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Deliverable 4.1: Gap analysis report of challenges, needs and benefits of the OOP4C analysis

Work package: WP 4 – Gap analysis and roadmap for future areas of actions

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Abstract:	This report documents the findings of tasks 4.1 and 4.2 by synthesising and consolidating the challenges, needs and benefits of the once-only principle for citizens. Based on the insights from the study of best practice cases across Europe (carried out in work package 1 - see D 1.2) and from the stakeholder analysis (cf. D 2.1), future cross-border scenarios of OOP solutions are developed in five domains (education, health, moving, social protection, taxation). Along these scenarios, existing gaps and challenges are highlighted and prioritised in view of the OOP vision (cf. D 1.1). Finally, the most promising characteristics of future cross-border OOP scenarios for citizens are extracted, which feed into the subsequent roadmapping task in WP 4.

HISTORY OF DOCUMENT

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
ABR	Administrative Burden Reduction
CERTH	Centre for Research and Technology Hellas, Greece
EC	European Commission
EGA	E-Riigi Akadeemia Sihtasutus E-Governance Academy EGA, Estonia
eID	Electronic Identification
EU	European Union
GDPR	General Data Protection Regulation
HEI	Higher Education Institute
INIT	INIT Aktiengesellschaft für Digitale Kommunikation-Init AG, Germany
IT-K	IT-Kommunal GmbH, Austria
OOP	Once-only principle
OOP4C	Once-only principle for Citizens
SCOOP4C	Stakeholder Community: Once-Only Principle for Citizens
SDGR	Single Digital Gateway Regulation
SLA	Service Level Agreement
UKL	University of Koblenz-Landau, Germany
VRA	Vehicle Registration Authority
WP	Work Package

1. INTRODUCTION

The once-only principle is among the seven driving principles in the eGovernment Action Plan 2016-2020 of the European Commission (EC)¹. To boost developments towards administrative burden reduction (ABR) and simplification of procedures, two projects are funded by the EC in its Horizon 2020 programme² to investigate once-only principle implementations: SCOOP4C³ and TOOP⁴.

SCOOP4C investigates, discusses and disseminates how the once-only principle (OOP) can be implemented in contexts of co-creation and co-production of public services for citizens in order to contribute to significant reduction of administrative burdens and simplification of administrative procedures for citizens while reusing data among public administrations with the control and consent in the hands of citizens. European policy makers expect that successful implementation of the OOP strengthens economic growth, therewith contributing to implement the strategic objectives of the Digital Single Market⁵ as well as the eGovernment Action Plan 2016-2020.

The objectives of SCOOP4C are as follows:

- to build up and sustain a stakeholder community for the once-only principle for citizens in order to discuss and share experiences as well as drivers, enablers and barriers
- to identify, collect and share existing good practices of once-only implementations for citizens across Europe and to establish a body of knowledge about these cases
- to discuss challenges, needs and benefits of widely implementing and diffusing the once-only principle in co-creation and co-production contexts involving citizens and governments as data providers and data consumers
- to draw conclusions from comparing existing best practices with needs and challenges, including policy recommendations towards a necessary paradigm change in the public sector and of the citizens to build up trust on data shared among governments while no longer bothering citizens to repeatedly provide the same data in public service provisioning
- to identify relevant stakeholders and to develop a strategic stakeholder engagement plan to ensure sustainable implementations of the once-only principle with a large engagement of stakeholders in various co-creative and co-productive public service provisioning contexts
- to develop a tangible roadmap of future areas of actions to implement, diffuse and sustain concepts and implementations of once-only solutions for citizens

The deliverable at hand documents the results of tasks 4.1 and 4.2 of work package (WP) 4. The main objectives of the two tasks were i) to analyse and synthesise challenges, needs, and benefits of the OOP for citizens and ii) to prioritise these aspects against the vision of OOP formulated in deliverable D 1.1⁶. Along task 4.1, challenges, barriers, needs as well as benefits of OOP implementations were studied based on the state of play report (see deliverable D 1.2⁷ of work package 1) and the stakeholder analysis (see deliverable D 2.1⁸ of work package 2). Furthermore, the scenario technique was used to depict potential cross-border OOP solutions through future scenarios in five different domains (education, healthcare, moving, social protection, and taxation). The scenarios were used to study gaps, needs, and benefits of OOP in cross-border contexts. This was complemented with desk research as well as participative methods to gather inputs from the stakeholder community. Five stakeholder workshops involving relevant actors of the OOP cases were conducted to validate the scenarios as well as to

¹ <https://ec.europa.eu/digital-single-market/en/european-egovernment-action-plan-2016-2020>

² <http://ec.europa.eu/programmes/horizon2020/node/85>

³ www.scoop4c.eu

⁴ www.toop.eu

⁵ http://ec.europa.eu/priorities/digital-single-market_en

⁶ Deliverable D 1.1: Vision of the once-only principle for citizens, including key enablers and major barriers 2017, SCOOP4C Consortium, <https://scoop4c.eu/Materials>

⁷ Deliverable D 1.2: State of play report of best practices, 2017, SCOOP4C Consortium, <https://scoop4c.eu/Materials>

⁸ Deliverable D 2.1: Identification and mapping of stakeholders, 2017, SCOOP4C Consortium, <https://scoop4c.eu/Materials>

identify and prioritise gaps and needs of OOP in cross-border contexts. For the prioritisation of gaps towards the OOP vision, the future scenarios were the basis to highlight the most important aspects for administrative burden reduction in cross-border public service provisioning.

The report is structured as follows: Chapter 2 describes the research design including the scenario technique, the gap analysis method, and the prioritisation of gaps, needs, and benefits of OOP. Chapter 3 presents the future cross-border scenarios, which show how the OOP could be implemented in different public services in healthcare, education, social protection, taxation, and moving. Each scenario comprises of two parts: a generic scenario outlining an ideal solution, and a version with the application of existing best practice cases. The scenarios are visualised through graphics (rich pictures) and described textually. Tables are used to extract needs, existing enablers, and challenges along the scenarios. In addition, possible benefits for participating stakeholder groups with their impacts on society and economy are included in chapter 3. Chapter 4 provides a synthesis of the identified gaps and benefits from the future scenarios, including a prioritisation concerning the implementation of the OOP vision. Chapter 5 concludes the report with lessons learned and an outlook on future work.

2. LITERATURE ANALYSIS AND RESEARCH DESIGN

This work builds on insights from studying once-only principle cases and enablers (collected in the online knowledge base⁹ and documented in deliverable D 1.2 of work package 1). To synthesise the gaps, needs and benefits of the OOP from the existing best practices and to prioritise the gaps in relation to the OOP vision, a multi-method approach is used. It combines literature analysis and desk research with scenario technique and the gap analysis method of (Pucihar, Bogataj, & Wimmer, 2007b). Overall the approach from the eGovRTD2020 project (Codagnone & Wimmer, 2007) was adjusted to the needs and objectives of SCOOP4C. The following subsections outline the applied methods. Subsection 2.1 summarises findings from literature in relation to administrative burden reduction through the once-only principle. Subsection 2.2 describes the scenario technique used to construct future cross-border OOP scenarios in different domains. The gap analysis methodology is presented in subsection 2.3. Furthermore, interactive techniques were used in stakeholder workshops to engage with stakeholders from different areas and different EU Member States in validating the scenarios, gaps and benefits. The technique is described in subsection 2.4.

2.1. Insights from literature analysis

First step of the work was an analysis of existing literatures on administrative burden reduction and related domains. The “Study on eGovernment and the Reduction of Administrative Burden” investigates the main strategies to reduce administrative burden along with the OOP implementations in Denmark, Netherlands, and the United Kingdom. It also identifies successful OOP practices in further Member States and therewith depicts a first valuable “landscape of the once-only principle” showing how the European countries apply the OOP. This study points out the following common challenges and barriers for the OOP implementation (European Commission, 2014):

- Shortages in smooth interaction between public authorities
- High level of development cost that government will face by the OOP implementation
- Data sharing restrictions and privacy issues
- Cultural, practical, and organisational construction changes

According to the cost-benefits analysis carried out on the successful implementations, the study anticipated that once-only principle implementations would enrich economic growth. Moreover, the study concludes a policy roadmap to guide European Member States in the implementation of the OOP to reduce administrative burden. This roadmap investigates the following strategic factors and building blocks:

- | | |
|--|--|
| <ul style="list-style-type: none">• Strategic aspects<ul style="list-style-type: none">○ Policy○ Administration○ Legal○ Monitoring○ Quick wins | <ul style="list-style-type: none">• Building blocks<ul style="list-style-type: none">○ Interoperability and data exchange○ Data quality○ Data protection○ Base registries |
|--|--|

Policy, administrative, and legal factors are pointed out as very important strategic aspects in the OOP implementation. Interoperability, data quality, and data protection are classified either as very effective or effective. The findings of the study complemented the insights from deliverables D 1.1 and D 1.2 of work package 1, and they build the initial grounds of the present gap analysis. In particular, the above critical strategies as well as very effective and effective building blocks were included in the classification of the barriers and enablers of the once-only principle as documented later in this report.

Already in 2003, Vintar et al analyse the reduction of administrative burden at national level in Slovenia. This study demonstrates a framework for assessing and measuring e-government progress in European countries. The framework provides a model that classifies e-service maturity in four levels, ranging from a very basic level that indicates only the online availability of certain information, to the highest level that indicates sufficient interoperability between public authorities and availability of fully implemented online services (Vintar, Konstelj, Dečman, & Berčič, 2003). The implementation of the once-only principle is classified at the highest maturity level, as the interoperability between public entities is an essential requirement. Moreover, the study highlights the necessity of sufficient interoperability between different public authorities for once-only principle implementation. This need for interoperability is reflected in the classification used for analysis of needs, enablers, and challenges

⁹ <https://scoop4c.eu/knowledge> (only available for registered users)

in chapter 4. Furthermore, Vintar et al identify the organisational change as an essential requirement to achieve the highest mature level of e-service implementations. Accordingly, it applies to the implementation of the OOP as well. Finally, this study explains the Slovenian plan for e-government development, including once-only principle implementation as well as current supporting enablers, such as legal and organisational frameworks, strategies as well as technical interoperability. These enablers are considered as possible enablers to support the implementation of future cross-border scenarios.

Another national study recommending a framework for assessing e-government readiness is published by (Azab, Kamel, & Dafoulas, 2009). The authors stress the internal factors of the public sector and they recommend that the assessment framework considers the e-government readiness in four key areas, with relevant factors:

- | | |
|--|--|
| <ul style="list-style-type: none"> • Strategy <ul style="list-style-type: none"> ○ Motives ○ Goals ○ Strategic Alignment ○ Identification of Challenges ○ Action Plan • Processes <ul style="list-style-type: none"> ○ Business Process Change (BPC) ○ Evaluation <ul style="list-style-type: none"> ▪ Design/reality gap ▪ Usage ▪ Citizens' feedback ▪ Employees' feedback ○ Impact on stakeholders | <ul style="list-style-type: none"> • People <ul style="list-style-type: none"> ○ User Satisfaction ○ Impact on employees ○ Skills ○ HR Training and Development • Technology (Information Systems Structure) <ul style="list-style-type: none"> ○ Information quality ○ System quality ○ Web presence quality ○ Security measures ○ Hardware ○ Technical Support and Development |
|--|--|

The authors investigate these factors along a case study, revealing that all key areas affect e-government readiness where the e-government strategy has the highest effect on people. The study concludes with the recommendation to investigate all four building blocks in further research. The report at hand reviews those aspects and considers them in the scenario development, with the main focus on citizens.

Finally, Veiga et al analyse administrative burden reduction in the public sector and reveal different types of administrative burden such as learning, psychological, and compliance costs as spotted by (Moynihan, Herd, & Harvey, 2014), along with their potential impacts. The study introduces the Standard Cost Model (SCM) as a methodology to evaluate administrative burden reduction. Moreover, this study investigates possible e-government solutions, such as the once-only principle implementation, to overcome administrative burden reduction. The authors raise a number of important requirements for the successful implementation of e-government initiatives, such as citizen's eagerness to use e-government services and organisational preparation (Veiga, Janowski, Barbosa, & Luís, 2016). The specified types of administrative burden and their corresponding impacts were born in mind in the project's investigation of the benefits and impacts of future scenarios of cross-border OOP implementations in public services. Moreover, critical requirements for a seamless e-government implementation (including OOP) facilitated the analysis of the needs, challenges, and benefits in this deliverable.

2.2. Scenario Development Technique

The implementation of the once-only principle in (cross-border) public service provisioning demands for a holistic approach, where different perspectives (political, legal, organisational, social, economic, process, data and technological factors, cf. (Wimmer, 2002)) are integrated. In order to understand the gaps, needs and benefits of implementing the OOP vision, the scenario technique is an effective method to depict the implementation the OOP in cross-border contexts. Scenarios are defined as "*archetypal descriptions of alternative images of the future, created from mental maps or models that reflect different perspectives on past, present and future developments*" (Rotmans, et al., 2000), similar in (Aichholzer, 2004, p. 3) and (van Notten, Rotmans, van Asselt, & Rothman, 2003). The scenarios in the context of this deliverable are narrative textual descriptions (structured or unstructured), which are complemented with a rich picture to illustrate a perceived view or understanding of a specific topic (Carroll, 1995), (Janssen M. , et al., 2007a).

The scenario building technique uses short narrative stories to build scenarios and explore possible pathways of a future development under uncertainty, surprise, human choice, and complexity (Lob, Costa, Nogueira, Antunes, & Brito, 2005), (Janssen, van der Duin, & Wimmer, 2007). The technique has become popular in the midst of the

past century, when the RAND Corporation worked out strategic studies on military issues for the American government (von Reibnitz, 1987). Subsequently, scenario building received a significant boost and was copied by well-known organisations such as Shell and Global Business Networks later. The simple 'what if' exercises performed by national armies turned into fully-fledged future research methods (May, 1996). In the 1960s and 1970s Gibson (Gibson, 1996) found that a general sense of certainty existed about where we were going and how to get there. However, the lesson learned is that nobody can just drive to the future on cruise control. At the end of the twentieth century, a more down-to-earth approach was demanded to look into the future. Consequently, the scenario technique became more mature (Johnson, Scholes, & Whittington, 2002), (May, 1996).

The future once-only principle scenarios in the cross-border context describe how future interactions between governments and the corresponding stakeholders could look like, which tools, standards, and technologies can be used to share and reuse data, and further important aspects derived from the present-day point of view (adopted from (Majstorovic & Wimmer, 2014)). Therefore, the scenarios have the potential to broaden perspectives, explore the alternatives, and point out policy recommendations. Those can significantly affect the future of administrative burden reduction and help raising questions, establishing consensus, challenge conventional thinking as well as encouraging debates on OOP solutions (cf. (Guimarães, Funtowicz, & Quintana, 2001), (Greeuw, et al., 2000), (Sharpe & van der Heijden, 2007), (van der Heijden, Bradfield, Burt, Cairns, & Wright, 2002).

An inclusive methodology, which considers many different features, as pointed out above, is necessary for developing e-government as a socio-technical system (Pucihar, Bogataj, & Wimmer, 2007b). The holistic reference framework of (Wimmer, 2002) integrates technological, economic, organisational, legal, social, and political points of view. The scenario development in this report considers these different factors.

Scenario building provides a comprehensive technique to collect information about the system of a certain complex scope. Scenarios help to identify the framework conditions of this system, in order to allow better handling of the complexity and related uncertainty, therewith providing better predictions for the evolution. Based on the insights from such alternatives, a roadmap can be derived to describe the system and the behaviour of its elements.

The scenario technique applied throughout chapter 3 is based on the methods described in the analysed literature above; however, it was adjusted to the specific context of the project and the desired future cross-border OOP scenarios. As a first step in developing these scenarios, a template was designed to guide the partners and to ensure a common approach and style in scenario development. The policy domains for the scenarios were chosen basing on the "information areas related to citizens" suggested in Article 2(2)(a) of the Single Digital Gateway Regulation (SDGR)¹⁰. The SDGR proposes a European gateway to inform and assist citizens with services within the EU. From the eight areas of information, the following five were selected for the scenario development:

- Education or traineeship in another Member State, leading to the scenario '*education*', which outlines the process of a student applying for a study in another Member State in order to take a semester abroad (cf. subsection 3.1)
- Cross-border family rights, obligations and rules leading to the cross-border scenario called '*social protection*', which addresses parental responsibilities in relation to registering the new-born citizen (cf. subsection 3.2)
- Work and retirement within the Union leading to the cross-border scenario called '*taxation*', which is related to a citizen temporarily working in another Member State while still handling his tax declaration in the home country (cf. subsection 3.3)
- Vehicles in the Union, in particular taking a motor vehicle temporarily or permanently to another Member State – leading to the scenario '*moving*' (cf. subsection 3.4)
- Healthcare related to buying prescribed pharmaceutical products in a Member State other than the one where the prescription was issued, on-line or in person, leading to the scenario '*health*' (cf. subsection 3.5)

As initial step in the scenario development, each partner selected a scenario domain and subsequently identified the main actors (e.g. citizens, public administrations and businesses – informed in part also by the stakeholder analysis carried out in work package 2, cf. Deliverable 2.1) as well as the main interactions and supporting building blocks, challenges, needs, and enablers of the scenario. On this basis, each partner elaborated their scenario following the template with the following three subsections:

¹⁰ https://ec.europa.eu/info/law/better-regulation/initiative/25646/attachment/090166e5b20c4bdd_en and https://ec.europa.eu/info/law/better-regulation/initiative/25646/attachment/090166e5b20c5741_en

1. Generic future cross-border OOP scenario, containing
 - a textual description of the scenario, which explains step by step the interactions between citizens, public authorities, and systems across borders
 - a rich picture that demonstrates the actors, information systems, data elements, and needed enablers as well as the different steps of interactions between the stakeholders
 - a table of needs emerging from the scenario, including a brief description of how these needs are related to the scenario
2. Real case future cross-border OOP scenario that builds on one or more existing OOP cases and/or enablers identified and described in D 1.2 and that contains
 - a textual description of the scenario, which explains step by step the interactions between citizens, public authorities, and information systems involved in the real case(s). This includes also existing enabler(s) used in the real cases of OOP implementations at Member State level;
 - a rich picture that demonstrates the actors, systems, data elements, and existing enablers as well as the different steps of interaction between different stakeholders;
 - a table of existing enablers with a brief explanation of their supportive role;
 - a table of current challenges and corresponding description on how these challenges could hamper the seamless implementation of the future scenario;
3. Synthesis of the benefits and impacts that would be achieved by the implementation of the future cross-border scenario, including
 - a list of stakeholder groups in the scenario and possible benefits they may receive through the implementation of the cross-border OOP scenario;
 - a description of the social and economic impacts that the implementation of the cross-border OOP scenario could generate if implemented effectively;

The generic scenarios identify needs for the domain-specific once-only principle implementation. The real case scenarios show the gaps between the needs and the current OOP implementations as described in D 1.2. Finally, the last part of each scenario represents the potential benefits and impacts and considers the different stakeholder groups. Throughout this scenario development and analysis, the needs, gaps, and benefits were assessed against the vision of the OOP evaluated in work package 1.

The project partners developed the scenarios in an iterative way. To guide the project partners, the work package leader (UKL) developed the first generic and real-case scenario for education. Subsequently, each partner developed a generic and real case future scenario for the selected area. In several iterations, the partners reviewed the scenarios in regular virtual meetings as well as in stakeholder workshops, and improved them based on the received feedback.

To simplify the interactive discussions in the stakeholder workshops, where the scenarios and gaps were discussed and validated (see section 2.4), an additional graphical representation of the scenarios was developed in poster format by UKL. This was necessary because the rich pictures mentioned above were perceived by the partners as being too complex for the stakeholder interaction in the interactive sessions, although the rich pictures were well perceived in presentations, where a speaker explained the steps of the interactions between actors or with information systems step by step and with the details of all relevant enablers.

The results of developing the future cross-border OOP scenarios are documented in chapter 3 below.

2.3. Gap Analysis Method

Pucihar et al describe a gap as the discrepancy between the current situation (as is) and the desired state (to be) (Pucihar, Bogataj, & Wimmer, 2007b, S. 27), (Pucihar, Bogataj, & Wimmer, 2007a). Based on this definition, the same authors define gap analysis as a methodology to compare the “as is” and the “to be” conditions of a specific situation.

The gap analysis methodology in SCOOP4C is based on the technique used in eGovRTD2020 (Pucihar, Bogataj, & Wimmer, 2007a), (Pucihar, Bogataj, & Wimmer, 2007b). This technique is built on several foundations:

- **Soft system methodology (SSM).** The SSM methodology is a commonly used method in design science research to study 'soft' problems in complex socio-technical system environments. Soft problems describe complex and multidimensional conditions including political, social, and technical aspects challenging a system environment (Checkland & Scholes, 1990) (Hicks, 1991) (Lenart & Hribar, 2004).

- **SWOT analysis.** SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis is a structured method used in strategic planning to gather and study internal strengths and weaknesses as well as external opportunities and threats in regards to a desired state of a system / project / institution (Helms & Nixon, 2010) (Johnson, Scholes, & Whittington, 2002). To apply the method, the desired state needs to be clearly defined in advance.
- **ITPOSMO methodology.** ITPOSMO is an acronym for Information, Technology, Processes, Objectives and values, Staffing and skills, Management system and structures, and Other resources (time and money). This methodology was developed by Heeks and brings these seven dimensions together with the aim of studying the design-reality gap (Heeks, 2003) (Heeks, Mundy, & Salazar, 1999).

A common feature of the mentioned methods is the comparison of existing vs. preferred future situations in order to recognise gaps between them and to further analyse them (Heeks, 2003). Since the eGovRTD2020 gap analysis methodology already builds on above introduced methodologies, it provides a suitable frame, which was adjusted to the needs of SCOOP4C gap analysis. In particular, the SCOOP4C consortium defines gaps as challenges and barriers that hamper a seamless implementation of cross-border OOP implementations (as e.g. outlined in the future scenarios). Gaps may be determined by identifying

- Missing (not existing) enablers for the successful implementation of future cross-border OOP scenarios;
- Existing enablers, which require further development to support the seamless implementation of the future cross-border OOP scenarios fully.

Since the identified gaps in the future OOP scenarios relate to missing or incomplete enablers, the gaps were classified into the same categories as the enablers and barriers of OOP implementations in deliverable D 1.1. To recall, these categories are: Political commitment; Legal interoperability; Organisational commitment and collaborative business processes; Semantic interoperability; Technical interoperability/ Technical enablers; Interoperability governance/ Governance mechanisms; Motivators, benefits, and public value; Data protection and privacy; Trust and transparency; Socio-cultural influence factors; Citizen-centred design; Data quality; Flexible business models).

The overall gap analysis method is illustrated in Figure 1. It starts with the inputs from the analysis of good practices of OOP implementations (cf. D 1.2) as well as the future cross-border OOP scenarios (see chapter 3). Subsequently, the following four steps are performed:

- Step 1 identifies gaps in two ways:
 - (i) by highlighting that an existing enabler at national or European level does not meet the needs expressed in the future cross-border OOP scenario and thereby does not fully support the implementation of the once-only principle in the scenario;
 - (ii) by spotting a missing enabler, which is needed in a scenario for the seamless cross-border implementation of the OOP, while it does not yet exist as an OOP enabler.

The gaps are documented along with the scenario descriptions in chapter 3 – see the tables in each scenario description outlining the needs of the enabler and arguing why their insufficient development is challenging the OOP implementation.

- Step 2 identifies the potential benefits of the implementation of the once-only principle for the different stakeholder groups involved in the future OOP scenarios. Furthermore, it argues potential impacts on economy and society through the identified benefits. The results of this step are documented along the scenario descriptions, too (cf. last subsection in each scenario description).

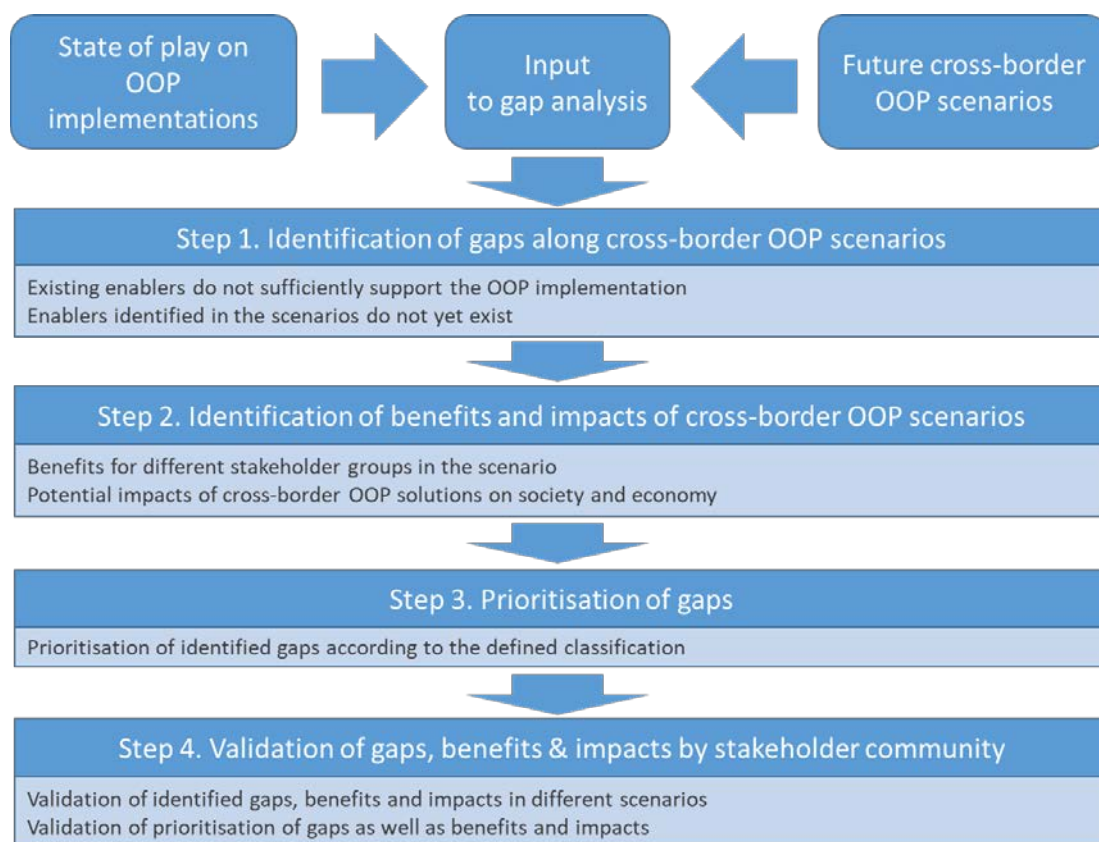


Figure 1: SCOOP4C gap analysis methodology

- Step 3 prioritises the gaps and benefits identified in steps 1 and 2 along:
 - the severity of a gap to prevent a successful OOP implementation – see the classification in Table 1;
 - the level of contribution to potential benefits and impact to meet stakeholders' needs if the OOP is effectively implemented – see classification in Table 2.

The prioritisation of gaps and benefits of this step was performed by the partners in several iterations. It is documented in chapter 4, together with a synthesis of the gaps and benefits.
- Step 4 validates the identified gaps and the gap priorities with the SCOOP4C stakeholder community (including representatives of the public and private sector, of NGOs, and of academia) through several interactive workshops. The inputs and prioritisation of gaps by the stakeholder community are integrated in the afore-mentioned documentation of gap and benefit prioritisation in step 3.

Table 1: Classification of the severity of gaps

Gap priority	Description
Critical	Gaps that critically hinder the implementation of the future cross-border OOP scenario and hardly reduce administrative burdens
High	Gaps that affect the main OOP aspects and prevent the effective implementation of the future cross-border OOP scenario
Middle	Gaps that affect some OOP aspects and impede the successful implementation of the future cross-border OOP scenario
Low	Gaps that decrease the performance of OOP implementation and prevent the perfect implementation of the future cross-border OOP scenario

Table 2: Classification of the level of contribution to potential benefits and impact of OOP implementations to meet the stakeholders' needs

Level of contribution to benefits and impact	Description
High	<p>The benefits for the target groups are high, in particular the benefits for citizens substantially reduces administrative burden, cuts red tape, simplifies public service consumption and increases service quality.</p> <p>The impact on economy and/or society is high by establishing favourable market conditions for businesses / creating better societal conditions for citizens and improving efficacy of public service provisioning as well as trust in public administrations.</p>
Middle	<p>The benefits for the target groups are noteworthy, e.g. by still contributing to administrative burden reduction and simplification of public service consumption.</p> <p>The impact on economy and/or society is noteworthy as current market or societal conditions improve for businesses or citizens.</p>
Low	<p>The benefits for the target groups are low. The investments in the OOP solution are not generating large changes in the service provisioning (such as simplification, reduction of ABR, less costs).</p> <p>The impact on economy and/or society is relatively low in relation to the efforts for the implementation.</p>


2.4. Interactive workshops engaging the stakeholder community

The development of future cross-border scenarios and the validation of gaps was accompanied by several workshops with the stakeholder community and the steering board members of SCOOP4C. In total, six workshops were carried out in different Member States in order to meet the ambitions in scenario development and gap analysis. The participants represented different stakeholder groups, including academia, public administration at different levels, private sector, and NGOs to assure comprehensive coverage of relevant stakeholders.

