Ekaterina Fedko

Implementation of the Once-Only Principle in the cross-border context: analysis of good practices

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Supervisor: Prof. Dr. ir. Joep Crompvoets

Presented by: Ekaterina Fedko,
Rue Jourdan 142,
1060 Brussels
+32 494 164581
katerina.fedko@gmail.com

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Abstract

The rapid growth of Information and Communication Technologies in the second half of the XX century conditioned digitalization of public services. First guided by the national initiatives, the Member States of the European Union later aimed for establishment of shared digital space to enable the potential of the mass digitalization and benefit its citizens and businesses. The capacity of information-sharing as one of the most indispensable features of cross-border service functioning, postulated the necessity for multi-layer interoperability, enabling smooth transaction of data between multiple stakeholders. Once-Only Principle, constructing upon the achieved interoperability facilities, aims to reduce the administrative burden from citizens and businesses via warranting reuse and share of previously submitted data under the existing national and European regulations. However, characterized by different advancement level of the available technologies and policies, the countries have been advancing at different pace, achieving different indices of implementation of the Once-Only. For the Once-Only Principle to be one of the cornerstone elements of European eGovernment Agenda, the present thesis will research upon the practices and strategies of Once-Only implementation among the EU Member States. The analysis will be conducted under the lens of previous achievements toward Once-Only and is aimed at identification of list of characteristics, which can later constitute to the set of good practices and be potentially applied onto further propagation of Once-Only principle in other Member States.

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Abbreviations

API	Application Programming Interface
BMI	Federal Ministry of the Interior, Building and Community
CBS	Cross-border services
CEF	the Connecting Europe Facility
DE4A	Digital Europe for All
DINSIC	Inter-Ministerial Directorate for Digital Affairs and State Information and Communication System
DITP	Inter-Ministerial Directorate for Public Transformation
DSI	Digital Service Infrastructure
DSMS	Digital Single Market Strategy
eID	electronic identification
EIF	European Interoperability Framework
EIS	European Interoperability Strategy
EU	European Union
GDPR	General Data Protection Regulation
ICT	Information and Communication Technologies
ISA	Interoperability Solutions for Public Administrations
IT	Information technologies
MS	Member State
OOP	Once-Only Principle
OZG	Law on online access to administrative services
RIE	Inter-ministerial network of the State
SDGr	Single Digital Gateway Regulations
TOOP	the Once-Only-Principle Project

1   Introduction

The rapid development of Information and Communication Technologies (ICT) has significantly transformed the perception of public sector functioning. Emerged in the early 2000s, the concept of electronic government (hereinafter eGovernment) has been actively deployed among public administrations to address the existing challenges. While the adoption process of eGovernment tools – due to its innovativeness – has been facing certain challenges, it is broadly expected to contribute to the improvement of bureaucratic procedures and bridge administrative silos (Heeks, 1999).

Research on the potential of ICT in the public domain and the development of digital solutions has been happening in parallel with further European integration. Simplification of transnational trade led to the economic integration of the European Union (EU), articulating an increased demand for cross-border services (CBS) and the necessity to establish shared European market under European-wide rule-making mechanisms (Stone Sweet & Sandholtz, 2011). This trend came officially to life in 1993, with the EU announcing the establishment of European Single Market, via this proclaiming free movement of services, goods, labor and capital (European Commission, n.d.-c).

Underpinning free movement of "four freedoms", the EU thereby fostered the development of CBS, resulting in European-wide cooperation on provision of CBS and establishment of a single legislative environment. The initiated digitalization of public sector gave a new impetus to these efforts, resulting in a myriad of projects and initiatives aimed to foster digitalization of public services and to endorse the creation of Digital Europe. Several eGovernment Action Plans were passed to identify the strategic direction of digitalization development, reckoning for building up new solutions on previous digital achievements. Regulation on Single Digital Market and General Data Protection were aimed to legislatively contextualize the chosen path in order to ensure the compliance of the developed digital solutions with existing European regulatory frameworks. Other initiatives – such as European Interoperability Framework (EIF) and Interoperability Solutions for Public Administrations (ISA) – had their goal in addressing cross-organizational and cross-border challenges to reproduce seamlessly functioning bureaucracy processes.

Digital Europe For All (DE4A) – one of the most recent and the most ambitious digitalization projects – has set its goal to create a shared vision on development of seamlessly functioning cross-border platform for provision of public services for both citizens and businesses across the EU. Built upon already fully/partially implemented initiatives, the project aims to practically apply the concept of the common digital market by making the public services fully digitalized, user-centric, data-driven and trustful by

design (European Commission, 2019b). Shifting the focus toward a more user-centric approach and seamless provision of public services has been enabled by the introduction of the Once-Only Principle (OOP). The underlying concept of the OOP is to facilitate reuse of submitted data by public administrations – both nationally and cross-border –to avoid redundant interaction between public administrations and citizens or businesses. Obliging public administrations to reorganize their bureaucratic processes, the OOP fosters user-centric approach via reducing the administrative burden from its end users (Krimmer et al., 2017). Proclaimed as one of the essential eGovernment principles (*Tallinn Declaration on eGovernment*, 2017), the OOP has similarly become one of the most important criteria for evaluation of eGovernment progress.

As suggested by eGovernment Benchmark reports, the advancement on eGovernment and implementation of the OOP has been uneven throughout the European countries. Having a considerable dispersion of eGovernment indices (Cross-border mobility, Transparency, User-Centricity, Electronic Identification means), the EU represents a scattered field of digital advancement, impeding the smooth implementation of a single pan-European strategy. The OOP – being one of the cornerstone principles of eGovernment – has been similarly experiencing multiple challenges caused by dissimilarity of digital evolvement in Europe. Some European states demonstrated higher level of engagement in digital initiatives leading to a consequent development of necessary infrastructure and enabling a smoother transit to the OOP. Participation in pan-European initiatives (e.g., TOOP – The Once-Only Principle Project) or bilateral projects (e.g., X-Road between Estonia and Finland) benefited the participating countries by gradual change of existing processes and setup of compatible solutions.

Eventually, voluntarism of pilot projects participation, uneven development of ICT infrastructure and siloed organizational processes, rather abstract – and occasionally non-binding nature of the EU regulations have led to a different level of eGovernment and OOP advancement of the EU member states. The notion of the OOP – one of the most essential priorities in European eGovernment strategies – has been introduced comparatively recently and yet gained strategic importance in the context of the launched DE4A project. The very recency of the OOP phenomenon advocates for the necessity for in-depth subject exploration to obtain insights on the OOP strategies, which might turn out to be useful for further practical considerations. The scattered OOP scoreboard among the EU member states implies the availability of different approaches toward deployment of the OOP, which will be the subject of the present thesis.

Driven by the necessity to level off the state of play in the context of OOP implementation, the aim of this research is to identify leaders and outsiders in the OOP

context and to search for benchmark solutions among top-performing countries for Once-Only Principle adoption. To meet the defined research goal, the present thesis will intend to answer the following question: "*How do different EU member states address the implementation of the Once-Only Principle and how their experience can be applied onto other countries?*" To answer this research question, the study will be organized in the form of an exploratory multiple case study research on OOP implementation practices among the EU member states (Yin, 2018). The exploratory nature of the study will take into account the prior advancements of the chosen member states in the OOP context and contribute to the general set of OOP implementation practices in the EU. Each of the selected cases will be analyzed one per one through the lens of administrative, legal and technical layers with a consideration of the antecedent projects with regards to eGovernment, CBS and OOP, developing a holistic understanding of the deployed practices among the chosen member states. The thesis is qualitative oriented, but uses both qualitative and quantitative methods to minimize potential bias of the outcomes and to put each of the cases in an appropriate analysis context (Yin, 2018).

The research is conducted with the support of the DE4A project, which at its first stage aims to take stock at the current level of eGovernment advancement – including the maturity of the OOP implementation – among the participating countries. Seeking to establish a digital platform for CBS provision, the European Commission entertains an idea of aligning the current inequalities in terms of eGovernment and OOP progress of the EU member states. Due to the focus of the present research on drivers and challenges of the OOP implementation, its findings might be a relevant contribution to the identification of further enablers and good practices for other member states.

The thesis will be structured as follows. First, the thesis will explore the notions of cross-border services, interoperability and Once-Only Principle. Briefly covered in the introduction chapter, they will be considered in more detail and placed in the context of the above research question. Elaborating on the problematics and the formulated research question, it will define the scope of public sector innovation by consequently narrowing it down to CBS, interoperability and OOP. For each of the identified topics, the research will provide some historical perspective of the evolvement of the subchapter's matter, followed by existing regulatory frameworks and strategies in place. This chapter will also include some relevant typology or maturity models pertinent for contextualizing the mentioned topics, concluding with existing challenges and prospects of their further development.

Secondly, the thesis will elaborate on the methodology of the research, covering the applied theoretical framework, data collection and analysis methods and motivation of

the selection of study cases. The choice of the countries – Austria, Belgium, Germany and France – will be motivated by quantitative analysis and will be placed in the general EU context of the eGovernment and OOP progress.

Next chapter will deploy the chosen theoretical framework for the analysis of the selected cases. The study will first provide the context of the OOP progress, briefly elaborating on the available solutions, their architecture and infrastructure. It will then proceed with the consequent analysis of the four chosen countries, covering the administrative, legal and technical domains and equally complementing the storytelling with relevant antecedent experience with regards to OOP adoption.

The research will later expand on the significant findings on the OOP practices, deployed in the studies countries. It will attempt to classify the derived practices into major domains and narrate the OOP implementation in the country context. The subsequent chapter will discuss the derived practices through the lens of applicability to other countries.

The thesis will end with the concluding remarks on the evaluation of the formulated goals of the research. It will also include critical notions on the limitations of the research methodology and potential applicability of the results onto other countries. And lastly, the thesis will suggest further studies implications and identify areas of potential research.

2   Literature review

The OOP has been continuously shifting the focus of public authorities toward a more user-centric approach. Focused on the reduction of administrative burdens for users and businesses, the OOP has been penetrating the guidelines of public authorities on public service provision. Via facilitation and encouragement of data exchange among public authorities on different levels to achieve seamless cross-border service provision, the OOP has become a cornerstone of the existing EU regulations and a core element of the supra-national and national digitalization strategies. With the OOP to be one of the essential political priorities in the EU, there has been a significant number of projects attempting to reorganize the existing siloed approach toward provision of public services by local, regional and federal governments.

Interoperability – frequently seen as one of the preconditions for the OOP – has been rather recently brought to the discussion table of the EU policymakers, reaffirming its strategic importance for the digitalization of public sector. Bringing the notion of necessity for multidimensional compatibility of government systems (including legal, organizational, technical and semantic layers), the newly adopted interoperability framework provides further impetus for the development of pan-European CBS. Employing a user-centric approach, the current direction of cross-border services design has likewise become a core of the eGovernment action plans and digitalization strategies, reasoning the innovations with an anticipated increase of administrative efficiency and a higher level of citizens participation.

Thus, to conceptualize the research matter, the following subchapters will consider the development and peculiarities of the provision of CBS, address the interoperability issues in the context of cross-organizational functioning and study the OOP and its implication in a national and cross-border context.

2.1   Cross-border services

Initiated by the Treaty of Rome (*EEC*, 1957), the commence of European integration enabled the creation of one of the largest markets in the world (European Commission, 2019h). Facilitated conditions of trade and taxation within the EU articulated a significant increase of cross-border trade among the member states and establishment of transnational collaborations among different regions and companies. The development of interregional value chains and the consequent steady integration of European market and economy created favorable condition for the European service sector, articulating an increased demand for cross-border services and fueling development of transnational exchange, establishment of supranational organizations and European-wide rule-making

(Stone Sweet & Sandholtz, 2011). Emerging cross-border collaboration in the European space has been pushing the involved parties to construct policies regulating the transnational interaction and fostered new transfrontier initiatives, opening up new forms of territorial cooperation (De Sousa, 2012). Currently, the market interdependence of the EU is characterized by the continuously increasing demand for cross-border services, which are expected to meet the needs of citizens and businesses affected by or involved in cross-border initiatives (Peristeras et al., 2007).

Simultaneously, the rapid development of ICT has enabled innovation paths for the governments and offered them new ways to tackle the existing challenges. While there have been no general disagreements on the potential of the ICT to contribute to better organizational performance (Wade & Hulland, 2004), the adoption of the ICT is expected to contribute to efficiency and effectiveness of administrative functions, increase their performance and productivity (Sandoval-Almazan & Gil-Garcia, 2011), promote transparency and openness, combat corruption (Khan & Park, 2013) and – notably – contribute to better information-sharing across public sector (Yang & Maxwell, 2011) and reduction of bureaucratic burden in public service delivery (Cordella & Tempini, 2015). The last two factors are decisive for conceptualization, design and implementation of CBS, fostering the transformation of the siloed administrative approach and bridging the gap in information and bureaucratic procedures amongst multiple public administrations (Heeks, 1999).

With Digital Agenda for Europe underlining the importance of the creation of a seamlessly functioning digital market (European Commission, 2010a) and European Digital Single Market Strategy (DSMS) aiming to remove barriers to free movement of CBS (European Commission, 2015a), it is impossible to consider a CBS solely from an administrative or technical perspective. With a political decision to provide digital-first, digital-by-default solutions (*Tallinn Declaration on eGovernment*, 2017), a CBS thus becomes an inseparable part of an eGovernment system and consequently is bound to be analyzed in the context of an institutional environment (Heeks, 2006). Accordingly, a CBS will be no longer segregate between the provision of "offline" and "online services" but will be seen as a constitution of paper and digitally enabled public services.

The perplexity of administrative and digital procedures needed to design and implement a CBS is further intricated by the necessity to bind two or more eGovernment systems. For two eGovernment systems possessing a different set of characteristics, seamless functioning between them might be in a similar way impeded by an uneven level of advancement of each of the system. To categorize the development level of eGovernment

systems, Layne and Lee (2001) created a model, where they distinguished four maturity levels of eGovernment (Figure 1).

Operating by the dimensions of technological and organizational complexity, Layne and Lee noted the high level of fragmentation of dedicated eGovernment structures and systems. The initial maturity stage – catalogue – implies online presence but does not account for the actual online provision of services, which – along with the availability of operating databases – constitutes to the second level of eGovernment maturity, namely "Transaction". The last two stages stipulate hierarchal and cross-functional integration of the systems, with the most advanced maturity step – corresponding to the "Horizontal integration" – being a one-stop shop for its end users (Layne & Lee, 2001).
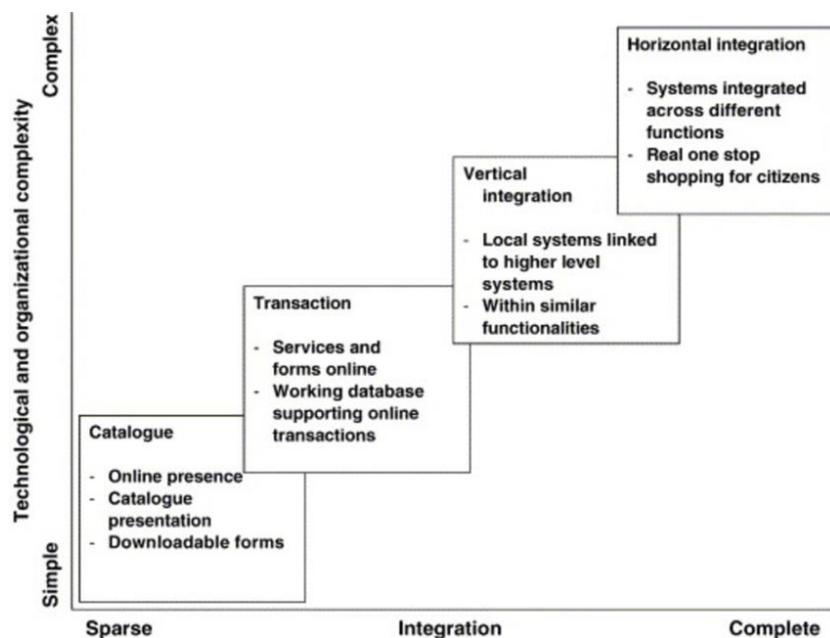
Figure 1. E-government: A four stage maturity model

(Layne & Lee, 2001)

Integration of eGovernment systems across different functions and states and consequently enabled data exchange can be, thus, seen as a precondition for the provision of CBS. Accounting to the ways in which eGovernment systems can interact and communicate among each other, Aavik & Krimmer (2016) propose a following typology of CBS:

- Bilateral services are subject of a bilateral agreement between two member states. An example of a bilateral CBS might be cooperation between – normally –

neighboring states on avoidance of double taxation (e.g. Austria and Germany, France and Spain)[1].

- Unilateral CBS is a service provided by a specific government, but accessible by citizens or businesses of other governments. An illustrative example of a unilateral CBS is Estonian e-residency project, which allows citizens residing outside of Estonia benefit from some services designed for Estonian residents.

- Mediated CBS is a service provided by a public-private partnership or exclusively by a neutral non-governmental body and accessible in the transboundary area. SignWise – an Estonian company – provides cross-border authentication services for its users.

- Multilateral CBS are provided in the scope of a supranational framework, which – accounting to the principle of subsidiarity – allows mutual recognition of eGovernment systems of participating MS, as in the case of eIDAS regulatory framework.

Extending the classical predominant division of CBS into public and private services, the authors propose a new lens of its analysis, via integration of further participating actors in the context of service consideration. Taken the spread assumption on the superior performance of private CBS (ESPON, 2019b), Aavik & Krimmer shift focus toward the integrative framework of CBS.

Defining a CBS as a

> "*service that generates benefits for the general public or a specific target group in this cross-border territory, without excluding any person or organisation from the respective scope of services provided*" (ESPON, 2019a, p.1)

the EU focuses on the generation of public value via the provision of public services in the cross-border area. The founding idea of public value generation requires alignment of numerous levels of organization's functioning, including articulation of a targeted value proposition, encouragement of cross-organizational collaboration and advocation of its interests in the political and regulatory environments (Melville et al., 2004). Putting a public value at the center of a political mandate of a public organization, Moore (2000) likewise underlines the necessity of alignment among the identified value proposition, operational resources and authorizing environment. Dictated by the political will to create

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[1] European Commission. n.d. "Treaties for the avoidance of double taxation concluded by Member States". Available at: https://ec.europa.eu/taxation_customs/individuals/personal-taxation/treaties-avoidance-double-taxation-concluded-member-states_en Accessed 11/03/2020

a single space for the provision of public services, the EU authorities designed a regulation on European Single Market, which entered into force in 1993 and de-facto initiated the development of the European shared space (European Commission, n.d.-c). Proclaiming free movement of goods, labor, capital and services, the EU enabled the creation of a shared European area, which later gave an impulse to dedicated legislative frameworks. Contributing to the reduction of bureaucratic burden associated with movement of individuals and businesses, the European Single Market regulation set the stage for development and adoption of strategic directives aiming at conceptualization of single digital space.

Nevertheless, despite the perceived simplification of the administrative processes for individuals and businesses, it was indispensable to not only re-orient the distribution channel of public services but fundamentally transform the ways public administration was functioning, including reorganization of the underlying architecture and processes (Zimmermann et al., 2018). Uneven level of eGovernment development, scattered approach toward the provision of eServices at the national level and incompatibility of national regulations required the creation of a single vision on European eEnvironment and a set of guidelines on its practical implementation (Hřebíček & Pillmann, 2011). In spite of the announced freedom of service movement, consumers reported inaccessibility of certain services on the cross-border perspective. They expressed their concerns with regards to the confidentiality of their personal data and the cross-border aspect of data-sharing (Monti, 2010).

In 2010 the EU adopted an eGovernment Action Plan 2010-2015 (European Commission, 2010b) to tackle the existing implementation drawbacks in the scope of CBS provision. Established upon the priorities identified in Malmö declaration (se2009.eu, 2009), the Action Plan fostered creation of a collaborative environment among the European public authorities to support provision of cross-border eGovernment services. Promoting the use of CBS enablers – such as eProcurement, eJustice, eHealth, eIdentification and eSignatures – it has become one of the milestones of cross-border service mobility. Achieved to mobilize scattered actions of the EU MS, the eGovernment Action Plan 2010-2015 was called successful for its attempts to create a holistic approach toward bridging siloed national digital spaces (Wauters et al., 2015). Recognizing the importance of the eID solution as a focal point of cross-border services, it motivated further construction of eService infrastructure around eID.

In spite of the emphasized importance of the eID for the establishment of the common ground for CBS, the Action Plan 2010-2015 did not, however, impose any binding regulations concerning eID. Reckoning for the existing pilot projects – e.g. STORK – the

Action Plan presented rather an overarching guideline of the development of CBS with a notion of eID (European Commission, 2010b). Notably, by this time, there had been already several attempts on a country level to position eID schemes in the core of public interactions with citizens and businesses. For instance, Estonia and Portugal being one of the pioneering countries to create and test their national eID schemes (*Lei n.º 7/2007*, 2007; *The Estonian ID Card and Digital Signature Concept*, 2003) – before the adoption of the eGovernment Action Plan in 2010 – are reported to demonstrate higher performance in the provision of digital public services (European Commission, 2019g) than the EU average. Scattered eID implementation across the EU MS articulated uneven level of eID development and accessibility, motivating the creation of siloed solutions unable to provide a secure supra-national framework for CBS functioning (Tauber et al., 2012).

