D1.1 Member States eGovernment Baseline

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List of Acronyms

Abbreviation / acronym	Description
BRIS	Business Registers Interconnection System
CEF	Connecting Europe Facility
DE4A	Digital Europe For All
DESI	Digital Economy and Society Index
DSI	Digital Service Infrastructure
Dx.y	Deliverable number y, belonging to WP number x
EC	European Commission
eID	Electronic Identification
eIDAS	Electronic IDentification, Authentication and trust Services
EU	European Union
GDPR	General Data Protection Regulation
MS	Member state
NIFO	National Interoperability Framework Observatory
OOP	Once-Only Principle
SDG	Single Digital Gateway
SSI	Self-Sovereign Identity
WP	Work Package

Executive Summary

The project Digital Europe For All (DE4A) was launched January 2020 as a result of collaboration of 27 organizations from 11 countries of the European Union. The project is funded by the EU Horizon 2020 research and innovation Framework Programme and is aimed to create an inclusive digital Environment in Europe ensuring the Single Digital Market rights of citizens and businesses by building on secure, privacy-preserving and trustworthy realisation of fundamental once-only, relevant-only and digital by default principles. The DE4A large-scale pilot reinforces the connectivity of national digital endeavours and, building upon the existing infrastructure, it attempts to contribute to an overarching eGovernment network for Europe supporting parallel efforts from the EC and the Member States to realize the Once-Only Principle Technical System in compliance with Single Digital Gateway and aligned with EU eGovernment Action Plan 2016-2020, Tallinn Declaration and EIF Implementation Strategy [11].

"D1.1 Member States eGovernment Baseline" is one of the formal outputs of WP1 "Inventory of current eGovernment landscape" for the DE4A project. This workpackage which aims to take stock of the existing situation of the deployment of cross-border integrated Digital European Public Services in the Member States participating in DE4A, has produced four deliverables in the first period of the project:

- D1.1 Member state eGoverment Baseline (June 2020)
- D1.3 Member State Once Only and data strategy Baseline (June 2020)
- D1.5 Baseline EU Building Blocks supporting Once Only and standard data sharing patterns (June 2020)
- D1.7 Legal, technical, cultural and managerial barriers (August 2020)

The purpose of D1.1 is to take stock at the existing eGovernment landscape in Europe for implementation of eServices and cross border enablers, identifying existing national eGovernment capacities, major setbacks and potential drivers for the project implementation. The study covers the domains of Electronic Identification, Authentication and Trust services (eIDAS), Single Digital Gateway (SDG), Digital Service Infrastructure (DSI), Once-Only Principle (OOP) and Data strategy. Whilst the present report majorly focuses on the first three domains, the deliverables D1.3 "Member State Once Only and data strategy Baseline" and D1.5 "Baseline EU Building Blocks supporting Once Only and standard data sharing patterns" suggest insights onto OOP, Data Strategy and existing EU Building blocks respectively. The study was based on the data derived from a survey (see more details in Section 2.3), which was distributed among the EU and the EFTA countries. The quantitative analysis from the study was complemented by desk research.

The eID schemes – one of the cornerstones of the cross-border functioning of eGovernment systems – have been unequally implemented across the EU. The research suggests that only one third of the eID schemes have been (pre-)notified under the eIDAS regulation, whilst over 90% responding countries confirmed availability of a national eID scheme. The national eIDAS-Nodes similarly demonstrate asymmetric readiness for cross-border use, being more advanced in terms of receipt of foreign eID-schemes for national use rather than supporting national eIDs abroad. On the contrary, the implementation of trust services has demonstrated rather homogenous spread across the participating countries.

The DSIs envisaged in the Connecting Europe Facility, have likewise showed different scale of implementation of both domain-specific and domain-independent building blocks. Whilst some DSIs have been widely set on technical implementation in the EU, some others were not referenced by the majority of the respondent countries. Notably, most of the respondents denoted their on-going Blockchain projects, aiming to increase connectivity and transparency of the built solutions.

The 21 life events announced under the SDG regulation, have similarly exposed significant differences in term of possibility for eID-authentication, mobile accessibility, applicability of the OOP and availability for cross-border use. Whilst showing generally high availability of the services for use with mobile devices, only approximately half of the services were accessible with the eID and enabled for cross-border use.

Providing the respondents with a possibility to leave context-relevant remarks for comprehension of eGovernment strategy, the study discovered self-reported dependency of eGovernment initiatives on the administrative system of the country. The peculiarities of the national eGovernment functioning were also complemented by the heterogeneity of the legal environment, revealing a rather infant stage of regulatory development of some states. The study also puts a notion on different level of involvement among the private sector, detecting its interconnectedness with the eGovernment advancement.

Together with the D1.3 “Member State Once Only and data strategy Baseline” and D1.5 “Baseline EU Building Blocks supporting Once Only and standard data sharing patterns” these deliverables serve as an input for development of pilots on Studying Abroad, Moving Abroad and Doing Business Abroad (cfr. WP4). The report will also be used as a benchmark for evaluation of eGovernment advancement under the upcoming digitalization initiatives, serving as a reference point for assessing the initial eGovernment landscape. The DE4A project foresees to provide updated eGovernment studies during 2022.

1 Introduction

1.1 Purpose of the document

The present report is conducted under the DE4A project and constitutes the D1.1 deliverable. The purpose of this study is to take stock of the existing eGovernment landscape, including such domains as electronic identification and trust services, Digital Service Infrastructures and Single Digital Gateway. The study is complemented by the deliverables D1.3 "Member State Once Only and data strategy Baseline", which elaborates on the current advancement level of the OOP in Europe, and D1.5 "Baseline EU Building Blocks supporting Once Only and standard data sharing patterns". Elaborating on the existing infrastructure and practices, the three reports aim to provide helpful insight for DE4A and serve as an input for the subsequent development of its cross-border pilots. The documents are designed as stand-alone documents, and some repetition is therefore necessary to provide context on background and methology.

1.2 Structure of the document

This document is divided into four main sections:

- Chapter 1 gives introductory context to the matter of the research;
- Chapter 2 elaborates on the utilized methodology and data sources for the analysis;
- Chapter 3 presents the results of the analysis on eGovernment baseline;
- Chapter 4 discusses the obtained results in an aggregated format;
- Chapter 5 provides conclusion remarks on the research.

The document additionally includes following annexes:

- Annex I – Calculation Methodology;
- Annex II – Survey.

1.3 Theoretical background

In the light of single digital space of Europe, the project Digital Europe for all (DE4A) aims to create an inclusive digital environment for the EU citizens and businesses, ensuring their Single Market rights. Supporting the EU Public Administration in addressing the existing challenges toward the implementation of the digital cross-border initiatives, the DE4A complies with the Single Digital Gateway Regulation, EU eGovernment Action Plan 2016-2020, Tallinn Declaration and EIF Implementation Strategy. As articulated in the project proposal, the DE4A goal is to:

> *«reinforce trust in public institutions and to unleash multiple measurable positive impacts in terms of efficiency gains and reduction of current administrative burden and costs, rooted on a Toolkit for extended semantic interoperability and on secure, privacy-preserving and trustworthy realization of fundamental Once-Only, relevant-only and digital by default principles, through state-of-the-art, usable and high-quality fully online procedures accessible through the Single Digital Gateway (SDG)»*

Rapid development of Information and Communication Technologies (ICT) gave a significant impetus to transformation of public administration and set eGovernment on the political agenda of the EU. Formulation of the first large scale eGovernment Action Plan 2011-2015 articulated the necessity for

political mobilization of digital transformation and became one of the milestones toward the establishment of a collaborative network of the EU Member States in the area of government digitalization [15]. The termination of the Action Plan coincided with the adoption of the Digital Single Market Strategy, which put forward the necessity to establish seamless cross-border functioning of public administration and easing access to public services for citizens and businesses. The new eGovernment Action Plan 2016-2020, reckoning upon the previous achievement on cross-border eEnvironment, underpins user-centricity as one of its main objectives and sets a strategic mainframe for the current digital initiatives in Europe [10]. Tallinn Declaration on eGovernment endorses the undertaken strategy and elaborates on the principles of digital transformation of public administration [1]. Reinforcing the reduction of administrative burden on citizens and businesses, the adopted strategies take Once-Only Principle (OOP) as one of the central elements for the development of the Digital Single Market.

The European digital strategy was supported by a set of regulations, expatiating on the legal base for the designated digitalization initiative. Legal compliance with the regulation on eIDAS, GDPR, SDGR have identified the regulative framework for all digital large-scale projects and initiatives, such as TOOP [24], STORK and STORK 2.0 [13], SCOOP4C [23], e-SENS [7], CEF Digital [5], etc. Complying with the above regulation, DE4A consolidates and extends the vision and conclusions of the relevant projects. Commencing with inventory of the current status of existing digital solutions, DE4A assesses eGovernment baseline to identify the starting ground for its architecture.

As different studies on eGovernment suggest, there is an uneven level of eGovernment advancement across the EU Member States. Despite the availability of the common regulatory framework and the launch of large-scale cross-border projects, the report on eGovernment Benchmark demonstrates some countries having a higher adoption rate of eID adoption and availability of public services on cross-border perspective [9]. Digital Economy and Society Index similarly depicts unequal coverage of Internet connectivity and availability of public digital services across Europe [14]. These differences are essential for comprehension of the current European eGovernment landscape, which will serve as one of the foundations for the DE4A project. In what follows, the report considers three major components that are relevant for understanding EU Member States' advancement in eGovernment:

- Electronic Identification, Authentication and Trust services,
- Digital Service Infrastructures and
- Single Digital Gateway.

1.3.1 Electronic Identification, Authentication and Trust Services

The regulation on Electronic Identification, Authentication and Trust Services (eIDAS) was adopted on 23 July 2014 and has become a milestone for establishment of regulatory environment to enable secure cross-border interactions among the citizens, businesses and public authorities of the EU Member States [19]. Supporting the development of the internal European market, the adopted regulation urges the EU Member States to modify or repeal inconsistent national frameworks, thusdevelopment of a coherent and predictable legal environment for accessing services online.

The eIDAS regulation is principally composed of two parts: The first component elaborates on the electronic identification (eID) systems of the EU Member States. Outlining legal base for mutual recognition of national eID systems (which entered into force on September 29th, 2018), the eIDAS regulation enables cross-border electronic identification and authentication among different authorities, thereby stimulating further development of a shared digital space. The notified eID schemes as well as the relying parties where they are used are connected to a national eIDAS-Node, allowing mutual recognition of electronic identities in Europe. Interconnected among the EU Member States, the eIDAS-Nodes build up an eIDAS Network, which enables cross-border eID-based authentication.

The second component of the adopted regulation, which entered into force on July 1st, 2016, establishes a shared internal market for certain Trust Services which are listed in the Regulation – including notably electronic signatures, electronic seals and electronic timestamps. Elaborating on the minimum standards for the trust services and on principles of technological neutrality, the eIDAS regulation improves the reliability of these services, granting them an equivalent legal status as paper-based processes. Postulating a non-discrimination principle for all of these electronic services as a baseline, the regulation furthermore differentiates between several levels of service – electronic service, advanced electronic service and qualified electronic service (the latter allowing the use of a recognizable EU Trust Mark), depending on the type of trust service – with differing levels of legal certainty linked to each level of service.

A set of implementing acts stipulate the implementation process of the eID schemes and trust services on both national and cross-border perspective, establishing the practical and technical modalities for a European connectivity network. Further, under these implementing acts, notified national eID schemes are mapped against specific qualitative criteria to assess their respective levels of assurance, to establish a method for assessing equivalence between notified electronic identities. To promote transparency of the internal market, the European Commission mandated the establishment of trust lists of qualified trust services and created an overview of notified eID schemes that are providing authentication services to citizens and businesses.

1.3.2 Digital Service Infrastructures

With a notion on the available set of digital tools, the DE4A constructs upon reusable Digital Service Infrastructures (DSI). Developed under the CEF program, the DSI fulfils the role of a central hub platform, linking up national service infrastructures and via this creating a network of interconnected national infrastructures in Europe.

Encouraging reuse of the existing solutions, the CEF program fosters development of standardized building blocks such as eID, eSignature, eDelivery…, which can be reused in multiple digital services independently from the technological environment and which are relevant to DE4A as common fundamental for cross-border interoperability in the context of the SDG fully online procedures and evidence exchange. Promoting adoption of the available DSIs, the CEF attempts to reduce implementation costs, time-to-market and to improve cross-border technical compatibility. This is to be achieved via the introduction of ready-to-implement solutions replacing some routine and most commonly needed processes (such as electronic identification of users, activation of documents, exchange of messages etc.).

These basic DSIs are complemented with a set of sector-specific DSIs, which are applicable in certain policy areas, such as health or procurement but also in Social Security (EESSI) and Business Registers (BRIS), which are of direct relevance to some of DE4A piloting areas. Developed in compliance with the existing EU legislation, the sector specific DSI are expected to facilitate the alignment of national legislation with the European regulations.