The stakeholder workshops followed similar structures, as follows:

- Outline presentation of the SCOOP4C project including objectives and what has been achieved so far;
- Brief presentations of successful OOP implementations (cases and enablers);
- Introduction to the interactive session and the expected tasks, including dividing participants into small groups per specific scenario discussed;
- Moderated discussions with participants in world café or group discussions, therewith addressing various questions and discussion items, including reviewing the scenario, reviewing the enablers and barriers, reviewing identified and prioritised gaps, highlighting potential benefits and impact;
- Presentation of the main findings from each group to the plenary and discussion.

An example of guiding the participants through an interactive session is shown in Figure 2. It is from the stakeholder workshop in Brussels, 26th April 2018, which aimed at verifying and prioritising the gaps as well as identifying initial roadmap actions.



SCOOP4C
STAKEHOLDER COMMUNITY
FOR ONCE-ONLY PRINCIPLE

Funded by the European Union under
H2020 CO-CREATION-09-2018

Introduction to the World Café Session
Soft factors of the once-only principle:
Developing a roadmap of future areas of actions

www.scoop4c.eu

Stakeholder Workshop
26th April 2018

Prof. Dr. Maria A. Wimmer
(Project Coordinator)

UNIVERSITÄT
KOBLENZ-LANDAU

Coordination and Support Action (CSA), GA no. 737492, 11/2016 – 10/2018

World Café tasks:

- [1] Choose a scenario of interest (if possible w/ equal distribution of people)
- [2] A Scenario Master will introduce you to the scenario (max. 5 minutes)
- [3] The group will discuss the scenario in three steps (ca. 40 minutes)
 - Verify gaps
 - Prioritise gaps
 - Define actions for the roadmap

[4] Report back findings / insights and discuss them in the plenary session (max 10 mins per group)

Step 1: Verify gaps

Task: Teams discuss and verify existing enablers (green objects on posters) and gaps of the scenario (pin prepared gaps on the poster). Teams identify and add new gaps (use white blank sheets) with focus on soft factors.

A scenario:



Step 2: Prioritise gaps

Task: prioritise gaps along criticality and impact on successful implementation of OOP in the scenario. Use ● for highly critical, ● for medium critical, and ● for low criticality. The team should agree on the assessment and put one assessment on each gap

The scenario with gaps:



Step 3: Define actions for the roadmap

Task: formulate actions needed to overcome the gaps (starting with the highest prioritised gaps and focus on soft factors). Write the suggested actions and actors that should tackle an action on sheets and pin them next to the scenario gap(s) the action should tackle.

The scenario with prioritised gaps:



Figure 2: Choreography for interactive sessions – example from Brussels workshop

After each workshop, interim results were updated based on the feedback collected from the stakeholders, and a next version of materials was generated for interactive sessions of future workshops. Subsection 3.6 in the next chapter (cf. page 73)

- lists the stakeholder workshops organised in different Member States, where stakeholder input was collected,
- outlines the main findings from each stakeholder workshop, and
- describes how the different stakeholder groups were engaged in the process.

3. FUTURE CROSS-BORDER OOP SCENARIOS

In the following, five future cross-border OOP scenarios are described in the selected domains (see section 2.2 for the selection process), namely education (cf. section 3.1), social protection (cf. section 3.2), taxation (cf. section 3.3), moving (cf. section 3.4) and health (cf. section 3.5). The future cross-border OOP scenarios aim to describe 'a potential ideal state of cross-border OOP implementation', where *"citizens and businesses supply the same information only once [...]. Public administration offices take action [to share and reuse this information within a given legal frame ...], in due respect of data protection rules, so that no additional burden falls on citizens and businesses [in providing information that is already in the hands of public authorities]"* (European Commission, 2016).

The scenario descriptions follow a unique template as introduced in section 2.2, hence each scenario is described in subsections with a generic (ideal) future cross-border OOP scenario (with narrative text, rich picture, and poster), a 'real case' scenario that builds on existing national OOP implementations and extends these cross-border, an analysis of needs, enablers and challenges, and an outline of identified potential benefits and impact. The presented results reflect the final version of the scenarios and analysis results.

3.1. Cross-border OOP scenario in 'Education'

3.1.1. Generic scenario for applying for studying abroad

The scenario is depicted as a rich picture in Figure 3 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

Lisa, a student from country A wants to study for a semester at another university in country B. Lisa applies through an online subscription portal to the host university (1) using her national digital ID. Through the application portal, her name is read from the digital ID and she selects the home university and study program she is subscribed to, as well as host university and the study programme she wants to attend abroad. She also provides the consent to the host university to retrieve her relevant personal and education data from her home university's information system (IS).

The host university in country B – the responsible clerk being authenticated through her or his national eID of country B – verifies Lisa's digital identification and sends a request to the home university IS to retrieve Lisa's relevant personal and educational data (2). After the data is gathered, a responsible administrator reviews the data to ensure that Lisa fulfils the relevant educational prerequisites for studying modules in the intended programme at the host university. Since the data is correct and Lisa fulfils the requirements, a confirmation of the successful subscription is sent to her from the host university (3) (e.g. via email or other communication channel Lisa has indicated).

Subsequently, Lisa is able to select and subscribe online to the courses she wants to take during her study abroad and which are offered in the semester she wants to study there (4). For this, she uses her home university IS to subscribe to the relevant courses at the host university and therewith generates a digital learning agreement. To map the courses, a semantic mapping tool is used, which maps suitable learning objects and credit points across universities in Europe. When she has finished the selection of courses, she submits the digital learning agreement to the administrator of the home university's study program and the host university, who approve the digital learning agreement. Lisa receives a notification and now can be sure that the modules she will be attending will be added to her transcript of records at the home university, when she will have finished her study abroad.

Lisa travels to the host university and studies there (5). After every module is graded, the respective grades and credit points are stored in the host university's information system (filling up the transcript of records at the host university). When Lisa has attended the last exams, she returns back to her home university. When all grades are available at the host university's IS (at best before Lisa leaves), Lisa manually triggers the transmission of the digital transcript of records (using her eID) to the home university (6). In this step, again semantic mapping and necessary translation services are used to map the educational data including courses, credit points, and grades from one education system to the other. For the mapping of the courses in the transcript of records, a European-wide service is used that handles the knowledge of both national vocabularies and grading systems and that knows the translation rules for the credits and grades received in different European countries. This way, the data can be automatically stored in the home university's information system (7). An

administrator at the home university is notified to approve the data and ensure the correct mapping of modules to the curriculum of Lisa. When all data is correctly mapped, the transcript of records data is added to the home university IS, so Lisa's curriculum data is updated.

The transmission of the data between the two universities is done via a secure transport protocol. The student exchange and simplification of administrative procedures is based on the strategies for the Digital Single Market and the legal frameworks (including GDPR, eIDAS or SDGR) that provide the legal basis for the seamless OOP implementation.

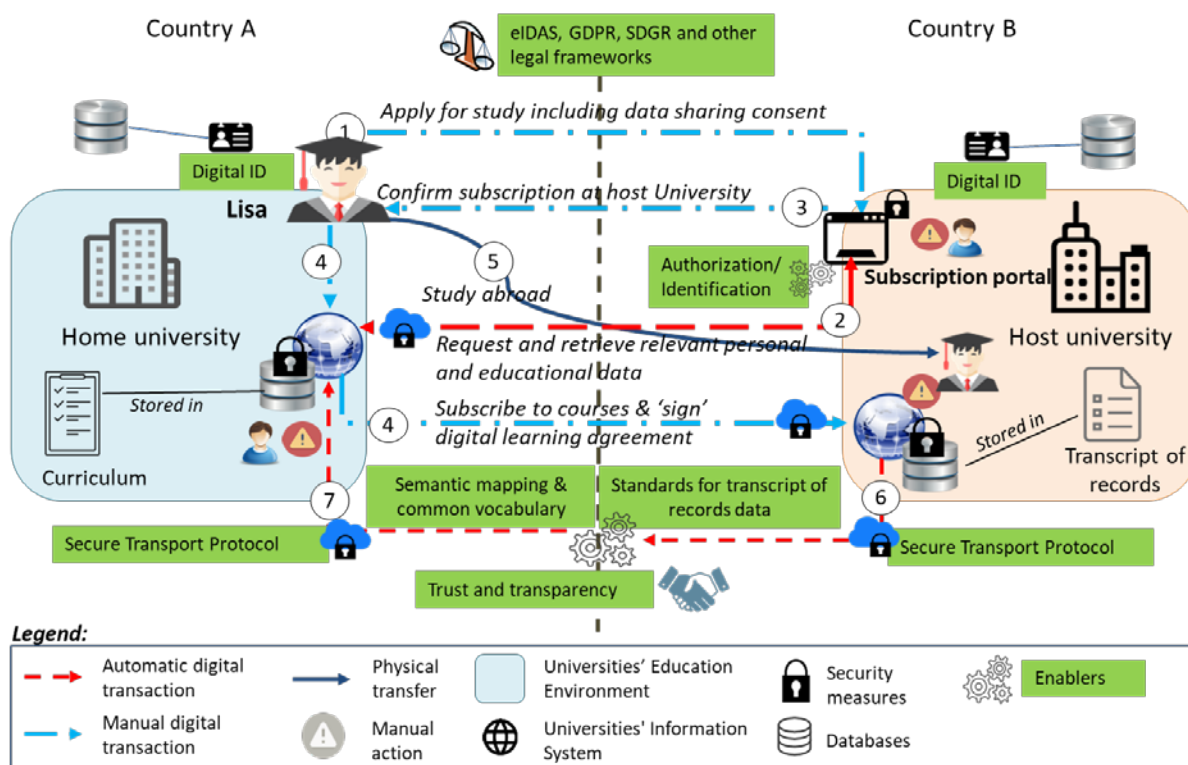


Figure 3: Generic scenario in the education domain – studying abroad

The poster for the interactive sessions used in the workshops is shown in Figure 4. It should be noted that the poster still embarks on the generic scenario, while some contextualisation has been applied to the specific geographical aspects of a workshop (e.g. the host University being either in the Netherlands (as is shown in the poster) or in Bulgaria).

Table 3 demonstrates the needed enablers for the scenario described above, grouped by the types of key enablers as identified in D 1.1 and D 1.2.

Future cross-border scenario in EDUCATION

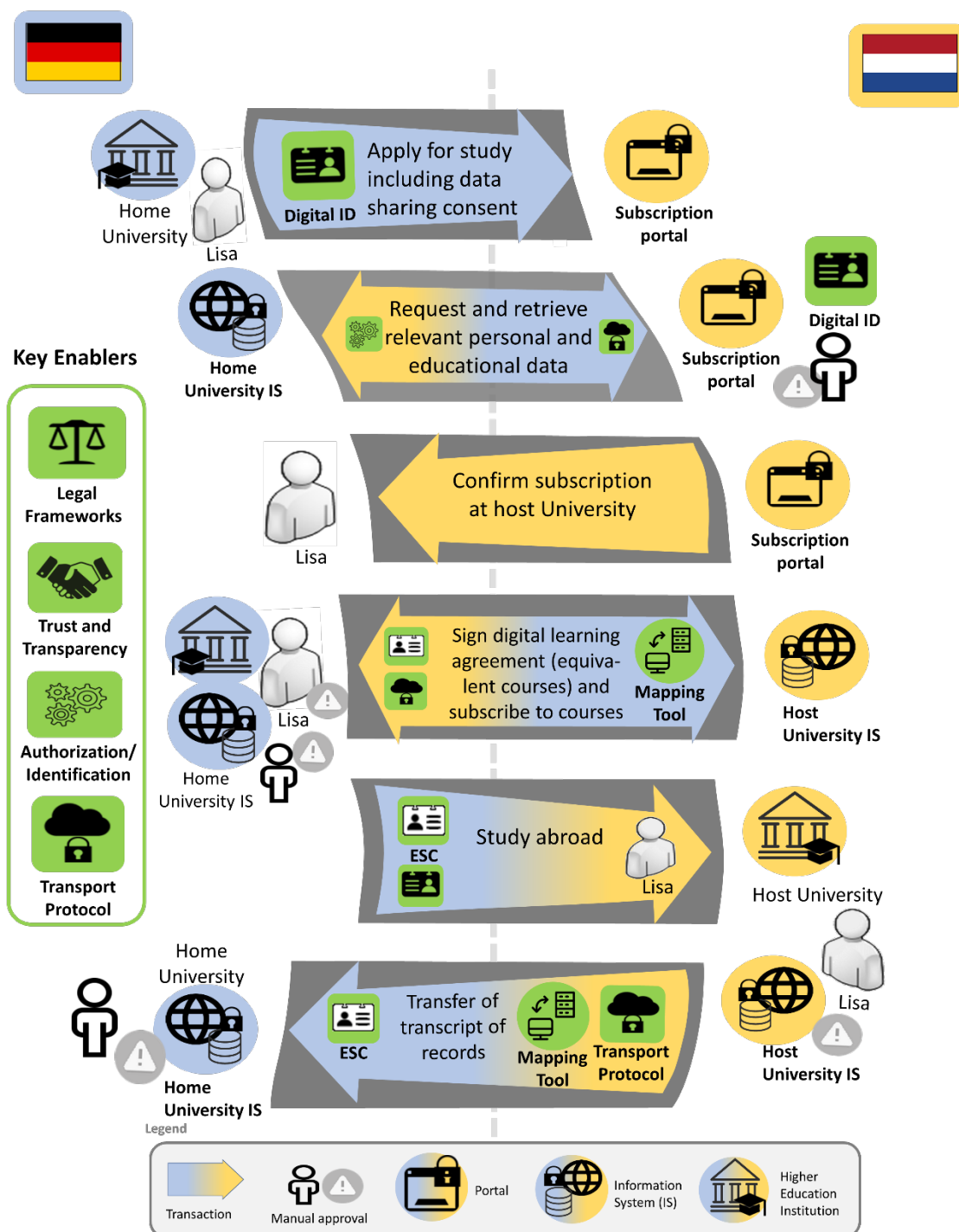


Figure 4: Poster for the generic scenario on studying abroad

Table 3: Needed enablers for implementing the future cross-border OOP scenario in the education domain

Type of enabler	Description of the needed enabler	Role of the enabler(s) in the scenario
Political commitment	Political commitment both at national and European level for simplification of administrative burdens in the procedure of applying for a study abroad is a necessary precondition for this scenario.	To ensure that necessary funding will be made available to provide the necessary building blocks such as semantic mapping for the digital learning contents; A necessary condition for HEIs to connect their information systems and to enable the sharing and reuse of data among them in the cases of student exchange;
Legal interoperability	Legal frameworks at European and national level need to provide the legal basis for secure, semantically correct, and transparent digital transmission of personal and educational data between the universities and involving registries in different Member States. Existing regulations such as GDPR and eIDAS provide a relevant basis for the cross-border data exchange. The Bologna regulation provides the legal grounds for equal educational standards, which however need yet to be embodied in respective mapping services across European HEIs.	As Lisa's personal and educational data is transmitted between two Member States, legal frameworks may need to be updated to enable this digital transmission / or data access to be legally compliant. Regulations such as eIDAS are essential to facilitate cross-border use of national eID and electronic authentication and authorization. The Bologna regulation can facilitate data mapping between the learning contents across EU Member States.
Semantic interoperability	Multilingual code lists of educational resources (e.g. education institutions, study programs, courses, grading, and credit points). Common standards for data exchange of personal and educational data at European level to ensure interoperability between universities and increase quality of data exchange between them. Catalogues of services such as available subscription portals and other information systems and catalogues of data at both national and European level among which data is to be exchanged.	Code lists as the universal data exchange facilitate transmission of data in this scenario by making UKL or TUD identifiable. As two universities in this scenario are in different countries with different languages, the code lists should provide multilingual content. Common standards should be embedded in information systems in this scenario to make stored data in them exchangeable.
Technical interoperability / Technical enablers	Secure transport protocol and technical standards at national and European level to facilitate secure digital transmission of the data between universities' information systems and registries; A European-wide semantic mapping of the course content and grades for digital learning agreements and transcripts of records; Digital ID, which provides secure and trustworthy cross-border electronic identification and authentication;	Secure transport protocols enable secure transmission of Lisa's data between the universities. Transmission of educational data between two universities with different educational systems (e.g. different grading systems) should be facilitated by semantic mapping services supporting automatic data exchange. Lisa uses her national digital ID in this scenario for online identification and authentication in consuming public services in another country.
Trust and Transparency	Trust services and clear role and access management with possibility for the user to give consent for data sharing as well as	Trust services enable Lisa to understand at any point in time what data is shared by whom and for what purpose. Through a transparent and clear communication of

Type of enabler	Description of the needed enabler	Role of the enabler(s) in the scenario
	receiving feedback on 'who has accessed what data for what purpose along the application for my study abroad' to ensure the implementation of GDPR;	access management, Lisa feels that she is in the driver's seat for the data sharing, since she explicitly gives consent for sharing educational and personal data among the Universities. Transparency is a vital issue in order to achieve citizens' trust and acceptance for these services.
Data protection and Privacy	Data protection and privacy should be ensured on national and European level, data supervisor entities at national and European level should be determined for checking and enforcing the application of the data protection regulations.	As cross-border personal and educational data sharing is a key part of this scenario, data protection and privacy assurance are two outstanding issues for a successful implementation.
Data quality	The automatic retrieval of students' personal and educational data from the home University provides higher reliability and data quality if the data exchange is based on common standards and semantic mapping across Europe; Manual approval of automatically mapped data provides an additional quality approval in the steps of approving the digital learning agreement as well as in the transmission of the transcript of records with the final grades and credit points taken.	The administrator at the host University can embark on higher data quality if data of an applicant (in the scenario: Lisa) is directly retrieved from the home University's information system. The manual approval (a digital signature of an administrator on the digital file) of the digital learning agreement or the transcript of records provides a means for additional quality control and hence establishes higher trust in the transmission of sensitive data across information systems of HEIs.
Citizen-centred design	Students and administrators of HEIs should be involved in co-creative service design in order to ensure convenient and easy to use services for the users	Lisa and the administrators of both Universities as service users will only accept such a service if it provides a convenient process which meets the users' needs (e.g. reducing administrative burden, ensuring legal compliance in the process and data exchange, speeding up the process, simple system to system interaction, secure and trustworthy transmission of sensitive personal and educational data, etc.)

3.1.2. Future real case scenario for studying abroad

The real case scenario embarks on the Dutch Studielink (case described in D 1.2 and in the online knowledge base) as national subscription portal for other European students wanting to study a semester in the Netherlands. Furthermore, EMREX (see D 1.2 and online knowledge base for the description) and DigID as Dutch eID are key enablers used in the scenario.

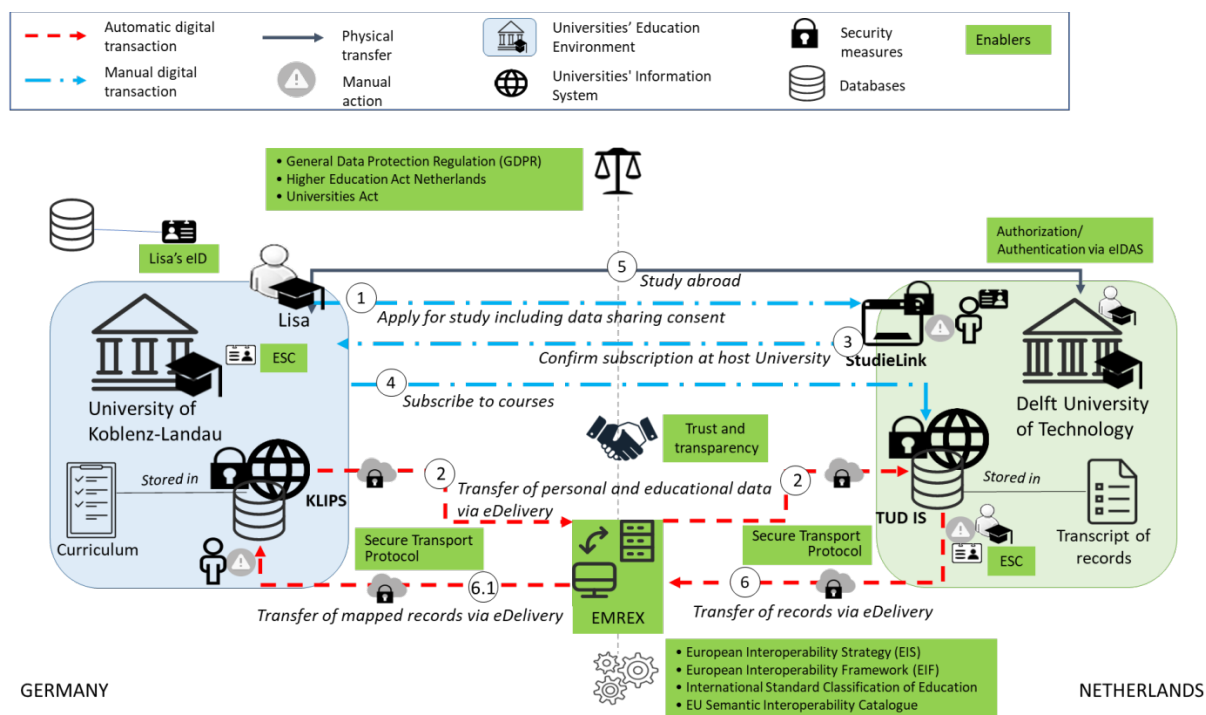


Figure 5: Real case scenario in the education domain – studying abroad

The scenario is depicted as a rich picture in Figure 5 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

A student, Lisa, from the University Koblenz-Landau (UKL) in Germany wants to study for one semester at the Delft University of Technology (TUD) in the Netherlands. Lisa applies through the Studielink Portal using her national eID from Germany (1). Along applying via Studielink, Lisa also provides consent to the TUD to retrieve her relevant personal and educational data from the information system (KLIPS) of UKL. Since Lisa used the eID, which is enabled through eIDAS, TUD can verify her identification and can retrieve relevant personal and educational data via eDelivery (2). In addition, the European Student Card (ESC)¹¹ facilitates recognition of Lisa's educational status and retrieval of her personal and educational data from KLIPS for TUD. For a secure data transmission, eDelivery is used.

Before Lisa's subscription is confirmed (3), a Dutch administrator approves Lisa's personal and educational data manually, accessing them in Studielink through a secure authentication with his eID. After Lisa receives the confirmation, she is able to subscribe to courses at TUD via the TUD information system (4). The result of the subscription to courses is a digital learning agreement that is approved by the administrators of both Universities, so that Lisa can be sure that the courses she will take will be added to her curriculum at the home University. Semantics are solved through the mapping tool EMREX that includes eTranslation and follows the EU Semantic Interoperability Catalogue as well as the International Standard Classification of Education.

While Lisa studies abroad (5), her grades and credit points are stored in the TUD IS. Before Lisa turns back to UKL, she uses her eID or ESC to trigger a process where a digital transcript of her

¹¹ <http://europeanstudentcard.eu>

records is sent to UKL via EMREX over a secure transport protocol (6). EMREX maps the courses, credit points and grades to the system of UKL. As before, for the mapping of the courses in the transcript of records, EMREX handles the knowledge of both countries' semantic standards, national vocabularies and grading systems and uses the translation rules for the credits and grades received in the Netherlands. UKL is notified in advance of the automatic data storage in KLIPS for confirmation of the received data. A responsible clerk from UKL will check and verify the correct mapping of the mapped transcript of records before saving it to Lisa's curriculum (6.1).

The digital transmission of Lisa's personal and educational data between the two Universities is based on the strategies for the Digital Single Market and the legal frameworks (including GDPR, eIDAS or SDGR) that provide the legal basis for this seamless OOP service. The transmission of the data between the two universities is done via a secure transport protocol using eDelivery as European building block.

Table 4 summarises existing enablers to facilitate the future cross-border OOP scenario. Since not all enablers are in place, Table 5 lists several challenges for the implementation of the OOP in this future scenario. The number codes along the challenges (e.g. E.1, E.15, where E stands for 'education domain') provide a unique identification of the challenges to ensure provenance in the subsequent analysis of the challenges and barriers as carried out in chapter 4 and in the subsequent task of roadmapping (upcoming deliverable D 4.2).

Table 4: Existing enablers to support the scenario 'studying abroad'

Type of enabler	Name of enabler	Contribution to the scenario
Political commitment	<ul style="list-style-type: none"> Digital Single Market Strategy; eGovernment action plan 2016-2020; ISA¹² programme Erasmus and Erasmus Plus programmes; European Interoperability Strategy (EIS)¹³. 	The political strategies and plans emphasise the importance of OOP and encourage the Member States' governments to support the OOP implementation. European programmes such as Erasmus Plus encourage student mobility across Europe.
Legal interoperability	<ul style="list-style-type: none"> General Data Protection Regulation (GDPR); Bologna Declaration; Digital Single Market Regulation; eIDAS regulation; Dutch Education Act; Federal Data Protection Act (BDSG)¹⁴ in Germany; Set of German data protection acts at state level such as Berlin Data Protection Act (BlnDSG). 	The Bologna Regulation ensures equal educational standards between Member States, aligning all degrees to the three-cycle system (bachelor, master, and doctorate). The GDPR provides an EU wide regulation that ensures the same level of data protection between Germany and the Netherlands. Lisa has not to be afraid that her data has a different protection level in another country. The Dutch Education Act guarantees interoperability between all Dutch universities so Lisa could attend each of them, due to a unified legislation. In addition, a set of German acts assures data protection on the national and local level.
Semantic interoperability	<ul style="list-style-type: none"> International Standard Classification of Education (ISCED)¹⁵ National Vocabulary of Education, OKSA (Finland); ECTS, European Credit Transfer and Accumulation System; EU Semantic Interoperability Catalogue¹⁶, including: <ul style="list-style-type: none"> The thesaurus for education systems in Europe; Classification of Fields of Education and Training; SCL-International Standard Classification of Education; 	The International Standard Classification of Education and the National Vocabulary of Education (OKSA) provide a core vocabulary for the universities and the mapping tool EMREX, making it easy to translate the educational data. ECTS provide a homogeneous base for the grading systems of the Member States HEIs, thereby granting Lisa the easy adaption at the host university and the simple transfer of her transcript of records back to the home university. The EU semantic interoperability catalogue supports the development of e-government services in the education domain. This catalogue enhances the implementation of the scenario.

¹² https://ec.europa.eu/isa2/home_en

¹³ https://ec.europa.eu/isa2/library/european-interoperability-strategy-eis_en

¹⁴ https://www.gesetze-im-internet.de/englisch_bdsch/index.html

¹⁵ <http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf>

¹⁶ <https://joinup.ec.europa.eu/collection/eu-semantic-interoperability-catalogue>

Type of enabler	Name of enabler	Contribution to the scenario
	<ul style="list-style-type: none"> ○ Standard Fields of Education Classification; ○ EUN Learning Resource Exchange Metadata Application profile. 	
Technical interoperability / Technical enablers	<ul style="list-style-type: none"> ● UKL's information system KLIPS¹⁷; ● TUD's information system; ● EU-wide mapping tool EMREX; ● National eIDs from Germany and the Netherlands; ● European student card (ESC); ● eDelivery; ● European Interoperability Framework (EIF). 	<p>Information systems on both sides process the educational data from its own university and the translated data from EMREX. EMREX is using the semantic enablers and eDelivery to map and transfer the data like the transcript of records between the information systems.</p> <p>National eID in Germany and the Netherlands are facilitating online authentication and identification of Lisa and other persons who are participating in this scenario. Moreover, eIDAS supports cross-border use of national eID in both sides. ESC supports the host university to check Lisa's educational status and ease student identification as well as transfer of student's records.</p>

Table 5: Challenges for OOP implementations in the education domain

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
Political commitment	<p>Lack of sufficient political commitment on national and European levels to promote the implementation of the OOP in the exchange of students across Europe (E.1);</p> <p>Existing discrepancies between the concepts of freedom and flexibility of teaching for teachers vs. aims of EU-wide standardisation in education (E.15)</p>	<p>Political commitment at different levels as mentioned in Table 4 is a prerequisite to support the OOP implementation in this scenario. However, lack of sufficient political commitment on different levels (incl. European and national) threatens seamless implementation of OOP in the scenario.</p> <p>The incompatibility between the two concepts 'freedom of research and teaching' and 'standardisation in education' provides a conflict of interest and may hamper successful implementation of the OOP in regards to mapping educational resources across borders (digital learning agreement) and transferring the results of a study abroad to the home university system (digital transfer of records). Consequently, an appropriate balance between them on EU level is needed.</p>
Legal interoperability	Lack of regulations on national and European level to assure secure and transparent digital transmission of	Though there is a variety of national and European regulations to support this scenario, a lack of sufficient regulation particularly on the national level in some Member States could prevent seamless implementation of the OOP in the scenario.