Thus, to bridge the continuously growing gap among the national eID solutions, the EU pushed the adoption of a respective regulation on electronic identification and trust services (eIDAS). Entered into force in September 2014, it articulated technical standards and regulative framework for eID-enabled eGovernment environment (European Commission, 2014c). Calling upon the necessity for mutual recognition of national eID schemes, it likewise framed minimal technical procedures and specifications elaborating on the assurance level of the used identification mechanisms for the purpose of data securitization. Compulsory recognition of the eID schemes of other EU MS by September 2018 (CEF Digital, 2018) enabled creation of a common denominator for design of supra-national eGovernment services. It was presented as a key enabler of the public sector digital transformation in the scope of the following eGovernment Action Plan 2016-2020 (European Commission, 2016b).

The reliance of CBS on well-operating and mutually recognizable eIDAS scheme originates from their dependency on interoperability of eGovernment systems in the cross-border perspective (European Commission, 2016b). Bridging the siloed platforms for the national provision of public services, eIDAS establishes a single joint framework for secure authentication and data sharing (European Commission, 2018c), which plays an indispensable role for sustaining eGovernment systems and, consequently, transboundary provision of public services (Scholl et al., 2012). For this reason, the following subchapter is aimed to analyze the interoperability phenomena and to assess its role in the context of CBS.

2.2   Interoperability

Despite the term "interoperability" was defined in the XX century, the phenomena itself had much more ancient roots (Kubiciek et al., 2011). From the historical perspective, it

is possible to see governmental attempts to introduce interoperability standards long before the term was conceptualized and defined. For instance, a regulative act on railcar airbrakes in the USA in 1893 can be seen as an attempt to create an interoperability standard in the railway industry, by this imposing country-wide compatibility of the designed airbrakes and introducing a fine for production of non-compliant trains (*Act of Mar. 2, 1893, 27 Stat. 531*, 1893).

While the first perceptions of interoperability were widely associated with the technical compatibility of the operating systems, it received a new impetus with the development of personal computers in the 1970s (Freed & Ishida, 1995). The soared demand of businesses for computing facilities made a lot of profit for computer vendors. However, due to the competitiveness for the market share, vendors were developing personal computers with independent operating systems, which posed a new problem for cross-organization communication. With an increased need for data exchange – both within the organization and across multiple organizations – it remained impossible to organize communications between computers supplied by different vendors. The necessity for seamless data exchange across organizations initiated talks about integration and connectivity and introduced such terms as Electronic Data Exchange and Open System Interconnection (Kubiciek et al., 2011).

Military sector – being formerly one of the major users of computing machines – introduced the term "interoperability" defining it in the following way:

> *The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together* (Charalabidis et al., 2019, p. 356; DODD, 1977).

Remaining primarily used in the military sector, the term "interoperability" was then later accepted by the European Commission, introducing the directive on copyright software and defining it as "the ability to exchange information and mutually use the information, which has been exchanged" (European Commission, 1991). Spreading later to a broader ICT domain in the EU, interoperability was then mentioned in the Directive on European Standards (European Commission, 1998). It became one of the eGovernment policies objectives under the Lisbon Strategy (Kubiciek et al., 2011).

With a special notice on interoperability in both eGovernment Action Plans, interoperability has already been set as one of the priorities of eGovernment by the eEurope 2002 and 2005 action plans (Kubiciek et al., 2011). Interoperability Solutions for Public Administration (ISA) launched in 2009, was anticipated to create a common

ground for the EU MS to address the issue of eGovernment systems interoperability (European Commission, 2009). For the purpose of consensual attempts toward development of an interoperable solution, the EU outlined the scope of future EU efforts toward common digital interoperable space, by commonly agreeing on the definition of "interoperability":

> *The ability of disparate and diverse organizations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between organizations, through the business process they support, by means of data between their respective ICT systems* (European Commission, 2009, p.23).

Aiming to empower common European frameworks for cross-sectoral and cross-border interoperability, ISA program called upon the assessing ICT implication to support the interoperability agenda, by endorsing the interoperability of existing public infrastructures and creating new reusable and interoperable-by-default tools for public administration (European Commission, 2009). To support the fulfillment of the ISA program, the Commission adopted the European Interoperability Framework (EIF) and the European Interoperability Strategy (EIS), which basically represented a guideline and principles of European public services.

This initiative was received by considerable EU political support, after interoperability being declared as one of the core pillars of the EU digitalization strategy. Adoption of the DSMS asserted political decisiveness to endorse seamless functioning of CBS though achieving interoperability of eGovernment systems (European Commission, 2015a). While recognizing the innovative power in the economic system, the DSMS constructs its vision on (1) providing better access to online goods and services through (2) creating favorable conditions for digital services and via this (3) maximizing growth potential of the EU digital economy. With the ambitious goal of revolutionizing the existing practices and moving toward seamlessly functioning digital market, the DSMS still saw a lack of interoperability and standardization as one of its major obstacles.

Coupled with the considerate advancement in ICT, this required reconsideration of the existing policies toward interoperable solutions, which resulted in an updated ISA program. ISA[2] program, adopted as a follow-up to ISA, called upon the necessity for better top-level coordination of interoperability efforts and offered updated instruments – revised EIF and EIS (European Commission, 2017d).

The interoperability definition set by the European Commission unambiguously identifies seamless cross-organization data sharing as its priority and reckons for the support of

business processes as one of its significant enablers (European Commission, 2009). The updated EIF likewise emphasizes the lack of interoperability as a critical obstacle toward CBS provision and serves as a political and practical guideline for organizations to enhance their interoperability (European Commission, 2017d). To enable digital transformation and digital availability of CBS, administrative entities should "electronically exchange, amongst themselves and with citizens and businesses, meaningful information in ways that are understood by all parties" (European Commission, 2017d, p.2). Providing a list of 47 recommendations, the EU implementation strategy primarily addresses four interoperability layers:

- Legal interoperability. For all the participating EU MS have their national legislative frameworks, policies and strategies in place, it is crucial to ensure alignment of national legislation in a way, that would allow organizations to work together. Legal interoperability imposes the requirement for the national regulatory policies not to block establishment and functioning of CBS within and between the EU MS. Along with the necessity to harmonize cross-border legislative aspects via agreeing on how to address the differences and possibly putting new legislation in place, it is necessary to align national legal frameworks with the achieved EU regulations – e.g. Single Digital Gateway Regulations (SDGr), eIDAS-regulation, General Data Protection Regulation (GDPR) etc (European Commission, 2017c, 2017d).

- Organizational interoperability. Having different procedural and organizational practices in place, the EU MS do not possess an interoperable capacity for enabling cross-border functioning of public services and cross-organizational exchange of data and information. To tackle this issue, public entities need to align their business processes and responsibilities. Via commonly agreed documentation, alignment and integration of business processes and exchange of relevant information, the public authorities could make the processes and associated services identifiable and accessible for cross-border use (European Commission, 2017c, 2017d).

- Data / Semantic interoperability. Developed in a siloed environment, European public authorities use different formats of the exchanges data. The necessity to ensure semantic interoperability addresses the need to create a common data format and its interpretation by other relevant parties. Among all, it mainly focuses on the creation of a single data reference system and elaboration on the relationship between its data elements. Development of explicit vocabularies and data exchange schemata, it enables unequivocal understanding of the transmitted

data by all parties. It further foresees description of grammar and the exact format of the exchanged data (European Commission, 2017c, 2017d).

- Technical interoperability. Historically, bottom-up development was a predominant way of developing information systems and applications. Leading to fragmentation of technological infrastructures both within the EU MS and across the borders, the current isolated solutions impede technical aspects of cross-organization and cross-border functioning of public administration. The EIF articulates the necessity for the EU MS and regional/local public entities to agree upon formal technical specifications, including interface specifications, data integration and presentation, interconnection procedures and securitization of communication protocols. Enhancing the compatibility of technological tools and setting up a standard technical environment will allow uninterrupted data flow, necessary for CBS functioning (European Commission, 2017c, 2017d).

The political context is – among others – frequently mentioned as an influencing factor over interoperability efforts. Lack of political will and coordination is seen as one of the central issues in interoperability reports. For example, Gartner report on the refined EIF includes four principal sources of interoperability barriers: policymakers, administrations, IT departments, and accessibility (Malotaux et al., 2007). Whilst only the last two report significant technical issues, lack of coordination, political decisiveness and persistence remain the common ground for all of them. Similarly, Varney (2006) identifies budgetary constraints and lack of coordination as one of the primary obstacles to interoperability.

Further, Novakouski and Lewis (2012) put a notion of sociocultural factors in the context of the interoperability consideration, emphasizing the need for service customization depending on the target audience on order to achieve adequate user adoption rate. Other scholars define interoperability as a socio-technical phenomenon, which equates the technical and societal aspects of eGovernment systems (Gil-Garcia et al., 2010). Distinguishing trusted social networks, shared information, integrated data and interoperable technical infrastructure, Gil-Garcia, Pardo and Burke (2010) call upon the interdependence of interoperability solutions and need for its multifaceted consideration.

The challenge to integrate multiple interoperability layers results in the necessity for standardization and centralization of interoperability efforts (Kubiciek et al., 2011). In the historical perspective of the siloed provision of public services, their infrastructures evolved dispersedly over different units of public entities, leading to various interdepending connections amongst themselves. Differentiating by the modes of the coordination, Kubiciek (2011) distinguishes pooled, sequential and reciprocal

interdependencies. Whilst sequential interdependence implies the output of one process to be the input for the following procedure, reciprocal interdependence admits the possibility of a process output to be used by multiple – not necessarily sequentially connected – processes as their input. Pooled interdependence deals with the availability of shared resources and – unlike sequential and reciprocal interdependencies which are majorly focused on functional and time-related dependencies – addresses the notion of resources shortage, their timeliness, accuracy and compatibility with the connected processes (Kubiciek et al., 2011).

The complexity of the process of public service provision and mutual interdependence among different units require alignment and front- and back-office integration (Kubiciek et al., 2007). Differentiating between horizontal and vertical integrations, Kubiciek (2011) mentions integration of several stages of the service provision process and associated minimization of human intervention. In like manner, the integration of two or more services of the same level will facilitate creation of one-stop-shop eGovernment approach and reduce related production costs.

The notion of the beneficial outcomes of the dual integration partially corresponds to the eGovernment maturity model by Layne and Lee (2001), described in the overview of CBS (Figure 1). Description of the four-stage eGovernment model – namely (1) catalogues, (2) transactions, (3) vertical integration and (4) horizontal integration – implies the vertical integration as a pre-request of horizontal integration. Kubiciek (2011), on the contrary, report to not have found empirical evidence of the evolutionary dependence of horizontal integration on vertical integration, discussing the need of different requirements for each type of integration (Kubiciek et al., 2011).

Evolving from maturity models of electronic commerce and enterprise, the significant number of developed frameworks for eGovernment maturity assessment included multistage analysis and dynamic evolutionary component (Gottschalk, 2009). Comparing over 20 eGovernment maturity models, Fath-Allah (2014) derives interoperability and harmonization of systems as one of the most critical features of eGovernment at already early maturity stages.

Attempts to evaluate interoperability of eGovernment systems resulted in creation of several maturity frameworks with different focuses. Essaying to analyze the success of eGovernment interoperability efforts in Mozambique, scholars established a four-dimension maturity scheme with a notion of data, technology, process and infrastructure maturity levels (Shvaiko et al., 2009). Other evaluation schemes expand the focus of predominantly technology-oriented scheme and include socio-technical perspective in consideration of eGovernment interoperability maturity and evaluate dimensions of

polices, management and technology capabilities (Pardo et al., 2011). Moved by the goal to create an overarching framework of eGovernment interoperability consideration, Gottschalk and Solli-Sæther (2008) propose an experimental four-stages framework for its assessment. Acknowledging the heterogeneous nature of the phenomenon, the scholars distinguish between (1) alignment of work processes, (2) knowledge sharing, (3) creation of joint value, (4) strategic alignment.

Similarly, grounding his research on the existing eGovernment maturity models and systems interoperability, Gottschalk (2009) presents an updated maturity model of eGovernment interoperability (Figure 2) which expands largely technological-focused models and includes major notions of eGovernment growth stages (Gottschalk, 2009).
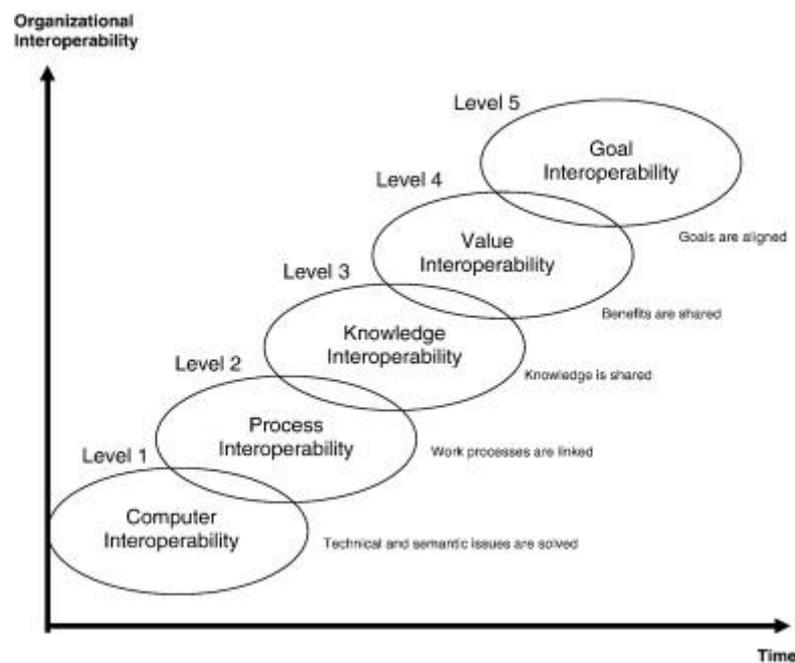
Figure 2. Maturity model of eGovernment interoperability
(Gottschalk, 2009)

Splitting eGovernment interoperability into five maturity levels, Gottschalk reassured the unity of technical and organizational aspects under a common goal. The first level – computer interoperability – corresponds to the technical compliance of hardware and software eGovernment systems, referring to technical and semantical layers of EIF (European Commission, 2017d). The second level elaborates on the necessity to align both intra- and inter-organizational processes and relationship. Knowledge interoperability, being the third level of the maturity model, requests organizations to establish and maintain a collaborative environment which would enable collecting and storage knowledge critical in resolving incompatibility issues. The fourth level reckons for the shared value to be essential to align inter-organizational relationships toward the

mutual goal of service delivery to its end users, referring to the focal part of the value in the context of CBS provision, discussed in Chapter 2.1 (Melville et al., 2004; Moore, 2000). The highest interoperability level foresees the obligatoriness of the alignment of strategic goals, recognizing the synergetic effect from integrated organizational strategy, mission and values (Gottschalk, 2009).

The sequential development of eGovernment interoperability and the process mediation via alignment of organizational and technological aspects has arisen the necessity of a strong coordinating body. The increased demand for eGovernment interoperability accentuated and magnified the scope of the existing issues with regards to development; maintenance and management of interoperability, resulting in the increased need for governance instruments (Abramowicz et al., 2008; Pardo & Burke, 2009).

Justifying the essential role of adequate decision-making instrument in the context of eGovernment interoperability, Kubiciek and Cimander (2009) suggest to firstly identify the scope of interoperability measures (functional view) and then introduce instruments of political and IT governance (institutional and IT-service views respectively), focusing basically on definition and enactment of interoperability standards and organization of interoperable data exchange. Other scholars suggest adjusting interoperability governance efforts to the respective layers of EIF, namely to segregate the measures to maximize their outcomes in organizational, semantic and technical interoperability layers (Abramowicz et al., 2008). Similarly, Pardo and Burke (2008) addressed the governance from the managerial perspective and identified nine essential capabilities relevant for interoperability management (governance, strategic planning, business case development, project management, resource management, stakeholder identification and engagement, leaders and champions, business and technology architectures, performance evaluation) and eight capabilities associated with information sharing (collaboration readiness, organizational compatibility, information policies, change acceptance, technology knowledge, data assets and requirements, secure environment, technology compatibility).

With a special notion on data format – regardless of the consideration focus – standardization of data formats has been seen as one of the prerequisites of digitalization of public services and, subsequently, interoperability of eGovernment solutions. Establishment of a single reference source for data formats enables reuse of data and creates the possibility for implementation of Once-Only-Principle, which has been set as one of the political priorities by Connecting Europe Facility's (CEF) digital program (European Commission, n.d.-a). The implication of the OOP in the context of CBS provision will be the subject of the research in the following subchapter.

2.3   Once-Only Principle

Once-Only Principle (OOP) has been widely discussed in the context of digital transformation and has been set as one of the strategic objectives for enablement of eGovernment and Single Digital Market. Fundamentally transforming the traditional approach toward the provision of public services, OOP obliges public administrations to collect data from citizens and businesses only once and then encourage sharing the collected data with other public entities for the purpose of service provision in compliance with respective European and national regulations on data privacy (Krimmer et al., 2017). This transformation shifts the focus to more-user centric approach, requesting public administrations to re-organize their internal processes rather than to require citizens and businesses to adjust to them (Krimmer et al., 2017).

Although the OOP has been only recently identified as one of the essential eGovernment principles, there were attempts to create pro-active government services already in the 1980s. The ubiquity of governmental services brought the Danish government to design a more pro-active user-centric approach which would condition a higher rate of services personalization. Dating back to 1988, Danish tax departments started to send out tax-declarations with pre-filled information to citizens, which they had to approve and mail back (Nixon & Koutrakou, 2006). Pre-filling of public forms can be considered as an analog version of the OOP, implying the same principle of reuse of the submitted data (Krenner, 2020).

Nevertheless, despite the first attempts to create data reuse patterns date back to the end of the XX century, the current status of the OOP implementation is seen as still evolving and fragmented (Cave et al., 2015). While the compliance with the OOP is associated with time savings, the share of the pre-filled forms in the whole scope of public services has been remaining quite low. With an average score of 58% of pre-filled forms (Tinholt et al., 2019), the implementation on the OOP in the EU scope remains scattered and restricted to national Once-Only standards (Krimmer et al., 2017). Notably, the EU MS have achieved higher performance rank in applying the OOP to the domain of the individuals' personal and businesses' identification data, but still leaves a lot of room for improvement in the context of OOP use for geographic, fiscal and health data (Cave et al., 2015).

Aspiring to reduce the administrative burden for citizens and businesses, the ministers of the EU MS included the OOP in their eGovernment declaration, stipulating it as one of the underlying principles of the upcoming eGovernment Action Plan (*Tallinn Declaration on eGovernment*, 2017). Intensifying the collaboration across the public entities of the EU MS – including local, regional, national and supra-national levels – the Declaration

attempts to create a culture of data reuse building on the results of the previous programs and projects and aiming to fully introduce the OOP for the EU-level digital public services.

Reflecting on the relevance of the OOP implementation for increasing the efficiency of the European Digital Single Market, the European Commission acknowledges further propagation of the reuse of citizens' and businesses data and calls upon a new plan for ensuring this principle (European Commission, 2015a). The new eGovernment Action Plan with a notion on the DSMS priorities distinguishes reuse of the collected data by public administrations as one of its underlying principles "so that no additional burden falls on citizens and businesses" (European Commission, 2016b, p.4). With the support of stakeholders, the Commission takes action to launch pilot projects on the OOP for businesses already in 2016. Likewise, recently adopted European Data Strategy urges sharing and reuse of available data to remove administrative burden from the businesses operating in the European Single Market and unleash the growth potential of the EU data economy (European Commission, 2020).

Besides the easing of administrative procedures for citizens and businesses, Cave et al. (2015) argue the implementation of the OOP will increase the efficiency of public administrations via achieving lower costs and greater procedural effectiveness and allow to decrease fraud cases. Another research shows that the list of the OOP drivers can be complemented by an anticipated increase of service quality, better governance and prior technical experience with the OOP (Kalvet et al., 2017). Interestingly, both Cave et al. (2015) and Kalvet et al. (2017) accentuate their attention on the political will and related legal obligations for the EU MS to comply with the OOP. Seen as one of the driving factors for the OOP implementations, the authors agree on the necessity to establish an overarching regulative framework to ensure the homogeneity of the OOP efforts (Cave et al., 2015; Kalvet et al., 2017).

As previously discussed in Chapter 2.2, legal interoperability is seen by the Commission as one of the prerequisites for seamlessly functioning European Single Digital Market. For the OOP implying cooperation of multiple public administrations on cross-sectoral and cross-border levels, a set of relevant data regulations should be in place to ensure the security and privacy of the OOP-driven services. Although the strategic path toward the OOP was adopted only with the development of the DSMS, the EU adhered to the necessity to ensure adequate processing of personal data by adapting Data Protection Directive in 1995 (European Commission, 1995) Adhering to the principles of transparency, purpose legitimacy and proportionality; the Commission had its goal to ensure the rightfulness of personal data processing.

