurred by individual importers[43]

Some of the e-services in this category are connected with other governmental services, mostly with the finance departments. None of the services appear to have any limitation regarding the work schedule.

2. Users

Belgium's e-service in this category became mandatory in July 2009. In German's case, the e-service it is only partially mandatory. As stated on the e-service's website:

"Basically participation in ATLAS is voluntary. However, the following arrangements have been made by the EU Commission:

Obligation to participate in ATLAS Shipping (NCTS) in the framework of simplifications authorized consignee or consignor from 1 April 2004, see:

- Regulation (EC) no. 2787/2000 of 15 December 2000 (OJ. EC no. L 330 of 27.12.2000) and
- Regulation (EC) no. 993/2001 of 4 May 2001 (OJ. EC no. L 141, 28.05.2001)
- Obligation to make electronic filings with the training and re-export from July 1, 2009 - ATLAS-export (AES), see also:

[43] http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageOnlineServices_ShowContent&propertyType=document&featurearticle=true&id=HMCE_CL_001614 (6.6.2014.)

- Regulation (EC) no. 648/2005 of the Commission of 1 April 2005 (OJ. EC no. L 141, 28.05.2001)
- Regulation (EC) no. 1875/2006 of 18 December 2006 (OJ. EC no. L 141, 28.05.2001)
- Obligation for economic operators from 1 January 2011 for goods brought into the customs territory of the Community or outside this territory goods to the customs authorities summary input and output applications to be submitted in electronic form - ATLAS-EAS (ICS) - so that these authorities on the basis of such can perform data computerized risk analysis before the goods are brought into the customs territory of the Community or leave this area, see also:
- Regulation (EC) no. 648/2005 of the Commission of 1 April 2005 (OJ. EC no. L 117, 04.05.2005)
- Regulation (EC) no. 1875/2006 of 18 December 2006 (OJ. EC no. L 360 of 19.12.2006)
- Regulation (EC) no. 430/2010 of the Commission of 20 May 2010 (OJ. EC no. L 125, 21.05.2010)"

Belgium and Croatia's e-service have different groups of users. Croatia's e-service has one section for Croatian businesses and another for foreign traders. There was no further information on numbers of users per group, percentage of users who use the service electronically or on the prevalent age groups using the service. Only three services (in Denmark, Sweden and Germany) had their e-services directly adapted for users with disabilities. No information could be found on users' satisfaction for any of the analysed e-services in this category.

3. Business optimisation

No information could be found about financial indicators or on the increase of efficiency in terms of time and work processes. None of the e-services in this category provided any information on their future plans, except UK's e-service. They claim on their web page that there are plans for replacing CHIEF. Because of the future processes and procedure changes to European Union (EU) legislation under the Union Customs Code (UCC), the existing CHIEF service must be replaced. The new service will need to:

- identify and collect the right duties and taxes
- release goods through inter-operation with port and airport inventory systems
- allow frontier and inland freight controls within the UK to be used by the nominated agency or authority
- electronically process all the required customs declarations
- record trade and transport statistics

- accommodate the UCC changes[44]

4. Technological solutions

Most of the e-services in this category require an EORI number or ID cards. EORI stand for Economic Operators Registration and Identification. Other than EORI, most countries provide another way of authentication. In Belgium's case, an alternative to e-ID is an X.509 certificate. In Croatia, a PIN can be used for local traders. Estonia provides, as with many of its other services, the option to use an ID card, Mobil-ID, internet banks or a User ID. Sweden's e-service uses username and password as a method of authentication, while Germany uses only the EORI number. No information was found for the UK.

All of the e-services in this category have the communication between the server and client station encrypted, SSL/HTTPS being the most prevalent method. E-ID is used in Belgium, Denmark and Estonia. In this category, most e-services use digital certificates. The Croatian e-service has this very thoroughly explained in the documents available on their web site: "For the purposes of accessing the e-Customs services and the signing of documents /messages that are subject to electronic data interchange, the Customs Administration has decided to use digital certificates. In order to access the e-Customs service, the user uses the certificate issued based on the rules of the Normalized Certificate Policy (NCP+), defined in accordance with the standard of ETSI EN 319 411-3 v.1.1.1, hereinafter: normalised certificate. For electronic signing, the advanced (qualified) electronic signature is used, supported by the qualified certificate (QCP+), defined in the standard ETSI EN 319 411-2 v.1.1.1, hereinafter: qualified certificate. For the purpose of accessing and signing within these services, e-Customs users must obtain these two types of certificates as well."[45] The e-service in the UK also requires digital certificates: "National Export System (NES) - for traders to submit Export Declarations to the CHIEF system - please note that at the present time, NES XML traders must obtain a digital certificate from an approved supplier."[46]

The Danish service has two different digital certificate formats which are stated above. Belgium's e-service lists GlobalSign, Isabel and E-Trust as digital certificate providers. Germany's e-service in this category requires a "participant identification number (BIN), which replaces the handwritten signature with the electronic message exchange with Customs."[47]

The analysed e-services in this category mostly use web forms as means of filling in and sending out data. It was not possible to confirm if any of the services in this category have the option of sending out attachments with the filled in data due to login restrictions. None of the e-services in this category gave any information on this issue on their website or the few guides available.