1.3.3 Single Digital Gateway

The EU Regulation on Single Digital Gateway (SDG) endeavours to the creation of a single online point of access to information, procedures and assistance services for citizens and businesses within the EU [18]. Information imposes obligation onto public administration to provide exhaustive and reliable information for the citizens to attain national or cross-border services. Distinction of procedures attributed to a chosen service will guide the user on the administrative procedures necessary for provision of the service. This is supported by assistance services designed to support the users in case of problems understanding or applying information or completing a procedure.

The SDG regulation elaborates on the list of 21 essential life events identified as the priority for digitalization. These life events are related to birth, residence, studying, working, moving, retiring, and

starting, running and closing a business and they are expected to significantly release administrative burden from the EU citizens. The Regulation stipulates the equality of the online access for both national and cross-border completion of procedures established at national level related to such life events (referred to in point (b) of Article 2(2)), postulating the necessity for online availability of these services in non-discriminatory manner for cross-border users and for eID-enabled authentication. Further, the development of the services is framed by the once-only principle, which will be equally applied for cross-border procedures.

2 Approach and methodology

2.1 Approach and objectives

The present study is carried out under the Digital Europe For All project (DE4A), which aims to contribute to practical realization of the European Digital Single Market. Underpinning the necessity to guarantee the enforcement of Single Market rights of citizens and businesses, the DE4A promotes and supports delivery of better public services that are fully digitalized, user-centric, data-driven, trustful and cross-border.

Deploying a comprehensive and holistic approach towards implementation of the larger-scale EU project, the DE4A takes a notion of the current level of eGovernment advancement in the EU and takes the existing solutions of the EU Member States as an input for further service- and infrastructure development. The DE4A endaveours to bring the participating Member States to a common vision on the challenges for eGovernment development, in the context an open and comprehensive environment and platform for collaboration and innovation.With an endeavour to bring all the EU Member States to the same page in the context of the eGovernment development, To achieve this, the DE4A takes the state-of-art as a commencement point for further digital transformation to soften the variety of the eGovernment environments across Europe. Derived from this approach, the aim of this study is threefold:

First, the study investigates the existing eGovernment digital transformation landscape in Europe. Taking stock of an existing eGovernment advancement level, it provides a general prospect on the status of public digital initiatives in Europe, covering the compliance level of the EU Member States with the major cross-European digital initiatives. As a part of the common European endeavour toward the interoperable and seamless cross-border digital space, the study aims to reveal the existing challenges and enablers for the designated transformation.

Second, the present research contributes to the implementation of the pilot use cases under the DE4A initiative, serving as well as guiding basis in the methodological process addressed in subsequent work packages, in particular in the WP2 “Architecture and Vision Framework“. Serving as an input to the project team, the survey provides a necessary insight into the existing services and practices across Europe, supporting the project with a solid starting ground for further development.

Finally, the results of the study will be serving as a point of reference for assessing the DE4A progress throughout the project lifetime. Scheduled for early 2021, the project will be carrying out a repeated study on the implementation level of eServices in the EU Member States, aiming to stock take the advancements in eGovernment propagation and compare it against the currently measured eGovernment landscape.

The study outcomes are represented – in accordance with the announced privacy statements – in an aggregated format. Making an inventory of the existing eGovernment practices, the report portrays the overall European advancement of the EU Member States, revealing the most crucial developments and pitfalls of the existing European digital space. Based on the obtained results, the study explores the perception of the participating countries of their digital advancement and suggests a ground for decision making for development of the DE4A pilot cases.

2.2 Scope

In the context of the identified objectives, the present study attempts to cover the versatile eGovernment landscape. To achieve the identified goals, the conducted research considered several criteria to ensure the integrity of the derived results:

- First, the research covers multiple aspects of the eGovernment area, investigating in the major milestones necessary for further development of shared European digital space. Aggregated in the 3 major initiatives, the research subsequently presents its findings on:
  - *Electronic Identification and Trust Services (eIDAS)*. Aiming to identify the level of compliance with the eIDAS regulation among the EU Member States, the research is composed of three major constituents, namely: electronic identification scheme (eID-schemes), eIDAS-Node and trust services. The findings, on one hand, comprise the general information on the deployed national eID schemes – including their characteristics, participation in the EU cooperation on the eID notification and their actual use indices – and on the other hand, the current status of the eIDAS-Node cross-border interoperability. The findings are complemented by the review of the implementation level of trust services, elaborated in the eIDAS regulation.
  - *Digital Service Infrastructure (DSI)*. The report reflects the major achievements on implementation of Building Block and sector-specific DSIs, elaborated under the Connecting Europe Facility (CEF) program.
  - *Single Digital Gateway (SDG).* The research aims to take stock at the existing level of implementation of the essential 21 SGD life events for citizens and businesses (as listed in the Annex 2 of the SDG Regulation). The implementation level of the SDG life events is performed from the perspectives of the available authentication method, accessibility for mobile devices, compliance with the OOP and availability for cross-border use.
- The geographical scope of the research was covering the 27 Member States of the European Union and was additionally complemented by the EFTA states (Iceland, Liechtenstein, Norway, and Switzerland). The survey questionnaire (see Annex II – Survey) was sent out to 31 state representatives, covering the aforementioned eGovernment initiatives. The responses were received from 24 countries - Austria, Belgium, Bulgaria, Croatia, Denmark, Finland, Germany, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland – amounting to a representativeness of 77.5% of the obtained results. The response rate among the countries participating in the pilot use cases amounts to 100%, offering a solid ground for informed development of the pilots announced under the DE4A.
- Measuring the performance of the EU Member States in the context of the cross-border European initiatives, the research likewise attempts to evaluate the advancement of national eGovernment agenda. Conducting an inventory of the availability of certain eGovernment aspects for national usage, the research investigates the availability of local and regional solutions and approaches toward implementation of the Digital Agenda for Europe [8].

The present report is supplemented by the deliverable D.1.3 “Member State Once Only and data strategy Baseline” and D1.5 “Baseline EU Building Blocks supporting Once Only and standard data sharing patterns”, conducted jointly with the identified research problematics.

2.3 Data collection and analysis

Combining both qualitative and quantitative research methods, the study used following data sources for the assessment of the eGovernment baseline:

- *Data collection survey*. The survey (see Annex II – Survey) was targeted at the current eGovernment advancement of European states and consisted of 4 major subjects: Electronic Identification and Trust Services, Single Digital Gateway, Digital Service Infrastructure and Once-Only Principle and Data Strategy. The online survey was disseminated among the Country CIOs of the EU Member States and EFTA countries and the data was collected between April 1st and April 24th , 2020. The respondents were suggested to self-evaluate the performance of their countries with respect to the

indicated topics. The questionnaire offered the respondents a possibility to supplement the submitted data with additional comments illustrating country-specific context relevant for understanding the particular eGovernment initiative.

- *Desk research*. The insights derived from the survey are supplemented by the analysis of the existing policies and reports relevant for comprehension certain eGovernment domains. The EU policies stipulating development of the shared European digital space have been used as a guideline for survey design and analysis. At the stage of the response analysis, the data obtained via the survey was supported by contextualization of the EU MS' eGovernment development through research of relevant national strategies and legislative frameworks supporting digital transformation. Comments from the survey served as supplementary input for further policy and context analysis of the respected country.

Driven by the goal of the DE4A, the set of the survey questions was based on the outlined scope of the project. It was further adjusted based on the availability of the relevant recent information on the subject matter in other reports and studies, such as eGovernment Benchmark reports, the Digital Economy and Society Index (DESI) and NIFO (National Interoperability Framework Observatory) factsheets [21].

Prior to the analysis, the data was cleansed and checked against the respondents' comments for the purpose of the possible adjustment. If needed, point communication was undertaken to clarify the position of a respondent on a specific question. For the purpose of analysis, the response data was converted to binary and numeric format according to certain rules:

- *Meaningfulness of the responses*. For the survey being targeted at the Country CIOs of the European countries, it suggested the respondents to complete the questionnaire at best of their knowledge, leaving out the possibility for abstaining from the answer if the information was not available. Absence of the answer or choice of "Do not know" were recorded but excluded from the numeric analysis of the relevant question. Similarly, the answers "Not applicable in my country" were not included in the quantitative analysis. Both responses, however, were used in evaluation of the representativeness of the respective question.
- *System of coefficients.* Questions containing pre-formulated answers were converted into numeric values depending on their logical significance (See the exhaustive list of the assigned coefficient system in Annex I – Calculation methodology. Per each indicator, the number of the respondents who chose a particular answer was summed up and multiplied with the suggested coefficient. Then, the sum was normalized by the number of meaningful responses (excluding responses "Do not know" and "Not applicable in my country") and converted into percentage system for ease of comprehension. In this case, the percentage should be comprehended in the context of the provided coefficient system.

As an illustrative example, the report demonstrates the analysis approach toward analysis of Mobile accessibility of SDG live events, such as "Requesting proof of registration of birth": the report investigates mobile accessibility of the service among the responding countries. To assess mobile availability, the survey offered 6 answers: Do not know, Not applicable, No, Only desktop enabled website, Mobile enabled website, Dedicated eGov app. According the logic above, the answers "Do not know" and "Not applicable" are not included in the numeric calculation. The rest of the answers are assigned to a system of coefficients based on its perceived advancement. Given that online absence ("No") is the least favourable status of the mobile accessibility, it is assigned to a 0. Availability of a desktop enabled website – seen as a more favourable development – is assigned to 1. The other two options, granting access to the service from a mobile device, are seen as the most advanced status and are coupled with the coefficient 2 (Table 1). The number of the respondents per each answer is then multiplied with the assigned coefficients.

Table 1. Requesting proof of registration of birth, Mobile accessibility - Illustrative example

	Do not know	Not applicable	No	Only desktop enabled website	Mobile enabled website	Dedicated eGov app
Coefficient	Not included in the calculation		0	1	2	2
Respondents	1	1	2	5	13	1
Sum	-	-	0	5	26	2

The bottom row counts the composition of the number of the occurrence of each of the responses with its coefficient. The resulting sum (33) is then normalized by the number of meaningful responses (33/21=1.57) and by the introduced system of coefficients (1.57/2=0.79). The interpretation of the results is provided in a table for each respective chart (e.g. Table 6. Single Digital Gateway: interpretation of value range).

The results of the study reflect the current advancement of eGovernment of Europe, but it heavily relies on the information provided through the CIOs of European countries. Acknowledging the challenge of gathering multifaceted information on eGovernment performance aggregated at the national level, the approach followed is to provide personal estimation where exact data was not available. This might have influenced impartiality of the study, which was attempted to be mitigated through additional desk research and context analysis. Further, despite the survey achieved 77.5% response rate, there are a number of countries that abstained from participation in the survey. Whilst the study is ensuring a high representativeness of the results, it however, cannot be assumed to be exhaustive for the complete geographical scope.

It is worth mentioning that the study might suffer from certain limitations, which are mainly related to the collection of data. In the first place, the collected data represents the judgement of the executive digitalization authorities on the eGovernment development and cannot be seen as official position of the Member State. To mitigate the risk of biased representation of information, the research has been supplemented with additional desk research aimed at contextualization and substantiation of the obtained survey outcomes. Another risk associated with the survey-based data collection is the quality of the responses, which in worst cases might distort the results of the analysis. To ensure consistent quality of the analysis data, the survey data have been cleansed and – if needed – verified via desk research and/or supplementary interviews.

3 eGovernment baseline

3.1 eIDAS

The regulation on Electronic Identification, Authentication and Trust Services (eIDAS) implies a legal obligation of the EU Member States to mutually recognize notified national eID-schemes on the cross-border perspective and it establishes a shared internal market following reliable common rules and standards for trust services, contributing to the interoperability of the European single market. However, despite the legally binding regulation, countries have achieved different levels on implementation of eID-schemes, eIDAS-Nodes and trust services.

3.1.1 eID schemes

Despite all the respondent countries have passed a certain level of implementation of an eID scheme, they have a different level of eID integration in public sector. Some countries are still at a preparatory step of the eID rollout: for instance, the Bulgarian eID scheme was implemented as a limited-scale pilot project in 2013 and has been using an optional substitute of an identification document [25]. Other countries demonstrate availability of one or several well-functioning eID schemes, which are segregated by their dedicated functionality (see Figure 1). The Portuguese government opted for a segregated set of eID schemes, differentiating Citizen eID Card, Digital Mobile Key and Professional Attributes Certification System. Used for different purposes, the division of national eID schemes fragmented the provision of the authentication service in Portugal [20]. Similarly, 10 other countries report to have more than one operating eID scheme, yet one national eID scheme is the most spread approach among the respondents.