Acknowledging the increasing complexity and volume of the shared data, the European Commission decided to replace the Data Protection Directive with new legislation "General Data Protection Regulation" (GDPR), which entered into force in 2018 (European Commission, 2016c). Postulating the interests of the data subject to be the core value of data processing, the GDPR imposes the necessity for public administrations to adopt adequate technical and operational measures to ensure privacy and security of the processed data. Operating based on the consent of data owners, the GDPR represents their interests, but likewise imposes obligations on public administrations to ensure the necessary safeguards (European Commission, 2016c). Evaluating privacy impact and audit of the processed data routine procedures for public entities, the GDPR fosters the establishment of data protection by-design approach and becomes one of the pillars for cross-border Digital Market interoperability (Cave et al., 2015).

However, apart from the establishment of a common field for OOP-based Digital Market, the GDPR demands public administration to reconsider and restructure their approach toward data processing in order to comply with the established regulations. The increased expenses associated with the introduction of the necessary personnel training, update and/or replacement of the currently used infrastructure (Cave et al., 2015) might impede the further advancement of the OOP and detain the development of OOP-enabled architecture for cross-border public services (Kalvet et al., 2017).

Besides the constraints implied by the GDPR, there are other legal – as well as organizational, semantic and technical challenges – which might impact the implementation of the OOP and altogether correspond to the EIF challenges (Cave et al., 2015) which were explicitly discussed in the previous subchapter. Privacy and data protection concerns so as a variety of national legislative frameworks impede the establishment of the homogeneous legal environment among the EU MS. Uneven distribution of cross-border collaboration and efforts among the EU MS and potential expenses for deployment and maintenance of the OOP-driven infrastructure constitute to the organizational barriers for its further propagation. Likewise, the heterogeneity of data and metadata structures, variety of the utilized document structures and language-specific issues correspond to the semantical issues in the context of the OOP implementation. The last EIF pillar – technical layer – argues that the dissimilarity of the technical infrastructure – and in particular the heterogeneous nature of national eID schemes and associated trust services pose another challenge for further advancement of the OOP (Cave et al., 2015).

Lack of political decisiveness and collaboration among the EU MS is also seen as one of the main barriers toward the OOP (Cave et al., 2015). Another research likewise suggests

that federal governments do not give sufficient political prioritization to the implementation of the OOP, maintaining lack of national coordination and political willingness as one of the major concerns (Kalvet et al., 2017). Some organizations similarly report low expected take-up among the end-users, which makes another issue – financial constraints – more acute in the context of political prioritization. Complemented by the lack of precedential experience in similar projects and presumed lack of relevant human resources, the practical implementation of future OOP pilot projects might encounter further difficulties (Kalvet et al., 2017).

Additionally, the European Strategy for data identifies the areas of data management, which are necessary for the OOP and the release of the EU potential from the Digital market. Encouraging the reuse of available data, the Commission in a similar manner elaborates on the necessity of data and ICT standardization in order to ensure the integrity of the data interoperability and relevant infrastructure upon which interoperable CBS are to be built upon. Leveraging the data market and evening the access to the necessary data for all relevant service providers is another essential pillar of the data strategy. Removing so-called "data advantage" from the existing large players might create more fair market conditions and encourage development of new services and emergence of new markets. Besides reasoning establishment of a holistic approach for better data governance, the Commissions also argues about the obligatoriness of citizens' empowerment in exercising their rights. Seeing the data-driven approach as a core engine of the future public services, the EU, nonetheless, emphasizes the necessity of trust and support from their end-users. Lastly, discussing the notion of technical interoperability, the Commission likewise puts cybersecurity issues forward. While cyber threats can pose a certain threat to data processing, it is indispensable to ensure the security of the data and the services build on it (European Commission, 2020).

The diversified nature of blocking factors enhanced by uneven anterior status-quo of the OOP advancement and involvement into different precursory activities toward its implementation account for various level of the OOP maturity. In the course of the OOP discussion, it has been firmly associated with the interoperability level and identified as one of the enables for provision of CBS (Cave et al., 2015; Pardo et al., 2011). Similarly to the interoperability approach, Vallner et al. (2017) analyzed the advancement of the OOP implementation through the lens of the Interoperability Maturity Model. Using the assessment model developed by the ISA program, the authors correlated the maturity level of government interoperability to the implementation status of the OOP, distinguishing five maturity levels (Table 1).

Table 1. Interoperability and OOP maturity model (Vallner et al., 2017)

	Interoperability maturity level	**OOP maturity level**
1	Ad Hoc	Poor OOP – almost no OOP in place
2	Opportunistic	Fair OOP – some elements of OOP best practices
3	Essential	Essential OOP – essential best practices for OOP
4	Sustainable	Good OOP – all relevant OOP best practices
5	Seamless	OOP leading practice

Analyzing multiple practical cases, compliance with the existing national and European regulative frameworks and the technical and semantic solutions in place, the authors developed a framework for assessing the OOP from exclusive solutions designed for a certain purpose (Ad Hoc / Poor OOP) to universally functioning services within the identified scope of services (Seamless / OOP leading practice) (Vallner et al., 2017).

However, the OOP's potential of enabling fully interoperable and seamless functioning of CBS – despite being the political priority of the European Commission – might, according to some researches impose a certain threat to democratic foundations of the EU. Pointing out at two potential risks, Jaeger (2003) argues that seamless eGovernment functioning and gathering governance elements in one government portal might endanger the principle of powers separation. Similarly, the storage of information and its concentration in a limited circle of public officials might potentially create power disbalance via obtaining a hegemonic control over citizens' and businesses' data (Jaeger, 2003).

The discussions around the potential abuse of personal data by public officials fueled the development of two approaches toward the OOP implementation. Formerly widely used government-centric approach toward personal data management and provision of public services has been gradually removed by citizen-centric models, which was anticipated to bring higher take-up rates and re-oriented its attitude toward more user-friendly solutions (OECD, 2008). Despite the government-centric ecosystems can be seen as efficient for more rapid development of interoperability standards and are associated with less administrative burden, they have been renouncing government-centric approach in favor of citizen-centric one-stop-shops (OECD, 2008).

The argued necessity to implement Privacy- and Security-by-Design approaches (*New Digital Security Models*, 2011), fosters establishment of a decentralized model of data

control via assigning a set of non-linkable identifies for the end-users, where citizens and businesses perform a role of data broker (SecurIST Advisory Board, 2007). The researchers argue that it might also reduce the potential damage of cyberattacks for the penetration in the data repository will unlikely provide the perpetrator with the desired level of data and communication control, remaining identity thief as one of the most serious problems in the security domain (SecurIST Advisory Board, 2007). With the national regulative frameworks – e.g., the decision of the Federal Constitutional Court in Germany on inadmissibility of unique identifier for its citizens (BVerfG, 1983) – or international regulations – such as the GDPR – the protection of citizens' privacy is, thus, considered to be an underlying principle of the eGovernment systems.

To further minimize this risk, some countries undertake a set of measures to prevent abuse of personal data by public officials. For instance, Portugal (*Lei n.º 7/2007*, 2007), Belgium (Thales, 2020), Estonia (Martens, 2010) and some other countries enable traceability of personal file access history and allow eID card to verify the rightfulness of the public officials in the context of data privacy. With an underlying pillar of trust-building, good practices suggest governments to construct services based on informed decision-making and transparency, reasoning the necessity to provide reliable information on the principles of services functioning and security of their transactions (Tassabehji & Elliman, 2006).

Besides the numerous regulations and inclusion of the OOP in the EU digitalization strategies, it is also supported by a variety of other relevant measures originating from different domains. The continuous evolvement of data regulations, interoperability standards, development of technical infrastructure and architecture – so as many other policy areas – require the OOP to recognize their efforts and make the OOP-policy development a multilateral EU-wide initiative, firmly interdependent with other Commission actions (Cave et al., 2015). The authors argue the OOP could potentially unleash better eServices based on continuous real-time data monitoring establishment of a decentralized model of its storage and control. Blockchain, being one of the most promising facilitators of the OOP-implementation, removes the necessity to endlessly collect fragmented data and to artificially restore it in the destination system. The blockchain technology enables a new way of public service provision by ensuring data consistency and abolishing data redundancy, via this overcoming existing organizational silos (Allessie et al., 2019). Likewise, real-time data analysis enables more interactive forms of service provision, which contributes to a higher level of service personalization and empowers end-users to engage in the interaction with public service providers (Cave et al., 2015).

The transformation nature of the OOP in the context of data management – with its user-centricity as a core value – allows optimizing the data flow within public entities, via this increasing the effectiveness of public administrations and contributing to the quality of the provided services (Krimmer et al., 2017). The initiated direction toward higher service personalization and compliance with its protection mechanisms require the availability of a single framework for synergetic functioning and abolishing a siloed approach toward service provision (Cave et al., 2015). Being an indispensable constituent of the interoperability framework, the OOP is likewise expected to generate value for the scope of CBS provision.

3 Methodology

The present research aims to assess the advancement of the OOP implementation across the EU member states, to derive good practices of the OOP adoption of the leading eGovernment states and to evaluate the applicability of those practices for other countries. Given the analytical nature of the thesis, the intended research will be conducted in the form of an exploratory case study (Yin, 2018). Figure 3 represents the major phases of the research process, briefly elaborating on the steps undertaken during each of them. The previous chapters have predominantly focused on contextualization of the research area and identification of the research problem. The chapter on Methdology will contribute to the research conceptualization via identifying the conceptual framework for further analysis. Secondly, research narrows down to the chosen case studies and deploys the chosen theoretical framework for analysis of OOP approaches among the chosen countries. Lastly, the study will attempt to assess the derived results and match them with the research problem, identified at the first stage.
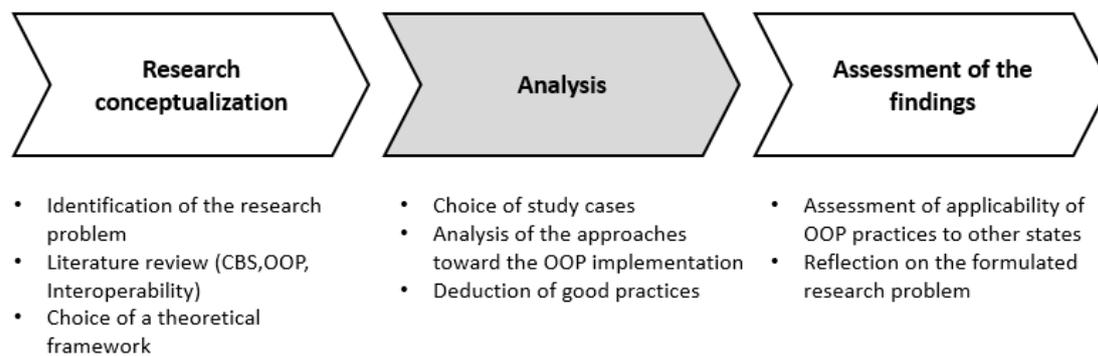
Figure 3. Research structure

To encompass the multitude of national OOP approaches, the study will focus on four selected cases – namely, four selected EU states – and their national strategies toward implementation of the OOP. Combining qualitative and quantitative research methods, the analys will be, thus, constructed as follows:

- *Choice of study cases.* At this step, the EU member states will be assessed from the perspective of the OOP implementation and based on the analysis of the available data; four study cases are to be selected. The selected case studies are expected to have a comparable background, but different level of the OOP advancement, distinguishing between well and fairly worse performing countries.

- *Analysis of the approaches toward the OOP implementation.* The approaches of the previously selected four countries are to be derived through the study of the secondary data upon the used policies and strategies toward the OOP enforcement.

It will be then done in accordance with the framework described in the Once-Only-Principle Project (TOOP), which will be described in more details in subchapter 3.1. The findings will be complemented by the results of the interview conducted with the executive manager of the DE4A work package on the EU eGovernment assessment.

- *Deduction of good practices.* The results of the desk research and interview analysis will facilitate identification of strategic and operational differences toward the OOP implementation among the four chosen EU member states. The deducted variations will be crossmatched with the states' OOP indicators and might contribute to the set of good practices.

The following subchapters will discuss the deployment of a chosen research framework, data collection and analysis, choice of the four study cases in more detail.

3.1   Theoretical framework

The Digital Europe for All (DE4A) project announced under the agenda of the Digital Single Market, promotes a new EU-wide large-scale pilot aimed at provision of better services which are "fully digitalised, user-centric, data-driven, trustful and cross-border according to relevant strategic goals in the Single Digital Market" (European Commission, 2019, p.2). Distinguishing the aforementioned SDGr, eGovernment Action Plan, Tallinn Declaration and EIF, the DE4A likewise acknowledges the efforts of antecedent projects and their previous achievements. Reckoning the outcomes of the EU cross-border initiatives, DE4A distinguishes TOOP as a valuable input in the course of the OOP-driven delivery of CBS.

The TOOP project started in 2017 with a goal of an actual provision of digital CBS for businesses. Attempting to design a generic federated architecture, TOOP project chooses to guide its pilots by three principal viewpoints: administrative, legal and technical (Krimmer et al., 2017). Acknowledging the differences in administrative arrangements within different public entities, Krimmer et al. (2017) likewise outline the importance of the actual administrative burden reduction, which cover organizational peculiarities, various approaches toward governance and dissimilarity of organizational frameworks and processes in place. Legal perspective communicates the necessity for harmonization of national legislative frameworks in the OOP-relevant matters and their alignment with the EU data protection regulations. The technical side of the framework stipulates the implementation and interconnection of base registries as a prerequisite for the realization of the OOP.

As a follow-up on the success stories, the Commission commenced the DE4A project, which – constructing on the previous achievements – sets an ambition on technical implementation of digital services, covering the essential life events (European Commission, 2019b). While both TOOP and DE4A projects put the interoperability principles at the core of the cross-border functioning and the actual OOP implementation, the DE4A attempts to establish a linkage between the project's goals and particular outcomes of the precedent projects. With the legal, administrative and technical viewpoints to be a common denominator for the above-mentioned projects, they will create a base for conceptual analysis framework in the scope of the present research. Borrowing the TOOP's framework, the selected four cases will be analyzed through the lens of the afore-described standpoints:

- Administrative layer will comprise the organizational setup of public entities, including the governance principles and managerial approaches. Investigating the existing procedures and administrative processes, it will eventually consider the capacity of the MS for reduction of administrative burden for its citizens and businesses.

- Legal layer strives to put the data management process in the context of the EU legislation. Alignment of the national laws with the European regulatory framework as well as the availability of the national legislation to support and unleash development of eGovernment – and OOP respectively – will be the focus of the present layer.

- Technical layer encompasses the availability of actually functioning solutions and takes stock of the existing infrastructure. With the base registries to be an indispensable component of the OOP solutions, the technical layer will likewise analyze the existence and usability of the national data registries.

From the perspective of the present thesis, the proposed theoretical framework lacks on contextualization of national solutions. Conduction of case analysis, as suggested by Yin (2018), might be associated with a certain level of bias and lack of generalization capacity. The dissimilarity of the chosen digitalization paths among the EU MS led to divergent national strategies and solutions, resulting in the various levels of the eGovernment advancement. The DE4A project acknowledges the severe dependence of the OOP implementation on the success of the previous pilot projects and national efforts. Hence, recognition of the previous European endeavors towards establishment of the Digital Single Market calls for the necessity to contextualize the levels of eGovernment and OOP advancement by elaborating on the previous experience with national and European projects. Yin (2018) in a similar manner warns against the biases of the

deducted conclusions in a context-independent environment, advocating for the need to bring in "real-world context" into the analysis of the chosen cases. Thus, the proposed framework will be extended by an additional layer, which will provide a context of the relevant OOP solutions carried out via national initiatives or through participation in the EU-launched projects.

3.2   Data collection and analysis

Split into three major parts, the thesis will deploy a combination of qualitative and quantitative research methods to objectify the selection of study cases, to assess the deployed OOP strategies of the chosen countries and to evaluate their applicability for other member states. The first part of the research, aimed at identification of top and bottom performing OOP countries, will be based on quantitative analysis of the contextual parameters and OOP indices. To inform decision making, the data for the analysis will be extracted from eGovernment benchmark and Digital Economy and Society Index (DESI) reports, Eurostat website. Giving a comprehensive overview of the eGovernment advancement of European states, they represent ones of the most reliable sources of information via taking stock at multiple factors relevant for the assessment of digitalization rates of public sector (*DESI*, n.d.; European Commission, 2019i). The collected data will be analyzed with means of SPSS and Qlik Sense to provide visual justification for the selection of the study cases.

Upon the selection of the study cases, the thesis will deploy desk research, which will be aiming at analysis of the approaches toward the OOP implementation, entertained by the chosen member states. Desk research will include Digital Government reports submitted to the European Commission, assessment of National Interoperability Frameworks, relevant national regulations, official strategies, white and green papers on the OOP and data reuse matter. The research will also consider governing systems, administration peculiarities, contributing to either of the previously identified components of the theoretical framework.

The results of the desk research will be complemented with additional insights derived during the interview with Mr Frank Leyman, one of the co-managers of the DE4A project. To provide insights for the developers' team, Mr Leyman coordinated efforts toward the evaluation of the EU eGovernment landscape, where assessment of countries' OOP performance was highly prioritized. The interview was organized in a semi-structural format, where Mr Leyman was offered the possibility to address enabling and challenging factors of the OOP implementation in the EU.

3.3 Selection of study cases

The selection of the study cases will be guided by several considerations. Foremost, the deduction of good practices and their application onto other cases should present an even environment and adoption possibilities. In the context of the EU policies, Ryan (2016) conducted a research on how to disseminate the best practices among the EU MS and facilitate cross-border exchange of relevant policies. In the context of the previously discussed scattered eGovernment development of the EU member states, it deems to be appropriate to consider the initial development level of the participating countries and their socio-economic similarity (Ryan, n.d.).

Whilst – as discussed in the course of literature review – the OOP remains one of the principal pillars of the public CBS, this research will borrow the contextualization parameters from the major eGovernment reports. eGovernment benchmark report – continuously revised by the Commission – has its aim at informing the process of policymaking and support the EU eGovernment Action Plans. Underpinning the OOP as one of the underlying principles to support the propagation of eGovernment, the report reaches the objectivity of the representation of its outcomes by laying out the socio-cultural aspects of the EU MS (European Commission, 2017e).

Comparing advancement in the context of digital government among the EU MS, the Commission contextualizes its findings via providing supporting information on the countries. The eGovernment development indices are accompanied by generic country's data (e.g., GDP, inflation rates, population, area) and generic ICT indicators (e.g., Internet access, Internet use rates etc.) (European Commission, 2017a). Thus, to level off the research context and test the applicability of the outcomes for broader perspectives, the present research will introduce several criteria at the stage of choosing study cases.

While it is important to contextualize the findings, it deems to be likewise crucial to select a set of indicators which would not directly determine the achievement of higher eGovernment performance. Introduction of depending variables at the stage of the selection of the EU MS might lead to biased results as they would be built upon the existing difference in the eGovernment advancement. For instance, Digitization and Penetration rates studied by the eGovernment report comprise the availability and usage of digital public services and were used to identify the maturity levels of eGovernment (European Commission, 2017e). However, the present thesis presumes the OOP performance to be dependent not solely on the technology aspect, but on the process of policymaking, stakeholder engagement, management etc. Thus, the selection of the study cases will not be limited by technological aspects in order to comprise a set of countries with a broader collection of practices.

Under consideration of the above restrictions on the interdependence of the variables, it was decided to introduce the economic and connectivity parameters at the stage of the selection of study cases (Table 2)[2].

Table 2. Parameters for selection of study cases

Parameter	Composed variables	Data source
Internet access	Average of: • Householdes with internet access • Enterprises with internet access	Eurostat
GDP per capita	Real GDP per capita	Eurostat
OOP and eGovernment maturity	Average of: • eGovernment overall average • Percentage of pre-filled forms	eGovernment Benchmark 2019

The introduction of the first two parameters allows to mitigate the risk of incomparability of the selected countries, offering even connectivity and economic playfield:

- **Internet access**. Identified as one of the context parameters for the assessment of the eGovernment advancements, Internet connectivity is calculated as an average percentage on internet connectivity among the citizens and enterprises. Remaining one of the primary enablers of the provision of digital public services, Internet access per se does not condition the success of eGovernment initiatives. Being one of the prerequisites of eGovernment, it will, thus, be included, in the process of EU MS selection, but with a supportive analysis of other non-technical variables.

- **GDP per capita**. Aimed to justify the economic comparability of the selected countries, this parameter represents an overall economic development normalized by its population. The economic constituent is argued to be essential for consideration of innovation projects. Lack of financial resources or costs associated with the maintenance of the digital solutions might become an impeding factor for cross-border eGovernment initiatives (Kalvet et al., 2017). The similarity of economic playfield might also be considered as a facilitating

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[2] See Appendix A

factor for measuring applicability and transferability of good practices for underperforming countries. Along with Internet access, the GDP parameter is solely expected to contribute to the comparability of the chosen countries but does not restrict the application of best practices by economic characteristics.

