D6.2 Business models for sustainability: design and implications

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List of Acronyms

Abbreviation / acronym	Description
AMB	Architectural Management Board
BB	Building Block
CA	Consortium Agreement
CEF	The Connecting Europe Facility
CFS	Certificate on the Financial Statements
DAO	Decentralized Autonomous Organisation
DBA	Doing Business Abroad (pilot)
DEP	Digital Europe Program
DGT	Digital Government Transformation
DLT	Distributed Ledger Technology (eg. Blockchains and Hashgraphs)
DoA	Description of Action
DSI	Digital Service Infrastructure
Dx.y	Deliverable number y, belonging to WP number x
EBA	European Blockchain Association
EBSI	European Blockchain Service Infrastructure
EBP	European Blockchain Partnership
EC	European Commission
EDIC	European Digital Infrastructure Consortium
ENISA	EU Agency for Cybersecurity
EUDI	EU Digital Identity
GA	Grant Agreement
GaaP	Government as a Platform
GaaS	Government as a Service
GCG	Gateway Coordination Group
GOFA	Governance, Operations, Financing and Architecture
IdP	Identity Provider
IQ	Interdisciplinary Questions
KPI	Key Performance Indicator
LE	Life Event
LoB	Line of Business
LSP	Large Scale Pilots
MA	Moving Abroad (pilot)
MCP	Multi-Country Project
MOR	Multilingual Ontology Repository
MS	Member State
NGO	Non-government Organisation
NIS	Network Information Security (Cooperation Group (NCG)
OMB	Operational Management Board

Abbreviation / acronym	Description
OOTS	Once Only Technical System
PA	Public Administration
PC	Project Coordinator
PM	Person-month
PMC	Platform Model Canvas
PRNA	Process, Rules, Norms and Actions
PSA	Project Start Architecture
QA	Quality Assurance
QM	Quality Manager
RASCI	Responsible/Accountable/Supportive/Consulted/Informed
RoI	Return on Investment
RP	Reporting Period
RTE	Real Time Economy
SBB	Solution Building Blocks
SC	Steering Committee
SDG	Single Digital Gateway (Regulation)
SDG-C	SDG-Committee
SoTA	State of The Art
SP	Service Provider
SSI	Self-Sovereign Identity
SA	Studying Abroad (pilot)
STO	Strategic Tactical and Operational
TIR	Trusted Issuer Registry
TL	Task Leader
VAS	Value-adding Services
VC	Verifiable Credential
WG	Working Group
WP	Work Package
WPL	Work Package Leader

Executive Summary

This document sets out to design new DE4A generic models and give the Member States (MS) and other stakeholders a starting point for appropriation in roadmaps. The purpose is to start to consider and create policy recommendations based on business models and how this has implications on roles and responsibilities as well as how to start road-mapping to mitigate risks and barriers in addition to considered social and monetary benefits. Due to the profile of the implicated actors as Member States, DE4A WP6 "Sustainable impact and new governance models" focuses on Governance rather than Business models per se.

This deliverable is an intermediate step towards the final deliverable which aims to solidify recommendations and visions for the outputs and outcomes of the project (D6.3 New models for shared delivery of common services roadmap, due in December 2022). Therefore, draft roadmaps are already included in this deliverable, but not with the intention to come to final conclusions on governance models. Not everything found in this document will find it is a way to the final deliverable because it is a step on the journey to develop and solidify the discussions, while trying to work in an agile way bringing in the latest developments from the Single Digital Gateway (SDG) and market developments.

The Member States have given input to both new Governance as well as business models as a starting point for the road-mapping activities. The section on Governance and new roles for the MS agencies and the EC is currently a collection of experiences and facts from different projects and the latest SDG envisioned governance. DE4A hopes to give concrete feedback in D6.3 New models for shared delivery of common services roadmap for the setup of the Single Digital Gateway (SDG). It is also well understood that there are several constraints in the regulation and acts themselves that need to be considered.

For the "business-modelling", especially focused on public agencies, the focus is on the three DE4A pilot services (Studying Abroad, Doing Business Abroad, Moving Abroad) but with the aim of also finding generic parts for all SDG services as well as other cross-border services demanded by the citizens. WP6 tries to describe and understand the shift from Platform Models to Protocol Models at the same time as DE4A Member States focus on the practical implications for Governance merging EBSI and Digital Europe Program (DEP) governance (former Connecting Europe Facility) and road mapping.

The road mapping will be the basis for further workshops with Member State beneficiaries as well as non-participating Member States. The current focus has been on the Public Agencies' and clerks' needs more than the citizens' which DE4A intends to gather in the final stretch of the project.

The intention is to create a basis for discussion and change beyond the project based on our time-lined predictions. It is clear that the Member States have not reached an advanced point of Digital Government Transformation (DGT) [1] but are rather still in a mode of Expansion and addition of eGovernment services.

1 Introduction

1.1 Purpose of the document

The present document that is produced in the ambit of WP6 Sustainable impact and new governance models is the draft vision for the DE4A project services and policy recommendations. This gives suggestions of possible public "Business" Models; and thereafter it starts to sketch draft roadmaps of the three DE4A pilots.

The consortium has chosen to focus on an agile approach to the document, to point also to a change needed in how governments work. This is in contrast to the envisioned approach in the contract (Description of the Action) which was more waterfall based. We believe this is a better approach to drive forward the Use cases of Living in Europe, Life-long learning and Doing Sustainable Business based in the EU. The three Platform Business Models explored can be said to be both Human, -Organisation- and Member State-Centric and needs further work for all three. They are all also joined by the Protocol (DLT-based) Based Business Model view expected to be expanded via e.g. DEP (Digital Europe Program) over the coming decade and therefore comes into scope for t3-4 policy recommendations. The fundamental shift from API based models (aka PMC) to protocol-based models needs further understanding by the Member States (MS) and will be the main focus of our final deliverable, D6.3 New models for shared delivery of common services roadmap, due at the end of 2022.

Our approach focuses on systems of trust, starting with current European building blocks, such as eIDAS with DLT support, eSignature and other current systems that abstract the traditional concept of trusted institutions extending to new, more decentralised, non-institutional models of trust, such as Verifiable Claims (VC) linked to a Self-Sovereign Identity (SSI), in order to understand the changing role of the government in a world that moves beyond trusted institutions.

There are references throughout this document to DE4A project structure in workpackages (WP), copied here below for context and reference:

- WP1 Inventory of current eGovernment landscape
- WP2 Architecture Vision and Framework
- WP3 Semantic Interoperability Solutions
- WP4 Cross-border Pilots for Citizens and Business and Evaluation
- WP5 Common Component Design & Development
- WP6 Sustainable impact and new governance models
- WP7 Legal and ethical compliance and consensus building
- WP8 Stakeholder dialogue, dissemination and communication
- WP9 Project Coordination and Management

1.2 Structure of the document

This document is divided into five main sections and follows our methodology for analysis focusing on the main concepts of Governance, Business models and roadmaps:

- Chapter 1 - Overview and Introduction
- Chapter 2 – Governance

- Chapter 3 – Business Models
- Chapter 4 – Sustainability & Road-mapping
- Chapter 5 – Conclusions

The layout still follows the original intention of the document with the add-on of the focus on an agile approach, and a shift of focus more on governance rather than business models. The draft policy recommendations are found in Annex I. Interdisciplinary Questions to be further elaborated in D6.3 New models for shared delivery of common services roadmap, due at the end of 2022.

2 Governance

To come up with the appropriate governance model alternatives, WP6 participants are following DE4A methodology that was defined in D6.1 Methodological Approach [30], consisting of three streams running in parallel, namely the conceptual, empirical and consultation streams. One should, however, mention that empirical stream for governance models is somehow limited due to obvious reasons: related assumptions about governance are difficult to simulate or validate. While project format and DE4A pilots do offer some insights into the joint public administration (PA) governance principles or high-level decision making, many operational assumptions are difficult to evaluate and therefore currently left out from the empirical stream.

2.1 Conceptual framework from inception phase

Inception phase, as described in D6.1 Methodological Approach [30], carried out initial conceptual description of the main WP6 outputs. It has defined terminology and outlined the main issues or pillars of governance model, also called conceptual governance model framework, while designing key parameters that could serve in the assessment of suitable options and choices. It considers other related concepts, from service co-delivery business models to redefined role and responsibility of Public Administration or impact assessment for different stakeholders. Basically, inception phase investigated three governance model pillars:

- Who: list of relevant stakeholders?
- What: list of processes, rules, norms, and actions with a different degree of formality?
- How: list of parameters (cost, desirability, suitability etc.) to decide about the most suitable governance model options?

DE4A also defined levels of governance model: Strategic, Tactical, and Operational (STO), starting from a generic federated architecture that supports the interconnection and interoperability between Member States.

The question “who”, roughly described as “public service ecosystem”, has also been treated in business model conceptual framework (analysed in D6.1 [30] through Platform model canvas). The right or balanced distribution of control or decision-making processes between centralised (EC) and decentralised (Member States) organizations, has also been topic of discussions in WP7 “Legal and ethical compliance and consensus building” that covers legal aspects, or the SDGR implementation roadmap, or material from SDG coordination group, composed of national coordinators, and chaired by the EC (that acts as secretariat).

The second question is about “what” and here started with the analysis of Processes, Rules, Norms, and Actions (PRNA), that are included or linked to fundamental principles, policy documents, as well as derived principles that are specific to the project-scope. This list, aligned with the Project Start Architecture [31] PSA-list, was clustering relevant DE4A PRNA into several categories:

- Those that refer to DE4A governance principles and strategic goals. These will be treated as the strategic governance model issues. An example should be the transition between centralized to decentralized or semi-autonomous governance structures.
- Those that are expressed in terms of what each stakeholder in DE4A MUST or SHOULD do, in alignment with the existing or forthcoming regulations, in order to accomplish strategic goals. Given that these are open to implementation issues, WP6 refer to them as Tactical-governance layer.
- Operational-governance layer of PRNA that refer to operational mechanisms that need to have intra-organizational or institutional mapping of roles and actions

Finally, the third issue to tackle in governance model inception was question of "how", namely the list of parameters, such as cost, desirability, feasibility, and suitability, that would help us to come with relevant conclusions for the sustainability roadmap.

To summarize, the inception phase delivered a conceptual framework for further work on governance model analysis, and posterior conclusions that would feed a sustainability roadmap. Establishment of an efficient governance model for cross-border public administration service co-delivery is a challenging task that also must consider the best practices, lessons learned and all other previous experiences in the area from beneficiaries. This is also why the output of inception phase must be contrasted, and eventually enhanced, continuously with state-of-the-art analysis (SoTA). This phase, that is ongoing throughout all project with output delivery at discrete points of time, is described in the next chapters.

2.2 Empirical stream: state of the art analysis

One of the main sources that has already been identified in the previous deliverable D6.1 Methodological Approach [30] is the Digigov study[1], but this study is not focused on governance models. Other sources are deliverables from EU-funded projects that have some kind of governance model assessment, or papers describing research into governance models. Finally, WP6 also considers existing governance models of formal and informal entities that include members states and EU as the main stakeholders.

One should also note that there is a link to the business model conceptual frameworks that has been analyzed in D6.1 Methodological approach, namely concepts of multi-sided platform and more vaguely described Government as a Platform (GaaP).

Some governments already started to reorganize their ecosystem approach around the GaaP paradigm. The term 'Government as a Platform' was originally coined by Tim O'Reilly in an essay of the Lathrop and Ruma's 2010 book [20]. This has also later been defined by consultants as "a holistic approach, in which the public sector collaborates with private sector partners, citizens and even robots"[18]. The same source is also listing four platform models with varying communication channels and ecosystems for delivering public services:

- Whole-of-Government Platform: Focused on the role of government as the centralized service provider.
- Peer Platform: A service-centric and vertically integrated platform established by two or more government entities.
- Ecosystem Platform: An open and outcome-focused platform in which government collaborates or offers services jointly with non-governmental actors.
- Crowdsourcing Platform: An innovation-focused approach in which governments collaborate with citizens, companies, other government organizations or NGOs.

The nature of the DE4A services makes it likely that actors (especially private actors) will enter and leave the collaboration structure over time. The collaboration should therefore also focus on structure, for example by defining onboarding PRNA. The two main elements in the ecosystem approach could be a central core and several groups of collaborating actors, based on e.g. different knowledge domains (currently six in the SDG-WG descriptions, but more may be added), or different digital services. The organizations in the central core, focus on collaboration and coordination at program level, while the clusters around Digital Service Infrastructures (DSI) collaborate on specific areas. In the clusters, actors collaborate in thematic areas but might be coordinated by a single actor, probably stakeholder included in the core of the ecosystem approach. The actual division of labor and responsibilities can be regulated by voluntary, bilateral agreements, insofar as they are deemed

necessary. However, it cannot be ruled out that amendments to regulations or additional government assignments will be necessary.

Finally, for the scope of governance beyond that of the DE4A-project and to benefit common interests as much as possible, long-term political orientation and prioritization within the various areas covered by the program should also be considered. This means that in the medium term DE4A might need to encompass the social layer of below described governance layers and also consider more technical decentralization governance elements often discussed in Decentralized Autonomous Organisation (DAO)[5].

2.2.1 CEF and DEP Building Blocks and IT Governance Models

The proposed IT Governance Model [13] has been designed for the mid-term (from 2022 to 2025) and is focusing on IT with principles of Governance that are translated and covers into:

- the organisational structure, governance processes, decision-making process, the layers of roles and responsibility
- processes that formalise the set of activities

If compared with EBSI governance principles, one sees slight differences e.g. rules and operations are separated in EBSI, while decision making bodies description roughly corresponds to organisational structure layer in CEF.

Principles are further detailed with description of principles of CEF DSIs Governance Structure and those of CEF DSIs Governance Processes. Each principle has description, rationale, and implications.

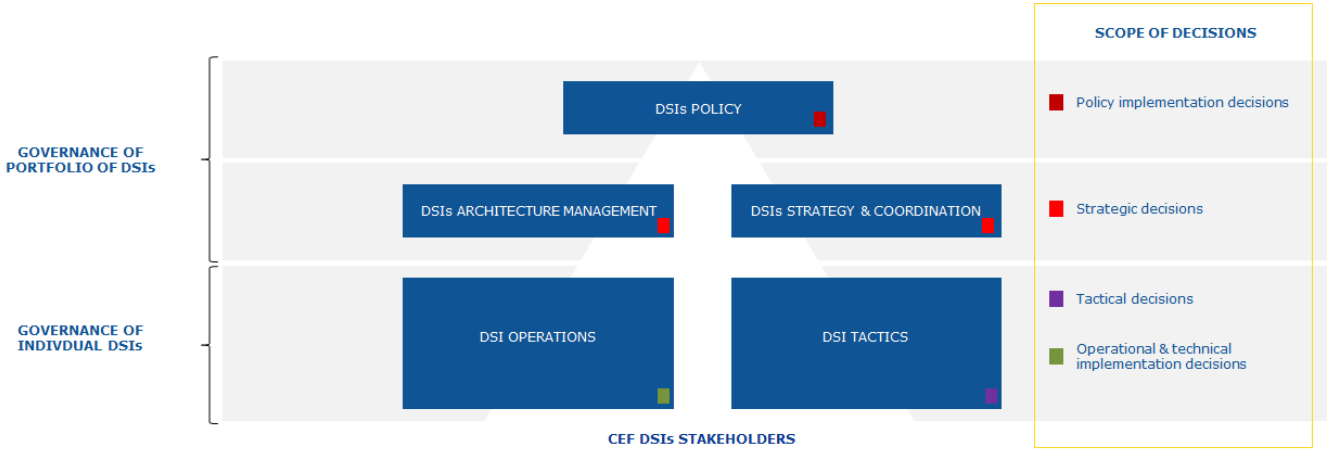

Figure 1: Proposed IT Governance Model for CEF and DEP Building Blocks

Figure 1 shows the concept of the model with the division of governance processes with three separate layers linked to one another through reporting flows and processes. It generally serves to show transfer of decision-making and ownership to a higher level.

The layer at the bottom is concerned with the governance of the individual DSIs, while the top layers address the governance between DSIs. This split of governance responsibilities is made in accordance with analysis made in 2015 report 92. Additional section provides information about the governance processes that are part of this conceptual IT Governance Model.

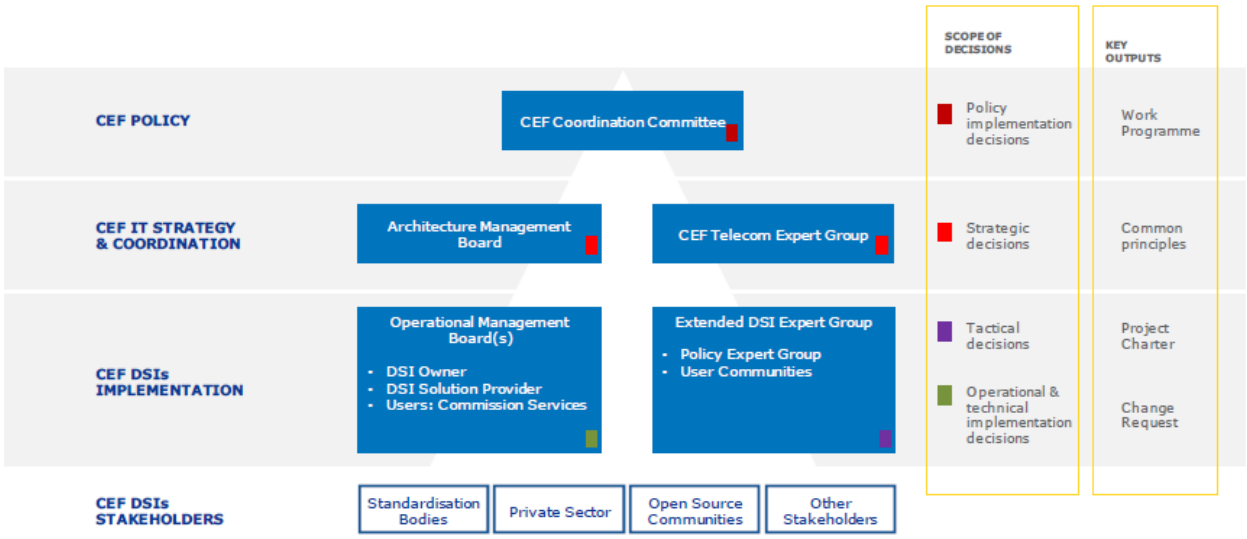

Figure 2: IT Governance suggested according to principles 1 & 9

In a 2015 study commissioned by the EC [10] the GOFA model (governance, operations, financing, and architecture coordination) was used for the assessment. Inside of the "G" part of GOFA, two layers of governance are analysed:

- Policy governance: i.e., the responsibility for taking decisions affecting individual DSIs. This layer is further described depending on if there is a regulatory framework or some other form of policy framework is in place.
- Operational governance: i.e., day-to-day decisions on the functionalities required for the DSI to provide continuous service

It has been noted that operational decision-making is generally already devolved to a dedicated entity, such as an operational management board (OMB), a steering committee (SC) or a Working Group (WG). Analyses has been done for services and building blocks (BB) such as the eID, eSignature, eInvoicing and eDelivery where the operational activities are carried out by DIGIT in its role of DSI Solution Provider (SP), while the DGs acting as owners of the sector specific DSIs carry out operational activities in-house (e.g. through their own IT departments) and/or task DIGIT with some activities [6]

Architectural (IT not Business-architecture and/or organisation) coordination is also considered at both levels: at the level of an individual DSI and at the cross-DSI level. In the first case, there is a need for agreements between DSI-specific stakeholders on the underlying architecture for that DSI. In the second case, there is a need to ensure that there is also need for alignment of Needs and Requirements. This layer is also related to the IT Governance of the CEF Building Block Digital Service Infrastructures (DSIs) described in [13] with a common Architectural Management Board (AMB) that oversees architectural coordination across the building block DSIs as well as with those sector specific DSIs that use them.