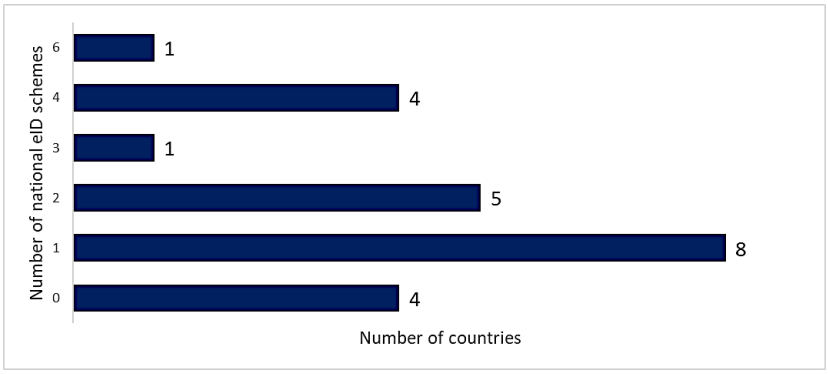

Figure 1. Number of eID schemes per country

Almost all reported eID schemes (96%) have been already implemented for national use with almost half of them being available for cross-border use. Despite 14 our of 27 EU Member States have notified at least one national eID scheme [12], only a third of the studied eID schemes have undergone the (pre-)notification process under the eIDAS regulation (see Figure 2), whilst 3 other countries admitted the necessity to adjust the existing national legislation to comply with the process of the eIDAS-notification. Four respondent countries combine a set of notified eID schemes with additional eID solutions deployed and used for national purpose. Other EU Member States – such as Austria, Ireland, Slovenia, Sweden and Malta – have operational eID schemes within the national borders and plan to proceed with the notification process as early as late 2020 or early 2021. As much as 60% of the operating eID schemes correspond to an assurance level “High” in accordance with the eIDAS security benchmarks (see Figure 3).

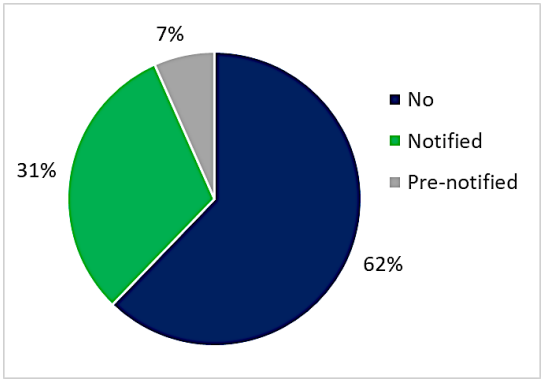

Figure 2. Notification status of national eID-schemes

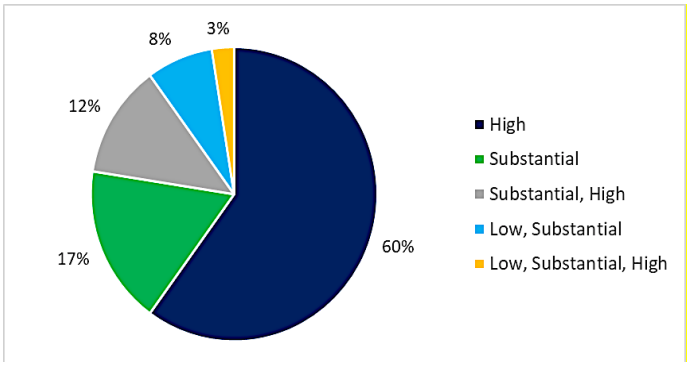

Figure 3. Level of assurance of eID-schemes

National eID cards tend to be the predominant eID scheme developed under the eIDAS regulation. Being an inherent constituent of the eIDAS regulation and present among all studied countries, it is followed by eIDs associated with banking services, electronic certificates and mobile solutions. Additionally, seven countries admitted plans for developing a mobile-based eID scheme or supplementing the existing eID scheme with a mobile solution as one of their eIDAS-strategy.

Service orientation of the eID schemes differ depending on the type of operating entity

Slightly over half of the national eID schemes deployed in Europe are operated and maintained by public entities (see Figure 4). Among the eID schemes operated by private entities, only one in four eID-schemes have undergone notification procedure foreseen by the eIDAS regulation. Simultaneously, half of the eID schemes operated by public entities have (pre-)notified their schemes through the notification procedure imposed by the regulation. Countries report to not have any significant differences on implementation scale of the designed eID schemes depending on the operating entity. With 96% of all the eID schemes being set in implementation, around half of them are reported to be implemented for cross-border use (however, majority of them still need to undergo the eIDAS-notification procedure to be fully functional in cross-border perspective). With a small deviation, publicly operated eID schemes are accessible for cross-border use in 52% of cases, whilst private entities envision cross-border use in only 47% by far.

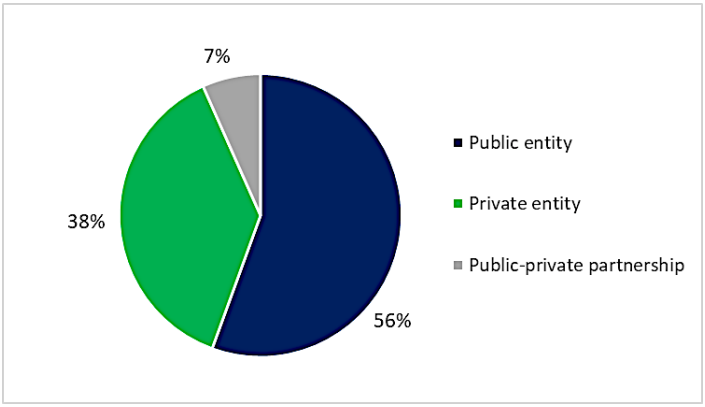

Figure 4. Operating entities of national eID-schemes

The operating entities of the eID schemes demonstrate support of different set of services. Generally, eID schemes operated by private entities have a higher rate of accessibility to all types of services, including provision of public services at national and subnational levels and various types of non-governmental services. Among the studied national eID schemes operated by public entities, only one in two eID schemes grant access to non-governmental services such as bank, telecom etc. (see Figure 5). The access rate to this type of services for privately operated eID schemes is implemented in 82% of cases. As reported by some of the respondents, some private operators – such as banks – freely distribute eID means, majorly connected to a Token or Mobile solution, automatically linking their services with the eID scheme.

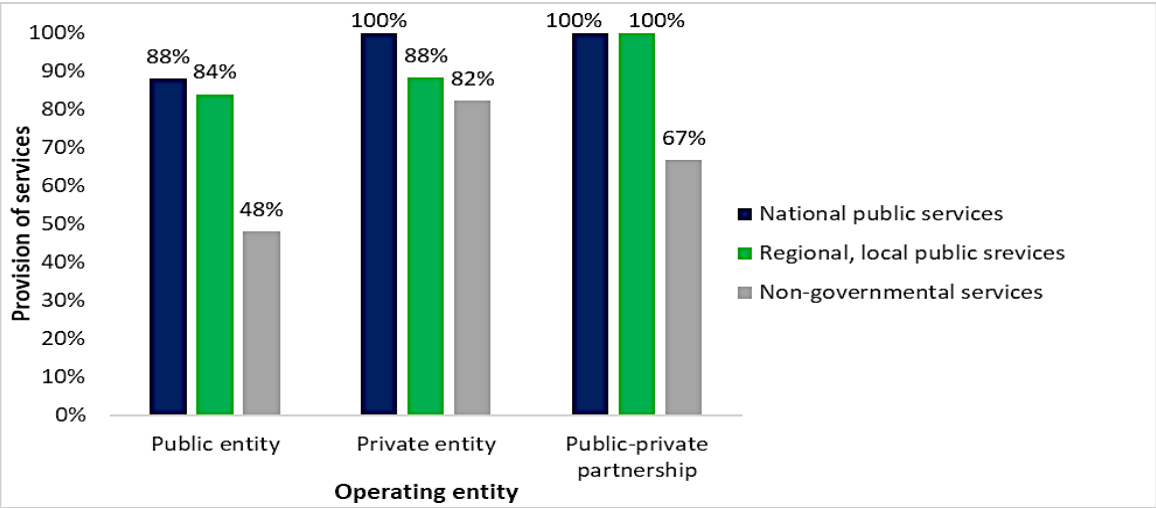

Figure 5. Service orientation of eID-schemes depending on the operating entity

In the overall scope of the provided services, governmental services are symmetrically coherent with the general distribution of the eID operating entities. Access to both national and subnational public services are predominantly provided by publicly operated eID schemes, leaving out around 40% for private operators (see Figure 6). eID schemes operated by public-private partnership constitute up to 7-9% from the overall scope of service provision due to its rather small sample in the collected data.

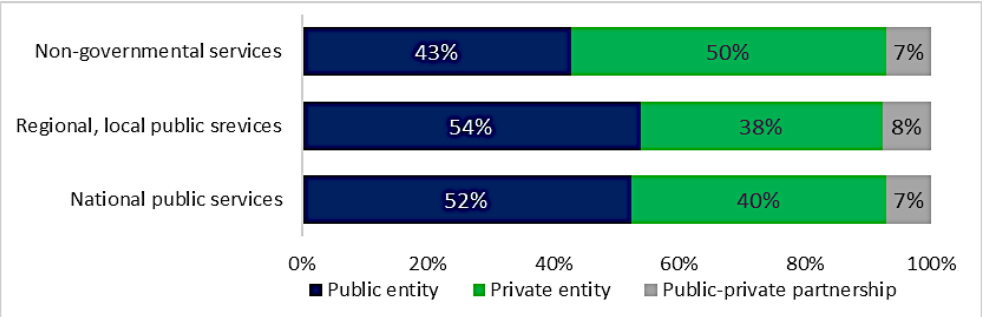

Figure 6. Implementation of access to services depending on the operating entity

Possession, activation and use rates of the eID schemes are correlated with the type of the operating entity

From the user's perspective, the DE4A study differentiates three stages of the eID adoption rate:

- ***Possession rate*** demonstrates the share of the inhabitants of the EU Member State, who have acquired an eID scheme. The index is calculated as a total number of holders of the eID mean divided by the sum of the state's population including foreign residents.
- ***Activation rate*** depicts the number of the distributed eID means that was actually activated after receiving it. The rate is calculated as a total number of the activated eID schemes divided by the number of the distributed eID schemes.
- ***Use rate*** represents the share of eID holders who have used the acquired eID scheme at least once to access one of the available services. The index is calculated as quotient of the number of the eID schemes used at least once and the overall number of the distributed eID schemes.

The possession, activation and use rates were collected for each eID scheme and classified depending on its operating entity. The Table 2 reflects the calculation logic and the response rate per each indicator:

Table 2. Adoption rate of national eID-schemes

Index	Calculation	Representativeness
Possession rate	[total number of eID holders] / [total number of inhabitants]	75,56%
Activation rate	[number of activated eIDs] / [total number of eIDs]	73,33%
Use rate	[number of eIDs used at least once] / [total number of eIDs]	48,89%

Overall, among the respondents, one in two inhabitants – including underage – have an eID operated by public entity. The reach of the privately operated eID schemes is considerably lower, constituting only a third of all the population of the respondent countries. In certain countries there is a specific law stipulating the mandatory possession of the eID cards as the primary identification document. For example, Belgium postulates obligatory distribution of eID cards among the population reaching the age of 12. Also in Belgium, the specifically designed Kids-eID is optional for the children under 12 years old and can be issued by a corresponding request. Similarly, Portuguese citizen eID card is mandatory for obtaining within the first 20 days after the birth registration, entertaining the strategy of mass use of the eID authentication means. Some other countries enact optional distribution of the national eID cards as a substitute for the existing national passports.

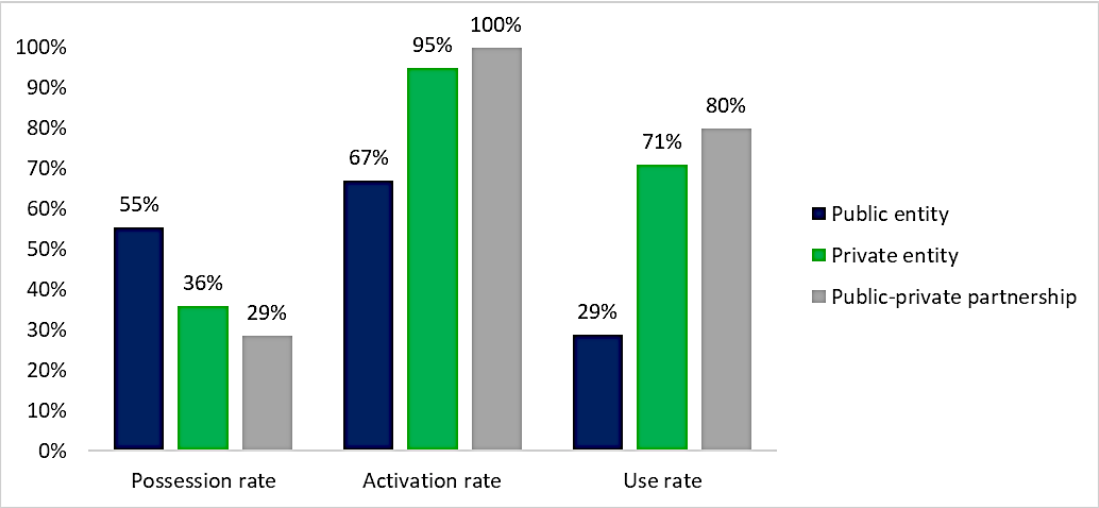

Figure 7. Adoption rate of national eID-schemes depending on the operating entity

Evidently, the activation rate of the eID schemes surpasses possession rate, signifying that once the eID scheme is distributed it's likely to be activated (see Figure 7). Despite the eID scheme operated by public entities have considerably higher possession rate than those by private entities (55% against 36%), the activation rate for the later demonstrates significantly higher values. As seen from the functioning principles of some eID schemes, the stage of activation is not mandatory for some of the eID schemes operated by private entities – frequently, the distributed eID schemes are pre-activated and set ready-to-use for citizens. To combat the low use rate of public eID schemes, Germany chose to pre-activate the distributed public eIDs, reducing the number of administrative procedures required to commence using the card. Pushing forward, the German law restricted the deactivation possibility for the eID cards starting from July 2017.