- **OOP and eGovernment maturity level**. Consisting of two variables, this parameter aims to objectivize the achievements of the EU MS with regards to the OOP implementation and eGovernment principles. While the notion of OOP and its political prioritization has been rather recent – as previously discussed in Chapter 2.3 – the number of quantitative studies on OOP evaluation is somewhat limited. Nonetheless, eGovernment reports have been measuring the indices of public forms pre-filing, which, as discussed in the course of the literature review, can be seen as one of the metrics constitutes. However, potentially there might be some limitations in the context of direct transposition of the forms pre-filing index and OOP maturity. While no sufficient numeric database is available on OOP, the study will deploy the forms pre-filing index to evaluate the current level of the Once-Only. OOP – being one of the principles of a digital government – is significantly interconnected with the eGovernment maturity models and hence, will be considered together with overall eGovernment score.

The independence of the introduced parameters will be tested via calculation of Pearson correlation coefficient:

$$r = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{\sum(X-\bar{X})^2 \sum(Y-\bar{Y})^2}}, \qquad \text{where}$$

$$\bar{X} = \frac{1}{n}\sum_{t=1}^{n} X_t, \ \bar{Y} = \frac{1}{n} \sum_{t=1}^{n} Y_t;$$

X, Y are values of the variables;

n is the number of value sets.

Conducted with help of SPSS software, the introduced variables demonstrate the following correlation values (Figure 4):

Korrelationen

		GDP per capita	Internet access	eGovernment, OOP
GDP per capita	Pearson-Korrelation	1	,561[**]	,303
	Sig. (1-seitig)		,000	,062
	N	27	27	27
Internet access	Pearson-Korrelation	,561[**]	1	,593[**]
	Sig. (1-seitig)	,000		,000
	N	27	27	27
eGovernment, OOP	Pearson-Korrelation	,303	,593[**]	1
	Sig. (1-seitig)	,062	,000	
	N	27	27	27

[**]. Korrelation ist bei Niveau 0,01 signifikant (einseitig).

Figure 4. Correlation analysis of the selection parameters

As depicted in the correlation analysis, there is no strong linear dependence between the introduced parameters. Generally, there is a positive trend of GDP and Internet access influencing the indices of eGovernment and OOP, yet the Pearson coefficient does not transcend the value of 0,6. Despite the moderate correlation between Internet access and eGovernment and OOP values, it has been previously assumed that Internet access can be considered as a prerequisite for eGovernment progress. Thus, comparatively higher correlation index can be tolerated as they constitute only one criterion of the case choice. Moderate dependence between these two parameters will be further kept in consideration at the stage of country analysis and the verification of the applicability of good practices in the scope of other EU MS.

In the cluster analysis conducted with help of Qlik Sense – presented in Figure 5 – the EU MS are placed on the matrix depending on their indices of Internet access and GDP per capita. The closer the EU MS are depictured on the graph, the more similar they are in terms of the selected characteristics. The level of eGovernment and the OOP advancement is depicted with size and color of the points. The EU MS with more advanced indicators are demonstrated with darker colors, while countries with lower scores on eGovernment and OOP are depicted with lighter colors. The selection of study cases should take into account the homogenous nature of the contextual indicators – GDP per capita and Internet access – and contain two fairly well and fairly poor performing countries (OOP, eGovernment). Based on the scatter plot, two major groups of study cases can potentially be selected:

- Group 1: Lithuania, Latvia, Croatia, Hungary;

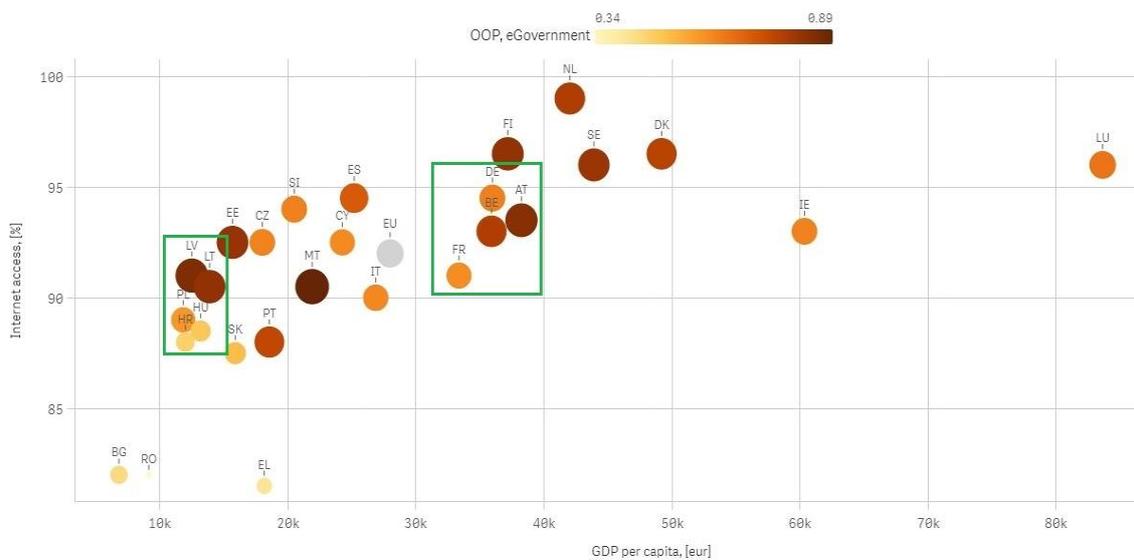- Group 2: Austria, Belgium, Germany, France.

Figure 5. Selection of study cases

Both groups are certainly of high interest for the OOP study as they are originating from various backgrounds and demonstrate different performance within the same group. While the first group of the countries suggest a more evident sample of the EU MS achieving different levels of eGovernment and OOP implementation, the latter demonstrates an averagely higher level of Internet connectivity which might also be associated with a higher level of digital services dissemination. The relatively bigger apartness of France from the other three countries by the parameter of Internet access in the second group is not expected to principally change the applicability of the analysis for the correlation reasons described above. Notably, it would potentially present an even more compelling case because coupled with Germany – which scored several points higher than France in terms of Internet connectivity – they both represent relatively poor performers if compared to Belgium and Austria.

While both groups might potentially set interesting study cases and lead to different outcomes, the following considerations will be taken into account before deciding upon either of the groups:

- *Leveling the moderate positive correlation between the parameters "Internet access" and "OOP, eGovernment".* As discussed previously, the level of the OOP and eGovernment advancement might require the availability of a certain level of internet connectivity, which might presume a certain bias in the process of case selection. By preferring Group 2 with a comparatively higher dispersion of Internet connectivity, this study can mitigate the risk of heavy reliance on the technical aspect of the matter.

- *Higher level of advancement demonstrated by all chosen EU MS*. Despite Group 1 represents a more demonstrative example of the difference in OOP and eGovernment levels, Croatia and Hungary demonstrate a below average level as compared to the aggregated EU indices. In this context, Group 2 seems as a more interesting set of study cases because all four identified countries presumably have a broader set of digitalization experiences and practices as compared to Group 1. However, despite sufficient presence of digitalization agenda in their home policies, France and Germany demonstrate lower performance as compared to Austria and Belgium. Having a broader set of national practices, their deployment and comparison deem to be of more interest in the scope of the present research.

- *Practicality and linguistic considerations*. Due to the reliability of the thesis on desk research, it will depend on the availability of the respective documents in a language comprehensible for the researcher. Thus, the availability of information in English, German or French will be introduced as an additional criterion for the choice of the countries, making the second set of the countries a preferable subject of the research.

Taking into account possible correlation between the introduced variables, estimation of the previous experience with regards to the OOP and language constraints, the present thesis will prefer Group 2 (Austria, Belgium, Germany, France) as a more suitable set of countries for the identified research goals.

4 Implementation of Once-Only Principle by the EU member states

As previously discussed in the course of the literature review, the actual implementation of the OOP might face considerable challenges implied by the dispersity of the existing legal and technical frameworks among the EU MS. The necessity to cover the gaps between the existing solutions across the EU motivated the creation of the Connecting Europe Facility (CEF) for the 2014-2020 horizon, which basically represents a pan-European investment instrument of 33 billion euros to boost the connectivity of the EU MS in energy, transport and telecommunications domains (European Commission, 2013). Enhancing the DSMS, the CEF Digital encourages the creation of "digital bridges to the benefit of citizens, businesses and public administrations" (European Commission, n.d.-b). Based on open standards and specifications, the CEF promotes further development of CBS, digital-by-default approach and data reuse while complying with the relevant European policies.

Seeking to decrease the dispersion of the used infrastructures, the CEF suggests encouraging the reuse of the existing solutions, via establishing a set of standardized Digital Service Infrastructures. While some of them are sector-specific, others can be reused as building blocks to enable reuse of digital services. Offering an option of implementing ready-to-use solutions, building blocks are proposing to replace the most common digital operations – e.g., electronic archiving of documents, electronic invoicing, electronic translation etc. – via this allowing to optimize cost-efficiency of digital solutions, making the development of digital services faster and easier (European Commission, n.d.-b).

Electronic identification (eID) has been recognized as one of the inherent building blocks for constructing pan-European digital infrastructure. Providing a single identifier for citizens and businesses, eID enables unequivocal verification of the user's identity and permits an unambiguous linking of datasets across multiple data registries and horizontal and vertical data exchange across public administrations (European Commission, 2014c). Now that base registries are performing the role of data aggregators to feed the delivery of public services, they represent "a reliable source of basic information on items such as persons, companies, vehicles, licences, buildings, locations and roads" (European Commission, 2017c), becoming as a result one of the cornerstone elements of eGovernment. The four base registries – namely Business, Land, Vehicle and Citizen registries – constitute the basis for delivery of essential public services, which are later via secure data management and interoperability considerations are orchestrated in aggregated public services available for end users (Figure 6).
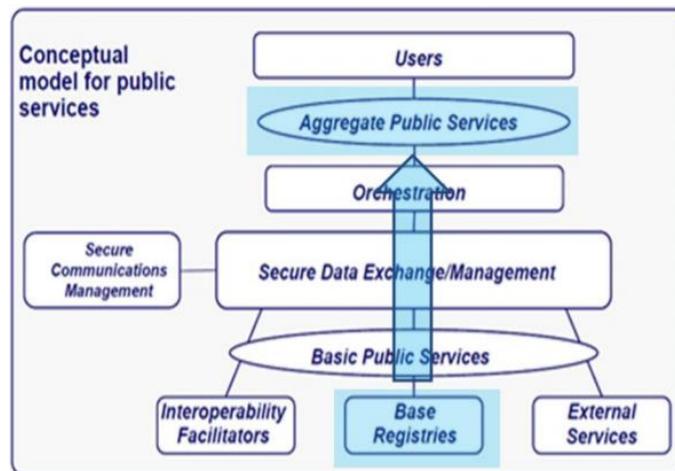
Figure 6. Conceptual model for public services (European Commission, 2014a)

Via aggregating the data relevant for public services provision, base registries allow storage and reuse of the collected data, removing the bureaucratic burden of redundant data provision. By means of linking the data across different registries with a single identifier, the public sector provides the possibility to reuse the available data under the OOP regulations (European Commission, 2014a). Postulating creation of shared data space for European Single Market already in 2006 (European Commission, 2006), the Commission made their first steps toward technical and semantical interoperability of cross-border public services and became one of the milestones for further OOP propagation.

The movement toward shared digital space set up the basis for accessing the public services in the cross-border context. The STORK (Secure Identity Across Borders Linked) project launched in 2008 called upon the mutual recognition of identification schemes among the participating European countries. Followed up by STORK 2.0 and further convergence of public and private services, they succeeded to develop an interoperable eID authentication system, which later became an input for new pilot projects (European Commission, 2015b). Fostering further collaboration on eID mutual recognition systems, the eIDAS regulation endorsed the endeavors toward establishment of the common eID infrastructure. While all the EU MS were expected to be eIDAS compliant by 2018, nineteen European states were using STORK 2.0 infrastructure. e-SENS project initiated in 2016 was introduced to cover the gap between eIDAS middleware and STORK proxy-services, suggesting to use eIDAS/STORK plugin to connect eIDAS network and transforming them into eIDAS-nodes (*EIDAS Connector*, 2016).

The Once-Only Principle project (TOOP) launched in 2017, takes into account the anterior achievements of STORK projects and e-SENS, aiming to create a generic

federated OOP architecture compliant with the existing EU frameworks. Constructing upon the European Interoperability Reference Architecture and EIF with usage of building blocks synthesized by e-SENS project, the TOOP focuses on OOP via enabling automated data sharing, improving data reliability and preferring querying existing data over redundant data submission (Krimmer et al., 2017). Bringing together 21 European countries, the TOOP constructs upon existing national infrastructure, bilateral cross-border initiatives and previous large-scale projects experiences. Enabling interconnection and interoperability of national base registries across European borders, the TOOP consolidates the existing building blocks and encourages standardization of eGovernment architectures.

While STORK projects, e-SENs and TOOP were majorly focused on the technical side of the OOP implementation, the SCOOP4C (Stakeholder Community Once-Only Principle for Citizens) project was addressing a broader community relevant for the OOP diffusion. Articulating the necessity of co-creation and co-production in provision of public services, the SCOOP4C was aiming to establish an open platform for practitioners to collaborate and share OOP practices, to promote the implementation of the OOP, to assess its challenges and drivers and to, finally, create a roadmap of actions to unleash the potential of the OOP (*SCOOP4C*, n.d.).

Inhering the achievements of the previous projects, the Digital Europe For All (DE4A) project will construct its solution of CBS provision upon the existing infrastructures with a thorough consideration of experience and best practices of the previous projects. Nevertheless, as pinpointed in the introduction, the diverse level of engagement in the aforementioned projects and uneven digitalization level of the EU MS establish a disproportionate field of further public sector digitalization. With full consideration of this notion, DE4A takes an attempt to contextualize the current level of eGovernment development, calling upon the necessity to develop a service customized to the actual needs of the EU MS (European Commission, 2019b). Thus, in what follows, this chapter will discuss the diverse levels of the OOP development, various practices toward its implementation and their applicability for other EU MS in order to create a more balanced playground for the DE4A.

4.1   Belgium

According to Eurostat, Belgium is a high-income country with a population of 11.4 million people (*Eurostat*, n.d.). Placed in Western Europe, Belgium is divided into Federal, Regional (Flanders, Wallonia and Brussels-Capital) and Community levels (Dutch-, French- and German-speaking). Both regional and communities level have their own legislative and executive powers, where communities carry out personal,

cultural and educative matters and regions are responsible for a broader set of subjects – such as economics, employment, transport and energy policies (European Commission, 2018b).

Ranking one of the top-performing countries among the EU MS according to the Digital Economy and Society Index (DESI), Belgium scores one of the highest indices in Internet connectivity thanks to the availability of fast and ultrafast broadband networks (*DESI*, n.d.), similarly leading to the increase of the number of citizens interacting with public authorities via the Internet (59% against EU average of 53%) (*Eurostat*, n.d.). Scoring one of the top in the EU, Belgium likewise demonstrates a high level of digital technology integration via encouragement of regional cooperation and connecting them to the EU programs (European Commission, 2019a). In terms of the eID advancement by 2018, Belgium demonstrates almost three times higher performance rate of cross-border eID availability for citizens than that of the EU average, equally scoring above-average functioning of national eID schemes within the country (European Commission, 2019d). The interoperability performance of Belgium under the EIF has been demonstrating a rather high level of implementation, despite the limited alignment of national and European Interoperability Frameworks (European Commission, 2016a).

The political agenda toward digitalization is supported by DG Digital Transformation, which also supports the endeavors of regional organizations in their eGovernment initiatives (European Commission, 2018b). Assisting in deployment of federal programs, the DG Digital Transformation participates in the execution of "Digital Belgium" program, intending to make Belgium one of the biggest European digital hubs (*Digital Belgium*, n.d.). Prioritizing the digitalization of the economy, infrastructure, labor market, government and digital security, the taken political agenda encouraged the creation of multiple start-ups and political initiatives to embrace the potential digitalization benefits (European Commission, 2019d). This program is acting in line with the Federal eGovernment Strategy announced in 2009, which aimed to consolidate the public administration under single digital initiative bringing in all the existing competencies and specificities of public authorities. Ensuring the security principles it encourages to improve cooperation between different administration layers in order to provide integrated services to Belgian citizens and businesses and simplify the associated administrative procedures (European Commission, 2019d).

In parallel with the federal digitalization programs, several regional initiatives were launched to uphold the digitalization process of the regions. In 2015, Flanders presented their ambitious plan "Flanders radically digital", aiming to create an umbrella initiative covering all digitalization programs in the area. Introducing the idea of public

transformation, the program seeks to increase the effectiveness of public administration and enhance their user-centricity – also embracing the OOP (Informatie Vlaanderen, n.d.-c). In a like manner, the Wallonia government adopted their regional Digital Strategy 2019-2024, distinguishing digitalization of public services and businesses as ones of their key priorities. Further, it emphasizes the necessity of seizing the socio-economical potential to apprehend the added value of the digital transformation (digitalwallonia.be, n.d.).

Despite the considerable number of the political initiatives to entertain development of eGovernment, the very first attempts to create public digital space in Belgium date back to 1999, with a federal policy describing the Belgian vision on "The way to the 21st Century" (European Commission, 2014b). Continuously developing their policies, Belgium passed several directives, establishing digitalization agencies and announcing cooperation agreements among the regions and the Federal Government. In 2003, Belgium became one of the first countries to launch a national eID scheme (*Loi 2003-03-25/31*, 2003). Presented in 2003, the pilot project was already rolled out onto federal level in 2004 (*Loi 2004-09-01/33*, 2004) reaching 100% of eID cards dissemination by 2011 (Gemalto, 2020). Also, being one of the first EU MS to present their national eID solution to the eIDAS community (European Commission, 2018a), Belgian eID scheme was granted the highest level of assurance and demonstrated third best results in terms of cross-border eID availability in Europe (Tinholt et al., 2019).

The high political prioritization of eGovernment development and the possibilities opened up by a relatively soon development of national eID scheme allowed Belgium to grasp the opportunity presented by pan-European projects. Participating in both STORK and STORK2 projects in 2008 and 2012, Belgium joined the collaborative efforts of the EU MS and received a possibility to test their eID solution in cross-border perspective. With the eID scheme being one of the essential prerequisites for the implementation of the OOP, Belgium was relatively well prepared to adhere to application of this principle. Guided by the OOP, Flanders launched the MAGDA (Maximum Data Sharing between Agencies) platform in 2006. Aiming to develop an authentic source of information, encompassing the data on citizens, businesses and public administration, the MAGDA project became the flagship of Belgian OOP practices (Informatie Vlaanderen, n.d.-a). Renouncing repetitive data collection it encourages central management of the collected data, serving 190 agencies and 13 departments of the Flemish government (*MAGDA 2.0*, 2014). Extending the functionality of the service, the MAGDA platform was moved to a cloud-based environment and was recognized as one of the exemplar solutions when unveiling SCOOP4C and TOOP projects (European Commission, 2018b).

4.1.1 Administrative layer

As discussed previously, Belgium has a federal structure, splitting the government power into federal, regional and community levels. While each region and community have a right to legislate and execute their power onto matter of their fields of competencies, the aim of the Federal Government is to ensure compliance of the segmental policies and practices and to create an overarching framework for consistent fulfillment of national strategies (European Commission, 2018b). Despite the availability of concurrent strategies and legislative frameworks in different regions, there is a need for a unified vision of digital strategy and priorities consolidated at the federal level to ensure the synergy of both regional and federal governments (ISA2 programme, 2018).

Having relative independence in the way of digitalization propagation, the public administration of the Regions established regional entities responsible for carrying out eGovernment initiatives. The Flanders Information Agency in Flanders, the eAdministration and Simplification Unit in Wallonia and Brussels Regional Informatics Centre in Brussels-Capital support the national strategy and closely collaborate with local public administrations to implement eGovernment solutions (European Commission, 2018b). The relative freedom on the way to achieve the compliance with the strategies of the Federal Government and the national and European regulatory frameworks might create certain discrepancies in the results of a particular initiative and different methods deployed for its achievement. In this case, political will of the body in charge might play a decisive role in attaining the progress. For instance, Flanders demonstrated a higher level of eGovernment impatience, leading to the Region to entertain their own OOP initiatives, with some of them to be highly evaluated and to be adopted by other public administrations (Cave et al., 2015).

The complexity of the federal structure is maintained via a complex network of organizations under coordination of DG Digital Transformation Office. Contributing to the practice of policy-making and development of infrastructure and middleware solutions, DG Digital Transformation promotes cross-government strategies, standards and services under the national eGovernment strategy (*BOSA*, n.d.). Federal Government Department for Information and Communication Technologies (Fedict) – being one of the internal departments of DG Digital Transformation – undertakes the role of coordination of national base registries (European Commission, 2019d), making it one of the most relevant actors in terms of managing the OOP endeavors. Unleashing the potential of data reuse after adoption of the respective law in 2014 (*Loi 2014-04-19/52*, 2014), Fedict took responsibility for coordination electronic data integration and enabling the dialogues among the involved stakeholders. Involving the owners of base registries,

processing units and users of the base registries' data, Fedict aimed to harmonize the workload among different service integrators (both federal and regional) and to build a circle of trust among them. It likewise contributed to establishment of monitoring mechanisms over the source of authoritative data unlocked by service integrators (European Commission, 2019d).