¹⁷ <https://klips.uni-koblenz-landau.de/qisserver/rds?state=user&type=0>

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
	<p>personal and educational data between Member States (E.12);</p> <p>EU regulations are not meticulous enough, tolerating varying implementations between the member states (E.18)</p>	<p>A higher acceptance by citizens and HEIs can be achieved by coherent EU-wide regulations.</p> <p>EU regulations on eIDAS (cf. Art. 22) ¹⁸ are not specific enough and this could lead to different implementations among member states. This could threat essential harmonisation at the EU-level for OOP implementations.</p>
Semantic interoperability	<p>Missing code lists of necessary objects in the education domain (E.2);</p> <p>Missing common standards for educational data exchange on European level (E.3);</p> <p>Lack of bilateral digital learning agreements between HEIs (E.13);</p> <p>Lack of competency matching for ECTS interoperability (E.17)</p>	<p>An EU-wide multilingual code list of objects in the education domain is necessary in order to facilitate effective data exchange between different countries. For instance, universities and its courses would be easily identifiable by unique identification code in the lists.</p> <p>Lack of common standard and framework for exchange of electronic educational information at Europe level can threat the implementation of the scenario.</p> <p>Bilateral digital Learning Agreements between universities will facilitate mapping of courses and credits achieved by student in the host university to the education system of the home university. This agreement could overcome the lingual issue as well.</p> <p>ECTS enables student to mapping and transferring the credits that achieved in one university to other universities. However, matching the competency is challenging.</p>
Technical interoperability / Technical enablers	<p>Lack of use of EMREX as an EU-wide mapping tool (E.5);</p> <p>Lack of connection between local systems to the European OOP infrastructure (incl. KLIPS, StudieLink, and TUD IS) (E.6);</p> <p>Absence of national eID (Lack of unique identification of subjects) (E.16);</p> <p>Cross-border use of eID not implemented across all Member States (E.7);</p>	<p>The mapping tool, EMREX has to be connected as a module to the HEIs in all Member States to be used in a cross-border manner. Currently, HEIs in just six Member States have the possibility to connect.</p> <p>National information systems are fundamental base for decentralised cross-border OOP implementation in this scenario. Therefore, the information systems have to connect with existing modules that enable cross-border operation and data exchange (e.g. with mapping tools such as EMREX). Both KLIPS and TUD's Information Systems in this scenario should be upgrade to be able to exchange data via EMREX.</p> <p>Unique identification for subjects such as students is needed to facilitate efficient identification and authentication. While national eIDs are implemented in most of the Member States, national eID Schemes are still under development in countries such as Bulgaria, Cyprus, Czech republic, France, Greece, Italy, Poland, and</p>

¹⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0910&from=EN>

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
	<p>Secure transport protocol not established in a cross-border matter (E.4);</p> <p>ESC is not yet widely implemented (E.10);</p> <p>Limitation of eID for including educational information (E.14)</p>	<p>Romania. According to eIDAS (EU regulation 910-2014), cross-border recognition of national eIDs will be mandatory from October 2018.</p> <p>ESC supports the host university to check student's education status and ease student identification as well as transfer of students report. However, it is not implemented in all Member States. Since the eID with eIDAS will become mandatory for identification and authentication, the role of the ESC remains unclear and it will be necessary to reflect clearly what eID will be surviving and will be accepted by the users. Hence, eID could well be enough for identification and authentication of students as well as verification of their educational status instead of bothering the users with yet another card (with still unclear digital functionality).</p>
Trust and Transparency	<p>Lack of clear concept and solution for citizens to provide consent for data sharing (E.11);</p> <p>Missing transparency about access and use of students' data by data consumer (E.8)</p>	<p>The student as a data subject has to provide consent to the host university for data sharing; however, Lisa as an international student is not able currently to provide data sharing consent in StudieLink.</p> <p>Transparency is an essential issue in order to accept a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. At the end, Lisa should be able to check who has used her personal and educational data for what purpose and when, which is not possible now.</p>
Data quality	Lack of clear concept for the (manual) approval of automatically mapped data (E.9)	Manual approval of mapped data should be facilitated by an authorised position in each data environment. This will lead to higher trust and acceptance of the service by citizens.

3.1.3. Benefits and wider impact of the future scenario on cross-border OOP in the education domain

Students

This scenario reduces administrative burdens for Lisa. She can easily apply for classes in the Delft University of Technology without the necessity to provide any further data or translating any of her documents. Furthermore, after finishing the courses, her transcript of records will be mapped to the German education system and saved automatically in KLIPS. She has access to complete, reliable, and up-to-date information regarding the Dutch education system and different courses and modules in the Delft University of Technology. Moreover, students in this scenario are served with a more user-friendly and more intuitive solution, which will lead to better user experience and a higher level of satisfaction from public sector services.

This scenario simplifies the application process for Lisa by providing the service with no need for repeatedly entering data that is already in the hands of HEIs. Moreover, Lisa is able to access and use this service anytime and anywhere. This will lead to a higher level of satisfaction and easier mobility for Lisa in Europe, which is in accordance with the Digital Single Market Strategy and the EIF. In addition, in this scenario, Lisa will save time and costs as the whole process is fulfilled online and mostly automatic.

HEIs

In this scenario both UKL and TUD will receive authorised and quality-assured data directly from German and Dutch HEIs' information systems. TUD receives Lisa's educational data already mapped into the Dutch education system. UKL receives Lisa's transcript of records in the German format from TUD via EMREX. This leads to the reduction of fraud and corruption on educational data in both countries and on European level overall. Furthermore, HEIs on both sides can tremendously simplify administrative procedures for more efficient process execution. In this scenario, the transmission of data is mostly automatic, therefore UKL and TUD do not need to provide any paper based documents for Lisa and will not receive any paper documents from each other. All this will lower the probability of fraud and will increase the level of trust and participation in public sector services.

HEI employees

Employees on both sides do not need to translate the receiving data into their local language. Using semantic standards and content mapping of educational resources over the mapping tool, the information exchanged is interoperable and in digital format, that only requires the 'approval' of the employee on each side to integrate data exchanged. Therefore, employees of both sides are going to have more time focusing on increasing the quality of their services.

Administrative offices

In this scenario, the information systems from different HEIs are enabling the access and receipt of data from HEIs across border. As a result, the cross-border interaction is boosting the data exchange and information sharing between the authorities, which in turn leads to administrative burden reduction as well as to higher data quality.

Economy and Society

Simplifying the process of applying for a study abroad will likely contribute to more student mobility and hence to achieving the objectives of the digital single market in the education domain more easily.

Since this scenario simplifies the process of student exchange, lower costs and burden reduction at HEIs will also lead to more effectiveness and efficiency in HEI management, in turn a) being able to focus more on quality of education with less overall administrative costs at the side of HEIs and b) enabling more students to study abroad.

3.2. Cross-border OOP scenario in 'Social protection'

3.2.1. Generic scenario for registering a new-born abroad

The scenario is depicted as a rich picture in Figure 6 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

A pregnant woman from country A travels for a certain period of time to country B. During their stay, the woman delivers her baby in a hospital (1). Still in country B, the parents of the new-born want to receive a birth certificate as well as register their child in their home country. The hospital reports the birth to the local civil registry office in country B (2). The parents do not need to go to the local civil registry, as they can register online (3) using their national digital ID to verify their identification. By this registration, parents provide consent to the local civil registry office to retrieve their relevant personal data from their home country. The local civil registry requests and retrieves the relevant personal data of the parents from country A (3.1). A clerk from the local civil registry office that is authenticated via national digital ID, reviews the parents' personal data manually to ensure the data quality. The processed data is dispatched to the ministry of interior in the host country and stored in the birth data registry of country B (3.2). Subsequently, the local civil registry office of country B issues a birth certificate for the new-born and sends it to the parents' temporary address in country B (4). The ministry of interior in the host country transfers the relevant personal data about the new-born and its parents to the ministry of interior in home country. Before the automatic integration of the received data into the personal data registry and the birth data registry in country A (5), a responsible clerk, authenticated through the national digital ID, checks and verifies the received data.

The transmission of the personal data between the public authorities of both countries is enabled through a secure transport protocol, which facilitates the secure data exchange. The standards for citizen registration and personal data as well as semantic mapping and common vocabulary at EU level pave the way for cross-border registries' interconnection and transmission of the personal data between two countries with different languages. This way, the data can be automatically stored in the registries in country A.

For the mapping of the birth certificate, semantic standards and vocabularies exist on European level, which are implemented in the European-wide mapping and translation service.

The digital transmission of the new-born's data between the two ministries of the interior and local civil registry is based on the strategies for the Digital Single Market and the legislations such as eIDAS and GDPR that provide the legal basis for this seamless OOP implementation.

The once-only principle is realised by the parents needing to register in the Civil Registry Office only once to identify them digitally. After that and provided that the parents give their consent for data sharing among the relevant involved actors, these public authorities (actors) exchange the data about the new-born and the parents without asking parents to provide any additional personal data evidences that the public agencies already possess.

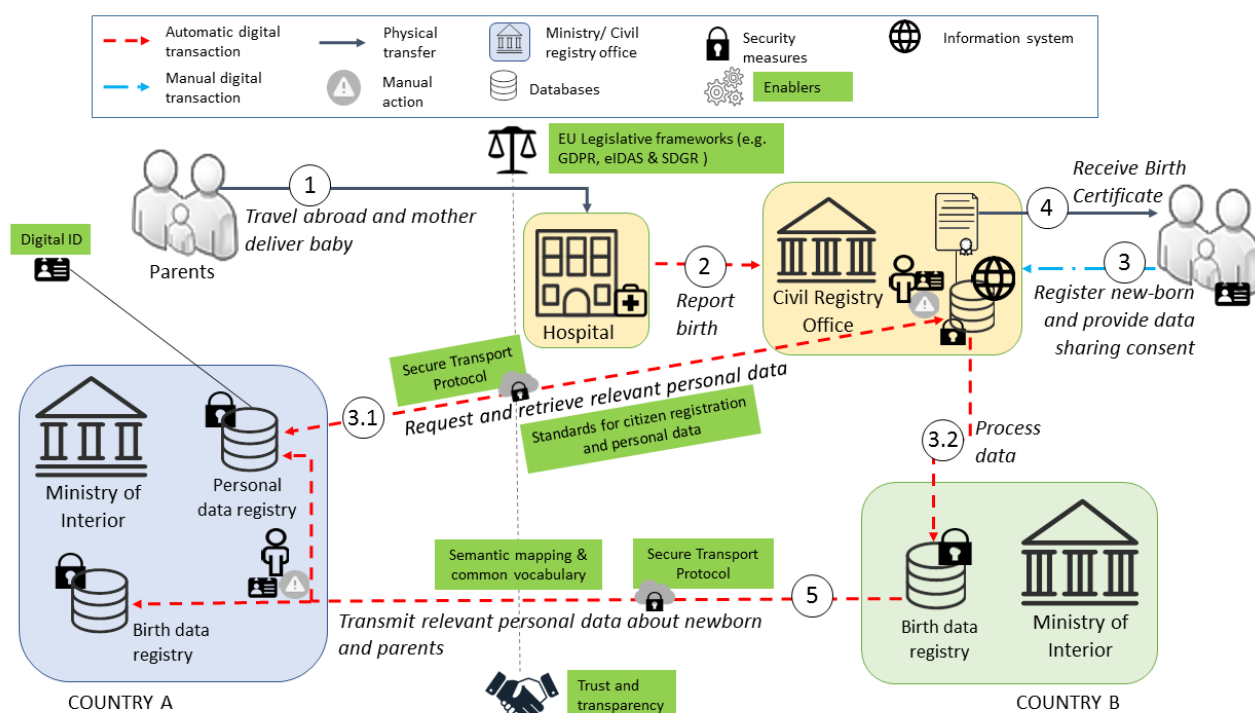


Figure 6: Generic scenario in the social protection domain – registering a new-born abroad

The corresponding poster, which was used in the world café sessions during the workshops, is shown in Figure 7. It should be noted that the poster still embarks on the generic scenario, while some contextualisation has been applied to the specific geographical aspects of a workshop (e.g. the foreign country being Austria that already implemented the birth registration and child benefit process through the once only case 'ALF' – see D 1.2 and online knowledge base for details)

Table 6 demonstrates the needed enablers for the scenario described above, grouped by the types of key enablers as identified in D 1.1 and D 1.2.

Future cross-border scenario in SOCIAL PROTECTION

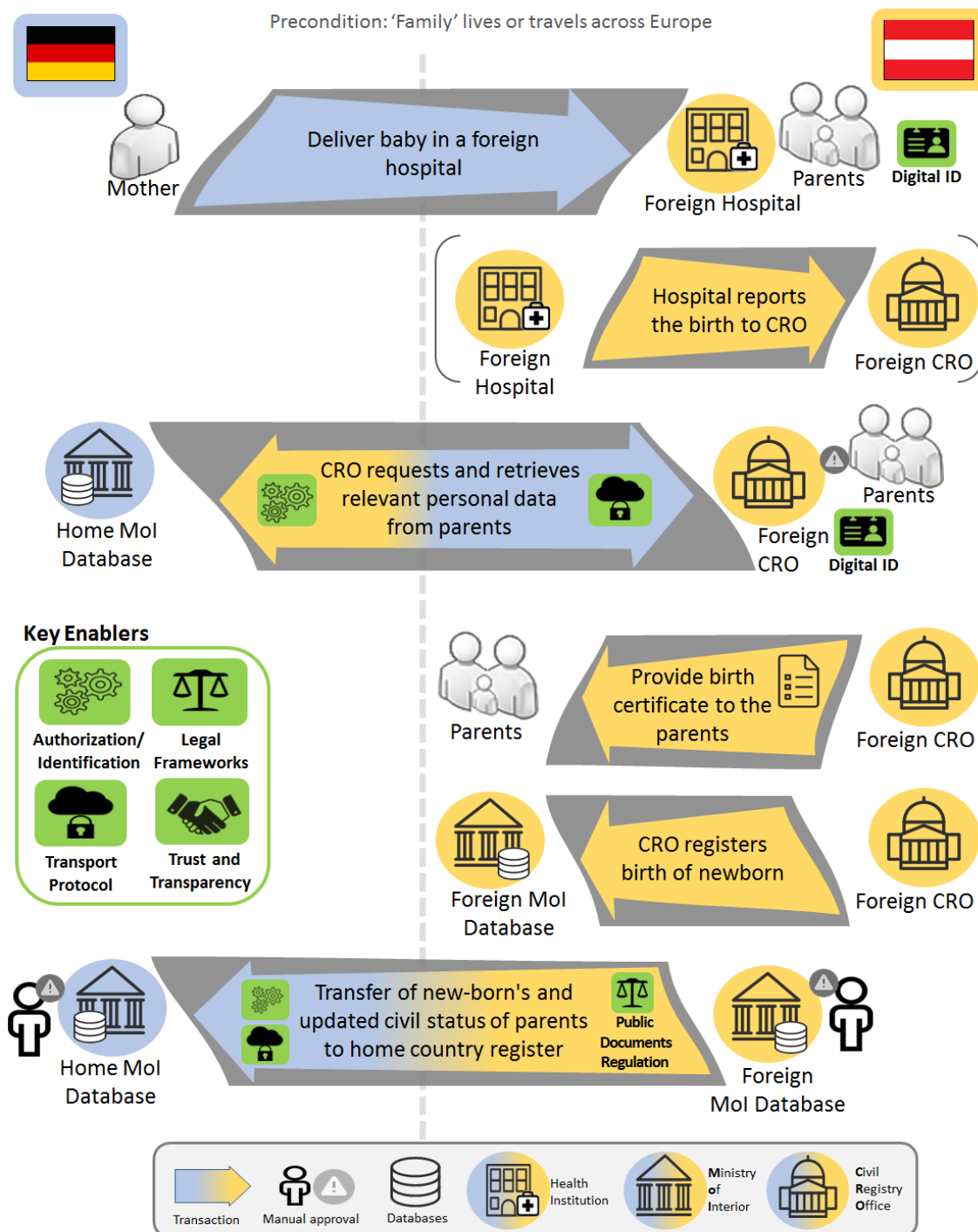


Figure 7: Poster for the generic scenario on registering a new-born abroad

Table 6: Needed enablers for implementing the future cross-border OOP scenario in the social protection domain

Type of enabler	Description of the needed enabler	Role of the enabler(s) in the scenario
Political commitment	Political commitment and strategies both on national and European level is essential to outline strategic importance of the OOP implementation and consequently facilitate funding for the implementation of the social protection domain scenario in Europe as well as the development of needed building blocks on national level; Political commitment both on national and European level is needed to promote data sharing in-between the public sector to achieve administrative burden reduction.	By the implementation of this scenario, parents can easily register their child abroad without providing any extra data as all necessary data is accessible for the ministries of interior. Sufficient political commitments are an essential requirement for the implementation of the scenario. They should highlight the importance of the OOP implementation in the social protection area as well as promoting government to facilitate needed enablers.
Legal interoperability	Strategies and legal frameworks on European level to provide the legal basis for digital transmission of data involving registries in different countries.	Legislations such as GDPR provide the legal grounds for data protection in general and specifically the new-born's personal data protection. Sufficient legislation both on national and European level is needed to guaranty appropriate data protection on different levels.
Semantic interoperability such as standards taxonomies, common terminology, etc.	Common standards for data exchange on European level ensuring interoperability between the ministries of interior and increase quality of data between them.	Common standards should be embedded to support effective data exchange. EU-wide data exchange could be challenging due to the different languages across Europe.
Technical interoperability / Technical enablers such as secure networks and infrastructure	Secure transport protocol on the European level facilitates secure data exchange between the ministries. Mapping tool and e-translation.	In this scenario, the parents' and the new-born's data is shared between ministries via secure data exchange enablers on the European level. Secure transport protocols enable secure transmission of the new-born's data between the ministries. A mapping tool is needed to map the knowledge of both national vocabularies and that knows the translation rules for the birth certificate.
Trust and Transparency	Consent of data subject for the data sharing; Transparency for the data subject about access and use of data by a data consumer	Transparency is an essential requirement for service users to trust and accept the service. Parents need to provide their consent for the sharing of their personal and the new-born's personal data between public agencies across borders.
Data quality	Manual approval of automatically mapped data	Data controllers have to check the mapped data in order to assure the quality of mapped data.

3.2.2. Future real case scenario for registering a new-born abroad

The real case scenario embarks on the Austrian child registration and family allowance ALF (all documented in deliverable D 1.2 and in the online knowledge base). The scenario is depicted as a rich picture in Figure 8 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

Julia, who is pregnant, is staying with her husband Thomas for a certain period in Germany. Julia and Thomas are from Austria. During this stay, the Julia delivers her baby in a hospital (1). Still in Germany, the parents of the new-born want to register their child in Austria. The hospital reports the birth to the local civil registry office in Germany (2). The parents do not need to go to the local civil registry, as they can register online (3) using their eID to proof their identity. The local civil registry retrieves the relevant personal data from the parents through the eID (4). The office registers the birth of the new-born in the foreign citizen registry, issues the birth certificate and delivers this to the parents (5). In order to transmit the citizen registry data into the home country's registry, an employee of the ministry of the interior in Germany triggers the transmission of the registry and birth data to the corresponding ministry of the interior in Austria (6). Using multilingual standard forms and a secure e-delivery mechanism, the data can be automatically stored in the central citizen register and central civil register in Austria – without any need for manual actions.

If the ministry of interior in Austria wants to clarify with its counterpart in Germany about the authenticity of the birth certificate, they can use the Internal Market Information System (IMI) (7). The IMI-System is an online multilingual tool that helps authorities to cooperate across border. It is accessible over the internet and at the same time it is secure and data protection friendly. The IMI has a multilingual directory of authorities, which works with pre-translated questions and answers.

Optional: This procedure can continue with applying for family allowance/child benefit. In this case, the central citizen registry or the civil status registry could automatically send a notification to the social security agency and to the ministry of interior in Austria to inform them about an entry of a new-born Austrian citizen whose parents might be entitled to receive child benefit.

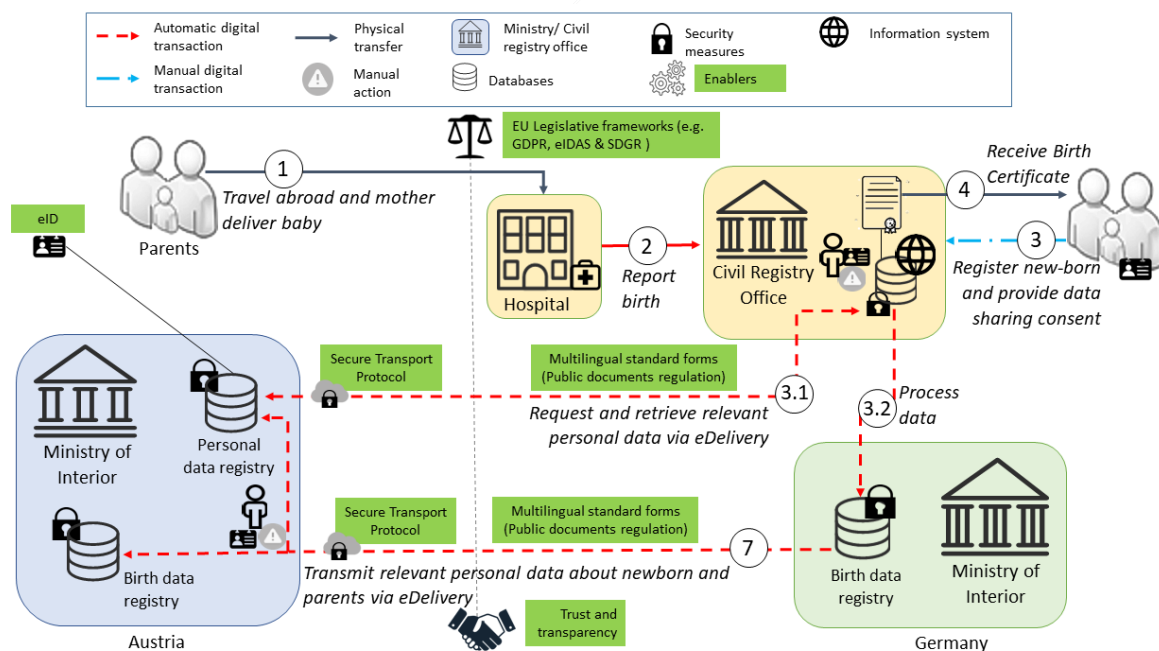


Figure 8: Real case scenario in the social protection domain – registering a new-born abroad

Table 7 summarises existing enablers to facilitate the future cross-border OOP scenario. Since not all enablers are in place, Table 8 lists several challenges for the implementation of the OOP in this future scenario. The number

codes along the challenges (e.g. SP.1, SP.2, where SP stands for 'social protection domain') provide a unique identification of the challenges to ensure provenance in the subsequent analysis of the challenges and barriers as carried out in chapter 4 and in the subsequent task of roadmapping (upcoming deliverable D 4.2).

Table 7: Existing enablers to support the scenario 'registering a new-born abroad'

Type of enabler	Name of enabler	Contribution to the scenario
Political commitment	<ul style="list-style-type: none"> Digital Single Market Strategy; eGovernment action plan 2016-2020 	These political strategies and plans emphasise the importance of OOP and encouraged Member States government to support the OOP implementation.
Legal interoperability	<ul style="list-style-type: none"> General Data Protection Regulation (GDPR); Digital Single Market Regulation 	The GDPR provides an EU wide regulation that ensures the same level of data protection between Austria and Germany. The parents have not to be afraid that her data has a different protection level in another country.
Technical interoperability / Technical enablers	<ul style="list-style-type: none"> Multilingual standard forms (public documents regulation) National digital signatures from Austria; eDelivery; Internal Market Information System (IMI)¹⁹ 	<p>Multilingual standard forms facilitate digital data transmission. Moreover, it overcomes language issue.</p> <p>In case of uncertainties, the Austrian Ministry of interior can use the IMI to contact their counterpart in Germany in their own language. The Ministry in Germany can answer in own language again.</p> <p>The eDelivery helps public administrations to exchange electronic data and documents with other public administrations in an interoperable, secure, reliable and trusted way.</p> <p>The national digital signatures from Austria, such as mobile phone signature and citizenship card signature will be used to identify online at the Central Civil Registry Office in Germany.</p>

Table 8: Challenges for OOP implementations in the social protection domain

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
Political commitment	<p>Lack of sufficient political commitment on national level in both countries (SP.5);</p> <p>Limitation on possibility of birth certificate issuance in different languages (SP.11)</p>	<p>While there are many EU-wide and some national political commitments that outline the importance of the OOP implementation, lack of enough political commitment on national and local levels could threat seamless implementation of this scenario.</p> <p>The Birth certificate is issued in the official language of the host country. It does not prevent implementation of the scenario; however, it could lead to some difficulties for parents as well as new-born for using the certificate later in the home country.</p>
Legal interoperability	<p>Lack of national regulation to assure secure and transparent data exchange (SP.1);</p> <p>Lack of EU-wide standards on required data for issuing birth certificate (SP.9);</p>	<p>There are varieties of regulation on European level to support implementation of this scenario. However, lack of legal support on national level could be considered as a barrier in this scenario.</p> <p>EU-wide standard according to required data for issuing the birth certificate could enhance the OOP implementation in this scenario. As mentioned in the scenario, multilingual standard</p>

¹⁹ http://ec.europa.eu/internal_market/imi-net/index_en.htm

	Diverse legal settings on birth registration procedure in different countries (SP.10); Uncertainty of legal requirements for cross-border scenario (SP.12)	forms considered for data exchange. Consequently, standard forms could be developed based on the fixed set of required data. Different legislations in Member States could lead to uncertainty about the necessary steps in this scenario. For instance, reporting the birth in a foreign country to the country of residence is necessary according to some countries' legislation and unnecessary in some other.
Semantic interoperability	Lack of EU-wide common semantic standards (SP.6)	Secure exchange of information is one of the fundamental requirement for the implementation of the OOP. Lack of common standard and framework for secure exchange of electronic information has been identified as a critical gap in this domain.
Technical interoperability / Technical enablers	Lack of EU-wide secure transport protocols (SP.13)	eDelivery exists as a EU building block to facilitate secure data transaction in cross border as well as cross-domain matters; however, it has to be implemented in the this area.
Trust and Transparency	Lack of clear definition and solution for parent's consent for data sharing (SP.2); Non-transparent access and use of personal data (SP.7)	Parent's (data subject) consent is necessary for data sharing on both national and EU level. However, clear definition is not exist on EU level and current infrastructures do not facilitate it. Transparency is an essential requirement for acceptance of a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. In this scenario, parents should be able to see which authorities (especially when personal data is stored cross-border) have possibility to see their (parents and new-born) personal data and who, where, and why used their personal data. However, current information systems do not facilitate it.
Data quality	Lack of common understanding as well as missing solution for the (manual) approval of automatically mapped data (SP.8)	An authorised person in both countries should facilitate manual approval of (automatic) mapped data. This will lead to higher trust in and acceptance of the service by citizens.
Motivation	Not comprehensive coverage of related services in this domain (SP.4); Offering service for non-popular situation (SP.3)	This scenario just emphasis on the birth certificate issuance. Further development of the scenario to including extra procedures such as automatic allowance of child benefit from the home country or payment in the hospital could further motivation citizens. Delivering baby in the foreign country could be considered as a non-popular occasion.

3.2.3. Benefits and wider impact of the future scenario on cross-border OOP in the social protection domain

Parents

The procedures are simplified, less cumbersome and more convenient, since the civil registry office in Germany forwards the parents' and child's data to the ministry of interior in Germany, who in turn delivers the new / updated data to the Austrian civil and citizen registries. Parents have much less administrative burden, since

1. they need not to go to the civil registries in the host and in the home countries,
2. they do not need to provide any relevant evidence documents as needed data is retrieved across borders from the authentic sources (as they gave consent for this data sharing), and
3. they can do the registration (and potentially automatically triggering the child benefit) procedure online in an easy way using their eID.