[44] https://www.gov.uk/government/collections/customs-handling-of-import-and-export-freight-chief-replacement-programme (6.6.2014.)
[45] All documents are available on this site: http://www.carina.hr/e_carina/G2B.aspx (6.6.2014.)
[46] https://www.gov.uk/chief-trader-import-and-export-processing-system#chief-services (6.6.2014.)
[47] http://www.zoll.de/DE/Fachthemen/Zoelle/ATLAS/Voraussetzungen-Teilnahme/Allgemeines/allgemeines_node.html (6.6.2014.)

Users have predetermined documents for downloading forms, which are mostly .pdf and .doc, though, as stated before, no information could be found for the case of sending out data. Regarding open-source vs commercial technologies used to develop the service, the Croatian e-service was developed by the IT company APIS and in the UK "CHIEF runs on Fujitsu Services Super Nova platform using the proprietary VME open operating system".[48]

All e-services in this category use web browsers. UK's e-service states: "CHIEF supports both Human Computer Interface (HCI) and interface EDI traffic, with dedicated high-speed communications links to the Community System Providers (CSPs) and customs offices throughout the UK."[49] All e-services in this category are available through any device with access to the internet.

Though some information was found pointing towards most of the e-services in this category being hosted within their responsible institutions, no information was found on the required certificates or the use of Cloud and its location.

5. Storage and long-term content availability

No information whatsoever was found for any of the questions regarding storage and long-term content availability for any of the analysed e-services in this category.

6. System operation transparency

Most of the analysed e-services in this category have a defined service use policy. Regarding use of users' data, only the e-service in the UK provided some information, stating: "Sophisticated system security and resilience features have been built into the CHIEF architecture to prevent sabotage or unauthorised access and to provide effective business continuity."[50] None of the e-services provided any information on the employees having to sign a non-disclosure agreement.

Regarding the ability of users to access, view, correct or update their data, the e-service in Sweden allows users to do so, as does the e-service Belgium. Belgium's e-service has the option to correct and update data: "If after receipt of MRN, you find that the transmitted data is incorrect or incomplete or the shipment cannot reach destination: you can correct or supplement the transit document provided that it is in the proper state; or you can send a request to cancel the transit document."[51] Furthermore, Belgium and Sweden's e-services also allow users to monitor the status of their applications, as stated in the case of Belgium's

[48] http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageOnlineServices_ShowContent&propertyType=document&featurearticle=true&id=HMCE_CL_001614 (6.6.2014.)

[49] http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageOnlineServices_ShowContent&propertyType=document&featurearticle=true&id=HMCE_CL_001614 (6.6.2014.)

[50] https://www.gov.uk/chief-trader-import-and-export-processing-system#chief-services (6.6.2014.)

[51] http://fiscus.fgov.be/interfdanl/fr/ncts/webnctsFR.htm (6.6.2014.)

e-service: “WEB-server NCTS will be available 24/7 in order to monitor or treat your transit operations at any time-without limit.”[52]

[52] http://fiscus.fgov.be/interfdanl/fr/ncts/webnctsFR.htm (6.6.2014.)

B07 Environment-related permits (incl. reporting)

1. Basic service information

In the case of services for environment-related permits, a satisfactory e-service was found only in Denmark and Estonia. In both cases, the Central government is the highest authority, considering that it is usually within the government's domain to govern environment-related issues. There was no information on the start of service development or implementation in both cases.

Most of the e-services in this category merely provided a printable form, giving them a low Maturity level. Only Denmark and Estonia have an e-service in this category that has a Maturity level higher than 2. The Maturity level of Estonia's e-service was estimated at 3, while the Maturity level of Denmark's e-service is 4.

No information was found on the services being connected to other governmental e-services or on the comparison of official and actual development of the services. Neither of the two analysed e-services in this category appear to have any limitations to their respective work schedules.

2. Users

No information could be found on whether or not the use of the e-services in this category is mandatory. Both services can, however, be used by both citizens and businesses. No information could be found on the number of users per group or on the percentage of users who use the service electronically.

The services did not provide any specific adaptations for users with disabilities, so the users depend on their browsers' abilities for audio-visual and access aids. No information, surveys or polls on users' satisfaction could be found in either of the two cases.

3. Business optimisation

There was no available information for any of the questions in the Business optimisation group for neither of the two researched e-services in this category.