The attempts to establish Once-Only approach by DG Digital Transformation Office are further supported by the respective ministries and federal departments. Appointing the Ministry of Interior and Finances, Federal Departments of Mobility and Transport, Economy and Social Security to handle different base registries, the Digital Transformation Office obliged the respective bodies to comply with the OOP. Charged to support different base registries depending on the department's profile, their administration is responsible for management of master data, which later contributed to the maintenance of the up-to-date and relevant data in national base registers. This is frequently done by delivering the task of data collection to the level of communes in each region, establishing a well-functioning and responsive vertical of data management (European Commission, 2019d).

Notably, the Federal Agency for Administrative Simplification – which aim is to assist in simplification of internal and external administrative procedures – launched an initiative targeted precisely at the interaction between the Federal Government and citizens and businesses. Educating the end-users of the advantages of the OOP and the dedicated regulations, the Agency encourages them to participate in the process of co-creation, via offering them a chance to share their suggestions directly with the Federal Government (kafka.be, n.d.).

4.1.2   Legal layer

The directive on reuse of public sector information was adopted by the European Commission in 2003 and regulated the necessity to encourage reuse of public data by the EU MS (European Commission, 2003). Aspiring to align national legislation with the European legislative framework, Belgium passed a decree on procedures and time limits in the context of handling requests for public sector information reuse in 2007 (*Loi 2007-10-29/31*, 2007). Applying to numerous domains of public services – including those of finances, transportation, employment etc. – the federal government set formal aspect on the procedures of reuse of public information. Implying the ubiquity of the postulated principles, the federal government imposed similar regulations onto governments of regions and communities (European Commission, 2019d).

Synchronously with this above decree, the Federal government issued the law on principles of governing reuse of public sector information, postulating the availability of public data for reuse under considerations of privacy and sensitivity of the data (*Loi 2007-03-07/36*, 2007). It was then later surpassed by the law on reuse of public data in 2016, which creates an overarching legislative framework for repetitive use of the public information encompassing principles, organization of data storage and access, data source, handling procedures and data exclusivity (*Loi 2016-05-04/17*, 2016).

Federal Open Data Strategy, adopted in 2015, was further encouraging establishment of the digital ecosystem in Belgium via obliging businesses to open up companies' datasets and documents (De Croo, 2015). Implying the principle of open-by-default, the Federal Government likewise compelled the provision of the data in a machine-readable format to decrease the dependency on human interaction and improve semantical coherence within the dataset sources. Advocating for the standardization of the existing data, the government enhanced data interoperability, establishing predisposition of the national data sources for the OOP and facilitating the entrance of Belgium in the global digital and data ecosystem (De Croo, 2015). The Open Data strategy was then later inherited by the regional government of Flanders to join the established open data ecosystem and to contribute to vertical data interoperability (Informatie Vlaanderen, n.d.-d).

The attempts for higher integration of business data was concurrently accompanied by a dedicated law on the OOP in 2014 (*Loi 2014-05-05/06*, 2014). Postulating reuse of data as one of the underlying principles in Belgian eGovernment system, the new law touched upon numerous public domains, stipulating reuse of data as the new norm of public services. In accordance with the new legislation, public administrations have to query the existing information via a unique identifier over demanding repetitive data submission by citizens or businesses. The transformation in the domain of data management by public administration was enabled thanks to the well-established national eID schemes and availability of base registries, which altogether allowed to retrieve the needed information by means of the personal identifier and to coordinate data exchange among multiple public administrations via connected registries (Krimmer et al., 2017). The ability to navigate among the vast amount of data and to extract the needed datasets contributed to a more targeted provision of public services, entertaining the ideas of user-friendliness of eGovernment system.

While the previous regulation was projecting the OOP onto the Belgian public services, the law on electronic identification – adopted in 2017 – responded to the eIDAS regulation by the EU and postulated the necessity to ensure the cross-border functionality of the national eID means (*Loi 2017-07-18/09*, 2017). Under the new regulation, the DG

Digital Transformation had to develop a minimum set of identification data to enable exchange of this data and unique identification of the data subject on the cross-border perspective. Enabling identification of alien citizens and businesses by another EU MS contributes to a broader propagation of the OOP, enabling the reuse of data not only within national borders but also for provision of public CBS (European Commission, 2019d).

4.1.3 Technical layer

A special unique identifier is appointed to each citizen and business, constituting to the national eID system. The data stored in the base registries is associated with a set of unique identifiers, which can be used to access and retrieve the needed data from the registries. The unambiguity of personal identifiers enables data exchange across governments – and potentially cross-border – conditioning easier access to digital services by citizens and businesses (Krimmer et al., 2017).
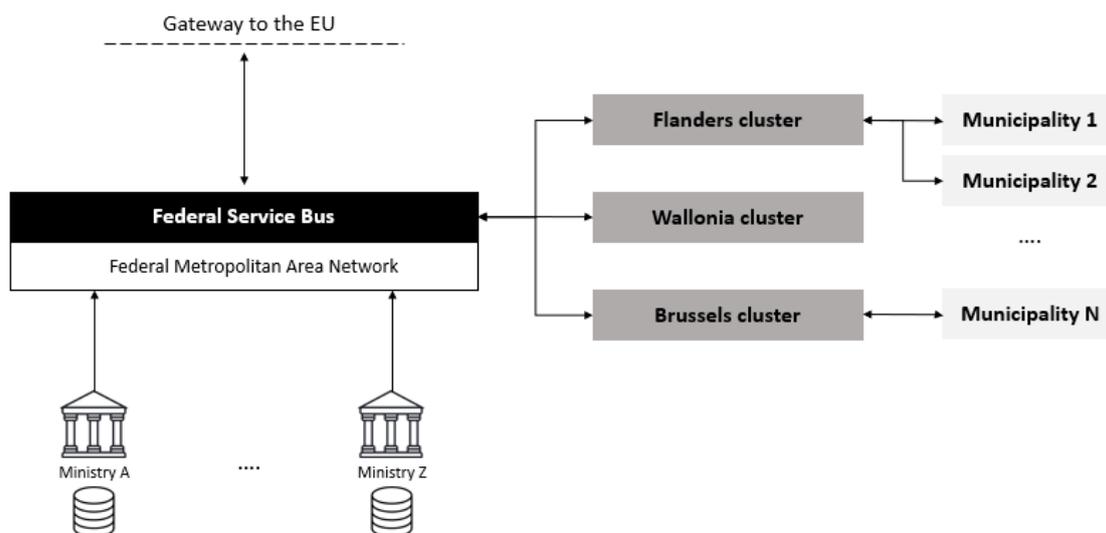
Figure 7. Data exchange between federal, regional and municipal public administrations - created by author, based on van Assche & van Tilborgh, 2010; European Commission, 2017b; personal communication with F. Leyman, 2020

Willing to enforce the integration of federal and regional data access mechanisms, the federal law on single data collection stipulates introduction of service integrators to bridge the potential gap between the base registers (*Loi 2014-05-05/06*, 2014). Renouncing the necessity for redundant data submission, the law in a like manner implies establishment of a single point of contact for data consumers via bringing the base registries together. The access to base registries is implemented via multiple channels, including replication

of the registries to the respective authorities and data lookup supported by application programming interfaces. The schematic representation of the data exchange process in the national context is represented in Figure 7.

The Federal Service Bus is a central unit to enable data exchange between different level of public administration and multiple ministries (European Commission, 2017b). Federal ministries are connected to the Federal Service Bus through Belgian Federal Metropolitan Area Network, which enables access to national registers of the respective ministries and enables connection with regional administrations. Upon the demand and sufficient access authorization, the data can be streamlined between the federal, regional and municipal administrations, allowing public service functioning within the country (van Assche & van Tilborgh, 2010). Equally, the Federal Service Bus performs the role of cross-border connector, where access to the national registers are introduced under the same considerations of data security and necessity of sufficient access authorization by non-Belgian public authorities.
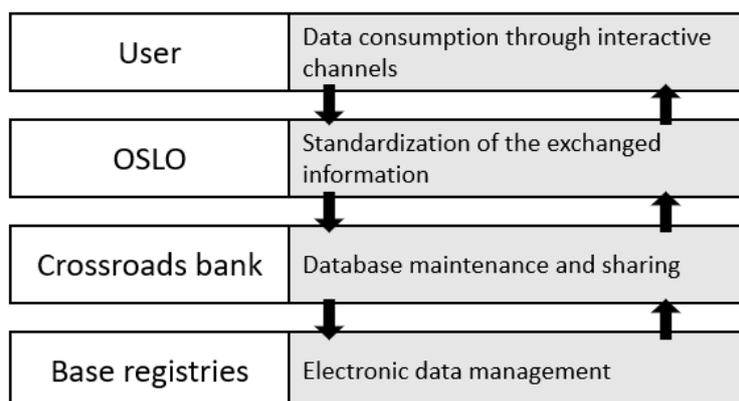
Figure 8. Interoperability of OOP solutions - Adapted model from Informatie Vlaanderen, 2019

Flanders – pioneering eGovernment-related solutions – undertook an OSLO (Open Standards for Linking Organizations) initiative, which aims to provide more coherence of data and contribute to its findability (Informatie Vlaanderen, n.d.-e). The introduction of the project complemented the process of management and use of data through supplementing the process of data input and retrieval by an additional standardization step (Figure 8).

The base registries organized around dedicated subjects are serving as an input for crossroads banks, which practically represents the set of databases containing information on broader concepts, aggregating information from a set of base registries. Later, OSLO project focusing on the semantic interoperability, establishes a system of interconnected

authentic data sources following the existing national and European standards, simplifying the use of the data by platforms and services of public administration for its end users. Despite being launched in Flanders, the Flanders Government was co-developing the project in association with regional and local public administrations, private sector, federal partners and the European Commission (Informatie Vlaanderen, n.d.-e). The success of the project conditioned the launch of OSLO² and left a legacy of open tools for automated vocabulary generation and vocabulary specifications (Informatie Vlaanderen, n.d.-b).

4.2   Austria

Austria is a central European country with a population of 8,9 million inhabitants and a high-income index (*Eurostat*, n.d.). Characterized by the federal system, Austria consists of nine federal states – or provinces – with shared legislative powers. Nevertheless, despite the federalism, the legislative power of provinces is limited, majorly dealing with matters of housing, environment, waste management and community laws and can indirectly participate in the administration of federal law (*The Federal Principle*, n.d.).

Significantly overtopping the average EU performance in the percentage of internet use to communicate with public officials (70% against 53%) and online submission of online forms (47% against 36%), Austria scores second-best in the average index of eGovernment advancement in Europe (*Eurostat*, n.d.). The country demonstrates particularly high achievements of cross-border mobility and user-centric approach in their eGovernment strategy (European Commission, 2019i). Overtaking majority of the EU countries, Austria is one of the leading member states in terms of eIDAS adoption, with general national eID use rate far above average. Similarly, Austrian eID-scheme almost twice outperforms the EU average in the context of cross-border eID availability for citizens (European Commission, 2019c). Further, Austria scores almost maximum in the alignment of national interoperability strategy with the EIF, introducing comprehensive mechanisms for interoperability monitoring (European Commission, 2016a).

With an ambitious goal to become the digital leader in Europe, Austria passed on several communications, creating a framework for its digital development. Having established a legislative framework for eGovernment already in 2004, Austria outlined the direction of digital development of the country, guarding the principles of security and data protection and granting free access to the information and services for all its residents (*E-GovG*, 2020). Building upon the existing legislation, Austria constructs functionality of its services around user-oriented values – such as comfort and simplicity, transparency and participation – as well as economic perspectives and, notably, convergence and synergy with European solutions (BMDW, n.d.-a).

Yet, despite the steps towards eGovernment in Austria were taken at the early stage of Internet development and the high level of digital advancement, the federal government keeps on pushing digital agenda, aiming to fully embrace the potential of digitalization. Unveiling the "Digital Roadmap Austria", the Federal Ministry for Digital and Economic Affairs put a goal to create a comprehensive digital agenda, embracing all emerging technologies and developing a strategic vision for their adoption in various governmental domains, such as public administration, politics, economics, innovation and research etc. (BMDW, 2017a). Formulating 12 guiding principles of digital innovation, the "Digital Roadmap Austria" also elaborates on a set of concrete measures showcasing the benefits of technology adoption and unleashing the transformation potential in all of the identified domains. Interestingly, the Ministry decided to keep the strategy dynamic, motivating it by the rapid development of technologies and the necessity to establish an agile approach toward their adoption.

OOP, envisaged by the eGovernment framework, has been continuously distinguished as one of the underlying principles for digitalization of public services. Going from Once-Only Principle, the Austrian government exceeded the OOP compliance of national public services, taking a proactive role in their provision. Transforming the classical *one-stop shop* approach in service provision, the federal government takes the lead in developing a *no-stop shop* solution which offers certain services prior to the demand from the citizens. In 2015 Austria launched a completely automated project for receiving children's allowance without filing an application, winning multiple awards for the most successful public project (Waldecker, n.d.). Similarly, Austria introduced an OOP-driven approach in other public services, offering services of social security, proof of residency, taxation, certificates issuance to its citizens and businesses (BMDW, 2017b). Reaching 81% of the forms pre-filling (Tinholt et al., 2019), Austria admits to having widely introduced OOP in the context of its public service provision.

Simultaneously with piloting national projects, Austria has been actively participating in European initiatives on the OOP, taking part in TOOP, SCOOP4C, ISA[2], STORK, BRIS (Business Registers Interconnection System) and some other OOP-relevant projects. Closely collaborating with the European countries, Austria actively participates in the sharing of their practices, having posted over 20 solutions at the Joinup platform (*Joinup - Solutions*, n.d.).

4.2.1   Administrative layer

The eGovernment endeavors in Austria are nationally coordinated by the Federal Ministry for Digital and Economic Affairs. Issuing digitalization strategy and policies, the Ministry is equally responsible for coordination of the digitization tasks and is

supported by its administrative units and the Platform Digital Austria (PDÖ). PDÖ, founded in 2005, is a strategic platform which includes representatives from both public (federal government, provinces, cities, municipalities) and private sectors. PDÖ performs the leading role in planning, monitoring and coordinating eGovernment strategy in the state (BMDW, n.d.-a). Cooperating closely with the Ministry, PDÖ establishes an overarching back office and remains open for representatives from all government levels, cultivating cooperation culture (European Commission, 2019c).

Despite the leading role of the Federal Ministry for Digital and Economic Affairs, multiple ministries participate in carrying out the digital initiatives in their domains. For instance, Ministry of Finance initiated a large-scale digital projects FinanzOnline – an electronic data exchange platform, while Ministry of Transport, Innovation and Technology launched Austrian Electronic Network, supporting access to innovative services and research (European Commission, 2019c). At the same time, several ministries are involved in coordination and maintenance of the used base registries, segregating their responsibilities with regards to the base registry management according to their field of specialization.

The need to access the potential of digital innovation and adoption of technologies articulated the foundation of eGovernment Innovation Centre in 2005 (*EGIZ*, n.d.). Establishing the base for informed policymaking, the Centre covers the gap between the somewhat abstract nature of innovation research and the actual practicality issues of the innovation implementation.

Aiming for inclusive collaboration environment, the federal government likewise reckons for the necessity of digital transformation of the economy. Founding the Digitalization Agency of the Federal Government, Austria fosters digitalization of industry, bringing private and public sectors to close digital collaboration. Majorly focused on support of small and medium enterprises, the Agency offers its expertise and know-how in the area of digitalization, security and innovation (*FFG*, n.d.).

As follows from the above, despite being a federated state, the Austrian Federal Government takes a leading role in implementing its eGovernment initiatives. However, trying to create an encompassing solution for all levels of government, it establishes a dialogue format with regional and local authorities as a collaboration platform among various administrations (*E-Government Bund-Länder Gemeinden*, n.d.). OOP, being a part if the general eGovernment framework is in a like manner addressed under this collaboration framework. Announcing Register and System Network, the Ministry for Digital and Economic Affairs – in collaboration with different levels of the government – outlined the importance of the OOP as a joint effort (BMDW, 2018). Mitigating the risk

of scattered development of the Network, the Register and System Network suggests an overarching standardization toward data maintenance bringing multiple data registries at different governance levels together under a single data reference structure.

4.2.2   Legal layer

As previously mentioned, the notion of the OOP has been introduced in the law on eGovernment and explicitly compels public administration to comply with the OOP, obliging them to access available data from digital registries – under the existing legal considerations (*E-GovG*, 2020). Identifying a citizen card as the principal prerequisite to public services, the law encompasses a broad definition of identification mechanisms, which might take a form of a smart card, but is not limited to it. Availability of the qualified signature function is a decisive criterion for the medium to be chosen as personal data holder (*E-GovG*, 2020).

Interestingly, the legislation likewise provides the mechanisms of securitization of privacy and means of interconnection of data across different registries, making a difference between the identification number stored at the citizen card (sourcePIN) and the set of sector-specific personal identifiers (ssPIN), granting access to the services of a specific authority. The regulation on sourcePIN register foresees a procedure of deriving the ssPIN from the sourcePIN and restraints its visibility only for the relevant authority. To protect the privacy of the citizens' data, the ssPIN can be used by another authority exclusively in an encrypted format (*StZRegBehV*, 2009).

The interconnection of the underlying base registries is regulated by a set of legislative acts corresponding to the subject of the data. Distinguishing Central Commercial, Central Civil, Land, Vehicle and Central Resident's registries, the law reckons for the necessity to regulate the access and use of the above registries by a respected law applied in the relevant domain (European Commission, 2019c). Having introduced the update on the base registries interconnection in these regulative frameworks, the federal government postulated the structure, rules of use and applied administrative charges for misuse of the data.

To support the endeavors towards the data interconnection and to promote delivery of public services, Austria established its national interoperability framework, complying with the EIF (Reichstädter, n.d.). Interconnecting all the existing organizational frameworks, it couples Austria with the European community, fostering cross-border interoperability. Postulating the necessity of interoperability considerations at the stage of public services development, the national interoperability framework encourages reuse of already existing solutions at the national level. Semantical interoperability significantly

supports the interconnection of base registries and the possibility to seamlessly query the needed data from an electronic register (European Commission, 2019c).

4.2.3 Technical layer

Although the national eID scheme of Austria has not been notified and peer-reviewed by the eID community under the eIDAS regulation, it has an alternative way of personal authentication, which is according to Cave (2015) is well developed and consolidated. Implementing the citizen card in almost 75% of all services provision (European Commission, 2019i), Austria enables one-stop shop approach for public service provision, bridging the data silos and eliminating the barriers between sectors and promoting the OOP solution (BMDW, n.d.-b). To ensure the privacy of the users, every citizen is assigned to a unique number – sourcePIN – which is stored at their device and cannot be transmitted further. The reachability of the data stored in the base registries is enabled via creation of a substitute key identifier – ssPIN – applicable for a particular public domain. To build the connection, the sourcePIN authorities request the sourcePIN via trust service providers which will be later received in the encrypted format. Transforming the sourcePIN in ssPIN, the query gets transferred to the destination domain, triggering the queried datasets (BMDW, n.d.-a). Ensuring the privacy of the citizens through a set of several personal identifiers, the public authorities manage to maintain consolidated registry querying procedures supporting the OOP.

The consolidation of the data infrastructure is enabled through the project of Register and System Network (RSV), which allows new approaches to data management.
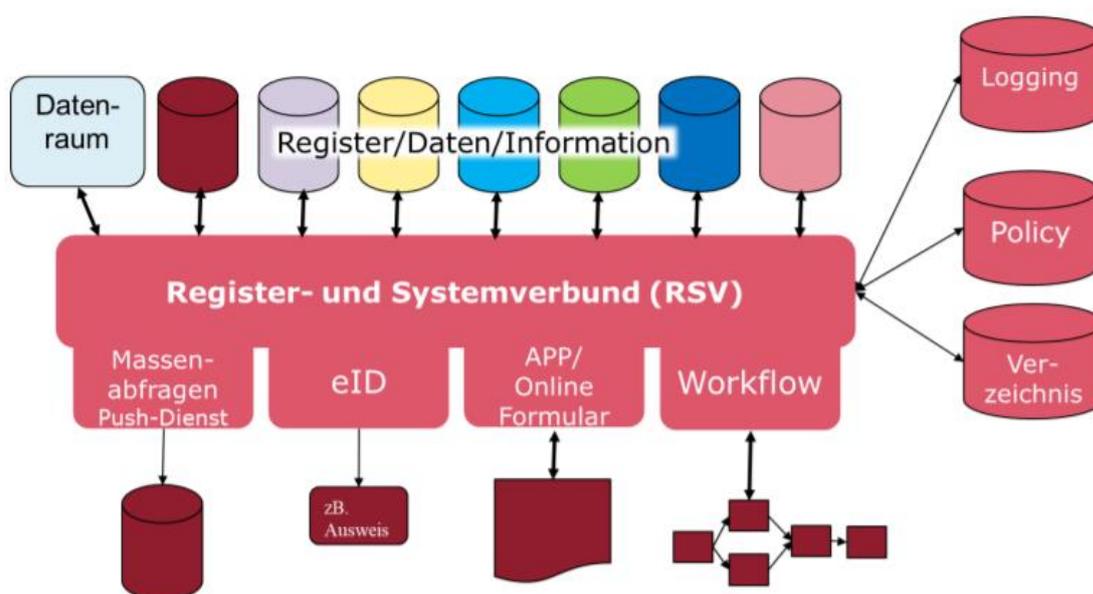

Figure 9. Connection of registers and systems (BMDW, 2018)

As seen in Figure 9, base registries are managed through RSV; however, remaining independent from each other at the data layer. At the opposite side, the RSV is coupled with bulk queries and push services, eID, application software and workflow. Bulk queries provide the possibility for offline data attribute comparison and establishment of temporary copies in different databases. Temporary storage and utilization of this data can be, however, done only in compliance with the data protection regulation. eID, as discussed above, provides a unique identifier that enables extraction of the needed data limited for the purpose of the requested service. The software components realize the communicator function, which serves as a means of the communication between the service user and the base registries. Filling out a respective online form, the user transmits its query for particular data attributes or adds a new entity in the registry. Workflow portrays the authorities' capacity for management of the RSV elements, including the update of the registries' attributes (BMDW, 2018). The RSV is further regulated by a set of additional attributes, which include logging protocols, relevant policy and management of directories.