Ministry of interior in Germany and Austria

The ministry of the interior in Austria does not need to perform any actions. Furthermore, in case of ambiguities the ministries have the option for further questions in their own language using IMI. Consequently, legal obligations can be fulfilled faster through sharing and re-using of data. Therefore, governments receive better quality of data. Efficiency and effectiveness of public administration can be increased through co-creation and collaboration between administrations by re-using data already in their hands. The ministry of interior in Austria receives authorised data, which leads to reduction of fraud and corruption.

Economy and Society

Parents can travel abroad with less worries of cumbersome registration procedures in the host and in the home country, with higher satisfaction about effective and simple procedures on birth registration (and subsequent child benefit allowance). Due to the automated data exchange and the translation into the local language, the data has a better quality and is more reliable. In addition, burden reduction may free up resources to be dedicated to more cumbersome tasks at the ministries.

3.3. Cross-border OOP scenario in 'Taxation'

3.3.1. Generic scenario for cross-border double taxation of income

Before describing the generic scenario, it is important to give some background about the current situation of cross-border taxation in the EU. Currently, there are no EU-wide rules that regulate clearly how EU nationals who live, work or spend time outside their home countries are to be taxed on their income. To determine where a European should pay his/her taxes, the tax residence of the person is to be determined (usually the country where that person spends more than 6 months a year). However, each country has its own definition of tax residence, e.g. depending on overall family, income, capital, and ownership circumstances. The challenge of individuals working in two different EU member states for a given time in the year is that a country taxes a resident of that country on his/her income from all sources – domestic or foreign – whereas non-residents are taxed on their income arising in that country.²⁰ Thus, individuals face the risk that income is taxed twice if two countries have the right to tax a person's income. To overcome these tax-related issues, in September 2017, a new EU agenda was launched to ensure that the digital economy is taxed in a fair and growth-friendly way.²¹ In the relevant Communication, the EC sets out the challenges currently faced by MSs and outlines possible solutions to be explored. Although this communication refers only to business activities of the digital economy that are based on intangible assets and data, it is nonetheless a first step towards a fundamental reform of international tax rules.

Given above challenges of double-taxation of citizens, the scenario for omitting double taxation through OOP services is depicted as a rich picture in Figure 9 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

Andreas comes from country A where he was born, raised, and became occupationally active before deciding to take advantage of a good work opportunity in country B. According to the national legislation of countries A and B and to the bilateral Double Tax Agreement among these countries, Andreas can be considered a tax resident of country A. Therefore, he has to pay income tax in both countries, i.e. pay tax to country A on his worldwide income and tax to country B only on the income earned there. However, Andreas is entitled to get a refund from country A for the double tax paid.

The scenario commences when Andreas starts working for the new employer in country B (1). The new employer provides the employment contract to Andreas (2), which Andreas submits to the ministry of finance of country A attached to an online application for certifying tax residency in country A according to the DTA provisions (3). Andreas completes this online using his eID. An officer at the ministry of finance considers Andreas' application in relation to legislation, the DTA in place, the data already stored for Andreas' financial and other circumstances, and certifies that Andreas is a tax resident of country A. This decision is communicated both to Andreas and to the ministry of finance of country B (4). At the same time, the officer sends Andreas' personal data to the ministry of finance of country B (4.1).

As soon as the fiscal year ends, each employer provides employees' salary data to the respective ministry of finance (5). As Andreas started working abroad in the middle of the fiscal year, two employers in two different countries are involved. Andreas' employer in country A provides relevant data to the ministry in country A, and Andreas' employer in country B provides relevant data to the ministry in country B. The ministry of finance in country B calculates Andreas' tax based only on income earned in country B (5.1). It then notifies Andreas on the income tax (5.2) and Andreas verifies it using his eID from his home country (6). At the same time, the ministry of finance in country B communicates Andreas' tax on income earned in country B to the ministry of finance of country A, where Andreas' tax residency is established (6.1). The ministry of finance in country A integrates all available data (i.e. country A employers' data, data sent by the ministry of country B, and other sources) (7) and issues Andreas' annual tax declaration in a pre-filled format for Andreas to check and accept (7.1, 8). Since the ministry in country A already knows Andreas' tax on income earned in country B, the overall tax calculated already includes the respective tax deducted. Using his eID, Andreas settles his tax declaration in country A fully online.

²⁰ Cf. https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/index_en.htm

²¹ Cf. https://ec.europa.eu/taxation_customs/business/company-tax/fair-taxation-digital-economy_en

For the mapping of data on income and tax, semantic standards and vocabularies at European level must be developed to facilitate implementation of European-wide mappings and translation services.



Table 9 demonstrates the needed enablers for the scenario described above, grouped by the types of key enablers as identified in D 1.1 and D 1.2.



Future cross-border scenario in TAXATION

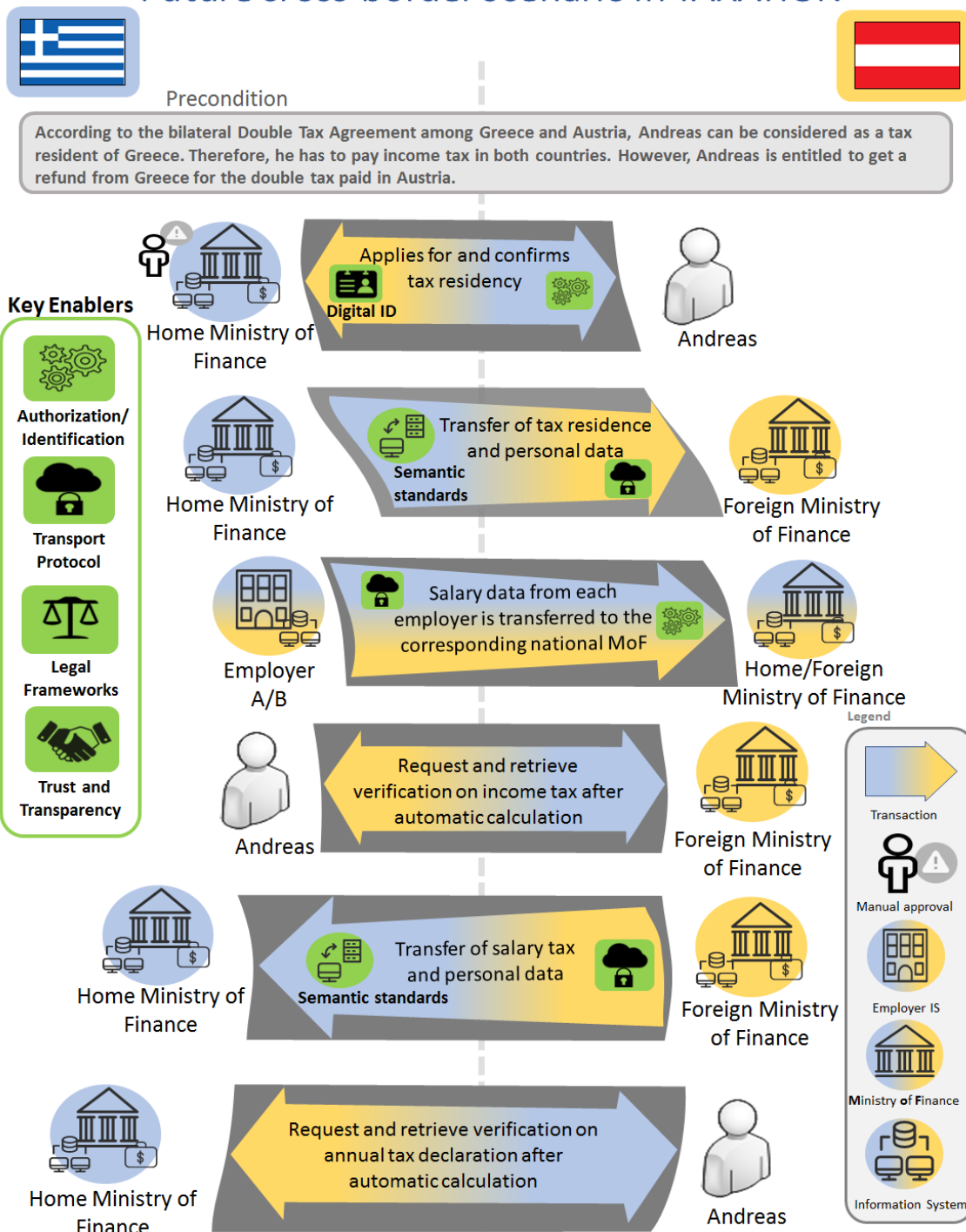


Figure 10: Poster for the generic scenario on double taxation of income

Table 9: Needed enablers for implementing the future cross-border OOP scenario in the taxation domain

Type of enabler	Description of the needed enabler	Role of the enabler(s) in the scenario
Political commitment	Political commitment and strategies both on national and European level to outline strategic importance of OOP implementation and facilitate funding for implementation of taxation domain scenario in Europe, development of building blocks on national level, encouraging work mobility, and promote data sharing in-between the public sector and in-between the public and the private sector in order to achieve administrative burden reduction	In order to implement this scenario, it is necessary to have political commitments on European and on national level in place for data sharing in taxation domain. Political commitments to stress the importance of the relevant building blocks at both national and European level are necessary.
Legal interoperability	DTAs among all MS or alternatively an EU-wide regulation on double taxation are needed in order to provide the legal basis for clarifying double taxation issues; Legal frameworks on the European level to provide the legal basis for secure digital transmission of personal and taxation data between Ministries and registries in different countries; Legal frameworks on national level to provide the legal basis for secure digital transmission of personal and taxation data between employers and Ministries within a MS; GDPR provides legal framework for assuring data protection on personal data all over Europe and legal ground for privacy assurance. This is particularly critical for the “sensitive” area of income and tax data; eIDAS as regulation on European level facilitates electronic identification and trust for electronic transactions; Digital Single Market regulation needs to include taxation of natural persons.	As Andreas’ personal and taxation data is being transmitted between two countries, legal frameworks are necessary to make this transmissions secure. In this scenario, Andreas uses his digital ID for electronic identification and authentication. Therefore, legislation to support this online cross-border procedure is necessary. Employees like Andreas will accept the OOP services only if they are sure about personal data protection.
Semantic interoperability such as standards taxonomies, common terminology, etc.	Code lists of certain objects (e.g. ministries of finance and other tax authorities) are necessary; Code lists should provide multilingual content and terminology (e.g. name of ministry); Common standards for data exchange on European level ensuring interoperability between public authorities (i.e. ministries of finance for this scenario) and high quality of data between them; Catalogues of services such as available taxation portals and other information systems at both national and European level among which data is to be exchanged.	The code lists for universal data exchange facilitate transmission of data in this scenario. As the two ministries in this scenario are in different countries with different languages, code lists should provide multilingual content. The Common standards should be embedded in information systems in this scenario to make stored data in them exchangeable.

Technical interoperability / Technical enablers such as secure networks and infrastructure	Secure transport protocol and technical standards on national and European level to facilitate secure digital transactions and transmission of data between public and private organisations and between different information systems; Secure information systems on national and European level to ensure the implementation of GDPR; eID and trust services, which provide secure and trustworthy electronic identification and authentication.	Secure transport protocols enable Andreas' secure authentication and facilitate secure transmission of his data between Ministries and between employers and Ministries. Secure national information systems are important infrastructure for implementation of the scenario. Andreas uses his national digital ID in this scenario for online identification and authentication.
Trust and Transparency	Non repudiation e.g. eSignature; Consent of the data subject for the data sharing; Transparency about access and use of data by data consumers; availability of this information to the data subject.	Andreas provides consent for sharing his personal and employment data between Ministries and between employers and Ministries.

3.3.2. Future real case scenario for cross-border double taxation of income

The real case scenario embarks on the Hellenic Online Tax System (TAXIS) as well as on the Austrian service FinanzOnline (FON) (both described in D 1.2 and in the online knowledge base). Furthermore, the Greek Interoperability Centre and the Greek Public Key Infrastructure are key enablers used in the scenario.

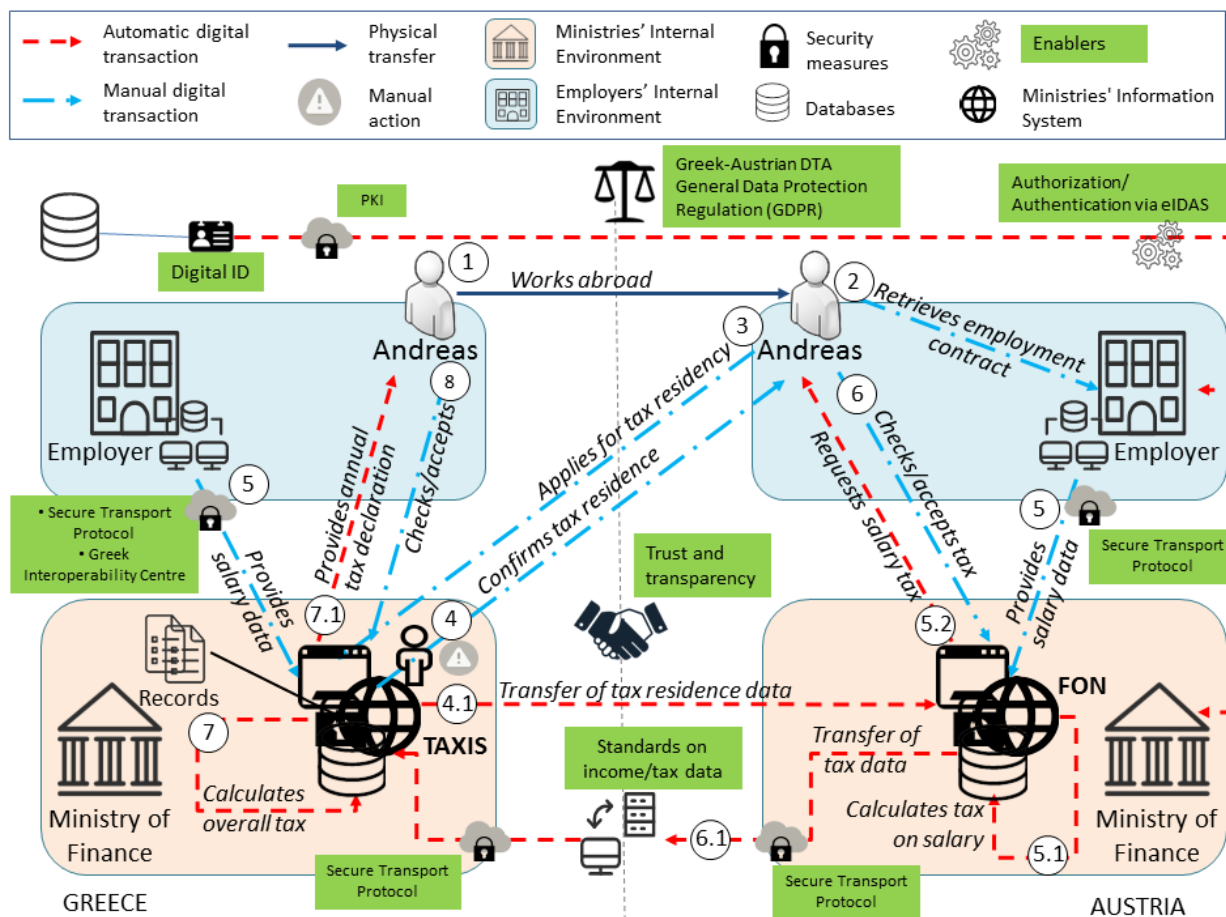


Figure 11: Real case scenario in the taxation domain – cross-border double taxation of income

The scenario is depicted as a rich picture in Figure 11 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

Andreas comes from Greece where he was born, raised and became occupationally active before deciding to take advantage of a good work opportunity in Austria. According to the national legislation of Greece and Austria and to the bilateral Double Tax Agreement among these countries (Greek-Austrian DTA, 2008), Andreas can be considered a tax resident of Greece, and he has to pay income tax in both countries, i.e. pay tax to Greece on his worldwide income and tax to Austria only on the income earned there. However, Andreas is entitled to get a refund from Greece for the double tax paid.

The scenario commences when Andreas starts working for the new employer in Austria (1). Andreas uses eID to log in to the employer's information system and retrieve the employment contract (2). Andreas then submits the contract to the Greek ministry of finance attached to an online application for certifying tax residency in Greece according to the provisions of the Austrian-Greek DTA (3). To do this Andreas logs in to the Hellenic Online Tax System (TAXIS) using eID. An officer at the Greek ministry of finance considers Andreas' application in relation to legislation, the Greek-Austrian DTA in place, and the data already stored for Andreas' financial and other circumstances and certifies that Andreas is a tax resident of Greece. This decision is communicated both to Andreas

and to the Austrian ministry of finance (4). At the same time, the officer sends Andreas' personal data to the Austrian ministry of finance.

As soon as the fiscal year ends, each employer provides employees' salary data to the respective ministry of finance (5). As Andreas started working abroad in the middle of the fiscal year, two employers in two different countries are involved. Andreas' employer in Greece provides relevant salary data to the ministry in Greece, and Andreas' employer in Austria provides relevant salary data to the ministry in Austria. The Austrian ministry of finance calculates Andreas' tax based only on income earned in Austria (5.1). It then notifies Andreas on the income tax through the FinanzOnline service (FON) which Andreas needs to check and accept using his eID from his home country (6). At the same time, the Austrian ministry of finance communicates Andreas' tax on income earned in Austria to the Greek ministry of finance, where Andreas' tax residency is established (6.1). The Greek ministry of finance integrates all available data (i.e. Greek employers' data, data sent by the Austrian ministry and other sources) (7) and issues Andreas' annual tax declaration in a pre-filled format in TAXIS, which Andreas needs to check and accept (7.1, 8). Since Andreas' tax on income earned in Austria was previously communicated to the Greek ministry, the overall tax calculated for Andreas in Greece includes the respective tax deduction. Using his eID, Andreas settles his tax declaration in TAXIS fully online.

The digital data transmission between the employers and the ministries is enabled via a secure transport protocol using an e-delivery service. Two enabling infrastructures facilitate this transmission in Greece: the Greek Interoperability Centre and the Greek Public Key Infrastructure (PKI).

The digital data transmission between the two ministries is done via secure transport protocol using an e-delivery service. The digital transmission of Andreas' personal and taxation data between the two ministries is based on the strategies for the legal frameworks (including GDPR and eIDAS) that provide the legal basis for this seamless OOP implementation.

For the mapping of data on income and tax, semantic standards and vocabularies on European level must be developed to facilitate implementation of European-wide mappings and translation services.

Table 10 summarises existing enablers to facilitate the future cross-border OOP scenario. Since not all enablers are in place, Table 11 lists several challenges for the implementation of the OOP in this future scenario. The number codes along the challenges (e.g. T.1, T.15, where T stands for 'taxation domain') provide a unique identification of the challenges to ensure provenance in the subsequent analysis of the challenges and barriers as carried out in chapter 4 and in the subsequent task of roadmapping (upcoming deliverable D 4.2)

Table 10: Existing enablers to support the scenario - 'cross-border double taxation of income'

Type of enabler	Name of enabler	Contribution to the scenario
Political commitment	<ul style="list-style-type: none"> eGovernment action plan 2016-2020; ISA² programme. 	These political strategies and programmes emphasise the importance of OOP and encourage Member States to support the OOP implementation.
Legal interoperability	<ul style="list-style-type: none"> General Data Protection Regulation (GDPR); eIDAS regulation; Convention between the Hellenic Republic and the Republic of Austria for the avoidance of double taxation with respect to taxes on income and on capital (DTA)²²; 	<p>GDPR provides an EU wide regulation for personal data privacy across EU. Andreas can rest assured that his personal data is handled at the same protection level in both Greece and Austria.</p> <p>eIDAS facilitates secure and seamless electronic transactions within the European Union, thus Andreas can securely perform all needed actions online.</p> <p>The DTA between Greece and Austria ensures that Andreas' income will not be double-taxed.</p>
Technical interoperability / Technical enablers	<ul style="list-style-type: none"> Hellenic Online Tax System (TAXIS); Austrian FinanzOnline service (FON); Greek public key infrastructure (PKI); Greek Interoperability Centre; Authentication services / national eIDs from Greece and Austria; eIDAS; eDelivery; European Interoperability Framework (EIF). 	<p>TAXIS and FON are fully operational e-tax systems in Greece and Austria respectively.</p> <p>TAXIS is already connected to public sector employers in Greece and obtains salary data for taxation purposes.</p> <p>The Greek enablers PKI and Interoperability Centre secure data transfer.</p> <p>eID is not yet widely implemented in Greece and Austria. There is an authentication service for taxpayers to access TAXIS and FON securely, and additionally, FON can be accessed with citizen card signature or a mobile phone signature.</p> <p>National eID in Greece and Austria are important in order to facilitate online authentication and identification of Andreas and other persons who participate in this scenario. Moreover, eIDAS supports cross-border use of national eID in both sides.</p>

Table 11: Challenges for the OOP implementation in the taxation domain

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
Political commitment	Lack of sufficient political commitment on national level in Greece and Austria (T.3)	While there are many EU-wide and some national political commitments with emphasis on the importance of the OOP, lack of sufficient political commitment on national and local level could threaten the seamless implementation of the OOP in this scenario.

²² http://www.gsis.gr/gsis/info/gsis_site/ddos/

Legal interoperability	<p>Lack of EU-wide regulation on double taxation (T.1);</p> <p>Lack of regulation on secure data exchange between public and private entities (T.2)</p>	<p>There are many bilateral Double Tax Agreements among Member States that support the implementation of this scenario; however, this needs to be strengthened by EU-wide legislation.</p> <p>Lack of appropriate regulation to facilitate secure data exchange on national level is observed not only between public administrations but also between public and private organisations. A legal framework to clarify data exchange in each OOP scenario is needed.</p>
Semantic interoperability	<p>Need of the code lists of necessary objects in taxation domain (T.4);</p> <p>Lack of EU-wide common standards for taxation data exchange (T.5);</p> <p>Lack of semantic enabler to map tax report from foreign country (T.13);</p> <p>Lack of EU-wide unique identification for companies and taxpayers (T.14)</p>	<p>A multilingual code list of objects in the taxation domain on European level is necessary in order to facilitate effective data exchange between different countries. For instance, Ministries would be easily identifiable by the unique code in the code lists. Moreover, unique identification code is needed for companies as well.</p> <p>The lack of common standard and framework for exchange of electronic taxation information on European level is a gap to reach the scenario in this domain.</p> <p>Citizen in this scenario receive tax reports from both home and foreign countries; however, sufficient semantic enabler is needed to make reports from foreign country understandable for citizen.</p>
Technical interoperability / Technical enablers	<p>Lack of connection between local systems (TAXIS, FON) to the European OOP infrastructure (T.7);</p> <p>Lack of secure transport protocols in communication (T.6);</p> <p>Absence of national eID in Greece (T.9);</p> <p>Missing of an eID enabler to connect national digital ID systems (T.8)</p>	<p>National information systems are fundamental base for decentralised cross-border OOP implementations. Therefore, both TAXIS and FON Information Systems should be upgraded to connect with existing modules that enable cross-border operation and data exchange (e.g. with mapping tools).</p> <p>The eDelivery has to be implemented in this area to facilitate secure data exchange that is fundamental base for the OOP implementation.</p> <p>National eID Schemes are still in developing phase in some Member States such as Bulgaria, Cyprus, Czech republic, France, Greece, Italy, Poland, and Romania.</p> <p>National eID should be in place in order to take advantage of the eIDAS regulation, according to which from 2018 cross-border recognition of eIDAS would be mandatory for all Member States.</p>
Trust and Transparency	<p>Need to implement the retrieval of consent from citizens to share their data (T.12);</p> <p>Lack of transparency about access and use of citizen data (T.10)</p>	<p>Data subject should be able to provide consent for data sharing. According to some national legislations data subject's consent is necessary in order to exchanging data. However, it is not facilitated by current infrastructures.</p> <p>Transparency is an essential issue in order to accept a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate data subject to check whom, when, and why access or use their data.</p>

Data quality	Lack of a clear concept and solution for the (manual) approval of automatically mapped data (T.11)	An authorised person in both countries should facilitate manual approval of (automatic) mapped data. This will lead to higher trust in and acceptance of the service by citizens.
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3.3.3. Benefits and wider impact of the future scenario on cross-border OOP in the taxation domain

Taxpayers

This scenario reduces different kinds of administrative burden for Andreas. Andreas can easily apply for a tax return online and does not have to report the results to the Austrian Ministry of Finance as they are submitted directly by the Greek Ministry of Finance. Due to the data exchange between employers and ministries in the individual countries, Andreas does not have to provide the tax authorities with income documents, but goes online and only checks and verifies the completed tax forms. Finally, Andreas needs not to provide proof of income earned and taxes paid in Austria to the Greek Ministry of Finance and apply for tax refund; this is automatically settled between the two ministries and double taxation is avoided completely.

This scenario simplified cross-border income tax settlement for Andreas by providing OOP services. This will lead to higher level of citizen satisfaction and easier labour mobility in Europe. In addition, in this scenario, Andreas will save time and cost as the whole process is online and mostly automatic.

Ministry of Finance / Tax authority

In this scenario, ministries of finance in both countries will automatically receive income data directly from employers. This will lead to reduction of errors in income tax declaration and consequently reduction of administrative burden, i.e. reduction of checks needed by ministry officials. Moreover, both ministries will receive authorised data of higher quality directly from each other. In specific, the Austrian Ministry will receive Andreas' personal data and tax residency information and the Greek ministry will receive the tax paid in Austria for income earned there. This will lead to reduction of fraud and corruption in public sector in both countries and even on European level.

Administrative burden reduction due to online income tax declaration is not included here as a benefit as this is already implemented in most EU countries. However, another benefit in this scenario is that many transactions become paperless (e.g. no tax residency application forms and certificate needed, no double tax application needed).

Ministry of Finance / Tax authority officer

TAXIS and FON will receive translated information. This means that ministries' officers do not need to map receiving data to German or Greek language and taxation system. Moreover, officers will receive information already in digital format. Thus, officers do not need to translate or digitise the information anymore, which is burden reduction. Therefore, officers at both sides are going to have more time focusing on increasing the quality of their services.

Employers

In this scenario, employers in both countries are digitally exchanging salary data with the respective ministries. This does not add burden to the employers as they are producing this data anyway and hand them over to their employees in paper format. There may be a learning curve when this data exchange is carried out for the first time across borders and digitally, but this approach is a direct, fast and secure way to provide payroll data to the ministries, ultimately leading to a reduction in administrative burdens, fraud and tax avoidance.

Economy and Society

Taxpayers will experience different kinds of administrative burden reduction in this scenario as explained previously. Moreover, taxpayers in this scenario use easier and more convenient services leading to higher level of satisfaction from the public sector service. Better services and lower level of fraud will increase level of trust and participation in public sector service.

This scenario makes the process of tax declaration and double taxation avoidance easier and with lower cost and burden for ministries as well. This could lead to enhanced labour mobility across Europe and hence to increased levels of European integration and increased satisfaction of European citizenship.

In general, an important impact of this scenario is easier and consequently higher mobility of professionals across Europe which will consequently bring economic growth and a more inclusive digital society. In addition, burden reduction could free more resources for the ministries, which can be channelled to enhanced public services or cost reduction.

3.4. Cross-border OOP scenario 'Moving'

3.4.1. Generic scenario for registering a car in another Member State

The scenario is depicted as a rich picture in Figure 12 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

Tanja moved from country A to country B for a new job opportunity, which she will pursue in the years to come (with no plans to stay permanently, hence no citizenship change). Before she registers her car, she has already registered herself as a foreign EU citizen through an online service. Since she moved her car, too, for which she has a valid car insurance from her home country that is accepted in the country B (this being a new regulation to simplify moving across Europe), she can register her car in her new country of residence.

For the vehicle registration, Tanja uses the vehicle registration service of the Single Digital Gateway (1). The single digital entry point provides her the needed information and forwards her to the registration portal of the local Vehicle Registration Authority (VRA) in country B (1.1).

Tanja uses her digital ID from her home country that is accepted in country B for the registration; in the first instance to verify her personal information and data about her car, and to give consent to retrieve the relevant data from her home country's data sources (2). The required data is then automatically transferred from the respective registries in country A to the VRA in country B, where the data is needed for registering Tanja's car in country B (2.1). The registration is accomplished with the use of multilingual standard forms, available in different EU languages. Tanja has to complete them with any missing data that could not be retrieved. Finally, she confirms the correctness by submitting the form (2.2). Relevant data includes the EU Certificate of Conformity, proof of insurance cover, proof of ownership, proof of roadworthiness (in accordance with EC 2009/40), and checking for potential outstanding vehicle car/ motor/ road tax payment.