The degree of concentration or dispersion was also analysed in governance structures (policy and operational) with the conclusion that there are no compulsory common governance procedures, while coordination approach falls in between the continuum of concentration and spread of activities. Operations are largely dispersed, with the lead policy DGs (in their role as DSI owners) as the main actor and owner.

CEF Building Block IT Governance Model is definitely a good reference for DE4A governance model. Previously, assessment of the decision-making powers found that these have been being largely allocated to the European Commission, while Member States had specific competences through established groups, such as expert groups. Private sector stakeholders played no role in decision-making but may have input in working or expert groups in some specific DSIs. This could be taken as a starting point for DE4A assessment, but many elements from decentralized EBSI governance will be considered as well. Architectural coordination is needed for agreements between DSI-specific stakeholders as well as for alignment of needs and requirements cross-DSI.

Choice between concentration and dispersion can be avoided with various degrees of coordination and cooperation in-between, which somehow resembles the idea of European Blockchain Association (EBA) a semi-decentralized organization.

DE4As need to assess which activities may be concentrated in a single body with a common set of procedures, and which should merely follow guidance, for example in cases when DSI opts for complete autonomy.

2.2.2 EBSI governance models

In 2018, 29 countries (All EU Member States, Norway and Lichtenstein) and the European Commission established the European Blockchain Partnership (EBP) and started building a European Blockchain Services Infrastructure (EBSI). This initiative is also related to DE4A and analyzed in the other parts of the project, but here the focus is on the governance of this initiative. The EBP allocates the work to groups focused on core areas, services, and infrastructure, while the main focus is on the public administration cross-border services.

The list of members is public [11], as well as joining to several groups (e.g. user-group). Financing is assured by the Connecting Europe Facility (CEF), initially, and the new Digital Europe Program (DEP), from 2021. The main result of EBSI, is described as a market-friendly ecosystem based on five key principles, among which is “transparent governance model”. EBSI is also deploying a network of distributed blockchain nodes across Europe, in line with European values and regulations, but it is for example not clear who (which group or body in EBP) is monitoring this alignment. On its webpage, it is stated that “The EBP group assists the European Commission with the establishment of a European Blockchain Services Infrastructure (EBSI)”[8], but when it comes to decision bodies and detailed set of agreements, these are still to be defined, as it is suggested by the “legal track of EBSI”. The core service platform currently in place for EBSI is procured with European Commission DG DIGIT. The Commission services are also working on the future relationship between different stakeholders (EBSI Consortium, between the Consortium and node operators, or the Consortium and application service providers that operate Use Cases).

The agreements are currently under review and they might also be useful for DE4A governance and sustainability in the future D6.3. During a Community Launch Event “Digital Decade presentation” and posterior Futurium [33] discussion it has also been suggested that these might use Multi-Country Projects (MCPs), part of EC proposal for the 2030 Policy Programme “Path to the Digital Decade”. This is strategic governance tool to ensure coherence and synergies among different initiatives, actions, measures and investments.

The Commission also analysed EBSI as concrete case studies to assess the need for a new instrument, European Digital Infrastructure Consortium (EDIC), that would address the need for a number of combined implementations features of MCPs.

It has been said that[9] "the EBSI has fully functioning governance to collectively take decisions on both the policy and operational levels", referring actually to the role of EBP to decide on priority of use cases (UC) for EBSI, and coordination of the work on use cases.

In this case study it has been mentioned that the current "consortium structure" of EU Commission and 29 Member States of the European Blockchain Partnership must in future be managed through a legal vehicle that can conclude legal relationships and manage regulatory questions.

The suggested legal vehicle is European Digital Infrastructure Consortium (EDIC), whose governance still needs to be finished, in particular with regards to:

- Scalability and onboarding procedure
- Liability – who is responsible for what?
- Long term operation
- Legal personality and the possibility to procure and operate infrastructure;
- Operational service decision making e.g. future development, deployment, support and maintenance

As for the technical governance, there is already a document that defines guiding principles, rules, decision making bodies and operation guidance for EBSI. Based on given examples, WP6 can also propose several categories for governance model of DE4A:

- Guiding principles, such as for example description of who can be selected as a node operator
- Governance rules, such as for example operational rules, e.g. how to add or remove node operator, but also implementation rules e.g. code development and deployment
- Operations, with several operational levels, such as management, onboarding or transactional governance
- Decision making bodies, with definition of composition, competencies, and decision procedures.

In the case of EBSI, it is also interesting to see what role, if any, can be played by the European Blockchain Association (EBA). This is structured as a Decentralised Semi-Autonomous Organisation (DSAO), which is derivative of the original Decentralised Autonomous Organisation (DAO) that describes a type of network connecting individual nodes that act autonomously with self-created rules. The EBA was founded as an association registered in Germany, in order to combine the advantages of decentralised networks with the essential requirements of legal entity and support by a set of governance processes decided by the EBA's board (e.g. acting as a contact).

Finally one should also mention the EU Blockchain Observatory and Forum that has been created as a European Parliament pilot project but is being run by a consortium funded by the European Commission, Directorate-General of Communications Networks, Content & Technology (DG CONNECT). The Consortium consists of INTRASOFT International (general contractor) the University of Nicosia, the Institute of Information Technology/ CERTH, White Research, Bitfury, OpenForum Europe and PLANET S.A. This initiative organized an event dedicated to governance models [5] where a number of issues have been discussed. Similarities between DAOs governance and governance of open-source projects, distribution of power and resources in a technocratic approach, was followed by a presentation about decentralized governance in the public sector. One of the use cases discussed was the EBA governance model. The framework from EBA can support a plethora of different nodes that have different roles. There are three types of membership namely individual, institutional, and corporate members.

After analysis of EBSI governance WP6 recommends empirical assessment with the DE4A project participants, as well as external consultation, of the first three categories (principles, rules and

operational levels), while the fourth one (decision making bodies) will need to take into account legal issues and assessment related to EDIC, and implementations features of MCP.

In a longer term, DSAO structure could also be considered, supported by a set of governance processes with an EDIC entity that facilitates all these aspects that need to be addressed by the legal entity.

2.2.3 Single Digital Gateway (SDG) governance

The OOTS has a three-tier governance structure as shown on the left side of the below Figure. The first two tiers and their roles (the SDG Committee (SDG-C) and the Gateway Coordination Group (GCG)) are defined by regulation. The last tier (the OOTS Working Groups (WG)) is agreed between the Commission and the Member States on a needs-basis and can evolve over time.

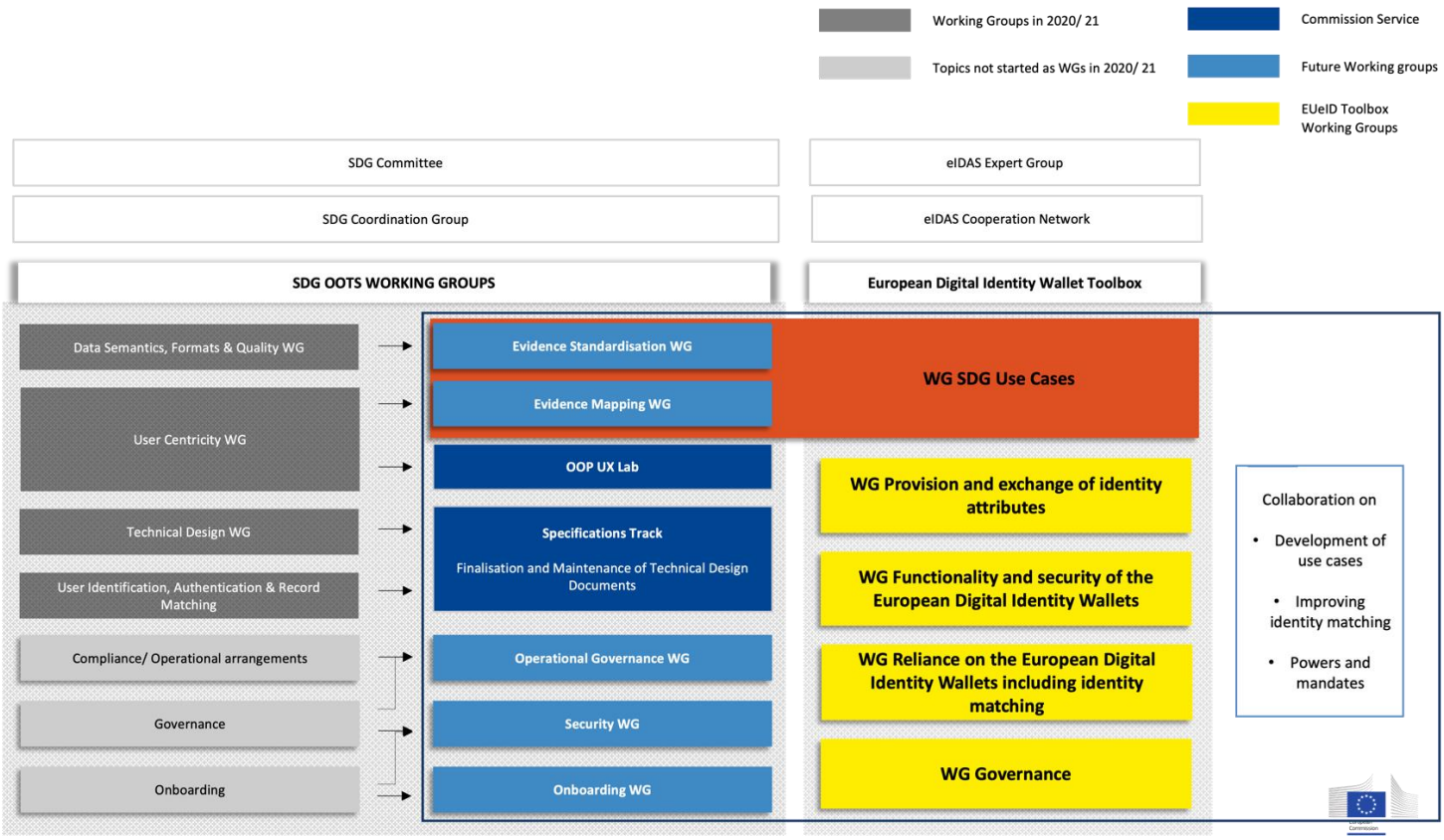

Figure 3: Suggested SDG Governance Overview

The SDG-Committee

The SDG Regulation[1] provides that when adopting implementing acts on the OOTS, the Commission shall be assisted by a (comitology) committee. The Commission has set up the SDG Committee for that purpose. The SDG Committee's role is to deliver opinions on draft implementing acts on the OOTS proposed by the Commission (or amendments thereof).[2] The effectiveness of this is heavily dependent on timing and frequency.

1 This refers to Article 14(9) read in conjunction with Article 37.
2 As refers to Article 5 of Regulation (EC) 182/2011.

The Gateway Coordination Group

The SDG Regulation[3] also establishes the Gateway Coordination Group, composed of one national coordinator per Member State and the Commission representative as its chair. The Regulation[4] provides that the role of the group is to *"support the implementation of the Regulation"* (including the OOTS). It lists the non-exhaustive tasks of the group, such as: assisting and advising the Commission in the implementation of various requirements of the Regulation as well as discussing, exchanging good practices and recommending certain actions to the Commission. The group should also cooperate with other governance bodies or networks of information, assistance or problem solving services.

The Thematic Working Groups

The Gateway Coordination Group cannot cover in detail all the issues of relevance for the SDG/OOTS. For this reason, the Group's rules of procedures provide that *"DG GROW may set up sub-groups for the purpose of examining specific questions on the basis of terms of reference defined by DG GROW. (…). The sub-groups shall report to the group. They shall be dissolved as soon as their mandate is fulfilled"*. For the purposes of developing the concept and architecture of the OOTS, DG GROW created a number of working groups. In order to focus on implementation after the adoption of the OOTS implementing act, DG GROW intends to relaunch the work in working groups and create a number of new working groups, of which some are the continuation of the previous or previously planned ones.

- **Evidence Standardisation Working Group**: This working group will work on standardised data models, stylesheets and code lists. This will be a joint group with the eIDAS Expert Group for the selected Use Case of the toolbox of the EU eID wallet.
- **Evidence Mapping Working Group**: This working group was already launched and will continue working on analysis of procedures, User Journeys. This work will be used as an input to the evidence types and data services of the common services of the OOTS.
- **OOP UX Lab** will, co-create with Member States, a set of UX recommendations for the user interface design of the once-only steps for evidence requester portals
- **Specifications Track Working Group:** This working group will finalise and subsequently maintain the technical design documents.
- **Operational Governance Working Group**: This working group will work on all elements of the operating model of the OOTS such as operational arrangements, terms & conditions, service levels, etc.
- **Security Working Group:** This working group will work on all security related matters associated to the common services and of the OOTS as a whole. And should have a clear interface to ENISA.
- **Onboarding Working Group:** This working group will work on all steps that will lead Member States to be live. In particular, it will develop a testing process including the schedule, set of testing indicators and monitor the testing of interoperability between the national and EU level components of the OOTS.

As foreseen by the rules of procedure of the Gateway Coordination Group, these working groups (third tier) will report to the Gateway Coordination Group, which assists and supports the Commission in attaining the goals laid down in the SDG Regulation, including the establishment of the OOTS.

The SDG governance below described in terms of relationships and interfaces in a more theoretical view than the earlier organigram.

[3] Specifically Article 29.
[4] Specifically Article 30.

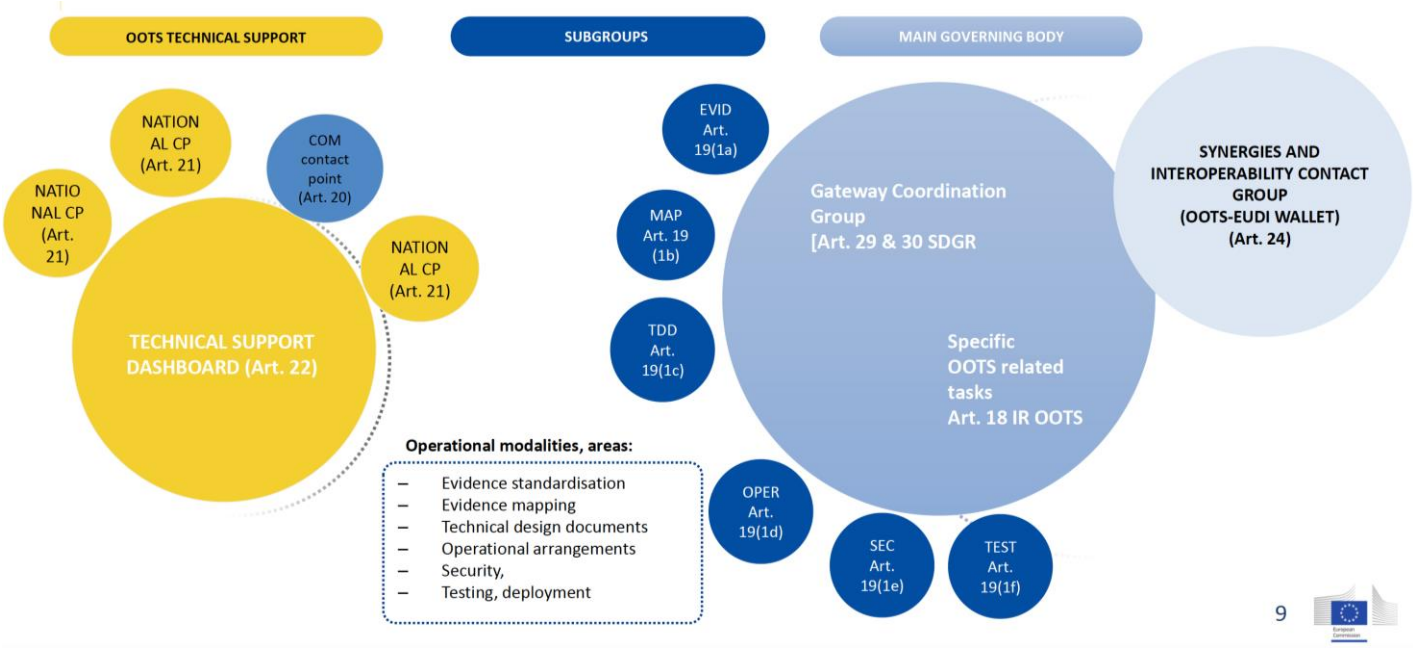

Figure 4: SDG Governance Overview

Cooperation with the Governance structure under the eIDAS regulation

As shown on the slides recently published on Wiki[12] there are a number of synergies between eIDAS (especially the revised version of the eIDAS Regulation including the eWallet as proposed by the Commission) and the OOTS. It is therefore important that both governance structures work hand in glove as shown on the attached slide. There will be a joint group for the selected Use Case of the toolbox of the EU eID wallet from the OOTS scope. Other areas of close cooperation are the improvement of record matching and powers and mandates.[5]

2.2.4 Governance models research from other EU-funded projects

In the platform model, governments can create a starting point, something that others can reuse and extend, so value building is different from other models. Governance related principles or PRNA, for example open standards and low entry barriers, look obvious but might need validation by users and external developers in order to check value and evolution directions. The same holds for open government APIs that might enable anyone to write an application using government data. Governance PRNA might need to be in place before external applications can be designed to collect new data from citizens or Value-adding-services (VAS) are onboarded to increase the intelligence and responsiveness of government. In any case, these long-term consequences and impact of GaaP paradigm and business model on proposed governance model, will be taken in to D6.3 our final empirical stream.

[5] This is not prevented by the fact that compared to the SDG Regulation, the eIDAS Regulation foresees a somewhat different approach to governance. Article 12(6) of this Regulation provides that the Member States shall cooperate on the interoperability and security of the national electronic identification schemes. Article 12(7) empowers the Commission to establish the procedural arrangement to facilitate this cooperation, which it has done by creating the eIDAS Cooperation Network. The leading role of the Member States in the Cooperation Network stems from the eIDAS Regulation itself, which limits the Commission's role to that of a facilitator for Member State cooperation.