Bringing together 130 registers distributed among various public authorities, the RSV takes the interconnector niche between the data layer and front-end service solutions. Aiding the compliance with the privacy regulations, it facilitates exchange of data between the public authorities in a transparent and secure environment. Putting a significant emphasis on RSV development, the Federal Ministry for Digital and Economic Affairs sees it as a prerequisite for the OOP implementation (BRZ, 2020).

4.3   Germany

Germany is a high-income country with a population of 82,9 million people (*Eurostat*, n.d.), located in west-central Europe. Federalism was historically enshrined as one of its constitutional principles by the Basic Law – *Grundgesetz*, granting significant sovereignty to the German states. Comprised of 16 federal states (Bundesländer), Germany reflects its principles of political and economic decentralization via giving the states the autonomy in dealing with internal security, education, culture and municipal administration (deutschland.de, n.d.). The federal government, at its turn, presumes its authority for managing foreign affairs, defense, immigration and monetary politics (*GG*, 1949).

Characterized by strong federalism, Germany by far is one of the most decentralized countries within the EU. The rigidity of the political system and the relative autonomy of the states in development of their own legislative frameworks and policies under their jurisdiction are argued to significantly impede the process of digital integration of the country (Kubiciek & Wind, 2005). Thus, despite advanced development of Germany in

the context of Internet-connectivity – among the top-10 EU member states – the country demonstrates one of the lowest performances in terms of digital public services (European Commission, 2019g). Notably, Germany scores one of the highest rates of use of internet services, taking the fifth place right after Austrian users. Despite particular challenges, Germany has significantly improved its eGovernment performance, steadily coming for higher ranking positions. Demonstrating an EU average results on user-centricity and cross-border availability of the services, Germany maintains relatively high positions in terms of government transparency and eDocument functioning (European Commission, 2019i). Aligned with the EU average results on eID availability, Germany, however, has not demonstrated any improvements in the context of cross-border eID-functionality, scoring the minimum in 2018 (European Commission, 2019f). In terms of the EIF implementation, Germany similarly scores the EU average, introducing limited possibilities for its monitoring (European Commission, 2016a).

The digitalization milieu in Germany is steered by the National eGovernment Strategy, adopted in 2010 (IT-Planungsrat, 2015). Acknowledging the fragmentation of national eGovernment landscape, the National eGovernment Strategy aims to establish a common ground for federal, state and local development of eGovernment initiatives, creating favorable conditions for citizens and businesses. While the overall strategy emphasizes the importance of user orientation, efficiency and cost-effectiveness, security, transparency and social participation, it also accentuates several legal principles of eGovernment transformation. The strategy postulates the necessity of cooperation between different levels of state powers and stakeholders, urging public authorities to make data processing transparent and secure (IT-Planungsrat, 2015).

Being continuously updated, the National Strategy aims to include the most crucial eGovernment milestones in its jurisdiction. The German strategic vision is supported by the respective memorandum in 2011, which envisages particular goals to achieve the objectives of the National Strategy (IT-Planungsrat, 2011). In 2019, the Federal Government shared their implementation strategy on Shaping Digitalization, where they evaluated the transformation perspectives, needed resources and involved stakeholders (digital-made-in.de, 2019).

Ratifying the Tallinn Declaration, Germany undertook the responsibility for fulfilling the eGovernment principles envisaged by the declaration and implicated by the EU eGovernment Action Plan 2016-2020. Complying with the OOP, the German Federal Government, however, state that the eGovernment Action Plan should elaborate in more detail the concrete steps needed to be undertaken by the EU MS with consideration of the national context (Die Bundesregierung, n.d.-b). Furthermore, Germany requests

clarification of particular areas for OOP appliance, delaying the adoption of respective policies and regulation to propagate OOP in their national domain (Die Bundesregierung, n.d.-b). The Hanns Seidel research foundation registers insufficient practical application of OOP practices within the country, reasoning this with local processing of the data (Baltissen, 2019).

However, there have been significant changes in the governmental reluctancy toward implementation of the OOP. Participating in TOOP, BRIS, SCOOP4C, CEF, ISA[2] and STORK projects, Germany encouraged internal development of the OOP. Additionally, Germany was a member of bilateral cross-border OOP initiatives – such as x-trans.eu, which was a matter of cooperation between Bavaria and Upper Austria on easing the procedures for application and approval of transborder transports (CEF Digital, 2019). Interestingly, the Joinup platform counts up to 54 solutions (co-)developed by Germany (*Joinup - Solutions*, n.d.).

4.3.1   Administrative layer

Established in 2018, the position of State Minister for Digitalization obtained the coordinating role in the digitalization efforts of Germany. While no publicly available information on establishment of such ministry was found, the website of the German Federal Government suggests it carries out the state digitalization strategy (Die Bundesregierung, n.d.-a). It further indicates the assistance of Innovation Council in forming the vision of implementation of emerging technologies and their role in the future.

In parallel to the newly assigned minister for digitalization, the responsibility of certain eGovernment functions belongs to the Federal Ministry of the Interior, Building and Community (BMI). The BMI articulates its goal in attaining opportunities from the digitalization process in accordance with the Digital Agenda developed by the ministry in 2014 (BMI, n.d.). Engaged in various domains, the BMI entertains policy domains of data, cybersecurity, digital society and data ethics. The ministry is supported by a federal commissioner, who is responsible for elaboration on eGovernment strategy and assistance with federal IT architecture and standards (European Commission, 2019f).

IT Council is another governmental entity performing a coordinating role for the domain of digitalization. It is composed of the state secretaries of all federal ministries in charge of administrative digitalization and it is responsible for management of digitization of federal administration (Die Bundesregierung, n.d.-c). Notably, German federalism grants considerable autonomy for federal states' governments in the domain of digitalization

management. Hessen[3] and Bavaria[4], for instance, dedicatedly established state entities responsible for the local digitalization initiatives, identifying digitalization strategies for the respective states.

Entertaining the representativeness of the states, the Federal Government founded IT-Planning Council, whose is facilitating the collaboration between the federal and state governments (*IT-Planungsrat*, n.d.). The IT-Planning Council fulfils the right for equal participation of state and federal governments in IT and digitalization co-working envisaged by the German Basic Law (§ 91C *GG*, 1949). Under its founding principles, the Council participates in coordination of IT-relevant domains, IT standards, eGovernment projects and network linkage of federal and state entities (*IT-Planungsrat*, n.d.). In 2020, under the IT-Planning Council initiative, Federal IT Cooperation (FITKO) team was founded, which by the end of 2021 will overtake the coordinating role of the IT-Planning Council. It is planned, that FITKO will exercise the implementation of IT strategy and architecture, coordinate federal and state digitalization efforts and facilitate distribution of IT solutions (*FITKO*, n.d.).

As seen from the German administration case, the country has a long history of distributed technological management following its federal principles. Recent initiatives aimed at improvements in collaboration between federal and state governments are expected to facilitate the progress in implementing digitalization strategies countrywide. The latest study of National Board of Standards Control of Germany published a study, which reveals the absence of a federally coordinated system of base registers (Nationaler Normenkontrollrat, 2017) impeding the country-wide implementation of the OOP. The research identified over 200 different registers belonging to federal, state and commune governments and to third parties, such as companies and associations. The current state of registries interconnection manages only three registries in the federal level, including those of commerce, land and population (European Commission, 2019f). Managed by the respective federal ministries, they are only partially available for federal use. Land registries are reportedly set up for use exclusively within a state and cannot be managed on the federal level. Similarly, the population registers are the matter of state government and are not automatically accessible for federal administration – unlike centralized registry for foreigners (European Commission, 2019f). While the Federal Government, including State Minister for Digitalization, identify OOP as an important eGovernment

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[3] Hessische Ministerin für Digitale Strategie und Entwicklung. Available at: https://digitales.hessen.de/ Accessed: 29/06/2020

[4] Bayerisches Staatsministerium für Digitales. Available at: https://www.stmd.bayern.de/ Accessed: 29/06/2020

milestone, the National Board of Standards Control foresees lots of work to be done prior to implementing OOP federal-wide (Nationaler Normenkontrollrat, 2017).

4.3.2   Legal layer

The roots of the scattered eGovernment landscape lie in the federal structure of Germany, which according to the Basic Law, envisages autonomy of the states in the matters of local affairs (§ 29 *GG*, 1949). The law on online access to administrative services (Onlinezugangsgesetz - OZG) adopted in 2017, postulates creation of an online portal to provide public services of federal, state and communal levels (*OZG*, 2017). Despite not mentioning the OOP directly, it is a cornerstone element of the future platform. The law reckons for the possibility to save and transmit the data of natural and legal persons for the purpose of service provision upon the person's consent. With the full implementation of the platform foreseen in 2022, the OZG is expected to significantly contribute to the development of the OOP-compliant eGovernment structures (Baltissen, 2019).

The eGovernment law adopted in 2013, regulates easing of the electronic communication between citizens and public administration (*EGovG*, 2013). Postulating the obligation to produce data ready for machine-reading, it equally provides the legal base for processing the citizens' files online in case they are provided by another public administration entity and upon user's consent. Another legal act on Social Code (Sozialgesetzbuch) equates the documents provided by the citizen in electronic and paper format, creating a legal base for OOP in the domain of social service provision (§ 21 *SGB*, 1980).

Nevertheless, there is no an overarching legislative framework which would regulate data harmonization and processing on the national level. Realizing the necessity for the dedicated data regulation, the State Minister for Digitalization launched a set of open consultation sessions, aimed to include all stakeholders' opinion on the principles of data governance (Die Bundesregierung, 2020). Struggling to overcome concerns of the sceptical part of the population, the Federal Government wants to improve digital competencies, elaborate the rules of data registering and processing, unleashing the potential for digital innovation.

4.3.3   Technical layer

The political will to consolidate the base registries for national use has been demonstrating certain achievements. Commercial registers are mostly available for use across states[5]; however, the registers for natural persons are not yet present at the national level (European Commission, 2019f). The report from the National Board of Standards

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[5] Justizportal des Bundes und der Länder. Available at: https://justiz.de/index.php Accessed 30/06/2020

Control, suggests that most of the natural person related data is saved and processed locally, compared to rather centralized company-dedicated registries (Nationaler Normenkontrollrat, 2017).
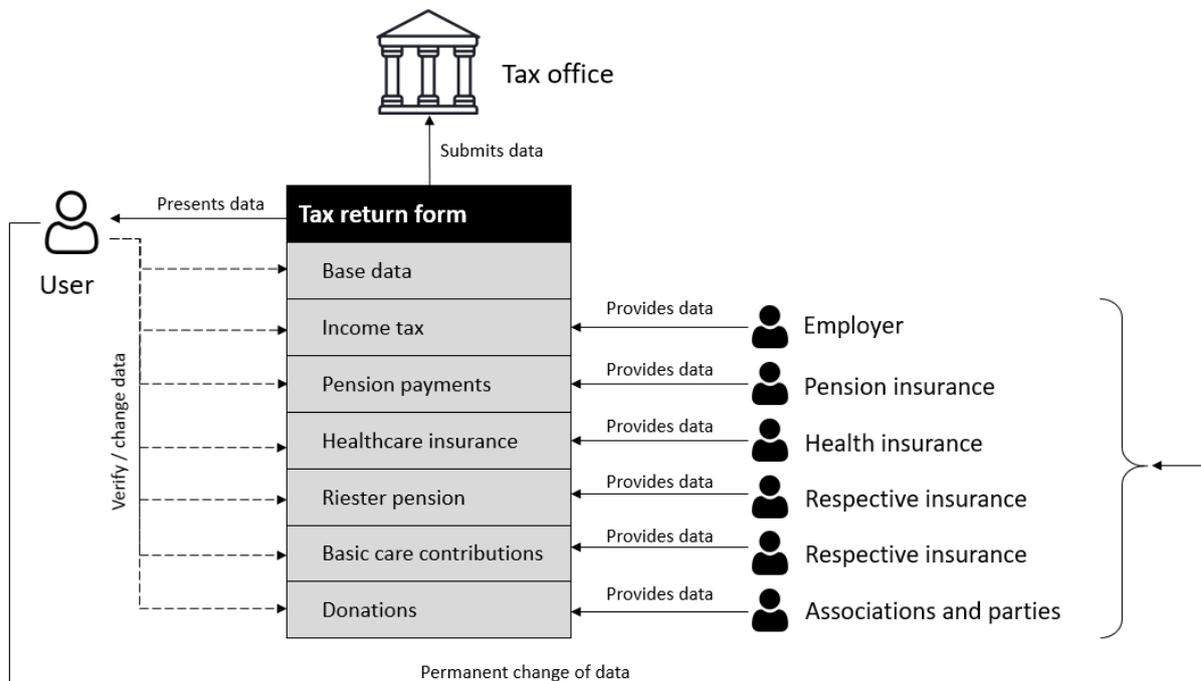

Figure 10. Process of submission tax declaration - created by author, based on Stocksmeier et al., 2019

The found data on interconnection of base registries was rather limited, and it deems to be impossible to evaluate a comprehensive approach toward centralization of registers in Germany. Figure 10 represents the outcome of OOP application with the example of tax return service *ELSTER*[6]. Introduced in 2014, *ELSTER* offers the citizens the possibility to file their tax return declaration online, automatically querying information from the respective bodies to pre-fill the declaration form (Stocksmeier et al., 2019). To access the service, the user must identify him/herself by either of the following methods: certificate and associated password, new eID-card and eID-application, mobile login and TAN, authentication USB stick, signature card and *ELSTER* authentication program. Upon successful authentication, the system pre-fills the form fields – such as income tax, pension payments, healthcare insurance, basic care contributions and donations – by querying the respective data from the relevant authorities. The user checks the correctness of the pre-filled data, makes corrections if necessary and submits the form to the taxation office. Notably, in case of introduction of changes into the pre-filled data, the changes are not transmitted to the respective authorities, but are processed locally. In case of the

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[6] ELSTER. Ihr Inline-Finanzamt. Available: https://www.elster.de/eportal/start Accessed 30/06/2020

necessity to introduce permanent changes, the user needs to contact the authorities to update the relevant information (Stocksmeier et al., 2019).

For *ELSTER* to offer only one example of OOP-enabled service, there are significant barriers toward country-wide implementation of the OOP due to the lack of registers interconnectivity (Nationaler Normenkontrollrat, 2017). Comparing the process of children's allowance to the one described in Austria, German public authorities do not have barrier-free access to information concerning the registration data of a person, unlike for example employment agencies, migration offices, state administration and some others. The research conducted by the National Board of Standards Control reveals a huge potential for automation and digitalization of the service in case of registries interconnection (Nationaler Normenkontrollrat, 2017).

4.4   France

Neighboring with Germany and Belgium, France is situated in Western Europe and belongs to high-income countries, with a registered population of 66.9 million people (*Eurostat*, n.d.). Despite the ongoing decentralization process, France is still considered as a highly centralized country (Larat, 2018). The national administrative structure consists of 22 regions, 96 departments and over 35000 municipalities, constituting to the respective three subnational administrative levels. The national central government holds exclusive responsibility for the matters of national sovereignty. The regional administrative level is held accountable for transportation, culture and education, economic and scientific development, regional planning. The department level elaborates the regional policies applicable for their own field of work and is additionally occupied with matters of public health, tourism and business environment. Municipalities are, in their turn, accountable for local social welfare, commuting plans, environment and public health and registry management (Larat, 2018).

From the point of internet connectivity, France falls under the average EU indices, reaching 90% of the households. According to the Eurostat calculation, 75% of the citizens use the Internet to interact with public authorities, compared to 53% of the EU average and outperforming Belgium, Austria and Germany with 59%, 70% and 59% respectively (*Eurostat*, n.d.). However, according to the eGovernment benchmarks, France scores close to the EU average in terms of cross-border mobility and user-centricity of the government, including the indices of eID advancement and its availability for cross-border use for citizens (European Commission, 2019i). DESI-indices similarly demonstrate average scores in terms of the level of public service digitalization and integration of digital technologies as compared to the EU average (European Commission, 2019g). Having adopted a rather comprehensive national interoperability

strategy, France has been, similarly, to Germany, reporting medium performance of its implementation (European Commission, 2016a).

The digitalization of the state is guided by the Action Plan launched in 2017 and prescribing the digitalization agenda for the upcoming five years (gouvernement.fr, 2017). The aim of this plan is threefold. First, it aims to improve the quality of public services for citizens and businesses; second, it recognizes the importance to provide sufficient and motivating working conditions for public servants; third, to develop a consistent budget plan for carrying out digitalization initiatives. The Action Plan is supported by the strategy developed in 2018, which established concrete measures to achieve and measure the success of the National Action Plan (gouvernement.fr, 2018b).

Recognizing the need for well-educated human resources, the French government launched a national program for inclusive digital society, aiming to educate its population in digital literacy in order to reduce the digital gap and provide fair and equal opportunities for the population (gouvernement.fr, 2018a). In line with the educational aim of the national strategy, the government similarly entertains digitalization process of school education (gouvernement.fr, 2019). Transforming the vision of school education, the program aims to educate future modernization leaders through pedagogical means.

Pursuing the "State as a Platform" strategy, France has recently launched an incubator for provision of digital public services (*Beta.Gouv.Fr*, n.d.). Under this program, public services are developed and launched in a centralized manner, consolidating work of numerous public entities and enabling cross-organizational data sharing. This vision is in line with the establishment of Inter-ministerial network of the State (Réseau Interministériel de l'État - RIE), which was initiated in 2011 and had its goal in creation of a centralized governmental network, connecting national, regional and local governments (gouvernement.fr, 2016a). The council of ministers sought to establish a secure and stable environment for provision of public services at all levels via facilitating information exchange among different levels of authorities. De-facto enabling OOP, conditioned adoption of "Tell Us Once" program in 2019, which presumes the principle of data reuse by public administration and avoidance of redundant data submission by users of public services (*J.O. 10 August 2018*).

Being part of several European OOP initiatives, France participated in TOOP, SCOOP4C, STORK and STORK2, ISA[2] projects. Together with Belgium, Luxembourg and Turkey, France is also a member of the cross-border pilot project on birth certificates exchange (Cave et al., 2015). According to Joinup, France has been co-hosting 16 digital solutions, aiming to bridge information silos across public administrations and to improve service access (*Joinup - Solutions*, n.d.).

4.4.1 Administrative layer

The federal coordination role of eGovernment efforts in France is performed by the Secretary of State for Reform and Simplification (gouvernement.fr, 2016b). Aiming to increase the transparency of the government and to improve international collaboration, the Secretary searched to participate in multilateral cooperation for Open Government, where its head been appointed the president of the partnership. All decisions and strategies taken at the federal level are cascaded to the subnational levels, where regional and local administrations can manage the implementation of the national strategy within their competencies (European Commission, 2019e).

Due to the high level of state centralization, the French government established two entities, which are held accountable for public transformation and digitalization of the state (*J.O. 21 November 2017*). The first organization – Inter-Ministerial Directorate for Public Transformation (Direction Interministérielle de la Transformation Publique – DITP) – is accountable to the Minister of State Reform and Simplification, supporting public transformation of the state. Being domain-agnostic, they are expected to provide independent expertise in transformation process initiated by the ministries, aiming to fulfil the eGovernment Action Plan. While DITP mostly performs the functions of policymaking and coordination, the second Inter-Ministerial Directorate for Digital Affairs and State Information and Communication System (Direction Interministérielle du Numérique et du Système d'Information et de Communication de l'Etat – DINSIC) is responsible for the implementation of the developed transformation projects. Developing unified IT architecture and standards, DINSIC is further responsible for development of open data projects.

Whilst these three bodies perform the function of centralized planning and implementation of public transformation initiatives, there is a set of supplementary agencies which support their functioning. National Council for Digitalization supports the federal decision-making with an advisory service, assessing the impact of the state digital initiatives on industry, economy and society (*CNNum*, n.d.). Another administrative directorate – Directorate of legal information and administration – supports the federal government in administrative information management of public services (*DILA*, n.d.).Several further agencies – such as National Committee for Informatics and Liberty, French Network and Information Security Agency – are responsible for assurance of data protection, providing legal and technical base for implementing safeguarding mechanisms (European Commission, 2019e).