After the local VRA of country B processed and accepted the registration (3), the confirmation certificate is issued (3.1) and the car tax is generated. Subsequently, Tanja receives a payment request (4). She goes to the local VRA portal and pays the fee for the registration via ePayment (4.1), enabled through the DIRECTIVE (EU) 2015/2366. Concurrently, she fills out a SEPA Direct Debit Scheme for the tax authority to collect the car tax going forward. The finalized documents as well as the general information on Tanja and her car are sent to the national VRA in country B (5) and stored in their registry (5.1). Finally, Tanja receives the registration confirmation certificate (6) and an invitation to come to the citizen service station of her new residence for picking up the new car plate and returning her 'old' plate. For this, Tanja uses the online portal of the citizen service station to agree on a suitable appointment. When showing up at the citizen service station and receiving her new plate in return of her old plate, the citizen service completes the process by marking the old plate as 'invalid' and updating the data in the local VRA (7.1). The local VRA in turn notifies the data sources in country A of the changes in the car registration using the digital single gateway (8).

After the registration procedure, Tanja has to return her old license plates to the VRA of country A. Because she had to physically move her car from country A to B, she had either to request temporary export plates at her past VRA or use her original plates.

For the seamless exchange of the different certificates, forms, and personal data between Member States, an EU-wide service maps the knowledge based on unified vocabularies and taxonomies. The services base on legal frameworks that support OOP implementations (e.g. eIDAS and SDGR). This way, data can be automatically shared between the data sources of the involved countries and registries. Exchange of data involved in this scenario is secured via a secure transport protocol (eDelivery service).

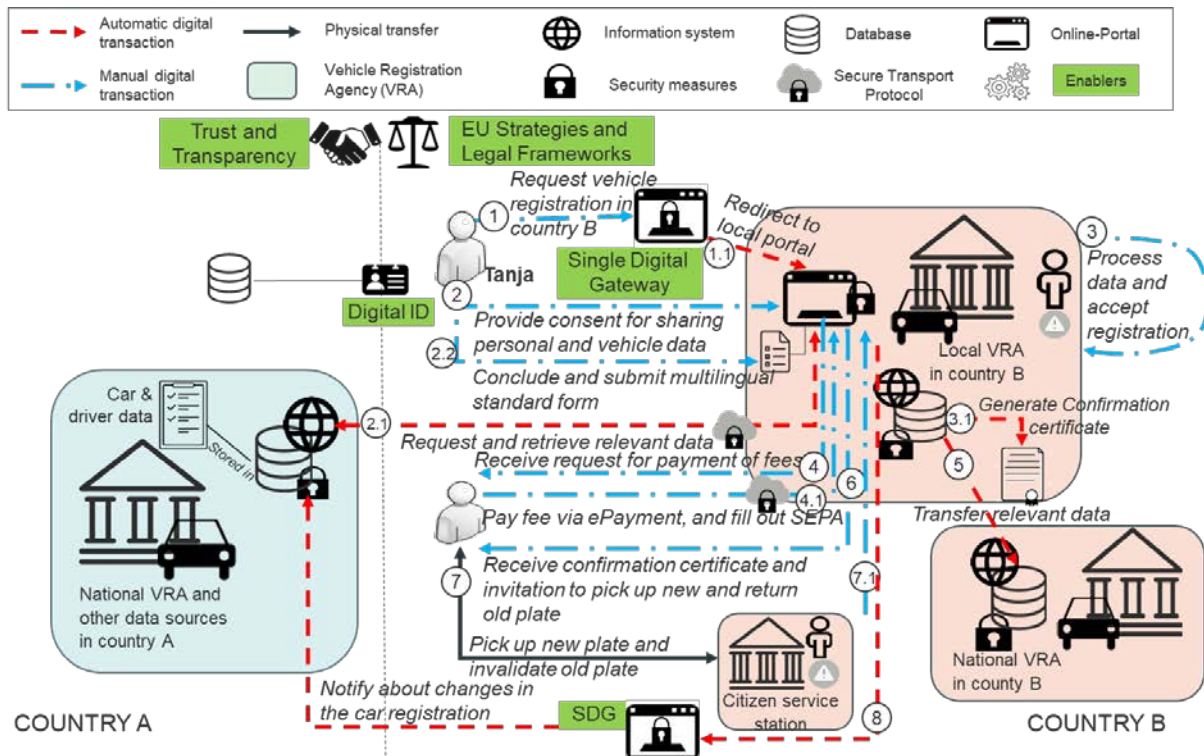


Figure 12: Generic scenario in the moving domain - registering a car in another Member State

The poster for the interactive sessions used in the workshops is shown in Figure 13. It should be noted that the poster still embarks on the generic scenario, while some contextualisation has been applied to the specific geographical aspects of a workshop (e.g. the foreign VRA being in Germany, as is shown in the poster).

Table 12 demonstrates the needed enablers for the scenario described above, grouped by the types of key enablers as identified in D 1.1 and D 1.2.

Future cross-border scenario in MOVING

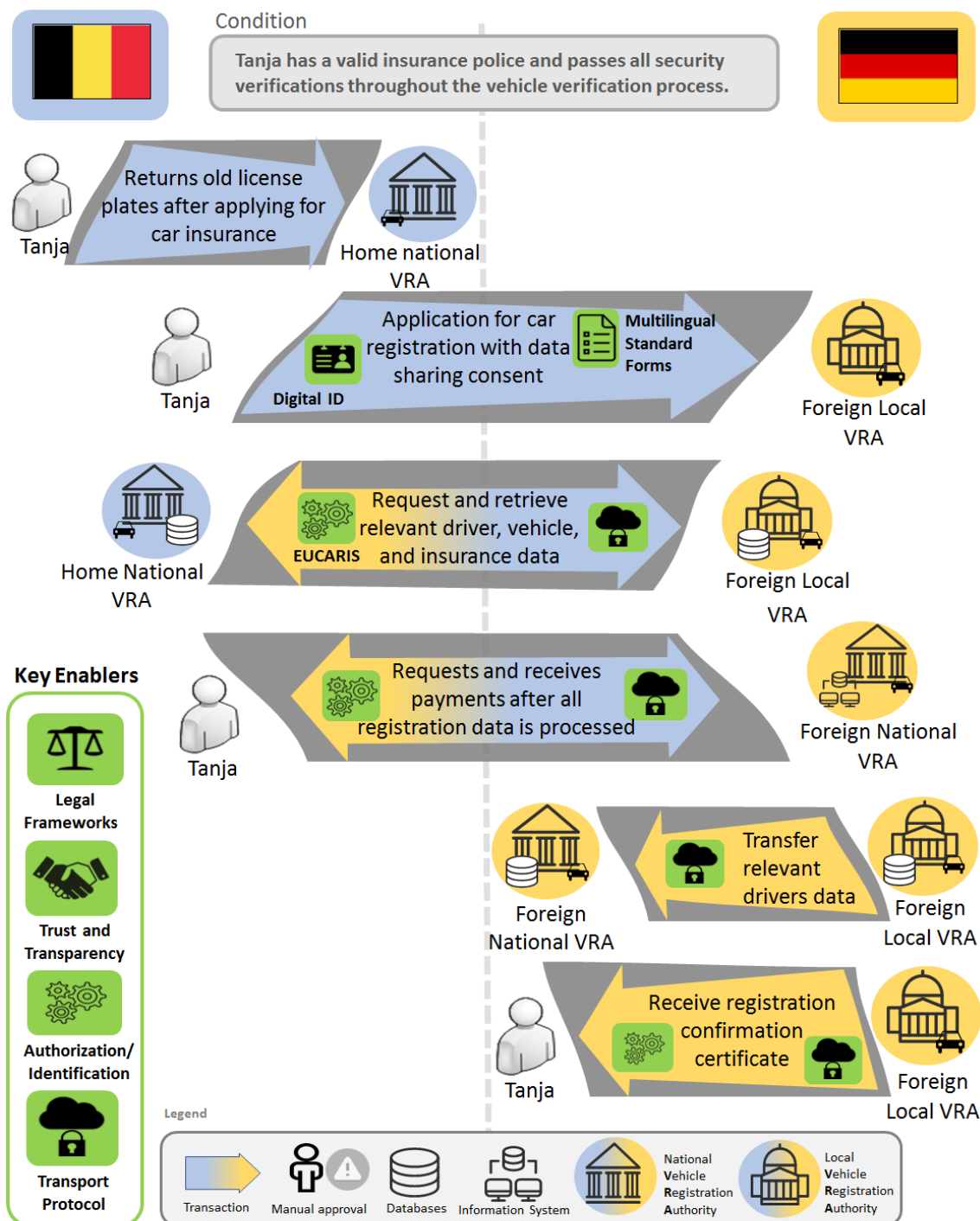


Figure 13: Poster for the generic scenario of registration a car in another Member State

Table 12: Needed enablers for implementing the future cross-border OOP scenario in the moving domain

Type of enabler	Description of the needed enabler	Role of the enabler(s) in the scenario
Political commitment	Political commitment and strategies both at national and European level to outline strategic importance of the OOP implementation, facilitate the mobility of European citizens, and promote data sharing between the public agencies across Europe in order to achieve administrative burden reduction.	In order to implement this scenario, it is necessary to have political commitments on European as well as national level in place with emphasis on data sharing for the mobility of European citizens. Political commitments to stress the importance of the relevant building blocks at both national and European level are necessary.
Legal interoperability	Legal frameworks on European level to provide the legal basis for secure digital transmission of personal data and data of the vehicle between the driver's license and Vehicle Agencies (VRA) and involving registries in different countries; GDPR provides legal framework for assuring data protection on personal data all over Europe; eIDAS as regulation on European level facilitates electronic identification and trust for electronic transactions; Digital Single Market regulation; Single Digital Gateway regulation.	As Tanja's personal data and the data of the vehicle are transmitting between two countries, legal frameworks are necessary to make this transmission secure. Tanja uses her digital ID for electronic identification and authentication. A legislation to support this online and cross-border procedure is necessary. Tanja uses the Single Digital Gateway to register her car.
Semantic interoperability	Code lists should provide multilingual content and terminology (e.g. name of the VRA); Common standards for data exchange at European level ensuring interoperability between public services and increase quality of data between them.	As the two driver's license and vehicle agencies in this scenario are in different countries with different languages, the code lists should provide multilingual content. Common standards should be embedded in information systems in this scenario to make stored data in them exchangeable.
Technical interoperability / Technical enablers	Secure transport protocol and technical standards on national and European level to facilitate secure digital transaction and transmission of the data between public services, information systems, and registries; Secure information systems on national and European level to ensure the implementation of GDPR;	Secure transport protocols enable Tanja's secure authentication and facilitates secure transmission of her data between VRAs. Tanja uses her national digital ID in this scenario for online identification and authentication.

	eID and trust services, which provide secure and trustworthy electronic identification and authentication.	
Trust and Transparency	Non-repudiation and eSignature; Consent of data subject for the data sharing; Transparency about access and use of data by data consumer through the data subject.	Tanja provides consent for sharing her personal and vehicle data on the Single Digital Gateway.

3.4.2. Future real case scenario for registering a car in another Member State

The real case scenario embarks on the existing enabler EUCARIS as the international portal for car-related processes. Furthermore, close collaboration with BearingPoint²³.

The scenario is depicted as a rich picture in Figure 14 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

A person, Tanja, has moved from Brussels, Belgium to Berlin, Germany for a new job. She has to register herself and her car in Berlin. Before starting the registration process in Berlin, she has to get a national car insurance as they differ from country to country. After making the contract with an insurance located in Germany, she receives a code of her new local car insurance policy that is needed in the registration process.

For the vehicle registration, Tanja uses the service of the Single Digital Gateway (1). The single digital entry point provides her the needed information and lists the documents she requires for the registration of her car. She can also search for the right procedure on the gateway and is redirected to the registration process of the Vehicle Registration Authority (VRA) of Berlin where she can find a form in German, English and French (2). She chooses the English version, fills out relevant personal information to submit the registration form (including the code of the new insurance policy).

She uses an eID scheme that fulfils the specifications for a high assurance level according to EC 2015/1502 (e.g. German eID with the nPA – new personal ID card with activated eID functionality) to provide her personal information.

She gives consent that relevant documents stored in the central registry of vehicles of the Belgian VRA, the WebDIV, can be used in the registration process. She, simultaneously, allows that this data can be transferred to and stored in the national central vehicle register (Zentrales Fahrzeugregister (ZFZR)) of the federal authority in Germany, the Federal Motor Transport Authority (Kraftfahrtbundesamt (KBA)).

The information in the application include the EC Certificate of Conformity, the vehicle identification number (VIN), the electronic proof of insurance cover (elektronische Versicherungsbestätigung (eVB)), the foreign license plate number, a proof of ownership (such as a sales contract), a proof of roadworthiness, and a filled out SEPA Direct Debit Scheme for the tax authority to collect car/ road taxes going forward (3). The VRA in Berlin also checks via EUCARIS for file entries on the car at the VRA in Brussels and to double-check car-related information that was provided by Tanja with the data that has already been stored in Brussels.

The relevant information is retrieved by the local VRA (3.1) and Tanja can proceed with the registration process by choosing between different license number selection options and deciding whether she wants to pick up the license plate herself at a registered pick-up point or if it should be send securely to her new address. Finally, she pays the fee for the registration via ePayment (4). The data is now send and checked by the VRA of Berlin, the notification is issued, the national car tax is raised (5). The registration certificate, the code of the insurance company and the retrieved general information on Tanja and the vehicle are send to the KBA (6) and stored in the ZFZR (7). Finally, Tanja receives the registration certificate online (8).

After the registration procedure, Tanja has to deactivate her old license number as soon as her new license number has arrived. This is not part in the registration process itself and therefore not shown in the rich picture. For the deactivation, she removes the plaquette on the plate, identifies herself on the platform via eID and enters the security code and the number of the car. She pays the fee via ePayment and her old number is inactive. The notification about this will be send to her insurance company, which activates her new contract and to the car agency of country A. The registry of country A deactivates Tanja's car registration in the system so that she does not have to pay the national car tax in Belgium anymore.

After Tanja has registered her car in Germany, she sends back her Belgian license plates to the VRA, which will then remove her car from their national registry and forward the information to the tax collecting authority in Belgium to stop deducting motor tax from her bank account.

²³ <https://www.bearingpoint.com/>

For the mapping of the different certificates and information, eTranslation is used that handles the knowledge of national vocabularies. This way, the data can be automatically stored in the central registry of vehicles of France.

The transmission of the data between the two public agencies is done via EUCARIS. For the mapping of data and certificates, semantic standards and vocabularies for the mapping exist at European level, which are implemented in the European-wide mapping and translation service.

The digital transmission of Tanja's personal data and data of the vehicle between the two vehicle agencies is based on the strategies for the Digital Single Market and the legal frameworks (including GDPR, eIDAS or DSG) that provide the legal basis for this seamless OOP implementation.

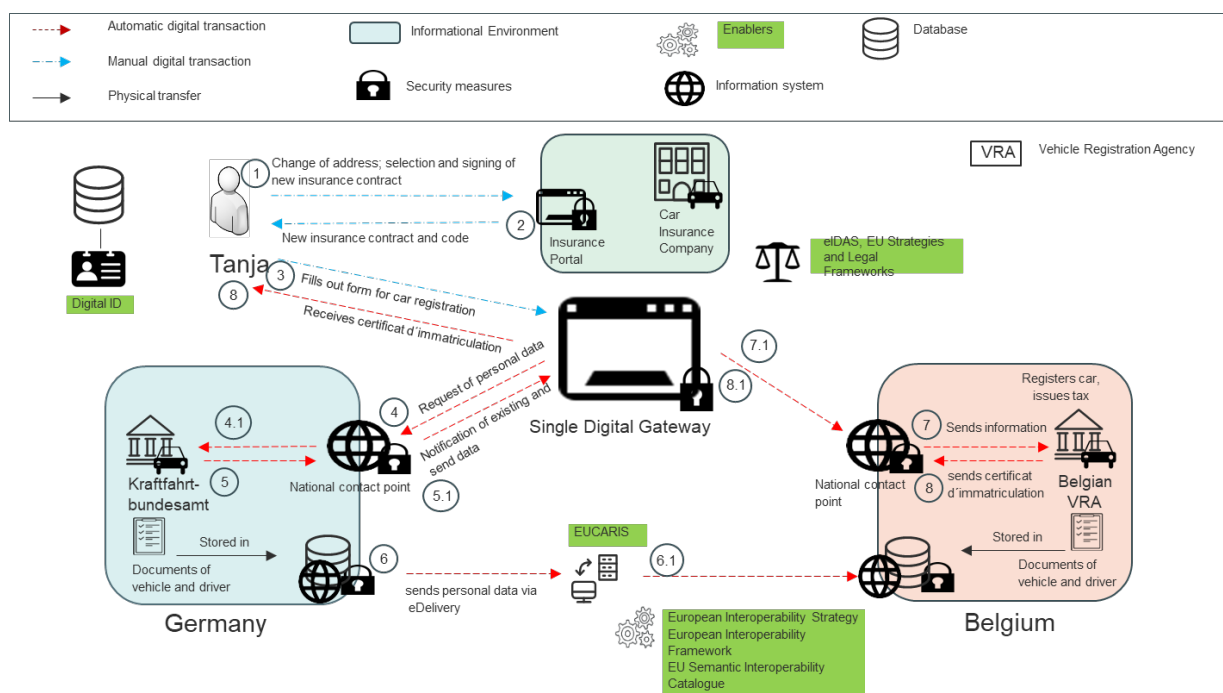


Figure 14: Real case scenario in moving domain – registering a car in another Member State

Figure 13 summarises existing enablers to facilitate the future cross-border OOP scenario. Since not all enablers are in place, Table 14 lists several challenges for the implementation of the OOP in this future scenario. The number codes along the challenges (e.g. M.1, M.3, where M stands for 'Moving domain') provide a unique identification of the challenges to ensure provenance in the subsequent analysis of the challenges and barriers as carried out in chapter 4 and in the subsequent task of roadmapping (upcoming deliverable D 4.2)

Table 13: Existing enablers to support the scenario - 'registering a car in another Member State'

Type of enabler	Name of enabler	Contribution to the scenario
Political commitment	<ul style="list-style-type: none"> Digital Single Market Strategy; eGovernment action plan 2016-2020; ISA² programme. 	A set of political commitment should be in place in order to support the implementation of this scenario. Listed political strategies and plans emphasise the importance of OOP and encourage the Member States' governments to support the OOP implementation.
Legal interoperability	<ul style="list-style-type: none"> Directive 1999/37/EC²⁴; Directive 2007/46/EC²⁵; Commission Decision of 17 December 2009 on minimum requirements for the data to be entered in the national electronic register of road transport undertakings²⁶; Commission Regulation (EU) No 1213/2010 of 16 December 2010 establishing common rules concerning the interconnection of national electronic registers on road transport undertakings²⁷; Legislation concerning the European Register of Road Transport Undertakings (ERRU)²⁸; The 3rd Driving Licence Directive (2006/126/EU, RESPER); Digital Single Market Regulation; eIDAS regulation; Article 114 TFEU²⁹; Proposal COM/2012/0164³⁰ 	<p>There are number of EU and national regulations to support diver and vehicle data exchange on in Europe in place, but not on the registering of cars itself.</p> <p>eIDAS regulation enforces cross-border application of the national eIDs in both sides. The Digital Single Market is the basis for further development of regulation.</p>

²⁴ <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31999L0037>

²⁵ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32007L0046>

²⁶ <https://publications.europa.eu/en/publication-detail/-/publication/c48debf7-c3fd-4b36-8119-c8d9889b2b52/language-en>

²⁷ <https://publications.europa.eu/en/publication-detail/-/publication/0c28400a-cdab-4c4d-859d-bde0add81a6d>

²⁸ https://ec.europa.eu/transport/modes/road/rules-governing-access-profession/european-register-road-transport-undertakings-erru_en

²⁹ <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:12008E114>

³⁰ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52012PC0164>

Semantic interoperability such as standards taxonomies, common terminology, etc.	<ul style="list-style-type: none"> • EU Semantic Interoperability Catalogue; • Certain data is already available in three main EU languages; • Documents and certificates are already harmonised. 	The EU semantic interoperability catalogue supports the implementation of the eGovernment services in different areas including moving.
Technical interoperability / Technical enablers such as secure networks and infrastructure	<ul style="list-style-type: none"> • "European Register of Road Transport Undertakings" (ERRU); • EUCARIS (European Car and Driving License Information System). 	The EUCARIS system connects the central car registers from the different EU countries. The information is already used for crime reasons or for imported cars, but is not open for the use of the citizens.

Table 14: Challenges for the OOP implementation in the moving domain

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
Political commitment	<p>Lack of sufficient political commitment on national level in both countries (M.3);</p> <p>Lack of political commitment with focus on moving on national level in both countries (M.5)</p>	<p>While there are many EU-wide and some national political commitments that emphasises on the OOP, lack of the sufficient political commitment on national and local levels could threat seamless implementation of the OOP.</p> <p>Motor vehicle registration problems are still one of the 20 main concerns with the Single Market as it stands now in a list compiled by the Commission. Therefore, more political commitment is needed to boost OOP implementation in this area.</p>
Legal interoperability	<p>Lack of legal interoperability and regulation on national and EU level (M.9);</p> <p>Missing right for data subjects to request their old personal data (M.14);</p> <p>Different ecological standards on national level (M.17);</p> <p>Lack of EU agreement on compensations in case of accidents (M.1);</p> <p>Lack of EU regulation for harmonising car's insurance (M.2)</p>	<p>There are number of national and European regulations to support this scenario; however, lack of sufficient regulation on national level could prevent seamless implementation of the OOP in moving domain.</p> <p>Data subjects should have legal right to request their old personal data; however, current legislation did not provide this right for them.</p> <p>Diverse of ecological standards and regulation in different Member States could threats sufficient collaboration on EU level.</p> <p>An EU level agreement on compensations in case of accidents and a legal basis for court cases could be helpful for further development of the scenario.</p> <p>Currently, there are many car insurances with tariffs differing from a Member State to others. EU-wide legislation is necessary to harmonised different aspects of car insurance including tariffs. While this shortage does not threat implementation of this scenario, it would be needed for more effective realisation of the scenario.</p>

Semantic interoperability	Need for code lists of necessary objects in the vehicle domain (M.6); Lack of multilingual portals and information systems on national level (M.16)	Multilingual code lists at European level are necessary in order to facilitate effective data exchange in this domain. National portals and Information systems have to provide services at least in two languages (English and local language).
Technical interoperability / Technical enablers	Lack of EU-wide data exchange accepted by all Member States (EUCARIS) (M.4); No national eID in some countries (M.10); ePayment is not facilitated for secure and transparent operation in all Member States and for cross-border operation (M.11)	EUCARIS has to be put in place by all Member States as an exchange infrastructure in order to facilitate secure data exchange on cross-border level. While national eIDs are implemented in most of the Member States, national eID Schemes are in developing phase in Bulgaria, Cyprus, Czech republic, France, Greece, Italy, Poland, and Romania. ePayment does not facilitates secure and transparent payment in all Member States.
Citizen-centred design	Not sufficient consideration of the real needs of the citizens (M.13); Non-sufficient service for people with disabilities (M.15)	Missing knowledge about the real needs of the individuals in the moving domain could leads to inaccurate design and implementation as well as less acceptance of the service by citizens as end users. The specific needs of citizens with disabilities are not facilitated by current infrastructures. Consequently, they cannot participate in this scenario. For instance, portals do not facilitate use of people with visual impairments.
Trust and Transparency	Lack of concept and solution of data subject for data sharing (M.12); Lack of possibility for data subject to see which data is transferred or will be stored (M.8); Missing transparency on access and use of sensitive data (M.7)	Data subject should be able to provide consent for data sharing. According to some national legislations including German legislation, data subject's consent is necessary in order to exchanging data. However, it is not facilitated by current infrastructures. Data subject should be aware that what data is exchanged (either on domestic or on EU level) and what additional data will be stored. However, current services do not covering this issue. Transparency is an essential issue in order to accept a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. Data subject should be able to check whom, when, and why access or use their data.

3.4.3. Benefits and wider impact of the future scenario on cross-border OOP in the moving domain

Citizens

For citizens like Tanja the implementation of OOP simplifies the registration process and reduces administrative burden in different ways: She can easily register her car through an online portal and her physical presence in the registering process is limited to pick up the new plate and invalidated the old plate. Furthermore, with the Single Digital Gateway, she finds all the information on the registration process at one place and is redirected to the responsible public authority. This means that she does not need a long research for the right procedure and the procedure is available in another European language than just the national language.

Using the portal, she can also register from anywhere at any time. This will save her time and costs. She does not need to hand in the relevant documents (driving license, car documents) physically for registering her car as all the information will be transferred automatically through the system. In ideal, she does not even have to pick up the license plates. This also saves time.

Local driver's license and Vehicle Agency

In this scenario, the local VRAs will face lower level of administrative burden as a lot of the paperwork done shortly will work automatically. It will also receive data that is from an authorized source, is therefore more trustworthy, and has a higher quality. Through the automated process, there are a lot of costs and time savings and further facilitate the life of the public servants. They don't need to check the paper-based documents and they do not have to insert the data themselves which is still done today. They will have time to support the citizens.

Economy and Society

Citizens will experience a big burden reduction while re-registering a car in another EU Member State. As they are able to execute the whole procedure online and they don't have to speak the national language, the process will be much easier. Due to the automated data exchange of the different registries, it is assured that the data has a better quality and is more reliable than paper-based documents. This enhances the work of the public sector. Through the transparent process of data exchange a higher level of transparency and therefore trust in the public sector will be reached.

3.5. Cross-border OOP scenario 'Health'

3.5.1. Generic scenario for getting an ePrescription filled in another Member State

The provision of health services across borders is among the best-studied domain in the EU. epSOS³¹ and eSENS³² are some pilot projects, which have been developing building blocks in this domain. The scenarios of these projects were taken into account for developing the cross-border OOP scenario of getting an ePrescription filled in another Member State. The scenario for the cross-border OOP ePrescription filling is depicted as a rich picture in Figure 15. The textual description reads as follows (the numbers in brackets refer to the respective interaction in the figure):

Karl, a resident from country A goes to the hospital in his home country to be examined by a doctor (1). The doctor discovers that Karl suffers from an illness and now needs continuous medication. Consequently, the doctor updates Karl's medical record in the Health Information System (2) using his national digital ID for authentication. At the same time, the doctor issues an ePrescription and stores it in the ePrescription Information System again using his national digital ID (3). The prescription does not include a specific name of a medication; however, it consists of a list of the needed medicine. Karl has access to his medical records and the issued ePrescriptions via the patient portal (4).

When Karl moves to country B for a temporary job (5), he goes to a pharmacy to get his medicine (6). When visiting the pharmacy, he gives consent to the pharmacy in country B to retrieve the particular ePrescription (6.1). As soon as Karl's identification is validated via his national digital ID, the pharmacist triggers the request for the ePrescription from country A through the pharmacy portal (7). The pharmacist has to authenticate himself with his national digital ID to access the pharmacy portal. According to the request from country B, the ePrescription Information System provides the approved prescription to the pharmacy via the pharmacy portal (7.1).

The pharmacist searches for available medication according to the list of ingredients listed in the received ePrescription. In the case of different suitable medicines with the same ingredients, Karl is asked to decide which drug suits him most on the base of the pharmacist's consultation. The pharmacist dispenses the medical products (8) to Karl. Afterward, the pharmacist generates an eDispensation document, which will be automatically transferred to the ePrescription Information System in country A (8.1).

The secure transport protocol facilitates safe and secure cross-border transmission of the medical data. In addition, the secure data exchange infrastructure connects different systems in the medical environment on national level. Common vocabulary and cross-border standards are used to map the medical data (e.g. ingredients of drugs) between the Member States.