Although some results, e.g. framework elements or set of recommendations might be relevant for DE4A governance model, they are mainly dealing with governance in single organisations or the long term assessment. Academic or theoretical approaches that might be more useful in sustainability long term road mapping, once that initial governance, based on existing CEF IT governance, is already established.

2.2.5 Inputs from position papers

eReg is the European association of Vehicle and Driver Registration Authorities and in their position paper [21] they also mention framework consisting of 3 levels of governance namely procedure governance, data governance and system governance. The procedures for re-registration of vehicles are country specific, so they think that governance should be kept in the hand of the local/national organizations. In relation to data, they consider, although harmonizing data sets in the vehicle domain is done centrally, some coordination is needed to share best practice and fit to local needs. When it comes to system level, they split a generic frontend (OOP) and an existing back-end (re-registration). Within their domain, the EUCARIS system is used for international data exchange in the back-end procedures and this system's governance is regulated through the EUCARIS Treaty.

2.2.6 Governance models in other relevant EU groups and initiatives

2.2.6.1 NIS Cooperation Group

Network Information Security (NIS) Cooperation Group (NCG) was established based on art. 11 paragraph 1 of the NIS Directive [9] in order to support and facilitate strategic cooperation and the exchange of information among EU member states. It relies on the EC Implementing Decision of 1 February 2017 and follows its own rules of procedure and not a joint doctrine. Decisions of the group, composed of representatives of the EU Member States, the European Commission (EC) and EU Agency for Cybersecurity (ENISA), are taken by consensus. Its tasks have been precisely indicated in art. 11 paragraph 3 of the NIS Directives, so it falls what has been described as "Governance-models backed by regulation" [6].

This initiative cannot be compared to DE4A as there is no service provision, but there are needs to ensure an interface between SDG bodies and ENISA.

2.2.6.2 European Open Science Cloud (EOSC)

Stakeholders represented in the EOSC Governance Board (member states, but also associated countries) agreed to run the EOSC as a co-programmed European Partnership under Horizon Europe from 2021. This brought changes in their governance model after 2020 including: EC, EOSC steering board and EOSC association.

To develop this further, WP6 will follow closely the evolving EOSC governance work. DE4A need to ensure that data between research and our use cases is interoperable; stakeholders need to ensure as broad as possible benefits from: data reuse, personal data and other types like open-data, private company data etc. To understand this, WP6 and WP3 Semantic Interoperability Solutions will look at the semantic requirements and specifications to handle most data types through our components, e.g. Multilingual Ontology Repository (MOR) component, and de-identification and reuse criteria as well. When visualizing and talking about different kinds of data, there are several possible models that can be employed, such as those e.g. on personal data and reuse given below.

2.2.7 Analysis and Conclusions

Multi-sided platforms, and pertinent platform and protocol business models, are creating value by facilitating the exchange of products and services between several independent groups, for example

citizens or eID owners, service providers (SP) and identity providers (IdP). A platform or protocol business model is found to be relevant for DE4A since it is related to co-creation of value. Although this is mainly a business model topic it is an important to consider also for the governance model.

While data governance is very similar to IT governance, given an important role of data in platform or protocol-based model, it is important to also consider Data Governance approaches that could be possible in the mid (2025) or long term (2030+), as well as the link between these approaches and general governance. Some of these emerging approaches are Data Cooperative, Data Commons, Data Collaborative, Data Spaces, Data Marketplace or Data Intermediaries (often today used as a common name for the before mentioned). Looking at goals of a GaaP, various considerations could be explored for the sustainability roadmap, for example maximizing both personal data utilization while achieving personal data protection.

CEF building blocks governance model is a good starting point that already explored role of private sector stakeholders, while decentralized EBSI governance need to be considered as well for a mid to long term. Architectural coordination with other building block owners, other member states and private stakeholders is needed for agreements and alignment of needs, requirements and operation across different services and member states.

Choice between concentration and dispersion can be avoided with various degrees of coordination and cooperation in-between, with proxies (e.g., expert groups) acting as a temporary way to cross governance bridges. Semi-decentralized organization could be a good option for mid to long term, but stakeholders need to assess which activities may be concentrated with a common set of procedures, and which should merely follow guidance, for example in cases when DSI opts for complete autonomy. Conclusions from EBSI experiments will be especially valuable, as they will likely pioneer implementation of EDIC, and implementations features of MCPs.

The functioning of the SDG gateway is supposed to be supported by the Commission in cooperation with national administrations, but different coordination groups will also co-exist. The application of the regulation will be an important input to governance model, as well as the Implementing Regulation and related rules on collecting and sharing data, including anonymized user statistics. Since data is also envisaged to be used by the service providers (and VAS), role and responsibility of these stakeholders also needs to be assessed. Implementing Regulation is accompanied by a Commission declaration, that mentions the feasibility of common EU-level service managed by the Commission.

This initial set-up might be later enhanced with ideas coming from research or theoretical approaches to governance models, more useful in sustainability or long-term road mapping. Specific success indicators could also be defined. As mentioned in [23], in 2013 an extensive number of national level online contact points, varying between 61 in Bulgaria and 22 in the Netherlands, existed, while the European level single points of contact were identified by less than 1% of consumers. This needs to be linked with continuous monitoring and implementation indicators should therefore also be established in the roadmap.

If one emphasizes cross-agency collaboration in the form of public service networks and draw upon the literature, WP6 can identify several elements that are common for business and governance models, and that need to be further analyzed in empirical stream, with the input from technical work, pilots and case studies (WP2-WP5), but also other work packages, such as WP7 with legal issues (e.g. Memorandum of understanding, as a basis for collaboration, or SDGR implementation), as well as WP1 (inventory of current landscape):

1. List of project outputs and outcomes, with library of common components and building blocks, ownership, service offerings etc.
2. Business processes and services across different patterns

3. Data issues (e.g. recognition of intermediator role, data minimization decisions, MS decisions about structured versus unstructured evidences)
4. Different forms of stakeholder collaborations

2.3 Empirical stream: input from other work packages, case studies and pilots

2.3.1 Input description

Inputs to this phase are the same as those described in the previous chapter (initial conceptual framework from inception phase), as this phase was going on in parallel with the analysis of SoTA. WP6 have also collected inputs from internal meetings and workshops, or from the other WPs including all information about case studies, pilot experiments, cost/benefit information, legal issues, and others.

Finally, as commented in the previous chapter, a list of project results could be created to collect all information related to each single piece of code or service that needs to be maintained, with an overview of role and responsibilities, integration constraints or guidelines, repository link and others. Another list should cover all Needs and Requirements such as further investment, training technology, additional stakeholders and other resources needed to sustain the results overtime.

Although it looks trivial, as the repository of common software components or specific procedures and services exist, it is not in fact a trivial task. In the business model part of the workpackage we need to identify what resources are required (investment, training technology, partners) to sustain these results overtime, as well as to explore related actions and needs, for example further fundraising, that would make DE4A services sustainable. This input will have important impact on governance, and this is also why this phase will have another iteration at the end of the project, when final inputs from the rest of the project will be analysed.

2.3.2 Analysis of governance related issues in work packages

WP1 Inventory of current eGovernment landscape is taking stock of the existing European eGovernment landscape for implementation of eServices and cross-border enablers. It is identifying existing national eGovernment capacities, setbacks to project results uptake and potential drivers for impacts. This will be further analysed in D6.3 our final deliverable due to timing of the deliverables.

In WP2 Architecture Vision and Framework , architecture is discussed and their contribution to the OOTS infrastructure was also contrasting the insights from the DE4A PSA [31] and an early version of the OOTS High-level Architecture. Trust models introduced in D2.2 Initial DE4A Trust Management Models and Blockchain Support Framework Design [34] are relevant for governance as well as the comparison regarding the trust factor between the patterns (Intermediation, User-supported Intermediation and Verifiable Credential pattern). Some procedures could be directly implemented for post-project operational governance e.g., coordination of the documentation effort through regular Editors' Meetings. The approach taken by WP2, with structured, accessible online repository for the overall project documentation is also an important input that could be reused in governance of DE4A based on the tools chosen by the EC.

Empirical inputs from WP3 Semantic Interoperability Solutions are especially relevant when it comes to collaboration with the external bodies since there are procedures and decisions about reuse of SDG, ISA2, Europass, and other existing assets (data models, vocabularies, code lists). In addition procedures, and actions related to the maintenance and operation of results (XML schemas and models, IEM and its supported payload (metadata, evidence types. And the Multilingual Ontology Repository) are also important.

WP4 Cross-border Pilots for Citizens and Business and Evaluation has been working, among other things, on definition of Pilot Success Criteria (PSC) to assess fulfilment of pilot goals (objective targets), as well as on other qualitative and quantitative metrics. These definition procedures and consensus about them could be useful in when new member states or new services need to be onboarded. When DE4A looks at the lessons learned, there are several inputs relevant to governance model. In Studying abroad pilot, for example, some functionalities (e.g., registering issuer into EBSI Trusted Issuer Registry (TIR)) cannot be done yet fully automatically, and alternative decision and set-up had to be taken. Procedures and decision making for "plan B" has brought useful insight, as well as coordination of inputs to standardization of the ESSIF diploma scheme, which is still in progress.

In the Doing business abroad (DBA) pilot, prioritization procedure has been used in relation to Once Only Principle Technical System. This pilot suggests starting with most frequently used cases/procedures and organize add-ons for later, and also to start with 2-Member State scenario but timely initiate analysis of 2+ MS scenarios. Here DE4A can also find a procedure for agreement on temporary solutions e.g., for use of non-notified eIDs for SDG-procedures. Other useful suggestions include specific plan of activities to conduct a thorough impact assessment on national infrastructure, as well as awareness actions to make sure that authorities that implement the SDGR, understand the components and the challenges the SDGR implementation includes.

For support and coordination of implementation on a national level, they suggest installing a central team of experts that supports Member States (like WP5 Common Component Design & Development for DE4A) and to facilitate exchange of knowledge (e.g., configurations, test-cases, best practices etc.). Some procedures (like obtaining certificates) are very time-consuming, while another challenge is that international exchange of information evolves continuously. Finally, when it comes to very specific inputs and challenges, DBA pilot concludes that there is a need to organize harmonization process of services for cross-border powers validation (like SEMPER/eIDAS), as well as to organize harmonization process of event types for cross-border subscription and notification. This actually goes for all Pilots and also both platform and protocol business models. Moving abroad pilot inputs are similar, while they also stress need for interrupted procedure due to the nature of SDG-like services and need for deregistration step.

In WP5 Common Component Design & Development there are several examples of support services that also contain procedures or actions, that could be later transferred in governance norms or rules. These are for example, support to the partners to deploy the DE4A Connector in their premises or link their components to perform tests. In the future governance model, special support will be needed for onboarding of new member states and new services, so the lessons learned from conduction of so called "Connectathons", including model for operational technical assistance and problem solving, is very useful empirical input. In addition, corrective maintenance procedures e.g., bug fixing, or maintenance of Playground components is also to be considered in operational governance.

For Task T5.4 Self-Sovereign Identity Supporting Framework, integration with EBSI is very important for governance in the sense that there is a need to define link between DE4A governance and EBSI governance. This link is currently piloted though the 'first wave' of EBSI's Early Adopters' Programme with a pilot Use Case on Diplomas Verification, where DE4A participates. Meetings with EBSI have served to align with EBSI/ESSIF v2.0 specifications. This collaboration needs to be enhanced in the future, especially when it comes to DE4A design choices (use of current eIDAS for users' authentication, limited legal validity of VCs (in some countries) as SDGR evidences, little use of Verifiable DIDs, DID-signing of VCs, etc.).

Furthermore, in WP7 Legal and ethical compliance and consensus building, although temporary (e.g., Memorandum of Understanding) legal basis is useful input for governance, as well as inputs to operational governance (GDPR/SDGR wireframes, T&Cs, privacy policies and DPO services), all which need to get permanented to achieve sustainability.

2.4 Consultation stream: input from the first workshop

2.4.1 Inputs to the workshop

In order to collect feedback from internal stakeholders in the empirical stream, or from external stakeholders during the future consultation, WP6 prepared tools that could provide or enable structured response. While there are no specific recommendations yet, WP6 opt to start with prioritization matrix for 25 Interdisciplinary Questions (IQ), to find the most relevant procedures and actions and address those first.

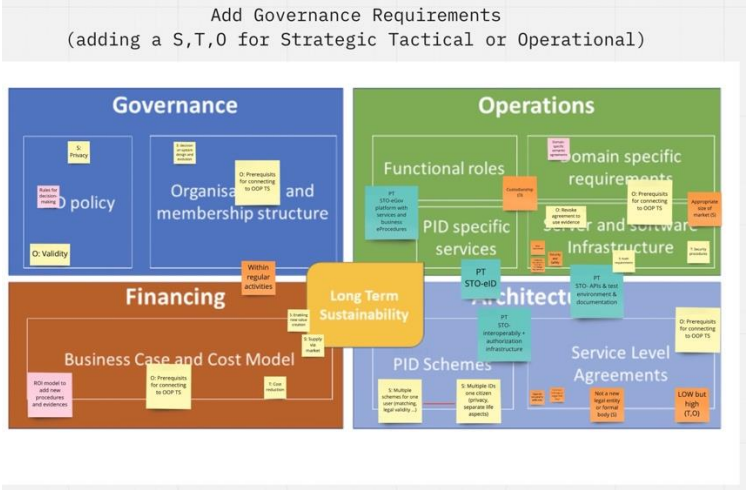

Figure 5: Tool used for first Empirical validation of DE4A priorities

Given that empirical and consultation stream rely on workshop format, also WP6 opted to use techniques such as Miro-based post-up supported Brainstorming. Sticking ideas written on post-it is also available in online innovation workshop tools and helps to organize or cluster ideas in several dimensions, which is particularly important for the governance model. These dimensions have been based on GOFA model, first introduced in 2015 study commissioned by the EC [10] as a framework for assessing sustainability for the digital service infrastructure (DSIs). The GOFA model (governance, operations, financing, and architecture coordination) is useful to narrow down scope of purely governance issues, both for policy governance, as well as on operational governance: i.e. day-to-day decisions on the functionalities required for the DSI to provide continuous service

2.4.2 Results and Analysis from workshop

It became clear in the first workshop that DE4A works with a team that is focused mostly on the operational and practical issues when it comes to governance. Since it is very hard to read what is in the above picture it is repeated below. This makes the text a bit fragmented, but still gives background to the analysis in the box at the end of this section.

In the Governance area: Here the MS placed PIDs (policy ID); Privacy (S), Validity (O), Rules for decision making. Org & Membership structure; Decision on system design and evolution (S), Prerequisites for connecting to OOP-TS (O). Stay within regular activities. Multiorganisational Governance, compare to eIDAS-strategy to move to an agency for maintenance.

In Operations Area: Here the MS placed Custodianship, Functional roles; STO-eGov platform with services and business eProcedures, Domain specific requirement; Domain specific semantic agreements, Prerequisites for connecting to OOP TS (O), Revoke agreements to use evidences (O), PID Specific services; STO affects eID, Server and SW infrastructure; Appropriate size of market (T), Security

procedures (T), Audit requirements (S), Security & Safety, Base components, Technical Requirements from Non Functional Requirements. Operations and practicalities are the most important. Too much documentation for new SW developers. Must be ease of use. Outwards focus for the reuse. Clear rules for decision making MUST exist. Compare to Joint Doctrine work of US. For transparency reasons. Onboarding material per domain due to specific semantic agreements. Need a long-term strategy including financing and RoI-model. Then Adding new procedures and evidences.

Financing: The MS consider this to be within regular activities, enabling new value creation (S), Supply via market (S), Prerequisite for connecting to OOP-TS (O), RoI-model for connecting new services and evidences. Cost reduction (T).

Architecture: Here the MS placed PID Schemes; PT STO- APIs & test environment & documentation, STO- interoperability + authorization infrastructure, S: Multiple IDs one citizen (privacy, separate life aspects), S: Multiple schemes for one user (matching, legal validity), SLA; O: Prerequisites for connecting to OOP TS, Depends on Systems (different), Common SLA-requirements or single SLA-requirements, Not a new legal entity or formal body (S), LOW but high (T,O). Multiple PID (policyID) leads to matching and legal validity also Multiple IDs due to privacy reasons, needs to be a balance. Time Based Validity of Data including rules and definition. SLA needs to be agreed. All WP7 legal issues MUST be clear to all.

The operations are the needed focus for sustainability, and MS have many clear needs and requirements as identified above. Interoperability Governance Act is coming out soon, that could help if done right. Interoperability must be based in legal terms, and this is an outside dependency but also a requirement to achieve agnostic data exchange for all domains. Needs to be agnostic for harmonization until 2030 and the advent of RTE.

2.4.3 New Roles and Responsibilities in different domains

When doing such an analysis the wider topologies of the ecosystems may need to be considered to understand which roles and responsibilities are affected. For Studying Abroad (SA) pilot it can be depicted as follows and this could help in the further analysis of SA Impacts:

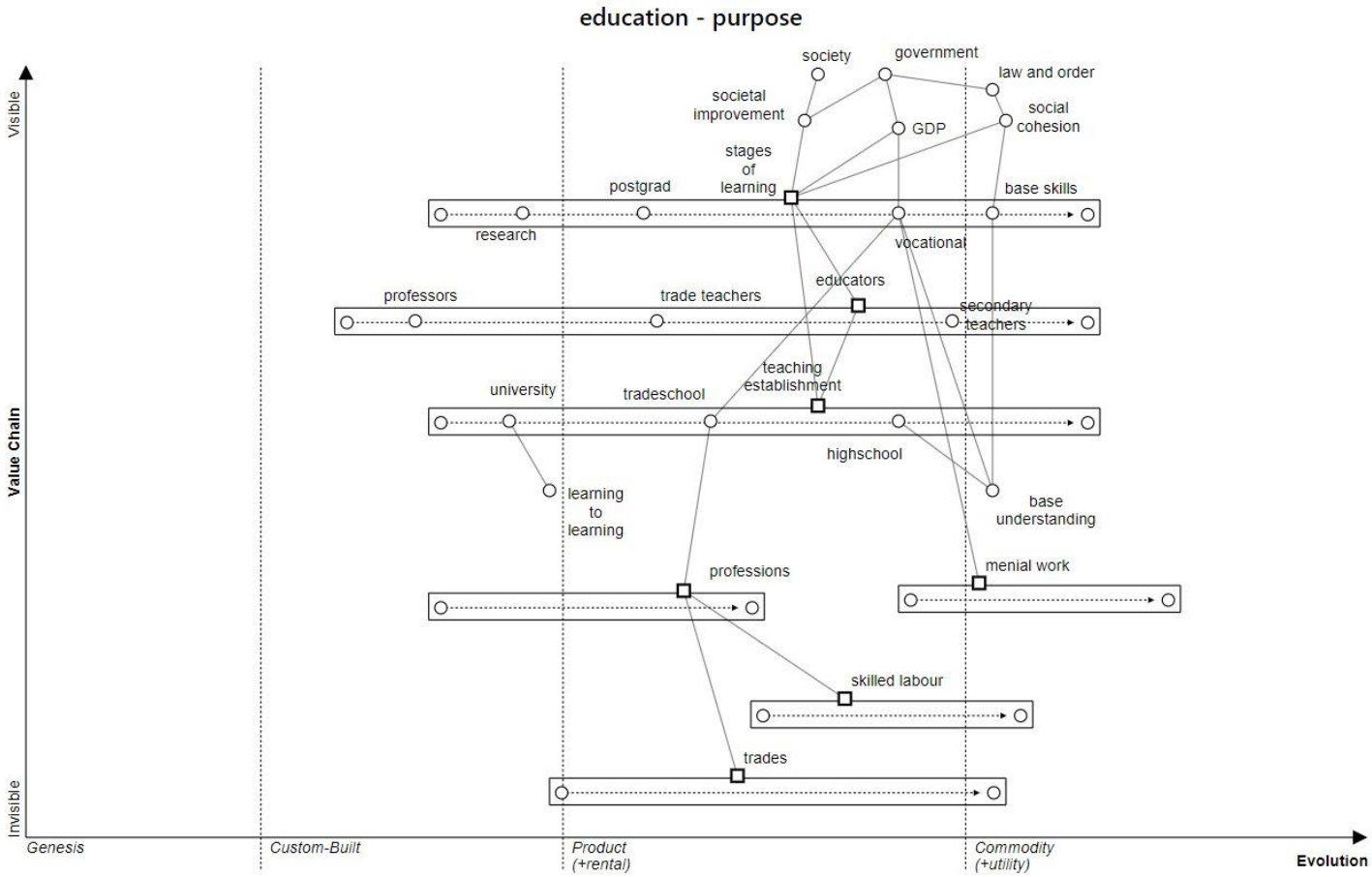

Figure 6: Wider Ecosystem Topology of SA area[14]

Similar maps could be produced for the other two pilots, but it is only done to SA as WP6 are trying to understand the tug-of-war of platforms and protocols in relation to governance with this domain as an example. As example if the technical perspective was put on top of this one would see a general placement of “Genesis” or “Custom-Built”.