4. Technological solutions

Regarding authentication, the e-service in Denmark uses NemID, the country’s e-ID, or a digital signature. A username and password is used in the e-service in Estonia. No information could be found on the encryption of the communication between the server and

client station, although the assumption is that there is one considering the development of the e-services. No information could be found on the use of digital certificates in electronic signatures or on their preferred formats.

Both e-services are accessed as web forms. There was no information, however, on the ability to send attachments with the forms. No information was found on whether the services were implemented through open-source or commercial technologies.

Both e-services are websites accessible through a web browser on any device with access to the internet. No information was found on the topic of hosting or the use of the Cloud with both researched e-services.

5. Storage and long-term content availability

There was no information available for any of the questions regarding storage and long-term content availability for neither of the two researched e-services in this category.

6. System operation transparency

No defined service use policies were found, along with no guarantees of proper use of users' data. There was also no information on employees having to sign a non-disclosure agreement. Users can, however, access and view their data in both cases, as well as monitor the status of their applications, but it is unclear on whether or not they can update or change any of their data manually or through request.

B08 Public procurement

1. Basic service information

Among analysed e-services in this category, Germany's e-service was the first one developed and implemented, starting in 2002. Lithuania's e-service was implemented in 2008, while Belgium and Estonia's e-services were both implemented in 2011, respectively. The most recently developed e-services in this category are Croatia and UK's e-service - implemented in 2014. There was no information for Denmark's e-service. Sweden is the only country that didn't have an eligible e-service in this category at the time of research.

Regarding Maturity levels, all researched e-services have the highest Maturity level of 5 except Denmark's e-service, which has a Maturity level of 1. Therefore, Denmark's service won't be covered in the remainder of this report.

None of the e-services in this category appear to be connected with any other governmental services. There appear to be no limitations to the working schedules of e-services in this category, though any phone support lines may have a limited working schedule.

2. Users

Regarding whether or not the e-services in this category are mandatory for use, the services in Croatia and the UK are not mandatory. The e-service in Lithuania appears to be mandatory, while the brochure on Belgium's e-service in this category states that the Belgian authorities (federal, regional, local) must use e-Notification for the publication of Belgian contracts above the publication threshold.[53]

The e-services in Belgium, Croatia and Germany appear to have different groups of users. The e-service in Germany further describes: "At least one person from that company must be registered with a supported e-Procurement signature. This person can then set up additional employees who are using your username and password can log in. The person who is registered with a certificate in e-procurement is referred to as the "Primary User" in the following, all others as 'secondary users'."[54] No information was found on the exact numbers of users per group.

Regarding information on the percentage of users, the brochure for Belgium's e-service only provides information on the number of notices published in e-Notification in 2012, the number being 29.499. Others provided no information.

[53] http://www.publicprocurement.be/portal/page/portal/pubproc/ambtenaren/e-procurement/faq2/brochure_eprocurement_en.pdf (10.7.2014.)
[54] http://www.evergabe-online.info/e-Vergabe/DE/3%20Unternehmen/Nutzungsvoraussetzungen%20f%C3%BCr%20Unternehmen/node_nutzungsvoraussetzungen.html;jsessionid=34F7E3909068300B9A18569F30173A90.1_cid389 (10.7.2014.)

There was no information on the prevalent age groups of users who use the services. The e-services in this category are not directly adapted for users with disabilities, and are thus dependant on the users' web browser's capabilities for audio-visual or other aids. No information was found on user satisfaction.

3. Business optimisation

None of the e-services in this category provided any answers for any of the questions regarding business optimisation.

4. Technological solutions

Regarding the type of authentication, in the case of Belgium's e-service the users log in via e-ID or a username and password. The Croatian e-service uses the OIB (osobni identifikacijski broj/personal identification number). Lithuania's e-service requires registration, while Estonia and Germany's e-service uses a username and password login. The e-service in the UK uses a DUNS number and a temporary username and password.

All e-services in this category appear to have an encrypted communication between the server and client station, the encryption being the standard SSL/HTTPS. Only Belgium and Estonia's e-services use e-ID.

Information on electronic signatures and the use of digital certificates in this category was provided by Croatia, Estonia and Germany's e-services. In Croatia, the documents are protected by the PKI (Public-Key Infrastructure) based on the digital certificate and electronic signature.

Croatia's e-service in this category uses the Advanced electronic signature, while Germany's e-service uses File-based signature certificates (advanced) and Map-based signature certificates (qualified).

Most e-services in this category use a web form, while Germany's e-service uses a PDF form. Most of the e-services also appear to allow/require the upload of attachments. Regarding predetermined types of documents while sending out attachments, .pdf appears to be the standard format with e-services in Croatia and Germany.