³¹ <http://www.epsos.eu/>

³² <https://www.esens.eu/content/e-health>

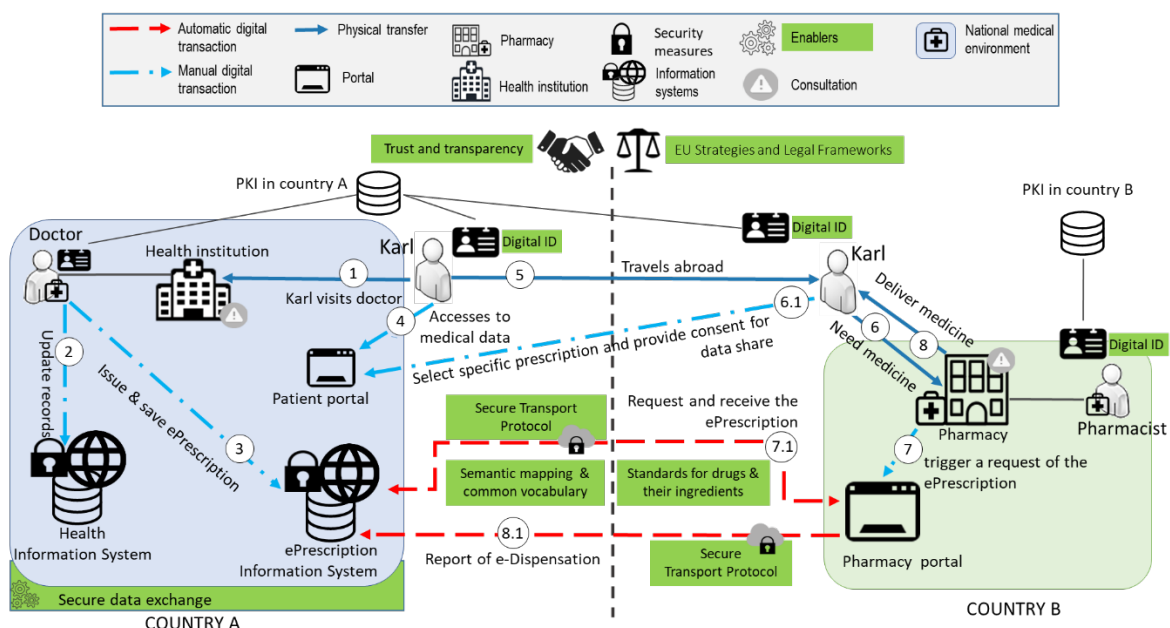


Figure 15: Generic scenario in the health domain – getting an ePrescription filled in another Member State

The poster for the interactive sessions used in the workshops is shown in Figure 16. It should be noted that the poster still embarks on the generic scenario, while some contextualisation has been applied to the specific geographical aspects of a workshop (e.g. the two countries being Estonia and Finland, as this scenario is already implemented between these countries).

Table 15 demonstrates the needed enablers for the scenario described above, grouped by the types of key enablers as identified in D 1.1 and D 1.2.

Future cross-border scenario in HEALTHCARE

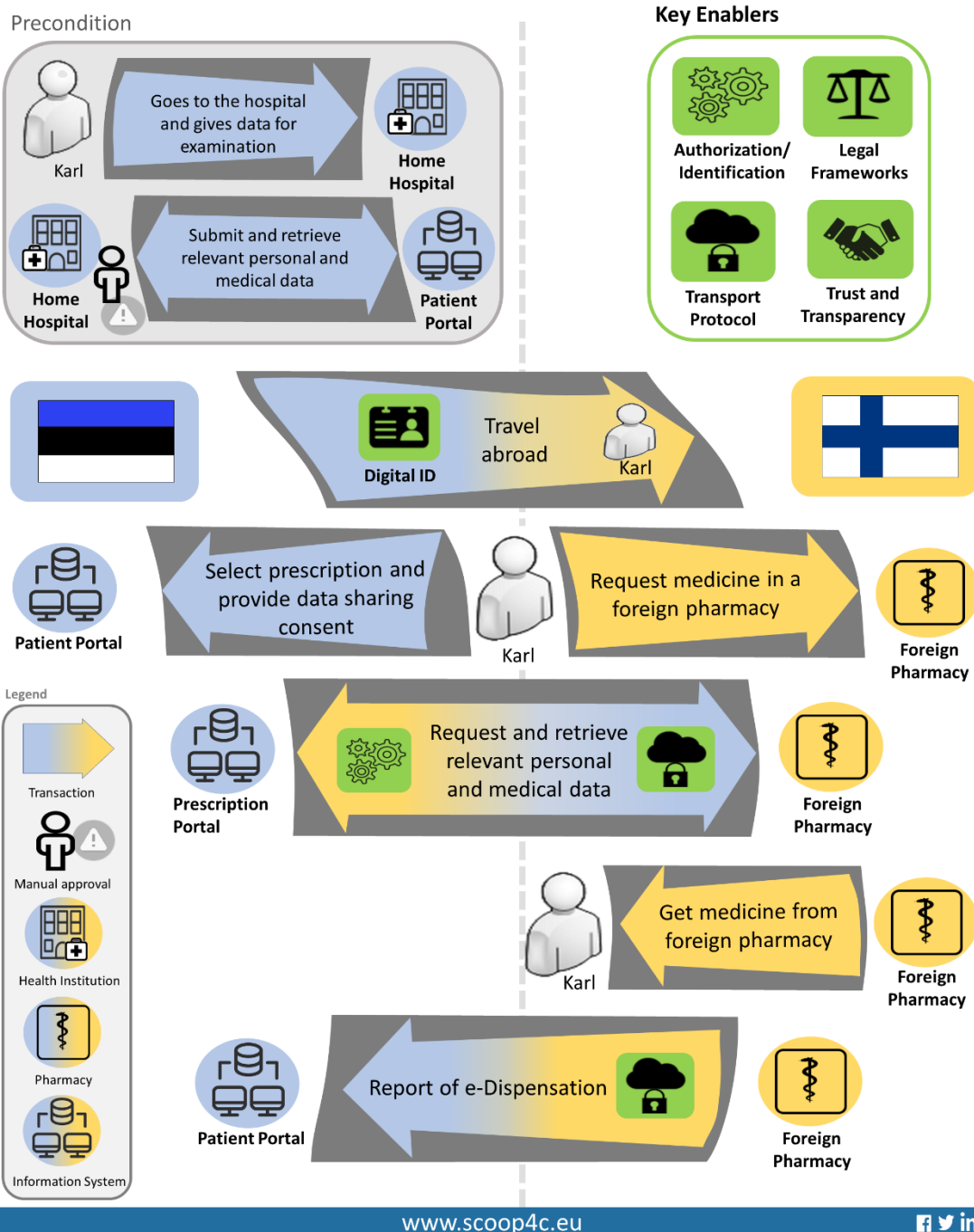


Figure 16: Poster for the generic scenario of getting an ePrescription filled in a different Member State

Table 15: Needed enablers for implementing the future cross-border OOP scenario in the health domain

Type of enabler	Description of the needed enabler	Role of the enabler(s) in the scenario
Political commitment	Both, national and European level political commitment and strategies are needed to: <ul style="list-style-type: none"> Confirm the strategic importance of the OOP implementation; Facilitate funding for; implementation of the OOP in the health section; Support development of building blocks; Promote cross-border data sharing in-between the public sectors; Encourage the cross-border use of electronic prescriptions. 	Cross-border exchange of the medical data is an essential part of this scenario. As this type of data is very sensitive, sufficient political commitments on different levels are necessary to emphasise the importance of the OOP as well as data sharing in this area. The development of the required building blocks should be stressed by these commitments as well.
Legal interoperability	Legal frameworks on the European level as well as on the national level are needed to provide the legal basis for: <ul style="list-style-type: none"> Providing cross-border health services; Data protection; EU-wide data sharing; Cross-border and electronic identification and authentication; and Secure and transparent digital transmission of data between the health institutions and involving registries in different countries. 	As Karl's medical data is transmitted between two Member States, legal frameworks are necessary to make this transmission safe and secure. In this scenario, Karl, the doctor, and the pharmacist use the digital ID for electronic identification and authentication. All information systems have digital seal certificates. Therefore, sufficient regulation is necessary to support these online cross-border identification and authentication.
Organisational commitment	Multilateral agreements allow Member States to harmonise national frameworks and business processes between themselves and facilitate cross-border data sharing.	In this scenario, cross-border collaboration between medical entities from two countries is needed to facilitate Karl's medical data exchange.
Semantic interoperability	Common standards are necessary to facilitate effective and smooth data exchange across Europe. EU-wide vocabulary is required to facilitate medical data exchange, including unique identifiers of doctors or hospitals. Catalogues of services such as available health and pharmacy portals or information systems on both national and European level among which data is to be exchanged are needed.	Interoperability in the data exchange facilitates effective process execution in cross-border ePrescription filling. This will increase the quality of data sharing between the involved countries. Common vocabulary and standards need to be in place to support mapping of the drug ingredients and other medical documents between different Member States.

Technical interoperability / Technical enablers	<p>Secure transport protocol and technical standards on national and European level are needed to facilitate secure digital transaction and transmission of data between health institutions, information systems, and registries.</p> <p>Secure national information systems and portals are required. These systems have to fulfil GDPR³³ as well as national data protection acts.</p> <p>National digital ID should be available all Member States.</p> <p>eID and trust services, which provide secure and trustworthy electronic identification and authentication are needed.</p>	<p>Secure transmission of Karl's medical data between health institutions is vital in this scenario. Secure data exchange systems in both countries are needed to connect different systems in national medical environments.</p> <p>Karl, the doctor and the pharmacist are using their national digital ID for digital identification, authentication and signing.</p> <p>Digital seals for authentication, signing and encryption are needed as well.</p>
Trust and Transparency	<p>Following points are required to develop a trustful and transparent process:</p> <ul style="list-style-type: none"> ○ Trust on service and personal data protection; ○ Consent of data subject for data sharing; and ○ Transparency about access and use of data by a data consumer. 	<p>Karl will trust the service and accept it, if the process of his data sharing is transparent. Moreover, he provides consent for sharing his personal and medical data on a national and cross-border level.</p>
Citizen-centred design	<p>Citizen-centres designed of this scenario ensures convenient and ease of use for service users</p>	<p>Karl as a service user will accept this service if it provides convenient process, which meets his needs.</p>
Data quality	<p>Approval of automatically mapped data is needed to assure data quality.</p>	<p>Automatically mapped data including the list of ingredients and e-Dispensation document have to be manually approved. This improvement guaranties the quality of data.</p>

³³ <https://www.eugdpr.org/eugdpr.org.html>

3.5.2. Future real case scenario for redeeming an ePrescription abroad

The real case scenario embarks on the Estonian Digital Prescription case, as well as on the Estonian Central Health Information System, Patient Portal, and Estonian state portal Eesti.ee as the national portals for doctors and patients. Furthermore, the Estonian Public Key Infrastructure, the Estonian baseline security system ISKE, the Estonian data exchange layer for information systems (X-Road), and the Estonian Catalogue of Public Sector Information (RIHA) are key enablers used in the scenario. All cases and enablers are described in D 1.2 and in the online knowledge base.

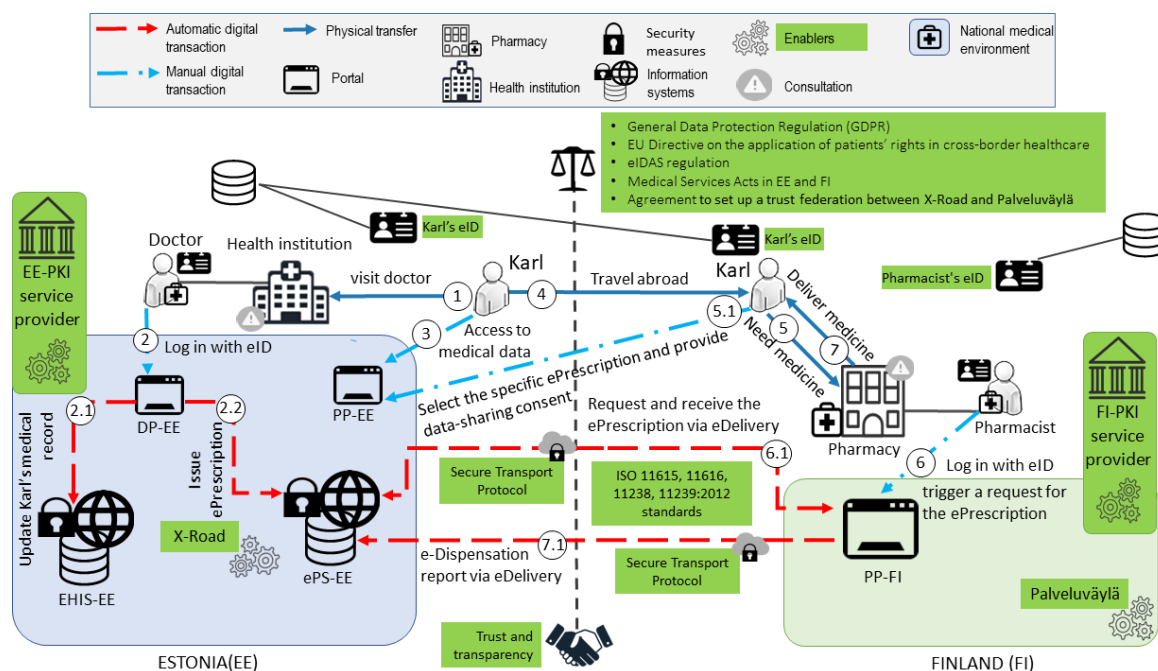


Figure 17: Real case scenario in the health domain – filling an ePrescription abroad

The scenario is depicted as a rich picture in Figure 17 and the description is as follows (the numbers in brackets refer to the respective interaction in the figure):

Karl lives in Tartu city, Estonia (EE). He goes to the hospital in Tartu to see a doctor (1) because of his health problems. He gives consent to the doctor to access and update his medical data using his eID. The doctor discovers that Karl suffers from a chronic illness. The doctor logs in with his eID in the DP-EE (Doctors Portal) (2). The DP-EE securely communicating with 16 other systems including Health Information System, ePrescription Information System, Patient Portal, Health Insurance Status register, and etc. through the Estonian data exchange layer, X-Road. Doctor updates Karl's electronic medical record (2.1) in the EHIS (Health Information System) via DP-EE. Subsequently, the doctor issues an ePrescription and saves it in the ePS-EE (ePrescription Information System) again via DP-EE (2.2). The ePrescription does not include name of medicines but the list of their ingredients.

Karl, as a patient with a chronic illness, does not need to visit his doctor regularly for issuing a recurrent prescription, because the attending doctor can simply renew his ePrescription on ePS-EE every month. Furthermore, this scenario enables the attending doctors to see which prescriptions (both historical and current) have been issued to Karl by other doctors, to assess pharmaceutical interactions. In addition, Karl is able to see his medical records and ePrescriptions via PP-EE (Patient Portal) by using his eID (3).

Karl moves to Porvoo, a city in Finland (FI) for a temporary job position (4). He goes to a pharmacy in Porvoo to get his regular medicine (5). In same time, he connects to the PP-EE in order to select the ePrescription that he wants to get in Porvoo and provides consent to the pharmacy to access the ePrescription (5.1) (The doctor in Estonia still needs to renew Karl's ePrescription every month).

The pharmacist has access to PP-FI (Pharmacy Portal) via her Finnish eID. This portal is member of the Finnish secure data exchange system Palveluväylä.

Karl uses his digital ID for identification at the pharmacy. When the identification of Karl is validated, the pharmacist triggers the request of Karl's ePrescription from the ePS-EE through the services provided by PP-FI (6). The requested ePrescription will be automatically send to the PP-FI, when the pharmacist can access it (6.1). Therefore, the pharmacist seeking for the medical products according to the list of ingredients mentioned in the ePrescription. A set of ISO standards including ISO 11615³⁴, ISO 11616³⁵, ISO 11238³⁶, ISO 11239³⁷, and ISO 11240³⁸ facilitate mapping of medicine ingredients between Member States. In case of existence of many drugs with the same ingredients but different names and different prices in Finland, Karl could decide which drug suits him based on the pharmacists' consultation. The pharmacist dispenses the medical product (7) to Karl. At same time, she generates eDispensation document, which will be automatically transfer to the ePS-EE (7.1). The doctor in Tartu can see the eDispensation document from DP-EE. In the same way, Karl can see the eDispensation through PP-EE. The European eDelivery³⁹ building block paves the way for a secure and cross-border transfer of medical data.

Table 16 summarises existing enablers, on national as well as on European level, to facilitate the future cross-border OOP scenario; however, these enablers are not sufficient for smooth cross-border OOP implementation. Table 17 lists challenges that threat the seamless implementation of this future scenario. The number codes along the challenges (e.g. H.1, H.2, where H stands for 'health domain') provide a unique identification of the challenges to ensure provenance in the subsequent analysis of the challenges and barriers as carried out in chapter 4 and in the subsequent task of roadmapping (upcoming deliverable D 4.2)

³⁴ <https://www.iso.org/obp/ui/#iso:std:iso:11615:ed-2:v1:en>

³⁵ <https://www.iso.org/obp/ui/#iso:std:iso:11616:ed-2:v1:en>

³⁶ <https://www.iso.org/obp/ui/#iso:std:iso:11238:ed-1:v1:en>

³⁷ <https://www.iso.org/obp/ui/#iso:std:iso:11239:ed-1:v1:en>

³⁸ <https://www.iso.org/standard/55033.html>

³⁹ <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eDelivery>

Table 16: Existing enablers to support the scenario – ‘filling an ePrescription abroad’

Type of enabler	Name of enabler	Contribution to the scenario
Political commitment	<ul style="list-style-type: none"> • Treaty of Lisbon (2007/C 306/01)⁴⁰; • European eGovernment Action Plan 2016-2020; • ISA² programme⁴¹ (Interoperability solutions for public authorities, businesses, and citizens); • European Interoperability Framework (EIF); • Previous EU projects such as epSOS, e-SENS, CEF eHealth⁴²; • Joint declaration between prime ministers of EE and FI⁴³; • Agreement between governing authorities in Finland and Estonia and SLA for trust federation^{44, 45}. 	<p>These political strategies, agreements, and plans emphasise the importance of the OOP implementation and encourage national governments to support it. Moreover, they facilitate the sufficient cross-border collaboration and data sharing.</p> <p>Previous EU projects in this domain guide the process of scenario development and design of further OOP implementation.</p> <p>The multilateral agreement between Estonian and Finland sets up a trust federation between X-Road and Palveluväylä, which promote secure data exchange between two countries.</p>

⁴⁰ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=OJ%3AC%3A2007%3A306%3ATOC>

⁴¹ https://ec.europa.eu/isa2/home_en

⁴² <https://ec.europa.eu/inea/connecting-europe-facility/cef-telecom/2015-ehealth>

⁴³ <https://www.valitsus.ee/en/news/prime-ministers-estonia-and-finland-agree-take-digital-cooperation-new-level>

⁴⁴ <https://www.ria.ee/en/x-road-trust-federation.html>

⁴⁵ <https://moodle.ria.ee/mod/page/view.php?id=611&lang=en> (in Estonian)

Legal interoperability	<ul style="list-style-type: none"> • General Data Protection Regulation (GDPR); • eIDAS regulation⁴⁶; • Single Digital Gateway Regulation⁴⁷; • Regulation on the coordination of social security systems⁴⁸; • Health service and data protection acts in Finland • Personal data act⁴⁹ • and in Estonia • Personal data protection Act⁵⁰ • Electronic communication act⁵¹; and • Directive 2011/24/EU⁵² on the application of patients' rights in cross-border healthcare. 	<p>These legislations provide EU wide regulations that ensure the same rights for Karl in Finland and Estonia. Karl has not to be afraid that his data has a different protection level in another country. The Estonian Acts guarantee interoperability between all health institutions and pharmacies; so, Karl could attend each of them under the same legislation.</p> <p>eIDAS regulation enforces cross-border application of the national eIDs in both sides.</p>
Organisational interoperability	Nordic institute for interoperability solutions (NIIS) has been established ⁵³ .	NIIS is responsible for cross-border operation of existing eGovernment services such as ePrescription in member countries. Furthermore, it facilitates cooperation between Member States and national enablers. For instance, collaboration between Estonian and Finnish secure data exchanges layers.
Semantic interoperability	<p>ISO IDMP (Identification of Medicinal Products) consists of the following five ISO standards, which can facilitate mapping of the medical data: ISO 11238; ISO 11239; ISO 11240; ISO 11615; and ISO 11616.</p> <p>Semantics building blocks from eSENS can facilitate semantic interoperability in this scenario as well.</p>	IDMP ISO standards facilitate cross-border unique identification of drugs and medicines, which can support cross-border exchange of ePrescriptions and semantic mapping of the medicine's ingredients between different Member States in this scenario. Different national and international health authorities including world health organisation and European medicines agency (EMA) accepted the ISO IDMP standards.
Technical interoperability / Technical enablers	<ul style="list-style-type: none"> • Finnish PKI; • Estonian PKI; • Estonian secure data exchange layer, X-Road; • Finnish secure data exchange layer, Palveluväyla; • Catalogue of interoperability; solutions RIHA (EE); • Doctor's portal (EE); • ePrescription system (EE); • Estonian three-level IT baseline security system ISKE; • National eIDs; • eDelivery. 	<p>PKIs and secure data exchange layers in Estonian and Finland as well as EU-wide building blocks such as eDelivery facilitate secure data exchange on both national and European levels.</p> <p>Existence of the national eIDs in both countries and their cross-border application enable online authentication, identification as well as signing for Karl, the doctor, the pharmacist and other persons who are participating in this scenario.</p> <p>Seamless implementation of this scenario depends on availability of the secure and reliable national portals and information systems. Estonian side systems were maturely developed.</p>

Trust and transparency	<p>National data supervisor entities in Estonia and Finland monitor accurate development and function of systems according to data protection acts.</p> <p>Data subject can provide consent for data sharing via PP-EE. Estonian state portal (Eesti.ee) facilitates transparency about access and use of the data subject's medical data.</p>	<p>The Estonian personal data protection act, determines that cross-border personal data exchange is possible just by the data subject's consent. The Estonian data protection inspectorate is the responsible entity to enforce laws and defence citizens' constitutional right.</p> <p>Karl's consent for his medical data sharing between ePS-EE and PP-FI, is fulfilling data protection regulations.</p> <p>Moreover, the Estate online portal allows Karl to check who has accessed his medical data, when and why.</p>
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Table 17: Challenges for the OOP implementation in the health domain

Type of challenge	Description of challenges	How the challenge could prevent successful implementation of the OOP in the scenario
Political commitment	Lack of political commitment at ministerial level (H.3)	Political commitments at both national and European level outline the importance of the OOP implementation in the health domain. However, lack of commitments at ministerial level could threat the accurate implementation of the OOP in this scenario.
Legal interoperability	<p>Lack of clear implementation guides of national and European legislation (H.2);</p> <p>Contrasting bilateral agreements between Member States (H.9);</p> <p>Different proficiency requirements for pharmacist among Member States (H.11);</p>	<p>There are a variety of regulations at European and national level to support the implementation of the OOP in the health domain. Nevertheless, the lack of implementation guidelines and agreements of European and national legislations for implementing bodies cloud threat concrete implementation of the OOP in this area.</p> <p>Though existing agreements between Member States could support the EU-wide implementation of the OOP, probable conflict between these bilateral agreements could hinder the OOP implementation on EU level. These agreements should be harmonised or replaced by EU level agreement and regulation.</p>

⁴⁶ http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.257.01.0073.01.ENG

⁴⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017PC0256>

⁴⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legisum:c10521>

⁴⁹ <https://www.finlex.fi/en/laki/kaannokset/1999/19990523>

⁵⁰ <https://www.riigiteataja.ee/en/eli/ee/507032016001/consolide/current>

⁵¹ <https://www.riigiteataja.ee/en/eli/501042015003/consolide>

⁵² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011L0024>

⁵³ <https://www.niis.org/>

	Lack of EU-wide regulation on insurance (H.10)	Various proficiency requirements are needed for pharmacists in different countries. Additionally, some national legislation limited the access to citizen's medical data to particular professional groups. Consequently, pharmacists with different proficiency levels have different rights for accessing patients' data. EU-wide regulation on insurance is needed for further development of the scenario and covering the financial issues.
Technical interoperability / Technical enablers	Lack of essential infrastructures, including information systems and portals on national level (e.g. the Finnish Pharmacy Portal) (H.7); Lack of EU-wide e-Delivery building block in health domain (H.8); Uncertainties about technical stability (H.12)	Infrastructures such as national portals and information systems provide the essential base for the cross-border implementation of the OOP in different domains. Lack of these infrastructures have been identified as existing gap. Absence of the EU level, e-Delivery building block prevents direct connection between independent government organizations (and businesses). This may be partially overcome through the implementation of the CEF e-Health Building blocks. Moreover, technical stability is essential for smooth implementation of all scenarios; particularly, for medical service in this scenario.
Interoperability governance	Lack of Service Level Agreements (SLA) (H.1); Potential conflict between legal, semantic, organisational, and technical interoperability enablers (H.13)	Participating bodies in different Member States often exchange information based on the bilateral agreements. It would be better to standardise these contracts and open the services on basis of multilateral SLA. Legal, semantic, organisational, and technical interoperability enablers are needed for seamless interoperability between different entities. Moreover, all these interoperability enablers should match each other's (Lack of harmony between different interoperability enablers could threat smooth interoperability).
Data protection and privacy	Lack of possibility for citizens to limit access to their medical data (H.4)	The patients should be able to forbid doctors and other data consumers in this scenario to access their medical information. In Estonia, patients can do this in patient portal; however, it have to be facilitated in other Member States as well.
Trust and transparency	No transparent access and use of citizens' data (H.6); Lack of a clear concept and solution for the consent of data subject for the data sharing (H.5); Lack of concept and solution for data sharing in emergencies (H.14)	Patients should be able to see their up-to-date medical data as well as to check whom, when and why access their personal and medical data. This is currently facilitated for Estonian patients; though, it should be implemented in all other Member States including Finland. The data subjects' consent is an essential requirement for data sharing on both domestic and EU level. This is not facilitated by the current infrastructures. In this scenario, the patient should be able to provide consent for data sharing to the specific pharmacy in the foreign country. In emergencies, when the patient cannot provide data sharing consent to the pharmacy, there should be still access to the patient's ePrescription to provide emergency services.

3.5.3. Benefits and wider impact of the future scenario on cross-border OOP in the health domain

Patients

This scenario reduces administrative burden for Karl. He does not need to see a doctor regularly for issuing a recurrent prescription for his chronic illness. The attending doctor can simply renew the digital prescription on ePS-EE. Consequently, Karl saves cost and time. No paper prescriptions will be issued even when the patient moves to another country. Karl has the same level of access to the health services across Europe. Attending doctors are able to see, which prescriptions (both historical and current) Karl has from other doctors in order to assess pharmaceutical interactions. This will lead to more convenience and a higher level of quality in public sector service for the patients. In addition, the implementation of this scenario will simplify the process of getting medicine in the home country and abroad. Karl is able to see his health record and prescriptions on the patient portal by using his eID, which brings a higher level of transparency.

Doctors

As a visit to the doctor is not necessary for issuing a recurring prescription for chronic patients, the burden for the doctor is reduced and she or he saves time. Electronic prescription leads to less paper work for doctors. Attending doctors are able to see, which prescriptions (both historical and current) a patient received from other doctors in order to assess pharmaceutical interactions. In addition, a doctor sees at the doctors portals if the medicine is dispensed or not. This will increase the quality of services that doctors can provide to patients.

Pharmacists

The implementation of this scenario leads to less paper work for pharmacists. Automatically mapped ePrescription enables pharmacies to provide service for people from other Member States easier and faster.

Research and Academia

Non-personal data is easy to use for statistics and analytics.

Economy and Society

Access to the same level of medical services across Europe could lead to higher mobility of citizens and, in turn, to a more integrated European society and economic growth. Higher level of citizen satisfaction and more transparent health service as well as cost and time saving for citizens, doctors and pharmacists could increase the level of trust in the public sector.

3.6. Stakeholder workshops and inputs to the scenario generation

As mentioned in section 2.4 on page 16, interactive sessions were carried out along five events (see Table 18) to investigate different aspects of the future cross-border OOP scenarios. The stakeholder workshops aimed at involving stakeholders in reviewing the scenarios (i.e. assessing the feasibility of the cross-border OOP scenarios in the five domains and evaluating or adjusting the need of identified key enablers) as well as in reflecting gaps (challenges and barriers) and prioritising them. Stakeholders from academia, public administrations, NGOs, and possible end users of the OOP implementations contributed to enhance the findings.

Table 18: List of stakeholder workshops with interactive sessions pursued along this work

Event	Date	Location	Participating stakeholder groups	Number of Participants*
SommerUni workshop OOP workshop in lecture 'Introduction to e-government'	22.05.2017 30.01.2018	Koblenz, Germany	Students (workshops were held in German)	17
First SCOOP4C conference	28.11.2017	Berlin, Germany	Academia, public administration, businesses, SCOOP4C and TOOP project members	50
4 th stakeholder workshop	22.02.2018	Sofia, Bulgaria	Academia, public administration representatives, NGOs focusing on privacy and trust, students	28
6 th stakeholder workshop	26.04.2018	Brussels, Belgium	Public administration, including local and regional government representatives, ICT companies, academia, NGOs (focus on privacy and trust)	30
Workshop with SCOOP4C Steering Board	27.04.2018	Brussels, Belgium	Steering board members (individual experts)	12

* including participants from the project team

The *SummerUni workshop and the OOP workshop in the lecture 'Introduction to e-government'* were organised with students from the University of Koblenz-Landau. During the workshops, students discussed their expectations towards an ideal implementation of the future cross-border OOP scenarios in the education and social protection domains. They also reflected possible challenges and barriers as well as potential benefits in the future cross-border OOP scenarios. The main insights gathered were that the students' consent for data sharing, trust & transparency, and data protection in the cross-border data exchange are main challenges that need to be addressed carefully when implementing such scenarios. In addition, 'really achieving' administrative burden reduction is a crucial expectation when implementing OOP solutions from the student's point of view. The finding from these discussions were used in the process of developing future scenarios in education and social protection domains.