2.5 Drafting Models for shared Delivery

With the above input and analysis the project finds that the most relevant governance models are the EBSI delivery model as well as the CEF Service Canvas depicted below. Once the list of project results, with library of common components and building blocks, ownership, service offerings etc. is considered complete (e.g. in the form of CEF service canvas, see below), these models will be interwoven in the Business model section here following, together with our overview Architectural depiction in the draft Road-mapping in the final section.

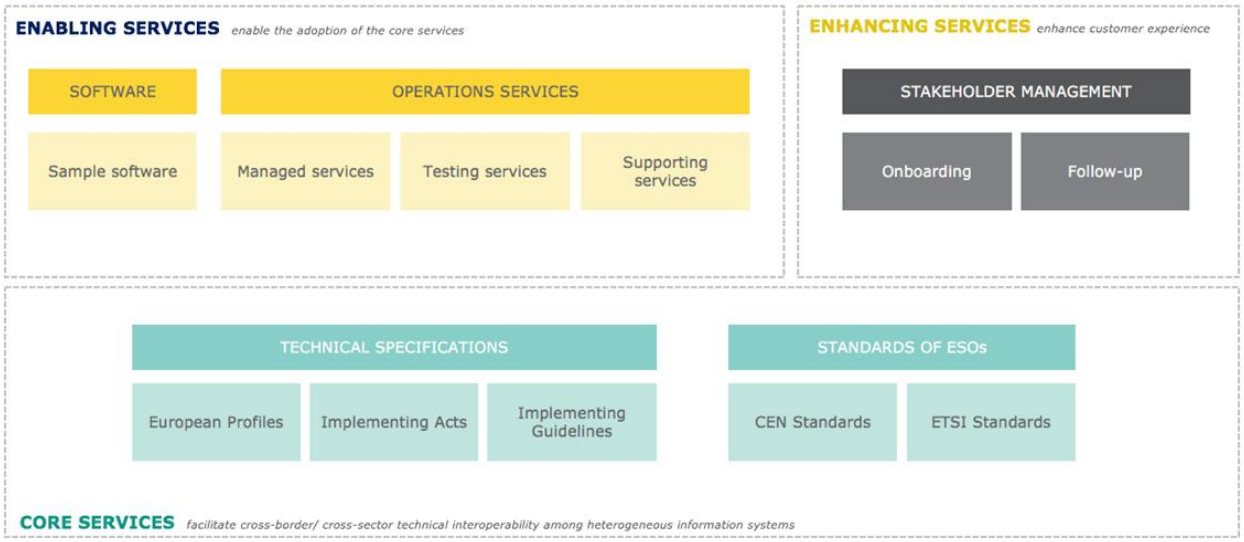

Figure 7: CEF service Canvas Model

3 Business Models

3.1 Empirical stream - State of the art

The DE4A platform and its services can be divided into two broad "Business Model" (BM) paradigms; Namely Platforms and Protocols [17]. Platforms are defined by Distributed production, Personalized Consumption and Global digital Connectivity. Protocols are defined by Distributed Ownership, Interoperable Identity and EU-wide Contract Execution with possible Global interoperability. We will describe both per service and then also point to findings of differences before the end of the project.

It should be noted that we have decided to put Citizens in the Consumer Segment and Public Entities in the Producer segment. One could argue that in the SA pilot the citizen is also a producer.

3.1.1 Monetary Benefits

This section is mainly connected to Impacts of DGT and the SDG and the Digital Europe Program (DEP). We have during the last months been able to collect a couple of studies specifically looking at our services or very similar. Below we describe three of them and these will be the basis for further discussion in D6.3 our final deliverable on this topic. One of a few relevant studies mentioned by MS, is the OTE-estimation from Finland where each completely manual transaction costs 1000 Euros (for the system not including the cost and burden on the citizen (to be verified in detail). We will use this and the Swedish (SE), Austrian (AT) and SMART-study input as our base for discussions and modelling of calculations.

3.1.2 A Swedish Model for common Information Exchange Benefits Analysis

The building blocks in Digital Services analyzed were My Proxies, My Cases, My Profile and My messages. They should together result in an infrastructure that enables services to end users who may be public sector companies, companies and / or citizens. The benefits that arise in each building block have been analyzed with the help of one uniform model based on economics. The following describe the estimated value of the benefits that are expected to arise in each building block category.

Benefits from Digital Services

Benefit category	**Benefit type**	**Total value 10 years***	**Actors benefitted**
1) Less resources invested.	Time and cost saving	350 MSEK	Public Agencies, Companies and Citizens
2) Reduced lead time.	Time and cost saving	240 MSEK	Companies and Citizens
3) Better overview saves time.	Time and cost saving	60 MSEK	Public Agencies, Companies and Citizens
4) Better overview and control increases security	Better Services and New Service areas	470 MSEK	Public Agencies, Companies and Citizens
5) Other effects.	Better Services, New Service areas and Time and cost saving	330 MSEK	Public Agencies, Companies and Citizens
Total		**1 450 MSEK**	Public Agencies, Companies and Citizens

Figure 8: Benefits Estimation for Digital Government Transformation of Services

The benefits are presented in monetary terms and in the 2020 monetary value. The value of the benefits are reported as a total sum over a period of ten years. For an estimate of the size of the benefits for each year is referred to the building block appendices. Generally the benefit is low during the first years of the time period because it takes time before the use of building blocks becomes high. The benefits that the building blocks in Digital Services create are both direct and indirect and can primarily be categorized as;

1) time and cost savings (efficiency gains)
2) better services and new uses (quality gains).

The benefits arise as efficiency gains and quality gains and goes to the public sector, businesses and citizens. That means the benefits not only leads to public finance effects. The quantified benefits of the building blocks in Digital Services are estimated to be worth 1.5 billion SEK over a ten-year period. For further information see Annex 2.

3.1.3 Implementation and evaluation of the full Impact assessment in AT

Austrian Model overview "Wirkungsorientierte Folgenabschätzung" since 2013, the Federal Administration has been managed by targets, effects and achievements. Against the background of tight budgets, the available resources must be used optimally. The focus is therefore on the effects achieved with the means used in each case. Only this enables a strategic orientation and prioritization with which the high level of performance of the public administration can be maintained.

Part of the implementation of this control logic is the impact-oriented assessment. All draft laws and regulations (regulatory projects), but also larger projects are discussed on the basis of desired goals and measures. By defining indicators, the achievement of targets is made measurable.

In addition, in a modern, complex society, state intervention is likely to involve a dense network of mutual effects and connections that extend far beyond the competence of a ministry. In order to ensure a coherent approach by the entire Federal Administration, it is therefore necessary to take greater account of these effects.

In defined policy areas ("impact dimensions") such as:

- financial
- environmental
- consumer protection policy or
- macroeconomic impact,
- impact on companies,
- administrative costs for citizens and businesses,
- from a social point of view,
- on children and youth as well as
- effective equality between women and men

is therefore investigated whether desirable or undesirable effects must be expected. Since 2013, the Federal Administration has been managed by targets, effects and achievements. Against the background of tight budgets, the available resources must be used optimally. The focus is therefore on the effects achieved with the means used in each case. Only this enables a strategic orientation and prioritization with which the high level of performance of the public administration can be maintained.

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is therefore investigated whether desirable or undesirable effects must be expected.

The impact-oriented impact assessment consists of the steps problem analysis, goal formulation, formulation of measures and assessment of the effects. An evaluation of the underlying project will take place after five years at the latest.

Problem analysis: This step shows why state action is necessary.

Target formulation: When formulating the objectives, it is stated which effect is to be achieved in society. Indicators can be used to measure actual success.

Formulation of measures: Here is a description of how the respective goals are pursued. The indicators also used here can be used to check whether the measures have been implemented as planned.

Impact assessment: As a first step, it will be examined whether the impact in the above-mentioned policy areas exceeds a certain intensity. In those impact dimensions for which this applies, a more in-depth assessment is then carried out. In any event, financial effects are material and must therefore be disclosed. Since 1 April 2015, it has been possible to make a simplified presentation in the case of expenses of less than EUR 1 million. An IT tool supports users in this process and guides them. Where appropriate and possible, quantifications are carried out. Examples include the number of people affected, the number of new jobs created, or the hours required for an administrative route.

Evaluation: After five years at the latest, the responsible department carries out an internal evaluation of the impact-oriented impact assessment. The effects that actually occurred are compared with the assumptions of the time. From this comparison, important information about the assumed interdependencies and possible improvement potentials are to be obtained.

In our final deliverable data from the AT-SDG assessment will be added. It was not yet available to be included here.

3.1.4 SMART and other SDG and EC studies

There is a wide difference in mean for implementing costs varying between 7.3 to 29.2 in different MS to connect to SDG OOP system[24]. Major drivers in this model are Organisational complexity and the number of endpoints (data consumers and data providers) that must connect to the SDG OOP technical system. Most often driven by decentralised procedures and evidences. Another driver is Implementation options were different approaches towards the implementation of the SDG OOP components and enablers such as eProcedureportals, data service, and national data exchange

infrastructure vary. Also the level of Technological maturity drives the variation in particular, the presence or lack of a national data exchange infrastructure and availability of evidences/data over it.

Number of evidences available over infrastructure can be considered is low in most MS.

With regards to the Monetization of data by or from public agencies it is clear that MS take different approaches overtime. Moving from the PSI-Directive to the Open Data Directive there are calculation The total direct economic value of PSI is expected to increase from a baseline of €52 billion in 2018 for the EU countries and the UK, to €194 billion in 2030 [32].

Several public sector bodies continue to charge well above what is needed to cover reproduction and dissemination costs for the re-use of public sector data. Such charges constitute a market barrier for small and medium-sized enterprises (SMEs). Getting rid of charges typically results in a surge in demand for public sector data, which translates into more innovation, more business growth and, ultimately, higher budget revenues (via taxes) for the public sector.

3.1.5 Protocol-Based Business Modelling

Going from Pipeline-models that was focused on Mass production, Mass Consumption and the Global Supply Chains, the focus was on the reduction in Search costs and bargaining costs. Then in the Platforms the focus was on Distributed Production, Personalized Consumption and global digital connectivity. Moving to Protocols (beyond API and companies only) the focus is on reduction in verification/policing costs and network mobilization/coordination costs and the basis of protocols are Distributed Ownership, Interoperable Identity and Global Contract Execution.

With the implementation of the EUDI-wallet tested in DE4A Studying Abroad pilot the Member State roles will come to change quite significantly. They must cater for both a Globally valid ID (or eIDAS will not take off this time either) and Self-sovereignty for Nations and Persons.

What is clear is that a new MS-led infrastructure is needed for handling of the above change from Platforms to Protocols. Instead of being reliant on a few private organisations all the time, it would concern a distributed infrastructure not dependent on any one organisation. And as a bonus we get the self-sovereignty needed by MS and individuals. In the project we have been heavily reliant on certificates, something that has actually made us dependent on German postal laws in the end, much to our frustration.

Instead of dealing with this change as a separate topic run by EBSI, we will introduce the changes and analysis in the following chapters so as not to forget any Output (new), Outcome (updated) or Impact. Our service is mainly about a Collective-Good namely Data something that gains in value when shared properly and reused.

3.1.6 Conclusions

We used the PMC for the consultation and collection of feedback from the Member States, while we intend to use the protocol based for the final road-mapping in D6.3. There are only a few examples of value calculations around and all of them consider that they are very rough estimates. The usage of PMC business modelling done in the consultation stream (next chapter) show us what we need to consider and how to proceed in analysis also in comparison to input from the projects WPs in chapter 3.3.

3.2 Consultation stream: input from the first workshop based on PMC

DBA- and MA -pilot uses a standard platform model. The main focus is on how EU and MS states can give stimuli and facilitate to create these platforms. The following sections describe a possible

approach based on inputs and examples from the pilots. In the end each MS should model their own approach, including the Principle of Fair-sharing.

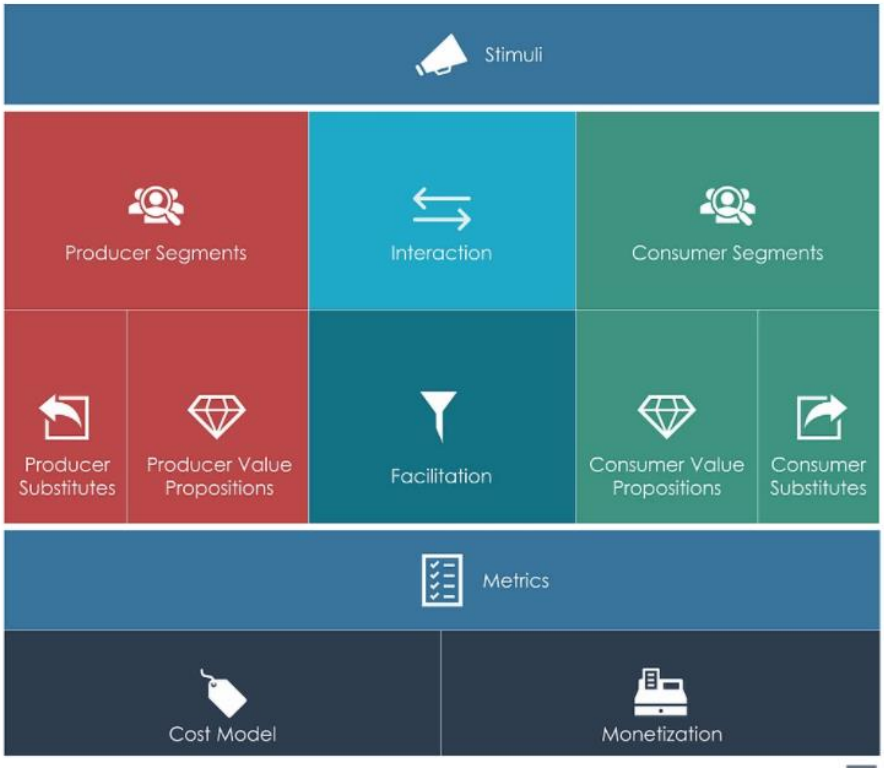

Figure 9: Platform Model Canvas

3.2.1 Consumer Segments

Citizens are the main focus of the consumer segment. One could also in a second step consider Foreigners and Public agency Clerks and even private entities carrying out the administrative tasks as a service.

It is clear that better and more up to date information is needed but it is also clear that no Member State finds the current reports from different consultancy firms very accurate. Their own studies are even older, but WP6 are in a situation where the old studies still carry enough drive to improve from eGovernment paradigm to DGT. E.g., Spain has a roadmap to implement 114 services but 75% of the transactions currently come from 7 services and 90% is covered by 18 evidences. This compares well with our estimation of "good-enough-approach". That WP6 internally have defined as going from a UC implementation covering 80% of all transaction to be able to handle 90% of all transaction by DGT.

In another example Austria (AT) estimates that the fully implemented DBA (with suggested improvements) will save 75% of the current costs of the administrative procedure. Further AT sees a need for a pan-EU trust service as envisioned in the SDGR. They also see good (80%) progress, but it could still improve. They envision explosive growth in SDG services 2023-25 period. All the services piloted are only going to be meaningful (considered to carry their full value) when 90% of all MS or Citizens are connected.

3.2.1.1 Consumer Value Proposition

It is a tug-of-war between stability and updates to National Portal Services (NPS) and this is an important parameter when looking at business modelling. Many of the services are rare-using services so they should be mature when released not to annoy the citizen.

Considering secondary users of the DE4A platform could be Service providers that act as Value adding Platform as a Service – e.g., Services firms building on eIDAS Wallets inc. evidences like Driver license based on standards from Global platforms like Apple & Google.

Other ecosystems turning up in t3 maybe, Protocol-based Ecosystem Service – Like e.g., EUDI-wallets, MetaMask, Wallet-connect and other different DLT (like HashGraph) and value transaction mechanism currently out-of-scope of the DE4A pilots.

When thinking in GaaS terms – In Government as a Service - all services MUST be delivered via a MS Webpage and through at least 2-4 webstores to have enough reach. When thinking in GaaP terms – Government as a Protocol (not platform, which is slightly different) based on open protocols will only emerge in t3.

It also is clear that DE4A is an eIDAS 2.0 door-opener for all MS. Having all of the services will drive adoption and demand/citizen expectations. It also drives adoption on the national level for interoperability of public and private services. In the current DEP program, the goal is set to have 80% of the EU citizens to use their EUDI credentials when using the SDG services and others.

3.2.1.2 Consumer Substitutes

The most common current substitute is paper. This has in many cases for companies meant that HR or Administrative departments have hired specialists or even outsourced these kinds of services. MS see that a market could grow in some MS for these kinds of services, depending on national regulations for open-data and other more cultural ways of working and buying services. For t2 WP6 do not see this happening broadly, the services will need to mature and increase in usage/need for them to find widely working business models.