Table 3. Adoption rate of eID-schemes used as national identifiers

National eID	Value
Share of eIDs operated by public/private entity	89,5% / 10,5%
Possession rate	66%
Activation rate	63%
Use rate	30%

The Figure 7 represents an overall adoption rate of the studied eID schemes, regardless of its functional purpose (e.g. supplementary mobile solutions or schemes for professional certification). Among the eID schemes performing the role of a unique national identifier, the average share of the population possessing the eID reaches 66% among the European countries. Only 2 out of 20 countries with an available national eID are operated by a private entity. Activation and use rates show no significant differences compared to the overall rates demonstrated by an aggregated analysis of all studied eID schemes.

3.1.2 eIDAS-Node

In compliance with the eIDAS regulation, all EU Member States were obliged to recognize electronic identification from other countries when this part of the regulation entered into force in September 2018. Self-assessment reported that 91% of the respondent countries have implemented an eIDAS-Node for receiving foreign eIDs (see Figure 8). Some of the respondents which admitted the current

unavailability of foreign eIDs recognition noted the readiness of the national eIDAS-Nodes for cross-border user but admitted the necessity of supplementary bilateral testing to ensure smooth functioning of the sending and receiving mechanisms. Additionally, several other Member States do not yet allow connection of private sector services to the eIDAS-Nodes under their responsibility, requesting changes of the national legislation.

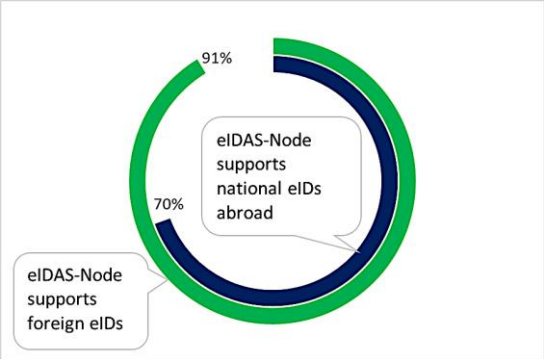

Figure 8. Implementation status of eIDAS-Node

Notably, the respondent countries admitted considerably higher advancement level of the eIDAS-Node to receive foreign eIDs over national eIDAS-Node supporting national eIDs for foreign use (91% against 70%). Recognition of foreign eID set as a priority of the eIDAS regulation has determined the prioritization of eIDAS-Node development. For instance, Italian eIDAS-Node demonstrates a more than twice gap between domestic receipt of foreign eIDs and support of Italian eIDs abroad – Italy received eIDs of 19 other European states, whilst its national eIDs are supported only in 9 countries [1]. Most of the countries which responded negatively for support of national eIDs abroad, reported plans to initiate production process (to support cross-border use of national eIDs) as early as completing the notification process for their national eIDAS-Nodes, foreseen for 2020-2022.

3.1.3 Trust services

Trust services included in the eIDAS regulation, imply several stages of implementation, commencing with electronic implementation and then proceeding to advanced and qualified implementation (depending on the type of trust service). Whilst electronic seal and electronic signature has all three stages, the eIDAS regulation recognizes only electronic and qualified timestamp. The assessment of the level of advancement was made based on the availability of appropriate national regulation, accessibility of the trust services for national use and, subsequently, for cross-border use. According to the introduced measurement system, value 0 of the X-axis corresponds to the lack of any form of preparatory development and 1 is to compare with the complete cross-border implementation of the trust service. Thus, the values of 0.33 to 0.66 indicate different progress in the development of trust services at national level and values of 0.67 and higher signify common adoption of the trust service at national level and partial implementation for cross-border use.

Table 4. Trust services: interpretation of value range

Value range	Interpretation
0	Not implemented
0.33	Necessary legislative framework adapted
0.66	Implemented for national use
1	Implemented for national and cross-border use

Based on the survey responses, the Signature has the most advanced level implementation among the three trust services under the eIDAS regulation (see Figure 9). Advanced and Electronic signatures are commonly introduced for national use and are quite widely implemented for cross-border use. The remaining types of electronic signatures are commonly supporting trust services at national level. Notably, there is no major consequential dependency between implementation of trust services and availability of the previous step of service implementation – e.g. implementation of *advanced* Electronic Seal, according to the survey data, is widely spread at national level, whilst *basic* Electronic Seal has significantly lower level of adoption. For the avoidance of doubt: advanced trust services (including signatures and seals) are of course essentially basic trust services that satisfy additional quality requirements. Where the graph below indicates implementation of basic trust services, this data refers inherently to non-advanced trust services. Similarly, qualified services generally comprise advanced trust services with additional quality assurances, so that data on advanced trust services should be understood as relating only to non-qualified trust services.

Several countries admit the trust services are not common for public use but are widely utilized by public and private organizations. Health sector and banking are frequently mentioned as one of the major domains for use of qualified electronic signatures. Some other countries provide a certain extent of liberty for organization to decide upon the use of trust services, including the choice of a format (e.g. advanced or qualified).

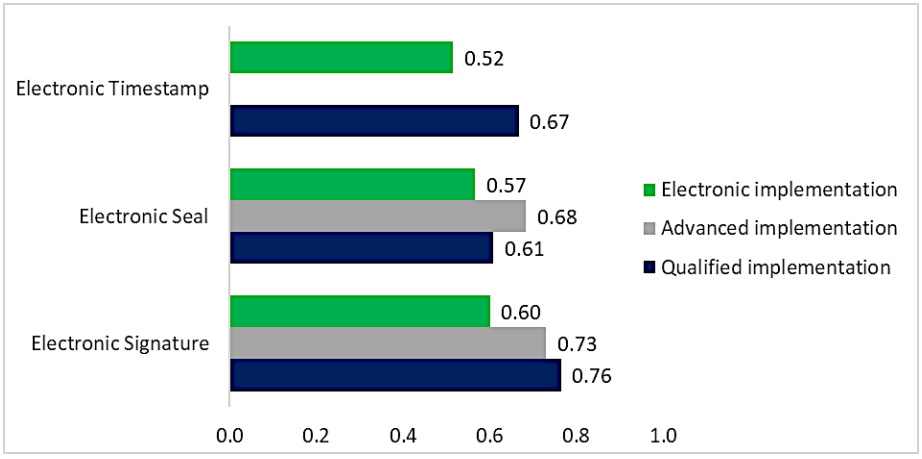

Figure 9. Implementation levels of trust services

From the legislative perspective, some countries do not explicitly reference certain formats of trust services in their national laws (e.g. national regulation omits Electronic Signatures, referencing only the use of Advanced and Qualified Electronic Signatures). In some other countries, there is no dedicated national legislation, which per se implies exclusive reliance on the eIDAS regulation, which makes them available for cross-border use.

3.2 Digital Service Infrastructure

Consolidating reusable blocks of infrastructure, the Connecting Europe Facility (CEF) establishes a set of sector-specific and building-block DSIs, which can later be deployed by Member States in their national eGovernment initiatives. To improve cross-border interoperability, the CEF Digital programme recommends using the developed building blocks in respective national solutions. Relevant for different utilization domains, the DSIs have been implemented to a different extent throughout the EU. The reference system for measurement of the DSI implementation by different countries includes their overall intention of the use of the listed DSI and the status of its practical implementation. Following referential points were used to assess the advancement of the DSI implementation by European states:

Table 5. Digital Service Infrastructure: interpretation of value range

Value range	Interpretation
0	Implementation has not been initiated yet
0.5	Preparation for a DSI implementation has commenced
1	Technical implementation of a DSI

Business Registers Interconnection System has been set on "technical implementation" by all states

Business Registers Interconnection System (BRIS) enables cross-border functioning of the companies, allowing them to benefit from Digital Single Market. Envisaged by the Directive 2012/17/EU, the European Commission stipulated obligatory interconnection of companies' registers in order to create a more adaptive environment for businesses. Introduced in June 2017, BRIS registers the information on companies – e.g. legal form, representatives, annual accounts – and makes it accessible within the EU shared market.

The Survey reveals that all the respondent countries have to a certain extent initiated technical implementation of the BRIS at their national scope. Being closely connected to eDelivery and eJustice DSIs, BRIS conditions development of the associated building blocks.

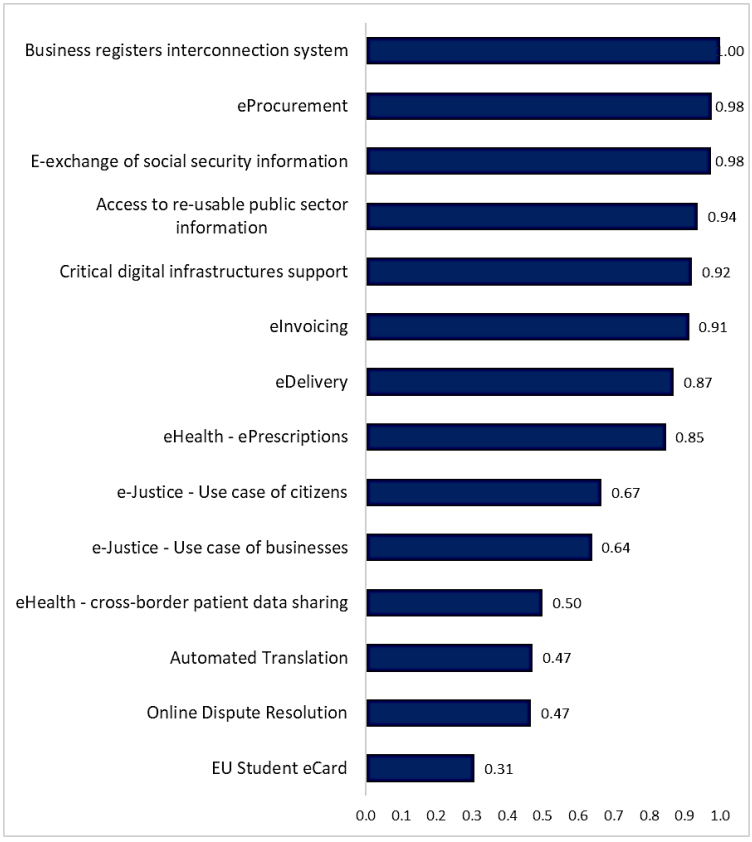

Figure 10. Implementation level of Digital Service Infrastructure

Efforts toward DSI implementation are unequally distributed

There is no legible dependency in the implementation status between the domain-specific DSI and domain-independent building blocks. Access to reusable public sector information, eInvoicing,

eDelivery demonstrate one of the highest implementation scores, along with sector-specific DSI such as BRIS, eProcurement, and e-exchange of social security information (see Figure 10). Most of the respondent countries – from 90 to 100% of respondents – acknowledged the fact of technical implementation of the aforementioned DSIs. Simultaneously, EU student card, Online Dispute Resolution and Automated translation show considerably lower level of advancement. In the European context, these three DSI are smoothly moving toward the commencement of implementation but are not widely spread.

Notably, there is a considerable difference between the eHealth related DSIs: ePrescriptions and cross-border patient data sharing. With the ePrescriptions reaching 0.85 it is possible to assume a rather wide spread of the DSI among the European countries. There have been a significant number of projects on ePrescriptions, commencing with national initiatives and reaching out to cross-border context. Initiated at national level, Estonian and Finnish governments expanded the scope of the projects onto cross-border context, offering their citizens to benefit from an eased procedure for medical products purchases between the countries. This is, however, principally different from cross-border sharing of patient data, which has been experiencing challenges with regards to a sufficient legislative framework. With the GDPR posing supplementary constraints on electronic health record, there is a necessity for harmonization of legal frameworks of the EU Member States [17].