In the *first once-only principle conference of SCOOP4C*, three future cross-border OOP scenarios (besides the interactive session on the TOOP architecture and pilot plans) were discussed with participants from academia, public and private sector representatives, individuals, and representatives of the TOOP and SCOOP4C consortia. The main objectives of the discussion in the interactive sessions were to evaluate a) the scenarios developed in education, social protection, and health domains, and b) the identified needs, challenges, and barriers in the corresponding scenarios; moreover, c) the identification of further challenges and enablers was subject of the discussions. Along the group discussions, all three scenario descriptions were amended. Furthermore, collected enablers and building blocks at national and European levels as well as identified barriers in each scenario were discussed, amended and descriptions improved. Since this was one of the first interactions with the stakeholders, the participants spotted further enablers and identified additional barriers in the scenarios. For example, the multilingual standard forms established by the public document regulation were suggested to overcome language

barrier in cross-border data exchange in the social protection scenario (four other enablers were suggested). Potential challenges in this scenario including legal and data protection barriers were discussed as well. The European Student Card (USC) is another recommended building block in the education domain to enhance the cross-border transfer of student's records. Non cross-border solutions for data exchange as well as lack of sufficient legal grounds were pointed out in the discussion of the education scenario. While the group discussion on the health scenario spotted the existence of a number of enablers and technical solutions for implementing the proposed scenario, the lack of political will was mentioned as potential challenge in this domain. Participants indicated further possibilities for extending the scenarios in health and social protection domains with the aim of covering further services in those domains as well as establishing connection between different scenarios.

In the *stakeholder workshop in Sofia, Bulgaria*, representatives from academia (incl. students), public administration, and NGOs participated. The interactive session aimed to discuss the possibility of once-only principle implementation in the education domain as well as to consider corresponding soft factors such as privacy, trust, and security as preconditions for the scenario to be successful. Beyond the usual reflection of the feasibility of the cross-border OOP implementation in the education domain, possible gaps on national level (particularly in Bulgaria) and EU level were discussed. Moreover, the current Bulgarian enablers (e.g. national registries of students and diplomas) as well as potential EU building blocks (e.g. EU-wide mapping tool) were investigated. Mapping study programs and courses between different countries were identified as an important challenge in the education domain, which need the experts' participation to overcome it. One result of the discussion is a recommendation to continue discussions with experts who have expertise in mapping course contents between different countries to facilitate digital learning agreements and the acceptance of courses of similar content across Europe (semi)automatically through digital transcripts of records.

For the report at hand the last two relevant *stakeholder workshops in Brussels, Belgium*, involved the stakeholder community and the SCOOP4C steering board. The two workshops were organised in a similar fashion and the focus of discussion in these workshops was to validate and prioritise the identified gaps. Along the interactive discussions of the workshop with the stakeholder community, the scenarios were reviewed and some were updated (e.g. expanding the interaction in generating the digital learning agreement to involve also the home University information system in the education scenario, which requires a semantic mapping of modules and content across the study programmes and a semantic standard for the digital learning agreement). In addition, new gaps were identified. The participants in the stakeholder community prioritised the gaps in each scenario (education, social protection, health, taxation, moving; see 3rd round of gap prioritisation as indicated in Table 23 on page 94). Based on the gap prioritisation, initial actions were suggested to overcome the highly prioritised gaps in each domain, which form a first input to the subsequent roadmapping activity (which will be reported in deliverable 4.2). In the subsequent steering board meeting, the gaps and their prioritisation by the stakeholders in the workshop the day before were reviewed and approved by the steering board members.

4. ANALYSIS OF GAPS, BENEFITS, AND IMPACTS

According to the definition of gaps and the gap analysis methodology introduced in chapter 2, different kinds of gaps were extracted from the future cross-border OOP scenarios. In this chapter, the identified gaps are synthesised and analysed. For the synthesis, the identified gaps from the future scenarios in education, social protection, taxation, moving, and health domains were extracted and summarised to create an overview. The same procedure was applied on the benefits for stakeholders in each domain. The gaps were structured and categorised along the different types of enablers introduced in deliverables D 1.1 and D 1.2. The benefits are organised by the domains and the stakeholder classifications from work package 2. All gaps, benefits, and impacts were identified and prioritised interactively with the SCOOP4C community, through intensive discussions with different groups of stakeholders in five workshops in different Member States (cf. Table 18 in subsection 3.6). Moreover, the SCOOP4C community verified the final set of gaps, benefits, and impacts as well their prioritisations. The results are presented in the following sections.

4.1. Synthesis of challenges, needs, and benefits

The first step of the synthesis was to extract and group the identified gaps from all the different scenarios along the type of enabler they hinder and the domain they occurred. Through this approach, similar or redundant gaps from different domains were detected and could be processed further. Table 19 lists the identified gaps along a unique gap number assigned in the analysis of the scenarios in chapter 3, the type of gap, the scenario domain it was derived from, the name and a brief description of the gap as well as a linkage to the related challenge or barrier spotted already in work package 1. As mentioned before, the gaps are grouped along the different types of barriers introduced in deliverables D 1.1 and D 1.2.

The identified gaps in the areas of political commitments, legal interoperability, semantic interoperability, technical interoperability, as well as trust and transparency are the ones that mainly threaten the cross-border implementation of the OOP in the domains studied.

As shown along the future real case scenarios in chapter 3, various numbers of national information systems and portals are already in place in different Member States to support the national OOP implementations. However, the current infrastructures need further development to support cross-border OOP implementations. In addition, the lack of interfaces between existing systems on national and European level was identified as a gap in most domains. Another need identified in all domains is the use of national eID as well as their recognition across Europe to simplify the process of the identification and authentication of citizens in between Member States. While national eID solutions are developed in the majority of EU Member States, the absence of eID in a few countries and the lack of cross-border recognition hinders the cross-border OOP implementations and therefore was identified as a current gap in all domains. Nevertheless, according to the eIDAS regulation, the use and cross-border recognition of eID will be mandatory for all Member States by the end of September 2018⁵⁴. An additional challenge, identified in the health, education, social protection, and taxation scenarios, is the absence of eDelivery in the named domains. Although eDelivery exists as an European building block to facilitate secure data exchange in cross border as well as cross-domain services, it is not implemented or integrated in the evaluated domains.

The “lack of regulation on national level” was identified as a gap in most domains. Since implementing OOP is based on the idea that citizens supply the same data to the public agencies just once and then public administration offices share this data among themselves, the legal frameworks at different levels are necessary to facilitate the data exchange between public authorities, citizens, as well as businesses and NGOs across EU. While EU-wide regulations such as GDPR and eIDAS (and if approved by the European Parliament and Council the SDGR) are in place, there is an essential need for further European level regulation in specific domains (e.g. moving, education) as well as comprehensive regulation on national and local levels to facilitate the cross-border OOP implementations. Nevertheless, varying national regulations as well as different approaches among Member States to implement the same EU regulation were identified as a possible threat for the seamless implementation of the OOP. Another key concept to achieve successful implementation of cross-border OOP is the harmonisation and interconnection between the Member State systems (i.e. semantic interoperability).

⁵⁴ <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/What+is+the+legislation++eID>

Table 19: Summary of identified gaps in different categories of barriers/enablers in the five scenario domains

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
H.3	Political commitment	Health	Lack of political commitment on ministerial level in the health domain	Political commitments at both national and European levels would outline the importance of the OOP implementation in the health domain. However, the absence of commitment at ministerial level could threaten the accurate implementation of the OOP in this scenario.	D 1.1, p 6. Political commitment D 1.2, p 23. Estonian Central Health Information System and Patient Portal
E.1	Political commitment	Education	Lack of sufficient political commitment on national and European levels	There is already some existing political commitment at different levels supporting the OOP implementations in this scenario. However, the lack of sufficient political commitment on different levels (incl. European, national, local, or ministerial) could threaten the seamless implementation of this scenario.	D 1.1, p 6. Political commitment
E.15	Political commitment	Education	Contrast between the flexibility of teaching and EU-wide standardisation	The incompatibility between the two concepts, of the freedom and flexibility of teaching in one hand, and EU-wide standardisation and harmonisation on the other hand, has been identified as a potential gap in the education domain. Consequently, an appropriate balance between them on the EU level is needed.	D 1.1, p 6. Political commitment
SP.5	Political commitment	Social protection	Lack of sufficient political commitment at national level	While there are many EU-wide and some national political commitments that outline the importance of the OOP implementation, the absence of sufficient political commitment at national and local levels could threaten the seamless implementation of this scenario.	D 1.1, p 6. Political commitment
SP.11	Political commitment	Social protection	Limitation of languages a birth certificate can be issued in a specific country	A birth certificate is issued in the official language of the host country. It does not prevent the implementation of the scenario; however, it could lead to administrative burden for parents and the new-born when lodging the certificate in their home country.	D 1.1, p 6. Political commitment
T.3	Political commitment	Taxation	Lack of sufficient political commitment at national level	While there are many EU-wide and some national political commitments with emphasis on the importance of the OOP, the deficiency of sufficient political commitment on national and local	D 1.1, p 6. Political commitment

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
				levels could threat the seamless implementation of the OOP in this scenario.	
M.3	Political commitment	Moving	Lack of political commitment with focus on the moving domain on national level	Motor vehicle registration problems are one of the main concerns addressed by the Single Digital Market as it is compiled by the EC. Therefore, more national political commitment is needed to boost the OOP implementation in this area.	D 1.1, p 6. Political commitment
M.5	Political commitment	Moving	Lack of sufficient political commitment at national level	While there are many EU-wide and some national political commitments with emphasis on the importance of the OOP, the deficiency of sufficient political commitment on national and local levels could threat the seamless implementation of the OOP in this scenario.	D 1.1, p 6. Political commitment
H.2	Legal interoperability	Health	Lack of clear implementation guides by national and European legislations	There is a variety of regulations on European and national levels to support the OOP implementation in this domain. Nevertheless, the absence of implementation guidelines and agreements by European and national legislation cloud threat the concrete implementation of the OOP in this scenario.	D 1.1, p 6. Legal interoperability
H.9	Legal interoperability	Health	Conflicting bilateral agreements between Member States	Though existing agreements between Member States could support the EU-wide implementation of the OOP, probable conflict between these bilateral agreements could hinder the OOP implementation on EU level. These agreements should be harmonised or replaced by EU level agreements and regulations.	D 1.1, p 6. Legal interoperability
H.10	Legal interoperability	Health	Lack EU-wide regulation on health insurances	Different insurance regulations in the Member States could prevent dispense of medicine in foreign countries.	D 1.1, p 6. Legal interoperability
H.11	Legal interoperability	Health	Different proficiency requirements for pharmacist among Member States	There are differing proficiency requirements for pharmacists in different Member States. Additionally, some national legislations limited the access to citizen's medical data to particular professional groups. Consequently, pharmacists with different proficiency levels would have different rights for accessing patients' data, threatening the implementation of this scenario.	D 1.1, p 6. Legal interoperability

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
E.12	Legal interoperability	Education	Lack of regulations to assure secure and transparent digital transmission of personal and educational data between Member States	Though there are a variety of national and European regulations to support this scenario, the absence of sufficient regulations, particularly on national level, could prevent the seamless implementation of the OOP in the education domain.	D 1.1, p 6. Legal interoperability
E.18	Legal interoperability	Education	Various implementation in different Member States according to a single EU regulation	Some EU regulations are formulated in a way that could lead to diverse implementations among Member States. This could threat the essential harmonisation and interconnection of OOP implementations at EU-level.	D 1.1, p 6. Legal interoperability
SP.1	Legal interoperability	Social protection	Lack of national regulation to assure secure and transparent data exchange	There are a variety of regulations at the European level to support the implementation of this scenario. However, the absence of legal support on national level could be considered as a barrier in this scenario.	D 1.1, p 6. Legal interoperability D 1.2, p 80. Estonian e-Census
SP.9	Legal interoperability	Social protection	Lack of EU-wide standards on required data for issuing birth certificate	EU-wide standards characterising the required data for to issue a birth certificate could enhance the OOP implementation in this scenario. As mentioned in the scenario, multilingual standard forms are already considered for data exchange for the life event 'birth'.	D 1.1, p 6. Legal interoperability
SP.10	Legal interoperability	Social protection	Diverse legal settings on birth registration procedures in different countries	Different legal setting among Member States could prevent sufficient cross-border implementation of the issuing birth certificate.	D 1.1, p 6. Legal interoperability
SP.12	Legal interoperability	Social protection	Uncertainty of legal requirements for cross-border scenario	Different legislations in Member States could lead to uncertainty about the necessary steps in this scenario. For instance, reporting the birth in a foreign country to the country of residence is necessary according to some countries' legislation and unnecessary in some other.	D 1.1, p 6. Legal interoperability
T.1	Legal interoperability	Taxation	Lack of EU-wide regulation on double taxation	There are many bilateral Double Tax Agreements among Member States that support the implementation of this scenario; however, this needs to be strengthened by EU-wide legislation.	D 1.1, p 6. Legal interoperability

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
T.2	Legal interoperability	Taxation	Lack of regulation on secure data exchange between public and private entities	Lack of regulation to facilitate secure data exchange at national level is observed not only between public administrations but also between public and private organisations. A legal framework to clarify data exchange in each OOP scenario is needed.	D 1.1, p 6. Legal interoperability D 1.2, p 80. Estonian e-Census
M.1	Legal interoperability	Moving	Lack of EU agreement on compensations in case of accidents	An EU level agreement on compensations in case of accidents and a legal basis for court cases could be helpful for further development of the scenario. These are hampered by the different socio-economic levels of the different EU Member States.	D 1.1, p 6. Legal interoperability
M.2	Legal interoperability	Moving	Lack of EU regulation for harmonising car's insurance	Currently, there are many car insurances with different tariffs from one Member State to others. EU-wide legislation is necessary to harmonised different aspect of car insurance including tariff. While this shortage does not threat implementation of this scenario, it would be needed for more development of the scenario.	D 1.1, p 6. Legal interoperability
M.9	Legal interoperability	Moving	Lack of legal interoperability and regulation on national and EU level	There are number of national and European regulations to support this scenario; however, lack of sufficient regulation on national level could prevent seamless implementation of the OOP in moving domain.	D 1.1, p 6. Legal interoperability
M.14	Legal interoperability	Moving	Missing right for data subjects to request their old personal data	Data subjects should have legal right to request their old personal data; however, current legislation did not provide this right for them.	D 1.1, p 6. Legal interoperability
M.17	Legal interoperability	Moving	Different ecological standards on national level	Diverse of ecological standards and regulation in different Member States could threats sufficient collaboration on EU level.	D 1.1, p 6. Legal interoperability
E.2	Semantic interoperability	Education	Missing code lists of necessary objects in the education domain	An EU-wide multilingual code list of objects in education domain is necessary in order to facilitate effective data exchange between different countries. For instance, universities and courses would be easily identifiable by those code lists. This code list will provide a unique identification code for objects in education domain.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc. D 1.2, p 80. Estonian e-Census

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
E.3	Semantic interoperability	Education	Missing common standards for educational data exchange on European level	Lack of common standard and framework for exchange of electronic educational information at Europe level can threat implementation of the scenario in this domain.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc. D 1.2, p23. Estonian Central Health Information System and Patient Portal
E.13	Semantic interoperability	Education	Lack of bilateral digital learning agreement between HEIs	Bilateral digital Learning Agreements between universities will facilitate mapping of courses and credits achieved by student in the host university to the education system of the home university. This agreement could overcome the lingual issue as well.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc.
E.17	Semantic interoperability	Education	Lack of competency matching for ECTS interoperability	ECTS enables student to mapping and transferring the credits that achieved in one university to other universities. However, matching the competency is challenging.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc.
SP.6	Semantic interoperability	Social protection	Lack of EU-wide common semantic standard	Secure exchange of information is one of the fundamental requirement for the implementation of the OOP. Lack of common standard and framework for secure exchange of electronic information has been identified as a critical gap in this domain.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc. D 1.2, p23. Estonian Central Health Information System and Patient Portal
T.4	Semantic interoperability	Taxation	Need of the code lists of necessary objects in the taxation domain	A multilingual code list of objects in the taxation domain on European level is necessary in order to facilitate effective data exchange between different countries.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc. D 1.2, p 80. Estonian e-Census

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
T.5	Semantic interoperability	Taxation	Lack of EU-wide common semantic standard for taxation data exchange	The lack of common standard and framework for exchange of electronic taxation information on European level is a gap to reach the scenario in this domain.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc. D 1.2, p23. Estonian Central Health Information System and Patient Portal
T.13	Semantic interoperability	Taxation	Lack of semantic enabler to map tax report from foreign country	Citizen in this scenario receive tax reports from both home and foreign countries; however, sufficient semantic enabler is needed to make reports from foreign country understandable for citizen.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc.
T.14	Semantic interoperability	Taxation	Lack of EU-wide unique identification for companies and taxpayers	Unique identification for companies on EU level could facilitate sufficient collaboration between national entities and private companies to enhance implementation of this scenario.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc.
M.6	Semantic interoperability	Moving	Need for code lists in the vehicle domain	Multilingual code lists at European level are necessary in order to facilitate effective data exchange in this domain.	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc. D 1.2, p 80. Estonian e-Census
M.16	Semantic interoperability	Moving	Lack of multilingual portals and Information Systems on national level	National portals and Information systems have to provide services at least in two languages (English and local language).	D 1.1, p 7. Semantic interoperability such as standards taxonomies, common terminology, etc.
H.7	Technical interoperability	Health	Lack of essential infrastructures, including information systems and portals on national level	Infrastructures such as national portals and information systems provide essential base for the cross-border implementation of the OOP in different domains. Lacks of these infrastructures (e.g. pharmacy portals in this scenario) have been identified as existing gap.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
H.8	Technical interoperability	Health	Lack of EU-wide eDelivery building block in health domain	Absence of the EU level, eDelivery building block prevents direct connection between independent government organizations (and businesses).	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
H.12	Technical interoperability	Health	Uncertainties about technical stability	In general, technical stability is essential for smooth implementation of all scenarios. Particularly in medical services it is very crucial to have stable technical infrastructure.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
E.4	Technical interoperability	Education	Secure transport protocol not established in a cross-border matter	eDelivery exists as a EU building block to facilitate secure data transaction in cross border as well as cross-domain matters; however, it has to be implemented in different sectors including education and taxation. EU-wide secure transport protocols are pre-requirement for secure data exchange that is fundamental base for OOP implementation.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
E.5	Technical interoperability	Education	Lack of use of EMREX as an EU-wide mapping tool	This mapping tool has to be connected as a module to the HEIs in all Member States to be used in a cross-border manner. Currently, HEIs in just six Member States have the possibility to connect.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
E.6	Technical interoperability	Education	Lack of connection between local systems to the European OOP infrastructure(incl. KLIPS, ÖIS, and SIAS)	National information systems are fundamental base for decentralised cross-border OOP implementations. Therefore, the information systems have to connect with existing modules that enable cross-border operation and data exchange (e.g. with mapping tools such as EMREX).	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
E.7	Technical interoperability	Education	Cross-border use of eID not implemented across all Member States	According to eIDAS regulation (EU regulation 910-2014), cross-border recognition of national eIDs will be mandatory from September 2018. However, it was not mandatory at the time of scenario development.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
E.10	Technical interoperability	Education	ESC is not yet widely implemented	ESC supports the host university to check student's education status and ease student identification as well as transfer of students report. However, it is not implemented in all Member States.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
E.16	Technical interoperability	Education	Absence of national eID (Lack of unique identification of subjects)	Unique identification for subjects such as students is needed to facilitate efficient identification and authentication. While national eIDs implemented in most of the Member States, national eID Schemes are in developing phase in countries such as Bulgaria, Cyprus, Czech republic, France, Greece, Italy, Poland, and Romania.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
E.14	Technical interoperability	Education	Limitation of eID for covering educational information	Further development of eID to facilitate confirmation of students' educational status as well as educational data exchange, could leads to elimination of ESC and further simplification of the scenario. Then eID could be enough for identification and authentication of students as well as verification of their educational status.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
SP.13	Technical interoperability	Social protection	Lack of EU-wide secure transport protocols	eDelivery exists as a EU building block to facilitate secure data transaction in cross border as well as cross-domain matters; however, it has to be implemented in the this area.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
T.6	Technical interoperability	Taxation	Lack of secure transport protocols in communication	The eDelivery has to be implemented in this area to facilitate secure data exchange that is fundamental base for the OOP implementation.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
T.7	Technical interoperability	Taxation	Lack of connection between local systems (TAXIS, FON) to the European OOP infrastructure	National information systems are fundamental base for decentralised cross-border OOP implementations. Therefore, the information systems have to connect with existing modules that enable cross-border operation and data exchange (e.g. with mapping tools).	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
T.8	Technical interoperability	Taxation	Missing of an eID enabler to connect national digital ID systems	According to eIDAS regulation (EU regulation 910-2014), cross-border recognition of national eIDs will be mandatory from September 2018. However, it was not mandatory at the time of scenario development.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
T.9	Technical interoperability	Taxation	Absence of national eID	While national eIDs are implemented in most of the Member States, national eID Schemes are in developing phase in Bulgaria, Cyprus, Czech republic, France, Greece, Italy, Poland, and Romania.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
M.4	Technical interoperability	Moving	Lack of EU-wide data exchange accepted by all Member States (EUCARIS)	EUCARIS has to be put in place by all Member States as an exchange infrastructure in order to facilitate secure data exchange on cross-border level.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
M.10	Technical interoperability	Moving	Absence of national eID	While national eIDs are implemented in most of the Member States, national eID Schemes are in developing phase in Bulgaria, Cyprus, Czech republic, France, Greece, Italy, Poland, and Romania.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
M.11	Technical interoperability	Moving	Secure and transparent ePayment is not enabled in all Member States and in a cross-border manner	ePayment does not facilitates secure and transparent payment in all Member States.	D 1.1, p 7-8. Technical interoperability /Technical enablers such as secure networks and infrastructure
H.1	Interoperability governance	Health	Lack of Service Level Agreement (SLA)	Participating bodies often exchange information basis on the bilateral agreements. It would be better to standardise these contracts and open the services on basis of multilateral SLA.	D 1.1, p 8. Interoperability governance / Governance mechanisms
H.13	Interoperability governance	Health	Potential conflict between legal, semantic, organisational, and technical interoperability enablers	Legal, semantic, organisational, and technical interoperability enablers are needed for seamless interoperability between different entities. Moreover, all these interoperability enablers should match each other's. (Lack of harmony between different interoperability enablers could threat smooth interoperability)	D 1.1, p 8. Interoperability governance / Governance mechanisms
SP.3	Motivators	Social protection	Offering service for non-popular situation	Delivering baby in the foreign country could be considered as a non-popular occasion.	D 1.1, p 8. Motivators, benefits, and public value

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
SP.4	Motivators	Social protection	Not comprehensive coverage of related services in this domain	This scenario emphasise on the issue of the birth certificate. Further development of the scenario to including extra procedures such as automatic allowance of child benefit from the home country or payment in the hospital could further motivation citizens.	D 1.1, p 8. Motivators, benefits, and public value
H.4	Data protection and privacy	Health	Lack of possibility for citizens to limit access to their medical data	The patients should be able to forbid doctors and other data consumers in this scenario to access their health information. In Estonia, patients may do this in patient portal	D 1.1, p 8. Data protection and privacy
H.5	Trust and transparency	Health	Lack of a clear concept and solution for the consent of data subject for the data sharing	Data subjects' consent is essential requirement for data sharing on both domestic and EU level. This is not facilitated by current infrastructures. In this scenario, patient should be able to provide consent for data sharing to the specific pharmacy in the foreign country.	D 1.1, p 8. Trust and transparency
H.6	Trust and transparency	Health	Non-transparent use and access of citizens' data	Patients should be able to see their up-to-date medical data as well as to check whom, when, and why access their personal and medical data. This is currently facilitated for Estonian patient; though, it should be implemented in all other Member States as well.	D 1.1, p 8. Trust and transparency
H.14	Trust and transparency	Health	Lack of solution for data sharing consent in emergencies	In Emergency situations, when patient cannot provide data sharing consent to the pharmacy. They should be able to access to the patient's ePrescription to provide emergency services.	D 1.1, p 8. Trust and transparency
E.8	Trust and transparency	Education	Missing transparency about access and use of students' data for students	Transparency is an essential issue in order to accept a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. At the end, data subject should be able to see whom, when, and why access their personal data.	D 1.1, p 8. Trust and transparency
E.11	Trust and transparency	Education	Lack of a clear concept and solution for the consent of students for the data sharing	Student as a data subject has to provide consent to host university for data sharing.	D 1.1, p 8. Trust and transparency
SP.2	Trust and transparency	Social protection	Lack of clear definition and solution for the consent of parents for data sharing	Parent's (data subject) consent is necessary for data sharing on both national and EU level. However, clear definition is not existing on EU level and current infrastructures do not facilitate it.	D 1.1, p 8. Trust and transparency

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
SP.7	Trust and transparency	Social protection	Non-transparent access and use of personal data	Transparency is an essential requirement for acceptance of a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. In this scenario, parents should be able to see which authorities (especially when personal data is stored cross-border) have possibility to see their (parents and new-born) personal data and who, where, and why used their personal data. However, current information systems do not facilitate it.	D 1.1, p 8. Trust and transparency
T.10	Trust and transparency	Taxation	Lack of transparency about access and use of citizen data	Transparency is an essential issue in order to accept a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. Data subject should be able to check whom, when, and why access or use their data.	D 1.1, p 8. Trust and transparency
T.12	Trust and transparency	Taxation	Lack of a clear concept and solution for the consent of data subject for the data sharing	Data subject should be able to provide consent for data sharing. According to some national legislations data subject's consent is necessary in order to exchanging data. However, it is not facilitated by current infrastructures.	D 1.1, p 8. Trust and transparency
M.7	Trust and transparency	Moving	Missing transparency on access and use of data	Transparency is an essential issue in order to accept a public service. This needs political commitments, and regulations to ensure legal interoperability as well as technical infrastructures that facilitate them. Data subject should be able to check whom, when, and why access or use their data.	D 1.1, p 8. Trust and transparency
M.12	Trust and transparency	Moving	Lack of concept and solution of data subject for data sharing	Data subject should be able to provide consent for data sharing. According to some national legislations including German legislation, data subject's consent is necessary in order to exchanging data. However, it is not facilitated on cross-border level.	D 1.1, p 8. Trust and transparency
M.8	Trust and transparency	Moving	lack of possibility for data subject to see which data is transferred or will be stored	Data subject should be aware on what kind of data is exchanged (either on domestic or on EU level) and what additional data will be stored. However, current services do not covering this issue.	D 1.1, p 8. Trust and transparency

No.	Barrier type	Scenario Domain	Name of gap	Brief description of gap	Related barrier identified in WP1
M.13	Citizen-centred design	Moving	Not sufficient consideration of the real needs of the citizens	Missing knowledge about the real needs of the individuals in the moving domain could leads to inaccurate design and implementation as well as less acceptance of the service by citizens as end users.	D 1.1, p 9. Citizen-centred design
M.15	Citizen-centred design	Moving	Non-sufficient service for people with disabilities	The specific needs of the disabled citizens are not facilitated by current infrastructures. Consequently, they cannot participate in this scenario. For instance, portals do not facilitate use of people with visual impairments.	D 1.1, p 9. Citizen-centred design
E.9	Data quality	Education	Lack of a clear concept and solution for the (manual) approval of automatically mapped data	Manual approval of shared (mapped) data should be facilitated by an authorised position in each data environment. This will lead to higher trust and acceptance of the service by citizens.	D 1.1, p 9. Data quality
SP.8	Data quality	Social protection	Lack of a clear concept and solution for the (manual) approval of automatically mapped data	An authorised person in both countries should facilitate manual approval of (automatic) mapped data. This will lead to higher trust in and acceptance of the service by citizens.	D 1.1, p 9. Data quality
T.11	Data quality	Taxation	Lack of a clear concept and solution for the (manual) approval of automatically mapped data	An authorised person in both countries should facilitate manual approval of (automatic) mapped data. This will lead to higher trust in and acceptance of the service by citizens.	D 1.1, p 9. Data quality

Further semantic interoperability enablers were recognised as a critical need in order to support the implementation of the future scenarios. For instance, the “lack of multilingual code lists” was considered as an existing gap in the education, taxation, and moving scenarios. As different countries have various entities related to each domain, which might differ between countries, code lists can facilitate the mapping of data in many cross-border services in a simple and cost-effective manner. Regarding to the education scenario, code lists can be used to map educational resources along competencies in order to simplify students’ transcripts of records to be transferred from one country to another (including to overcome language barriers). Moreover, the digital data exchange between public authorities and citizens as well as among the authorities requires common data exchange standards on national as well as on the European level in all five scenario domains. Although there are already a variety of data exchange standards on the EU level, the lack of the use of such standards was identified as a common gap in the domains studied.