3.2.2 Producer Segments

Mainly Public Agencies containing clerks and management and supporting IT-departments on different NUTS levels and under different jurisdiction. Several integrations were made for the first time in DE4A to actors that has not been of national character before. Specifically Base registries should be mentioned and investigated even further. In a typical country based on a central datahub (Enterprise Intermediary Platform (EIP)) there has been 6-10 integrations needed per service. Basically, an access point and a connector are what should be needed.

There is decision needed with regards to Identity Provider (IdP) Services; One or many per country? Only public responsibility (not the same as only publicly run) or free market based on “KYC”-like procedures. There is obviously a market for IT-integrators as well as IT-Projects/Services – Ranging from development projects to SaaS as DE/DO (DP/DC).

Technology Providers within HW/Network should also be considered even though they are largely currently not based in the EU. May need clear public investments for “Self-Sovereignty of the EU”.

3.2.2.1 Producer Value Proposition

The project has been a positive experience based on its tight connection to TOOP/PEPPOL and SDGR. They have all produced iterative steps towards fulfilling legislations and have helped in cascading knowledge and services. At least 50% of outputs and outcomes are immediately reused.

A value to the Producer has been the close focus on the citizen, but also the multipattern-approach, the future needs also to ensure a Green-DLT approach as soon as possible.

Depending on national-side ways-of-working (in-housing or outsourcing) One can see three different types of value propositions; Open-Source Ecosystem, Procurement based API-models (Organisation to organisation contracts), or Protocol based ecosystems that can be B2B (inc. G2B and G2G) and B2C and even C2C via verifier services and QR codes.

3.2.2.2 Producer Substitutes

Depending on national side, ways of working (in-housing or outsourcing) MS:s can see several different types of substitutes when it comes to how to interact mainly:

- Open-Source SW; consultancy and different licensing.
- Open-Source product development; with different licensing.
- SaaS; via API or Protocols

Also paper workflow could be considered as well as online searching in Business registers and portals could be substitutes.

3.2.3 Stimuli

The following is a collection of different stimuli suggested by the MS all with a rightful base for future activities. Maybe some of them can be stitched together, but for now we leave them here as input for possible actions to be defined in our final deliverable.

Infrastructure Stimuli

The DE4A/OOP platforms can be compared to official existing services like IBAN/BIC/SWIFT that are based on federation, that must be allowed to have different backends (Silos and Protocols) at least for a transition period. Platforms should be built by the ecosystem per domain.

National/Regional implementation stimuli

The future of the UC must fit national planning; including many organizational units that are not part of the project. All MS should make national use of these SBB as well for other agencies and also make reuse on the purely national side. Sweden is on the edge of EU and only have a few potent cross-border areas eg. Öresundsregionen, Stockholm and partly Finland/Norway. Compare in relation to metrics one country or part of population on NUTS level can show good levels of uptake. Timing is also important. When to start using what DE4A are piloting in real services plan differently together within NUTS levels. The requirement is to make it easy to implement otherwise there will be no adoption on municipality level until complete market uptake by vendors.

Ecosystem Stimuli

Further activities to support Business to business dialogue and not only regulatory measures; comparison can be to Roaming (for Telco operators) – Business Models/projects must be Equal Stakes & Shared Revenue/Value. It also needs to link to how the PPP and Governance models work allowing for harmonization across borders over time. DE4A is an LSP, what is the expected financing form after the project and until when. These are questions WP6 will try to have suggestions for at the end of the project.

One may also consider Service co-delivery like telcos and banks have done in the past. IdP-integrator consortia or ecosystems (like in 4 EUID-Wallet projects) for state-of-the-art eID-services. Compare to in the wild grown Covid-pass services like KIVRA and/or Freja as examples from Sweden that leads to de facto near monopolies. SDG-Services should maybe be the only “transnational trains” allowed to exist to push these services until a set date, suggested to be no later than 2026.

Reuse

Reuse is clearly an important component e.g. below: Less effort needs to be spent in maintaining legacy/existing solutions; It is important to handle versioning smoothly eg. Issues of eIDAS DBA versions, may be similar for the connectors.

- Not all tech needs to be greenfield - e.g. ISA2 components reused under new EU-legislation.
- New Infrastructure needed - e.g. SA issues with the legality of DLT. The Universities want to adopt DLT, and it may be for the best since they are so distributed and heterogeneous.
- Domain agnostic SBB – e.g. DE4A BB also present in other projects national projects, learned about the eDelivery to better configure this has been a great value. Will reuse this knowledge with some MS-bilateral projects e.g. in ES/PT where there is high interaction. How to do this has been a great help. MS will use MS-MS contracts for other services.
- "Do not patch what works"-default e.g. may at times be using legacy systems but they are working. There is often a high risk to exchange systems so MS need high assurance that a shift will work.
- EC Custodianship – e.g. MS find there are existing building blocks which are faulty and with big issues, but they are not removed (by the EU services). People are afraid to change. Need to identify the bad BB. If they work, then they must be upgraded with care.

Other stimuli

Another activity is to try to **enlarge the user universe**; In the early days it is important to have friendly users. Piloted services should approach users from other pilots and projects to try out in preproduction. Awareness of feedback between pilots and from the larger community. To get reuse of the system and evidences on a data level via base-registries within the MS. On a personal level project members should all connect with other projects and find friendly users/testers and influencers. They become aware and can reuse the ABB/SBB in current and future projects like.

One should compare and **break "Necessity" and "Stimuli" to each other** to find the most worthwhile Stimuli. Like Quality Stimuli; The DO must be of high and proper quality, but Governments should make it a rule to have to use it within 1-2 years for international UC as well. Invest money to adapt and adopt SDG for Agencies. Or Marketing Stimuli; For business, MS need to broadcast the possibilities "Solution is Available". Most do not know it exists. Create a new slogan like eSense did per domain. Also, Regulation Stimuli; stimuli should come through DE/DO budget. Interactions to increase value, e.g., English is the language of choice now for UC-DBA. Would be great to go to transcoding/use the real services in eg. RO and PT. MS:s also need to increase the datasets available in each MS. Focus on one dataset at a time not all. More value with more/richer mandatory elements rather than manually having to add elements. Process time could/would be from 3 weeks to 3 days or 3 hours or less, but then deeper integration is needed. This is an important KPI/Metric

Further It takes time to build a wide international network, one may be involved for decades in R&D and it is still worthwhile to do projects like the LSP:s. In D&I, the "D" is the start of it all eg. in 2001, the 4-step model working both vertical and horizontal was created. With regards to I&E we are exploiting eGov/DGT for business in showing what are the advantages to use OOT. Some may focus on business as more important than citizens for change, but this may change depending on which point in time we are at.

A final comment was "No clue in other parts"; Meaning projects need to have **broader participation** as much of the participation is domain knowledge. Meaning future projects should all MS participate in all Services. OOP national program high focus within a domain or a UC will lead to less efficient implementations in other domains. Even so the pilots are likely to also improve SDG/Erasmus etc.

indirectly. Cross-pollination in all MS should happen via WP6 in a Workshop after the summer 2022. All MS to send stakeholders (even non beneficiaries) for every Business Use Case. Otherwise, one will continue to have examples like the SMART study that several beneficiaries never heard of.

3.2.4 Interaction

DE4A Statistics and other Open data is very useful for dashboarding, understanding and supporting decisions on how MS all interpret/regulate locally and nationally. Important not to take advantage for just one MS (FAIR principle), but to see the whole. EC and MS need to understand onboarding of new entities if causing liability or breaking national regulations and rules. Eg. Personal data, like Civil Status Birth Certificates and Address is shareable most are machine-readable and should be fully available online based on individual consent between MS.

Should create a common trusted directory (TIR) to better identify where to find authentic data, based on regulation (MS/EU) and work for highest security and privacy to avoid bad-apples. Still allowing private entities to take part. eIDAS and Notification service should be a prerequisite helping to push faster/easier mandates e.g. Powers Validation is extremely useful for both UC-MA & DBA.

3.2.5 Facilitation

MSs have not been business-oriented enough, compared to the uptake of GAFA-eID. This can now be mediated via SDG-services and by a joint perspective, but it needs to be better coordinated and more aggressive than now. Push the process and align more nationally and cross-border. EC leadership mentioned in their latest speech that EUDI should be used in the GAFA-platforms rather than only the other way around.

The support from central WP:s to the national interoperability teams have been very important and matured them a lot. Also, the BB have been matured and integrated to national side platforms. The smaller group (not all MS at once) has been positive. This also is important for Governance. It is likely this will help a lot when implementing with 28 MS. Also allowing new beneficiaries and MS in new roles (e.g. Germany) to join in has really helped. This smaller group also help in making absolutely clear in documentation and process improvements on the national side.

To prove outcomes by real pilots is Research and the start and continuation of it all. The project expects some reusable Development Outputs and Outcomes to improve final solutions after iteration two as well. The project has created important knowledge. Sometimes the SDG-group has often formally ignored the Outputs but that is that is ok as DE4A have had good communication with Key-Enablers. And eventually our input has been considered and taken onboard. When the EU have the EUDI-wallet no one will use it until the services are there, but DE4A have tested in practice the real UC. Finding issues with inefficient DLT, difficulties with “One-eID-only” and many more important findings. It has been extremely useful for MS that cannot overstep legal frameworks, but they have been able to learn about DLT in the project to understand.

When DE4A ends MS intend to set up a separate meeting with the objective to present what DE4A achieved to any MS or European country. One country should take the lead on each BB/Service Engage other actors like universities to make new MS/Actors interested no new “DE4A 2.0”-services and projects even if no other impact than just to raise awareness.

3.2.6 Metrics

There are many metrics already and WP6 should only in the end suggest what one may find to be useful over a 5+ year period. Below are our current suggestions to be validated before the end of the project.

- Complete process measure per Citizen and per Civil Servant. Double Entry, updates, PT and some others thinks they can measure that. Reuse of documents/data for other UC like Validation and to Catch Fraud.
- One system for national and one for non-nationals. The SMART study has been suggested but it is not accepted by everyone. AT have shared their model, no one else have a really viable model they are currently willing to share. No one knows of such a model in the WS, the closest suggestion is some model from Finland).
- Environmental measures CO2 saved.
- When the City halls and municipalities realize the usefulness of the centralized platform. Many actors with procedures have already asked to reuse our knowledge and services and want to integrate towards this data. This could be turned into a measure.
- Can MS invest the time in better more productive tasks and services than DE4A (or any other project). A barometer per MS on all initiatives.
- DE4A helps the national side as well. Transforming also to national evidences.
- How much is physical visit today 2021 versus tomorrow 2023 and 2025?
- National 15 million tx/month when only a few of 8000 municipalities are covered, but it covers the majority of population. Digital divide for the rural areas.
- Reducing cost measures.
- Sort out Major Benefits/Impacts connected to Outcomes and Outputs. Do not try to "reuse everything".
- What happens to the project Outcomes and Outputs is the final measures, even though MS joined to understand (it is a H2020 R&D-project).
- MS are convinced they will need ID-matching services, this need to be measured somehow.
- Investigate decisions and overcome barriers in a more structured way than just in deliverables.
- Map and Calculate 90% of countries
- Map and Calculate 90% of population covered.
- Map and Calculate 90% of Population in cross-border regions eg. Öresundsregionen 0% as Denmark left.

With all that has been said and are in the models it is still hard to evaluate. EC could build on and work with models like AT "Wirkungsorientierte Folgenabschätzung" [26] or the Swedish "Nyttoanalyser" [27]. They need to be process-based 1-2-3-n-models and make estimates on what benefits to reap and by whom. AT and SW did this for the OOP to help the leadership on what to do first politically. In Annex IV. DBA Impact Assessment Template you find the template for change estimates from DBA. In the next steps we intend to do this for at least one more UC. Member States are not really doing this kind of analysis on a normal basis yet but EC should help push for that.

3.2.7 Cost & Value (inc. Monetization)

See Chapter 3.1.1 Monetary Benefits.

3.2.8 Social Benefits – long term

We envision the DE4A services in the second iteration will bring the following benefits to our main stakeholders, citizens and businesses. Citizens will be more prone to move to improve their lives throughout their lifetime (Study, Work and Retirement). SME, Consultancy and Product firms will have plenty of opportunities with a multipattern approach that will better support the plethora of use cases within and beyond SDG. Large CAP consultancy firms still have great opportunity to lead DGT programs and have a better structure and harmonization to start from in setting up cross-border services. Clerks will be able to spend more time with the difficult cases and to detect fraud. Mundane tasks will be

more and more automated. Public Agency IT departments will be able to have a more structured dialogue with their lines of business for all SSDG services and beyond.

3.2.9 Section Summary and conclusions

Metrics and Business models are still not widely discussed between MS. This is a problem if we compare to private entities. One example is Alibaba; that in its creation was created to be hidden from Google so they can sell the data themselves. Value of ethics and model citizen must be included as mandatory in EU services and projects. DE4A and any project participant public and private should make available the value created of the "DE4A-data". Also the quality of the Data has value for trust and is there for of higher value to any actor.

Dashboards and statistics for real estate can be used as one example also when doing Urban planning in future Use Cases. Up-to-date data is key to all actors Portugal today updates many statistics only every 4 years, this can be replaced by real-time data or monthly depending on detailed requirements from any MS. What does this mean for Fintech and Gov/REG-Tech in the RTE in 2030 taking in to account the Notary entry for cadaster or for the taxation of cars. These are question that need answers from all MS to go from 27 markets to ONE Market and ONE Network. Having looked at the older Platform Model Canvas in the next chapter we will dive into the realization of the SA services and compare only them to each other. We do think this could be generalized though also for the other pilots.

3.3 Empirical stream – input from other WP

Building on our Architects' model we try to have a business modelling perspective on our project while trying to apply the CEF-model. We want to make this overview Model/Picture more accessible to people in the Line of Business and the leadership. Please be aware that there are many more perspectives that could have been used and, also, much more low-level granularity that may affect sustainability of any artifact. To find a more detailed and structured version we have also included an Annex V. List of Outputs and Outcomes.

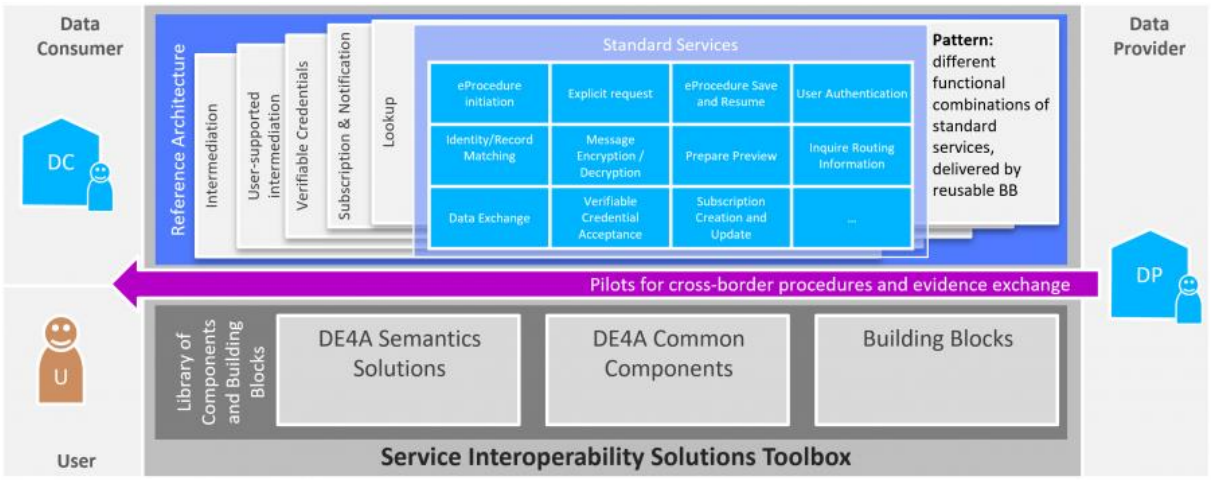

Figure 10: Simplified Architectural Overview

There are many ways to portray the different Outputs, Outcomes and Impacts and they can be viewed through many lenses. Trying to keep it focused on business and organisation and governance we decided to relate the components of the above visual instead of going into every detailed component,

which are best viewed on the wiki. What is not directly visible above is the legal foundation, but obviously that is the basis for all parts. And of course, it all needs to relate to our chosen governance model in the end, be it EBSI or CEF Model canvas or most likely a mix of both.

3.3.1 Components of Architecture overview

User – Are the first in line for Stakeholder management there for a common Helpdesk is expected and is the only part of enabling services that the end users will have to interact with

Data Consumer & Providers – are also stakeholders and are in need of Onboarding and structured follow up. They need SW and preferably access to open-source variant of COTS. Further the DC/DP need to have national side MS Operating services to support those agencies that are not present in the EU discussions directly.

Pilots – Need to have a structured turn off or handover (e.g. delete GDPR relevant data etc.) further the project outcomes and outputs must be taken care of in the relevant ESO (European Standardisation Organisations) or technical specifications handled by the SDG-CG. Or they need to have all Enabling and Enhancing services being moved into regular Line of Business operations on the member state side.

Service Interoperability Solutions Toolbox – Is an attempt to help SDG-WG structure their tools for all of the services based on whatever Service Management tool the EC choose to use internally for the continued running of the services. The main requirement here is that the tool should satisfy all levels of computer skill and not feel intimidating for any person needing to interact with the system and services and it should use eIDAS login.

Library of Components and Building blocks – The most common and used platforms should be used, at the same time as full autonomy for the EC and MS must be guaranteed. We have chosen to use the most commonly used tools by developers and semantic experts, but this may need changing when going into operations.

DE4A Semantic Solutions – Will be placed in the regular process EC for Semantics to ensure high grade of structure and automation, we believe this to be The EC publications office but it is not entirely clear.

DE4A Common Components – There are both examples of Outputs (eg. MOR and Patterns) and Outcomes (further functionality of several AS4-Gateway products). One must make a difference between common components (same version or at least a guarantee of backwards compatibility to a reasonable extent) and components in common (may have different versions but does not guarantee anything as they may be used also for many other services on the national/local level). The starting point for this is found in Annex V. List of Outputs and Outcomes

Building Blocks (DEP) – MUST have a Specifications MAY possibly SHOULD have a Connectathon testing tools available. These testing tools may be for certification or for development in “playgrounds and Sandboxes of different kinds.

Reference Architecture – Not to make this a technical document we consider that our Reference Architecture mainly contributions to SDG are Multipattern Approach and Preview further we have contributed requirements and specifications via outcomes and recommended change to the EIF and SDG architecture. See Annex V. List of Outputs and Outcomes

Patterns - Different functional combinations of standards services delivered by reusable BB. All are reusable and should be followed up in Operations and/or enabling service

Standard Services - The services can be combined in many different ways and you find their main attributes in the Annex V. List of Outputs and Outcomes

3.3.2 New Services, Processes and Products - Outputs

See Annex V.

3.3.3 Improved Service & Processes & and Better Policy Products - Outcomes

See Annex V.