3.2.1 Blockchain-based solutions

The adoption of blockchain technologies is associated with a considerable potential for public sector transformation. Aiming to increase transparency and accountability of the interactions among the government, businesses and citizens, the CEF Digital program acknowledges blockchain technologies as one of the underlying building blocks [4]. The joint efforts of the European Commission and the European Blockchain Partnership resulted in the creation of the European Blockchain Service Infrastructure (EBSI), which connects the nodes across Europe and starts from 2020 to provide reusable solutions to support the adoption of blockchain-based solutions by European public authorities [3].

Pilot blockchain projects on Notarization, Diplomas, European Self-Sovereign Identity and Trusted Data sharing were launched in 2019. Notably, Self-Sovereign Identity (SSI) is among the most frequent blockchain solutions among the respondent countries. Expected to change the centralized approach of managing one's identity data, SSI provides the users with the possibility to store this information at their side. The European Self-Sovereign Identity Framework coordinated by the European Blockchain Service Infrastructure and by the European Blockchain coalition, sets governance frameworks for national implementation of the SSI by its Member States. The Netherlands, being one of the pioneers in the domain of SSI, develops its solutions under the cascaded EU project on European Self-Sovereign identity Framework (ESSIF) that is expected to be coupled with the existing eID schemes (e.g. DigiD) [6] and which is being assessed in conjunction to the revision of the eIDAS framework (e.g. eIDAS-Bridge [22]).

Half of the respondent countries mentioned usage of blockchain-based solutions in provision of public services for both businesses and citizens. Despite the solutions are rather domain-dependent and nationally bound, the States are principally developing solutions in comparable domains. Housing markets, supply chains and university certificates are among the most spread areas for blockchain implementation. For instance, in December 2019, Spain launched a BLUE project, which incorporates blockchain-based validation of certificates for 76 Spanish universities. Reducing the possibility for altering the certificates via distributed tamper-proof ledger, the Spanish government ensures integrity of the issued diploma and facilitates countrywide and cross-border recognition of national education. Similarly, the Maltese Ministry of Education and Employment has launched blockchain-based education certificates in 2017. Serving as an overarching validation mechanism, the Maltese Blockcerts project not only ensures the validity of the issued academic certificates for the students but also

enables receipt of blockchain accreditation certificates for education institutions. The project aims to ensure integrity and validation of the certificates and to ease the recognition of these certificates by foreign bodies, contributing in this way to the basis of the DE4A Studying Abroad pilot.

3.3 Single Digital Gateway: Life events

The 21 life events enumerated in the Regulation encompass the most vital services provided by public authorities and are expected to be set on digital track as a high priority. Embodying the principles of user-friendliness, Once-Only, digital by default and other principles of the Tallinn Declaration, the SDG regulation sets a baseline for general public sector transformation and the implementation of these services in particular. To take stock at the current level of the implementation of the life events, they were analysed from the perspectives of eID-accessibility, mobile friendliness of the solutions, principle of data reuse and availability of the services on a cross-border perspective. The received answers were coupled with the system of coefficients (See Annex I – Calculation methodology) and the aggregated sum was normalized within the [0;1] value range. As a result, for each life event, every mentioned parameter is evaluated from 0 to 1 in accordance with the values represented in the Table 6.

Table 6. Single Digital Gateway: interpretation of value range

Parameter	Value range	Interpretation
Means of authentication	0	The access to the service is available only by personal presence
Means of authentication	0.5	The access to the service is available through online non-eID means
Means of authentication	1	The access to the service is available through online eID-authentication
Mobile accessibility	0	There are no digital solutions for the service
Mobile accessibility	0.33	The service is available through desktop-enabled websites
Mobile accessibility	1	The service is available through both desktop and mobile friendly solutions
Appliance of OOP	0	The collected data is not currently reused
Appliance of OOP	0.33	Reuse of data is planned, but not technically implemented
Appliance of OOP	0.66	Only reuse of structured data is currently in place
Appliance of OOP	1	Reuse of both structured and unstructured data is implemented
Cross-border availability	0	The service has not been implemented for cross-border use yet
Cross-border availability	0.5	The information on the service is available for cross-border use
Cross-border availability	1	Both information and the service are available for cross-border use

To ensure the consistency and the scalability of the obtained results, the responses were analysed for the purpose of their representativeness. The following charts contain representation on the life events,

which holds a threshold of at least 60% of meaningfulness – i.e. the number of responses "Not applicable in my country", "Do not know" does not surpass 40% of the obtained results. For this reason, life events "Request for determination of applicable legislation in accordance with Title II of Regulation (EC) No 883/2004", "Obtaining stickers for the use of the national road infrastructure: time-based charges (vignette), distance-based charges (toll), issued by a public body or institution" and "Obtaining emission stickers issued by a public body or institution" cannot be considered as representative for this study.

Calculated as an aggregated percentage of all responses per each answer options, the four parameters – "Means of authentication", "Mobile accessibility", "Appliance of OOP (data reuse)" and "Cross-border availability" hold the 60% meaningfulness threshold and are represented in the following charts (Figure 11, Figure 12, Figure 13, Figure 14).

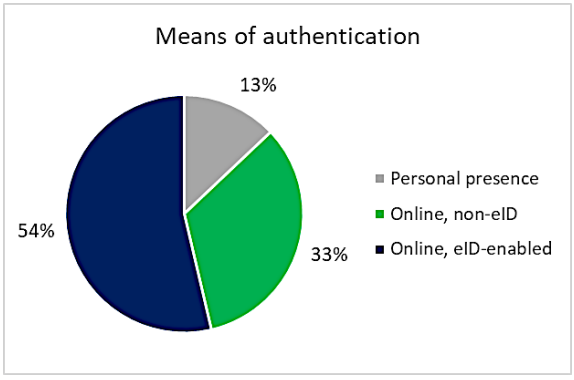

Figure 11. SDG live events: Means of authentication

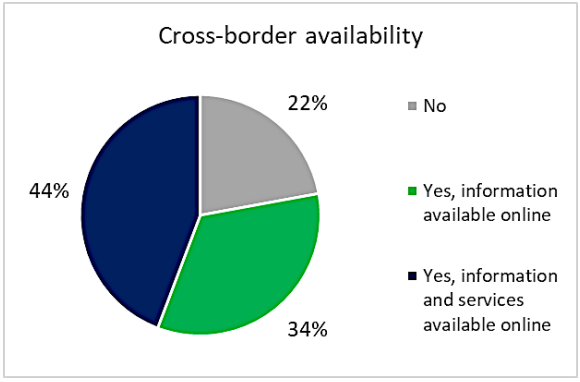

Figure 12. SDG live events: Cross-border availability

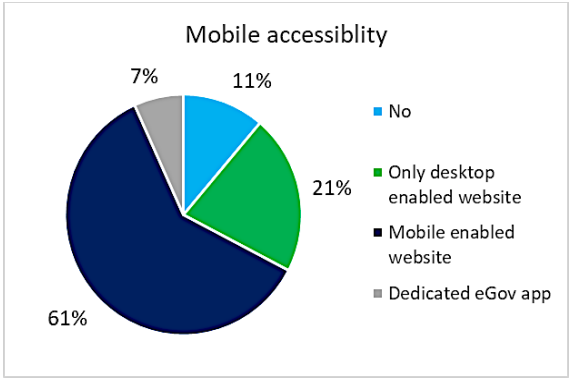

Figure 13. SDG live events: Mobile accessibility

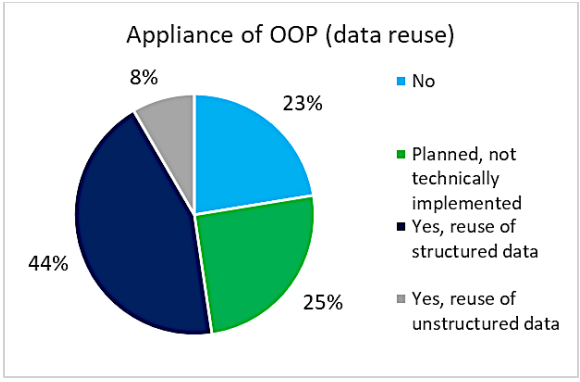

Figure 14. SDG live events: Appliance of data reuse principle

Similar logic is applied with regards to the aggregated representation of the chosen parameters.

Life events score differently on eID authentication, mobile friendliness, data reuse and cross-border use

Adaptability of the developed solutions for mobile devices has been fairly well achieved by the majority of the respondent countries. Reaching 68% of the life events Europe-wide, around two thirds of the countries have a mobile solution – a mobile-enabled website or a dedicated application – for the use of the relevant services. Simultaneously, only approximately half of the respondent countries reported to have life-event based services, available for authentication with eID means. Notably, several countries admit the availability of these services with exclusively national eID schemes. However,

according to the SDGR those MS having the procedures available online for national users will need to make them available cross-border (Art. 13 (1)). In a like manner, close to 80% of the countries demonstrated availability of the information concerning the access to services online for non-national users, whilst only half of them have actually enabled the actual provision of the services online. Furthermore, only half of the respondents exposed their current level of compliance with the Once-Only Principle. Constituting to approximately a quarter of all responses, countries report the absence of a comprehensive approach toward data reuse with respect to the identified list of life events. Whilst another quarter of the responses correspond to the availability of certain plans with regards to the OOP implementation, the other half of the respondents commit to have implemented the data reuse principles.

Countries with a federated government – such as The Netherlands, Belgium, Germany etc. – provide regional and local public authorities with a certain degree of liberty in the provision of public services, removing national constraints for developing digital solutions. Hence, countries with higher autonomy of regional and local public authorities might have different approaches toward the development process, which might lead to uneven results even in the context of one country.

Live events have an uneven level of implementation across Europe

Conducting self-assessment of the SDG-relevant life events, Figure 15 demonstrates aggregated progress on the development and implementation of the corresponding services under consideration of each of the four parameters. Represented at the Y-axis, the life events evidently indicate a different level of advancement if compared among each other.

Life events associated with tax collection – namely, “Submitting an income tax declaration” and “Submitting a corporate tax declaration” – have a distinctly higher score rate than other services. Compared to the other life events, tax collection is centralized at the federal level, which in its turn contributes to the consolidated approach toward the service development. In the centralized states, the processes are streamlined from the national onto subnational level. On the contrary, countries with federal structure – despite relative freedom for regional and local public authorities – have centralized centres for tax collection, conditioning the unique approach toward the tax-related processes onto lower administrative levels.

Whilst there are no major differences in the overall score of the services based on the four parameters for most of the services, there are several processes, which lay back in comparison to the overall advancement. Registration of a motor vehicle, application for the European Health Insurance Card, notification of personal and/or professional changes, change of address, request for diploma recognition and application for a public education institution score seemingly less than other services. The latter three services are use cases in DE4A pilots. With a minor variation, these services primarily yield availability of eID-authentication and principle of data reuse to the remaining life events.

The DE4A pilots oriented on moving, studying and doing business abroad are differently affected by the current development status. Whilst business-related events such as notification, obtaining permission, changes and termination of business along with the live events related to taxation and employment regulation are fairly well implemented, the life events induced in the processes of studying and moving abroad are laying behind the overall score of the SDG life events. Compared to other life events, the processes of address change and request for diploma recognition have scored around 1.5 times less than an average in terms of availability of eID-authentication and reuse of available data. However, several countries noted an evolving process of introduction of eID-authentication possibilities, which are firmly bound with on-going CEF initiatives on building blocks. The process of application for an education institute and change of the address are primarily processed by the regional and local public authorities, which might be associated with a possible lack of centralized coordination, conditioning comparatively a low score of data reuse.