Finally, trust and transparency is another frequently occurring category where a number of gaps was identified in the different scenarios. Most of the existing information systems, portals, or other building blocks do not facilitate the possibility for citizens to provide (or deny) data sharing consent nor provide an overview over who has accessed when and for what purpose their personal data. Consequently, the “non-transparent access and use of personal data” and the “lack of a clear concept and solution for the consent of data subject for the data sharing” are two important gaps in this category.

Table 20 sums up the 76 gaps along the barrier types and per domain studied. The numbers of the identified gaps in the different types are highly distributed. The highest number of gaps, eighteen, was identified within the technical interoperability classification, while only one gap was recognised relating to the data protection and privacy type. The numbers of the identified gaps in legal and semantic interoperability as well as trust and transparency are close to the high number of the technical interoperability type. Similar to the low number of the identified gaps related to data protection and privacy, three or less gaps have been associated with the enabler types interoperability governance, motivators, citizen-centred design, and data quality. In contrary to the high distribution in between the enabler types, the number of gaps in the different domains are more coherent, ranging from thirteen gaps in the social protection domain to eighteen gaps in the education domain.

Table 20: Identified gaps in each scenario domain grouped by category of barriers

Barrier type	Education	Social protection	Taxation	Moving	Health	Total
Political commitment	2	2	1	2	1	8
Legal interoperability	2	4	2	5	4	17
Semantical interoperability	4	1	4	2	-	11
Technical interoperability	7	1	4	3	3	18
Interoperability governance	-	-	-	-	2	2
Motivators	-	2	-	-	-	2
Data protection and privacy	-	-	-	-	1	1
Trust and transparency	2	2	2	3	3	12
Citizen-centred design	-	-	-	2	-	2
Data quality	1	1	1	-	-	3
Total	18	13	14	17	14	76

The analysis in this deliverable also looked into potential benefits for different stakeholder groups and potential impact of the OOP implementation on society and economy. Table 21 lists benefits expected for each group of stakeholders that are involved in the future scenarios. The list of potential benefits is grouped into the domains studied - with the first category 'General' listing the benefits and impact applying to all scenario domains. While for the education domain, no specific further benefits than those listed under 'general' could be identified, such further specific benefits were identified for the other four domains, mainly for the health and taxation domains. The list of potential benefits is structured further into the stakeholder types, stakeholder groups and roles according to D 2.1, and finally the description of the potential benefits, which explain how the different stakeholders may benefit from the OOP implementation in the corresponding domain.

Table 21: Overview of potential benefits per stakeholder type and stakeholder role identified in the five OOP domains, and potential impact on society and economy

Stakeholder type	Stakeholder group	Stakeholder role	Description of benefits
<i>Potential general benefits</i>			
Citizen	Students Tax payers Patients Parents	Data recorder Data subject	Administrative burden reduction The OOP implementation facilitates cross-border data exchange between public administration offices. Therefore, citizens do not need to provide any data that previously was supplied to public agencies at any level and in any Member States. This will lead to: - Cost and time saving - Higher level of mobility - Simplification of the process
Government	HEIs Tax authorities Ministries of finance Ministries of interior	Data consumer Data provider Data controller	- Administrative burden reduction - Less effort for employees could lead to higher quality of work and higher satisfaction with the work environment - Cost reduction through less paperwork between public entities
Government	HEIs Tax authorities Ministries of finance Ministries of interior Vehicle Registration Authority	Data consumer Data controller	Public administration offices will receive higher quality data (i.e. fewer errors) directly from authorised sources.
Government	HEIs Tax Authorities Ministries of finance Ministries of interior	Data provider Data recorder Data controller	Implementation of the OOP could lead to lower level of fraud and corruption because of transparent and secure data exchange.
Government	Employees	Data consumer Data provider	Less burden on public administration employees will lead to: - Time saving - Public administration offices will share unified and mapped data at cross-border level, as a result there are less translation errors - Public administration offices do not need to deliver paper documents to citizens

Stakeholder type	Stakeholder group	Stakeholder role	Description of benefits
<i>Potential benefits in the health domain</i>			
Citizen	Patients	Data subject Data recorder	Patients have the same level of access to health service from their home or foreign country.
Citizen	Patients	Data subject Data recorder	Patients will experience a higher level of health service in general.
Citizen	Patients	Data subject	Patients will experience a higher level of transparency, as they can see their health record and prescriptions from patient portal by using their eID. In addition, they can check who, when, and why has access to their medical data.
Business	Doctors	Data consumer Data provider Data recorder	<ul style="list-style-type: none"> - Administrative burden reduction for doctors - Doctors will save more time - Doctors will have access to all amiable personal and medical data of patient and do not need to enter data that contains in other registers - A physical visit to the doctor is not required for issuing a recurrent prescription for chronic patients
Business	Doctors	Data consumer	Attending doctors are able to see which prescriptions (both previous and current) a patient has from other doctors in order to assess pharmaceutical interactions. In addition, the doctors can check if the medicine was dispensed or not.
Business	Pharmacists	Data consumer Data provider	Process of dispensing medicine is fully automated and pharmacists do not need to read paper-based prescriptions.
Government (Academia)	Researchers Universities Research institutes	Data consumer	Non-personal data is easy to use for statistics and analytics purposes.

Stakeholder type	Stakeholder group	Stakeholder role	Description of benefits
<i>Potential benefits in the taxation domain</i>			
Citizen	Taxpayers	Data recorder	Administrative burden reduction for citizens as tax payers by: <ul style="list-style-type: none"> - Prefilled forms for tax declaration (i.e. including income data and double taxation data) - Automatic deduction of income tax that was paid in another country
Government	Tax authorities Ministries of finance	Data consumer	Administrative burden reduction Ministry of Finance in tax resident country will directly receive data regarding to the income tax that was paid in other countries.
Government	Tax authorities Ministries of finance	Data consumer Data controller	Direct data exchange between tax authorities and employers (as authorised source of data) will lead to reduction of errors and fraud (i.e. taxation avoidance) and to higher quality of services in taxation domain.
Government	Tax authorities officers	Data consumer Data controller	Administrative burden reduction for tax authorities' officers as tax authorities will receive translated data that has been mapped to their taxation system and data will be exchanged in digital format as well. Therefore, no human effort will be needed for translation and mapping.
<i>Potential benefits in the moving domain</i>			
Citizens	Individuals as vehicle owners	Data subject Data recorder	Administrative burden reduction by: <ul style="list-style-type: none"> - SDG provide all necessary information in different language and redirects to responsible public authority that decreases the learning burden - All the information will be transferred automatically through the system. Ideally, citizens do not even have to pick up the documents, as they will be posted to them - Time and cost saving
<i>Potential benefits in the social protection domain</i>			
Government	Ministries of interiors	Data controller Data provider	Faster fulfilment of the legal obligations through sharing and re-using of data.
Government	Employees of ministry of interiors	Data consumer	Ministry of interior in the home country will receive record of birth certificate in multilingual standard forms which means no human effort will be needed for translation and mapping.

The benefits show that the reduction of all kinds of administrative burden is the most important benefit and is expected to materialise for all groups of stakeholders. The different burdens, including the learning, psychological, and compliance costs, could be overcome by the provision of access to complete, reliable, and up-to-date information in the desired domain (Moynihan, Herd, & Harvey, 2014). Thereby, stakeholders would not be hindered to receive and provide the necessary information.

Further benefits brought through the implementation of these OOP scenarios are time and cost savings for the majority of the stakeholder groups. All scenarios facilitate public online services for citizens that are easily and permanently accessible, mostly without the obligation to provide paper-based data, and with automated workflows. Therefore, the different stakeholder groups benefit from the simplified procedures and consequently achieve a higher level of satisfaction. In addition, as all scenarios are developed in a cross-border scope, all participating citizens will benefit from a higher level of mobility across Europe.

The different public and private organisations and institutes that participate in the scenarios will receive data, validated from an authorised source, which will lead to a higher quality of data. The data quality is additionally increased through the automated workflow, limiting the invalidation of data by human errors. Moreover, the OOP implementations may decrease the level of fraud and corruption through transparent processes. Therefore, the implementation of these cross-border OOP scenarios can bring a higher level of acceptance of the services and the public authorities in general. Summarising, all those benefits could lead to a higher level of participation of the citizens in the public sector and a higher level of trust.

The potential impacts of the OOP implementation on society and economy as elaborated along the scenario domains and as can be summarised by the benefits for the different stakeholder types along a higher quality of public service and a lower level of fraud and corruption will lead to

- Higher level of trust and satisfaction to the public sector
- Higher level of citizens' participation in public services
- Increased level of European integration
- Increased European citizens' satisfaction
- Economic growth and more inclusive digital society
- Development of sophisticated public services

Further positive impacts potentially resulting of a successful cross-border OOP development could affect society and economy as a whole, leading to economic growth and a more inclusive digital society.

4.2. Prioritisation of challenges, needs, and benefits

The gaps and benefits that were synthesised in section 4.1 were analysed further to assign a priority of their influence on the successful implementation of the OOP. Table 23 lists the gap number and name of gap along with the barrier type and scenario domain. On the right side, each individual gap is assigned a priority according to the classification described in section 2.3. To gain a balanced prioritisation and to involve the stakeholder community and steering board members, the priority was iteratively evaluated by the project partners and verified by the stakeholder community and the steering board members in separate sessions. At first, each identified gap was prioritised by the individual project partners for their responsible scenario. The results of this iteration are shown in the column "1st round". After further deliberation along a face-to-face meeting, the project partners concluded their prioritisation as shown in the column "2nd round". The stakeholders of the sixth stakeholder workshop conducted the third and final assessment of the prioritisation shown in the column "3rd round". Subsequently, during the steering board meeting in Brussels on the following day, the steering board members verified the priority and confirmed most of the priorities assigned along the stakeholder workshop (cf. column "3rd round"). Based on the inputs in the three rounds, the final priority was calculated as shown in the last column "Overall" with the coding scheme as shown in Table 22. Gaps missing priority in one or two rounds were either identified during the later iterations or not discussed during the corresponding iterations.

Table 22: Coding scheme for the final prioritisation of gaps

Final gap priority	Argumentation
Critical	<p>If 'critical' in all three rounds, the final prioritisation is clearly critical;</p> <p>If 'critical' in second and third round, the final prioritisation is clearly critical;</p> <p>If 'critical' in third round (consultation with the stakeholders and steering board) and partners assigned 'high' in second round, then the final prioritisation also results in 'critical', as the stakeholder community and steering board members confirm this.</p>
High	<p>If 'high' in all three rounds, the final prioritisation is clearly high;</p> <p>If 'high' in second and third round, the final prioritisation is clearly high;</p> <p>If 'high' in third round, while partners assigned 'critical' in second round, precedence is given to stakeholders' assessment, resulting in middle;</p> <p>If partners' assigned 'critical' in the second round and stakeholder community and steering board members assigned 'middle' (and vice versa), the final prioritisation will be high (balancing weights among partners' and stakeholders' assessment);</p> <p>If 'middle' in round two and 'high' in round three, the final priority will be high (giving weight to the stakeholder community's assessment);</p> <p>If 'low' in round two and 'critical' in round three, the final priority will be high (balancing weights among partners' and stakeholders' assessment, with more weight on the stakeholder assessment);</p>
Middle	<p>If 'middle' in all three rounds, the final prioritisation is clearly middle;</p> <p>If 'middle' in second and third round, the final prioritisation is clearly middle;</p> <p>If partners' assigned 'high' in the second round and stakeholder community and steering board members assigned 'middle', the final prioritisation will be 'middle' (giving more weight to the stakeholders' assessment)</p> <p>If partners' assigned 'high' in the second round and stakeholder community and steering board members assigned 'low', the final prioritisation will be 'middle' (balancing weights among partners' and stakeholders' assessment)</p> <p>If partners' assigned 'critical' in the second round and stakeholder community and steering board members assigned 'low', the final prioritisation will be 'middle' (balancing between partners' assessment in the project meeting and the stakeholders' assessment, with more weight on stakeholder assessment)</p> <p>If 'low' in round two and 'middle' in round three, final prioritisation is middle (giving more weight to the stakeholders' assessment)</p>
Low	<p>If 'low' in all three rounds, the final prioritisation is clearly low;</p> <p>If 'low' in second and third round, the final prioritisation is clearly low;</p> <p>If 'middle' in round two and 'low' in round three, final prioritisation is low (giving more weight to the stakeholders' assessment)</p>

Table 23: Priority of identified gaps

Nr	Barrier type	Scenario Domain	Name of gap	Priority			
				1 st round	2 nd round	3 rd round	Overall
H.3	Political commitment	Health	Lack of political commitments on ministerial level in the health domain				
E.1	Political commitment	Education	Lack of sufficient political commitment on national and European level				
E.15	Political commitment	Education	The contrast between the concepts of the flexibility of teaching and EU-wide standardisation	N/A	N/A		
SP.5	Political commitment	Social protection	Lack of sufficient political commitment at national level				
SP.11	Political commitment	Social protection	Limitation on possibility of birth certificate issuance in different languages	N/A		N/A	
T.3	Political commitment	Taxation	Lack of sufficient political commitment on national level				
M.3	Political commitment	Moving	Lack of political commitment with focus on moving on national level in both countries				
M.5	Political commitment	Moving	Lack of sufficient political commitment on national level				
H.2	Legal interoperability	Health	Lack of clear implementation guides of national and European legislations				
H.9	Legal interoperability	Health	Contrasting bilateral agreement between Member States	N/A		N/A	
H.10	Legal interoperability	Health	Lack EU-wide regulation on insurance	N/A	N/A		
H.11	Legal interoperability	Health	Different proficiency requirements for pharmacist among Member States	N/A	N/A		
E.12	Legal interoperability	Education	Lack of regulations on national and European level to assure secure, effective, and transparent digital transmission of personal and educational data between Member States				
E.18	Legal interoperability	Education	Various implementation in different Member States according to a single EU regulation	N/A		N/A	
SP.1	Legal interoperability	Social protection	Lack of national regulation to assure secure, effective, and transparent data exchange				
SP.9	Legal interoperability	Social protection	Lack of EU-wide standards on required data for issuing birth certificate	N/A	N/A		
SP.10	Legal interoperability	Social protection	Diverse legal settings on birth registration procedure in different countries	N/A		N/A	
SP.12	Legal interoperability	Social protection	Uncertainty of legal requirements for cross-border scenario	N/A		N/A	

Nr	Barrier type	Scenario Domain	Name of gap	Priority			
				1 st round	2 nd round	3 rd round	Overall
T.1	Legal interoperability	Taxation	Lack of EU-wide regulation on double taxation				
T.2	Legal interoperability	Taxation	Lack of regulation on secure data exchange between public and private entities				
M.1	Legal interoperability	Moving	Lack of EU agreement on compensations in case of accidents				
M.2	Legal interoperability	Moving	Lack of EU regulation for harmonising car's insurance				
M.9	Legal interoperability	Moving	Lack of legal interoperability and regulation on national and EU level				
M.14	Legal interoperability	Moving	Missing right for data subjects to request their old personal data	N/A	N/A		
M.17	Legal interoperability	Moving	Different ecological standards on national level	N/A	N/A		
E.2	Semantic interoperability	Education	Missing code lists of necessary objects in the education domain				
E.3	Semantic interoperability	Education	Missing common standards for educational data exchange on European level				
E.13	Semantic interoperability	Education	Lack of bilateral digital learning agreement between HEIs	N/A			
E.17	Semantic interoperability	Education	Lack of competency matching for ECTS interoperability	N/A	N/A		
SP.6	Semantic interoperability	Social protection	Lack of EU-wide common semantic standard				
T.4	Semantic interoperability	Taxation	Need of the code lists of necessary objects in the taxation domain				
T.5	Semantic interoperability	Taxation	Lack of EU-wide common semantic standard for taxation data exchange				
T.13	Semantic interoperability	Taxation	Lack of semantic enabler to map tax report from foreign country	N/A	N/A		
T.14	Semantic interoperability	Taxation	Lack of EU-wide unique identification for companies and taxpayers	N/A	N/A		
M.6	Semantic interoperability	Moving	Need for code lists in the vehicle domain				
M.16	Semantic interoperability	Moving	Lack of multilingual portals and Information Systems on national level	N/A		N/A	
H.7	Technical interoperability	Health	Lack of essential infrastructures, including information systems and portals on national level				
H.8	Technical interoperability	Health	Lack of EU-wide eDelivery building block in health domain				
H.12	Technical interoperability	Health	Uncertainties about technical stability	N/A	N/A		
E.4	Technical interoperability	Education	Secure transport protocol not established in a cross-border matter				

Nr	Barrier type	Scenario Domain	Name of gap	Priority			
				1 st round	2 nd round	3 rd round	Overall
E.5	Technical interoperability	Education	Lack of use of EMREX as an EU-wide mapping tool				
E.6	Technical interoperability	Education	Lack of connection between local systems to the European OOP infrastructure (incl. KLIPS, ÔIS, and SIAS)				
E.7	Technical interoperability	Education	Cross-border use of eID not implemented across all Member States				
E.10	Technical interoperability	Education	ESC is not yet widely implemented				
E.16	Technical interoperability	Education	Absence of national eID (Lack of unique identification of subjects)				
E.14	Technical interoperability	Education	Limitation of eID for covering educational information	N/A		N/A	
SP.13	Technical interoperability	Social protection	Lack of EU-wide secure transport protocols	N/A		N/A	
T.6	Technical interoperability	Taxation	Lack of secure transport protocols in communication				
T.7	Technical interoperability	Taxation	Lack of connection between local systems (TAXIS, FON) to the European OOP infrastructure				
T.8	Technical interoperability	Taxation	Missing of an eID enabler to connect national digital ID systems				
T.9	Technical interoperability	Taxation	Absence of national eID				
M.4	Technical interoperability	Moving	Lack of EU-wide data exchange accepted by all Member States				
M.10	Technical interoperability	Moving	Absence of national eID				
M.11	Technical interoperability	Moving	Secure and transparent ePayment is not enabled in all Member States and in a cross-border manner				
H.1	Interoperability governance	Health	Lack of Service Level Agreement (SLA)				
H.13	Interoperability governance	Health	Potential conflict between legal, semantic, organisational, and technical interoperability enablers	N/A	N/A		
SP.3	Motivators	Social protection	Offering service for non-popular situation				
SP.4	Motivators	Social protection	Not comprehensive coverage of related services in this domain				
H.4	Data protection and privacy	Health	Lack of possibility for citizens to limit access to their medical data				

Nr	Barrier type	Scenario Domain	Name of gap	Priority			
				1 st round	2 nd round	3 rd round	Overall
H.5	Trust and transparency	Health	Lack of a clear concept and solution for the consent of data subject for the data sharing				
H.6	Trust and transparency	Health	Non-transparent use and access of citizens' data			N/A	
H.14	Trust and transparency	Health	Lack of solution for data sharing consent in emergency situations	N/A		N/A	
E.8	Trust and transparency	Education	Missing transparency about access and use of students' data				
E.11	Trust and transparency	Education	Lack of a clear concept and solution for the consent of students for the data sharing				
SP.2	Trust and transparency	Social protection	Lack of a clear concept and solution for the consent of parents for the data sharing				
SP.7	Trust and transparency	Social protection	Non-transparent access and use of personal data				
T.10	Trust and transparency	Taxation	Lack of transparency about access and use of citizen data				
T.12	Trust and transparency	Taxation	Lack of a clear concept and solution for the consent of data subject for the data sharing				
M.7	Trust and transparency	Moving	Missing transparency on access and use of data				
M.12	Trust and transparency	Moving	Lack of concept and solution of data subject for data sharing				
M.8	Trust and transparency	Moving	Lack of possibility for data subject to see which data is transferred or will be stored	N/A	N/A		
M.13	Citizen-centred design	Moving	Not sufficient consideration of the real needs of the citizens	N/A		N/A	
M.15	Citizen-centred design	Moving	Non-sufficient service for people with disabilities	N/A		N/A	
E.9	Data quality	Education	Lack of a clear concept and solution for the (manual) approval of automatically mapped data				
SP.8	Data quality	Social protection	Lack of a clear concept and solution for the (manual) approval of automatically mapped data				
T.11	Data quality	Taxation	Lack of a clear concept and solution for the (manual) approval of automatically mapped data				

Table 24 summarises the gaps per priority. The overall assessment shows a rather balanced matrix among the four values of priority. Among the gaps prioritised as 'critical', the two main barrier types are lack of political commitment and lack of semantic interoperability with four 'critical' gaps in each of these barrier types. In the group of gaps with 'high' priority, the lack of legal interoperability counts most gaps (9 out of 24), followed by technical interoperability gaps (7) and semantic interoperability gaps (4). In the group of gaps with middle priority, technical interoperability and trust and transparency count most gaps (6 each), followed by political commitment with four gaps.

Table 24: Overview of gaps with final priority assignment

Barrier type	Critical	High	Middle	Low	Total
Political commitment	4	-	4	-	8
Legal interoperability	1	9	1	6	17
Semantical interoperability	4	4	2	1	11
Technical interoperability	1	7	6	4	18
Interoperability governance	1	1	-	-	2
Motivators	-	1	-	1	2
Data protection and privacy	-	-	-	1	1
Trust and transparency	2	1	6	3	12
Citizen-centred design	2	-	-	-	2
Data quality	-	1	2	-	3
Total	15	24	21	16	76

Table 25: Benefits for service users, corresponding impact, and assessment of the level of contribution

Benefits for service users (Citizens/ Businesses)	Level of contribution to benefits	Corresponding impact on society	Level of contribution to impact
ABR through cost saving	High	Higher level of satisfaction on public sector services Higher quality of life	High
ABR through time saving	High		
ABR through simplification of the public sector services/ Higher quality of public sector services	High		
Higher level of EU mobility	Medium	More integrated EU	Medium
Higher level of transparency in public sector services	Medium	Higher level of trust on government	Medium
Easier and better communication between service users and service providers	High	Higher level of citizens' participation in public sector	High
Easy and inclusive access to public services and required data/ information throughout EU Member States	High	Inclusive digital society Higher acceptance of the EU Ecological impact (less paper needed)	High

In Table 25 (for service users) and Table 26 (for service providers), the expected benefits for different stakeholder groups were linked to their potential impact on the society or economy. Moreover, the possible benefits and their impacts were prioritised in three levels: high, medium, or low. The tables are separated to show the different benefits for citizens and businesses that are categorised as service users, and the possible benefits for governments

and public service providers, categorised as service providers. Moreover, the benefits for service users are connected to benefits on the society, while benefits for service providers are expected to have impact on the economy. Five out of seven expected benefits for service users were classified as high, leaving two benefits classified as medium. The impacts on the society are expected to have the same level of contribution as the corresponding benefits. From five likely benefits for the service providers, four benefits were classified as high and one as low. Finally, all corresponding impacts on the economy were assigned a high level of contribution.

Table 26: Benefits for service providers, corresponding impact, and assessment of the level of contribution

Benefit for service providers (Public administrations, others)	Level of contribution to benefits	Corresponding impacts on economy	Level of contribution to impact
ABR through less effort, time saving, and automated workflow	High	Development of higher sophisticated public services	High
ABR through cost reduction by fewer human effort needed as well as less paperwork	High	Lower level of fraud and corruption	High
Higher quality of data/ fewer transaction errors	High	More integrated EU	High
Easier and better communication between service providers at national and EU level	High	Effective use of resources and restructuring of unnecessary processes	High
Better overview over the statistics incl. used service	Low		

5. LESSONS LEARNED AND CONCLUSIONS

This deliverable aimed to investigate the needs, gaps and benefits of cross-border OOP implementations and to analyse the priority and impact of the identified aspects. The results will be considered during the roadmapping procedures and the following work within work package 4, as the evaluated gaps represent preliminary indications for needed actions and the benefits and impacts can be used to assess these actions.

The analysis of gaps, benefits, and impact is based on the inputs of Deliverables 1.1, 1.2 and 2.2. Since the cross-border maturity of once-only principle implementations at the European level is at an early stage, a set of future scenarios were developed to demonstrate possible OOP implementations in a cross-border context. These future cross-border scenarios aim to illustrate the main characteristics of a seamless cross-border implementation of the OOP in the five domains: education, social protection, taxation, moving and health. These domains reflect the SDGR categorisation for information areas related to citizens and businesses.

In addition to the evaluation from the partners, the identified gaps and benefits in the different scenarios as well as their prioritisation reflect the views of citizens as well as employees from the public and private sector. During five stakeholder workshops, the participants were eagerly contributing to the interactive sessions, thereby showing the high value of the topic and these discussions. Along the discussions, the main concerns were formulated towards political commitment, the legal conditions to enable cross-border OOP solutions, semantic and technical building blocks needed, and the establishment of trust and transparency in the data sharing among public (and private) agencies on personal data of the data subjects. The amplitude of gaps in these gap categories form the most basic requirements for successful OOP implementations.

The highest prioritisation was set to the legal interoperability gaps, where nine gaps were classified as high. Most of those can be combined to the general lack of regulations to support the workflows of the OOP implementations. This kind of redundancy occurred not only for the legal gaps. In fact, the synthesis and analysis showed that several gaps were repeated throughout the different scenarios. Within the technical gaps the mostly named challenge was the missing or inefficient implementation of eIDs across the Member States. The high emergence is basing on the eID being a main enabler within the scenarios. Nevertheless, the secure identification and authentication is the key for the successful data sharing, which is the essence of the OOP. The education scenario shows a possibility to fulfil the scenario without (or with limited use of) the eID by introducing the European Student Card. The participants acknowledged this workaround, which is seen in the overall medium prioritisation of the corresponding gaps. Therefore, the analysis showed that a high occurrence of gap must not be a high obstruction for the OOP. Accordingly, it is reasonable to concentrate on the gaps with the highest priority. These are four gaps from the semantic interoperability and three from the political commitment type. Political commitment is interconnected with and seen as a precursor to legal interoperability, as previously mentioned, the type of gaps with the second highest occurrence within the gap analysis. A similar connection is seen between the type of semantic interoperability with the highest number of critical gaps and the associated type of technical interoperability, which has the highest number of identified gaps overall. These correlations will be revised during the research on future areas of actions in the following deliverable D 4.2 in work package 4. As the actions will base on the results of this gap analysis, any logic succession will be detected and shown within suggested timetables for these actions.

During the development of the scenarios and the identification of gaps, partners defined possible benefits for the actors involved in the scenarios and the overall impacts on the society and the economy. The synthesis and analysis of them showed, similar to the gaps, redundancies and interconnections between the benefits and impacts. However, there was a general difference for benefits emerging from overcoming the gaps for service users and service providers. The service users, being citizens and businesses, benefit mainly from less manual steps in the use of and easier access to public services, while the service providers, like public administrations, benefit from simplified processes and a higher data quality. However, the general reduction of administrative burden is benefiting both groups with a high level of contribution. Additionally, the aspects of the administrative burden reduction between the groups are influencing each other. The automated workflows in public administrations lead to the simplification of the services for the citizens and the better communication between the users and providers of the public serviced lead to a higher data quality. The corresponding impacts of the different benefits can be associated as well. The development of higher sophisticated public services and a lower level of fraud and corruption would lead to higher trust in the government as well as higher level of satisfaction and participation in public sector services. These benefits and impacts show the importance of the implementation of the OOP; therefore, they are a key asset in the development of the future areas of actions and policy recommendations for

policy makers provided by the project. Moreover, the benefits and impacts can reflect the outcomes of the recommended actions that will be part of the roadmapping during the future efforts of the work package. Finally, the benefits and impacts will be used for the final review of the OOP4C vision developed by the project in D 1.1. The continuous reflection and verification of the project's results reassures and settles the direction of the work of the partners to establish a verified roadmap of future areas of actions for policy makers and implementers of the OOP for citizens to reach the full potentials of administrative burden reduction (D 4.2) and policy recommendations for policy makers to embed the OOP in a wider policy and public administration modernisation context (D 4.3).

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