3.3.4 Value Creation by Organisational Change and Population well-being - Impacts

This Impacts section will handle and be aligned to the goals set out in the new Implementing Act (IA) that did not arrive in time for this deliverable. D6.3 our final deliverable will also draw on this and the conclusions of WP1 Inventory of current eGovernment landscape. On a high level we envision, with the advent of the Protocol BM students can choose schools much more transparently and eventually a social scoring like situation can/will emerge. The old barometers of the Best Schools of 2030 will be updated quarterly (or maybe per semester or trimester) not yearly.

For the Life Event (LE) of moving abroad citizens will be able to choose from different attributes by NUTS regions as things get more transparent. What these will be we can only imagine today, but hopefully, we the citizens and the politicians will be able to ensure that each NUTS area will be able to live and be prosperous by both separating themselves from their equivalents as well as competing head-to-head.

For the Impacts on the Digital Single Market, especially for SME, the impacts are already measured in so many ways we do not see how we at this point in time can make a difference by coming with new Impact numbers. It is clear to anyone that the DGT of all administrative tasks (the administrative burden) is strongly positive for all companies. It is even a must with the current level of detailed follow up that could and should be exerted by Member states. It must be kept in mind though that in the end it must (or at minimum should) deliver functions and capabilities to European companies and public agencies that are sought after globally.

It is interesting to see the difference between Austria (AT) and Sweden (SE), where AT has a 5-year horizon and SE a 10 year one. For sure Sweden is also likely to have a more precise and short term (project length based) measure. In 2-3 years from now several MS should be able to make new calculations and comparisons. This is something we recommend the MS to follow up on. Public data holders sometimes enter into arrangements with the private sector to derive extra value from their data. This creates the risk of lock-in of public sector data, benefiting large companies and thereby limiting the number of potential re-users of the data in question. We will focus on the difficulties lying in the borderline of multipattern approach and replicability between sectors and different organisations and decentralization topic of DLT or PKI infrastructures we find is discussed enough elsewhere and is currently still too difficult to find meaningful differences within the project scope.

4 Sustainability & Roadmap

4.1 The Current Landscape

Starting with a roadmap before knowing the topology of the ecosystem often leads to a strange journey. There are many Institutional features and levers used when creating policy and governance mechanisms. There are Inter-organisational networks of influence and if enough people participate it possibly leads to isomorphism processes such as the need to converge Large Scale Pilots (LSP) and EBSI-projects and SDG into one coherent Activity or program.

With the intention to release 4 EUDI-Wallet projects DE4A should have a good opportunity to continue its journeys, in one or several projects. MS council should prepare and decide on strategic and tactical approaches on how to do this most effectively. The following section is largely based on reusing the Nordic Smart Government Project tools [25].

4.1.1 Starting point Doing Business Abroad - Strategies and Visions

As Is - Strategies & Vision in DE4A will, in the future document D6.3 New models for shared delivery of common services roadmap (December 2022), be related to DE4A deliverable D1.7 Legal, technical, cultural and managerial barriers [29] concerning the questionnaire and the Topology of DGI/DGT model as answered by each national beneficiary first as well as one MS.

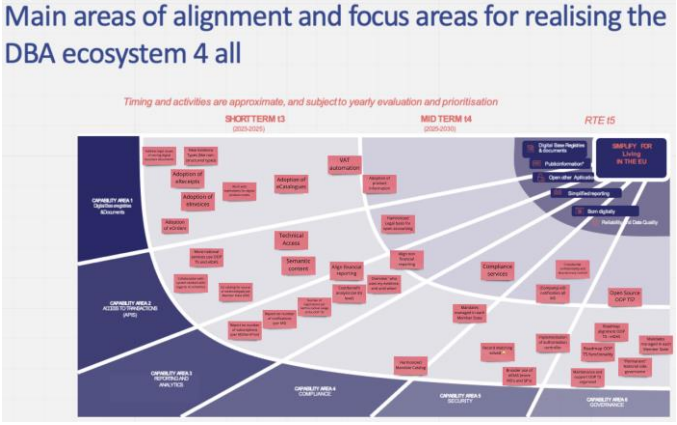

Figure 11: Draft Roadmap DBA

4.1.2 Starting point Studying Abroad – Strategies & Visions

As Is - Strategies & Vision in DE4A will in the next deliverable be related to the D1.7 [29] Questionnaire and the Topology of DGI/DGT model as answered by each national beneficiary first as well as one MS.

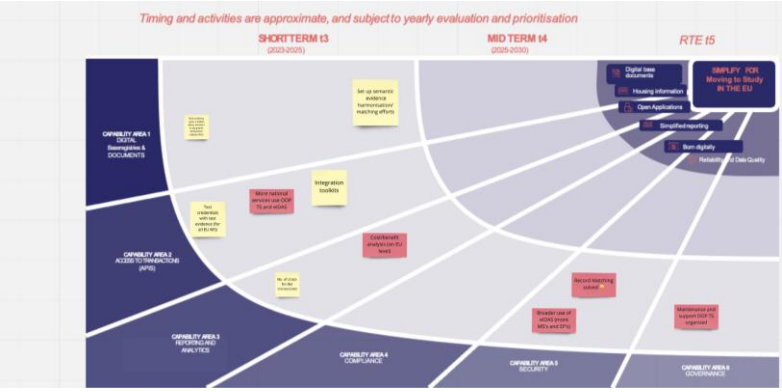

Figure 12: Draft Roadmap SA

4.1.3 Starting point Moving Abroad – Strategies & Visions

As Is - Strategies & Vision in DE4A will in the D6.3 our final deliverable be related to the latest WP1 Questionnaire and the Topology of DGI/DGT model as answered by each national beneficiary first as well as one MS. In the case of Moving Abroad (MA), WP6 had the MS look at it both in general as well as just from a public agency clerks' viewpoint. However, due to the small amount of information we choose to report it together.

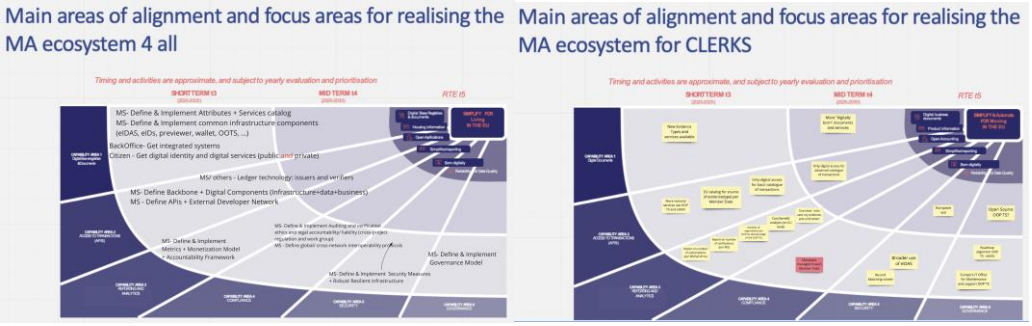

Figure 13: Draft Roadmap MA

4.1.4 Design and Appropriation process and implications

The following two sections give a high-level introduction and overview of the project setting. Creating draft generic models and policy recommendations based on the business models' implications roles and responsibilities, risks and barriers, and social and monetary benefits based on our now three-tiered timeline; Going live with SDG (t2), Regular Full Services (t3) and the Real Time Economy (RTE, t4).

	t2 (2023)	t3 (2025+)	t4 (2030-) Longterm vision
Technology WP:s	PSA (2020)	PSA2 (2021) D2.7 - Target Architecture	2021/22 D2.8 EDSM-Ecosystem (via Policy)
	Technology & Semantic basis stable		Next tech Cycle
WP6 - Governance, Sustainability and Business Models Actors / Stakeholders	Gov. to Citizen & Business	+ Priv. Sector & Civ.Soc.org	e-Commerce Information Services Real Time Economy
	Authorities (Agencies) is DC is DP Users = Citizen & Business	eg. Fintech +Notary services +Real estate Agents +third party services +other	

Figure 14: Three-Tiered Timeline

In the Conclusion Paper on the eGovernment Action Plan we can get direction by "by 2030 public authorities at local, regional, national and European level have developed into agile, resilient and innovative organisations, seizing the benefits of the digital transformation and emerging technologies and advanced capabilities to provide inclusive, seamless, convenient, secure and trusted human-centric digital services." We are also well in line with the themes of "Innovative Governments", Human-Centric Governments and Knowledge Ecosystem and Monitoring."

4.1.5 Digital Government Innovation Approaches Consultation

Working in the consultation workshop with DGT the MS gave the following self-proclaimed view on digital government transformation[1] approach in their country related to the DE4A services.

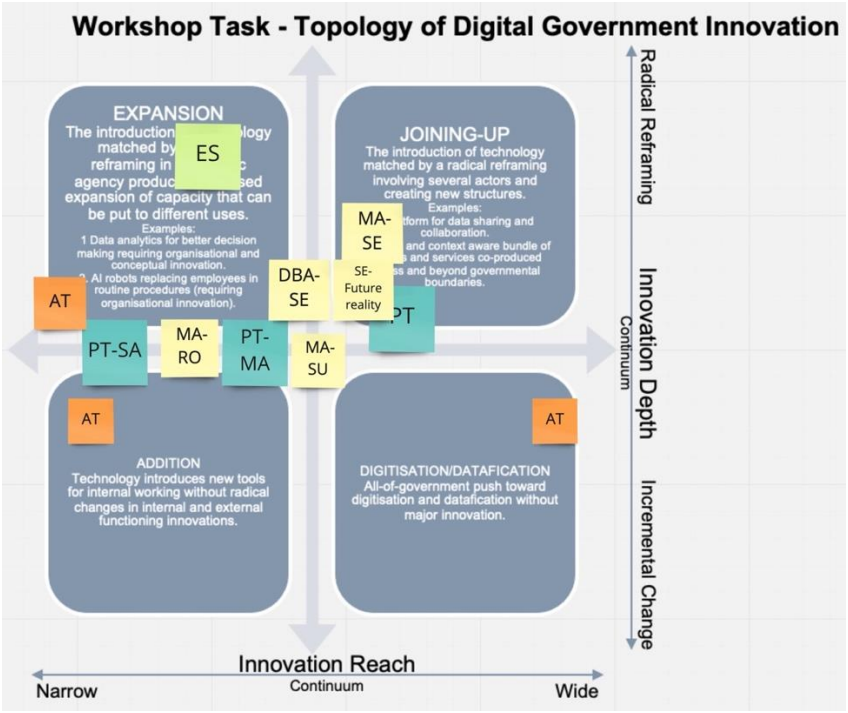

Figure 15: Topology of DE4A Digital Government Innovation

4.1.6 MS Evaluation

Based on workshops and pilots input so far there is a tendency that the services are seen more as narrow specific innovation rather than being part of complete well thought through national programs. At the same time the project seems to be well in line with the national programs. It is also the case that depending on your viewpoint you get different answers to by different actors or use cases within a MS.

In the discussions, it was clear that the MS's want to move away from the eGovernment program concepts and move on to something new based on the new trends of more reusability across agencies based on more novel concepts like advanced AI as well as Automation.

4.1.7 Validation of Pilots' results

Validating early answers and hypotheses is unfortunately not really possible at this stage of the project. It will be part of further workshops with MS and external stakeholders and delivered later also based on the input from WP1 and WP4. Below is our first view.

4.1.7.1 Pilot Doing Business Abroad DGT Analysis

Using the fine-grained powers and mandates via the IM-pattern has given positive effects on the understanding of the need for it in hundreds (maybe even thousands) of different business document/Smart contracts-processes, due to different legislation in different MS markets. Especially a need for further harmonization in the area of publicly traded companies are visible due to local Regulation & Policies on eg. timing of release of company information.

4.1.7.2 Pilot Studying Abroad DGT Analysis

Using the Verifiable Credentials (VC) pattern, even without our own Framework but rather based on EBSI together with the already existing agency infrastructure has given positive effects by having agencies and universities work closer together. Allowing to pilot DLT with a group of Digital-Natives as well as clerks deeply in need of more connected systems.

The pilot has also shown the usability of using the same data in two different paradigms and insights into the costs and technical difficulties and even double work due to these two quite different paradigms.

4.1.7.3 Pilot Moving Abroad DGT Analysis

Creating and piloting the USI-pattern has given insights into the need for engagement of the end-users and the need for highly useable systems that have a look and feel that satisfy millions of users meaning a more regular application interface and symbols.

Examples are the need for registering detailed purposes and legal basis by canonical evidence type and possibly even by information item. So that data can be mixed and matched for different future purposes as well. A reconnect possibility to the end-user also seems to be needed for reuse purposes.

A version of this has been designed for the second iteration due to requirements from Portugal but DE4A envision this also to be reusable for other requirements.

4.2 Pilot Roadmaps Future Activities

4.2.1 Doing Business Abroad Future Activities

Capability Area 1 - Digital Documents

2023 Address legal issues of storing digital business documents. Adoption of eOrders. Adoption of eInvoices. Adoption of eReceipts. New Evidence Types (like non-structured types)

2024 Work with stakeholders for digital product codes. Adoption of eCatalogues. VAT automation

2025 Adoption of product information

Capability area 2 - API access

2023 Collaboration with system vendors with regards to semantics. More national services use OOP TS and eIDAS. EU catalog for source of evidence(type) per Member State (IDK)

2024 Technical Access. Semantic content.

2025+ Harmonized Legal basis for open accounting.

Capability area 3 - Reporting & Analytics

2023 Report on number of subscriptions (per MS/SP). Report on number of notifications (per MS)

2024 Number of registrations per SP (actual usage of the OOP TS). Cost/benefit analysis (on EU level). Align financial reporting. Overview ' who uses my evidence, and until when'.

2025 Align non-financial reporting.

Capability area 4 - Compliance

2023 Harmonized Mandate Catalog

2024 Mandates managed in each Member State

2025 Compliance services

Capability Area 5 - Security

2023 Broader use of eIDAS (more MS's and SP's). Record Matching solved.

2024 implementation of authorisation controller

2025 (Company) eID notification all MS. Crossborder confidentiality and discretionary control

Capability area 6 – Governance

2023 Maintenance and support OOP TS organized. "Permanent" National side governance

2024 Roadmap OOP TS functionality. Mandates managed in each Member State.

2025 Open-Source OOP TS

Based on the above input and future workshops WP6 will look at recommendations on restructuring of resources, leadership, structure & process, employee skillsets. Also the need for new technological combinations, sunsetting of legacy silos, relationships of system integrators, data availability and sharing possibilities. Also reframing of digital culture should be part of such change strategy recommendations going from eGovernment to Digital Government Transformation (DGT) in future MS program plans. In the final step of the project we will give recommendations on milestones.

4.2.2 Studying Abroad Future Activities

Capability Area 1 - Digital Documents

2023 New evidence types tested, many more for study grants. Household composition,

2024 Set up semantic evidence harmonisation/matching efforts

2025

Capability area 2 - API access

2023 Test credentials with test evidence (for all EU MS). More national services use OOP TS and eIDAS

2024 Integration toolkits

2025

Capability area 3 - Reporting & Analytics

2023 No. of cross-border transactions. Cost/benefit analysis (on EU level).

2024

2025

Capability area 4 - Compliance

2023

2024 Compliance services

2025

Capability Area 5 - Security

2023 Record Matching solved. Broader use of eIDAS (more MS's and SP's)

2024

2025

Capability area 6 – Governance

2023 Maintenance and support OOP TS organized

2024

2025

Based on the above input WP6 will look at further understanding of the capability areas to be able to make recommendations on restructuring of structure & process, employee skillsets. Also the need for new technological combinations, sunsetting of legacy silos, relationships of system integrators, data availability and sharing possibilities based on DLT. Also reframing of digital culture should be part of such change strategy recommendations going from eGovernment to Digital Government Transformation (DGT) in future MS program plans. In WP6 we will give recommendations on milestones before the end of the project.

4.2.3 Moving Abroad Future Activities

Capability Area 1 - Digital Documents

2023 New Evidence Types and services available

2024 MS- Define & Implement Attributes + Services catalog, MS- Define & Implement common infrastructure components (eIDAS, eIDs, previewer, wallet, OOTS). BackOffice- Get integrated systems. Citizen - Get digital identity and digital services (public and private)

2025 More "digitally born" documents and services

Capability area 2 - API access

2023 More national services use OOP TS and eIDAS. MS- Define Backbone + Digital Components (Infrastructure + data + business). MS - Define APIs + External Developer Network

2024 EU catalog for source of evidence(type) per Member State

2025 Only-digital access for basic catalogue of transactions. MS/ others - Ledger technology: issuers and verifiers

2025+ Only-digital access for advanced catalogue of transactions.

Capability area 3 - Reporting & Analytics

2023 No. of cross-border transactions. Cost/benefit analysis (on EU level).

2024 MS- Define & Implement. Metrics + Monetization Model. Accountability Framework

2025

Capability area 4 - Compliance

2023

2024 MS- Define & Implement Auditing and verification ethics and legal accountability/ liability (cross-project regulation and work group). MS - Define global/ cross-network interoperability protocols

2025

Capability Area 5 - Security

2023 Record Matching solved. Broader use of eIDAS (more MS's and SP's). MS- Define & Implement Security Measures + Robust Resilient infrastructure

2024

2025 One European eID

Capability area 6 – Governance

2023 MS- Define & Implement Governance Model

2024 Europe's IT Office for Maintenance and support OOP TS

2025

Based on the above input WP6 will look at further understanding of the capability areas to be able to make recommendations on restructuring of structure & process. Also the need for new technological combinations, sunsetting of legacy silos, relationships of system integrators, data availability and sharing possibilities based on DLT. Also reframing of digital culture should be part of such change strategy recommendations going from eGovernment to Digital Government Transformation (DGT) in future MS program plans. In the final phase WP6 will give recommendations on milestones.

4.3 Interdisciplinary Questions

4.3.1 Introduction to the Interdisciplinary Questions

Through-out the project all WP have worked based on the thought of Interdisciplinary questions to structure feedback and discussion. Now we use them as part of structuring the WP6 sustainability and roadmap work. The overall starting point for WP6 is that the major costs and benefits of any project or service lies in what is found in between of really anything; the unchartered. In the following sections WP6 take a look at interdisciplinary questions with business modelling glasses on.

Policy & Legal Questions: While the project has large implications on the policy level only a few questions are directly related to this interoperability area. On the other hand, many of the other domains have touch points and liaisons to the policy level to be realized. It is more the fact of us being a R&D project with a practical approach focusing more on the development than the research that has left us with this result.

Organisational Questions: The Organisational analysis focus of DE4A is mainly operational. There for any action to be taken in relation to Policy WG and MS representatives will be aiming for a formal body within the SDG governance structure. Connecting to pure governance issues it is important to get the right level of knowledge from different knowledge domains into the right working groups. The thought of interdisciplinary questions makes it evident that different skills and overlapping of people in groups are important is important functions to remember to fulfill by design and in practice.