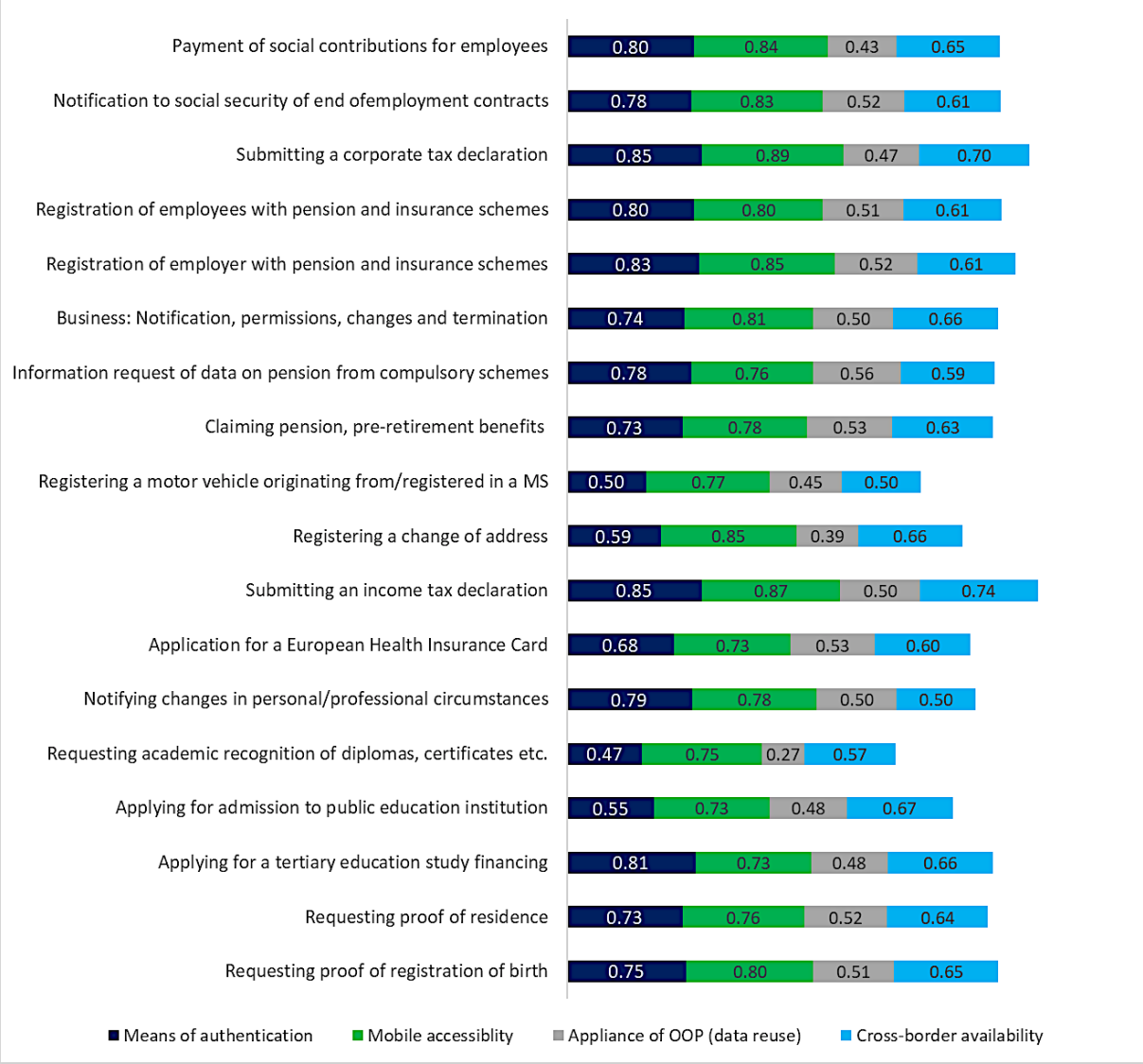

Figure 15. SDG life events: aggregated implementation progress

3.3.1 Digital-by-default

The responding countries report to have put in place various regulations and recommendations, establishing the ground for equality of digital- and offline service provision. For instance, imposing the legal obligation to provide both offline and online communication channels with the public administration, Austria passed the right to choose the most convenient communication method to the end-user, the government incentivises businesses and citizens to explore more innovative channels of interaction with the authorities. In line with the national and European digitalization agendas, over half of the country respondents noted an overall share of public services available online to constitute at least 60% of all national public services. Notably, the states did not signal any significant differences between the digital presence of public services at national and subnational levels.

Whilst some countries adopted a multi-channel approach, safeguarding access to the public services through different channels, several countries demonstrate a rather pro-active approach toward service provision. Not falling under the scope of the survey answer range, they, however, constitute an exemplary functioning of the public services foreseen by the Tallinn declaration. Prioritizing OOP and user-centricity at the base of the public service development, Austria has been continuously

scoring one of the highest in the DESI and eGovernment benchmarks. Pioneering its automated solutions, Austria presented a national service on receipt of child allowance automatically provided upon the registration of the new-born without filing a dedicated application form. Transforming a one-stop shop principle into no-stop provision of public services, Austria outperformed the European average on provision of certain public services.

4 Discussion of Obtained Results

The empirical research based on the DE4A survey and supported by the desk research on the relevant digitalization initiatives, was aimed to picture an overall level of eGovernment advancement in Europe. Attempting to cover the eGovernment blocks relevant for the DE4A project, the survey followed four major domains – Electronic Identification, Authentication and Trust Services, Digital Service Infrastructure, Single Digital Gateway and Once-Only Principle – which are of primary relevance for the DE4A pilots. In the context of the analysis, the following remarks should be considered:

- **Inconsistency of the state of implementation**. Despite the attempts of the European Commission to frame an implementation strategy to standardize and to guide digital transformation of the EU, its Member States demonstrate different levels of maturity and compliance with the harmonized EU level legislation. As seen on the examples of the DSI and eIDAS implementation, the European States hold onto different legal strategies when cascading the Commission's legislation onto the national level. Whilst certain countries establish tailored national policies and legislation in order to support country-wide implementation of e-government services (e.g. by favouring qualified or advanced trust services), others choose to rely on eIDAS as written without complementary national legal initiatives, or prefer to commence with the technical and operational development of supporting infrastructure without adopting dedicated national legislation. Similarly, the legal approach differs from Member State to Member State, with some preferring the introduction of specific obligations, and others relying on greater flexibility. As discussed under the SDG regulation, the Austrian government requires the public sector to provide multiple (online and offline) channels for interaction between public authorities and businesses and citizens, and allows businesses and citizens to choose their preferred channel. In contrast, Portugal prefers to maintain flexibility, giving the possibility of choice to public authorities, but highly encouraging them to entertain digital solutions.
- **Involvement of private sector in the provision of public services.** Trust toward the role of private entities in the provision of access to public services is unequally distributed in Europe. Whilst some countries express their mistrust toward excessive collaboration with private organizations, the private sector represents a tangible partner in the context of eServices provision. With almost 40% of the studied eID schemes to be maintained by private sector, they tend to demonstrate broader orientation of their services, and as such covering a significant share of the service market. Despite the fact that private entities are not directly involved in the vertical of the EU regulations, some States project the relevant regulation onto them. This is, for example, the case in the Netherlands, where a range of large digital service providers with a crucial role in e-government services are by law obliged to comply with the OOP, identifying the citizens based on their citizen service numbers.
- **Dependency of the eGovernment initiatives on an administrative system**. Multiple countries with a federated structure have distinctly emphasized the autonomy of regional and local governments to develop their proper eGovernment solutions. Depending on the level of legislative freedom of the subnational governments, they may acquire sufficient level of liberty to carry out subnational digitalization initiatives. As in the case of Germany, the states are the immediate source of provision of public services. The Federal Government establishes a generic national strategy on eGovernment and sets up guidelines on certain digitalization initiatives, holding the states accountable for their success of public service provision. In contrast, Austria – being also a federated state – leaves out fewer legislative powers to the provinces, consolidating the major decision-making mechanisms on eGovernment matters at the federal level.

The study also revealed scattered results of eGovernment development in Europe. Despite the available common digitalization strategy and principles of the EU, certain countries demonstrate a

higher level of involvement in European eGovernment initiatives complemented with national digitalization projects.

The eIDAS regulation created a single legal environment for the European countries to interact with each other in the context of access to public services via notified eIDs, and obliged the Member States to recognize and accept eIDAS-compliant identification mechanisms. With the vast majority (over 90%) of the country respondents stating to have a national eID-scheme, approximately a third of them (17 out of 45 studied eID schemes) have already been (pre-)notified under the eIDAS network, being assigned to a respective level of assurance. Among the studied eID-schemes, public and private organizations were sharing 93% of all the available authentication means, with the remaining 7% to be operated by public-private parnerships. Notably, eID schemes operated by the public sector are more broadly distributed, whereas private sector operated schemes are more broadly activated. Additionally, despite the comparability of the functional principles, publicly operated eID-schemes tend to have a lower access rate compared to non-governmental services such as banking, telecom, etc.

Postulating the necessity of the EU Member States to mutually recognize national eID schemes of other countries, the eIDAS regulation obliges national eIDAS-Nodes to accept foreign eID-schemes in the national context. Noticeably, the acceptance of foreign eIDs by national eIDAS-Nodes reaches 91%, whereas the support of sending national eIDs to foreign eIDAS-Nodes is implemented in only 70% of the respondent countries.

Trust services demonstrate a rather advanced development, especially that of the eSignature trust services. Whilst there is no apparent evidence on any dependency of a more complex development stage of trust services (e.g. qualified trust service or advanced trust service), all three types of trust services deem to have been widely spread for national use and crossing the border for international use.

Digital Service Infrastructures, being one of the underlying elements behind the European interoperability, have scored differently in terms of their adoption rate by the Member States. Business Registry Interconnection System (BRIS) has been set on practical implementation by all studied countries, whereas seven more DSIs – consisting both of domain-independent and domain-specific building blocks – have similarly demonstrated comparatively high outcomes, bringing on board more than 85% of respondent countries. European Blockchain Services Infrastructure, constituting an independent building block, suggests the implementation of blockchain technologies into other building blocks to increase transparency and accountability. The developed blockchain-based solutions are argued to provide more possibilities for cross-border cooperation for provision of public services.

Essential life events, elaborated by the Single Digital Gateway Regulation, have become a baseline for provision of public services, composing the most urgent services to be implemented in the first place. Overall, countries have demonstrated an uneven level of development of the services, demonstrating a distinctively more advanced level by services associated with the tax collection. Simultaneously, some of the services which are directly involved in the development of DE4A pilot cases showed a significantly lower performance in terms of the possibility for eID-authentication and reuse of available data. Generally, the eID-authentication was available in approximately 50% of the cases, whereas several countries claimed expansion of eID-enabled services after the completion of the on-going CEF projects. The reuse of data in the context of these services is similarly limited to 52%, leaving out space for improvement for OOP. The mobile accessibility of the associated services is considerably high, offering mobile-enabled solutions in 80% of the cases. Markedly, several countries demonstrate considerable advancement in provision of user-centric services via the offering of automated services and transferring the one-stop shop concept into pro-active service offer, i.e. no-stop shop.

5 Conclusions

The aim of this study was to take stock at the existing eGovernment landscape was threefold:

- Investigating the advancement of the eGovernment initiatives under the umbrella of European Single Market;
- Provide an input for subsequent work packages under the DE4A project;
- Establish a referential point for evaluating the advancement on eGovernment initiatives for the foreseen research early 2021.

Framed by the DE4A Grant Agreement number 870635 and by additional literature research, the analysis on the eGovernment landscape mainly consisted of four parts: compliance with the regulation on Electronic Identification and Trust Services, analysis of the adoption level of the Digital Service Infrastructures, stocktaking of the implementation level of life events under the Single Digital Gateway and realization of the Once-Only Principle (the full report on OOP is the subject of D1.3 deliverable "Member State Once Only and data strategy Baseline").

Due to the amplitude of the eGovernment concept, the research was consolidated on the most essential performance indicators identified per each domain. Both the multifaceted nature of the study and a broad set of countries with different experience in eGovernment that have participated in the survey, should have created a representative image of the current digital development in Europe. Providing a top-level overview of the status of digital initiatives in Europe, it is worth mentioning the dynamic nature of the research matter. The vast number of on-going eGovernment projects continuously shape the eGovernment landscape, reasoning the necessity for more frequent update of the established baseline.

Despite the dynamic nature of eGovernment initiatives, a snapshot of the current level of digital integration of the European shared digital space is practical for evaluating national eGovernment strategies. The present study, measuring the advancement of the eGovernment achievements in Europe, establishes a benchmark for future digitalization initiatives, serving as a referential point for further assessments.

Despite the significant number of eGovernment initiatives in the EU, it is crucial, however, to recognize the importance of the national context of digitalization strategies. Despite functioning in a shared European space, the States have different processes and legislation in place, which poses certain and significant challenges for establishment of a seamless cross-border platform for public service provision. Furthermore, there is a common trend for increasing private sector participation in the domain of service provision, which could reorient the available services, enabling provision of non-governmental services such as telecom, banking etc. The administrative structure of the country has also been repeatedly reported as an additional factor influencing the progress of the national digitalization strategy.

The limitations of the methodology discussed in the Chapter 2.3, have been meticulously addressed at the stage of data cleansing and data analysis, where dubious raw data was compared against the comments left in the comment box and via means of supplementary desk research. However, despite the measures taken to avert the risk of data corruption, the study cannot be considered as completely exhaustive. The collected data in this study accounts to 77.5% of the respondents, potentially leaving room for minor deviations if extrapolated onto all the countries.

Nonetheless, despite the potential restrictions in the context of the result scalability, the report covers the profiles of all states participating in the subsequent pilot use cases, by this providing sufficient insight into the current level of eGovernment advancement. Contributing to the T2.3, the report will support an assessment of the existing architecture for constructing to-be solutions. The second

evaluation of the eGovernment landscape will be made in the second half of the 2021, revealing the progress on the digitalization strategy.