Similarly to the centralized digitalization strategy approach, the data processed by the public administration is also managed in a centralized manner at the level of the federal

government. Segregating different types of processed data, the government appoints various ministries responsible for handling and maintaining different types of data (European Commission, 2019e). Dividing the data into four basic registries – Civil, Vehicle, Business and Tax registries – the government appoints respectively Ministry of Justice, Ministry of Environment, Energy and Sea, National Institute of Intellectual Property and Ministry of Economics and Finance for taking care of the collected data.

4.4.2 Legal layer

France has been demonstrating a historically consequent development of the legislative base aimed to support development of both general eGovernment approach and implementation of the OOP. Already in 2005, the federal government adopted an ordinance on provision of teleservices, admitting the equality of offline and digital ways of communication between citizens and public authorities (*J.O. 8 December 2005*). It gave the foundation for the ordinance regulating the conditions and procedures of electronic communication with public authorities which came into force in 2014 (*J.O. 6 November 2014*). Enabling provision of certain services online, the latter ordinance gave an impulse to a new Code of Relations between Society and Administration endorsed in 2016 (*J.O. 17 March 2016*). Obliging public administrations country-wide to provide electronic services to the citizens and businesses, the Code touches upon the necessity of regulation of data exchange between the end-user and public authorities and within the administration itself. Profoundly associating the quality of electronic services with the process of data management, the Code postulates the necessity for reuse of publicly available data. This notion is supplementarily supported by the law which is dedicatedly concentrated on the principle of data reuse and encouraging federal, regional and local authorities to address open data as their first source (*J.O. 28 December 2015*).

Developing data sharing and data reuse, the public administration in France has been improving interconnection of base registers to facilitate the exchange between different stakeholders within the administration. To develop the initiative, France adopted *Tell-Us-Once* Principle, which was expected to reduce bureaucratic burden of businesses by 2017 (gouvernement.fr, 2015). Despite the Tell-Us-Once Principle has never become an official regulation, but instead remained a written guideline, it was accompanied by several regulations, which conditioned implementation of the French OOP. The legislation on State in the Service of a trusted Society was a legal premise for the institutional spread of the OOP. The aim of the regulation was twofold. First, its goal was to ensure the confidentiality and controllability of private data processing. Secondly, it attempted to establish the relationship of trust with the public authorities, where the citizens were granted an error right, which enabled certain error margin when interacting

with the newly introduced system of public administration without sanctions being implied in case of erroneous data input (*J.O. 10 August 2018*). Later, in 2019 the OOP was complemented by two further regulations. The first decree established a set of data eligible for cross-administration sharing and processing (*J.O. 18 January 2019*). The second one was directly aimed at reduction of bureaucratic burden for the citizens and enterprises, outlining the list of documents and data which must not be requested by public officials in case of its prior submission (*J.O. 20 January 2019*). To ensure the quality of the registered data, the federal government adopted several codes, making the up-to-date maintenance of the base registers compulsory and elaborating on the rules and conditions of the submitted data (European Commission, 2019e).

4.4.3   Technical layer

API Particular (*French: API Particulier*) supports technical implementation of the French Tell-Us-Once Principle. Access to public services is organized through API (Application Programming Interface), which is connected to the set of national base registers, containing the relevant data (*API Particulier*, n.d.). By now, the government implemented access to the following base registers through *API Particular*:

- INSEE: administrative data concerning national population, their identity, basic information such as sex, age, marital status, registration, contact details etc.;

- Infogreffe: commercial court register, containing information on the companies, unions and associations, their legal statuses;

- DGFiP: financial registry, storing data in fiscal control, solvency, taxation and turnover;

- ACOSS: registry maintaining data on social security, allowances and overall social situation;

- Caisses retraites: retirement registry on pension funds and retirement insurance (European Commission, 2019e).

Representing a trustful source of information, the respective governmental bodies are responsible for maintaining and updating base registries, which are later queried by dedicated public services and which integrity is ensured by the state. Being launched in 2019, the government aims to develop an exhaustive list of APIs to ensure access to the reusable API blocks used by public services (European Commission, 2019e). The picture below represents the principle of public service functioning mediated by an API.
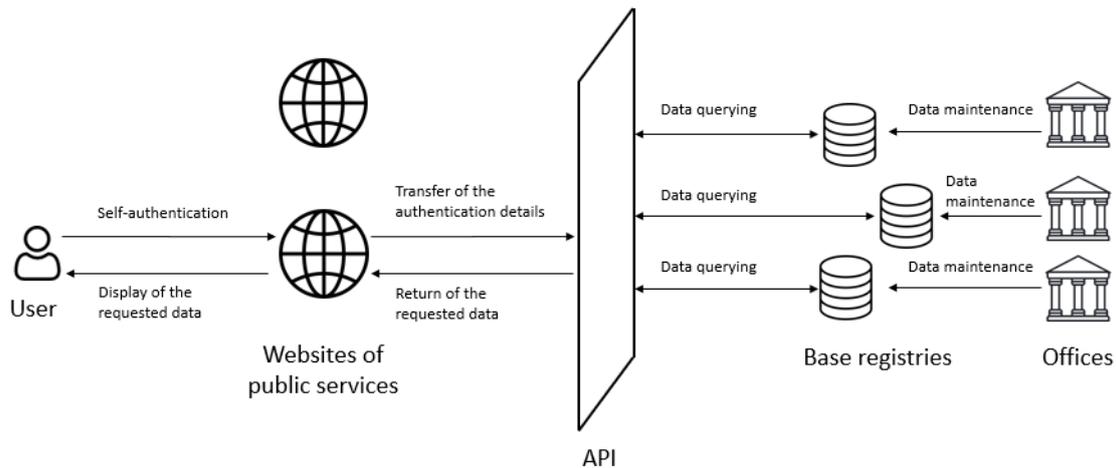
**Figure 11. Functioning of API-based public services - created by author, based on
API Particulier, n.d.**

The user accesses the dedicated website of the chosen public service, where s/he
authorizes him/herself by a set of predefined credentials (e.g. eID, fiscal number, social
security number, etc.). Upon successful authorization, the user's request is transmitted to
the API, which then queries the requested data coupling it with the inserted identification
credentials. The data is stored in base registries, which are continuously updated by the
respective public authorities and which integrity is assured by the State. Having retrieved
the requested information, API returns the queried data to the website, where it is
displayed in a human-readable format to the user (*API Particulier*, n.d.). Besides
interaction with the users, the *API Particular* in a similar way ensures data sharing among
public authorities, legislated by the respective legal acts on data sharing within public
administration (European Commission, 2019e).

5   Results

The previous chapter attempted to describe national approaches toward implementation of the OOP on the national and cross-border aspects. As elaborated in the Methodology, OOP strategies of the four chosen countries – namely, Belgium, Austria, Germany and France – were analyzed from the contextual, administrative, legal and technical perspectives to create a comprehensive image of the pursued approach. As a result, the present study attempted to articulate and group the distinguished characteristics into several categories.

In the context of the conducted research, the author suggests dividing the found OOP characteristics into either of the six groups: Centralization, Cooperation, International involvement, Legislation and Policies, Society and Trust, Technical and Semantical aspects. Despite the research did not attempt to fit the derived characteristics into either of existing interoperability or OOP frameworks, they are falling under the main research discourse on interoperability and OOP matters. The European Interoperability Framework, being one of the most frequent referential points for eGovernment initiatives, is similarly reflected in the set of described OOP characteristics. Its legal, technical and semantical layers are encompassing a certain portion of the found characteristics, suggesting following groupings of OOP practices: Legislation and Policies, Technical and Semantical aspects. Further OOP category on Cooperation conforms to the organizational layer of EIF, but for the specificity of the found characteristics, the thesis preferred altering the category's naming to depict its central traits.

Nevertheless, as previously discussed in Chapter 2.2, the EIF aims to systematize and coordinate stakeholders' efforts, but cannot be seen as an exhaustive framework. Different scholars suggested an expansion of the EIF with its four pillars by for example including sociocultural and sociotechnical perspectives (Gil-Garcia et al., 2010; Novakouski & Lewis, 2012), political environment (Malotaux et al., 2007), standardization and centralization processes (Kubiciek et al., 2011), etc. Taking into consideration the suggested framework extensions, the present research equally complemented the categorization of the derived OOP practices with two further categories: Centralization, Society and Trust. Lastly, the remaining category "International involvement" was not explicitly considered by the reviewed literature, but all the four studied countries have demonstrated participation in bilateral and multilateral international agreements. Consequently, this aspect will be considered as one of the relevant categories.

Thus, stemming from the conducted analysis and according to the body of literature, covered in Chapter 2.2, the derived OOP characteristics will be grouped into six categories:

- *Centralization*. The degree of centralization differs depending on the federal and political structure of the country and refers to the capacity of the state to take executive control of eGovernment strategies – including OOP – under single federative authority and/or initiative. Under the scope of this research, the role of the federal government and the concurring strategies of the sub-federal entities is the subject of the discussion.

- *Cooperation*. Evaluating the capacity of multiple stakeholders for collaborative work to achieving an overarching common goal is a relevant notion for complex federal strategies. This category will consider the extent of horizontal and vertical integration among the federal and sub-federal administrations, involvement of multiple stakeholders in the co-creation process, independency of other federal formations to carry out their own digitalization projects.

- *International involvement*. This category considers the previous participative activity in bilateral or multilateral projects, such as STORK and STORK2, TOOP, SCOOP4C, etc.

- *Legislation and Policies*. Practices grouped under this category are targeted at evaluation of the availability of comprehensive legal environment for OOP propagation. It will discuss the legal enforcement of the OOP, existing practices toward the policy-making and existence of an overarching legal framework on OOP, rightly integrated with relevant legislations on related matters.

- *Society and Trust*. Aiming to evaluate the societal sentiments toward implementation of the OOP, this category will focus on the societal environment of OOP implementation. It will precisely consider the practices of cultivation of trust culture, educational initiatives and state's position on responsibility of federal government in the data-governing matters.

- *Technical and Semantical aspects*. Reflecting the two corresponding layers of the EIF, this category will take into account the technical and semantical maturity of the eGovernment environment. It will namely look into the current state of base registries integration, achieved level of eGovernment interoperability and investigate the interconnection of the OOP with the eID take-up rates.

Table 3 presents 15 characteristics, derived from the conducted analysis, which are going to be discussed in the following subchapters. They will be more explicitly described in the context of similar practices, coupled with other characteristics from the same category.

Table 3. Characteristics of national OOP implementation strategies

	Characteristics	Category	BE	AT	GE	FR
1	Healthy competition of independent subnational administrations	Centralization	X			
2	Central role of the federal government in coordination of eGovernment initiatives	Centralization		X		X
3	Promotion of horizontal and vertical cooperation among local, regional and federal administrations	Cooperation	X			
4	Involvement of multiple stakeholders in policies discussion	Cooperation	X	X		X
5	Encouragement of Federal Ministries to entertain their own digital projects	Cooperation	X	X		
6	Participation (and leadership) of cross-border/eGovernment projects	International involvement	X	X	X	X
7	Legally binding nature of OOP implementation	Legislation and Policies	X	X		X
8	Agile approach towards policy making	Legislation and Policies		X		
9	Integration of OOP-notion in connected eGovernment legislation	Legislation and Policies	X	X		X
10	Attention to education and pedagogical aspects	Society and Trust				X

11	Cultivation of trust culture between society and the government	Society and Trust	**X**	**X**		**X**
12	State accountability for the trusted source of data	Society and Trust				**X**
13	High take-up of eID	Technical and Semantical aspects	**X**	**X**		
14	Overarching integration of base registers	Technical and Semantical aspects	**X**	**X**		**X**
15	Advanced level of eGovernment interoperability	Technical and Semantical aspects		**X**		

5.1   Centralization

The four chosen cases construct an interesting set of studies, for them to have a different federal system. Whilst Belgium, Austria and Germany are federal states, France has a highly centralized administration. Nonetheless, Austria is frequently characterized by a rather strong centralization vertical. The concentration of planning and coordination influences the role of central authorities in digitalization efforts of the state. Austria and France report to have a centralized entity at the federal level, which is held accountable for planning, propagating and executing national digital initiatives, including OOP strategies. The Austrian Federal Ministry for Digital and Economic Affairs and French Secretary of State for Reform and Simplification are holding the central role in eGovernment coordination, managing the work of subnational public administrations and further digital initiatives at the federal level. Germany, on the other hand, has a highly decentralized structure, by this limiting an executive authority of the federal government. Notably, on the federal level, Germany also seems to have several entities responsible for coordination and implementation of eGovernment projects. The newly created position of State Minister for Digitalization is supported by the Ministry of the Interior; it similarly heavily relies on IT-planning council, which plays a bridging role between the federal and state governments. This state of play grants the federal states a higher level of autonomy, limiting the possibilities for coordinated OOP strategy, including reduced opportunities for central management of national registries.

Interestingly, Belgium, despite having a complex federal administrative structure, including several communities and regional governments, has DG Digital Transformation Office responsible for coordination of state-wide digitalization. Being horizontally integrated with all the ministries, it ensures consequent implementation of eGovernment strategy. However, the Belgian centralized approach is limited to the essential elements of national eGovernment landscape. While DG Digital Transformation overtakes a leading role in standardization and centralization of data flows, the regional governments are granted sufficient level of autonomy to execute their own eGovernment initiatives, with some of them developing successful use cases and becoming European best practices.

5.2   Cooperation

Rather unique structure of the Belgian federal system implies additional measures to ensure the integrity of the eGovernment strategy. As discussed before, the federal, regional and community governments have different fields of competencies, granting them a different level of autonomy in execution of digital initiatives. While DG Digital Transformation remains the most relevant actor in the matter of implementation of eGovernment strategy, it equally incentives regional governments to collaborate among each other, sharing their practices and achievements. This characteristic is chiefly intrinsic to the national context of Belgium and can be barely applied to the centralized structure of governance as in case of Austria or France, where the federal government coordinates and harmonizes the country-wide digital advancement.

From the perspective of stakeholder involvement into the process of policymaking, Austria, Belgium and France demonstrate a rather inclusive approach. Belgium declares an inclusive environment for collaboration of public and private entities, including support of privately operated eIDAS solution for access to public services. Austria, promoting the necessity of transformation of the economy, invites businesses to represent their interests through via Digitalization Agency of the Federal Government. Accumulating know-how and best practices, the Austrian government is equally supporting small and medium enterprises to enable their digital transformation. The French government, experiencing some pressure for higher transparency, has decided to equally open up for private sector to allow them to have a say via participation in National Council for Digitalization. The tendency for inclusion of private actors in the process of Government-to-Citizen interaction is rather spread is the Nordic countries, where a significant number of public and authentication services are mediated by private sector (van Marion & Hovland, 2015). However, on overall, the EU tends to demonstrate reluctancy toward data sharing with private entities (Kramp et al., 2020), which might

potentially decrease the pace of service and data integration. Being a decentralized state, Germany aims to establish a well-functioning and responsive eGovernment collaboration framework with the federal states but does not seem to have widely implemented public-private cooperation.

Two out of four countries – Belgium and Austria – report having ongoing digitalization projects in different federal ministries. Austria, despite having a centralized head office for digital transformation, grants autonomy to the federal ministries to entertain their own digitalization projects. With the support of the Federal Ministry for Digital and Economic Affairs, Austrian Ministry of Finance succeeded to launch a large-scale data exchange platform, facilitating OOP integration. The Belgian DG Digital Transformation, first established as a back office to support the work of federal ministries and public sector, tends to remain as a background player, providing coherent and integrative eGovernment landscape, but abstaining from intervention into their own strategies. Germany, having shared responsibility between several entities on eGovernment initiatives, establishes a collaborative environment with inclusion of federal states, where sufficient number on coordination of eGovernment projects is taken. Interestingly, the German federal system envisages sufficient autonomy for federal states to pursue their own eGovernment agenda, with some of them having their individual state digital chambers. France, as an example of a centralized state, established two supporting federal entities – DITP and DINSIC – who are responsible for coordination and implementation of state-wide digital projects.

5.3 International involvement

All the studied countries have been participating in one or more eGovernment and OOP dedicated projects. STORK and STORK2, TOOP, SCOOP4C and DE4A projects are thought to be directly relevant for cross-border OOP implementation, and each of the countries has been involved in at least three of them. Besides the named projects under the EU leadership, countries have likewise been participating in other bilateral and multilateral projects, aimed to facilitate data exchange on the cross-border perspective. For instance, Belgium, France, Luxembourg and Turkey have enabled a network of birth certificate exchange. Despite certain privacy consideration of sharing personal data with non-EU countries, the exchange is well arranged among the three remaining participants (Cave et al., 2015). Austria and Germany, sharing a common border, have also been entertaining some joint cross-border data-sharing projects. One of them, x-trans.eu, is used to facilitate the exchange of information on a high number of trucks crossing the German-Austrian border to ease the burden of the companies and truck drivers. Curiously, the project on cross-border data sharing was arranged between Bavaria and Upper

Austria, without involvement of the federal governments. However, due to political consideration, the project was closed two years after its launch (CEF Digital, 2019).

5.4 Legislation and policies

In legal terms, three out of four countries – Belgium, Austria and France – reported having dedicated legally binding OOP legislation. Belgium was one among the first countries to adopt an OOP legislation, which created binding conditions for reuse of the previously submitted data. Issued in 2014, it obliged public administrations to query the existing data from consolidated base registries by using personal identifiers. Austria passed a law of eGovernment in 2004, where the principles of data reuse of registration registers were advised, but not binding. In 2018, it became compulsory to retrieve the information needed for provision of a particular service from the central registers.

Similarly, France adopted a non-binding practice of OOP to reduce bureaucratic burden for enterprises. Later in 2019, the French Federal Government passed two binding legislations, establishing mandatory reuse of previously submitted data for communication with the citizens and amongst authorities themselves. Germany, in its turn, demonstrates a moderate approach toward implementation of OOP strategy. Adopting the law on online access to administrative services in 2017, it aims to create an online platform for public service provision by 2022, indirectly indicating the strategic necessity for OOP implementation.

Markedly, Austria, having a long story of eGovernment-related legislation, manages to maintain a coherent legal base for the subsequent digitalization initiatives. Recognizing the rapid development of technologies, the Austrian Federal Ministry for Digital and Economic Affairs adopted an agile roadmap to enable and guide digital public transformation. The digital roadmap leaves the space for strategy adjustment in case of the necessity to include the notion of newly emerging technologies and the EU legislative acts.

Striving to create a comprehensive legal OOP environment, Belgian, Austrian and French governments explicitly included the notion of data reuse in connected eGovernment regulations. Although the dedicated OOP-legislation in Belgium was adopted in 2014, the OOP is indirectly or expressly mentioned by relevant regulations, conditioning handling requests for public information, reuse of public data, cross-border eID-identification. Austria, unlike Belgium, collected a vast part of eGovernment regulation under single eGovernment legislation, identifying an even regulative framework for all digital-driven innovations. However, to ensure coherence with other public offices, the Federal Government inserted the OOP linkage in regulations, relevant for maintenance

of consistent administrative database. In case of France, the OOP has also become a cornerstone principle of Government-to-Citizen and Government-to-Business communication and data exchange between public authorities, being depicted in the respective legislations. However, these legal acts are supported by a number of supplementary regulations and codes, regulating the relationship and ethics of client - public administration interaction under the condition of data exchange.

5.5   Society and Trust

Trust among multiple stakeholders has been identified by many as one of the most impeding factors toward eGovernment transformation (Kramp et al., 2020). One of the analyzed countries, Germany, has been experiencing quite severe challenges from the perspective of community trust. The certain level of social anxiety was associated with use of personal eID-cards, which according to the report of one of the most prominent European hacker associations, was vulnerable and could potentially enable citizens' tracing (Krissler et al., 2017). Even though the security bridge was barely reproducible in normal circumstances, the trust toward the distributed eID-cards was diminished, leading to low use of eID-means in Germany (European Commission, 2019i). To avoid a similar situation, the other three studied countries have been implementing measures to cultivate a trust environment among the publicity. As an illustration, Belgium passed dedicated legislation, elaborating on the requirements to ensure ethics and protect the sensitivity of the processed data. Belgian residents are granted a right to trace access to their data by public administration to ascertain the rightfulness of the profile access (Thales, 2020). Austrian public service platforms have chosen an alternative way of ensuring the intractability of public data by irrelevant public entities. Introducing the system of sourcePIN and ssPin, the government guarantees the impossibility to associate all the available data with a particular service user, via this safeguarding the privacy of its citizens. Comparable to Belgium, France also established a relevant legislative framework to ensure secure and ethical principles of sensitive data processing, which later conditioned the official adoption of the OOP legislation. Notably, the French government did not solely focus on trust of the citizens toward the government but implemented a reciprocal approach. Introducing the citizen's right for an input error, the government announces a sort of presumption of innocence, recognizing the unintentional possible erroneous input by a citizen without implication of sanctions.