Technical & Semantic Questions: Technical and semantic convergence and harmonization to reach interoperability per domain is key here, why WP6 recommend each organisational domain to take lead and responsibility for new services not in the SDG-List. This recommendation may change if an efficient Governance structure can be found for a very large scope of services.

4.3.2 Overview Opportunities and Prioritization

Based on the interdisciplinary questions, below you have the results based on the first workshop of the MS with regards to the 25 Interdisciplinary questions and beyond. These will be reconsidered, but this is a consolidated first view. When there were differences in opinion on topics they have been discussed and kept in the "DO-rather sooner than later category" but it has been ranked lower within that category.

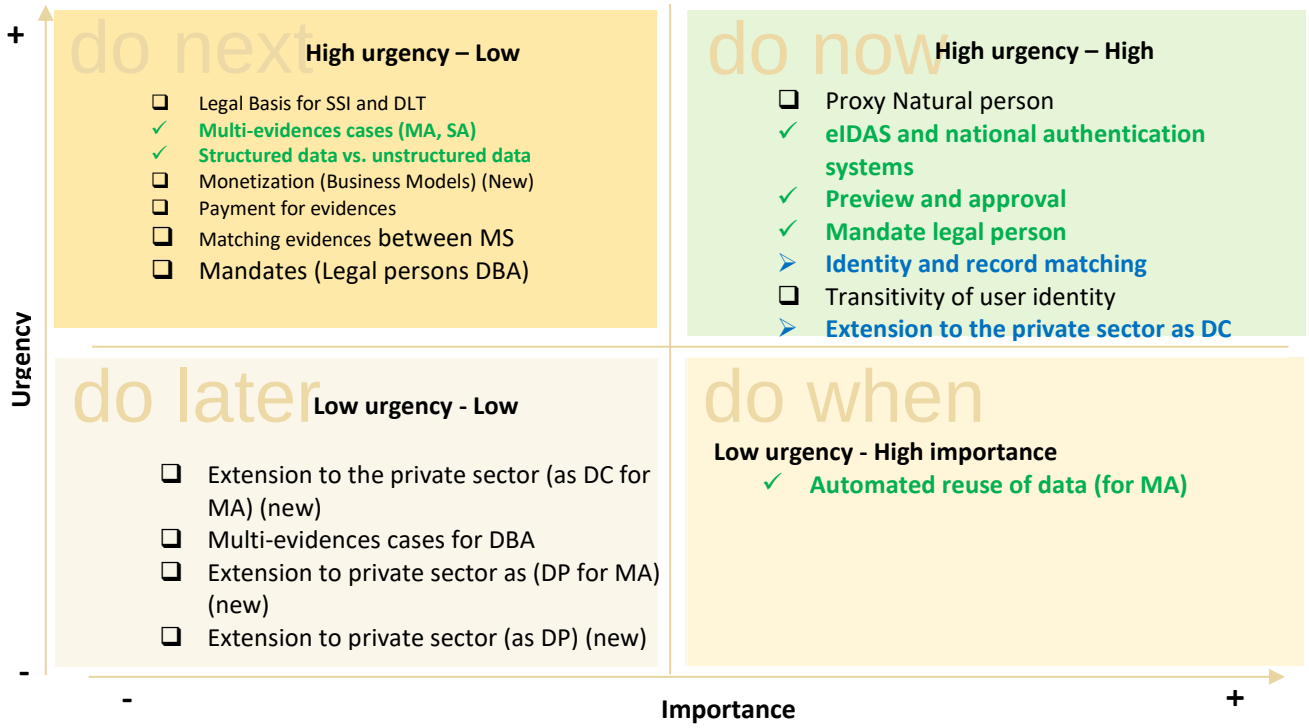

Figure 16: MS Prioritization and overview of Interdisciplinary Questions

For the interdisciplinary questions in green text, we consider them 90-100% handled within DE4A, but they are in need of an owner. Blue text indicates that the interdisciplinary questions are addressed but need continued dialogue before operationalization and in need of an owner beyond the project before

the end of the project. Black text indicates that the interdisciplinary questions are not fully analyzed yet. Need of an owner beyond the project.

4.4 Midterm Sustainability Instruments

Looking at the current state of the three pilots of the project it is clear that they all need a home or further project support. The following have been presented as the top 3 possibilities at this point in time.

European Digital Infrastructure Consortium (EDIC): Will be further analyzed in but looks interesting and promising as a tool for continued elaboration of the services.

Through Union's Agency Services: Not applicable

Joint Undertaking (JU): Based on Article 187 of the Treaty on the Functioning of the European Union (TFEU) specifies that the EU may set up joint undertakings (JUs) or any other structure necessary for the efficient execution of EU research, technological development and demonstration programmes.

The intention is to have a decision by the MS based on life events by the end of the project based on the following criteria:

a) No new organizations needed.

b) Theoretical possibility of Covering all SDG UC and services

c) Sustainability

Since eIDAS is not a question anymore in 2023 for the uptake of our SDG services DE4A consider this also the case for other services supporting our LE requirements. In the next deliverable D6.3 each activity or output object will have a suggested owner and task description. See Annex V. List of Outputs and Outcomes for a comprehensive start.

The instruments will be linked to the roadmap activities for realizing the value and fulfilling the needs of MS based on a chosen generic business model for each of the identified time horizons will be created. These maps were used in workshops with the Piloting MS and will be further validated in with MS and other stakeholders as well as other sources like European Innovation Scoreboard.[22] Further the draft conclusions of Chapter 2 & 3 will also go into the road-mapping. WP6 will map the Interdisciplinary questions and the needs from MS into one coherent way forward.

Figure 17: Capabilities and main areas of alignment

DE4A has chosen to reuse the capabilities of the Nordic Smart Government (NSGM) project in all of the pilots as it sufficiently covers our needs as it covered almost exactly the same Use Case as DBA. The NSGM had a very similar focus as the DBA pilot, it was further made clear by the pilots that this could also be used by the other pilots.

Capability Area 1, **Digital Base Registries and Documents**; Ability to capture and process all digital business documents like invoices, receipts, orders and bank account statements digitally.
Capability area 2, **Availability of Detailed Information**; Ability to make use of additional linked sources like product information through open and accessible API:s.
Capability area 3, **Reporting & Analytics**; Ability to perform predefined reports on the data and perform on demand analytics functions on the data.
Capability Area 4, **Compliance**; Ability to be in compliance with law and regulations and avoid being part of or victim of fraud.
Capability area 5, **Security & Data Protection**; Ability to protect sensitive data
Capability Area 6, **Governance**; Ability to govern the successful road map implementation at national, and EU levels.

5 Conclusions

Speed and agility are keys to all digital transformation. For Digital Government Transformation there is a caveat to “speed only” in the fact that the investment periods are longer, and the focus must be on infrastructure instead of short-term wins (eg. apps and siloed systems). An effect of this becomes clear in the need to focus on Governance and Stimuli rather than on pure business modelling. ICT-infrastructures rarely have political party requirements, but as available funds are scarce and need to be used most efficiently there always need to be a strict prioritization.

With regards to governance, Member States have just started the approach to the SDG governance as it was just recently released, but DE4A WP6 have a solid theoretical foundation for the structured discussion needed to meet all/most of the MS needs and requirements in relation to our outputs and outcomes.

WP6 have described two draft infrastructure business models for DE4A to discuss value realization and apply in our final deliverable to try to give recommendations and a create a fair playing field for the transactional platforms built within the project. WP6 finds that the MS are more and more doing their investment decision homework in EU projects, even though not all seem to be doing it in a harmonized and conformant way. Which is to be expected as it is a MS prerogative.

The prioritization of the Interdisciplinary questions as well as the needed actions to be taken can be found in Annex 1. This gives an outset for the final prioritization and analysis in D6.3 our final deliverable. With regards to risk and barriers as well as responsibilities in relation to our outputs WP6 have shown project progress in relation to the Interdisciplinary questions. We have also given a first possible prioritization with regards to next steps, road-mapping and vision. This first draft still needs to be verified further internally as well as externally in our last deliverable.

Annexes

Annex I. Interdisciplinary Questions

While the project has large implications on the policy and legal level only a few questions are directly related to this interoperability area. On the other hand, many of the other domains have touch points and liaisons to the policy level to be realized. It is more the fact of DE4A being a R&D project with a practical approach focusing more on the development than the research that has left this result. This section includes links to the DE4A wiki [28] for further information.

Legal and Policy Led

Legal Basis for DLT and SSI

There are several legal concerns related to Self-Sovereign Identity and Blockchain technology, such as the storage of personal data in distributed ledgers or the validity of a decentral identifier. This led Spain to all but ban blockchain from application in eGovernment. By RDL 14/2019 it is forbidden to use a blockchain infrastructure to offer any identification or signature process (until a European or national law regulates the use of these technologies). Ongoing research, discussions, and progress in context of EBSI and ESSIF are clearly relevant for DE4A. It cannot be ascertained yet whether piloting use cases applying blockchain technology can go live in production or would remain exploratory, running in acceptance environments.

Goals

Define DLT 3.0 (e.g., Blockchain, HashGraph) so that MS can update and or creates laws to support it.

Critical Success Factors

80% of MS Allow it.

Steps

Define the process for Public and private SSI in eIDAS and connect to Know-Your-Inhabitants-Process compared to KYC.

Scope

In scope for future SDG project

KPI

Number of countries where it is legal.
Number of Countries where it is practically used for one or more services by two or more public agencies.
Number of Countries where it is practically used by one or many public agencies for an SDG service.

Timing and Effort

In D6.3 a Roadmap will be created

Transitivity of User Identity

This problem mainly arises in the Intermediation Pattern because the user first authenticates vis-à-vis the Data Consumer (DC). It is however the Data Provider (DP) in another MS that needs to retrieve the

evidence related to that user. This often requires a Unique Identifier, for example the one in a Population registry, to access Natural person information. The identity (actually the Identifier number) of the user (e.g., coming from eIDAS) is unfortunately not transitive (i.e., eUniqueness IDs differ between Member States). This topic relate directly to the barrier 'L8: Identity transitivity cross border' identified in D1.7

As a result, the DP needs to re-establish the identity of the user, i.e., as described in #Identity and Record Matching by matching eIDAS attributes to national records. This has again two implications: First, the match can be ambiguous (especially for common names where transliteration and similarity algorithms are needed following language rules specific to each Member State). Second the DC must be legally allowed to transfer the eIDAS attributes to the DP.

In the business domain, this is simpler to resolve as a European Unique Identifier (EUID) for companies exist since 2012. The EUDI and the EUDI-Wallet for citizen, proposed for the current eIDAS revision should help to resolve this problem as well for natural persons in the Union.

Critical Success Factors

Must be DLT based and eIDAS-compliant (e.g., PKI compliant) based on fully decentralized Self Sovereign Identity (SSI).

Steps

Adapt national legislation to the latest eIDAS version.

Scope

Probably out of scope of DE4A Roadmap projects.

KPI

eIDAS in all MS containing both PKI and SSI identities.

Timing and Effort

MS responsibility. Could be calculated based on number of eID sponsored projects as well as services, Public and Private using eIDAS 2.0 compliant technology. Also, the number of Service providers used divided up on number of Public Agencies and Services.

Payment for Evidence

As defined as one of the organisational barriers in D1.7 [29] Some competent authorities charge fees for retrieving or issuing evidence. Pricing models usually cater for national data consumers, not for cross-border users. There could be a legal or financial arrangement for the piloting phase (and preferably beyond). It is important to understand that the payments can also be required between DC and DP and not only between U and DP. This is in line with the barrier 'Access to data may be subject to charges' identified in D1.7.

Goals

Connect FinTECH systems to handle direct payments in the process.
Only second option have invoice as backup.

Critical Success Factors

Minimum one (national) contact point for transactions per country.

Steps

Integrate Open Banking API projects for DBA.

Scope

Start with regular banking system and DLT currencies in late 2023

KPI

1. Mobile payment systems integrated
2. Banking system Integrates.
3. DLT systems integrated.

Time and Cost

Focus on Crossborder projects supported via EBSI.

Led By Engineers and Digitalisation Experts (Technical)

Orchestration and Choreography

The automated cross-border exchange of evidence requires many actors and systems to collaborate in an orderly manner, as also identified as barrier in D1.7 [29]: T3: The managing and governance of the choreography of distributed components managed by different agents and during a single user session. The sheer number of possible combinations in different procedures means that most combinations cannot be tested prior to first operational use. The more so, a solid concept of coordinating the actions and services required for the OOP exchange of evidence is required, irrespective of it being central orchestration or decentral choreography.

This need is further aggravated in Interrupted scenarios, which might include extended pauses or waiting periods in the overall process (i.e. issuing the evidence needs several days). Restricting the system to only uninterrupted exchange simplifies the challenge somewhat, but essentially, we still need to manage the interaction between User, DC, potentially several DP and several organisations in-between facilitating the exchange. In addition, we expect that a purely uninterrupted scenario might be too restrictive to cover the breadth of real-life scenarios.

Goals

Create a basis for managing all procedures in a process viewing tool for 80% of all MS.

Critical Success Factors

A tool that can support both Super admins and technical experts to have continuous dialogue for further Online services, automation and AI.

Steps

Create Program and Workplan for all known services in a continuous work program.

Scope

50% Citizen services
50% Business services

KPI

Continue to use and update via (or another existing tool). Have internal tools to follow number of changes and quality of code, corrections etc. etc.

Timing and Effort

Use Joint Undertaking (JU) mechanism or existing agency.

Preview and Approval UI

A lot of discussion already went into the topic of user preview and approval prior to completing the exchange of evidence. From a legal and data protection standpoint, we consider a preview prepared by the system of the DC as not optimal, because it would require the evidence to be already transferred prior to the preview. From a solution point of view, however, a preview provided by the DP would introduce several additional complexities, e.g., related to the handover of the user session from DC to potentially several DPs. We should consider the need for a user interface for the once-only technical system that is separate from the eProcedures form itself. Consensus on this point between Member States and the Commission is not yet final and the PSA includes reference interaction pattern for all three cases: preview at the DC, the DP or the User. This is largely solved and mainly need follow up and workplan for other services.

Goals

Finalize a ONE suggested User Interface of symbols before end of project.

Critical Success Factors

Harmonization / Interoperability

Steps

Finalized in project deliverables.

Scope

Harmonization / Interoperability

KPI

Output of the project; measure number of services using the UI and each MS MUST have a rolling plan for the next 2 years.

Timing and Effort

Measure SDG-Working Group (WG) meetings towards progress.

Complementary, Overlapping and Conflicting Evidence equivalents

We need to consider that the request for evidence in one country can lead to the identification of a multitude of available equivalents in other countries. This leads to the need for disambiguation: The equivalents can be *complementary*, meaning that several pieces of evidence are needed jointly to be equivalent. They also could be *overlapping*, meaning that several equivalents are available for a required evidence or criterion, yet all are valid; or they could be *conflicting*, which would mean that at least one of them is not correct. The underlying reasons for such situations could be complex real-life cases (e.g. multiple nationalities or complex life journey through several Member States), or the result of poor data quality across unreconciled registries in different Member States. In any case, the once only technical system will need to be robust against such cases and cannot assume a single request to single evidence case to be the only viable standard situation. Please note that this topic is about disambiguation, as opposed to cases that rightfully and correctly have multiple evidences involved in a single eProcedure (see Multi-evidence Cases in this chapter below).

Goals

Maximize MS side semantic harmonization of data, to increase the possibility of reuse.

Critical Success Factors

Architecture and semantics to follow global standards

Steps

Identify the conflicting and overlapping evidences. Take national decisions on what to make available through OOTS.

Scope

Starting with the SDG services and finishing them until 2025. Meanwhile identify others also involved/affected.

KPI

Base registries.

Timing and Effort

MS 50%
EU Projects 50%

Interrupted vs. Uninterrupted exchange

In the SDG context lives a strong assumption that the complete evidence exchange will be handled in an uninterrupted way within the timelines of a single user session, as part of completing an e-procedure. From Member State experience, we see that there are good practical and technological reasons to also consider scenarios where the evidence exchange is interrupted and can be resumed later (in the SDG context, the term “deferred response” is used at the moment). One practical reason is, for example, that some requested evidence is not immediately available in a format that allows for its automated exchange but can be made available at a later moment. Several member states have a mechanism to digitize the requested evidence on demand. Including this possibility would increase the volume of evidence that can be made available through the system. Also, in the multi-evidence case, when two or more evidences needs to be collected, it may not be feasible for the user to complete the procedure in one take. This topic was also recognized as organisational barriers in D1.7 [29]: O1: Data may be not ready for access in real-time without authorisation by a civil servant, and OP2: Data may not be ready for access in real-time without following procedures involving batch processing.

Also, a hybrid case appears to make sense, where the resume functionality serves as fallback to handle exceptions in an a-priori uninterrupted procedure. It must be considered, however, that supporting interrupted procedures (resume functionality) across a multitude of cross-border participants is a very complex challenge involving correlation across highly independent systems and persistence (and consequently clean-up) of process instances.

Goals

All relevant services are interruption enabled.

Critical Success Factors

Identify those that need the functionality.

Steps

Identify and plan for extended functionality. Then ask clerks and citizens specific questions.

Scope

MS cover all live SDG Services before end 2024.

KPI

Availability of services in MS.

Timing and Effort

Budget decision between Regular IT budget or “Line of Business” (LoB)

Explicit Request and Transitivity between actors

In the SDGR, the exchange of evidence is generally initiated on explicit request of the user (except where the relevant Union or national law allows for automated cross-border data exchange without an explicit user request).

Goals

Harmonization and clear description of way of working in each service relationship.

Critical Success Factors

Up to date DPIA

Steps

Review MS services, Document, Decide on way forward, Communicate.

Scope

MS responsibility monitored by the SDG-WG

KPI

Existing up to date DPIA for every connection.

Timing and Effort

Regular privacy and security budget,

Identity and Record Matching

This is the problem of matching the eIDAS attributes (mandatory and optional) to the national identification numbers required to extract the evidence. Basis for this matching are the eIDAS mandatory and in some cases the optional attributes. This issue arises both at the DC in starting the online procedure as well as the DP side for extracting the requested evidence (see #Transitivity of user identity below), as mentioned in D1.7 [29]: S5: Identity/record matching when accessing online services cross-border and S6: Identity/record matching of user for data request and data access.

As this match is not 100% an exception flow is required. This still needs discussion as it either leads to the OOTS not being available for the user (a potential solution for the Minimum Viable Product (MVP)) or might require more complex user interaction, potentially even involving manual work by a civil

servant or the provision of additional evidence. In this way this is also related to the topic of interrupted procedures above in #Interrupted vs. Uninterrupted exchange.

Goals

Minimize the occurrence of the issue in the source systems

Critical Success Factors

Harmonize the national systems and base registries

Steps

Use Interrupted procedures

Scope

Start with SDG services than move to others.

KPI

Cases per year and domain.

Timing and Effort

Handled via regular budget. Handled via Interrupted procedures, indirect cost missing out on automation efficiency gains. Citizen satisfaction.