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Annexes

Annex I – Calculation methodology

Table 7. Calculation methodology

Reference	Chart	Indicator description	Calculation methodology
eIDAS	Number of national eID schemes per country	Distribution of number of national eID schemes	For all possible numbers of national eID schemes, the number of countries with the respective eID schemes quantity is calculated.
eIDAS	Notification status of eID-schemes	Distribution of national eID schemes by the status of their notification under the eIDAS regulation	The number of national eID schemes with the respective notification status divided by the overall number of eID schemes. Not included: Answers "Do not know", "Not applicable".
eIDAS	Level of assurance of eID-schemes	Distribution of national eID schemes by the notified level of assurance	The number of national eID schemes with the respective level of assurance divided by the overall number of eID schemes. Not included: Answers "Do not know", "Not applicable".
eIDAS	Operating entities of national eID-schemes	Distribution of national eID schemes by the type of operating entity	The number of national eID schemes with the respective operating entity divided by the overall number of eID schemes. Not included: Answers "Do not know", "Not applicable".
eIDAS	Service orientation of eID-schemes depending on the operating entity	Share of national eID schemes enabling access to certain types of services depending on their operating entity	For each of the operating entities the number of linked services is calculated. The quantity of the linked services is normalized by the number of eID schemes operated by the respective entity. Not included: Answers "Do not know", "Not applicable".

Reference	Chart	Indicator description	Calculation methodology
eIDAS	Implementation of access to services depending on the operating entity	Breakdown of the operating entities providing specific types of services	For each type of eIDAS-enabled services the share of operating entities providing the access to this type of services is calculated. Not included: Answers "Do not know", "Not applicable".
eIDAS	Adoption rate of national eID-schemes depending on the operating entity	Comparison of possession, activation and use rate of national eID schemes depending on their operating entity	For each of the operating entity the average values of possession, activation and use rate are calculated. Not included: Answers "Do not know", "Not applicable".
eIDAS	Implementation status of eIDAS-Node	Comparison of availability of national eIDAS-Node for supporting foreign eID schemes in national scope and enabling use of national eID schemes abroad	The number of countries where eIDAS-Node enables support of foreign eIDs / national eIDs abroad divided by the overall number of respondents. Not included: Answers "Do not know", "Not applicable".
eIDAS	Implementation level of trust services	Comparison of trust services by their advancement in electronic, advanced and qualified implementation	Answers are assigned to a set of coefficients: 0 - Not implemented 1 - Necessary legislative procedures adopted 2 - Implemented for national use 3 - Implemented for cross-border use For each trust service, answers are counted and multiplied with the above coefficients by category. Summed up per each trust service, they are normalized by the number of respondents and the introduced coefficient system. Not included: Answers "Do not know", "Not applicable".

Reference	Chart	Indicator description	Calculation methodology
SDG	SDG live events: Means of authentication, Cross-border availability, Mobile Accessibility, Appliance of data reuse principle	Distribution of possible answers per parameter	The number of the response occurrence divided by total number of responses, grouped by four parameters: Cross-border availability, Mobile Accessibility, Appliance of data reuse principle. Not included: Answers "Do not know", "Not applicable".
SDG	SDG life events: Aggregated implementation progress – Means of authentication	Distribution of implementation advancement of SDG Life Events by the provided means of authentication	Answers are assigned to a set of coefficients: 0 - Personal presence 1 - Online, non-eID 2 - Online, eID-enabled For each authentication means, answers are counted and multiplied with the above coefficients by category. Summed up per each authentication means, they are normalized by the number of respondents and the introduced coefficient system. Not included: Answers "Do not know", "Not applicable".
SDG	SDG life events: Aggregated implementation progress – Mobile accessibility	Distribution of implementation advancement of SDG Life Events by the provided distance accessibility	Answers are assigned to a set of coefficients: 0 - No 1 - Only desktop enabled website 2 - Mobile enabled website 2 - Dedicated eGov app For each format, answers are counted and multiplied with the above coefficients by category. Summed up per each format, they are normalized by the number of respondents and the introduced coefficient system. Not included: Answers "Do not know", "Not applicable".

Reference	Chart	Indicator description	Calculation methodology
SDG	SDG life events: Aggregated implementation progress – Application of OOP	Distribution of implementation advancement of SDG Life Events by the corresponding level of data reuse	Answers are assigned to a set of coefficients: 0 - No 1 - Planned, not technically implemented 2 - Yes, reuse of structured data 3 - Yes, reuse of unstructured data For each data reuse format, answers are counted and multiplied with the above coefficients by category. Summed up per each format, they are normalized by the number of respondents and the introduced coefficient system. Not included: Answers "Do not know", "Not applicable".
SDG	SDG life events: Aggregated implementation progress – Cross-border availability	Distribution of implementation advancement of SDG Life Events by their availability for cross-border use	Answers are assigned to a set of coefficients: 0 - No 1 - Yes, information available online 2 - Yes, information and services available online For each format of cross-border availability, answers are counted and multiplied with the above coefficients by category. Summed up per each format, they are normalized by the number of respondents and the introduced coefficient system. Not included: Answers "Do not know", "Not applicable".

Reference	Chart	Indicator description	Calculation methodology
DSI	Implementation level of Digital Service Infrastructures	Comparison of implementation advancement among the Digital service Infrastructures	Answers are assigned to a set of coefficients: 0 - Not implemented 1 - Necessary legislative procedures adopted 2 - Fully/partially Implemented for national use For each DSI, answers are counted and multiplied with the above coefficients by category. Summed up per each DSI, they are normalized by the number of respondents and the introduced coefficient system. Not included: Answers "Do not know", "Not applicable".

Annex II – Survey

Digital Europe for All (DE4A) survey: *Country*

Purpose of the survey and data protection

Dear member state representatives,

On January 1st of this year, the EU member state-driven project Digital Europe for All (DE4A) started. DE4A aims at creating an open and comprehensive environment and platform to support public administrations in delivering secure, high quality and fully online cross-border procedures for citizens and businesses. You can read more about the project on the project website, https://www.de4a.eu/.

The present survey that we kindly ask you to fill in, takes stock of the current deployment of cross-border services, hereby providing insights into the barriers to cross-border interoperability and the enablers to address them. The collected data will be used to analyse the current status of eGovernment in the member states in order to identify the construction base for the target technical architecture and eGovernment environment. Likewise, the derived insights and good practices will serve as practical guidelines for the development and deployment of digital public services for other EU member states.

The survey consists of four major blocks: (1) electronic IDentification, Authentication and trust Services, (2) assessment of Life Events under Single Digital Gateway Regulations, (3) Digital Service Infrastructure, (4) Once-Only Principle and Data strategy.

We kindly ask you to express your opinion on the eGovernment advancement. The collected data will be used to create an aggregated report depicting an overall eGovernment landscape of the EU member states. We encourage you to make use of the comment boxes at the end of every subchapter of the survey in order to indicate legislative, technical, or other particularities relevant for understanding the national context. Please note that we do not request official positions of the EU member states and that no individual responses will be published.

Data protection statement

This survey is performed in the frame of the Digital Europe for All Project (DE4A - https://www.de4a.eu/), which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870635.

Please note that your participation in this survey implies the processing of your personal data. We will process your personal data in compliance with the Regulation (EU) n° 2016/679 on the processing of personal data (the GDPR). The input you provide will only be shared outside of the DE4A consortium in the form of de-identified aggregated data. Within the DE4A consortium, we will process your data in order to analyse your answers as foreseen in accordance with the grant agreement, on the basis of our public interest tasks. For further information or to exercise your rights, you may contact our project DPO via privacy@de4a.eu. These rights include requesting copies, correction, or deletion of your personal data, or restricting/objecting to further processing (all within the constraints of the grant agreement). You have the right to lodge a complaint with the competent data protection authority.

eIDAS: notified eID-schemes

This part of the questionnaire takes stock of the implementation of national eID scheme under eIDAS Regulation (EU) No 910/2014.

1. Please check the accuracy of the available information of your national eID scheme presented at the eID User Community:

National eID scheme	Level of assurance	Status	eID means
Notified_national_eID_scheme_1	LOA_1	Status_1	eID_means_1
Notified_national_eID_scheme_2	LOA_2	Status_2	eID_means_2
Notified_national_eID_scheme_3	LOA_3	Status_3	eID_means_3

If there are any updates with regards to the (pre-)notified eID scheme(s) (e.g., level of assurance, current notification status), please leave a comment in the following text box.

……

2. The eID scheme is operated by:

	Public entity	Private entity	Public-private partnership	Do not know / Other (please specify)
Notified_national_eID_scheme_1	○	○	○	○
Notified_national_eID_scheme_2				
Notified_national_eID_scheme_3				

Other (please specify) ……

3. The implementation level of eID scheme is:

	Not implemented	Necessary legislation adopted	Implemented for national use	Implemented for cross-border use	Do not know / Other (please specify)
Notified_national_eID_scheme_1	○	○	○	○	○
Notified_national_eID_scheme_2					
Notified_national_eID_scheme_3					

Other (please specify) ……

4. The eID scheme grants access to:

	National public services	Public services from regional / local authorities	Non-governmental services (e.g. Banking, Telecom) - please specify	Do not know

Notified_national_eID_scheme_1	☐	☐	☐	☐
Notified_national_eID_scheme_2				
Notified_national_eID_scheme_3				

Other (please specify) ……

5. Please indicate possession rate for all the listed eID schemes. *Possessions rate is a ratio of total number of eID holders to total number of inhabitants (citizens + foreign residents).*

Notified_national_eID_scheme_1 ……

Notified_national_eID_scheme_2 ……

Notified_national_eID_scheme_3 ……

6. Please indicate activation rate for all the listed eID schemes where applicable. *Activation rate is a cumulative ratio of activated eIDs to total number of eIDs.*

Notified_national_eID_scheme_1 ……

Notified_national_eID_scheme_2 ……

Notified_national_eID_scheme_3 ……

7. Please indicate use rate for all the listed eID schemes where applicable. *Use rate is a cumulative ratio of eIDs which have been used at least once to access a public service to the total number of eIDs.*

Notified_national_eID_scheme_1 ……

Notified_national_eID_scheme_2 ……

Notified_national_eID_scheme_3 ……

8. Please provide any further information which, in your opinion, is important for our understanding of your country's context with regards to the topics mentioned in this subchapter.

……

9. Are there any other national eID schemes in operation which have not been listed in this subchapter?

○ Yes

○ No

eIDAS: new eID schemes

This subchapter only appears, if in question 9 answer "yes" is selected

Please provide information concerning operating national eID schemes.

10. Please insert below the name(s) of your new national eID scheme(s):

eID_scheme_1 ……

eID_scheme_2 ……

eID_scheme_3 ……

eID_scheme_4 ……

eID_scheme_5 ……

11. Please indicate the corresponding level of assurance of the eID scheme(s):

	Low	Low	High	Not relevant / Do not know
eID scheme (1)	☐	☐	☐	☐
eID scheme (2)				
eID scheme (3)				
eID scheme (4)				
eID scheme (5)				

Other (please specify) .....

12. Please identify the level implementation of the eID scheme(s):

	Necessary legislation adopted	Implemented for national use	Implemented for cross-border use	Not relevant / do not know
eID scheme (1)	○	○	○	○
eID scheme (2)				
eID scheme (3)				
eID scheme (4)				
eID scheme (5)				

Other (please specify) .....

13. The eID scheme(s) is/are operated by:

	Public entity	Private entity	Public-private partnership	Not relevant / Do not know
eID scheme (1)	○	○	○	○
eID scheme (2)				
eID scheme (3)				
eID scheme (4)				
eID scheme (5)				

Other (please specify) .....

14. The eID scheme(s) grant(s) access to:

	National public services	Public services by regional / local authorities	Non-governmental services (e.g. Banking, Telecom) - please specify	Not relevant / Do not know
eID scheme (1)	☐	☐	☐	☐
eID scheme (2)				
eID scheme (3)				
eID scheme (4)				
eID scheme (5)				

Other (please specify) .....

15. Please indicate possession rate for all the listed eID schemes. *Possessions rate is a ratio of total number of eID holders to total number of inhabitants (citizens + foreign residents).*

eID_scheme_1 .....

eID_scheme_2 .....

eID_scheme_3 .....

eID_scheme_4 .....

eID_scheme_5 .....

16. Please indicate activation rate for all the listed eID schemes where applicable. *Activation rate is a cumulative ratio of activated eIDs to total number of eIDs.*

eID_scheme_1 .....

eID_scheme_2 .....

eID_scheme_3 .....

eID_scheme_4 .....

eID_scheme_5 .....

17. Please indicate use rate for all the listed eID schemes where applicable. *Use rate is a cumulative ratio of eIDs which have been used at least once to access a public service to the total number of eIDs.*

eID_scheme_1 .....

eID_scheme_2 .....

eID_scheme_3 .....

eID_scheme_4 .....

eID_scheme_5 .....

18. Please provide any further information which, in your opinion, is important for our understanding of your country's context with regards to the topics mentioned in this subchapter.

.....

eIDAS: eIDAS-Node and trust services

19. Does your eIDAS-node support using your national eID's abroad?

- ○ Do not know
- ○ Yes
- ○ No (please specify expected date of production) .....

20. Does your eIDAS-node support foreign eIDS's to be used for services in your country?

- ○ Do not know
- ○ Yes
- ○ No (please specify expected date of production) .....