Regarding information on implementation through open-source or commercial technologies, only Estonia provided information that Datel AS and Webmedia Group AS developed their e-service. All e-services in this category are available through a web browser and can be accessed on any device with access to the internet. All services appear to be hosted within their responsible institutions, though no information was found on required certificates or the use of Cloud.

5. Storage and long-term content availability

Regarding retention periods for the data in the system, only the e-services in Belgium and Estonia provided some information. In Belgium's case, if users are registered as an enterprise, they are required to renew their profile annually. Failure to do so will delete user data after the retention period of 1 year. If the users are registered as a contracting authority, the data is not automatically deleted. This can only be done by sending an e-mail to the helpdesk or by filling out a request with their superuser.[55] The e-service in Estonia states: "Data on procurement source documents and results of appeal proceedings as well as digitally submitted procurement source documents will be archived after five years from the end of the public contract or design contest. Registry data and source documents thereof will be stored for at least twenty-five years as of the time they were entered in the register."[56]

There were no answers for other questions in this category with the exception of storage in the case of Croatia's e-service - information and documents are stored in the computer system of the Electronic Public Procurement Classifieds of the Republic of Croatia.[57]

6. System operation transparency

Service use policies in some form were found in Belgium, Croatia, Estonia and Germany. The only e-service with proclaimed technological measures guaranteeing the users that their data will be used only for the defined purpose was found in Belgium, where the data is treated in accordance with the law passed in 1992 on the protection of privacy in processing personal data.[58] The federal public service Personnel and Organisation commits itself to taking the best possible security measures to prevent any misuse of the personal data you have divulged by third parties.[59]

No information was found on whether or not employees are required to sign a non-disclosure agreement for any of the analysed e-services in this category. Belgium's and Croatia's e-services provide the option to access and view user data through the service. Belgium's e-service's website claims that users have permanent access to their personal data, can verify it's accuracy and can have any errors corrected that pertain to their personal data.[60] Other than Belgium, only Estonia's e-service provides a clear option to update or correct user data, while only Croatia's e-service allows monitoring of user applications, with no information found for other e-services.

[55] https://enot.publicprocurement.be/enot-war/viewStaticData.do?staticDataId=2 (10.7.2014.)
[56] https://riigihanked.riik.ee/lr1/web/guest/e-keskkonna-kasutamine (10.7.2014.)
[57] https://eojn.nn.hr/Oglasnik/clanak_menu/opci-uvjeti-poslovanja-za-elektronicki-oglasnik-javne-nabave-republike-hrvatske/0/53/1/ (10.7.2014.)
[58] https://enot.publicprocurement.be/enot-war/viewStaticData.do?staticDataId=2 (10.7.2014.)
[59] https://enot.publicprocurement.be/enot-war/viewStaticData.do?staticDataId=2 (10.7.2014.)
[60] https://enot.publicprocurement.be/enot-war/viewStaticData.do?staticDataId=2 (10.7.2014.)

CONCLUSIONS AND RECOMMENDATIONS

The InterPARES Trust project research "Comparative Analysis of Implemented Governmental e-Services" analyzed 12 G2C and 8 G2B e-services in eight European countries by using the developed questionnaire consisting of 52 questions divided into 6 categories – (1) basic service information, (2) users, (3) business optimization, (4) technological solutions, (5) storage and long-term content availability, and (6) system operation transparency. The total of 8,320 questions were attempted to be answered by the research team conducting online research.

The developed questionnaire can be used by the users of e-services as guidance for establishing trust in an e-service they (intend to) use. If they are able to find (most of) the answers in the available online documentation they could make an informed decision. Of course, this would require a bit of technical knowledge, but the mere availability of information could be a positive sign even to an uninformed user. On the other hand the developed questionnaire should be used as guidelines by e-service providers. There they can find the systematized set of questions they should provide answers online if they want to become a trusted e-service provider.

During the research very little information was found on the hosting of e-services. This raises question if there are any contingency plans developed or if there are any long-term service continuity plans. Policies giving information on storage and preservation methods are virtually non-existent. Or they are not available online. Anyhow, the users cannot judge if the service will be able to preserve the stored data for the legally required period of, for example, 30 years, as required in the case of health care and social security records in Croatia and Sweden.

Long-term preservation of electronically signed records requires the preservation of digital certificates as well. Virtually no information on this issue was found. E-service providers should somehow assure users that they will be able to address this issue, or at least that they are aware of the problem, and that they are actively looking for the solution.

Lack of information on the use of clients' data is worrying. The users should know how will their data be used and for what purposes. This would greatly improve the system operation transparency.

In conclusion, the research tried to identify the weak spots of e-services and point them out in order for them to be improved, not only by the investigated e-services, but also by other e-services either already in place or being planned.

Disclaimer: There might have been information available online in time of the research which escaped researchers for various, previously mentioned, reasons. However, the researchers done the research with due diligence and possible omissions were not intended.

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