Further, despite having a centralized structure of eGovernment propagation, the French government attempted to establish relationship of trust with subnational public administrations. Acknowledging the difficulties encountered by the regional and local authorities associated with the OOP implementation, the Federal Government has

explicitly overtaken the responsibility for the quality of the data stored in the base registries. Designing the rules for base registries maintenance, they standardize data inputs, easing coordination of the registries. Despite the same standards were implied onto public authorities in Belgium and Austria, France has been trying to provide explicit communication on the transparency mechanisms.

In its attempts to develop an inclusive digital environment, France launched a number of educational initiatives, aiming to develop digital competencies of the French population. Offering special digital workshops, the government ensures the inclusivity of the transformation and provision of equal opportunities for all its residents. Similarly, to create a digital-native generation, French federal administration postulated the inclusion of technologic education in school curriculum.

5.6   Technical and Semantical aspects

The overall technical integration of the base registries can be seen as a consequent step of availability of the dedicated legislation framework and rules of data maintenance. Belgian, Austrian and French governments have succeeded in creating a merged pool of the base registries, which information is accessible via personal identifier. In case of Germany, there is only a limited number of registers, available for the federal use; they include, for example, data on tax returns and consolidated registry on foreigners' registration. However, in case of a German citizen to be moving from one state to another, the information is processed locally and is only to a limited extent on the federal level.

Further, as previously discussed in Chapter 2.3, the implementation of the OOP is thought to be interconnected with the level of eIDAS implementation and EIF advancement. During the case choice analysis, Austria demonstrated the highest pre-filling index among the four chosen countries. Similarly, it scores the highest in terms of developing eIDAS infrastructure and adoption of EIF standards. Belgium, despite scoring second highest in terms of data pre-filing, lies in the same range of eID and EIF implementation as France and Germany. However, in terms of eID implementation, societal trust might play a critical role, as argued in the previous subchapter. The distribution of the eID-cards among Belgian residents reaches almost 100%, with at least half of the citizens using their cards to access public services (Gemalto, 2020). France demonstrates comparatively lower adoption rate of the eID-cards, with the scores reaching the EU average. However, as mentioned by Mr Leyman in a personal interview (2020), while the major agreements in terms of the mutual scheme recognition and eIDAS-Node functioning have been achieved, no major challenges are posed toward cross-border OOP functioning in the context of eID-functionality. Underlining the freedom of the technological choice by a

member state under the scope of the required functional specification, Mr Leyman sees a more significant challenge in ensuring mutual trust among multiple stakeholders involved in the cross-border service provision.

Further, while eIDAS regulation serves as a mandatory regulation for cross-border service provision, the EIF elaborates on a set of recommendations to harmonize data exchange on a national and cross-border perspective to enable seamless provision of services on the respective levels. Although the EIF is of a non-binding nature, it can be seen as a premise for standardization of the exchanged data and harmonization of the dataflows between public administrations. Similarly to the performance under the eIDAS regulation, Austria scores almost maximum in terms of the EIF adoption, equally providing comprehensive implementation and monitoring schemes. Belgium, France and Germany achieved partial compliance with the EIF recommendations.

6   Discussion

Concluding the analysis of the four chosen countries, Chapter 5 aggregated the derived national characteristics toward implementation of the OOP. Table 3 depicts fifteen practices grouped into six categories: Centralization, Cooperation, International Involvement, Legislation and Policies, Society and Trust, Technical and Semantical aspects. The defined practices originate from the case per case analysis under the lens of the OOP framework and investigating the context, administrative, legal and technical layers. The analyzed countries tend to demonstrate different involvement in prioritizing OOP implementation, resulting in them entertaining a different number of OOP initiatives which later constituted a part of the described good practices.

Austria, Belgium and France demonstrated a similar level of national engagement in OOP initiatives, entertaining 11, 10 and 9 OOP practices respectively. Mostly sharing the same set of practices, some of the countries yet have country-unique characteristics, such as, for example, an agile approach toward eGovernment strategy in Austria or educative policies in France. Having no comprehensively articulated national OOP legislation, Germany yet participates in multilateral and bilateral cross-border initiatives, relying on federal state capacities. The list of the derived experiences consists of country-specific and country independent practices, which to a different extent might be applicable for further cases. In what follows, this chapter will elaborate on the national contexts and applicability of the formulated practices for further implication.

Based on the discussion of the country contexts and sets of OOP practices, applied by the analyzed countries, the author proposes following classification of good practices derived as the result of the analysis – the numbers of the practices correspond to the characteristics represented in Table 4:

Table 4. Applicability of the OOP practices

Applicability	Practices
Country specific	1, 3, 8, 12
Limited applicability	2, 5, 10, 13, 15
Country independent	4, 6, 7, 9, 11, 14

While certain practices seem to be specific for a particular context, the research proposes to divide into several groups, depending on their applicability for other cases. The division

was made upon considerations of national contexts, and similarity of the OOP approaches among the chosen countries. Thus, the practices are categorized as follows:

- *Country specific*. Those practices are dependent on the national context (e.g. federal vs centralized structure) or by far, have been explicitly deployed by only one of the analyzed countries.

- *Limited applicability*. Practices with limited applicability are not intrinsic to any particular countries, resulting in several countries attempting to implement them. For instance, the central coordination role of the federal government in eGovernment endeavors have been demonstrated by countries with both federal and centralized structures (e.g. France and Austria). Other practices – such as education program – address generic problems of ICT literacy and can have an indirect influence over the future development of the OOP. Similarly, there is a number of the EU digitalization projects, which contribute to the general development of the IT infrastructure and sometimes are seen as OOP premises, but which do not directly regulate implementation process of the OOP.

- *Country independent*. These practices are of direct relevance for the OOP and can be implemented independently from the national context. For each of them, there is implementation evidence by at least three researched countries. Having a direct impact on the OOP, these practices identify the general regulatory and technical environment of the OOP functioning.

Assignment of the good practices to either of the listed applicability categories was made under several considerations. First, the author considered the number of the existence of those practices in the analyzed countries. The characteristics which are present in the predominant number of countries – at least 3 countries – are expected to demonstrate lower rate of national context dependency and are expected to be able to be beneficial for other states. Accordingly, if a certain characteristic was found only in 2 out of 4 countries, there is a limited possibility to assess its applicability onto other countries, but it yet should be seen as a substantial finding which has been seen existent in the half of the analyzed cases. The practices intrinsic to one of the analyzed countries are sometimes bound to the national context of the country or its federal structure and thus, there is a limited evidence of their applicability for other EU member states, in case of significant administrative and contextual differences.

All four countries, despite having shared OOP practices, accentuate their OOP implementation strategy differently. Austria, being the OOP leader among the chosen countries, track their OOP implementation roadmap back to 2004, where reuse of public

information was first introduced on a voluntarily note. The emergence of different technologies, facilitating introduction of Once-Only requested implementation regulatory framework, which would set the legislative boundaries for their use, in order to ensure security, integrity and ethics of the innovative process. Recognizing the challenges of the frequent strategic reorientation, Austria adopted iterative and agile approach toward strategy maintenance. Identifying OOP as one of its priorities – along with several other eGovernment milestones, the Austrian Federal Ministry for Digital and Economic Affairs consequently adjusts the existing strategy to ensure the adequate support of the developing technologies and inclusion of the relevant EU policies.

Despite being a state with a federative system, Austria demonstrates rather centralized approach toward development of eGovernment initiatives and the process of policymaking. Nominating a central national digitalization agency, the country is maintaining the responsibility and strategy-making at the level of the federal government, via this shortening the time of negotiating and implementing a particular project. Similarly, France assigned a national Secretary of State for Reform and Simplification responsible for the process of state digitalization. Having a centralized secretariat responsible for eGovernment – including implementation of the Once-Only – the federal government established two supplementary federal state entities supporting top-down functioning of the OOP strategy.

Besides the centralized approach toward national OOP implementation, France demonstrates a significant number of other similarities as compared to Austrian OOP strategy. Establishing a comprehensive OOP legislation, involving multiple stakeholders in relevant policies discussions, cultivating the culture of trust, France has chosen a similar set of OOP propagation initiatives. Nevertheless, France scored significantly less than Austria in terms of the administrative forms pre-filing, compared to Austria and Belgium (see Chapter 3.3). From the authors perspective, this fact can be explained by the relatively late adoption of the OOP relevant legislation. As discussed above, although Austria adopted the OOP strategy on a legally binding note, there has been a rather long history of trials and errors, leading the country to the current OOP advancement. France, despite the visibly comparable set of OOP practices, only recently began investigating the possibilities for OOP implementation, with businesses to become the first target group in 2015. While there is a limited possibility to predict the further OOP development in France, it is possible to see the similarities between French and Austrian/Belgian approaches, which might potentially be beneficial for future Once-Only enhancement in the French context.

Interestingly, the approach of the French Federal Government toward OOP implementation is further characterized by a strong orientation to build a community of trust. Passing several legislations, the government of France aims to enlist support for its further digitalization agenda. Pursuing the goal in different ways, the government encourages eGovernment participation via educating citizens and businesses about the benefits of digitalization programs and via introducing digital curriculum at schools to raise a tech-savvy generation. While this approach has been introduced rather recently, it deems to be impossible to assess the impact of the initiative on the OOP implementation in a long run. However, via reducing the digital gap and maintaining the culture of trust, it becomes possible to expect the number of eGovernment professionals and reduction of societal skepticism toward eGovernment programs.

The Belgian government, being another rather well performing country, approached OOP implementation in a different manner than Austria or France. Keeping in mind the administrative complexity of the Belgian federal structure, the government preferred to assign the digital transformation team for background support of the "front desk" ministers. To back up the work of the vertical ministers, the DG Digital transformation was established as a horizontal ministry, taking care of eGovernment strategy and data harmonization and exchange. In 2014, at around the same time as Austria, Belgian Federal Government passed the binding OOP legislation on reuse of previously submitted data by citizens and businesses. However, in contrast to the Austrian avant-garde eGovernment policies, Belgium considered OOP as a must-have eGovernment attribute to ensure the seamless background functioning of the ministries. Interestingly, Belgian regional governments of Flanders and Wallonia have received significant autonomy on development and implementation of eGovernment strategies, which created an uneven environment in terms of digital advancement, including OOP performance. While particular regional solutions were selected as showcases by the European Joinup community, the other regional government received an incentive to adjust their digital strategy to become a competitive actor. The environment of health administrative competition might potentially lead to greater innovation incentives, conditioning more rapid development of digital solutions. Simultaneously, ensuring the harmonization of the eGovernment initiatives, the DG Digital Transformation performed the role of solution integrator, ensuring the compatibility of the developed solutions and appropriate standards of data exchange.

Germany, having a similar to Belgium decentralization context, has been, nonetheless, pursuing a different strategy of digital transformation. In the light of high decentralization and autonomy of the federal states, the German Federal Government has been experiencing difficulties, associated with a coordinated eGovernment strategy adoption

and implementation. Amplified by the notion of serious public concerns toward the security of the sensitive data submitted by the natural and legal persons, the Government is facing significant barriers to establishing an overarching platform for seamless data exchange among public authorities. While there is no up-to-now a dedicated OOP legislation, Germany has been waiting for establishment of a comprehensive OOP framework at the EU level, to adjust it to the national context and to propagate it further onto state governments. Curiously, despite the absence of the dedicated legislation, Germany scores decently in terms of the OOP performance, as compared to other EU countries. Being reluctant toward establishment of a federal system of base registers, the federal states, however, quite effectively perform data exchange on a cross-state milieu, ensuring functioning of public services independently from the physical location. Further, some German federal states are entertaining cross-border initiatives with neighboring countries, enable data exchange under the scope of the provided services as a part of a bilateral agreement.

Despite France demonstrating comparatively low performance in terms of the OOP implementation, there are several practices, shared by three out of four analyzed countries. They majorly concern the availability of an overarching legal and technical solutions, which would enable functioning of the dispersed public administrations in a shared regulative and data environment. In terms of the OOP maturity, establishing a shared environment would enable seamless interoperability, leading to the advanced OOP practices. Attempts to create a seamless interoperability space for public administration functioning is facilitated by the adoption of a comprehensive dedicated OOP legislation, supported by and supporting further relevant legal acts. Establishing a framework for operation, Austria and Belgium (and potentially, France) have been working on development of common technical and data standards and interconnection of the fragmented base registries. Integration of the data registries at the federal level – under consideration of the relevant privacy regulations and security standards – develop a common base for seamless OOP integration.

However, comprehensive legal base is a premise for developing a seamlessly functioning technological solution. Germany, lacking an integrative legislative environment, stipulating the process of data reuse by public officials, has been integrating a rather situative approach toward Once-Only, enabling – where necessary – data sharing between two public administrations, avoiding establishing a country-wide solution for data exchange. Anticipating creation of a complex EU legislation on OOP, Germany might later apply certain approaches onto its national agenda.

Whilst apart from several country-specific OOP practices, there has been no fundamentally different approaches toward implementation of Once-Only, it is to expect, that Germany would follow similar steps in terms of the OOP agenda. Austria and Belgium, being the first among the analyzed countries to pass the necessary legislation and establishing shared base registers, have been demonstrating relatively high performance on the OOP and eGovernment. France, despite having adopted the dedicated legislation somewhat later, has been consequently implementing similar initiatives aimed at implementation of the Once-Only. Even though there is not sufficient evidence to argue about the efficiency of the measures undertaken by the French government, the major OOP narrative line has been going in line with Austria and Belgium. While it is impossible to claim the uniformity of the national context, it would be fair to expect from Germany to undertake similar steps to ensure Once-Only. Despite there are certain state-specific OOP practices – such as high state centralization or regional competition – other practices with regards to legislation, stakeholder inclusion and cross-federal interconnection of base registers are applicable in a country independent context.

7   Conclusion

The ongoing integration of the EU has been significantly affecting the development orientation of the European digital space. Proclaiming the administrative efficiency and reduction of bureaucratic burden for citizens and businesses, the EU member states have been encountering a continuously growing demand for provision of services of cross-border perspective. With the necessity to ensure seamless transfrontier functioning of the services, the countries were challenged to establish a shared data space to ensure seamless functioning of cross-border public administration. Whilst there has been a considerable number of multilateral and pan-European agreements, the enablement of cross-border data exchange has been dominating the EU agenda since its creation. Nevertheless, the notion of once-only data input has been identified as a political priority across the EU only with the adoption of Tallinn Declaration on eGovernance in 2017. Ratification of the agreement put numerous efforts toward achieving greater interoperability and ensuring seamless cross-border sharing, via this establishing the OOP as a norm. Thus, emerged in recent times, the OOP is still considered to be at its infancy stage and requests further research to investigate its best application cases.

In light of the recent OOP achievement by the EU countries, the present thesis attempted to analyze the practices deployed to ensure the implementation of the Once-Only. To take stock at different approaches used in the EU, four countries – namely, Belgium, Austria, Germany and France – were chosen. The selection of study cases was conditioned by their techno-economic similarity and relatively diverse OOP and eGovernment achievements. National approaches toward the OOP implementation were analyzed through the lens of the TOOP project, which deems to be one of the milestones in defining and implementing Once-Only. The TOOP's three analysis components – administrative, legal and technical layers – were complemented by consideration of the national eGovernment and OOP context, which helped to reveal supplementary OOP practices and contributed to their further applicability estimation.

The analysis revealed 15 distinctive OOP practices, distinctive for the four analyzed countries. They were aggregately grouped into six categories: Centralization, Cooperation, International Involvement, Legislation and Policies, Society and Trust, Technical and Semantical aspects. While some of the distinguished practices were shared by the majority of all analyzed countries, others remained a national initiative and have not been explicitly entertained by other countries. Thus, the research suggests differentiation of the deducted OOP practices into further three groups: Country specific, Limited applicability, Country independent. The latter classification of the practices suggests a direct answer to the research question formulated at the introductory part of

the study: "*How do different EU member states address implementation of the Once-Only Principle and how their experience can be applied onto other countries?*"

For the OOP to be at its infancy stage, it is of limited possibility to establish a certain fit of the deducted OOP practices for the context of all the European countries. Taking into the account the objective limitations of the direct applicability, the thesis, however, suggests a set of the OOP practices, might be considered universal independently from the national context. In the majority of cases, these practices are relevant for establishing a comprehensive legal and technological environment for the coherent national and cross-border OOP functioning, and further extrapolate on the necessity of the stakeholders' collaboration and establishment of the society of trust. The second group of the described practices are of limited applicability for other countries. Predominantly, they involve high performing indices in the associated projects and programs and/or they are intrinsic to a certain type of federal structure which might be relevant for other states with a similar structure. The third group, or country-specific OOP practices, has demonstrated no consistent applicability by multiple countries and are considered as valid OOP practices for a limited number of cases. However, while further research on the topic is conducted, they might as well become the starting ground for further investigation on OOP and associated national and European practices.

7.1   Limitations

As suggested in the conclusion, the present thesis met the objectives of the research, formulated in the introductory part. However, the study is associated with some limitations, which are to be considered. First of all, as mentioned previously, the Once-Only Principle is at its infancy stage, and there has been limited scientific research conducted in the relevant domain, and thus, there are numerous research gaps, which need to be addressed to create a comprehensive scheme of the transferability of the results. Further research might reveal additional limitations toward applicability of the results onto other national cases.

Secondly, as outlined in the methodological part, the choice of the study cases was conditioned by the similarity of the countries by its economic situation and technological advancement. To address this limitation, the study suggests distinguishing the derived OOP practices into several categories, depending on their generalization and dependency on the country context. Under thorough consideration of the national context of the analyzed countries, the study attempted to distinguish practices which would hold true regardless of the environment. However, it would be fair to acknowledge, that the research was conducted in the context of rather technologically and economically

advanced countries, which might potentially limit the applicability of the found practices onto other states with a different techno-economic environment.

Lastly, the study is limited by the availability of the relevant datasets and policies for public use. Being a comparatively new field of research, OOP has not aggregated sufficient numeric databases to statistically support its findings. The selection of the study cases was made on the premise of comparability of forms pre-filling with the current status of the OOP implementation, which might not necessarily hold true for all the countries. With the study being majorly based on the review of secondary literature and documentations, the availability of numeric datasets could have benefited the study by supporting or disapproving the findings.

7.2   Future research

With the Once-Only Principle being at its early stage of the development, there is a potential for numerous further studies, researching its interconnection with other eGovernment initiatives and evaluating the influence on public administration. The present thesis attempted to look at the OOP implementation practices in a specific context of four European countries; there is still much room for further investigation.

Focusing on the study cases with similar national context, the study achieved to derive a set of good practices, which might be relevant for OOP implementation by other countries. However, the present research can be further expanded by examining approaches of other well-performing European countries, via this aiming to distinguish a consistent OOP development strategy which can be further adjusted for the national contexts of other countries. Similarly, further research on national OOP approaches will allow approving or refuting the practices derived from the result of this analysis.

Further, by now there has been limited statistical evidence on OOP implementation. While this study was borrowing numeric data on pre-filling of forms under the scope of public service provision, this approach can be to a limited extent matched with the real OOP indices. Establishment of objective OOP metrics and cross-matching of the applied practices with the obtained OOP results could provide a more durable proof of efficiency of certain practices.

Lastly, analyzing four cases of OOP implementation, the present study touched upon relevant eGovernment domains and attempted to construct a historical path of OOP development in those countries. With those countries being at different stages of OOP advancement, they have collected different attributes of OOP performance, which can be later used to establish an OOP maturity framework. It can further extend the maturity

framework deployed in this study and based on interoperability maturity. Establishment of a comprehensive OOP maturity framework would allow to accurately access the existing level of OOP performance and accordingly adjust further OOP endeavors.

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Appendix

A   eGovernment indices

EU MS	Code	GDP per capita	Households with Internet access, [%]	Enterprises with internet access, [%]	eGoverment '18, [%]	Pre-filled forms, [%]
Austria	AT	38240	89	98	85	81
Belgium	BE	35900	88	98	79	72
Bulgaria	BG	6800	75	89	56	28
Cyprus	CY	24250	89	96	70	59
Czech Republic	CZ	18000	87	98	61	51
Germany	DE	35970	94	95	80	41
Denmark	DK	49190	93	100	83	69
Estonia	EE	15670	90	95	84	89
Greece	EL	18150	78	85	49	33
Spain	ES	25170	91	98	78	73
Finland	FI	37170	93	100	81	82
France	FR	33360	83	99	84	36
Croatia	HR	11990	81	95	63	30
Hungary	HU	13180	86	91	66	31
Ireland	IE	60350	90	96	68	67
Italy	IT	26860	84	96	77	48
Lithuania	LT	13880	81	100	88	83
Luxembourg	LU	83640	95	97	71	56
Latvia	LV	12490	83	99	86	88
Malta	MT	21890	86	95	87	100
Netherlands	NL	42020	98	100	77	81
Poland	PL	11820	83	95	62	54
Portugal	PT	18550	78	98	78	81
Romania	RO	9130	82	82	50	10
Sweden	SE	43900	95	97	87	75
Slovenia	SI	20490	89	99	73	61
Slovakia	SK	15890	80	95	58	35

Declaration of Authorship

I hereby declare that, to the best of my knowledge and belief, this Master Thesis titled "Implementation of the Once-Only Principle in the cross-border context: analysis of good practices" is my own work. I confirm that each significant contribution to and quotation in this thesis that originates from the work or works of others is indicated by proper use of citation and references.

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