21. The Regulation on electronic identification and trust services (eIDAS) foresees the implementation of eSignature, eSeal and Timestamps. Please identify the advancement level of those services in your country:

	Do not know	Not implemented	Necessary legislative procedures adopted	Implemented for national use	Implemented for cross-border use
Electronic Signature	○	○	○	○	○
Advanced Electronic Signature					
Qualified Electronic Signature					
Electronic Seal					
Advanced Electronic Seal					
Qualified Electronic Seal					
Electronic TimeStamp					
Qualified Electronic TimeStamp					

22. Please provide any further information which, in your opinion, is important for our understanding of your country's context with regards to the topics mentioned in this subchapter.

……

Single Digital Gateway: Life Events

The Single Digital Gateway Regulation specifies a list of 21 procedures, covering the major life events of the EU citizens: Birth, Residence, Studying, Working, Moving, Retiring, Running a business. Please provide the current status of the digital presence and mobile availability of the 21 procedures in your country.

23 & 24. Please indicate the level of online availability of information, service and assistance with respect to the mentioned procedures:

Online authentication, possible answers from drop-down list: (1) Personal presence, (2) Online, non-eID, (3) Online, eID-enabled, (4) Do not know, (5) Not applicable

Implementation of the OOP (data reuse), possible answers from drop-down list: (1) No, (2) Planned, not technically implemented, (3) Yes, reuse of unstructured data, (4) Yes, reuse of structured data, (5) Do not know, (6) Not applicable

Mobile accessibility, possible answers from drop-down list: (1) No, (2) Only desktop enabled website, (3) Mobile-enabled website, (4) Dedicated eGov app, (5) Do not know, (6) Not applicable

Online availability for cross-border use, possible answers from drop-down list: (1) No, (2) Yes, information available online, (3) Yes, information and services available online, (5) Do not know, (6) Not applicable

	Online authentication	**Implementation of the OOP (data reuse)**	**Mobile accessibility**	**Online availability for cross-border use**
Requesting proof of registration of birth				
Requesting proof of residence				

Applying for a tertiary education study financing				
Submitting an initial application for admission to public tertiary education institution				
Requesting academic recognition of diplomas, certificates or other proof of studies or courses				
Request for determination of applicable legislation in accordance with Title II of Regulation (EC) No 883/2004 (1)				
Notifying changes in the personal or professional circumstances of the person receiving social security benefits				
Application for a European Health Insurance Card				
Submitting an income tax declaration				
Registering a change of address				
Registering a motor vehicle originating from or already registered in a Member State				
Obtaining stickers for the use of the national road infrastructure				
Obtaining emission stickers issued by a public body or institution				
Claiming pension and pre-retirement benefits from compulsory schemes				
Requesting information on the data related to pension from compulsory schemes				
Business activity: Notification, permission for exercising, changes and termination				

Registration of an employer with compulsory pension and insurance schemes				
Registration of employees with compulsory pension and insurance schemes				
Submitting a corporate tax declaration				
Notification to the social security schemes of the end of contract with an employee				
Payment of social contributions for employees				

25. Are there any procedural frameworks in place, which reckon for involvement of other parties (e.g., private entities, end-users etc.) in the process of co-creation?

……

26. What is approximate percentage of services available digitally as compared to overall number of public, administrative services

at national level……

at regional/local level……

27. What is approximate percentage of digital-only services (*services available exclusively online*)?

at national level……

at regional/local level……

28. Please provide any further information which, in your opinion, is important for our understanding of your country's context with regards to the topics mentioned in this subchapter.

……

Digital Service Infrastructure

The aim of this subchapter is to identify the level of advancement of Digital Service Infrastructures (DSIs). The DE4A project will be implemented in compliance with the existing DSIs, with the goal of delivering a network of public services available for citizens, businesses and public administrations.

29. Please indicate the level of advancement of the DSIs listed below:

	Do not know	Not implemented	Necessary legislative procedures adopted	Fully/partially Implemented for national use
EU Student eCard	○	○	○	○
eDelivery				
eInvoicing				
Access to re-usable public sector information – Public Open Data				

Automated Translation				
Critical digital infrastructures support – Cybersecurity				
eProcurement				
eHealth - ePrescriptions				
eHealth - cross-border patient data sharing				
Business registers interconnection system				
Electronic exchange of social security information				
e-Justice - Use case of citizens				
e-Justice - Use case of businesses				
Online Dispute Resolution				

30. Please indicate implemented and running use cases of Blockchain technology for the purpose of provision of public services (name and a brief description of its implication - e.g. public procurement, internal financial audit etc.):

……

31. Please provide any further information which, in your opinion, is important for our understanding of your country's context with regards to the topics mentioned in this subchapter.

……

Once-Only Principle and Data strategy

This part of the questionnaire measures the member states' implementation of the Once-Only Principle (OOP) and reuse of data principle. Enshrined in the eGovernment Action Plan, the OOP implies the reduction of administrative burdens for the EU citizens, businesses, institutions and public administrations by allowing them to provide a certain type of information once and implying the reuse of the collected data upon the consent of all parties.

32. Is there any national digital transformation strategy which sets forth a set of strategic and tactical measures to support eGovernment development?

- ○ Do not know
- ○ No
- ○ Yes (please provide a link) ……

33. To what extent has your country adopted a data strategy? Check all that apply.

- ☐ A national strategy of reusing public sector data in the public sector
- ☐ A national strategy for harmonization of data across select registries
- ☐ A national strategy for Open Data
- ☐ Implementation of Open Data by default
- ☐ One or more national catalogs of data sets to make data findable

☐ A national governance implementation supporting data access

☐ Other (please specify) ……

34. Which base registries implemented for national use can be accessed by private entities?

☐ Persons/citizens

☐ Vehicle

☐ Tax

☐ Businesses

☐ Addresses

☐ Building and housing

☐ Cadasters

☐ Geographical data

☐ Higher Education

☐ None

☐ Other (please specify) ……

35. Please elaborate on the types of private companies which can access base registries and the access conditions:

……

36. Please indicate how the access to base registries is implemented. Check all that apply.

☐ Replication of registries to authorities that need access

☐ Data lookup supported by API's

☐ Subscription of data for public services

☐ Access to base registries is subject to transactional fees

☐ Access to data services under authorization processes

☐ Other (please specify) ……

37. Are there any fees introduced for access to cross-border registries for private and public organizations?

Possible answers of drop-down lists: (1) Yes, (2) No, (3) Do not know

	Public organizations	Private organizations
Are there fees applied for national transactions?		
Are there fees applied for cross-border transactions?		
Are there fees intended to be applied for cross-border transactions?		

Other (please specify) ……

38. What communication patterns are supported in the offering of public services in your country?

- Synchronous (direct response to a request, typically within seconds)
- Asynchronous (delayed response, hours or even days)
- A mix of both
- Do not know

39. Please check the types of personal information citizens can examine and verify the access to by public officials:

	Not implemented	Citizens can access their own data	Citizens can verify access to their data by others	Not applicable in my country	Do not know
Personal file	☐	☐	☐	☐	☐
Tax declarations					
Medical file					
Cadasters (private property)					
Personal mandates					
None					

Other (please specify) .....

40. To what extend is OOP implemented in your country? Check all that apply.

- ☐ OOP is implemented broadly at the national level
- ☐ OOP is implemented in certain areas or organisations at the national level
- ☐ OOP is implemented broadly at the regional level
- ☐ OOP is implemented in certain areas/organisations at the regional level
- ☐ OOP is implemented at all levels of power
- ☐ Do not know
- ☐ Other (please specify) .....

41. In what cross-border OOP initiatives is/has your country been involved? Check all that apply.

- ☐ The Once-Only-Principle (TOOP)
- ☐ Business Registers Interconnection System (BRIS)
- ☐ Stakeholder Community Once-Only Principle for Citizens (SCOOP4C)
- ☐ European Criminal Records Information System (ECRIS)
- ☐ European Data Interchange for Waste Notification Systems (EUDIN)
- ☐ Connecting European Facility (CEF) programs

☐ Simple Procedures Online for Cross-Border Services (SPOCS)

☐ Interoperability solutions and common frameworks for European public administrations, businesses and citizens (ISA2)

☐ None

☐ Other (please specify) ……

42. In your opinion, what would be beneficial outcomes of national implementation of the OOP? Please specify in the textbox below any further expected benefits for your government from the national OOP implementation:

	Very unlikely	Unlikely	Neutral	Likely	Very likely
Efficiency	○	○	○	○	○
Administrative simplification					
Time savings					
Cost savings					
Increased collaboration between agencies					
Better governance					
Avoidance of duplication of tasks					
Increased data quality and reliability					
Increased interoperability					
Increased transparency and accountability					
Fraud reduction					

Other (please specify) ……

43. In your opinion, what would be beneficial outcomes of cross-border implementation of the OOP? Please specify in the textbox below any further expected benefits for your government from the cross-border OOP implementation:

	Very unlikely	Unlikely	Neutral	Likely	Very likely
Efficiency	○	○	○	○	○
Administrative simplification					
Time savings					
Cost savings					
Increased collaboration between agencies					
Better governance					
Avoidance of duplication of tasks					
Increased data quality and reliability					

Increased interoperability					
Increased transparency and accountability					
Fraud reduction					

Other (please specify) .....

44. How would you evaluate the likelihood of the following national, administrative factors to impede the European OOP implementation for your government?

	Not a barrier	Moderate barrier	Substantial barrier	Extreme barrier
Absence / insufficiency of national legislative framework	○	○	○	○
Incompatibility of national legislative frameworks of the EU member states				
Administrative complexity / Organizational silos				
Organizational resistance to changes				
Organizational and cultural differences among stakeholders				
Lack of financial resources				
Asymmetric costs distribution in the cross-border context				
Costs of sustaining the services in the long-term				
Lack of relevant human resources				
Political vulnerability and lack of political support				
Low take-up, low expectancy of number of potential users				
Different OOP levels in other EU member states				

Other (please specify) .....

45. How would you evaluate the likelihood of the following technical factors to impede the OOP implementation for your government?

	Not a barrier	Moderate barrier	Substantial barrier	Extreme barrier
Incompatibility of IT-processes / IT-standards / used technologies	○	○	○	○
Data incompatibility				
Deficient data quality				
Semantic incompatibility of information systems and used datasets				
Uneven quality of used technologies to ensure quality and security of the transferred and used data				

Other (please specify) .....

46. Is there specific legislation in your country at the national or federal level governing the OOP, i.e. legislation that allows or requires a public administration to exchange information in relation to a specific user directly from a trustworthy source to another public administration?

- ○ No
- ○ Do not know
- ○ Yes (please provide a link to the relevant law) ……

47. What sources of data are covered (i.e. what databases or data sources fall under the once-only principle and can be exchanged under the principle) by the respective legislation?

……

48. What are the procedural requirements or preconditions for an exchange under the respective legislation? Check all that apply.

- ☐ No conditions – any party may receive and use our data as-is without restrictions or prior authentication (data is shared as open data)
- ☐ Prior request from the user
- ☐ Authorization must be written into the law
- ☐ Authorization must be obtained from an authority designated in the law
- ☐ Agreement between the sending and receiving administrations
- ☐ Obligation to use certain data formats
- ☐ Obligation to use certain intermediary authorities to organise the exchanges
- ☐ Obligation to use certain security measures in relation to the data
- ☐ Limitations on the permitted use of the data
- ☐ Other (please specify) ……

49. Does the law make a distinction between requests coming from public administrations in your own country compared to from other countries? Specifically, is there any part of the law that makes it impossible or harder for your administrations to apply the OOP towards requesting administrations in or from other countries than your own (e.g. no transfer is allowed to foreign administrations, or there is a procedural requirement that in practice cannot cover foreign administrations)? If so, please describe the relevant provisions.

……

50. What are other sources of OOP regulation in your country? Check all that apply.

- ☐ None
- ☐ Non-legislative measures (strategies, green / white papers, etc.)
- ☐ Written guidelines or recommendations
- ☐ OOP is an unwritten rule / practice
- ☐ Other (please specify) ……

51. How would you evaluate the general attitude and willingness in your country towards the following aspects of OOP?

	Unsure / no information	Very cautious	Somewhat cautious	Mostly open	Very open
Sharing data with public organizations within the country	○	○	○	○	○
Sharing data with private organizations within the country					
Sharing data with other countries					
Sharing personal data with public organizations in the country					
Sharing personal data with private organizations in the country					
Sharing personal data with other countries					
Changing existing organizational processes, procedures and structures to enable OOP nationally					
Changing existing organizational processes, procedures and structures to enable cross-border OOP					
Changing existing technological solutions (information systems, architectures), etc. to enable OOP nationally					
Changing existing technological solutions (information systems, architectures), etc. to enable cross-border OOP					

52. Please provide any further information which, in your opinion, is important for our understanding of your country's context with regards to the topics mentioned in this subchapter.

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Contact information

53. Please provide contact details of people (name, email and/or phone number) who we could contact in case we would need some additional clarification or for the purpose of a personal interview:

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