Handover of UI between Actors.

If the eProcedure including the OOP transfer requires several systems, controlled by different actors in different MS, to interact with the user, then a UI reference would need to be handed on throughout the OOP evidence exchange. The likeliness for such a hand-on to break along a longer procedure is significant, which would again give rise to the need of supporting interrupted procedure as described in #Interrupted vs. Uninterrupted exchange above.

Goals

Keep processes clear short and automated.

Critical Success Factors

Follow simple RPA for year t3 and only more advanced AI in t4.

Steps

Continuous Process optimization within regular cooperation not projects.

Scope

Our 3 services in new JU-“project”

KPI

Ready in 24 months

Timing and Effort

In D6.3 deliver timed execution plan.

Mandates and Proxies

The power of representation, either a natural person representing a legal person (i.e., mandate) or a natural person representing a natural person (i.e., proxy) or even a legal person representing a natural person is a complicating factor in the identification and OOP exchange of evidence that we cannot ignore. It is also identified as one of the most critical barriers in D1.7 [29]: S8: Non-harmonised (or mapped) user rights, including powers and mandates.

Whereas a first implementation for citizen procedures might still put this out of scope, it is surely required in the mid-term solution (time horizon t=3 [6]), e.g., because of the aging population of the Union. For business-related procedures, this issue must be tackled from the start, as it is always a natural person representing a legal person. The long-term solution should also consider chaining together 'representation'-relationships or 'intermediaries' (e.g.: an accountant representing an accounting firm that represents a trading company that represents a manufacturer).

Successful piloting might require an eIDAS extension for powers attributes (i.e., SEMPER). Some partners may be hesitant to deviate from using their eIDAS reference software in production.

Goals

Maximize DLT implementation for openness, and minimize silos based on individuals and companies' ability to act as custodians of.

Critical Success Factors

Upgrade of existing systems and creation of an EU wide eIDAS mechanism for disclosure of rights and obligations in relation to the concept of delegation/mandates.

Steps

Maximize automation through time-based management.

Scope

Start with focus on SDG services in t3 others ASAP and no later than t4.

KPI

% of enabled systems

Timing and Effort

Market uptake via clear standards and incentives.

Encryption Gap

The existence of a national OOP system in many MS means that the roles of Data Requestor (DR) and Data Transferor (DT) will be taken over by central MS organisations that are separate entities or authorities from the Data Owners (DO) and Data Evaluators (DE). This is fully in line with the 4-corner model. This means that it is likely that the gateway between the national OOP system and the European cross-border OOTS will need to decrypt and then re-encrypt the evidence using the national and the European standards, respectively. Consequently, the evidence is available at some point in unencrypted form while being processed by the gateway. Real E2E encryption, which would result in nesting encryptions, could theoretically solve this problem on the technological level. It creates,

however, two new challenges: one related to managing certificates across many thousands of competent authorities and the second related to the user preview.

Goals

Maximize security, minimize leaks.

Critical Success Factors

New modern SW systems and upgraded HW.

Steps

Security audit task specifically on this question. Education on new technologies?

Scope

Every SDG involved system

KPI

Part of National side audits when opening up systems to Crossborder handling

Timing and Effort

Regular Security Audit budget.

Production Systems and real live use cases

The optimal outcome of the DE4A pilots are systems that add real value to the citizen and enterprises of the participating Member States. There are, however, significant impediments or hard-to-overcome challenges that could make full production go-live impractical or even impossible. Examples are extensions of the eIDAS nodes to support mandates and proxies (see #Mandate and Proxy) or the use of non-notified eIDs. These adapted systems would need to run in "acceptance environments" but could still interface with production systems (i.e., identity service providers) and pilots could still be based on real-life cases.

Another example is the availability of a legal basis for issuing evidence to competent authorities in another MS (cf. #Explicit request and transitivity between actors). Piloting, using real-life cases, can be seen as a required part of developing the OOTS prior to 12.12.2023. Consequently, it is considered to be covered by SDGR Article 14(11). While this interpretation would support piloting, it implies that the pilot solutions can transfer to full production use only after SDG Article 14(1) to (8) and (10) entered into force 12 December 2023. Approaches like signing a Memorandums of Understanding between piloting Member States (authorities) can alleviate this limitation and substantiate a consensus on the interpretation of Article 14 (11).

Goals

Plan the handover or the extension of services.

Critical Success Factors

Defined date for when the EC support services needs to be operational.

Steps

Clear handover plan.

Scope

No action needed for the project.

KPI

MS connection plan worked out and accepted.

Timing and Effort

Before end 2023 on existing budgets.

EESSI Integration

Electronic Exchange of Social Security Information (EESSI) is a domain specific, sectoral network that has some overlap with the third use cases in the DE4A Moving Abroad (MA) pilot, i.e. - Request Pension Information & Claim Pension, - both in regard to relevant authorities and to exchanged information. The MA pilot needs to assess whether some EESSI capabilities can be reused. This reuse can take different forms, reaching from a full adoption of EESSI for the use case, via a bridge solution that that would use EESSI as a DP on European level, to the adoption of harmonised data models and definitions.

Goals

Upgrade and integration of EESSI system and wider/complete MS adoption

Critical Success Factors

Semantic and organisational harmonisation

Steps

Needs to be handled by “DG-EESSI” and SDG Working Group workplan related to all services involved.

Scope

Finalize as the example on Governance in D6.3KPI
Uptake in MS and number of integrations. Measure satisfaction from MS on EC DG:s in relation to specific services.

Timing and Effort

Handled by budget in existing agency and MS, may need extra financing for 3 years

BRIS Integration

Business Register Interconnection System (BRIS) is a domain specific, sectoral network that has some overlap with the use cases in the DE4A Doing Business Abroad (DBA) pilot, both in relevant authorities (i.e. business registers) and in exchanged information. Even if BRIS can only be used by (a subset of) business registries themselves, it already provides today an operational exchange of company information across Europe. A reuse of (an extended) BRIS is understandably in the interest of the participating business registers, however, the possibility of DE4A to create legal and technical changes on the existing BRIS system is very limited. Analysis of the DBA pilot shows that the potential of reuse of BRIS is limited for the pilot, i.e. will remain at the level of the reuse of data definitions.

Goals

Several systems need to support business in a Crossborder setting. There needs to be different level of administrative completeness for SME and Large CAP. Also a difference for Local/national, vs. EU trade based vs. global companies to fulfill the Real Time Economy (RTE) vision.

Critical Success Factors

Reuse of data as defined in SDG/DE4A to minimize siloed systems per sector/domain/MS/nations.

Steps

Plan to open up or decommission siloed systems per sector/domain/MS/nations.

Scope

DLT based access to data, based on harmonized regulations among MS.

KPI

Number of harmonized trade rules and policies and/or just IT measure of number of integrations/systems.

Timing and Effort

EDIC project for DBA.

Non-notified eIDs

The question of user authentication in OOP centers around the use of eIDAS, after all this is what eIDAS is there for, to provide cross-border authentication. To focus exclusively on eIDAS might be too restrictive as it would exclude an important user group, namely users that have an eID of the DC country, encompassing own nationals and immigrants. In addition, the current state is that most eProcedures are designed for use by in both national and cross-border settings and we can safely assume that this will remain the case. This means that the eProcedure offers authentication via the national eID scheme or eIDAS as two alternatives.

Having both eIDAS and the national eID supported can in some cases resolve the issue if a MS has no eIDAS node operational, although this strictly limits the pilot population to users that have (already) an eID of the DC country. At the moment, Romania has no eIDAS node operational; Netherlands and Slovenia support only eIDAS IN.

Goals

All shall be notified before end of 2022.

Critical Success Factors

Build and extend on global standards

Steps

National service provider (IdP) market uptake

Scope

All domains

KPI

Report per domain via DESI

Timing and Effort

Regular budget

Trust Management

A consistent framework is needed that provide trust services across the complete OOTS. Having several PKI in parallel and different nested encryptions will make the overall system unmanageable. In simple terms: we need to make sure that the OOTS is not drowning in key and certificate management complexities. Task T2.2 Trust Management Models set out to develop this trust architecture, initially based on mature technologies and then extending it to include the capabilities of modern blockchain and DLT technologies.

Irrespective of the technical representation of trust relationships, there might also be an organisational interoperability barrier related to trust. On the one hand, the question whether a DP in one country trusts the DC in another country to handle the exchanged evidence in a trustworthy way. On the other hand, a DC in one country trusting a DP in another country to provide evidence that is correct, up-to-date, and truthful. This issues go beyond the scope of the DE4A pilots, however, discussions around authorization (which DC is allowed to request what type of evidence) or the discussion whether the DP can rely on an explicit user request issued to the DC or must evaluate such request independently of the DC (see also #Explicit request and transitivity between actors) are all influenced by the barrier of 'Lack of trust (cultural) cross member states' identified in D1.7 [29].

Goals

Achieve a trustless relationship architecture.
And / or
Build organisational mechanisms to support the building of trust.

Critical Success Factors

Acceptance (legal) and implementation of new technologies and adherence to policies and actionable follow up.

Steps

Decide on which path to follow. Implement and follow up.

Scope

All MS must decide together for one road to take.

KPI

Common decision taken within 12 months from end of project.

Timing and Effort

National programs planned before end 2023 defined.

Explicit Scope of ART. 14

The Blueprint of CEF Preparatory Action on OOP adopted a strict interpretation of Article 14: “this exchange pattern is the pattern specified in Article 14. This will therefore become the default evidence exchange pattern of the OOP technical system”.

This should not restrict DE4A to explore other interaction patterns for several reasons: First, initial discussions show that a translation of the legal text into requirements and further into an optimal solution provides more degrees of freedom than implied by the current blueprint version. Second, the

blueprint is focused on meeting the 12.12.2023 deadline, with is not the end, but the start of the Once-Only Technical system. Third, the scope of DE4A is wider than the scope of the SDG implementation.

Goals

Find several solution patterns.

Critical Success Factors

Acceptance of all solution patterns by all MS.

Steps

Define and adopt

Scope

SDG services and other voluntary services

KPI

Focus on one pattern with achievable targets but follow up on usage and consider decommissioning if low usage.

Timing and Effort

Program plan ready beginning of 2023, implemented by 2025.

Multi-evidence cases

A Multi-evidence Case is an interaction between Data Consumer and Data Provider, where the Data Consumer needs to request several pieces of evidence for a single eProcedure from one or more Data Providers. Multi-evidence Cases implies a more complicated scenario for the involved actors and may require multiple requests, previews, responses as well as aggregating evidences. The implications of Multi-evidence Case depends on the interaction pattern used in the procedure, e.g. intermediation, user-supported intermediation or verifiable credentials.

Goals

Simplify for the end-user, balancing the need for simple process and usability.

Critical Success Factors

National portal implementation

Steps

Acceptance by all

Scope

SDG services and other voluntary services

KPI

Citizen satisfaction survey and feedback

Timing and Effort

Program plan ready beginning of 2023 for SDG, implemented by 2025.

Stateless DE4A connector

Business Processes are either Stateless or Stateful, depending on the transactions contained in the process. Stateless: a stateless process or application can be understood in isolation. There is no stored knowledge of or reference to past transactions. Each transaction is made as if from scratch for the first time.

Stateful applications and processes, however, are those that can be returned to again and again, i.e. keeps track of the state of interaction. Stateful processes are intended to support business scenarios that involve complex, long-running logic and therefore have specific reliability and recovery requirements.

With respect to cross-border exchange of evidence in the context of the OOP Technical System there are complex cases where state needs to be maintained in between sessions. Examples include multiple DPs, multi-evidence, delay in digitising evidence, extensive input from the user required etc. It won't be feasible or is impracticable to perform this in one user session. Also see topic #3.

The main purpose of the DE4A Connector however is to:

- shield business parties from the complexity of using eDelivery and the information desk

- facilitating integration in MSs

- addressing the different roles DE/DR (DC) end DT/DO (DP) which might be performed by different entities.

Irrespective of whether a business process is stateful or stateless, in our view the state should not be maintained in the connector. Instead, this is on the DC/DP for doing so if needed.

Goals

Decide this is needed. Adapt MS portals and systems.

Critical Success Factors

Planning

Steps

Define together one plan in which order to approach each service

Scope

SDG

KPI

Plan with clear timing

Timing and Effort

Project/Program plan ready beginning of 2023 for SDG, implemented by 2025.

Highly Distributed, Crossborder systems

D1.7 Legal, technical, cultural and managerial risks and barriers [29]identified 'Administrative Complexity / Organisational silos' and 'Different OOP levels in other EU MS' as two of the main barriers for cross-border once-only. This points to the formidable integration challenge posed by the level of complexity that needs to be managed for a European cross-border, cross-domain Once-Only system to function properly: Integrating across 27 highly heterogenous national eGovernment architectures, administrative systems and legal frameworks.

This is not a typical Enterprise Application Integration (EAI) effort, it is orders of magnitude more complex, encompassing hundreds of organisations and thousands of applications in each of the 27 member states. As a consequence, best practices and architecture principles from EAI must be treated with caution, as they are not equally applicable for such highly distributed systems. Even simple things like maintaining case-specific single attribute correlation IDs can require changes in thousands of systems and interfaces.

In the DE4A architecture, we are constantly trying to balance "common EAI sense" with the subsidiarity principle and a 'minimal impact on MS systems'-approach in an attempt to follow up on two of the main findings of D1.7 [29]:

- cross-border digitisation should build upon national digitalisation efforts.
- that digitisation initiatives should have a positive return on investment.

With 27 national architectures in the mix, every assumption about their functioning, structure, ease of integration, used technology etc. is essentially wrong by definition, because at least one MS will be different. This is even true for the implementation of European building blocks - no, not all eIDAS-nodes are the same, they are mildly similar at best. Minimal assumptions about the national systems and an attempt to couple them as loosely as possible goes beyond defining clear interfaces, because these very interface requirements can have significant implications on national level: A mandatory cross-border correlation ID for example might already have significant impact that is disproportional to using concatenate keys to correlate request and response. The assumption that a platform can provide a static URL that is stable over time or that can accept a specific parameter might not hold for all eProcedure portals, as does the assumption that a portal can provide a case-specific URL; hence the solution should be able to deal with both.

Goals

Maximize louse coupling and harmonization. Each MS responsible to minimize the number of needed point to point integrations.

Critical Success Factors

Fewer organisation per MS present at EU level.

Steps

Decide nationally which are the main Domain Agencies.

Scope

National and EU level discussion to ensure acceptance of national representation. Thorough policy level discussions.

KPI

One example is Sweden who have consolidated their representation to 12 agencies.

Timing and Effort

12-18 months to include budget discussions.

eIDAS and National side Authentication systems

The question of user authentication in OOP centers around the use of eIDAS, after all this is what eIDAS is there for, to provide cross-border authentication. To focus exclusively on eIDAS might be too restrictive as it would exclude an important user group, namely users that have an eID of the DC country, encompassing own nationals and immigrants. In addition, the current state is that most eProcedures are designed for use by in both national and cross-border settings and we can safely assume that this will remain the case. This means that the eProcedure offers authentication via the national eID scheme or eIDAS as two alternatives.

Having both eIDAS and the national eID supported can in some cases resolve the issue if a MS has no eIDAS node operational, although this strictly limits the pilot population to users that have (already) an eID of the DC country. At the moment, Romania has no eIDAS node operational; Netherlands and Slovenia support only eIDAS IN.

Goals

SSI based authentication based on the need of the citizen at any given point in time.

Critical Success Factors

Interoperability on EU level and global reach towards current platforms.

Steps

Focus on SSI for the individual not the systems or agencies.

Scope

SDG services until 2024. Alongside planning for all other Public Crossborder agency services and national/regional/local systems.

KPI

National IT center monthly report.

Timing and Effort

N/A to wide

Led by Organisational and Semantic Experts

Structure vs. Unstructured data

In how far only structured or also unstructured data is to be supported by OOTS. The SDGR is explicitly not making a choice in this regard, however the solutions discussions are often assuming a structured

data exchange. The consensus is not yet final, and we expect this to be one of the topics that remain unclear at least until the completion of the implementing act which was planned for mid-2021.

If we refer to structured data, we mean electronic data that is adhering to some defined and known, domestic schemas or data models. It is important to note that this means that 'structured data' is not equivalent to data in data bases. Also, a structured data document adhering to a known schema is structured data. A document with "some text" or a randomly named image file (of a scanned document) is considered unstructured. Additionally, evidences from different domains might use different data models and schemas, it is important that the data models are defined and known.

This discussion is often confused with the assumption of automated re-use of data after transfer (cf. #Automated re-use of data below).

Goals

Define the minimum needed structure to fulfill each use case.

Critical Success Factors

Wide MS adoption

Steps

Continue the analysis to reuse different projects definitions

Scope

All SDG also for cross domain harmonization

KPI

80% of all MS fulfill the minimum mandatory defined data per Use case

Timing and Effort

Commission Expert group together with MS representatives.

Automated reuse of data

Related to the structured data discussion (see #Structured data vs. unstructured data above), is the widely held, implicit assumption that data can be automatically reused after exchange in the systems of the DC. Structured data is only one of the prerequisites for automated data re-use. Fully enabling such an automated reuse requires not only: 1) Structured data but also 2) established semantic equivalence across MS and 3) compatible data formats and attribute domains that lend themselves to automated transformation and re-use. Without going into the details of different transformation requirements (e.g. reversible vs. irreversible), it becomes apparent that enabling automated reuse of data is a major challenge across MS, which is also apparent in the barriers identified in D1.7 [29]: S2: Evidence Format and cross-MS Compatibility of Formats and S3: Missing Semantic mapping of data elements.

The way semantic equivalence and data format compatibility can be achieved is a closely related discussion. In simple terms, the two standpoints are:

a) Harmonization of data definitions (semantic standardisation and standardisation of the syntaxes, i.e. data formats used) through negotiated agreement either by the legislator (e.g.

Directive 2016/1191) or by voluntary consensus (i.e. Health domain) b) Use of semantic technologies to map different ontologies onto each other, potentially involving machine learning (e.g. used by e-commerce platforms and data aggregators).

Goals

SDG domain fully modelled

Critical Success Factors

Domain expertise and ICT support.

Steps

Collect all SDG projects Semantic outputs and outcomes. Review and decide/formalize.

Scope

Start “small”, focus “only” on SDG.

KPI

Actual % use of structured data. Compare to actual real reuse. Plan for reuse implementations. Model for Efficiency gains by automation.

Timing and Effort

DE4A model for Automation efficiency gains in D6.3.

Matching Evidences between MS

Evidences that cater for the same or similar life events or public procedures are very heterogeneous across MS, as was confirmed by a Study on Data Mapping for the cross-border application of the Once-Only technical system SDG [11] and corresponds to the barriers for Once Only, identified in D1.7 [29]: Data incompatibility, and Semantic incompatibility of information systems and datasets. This means that in many cases the evidence type required for a procedure in the DC country is meaningless for an evidence issuing authority in the DP country and vice versa. This extends well beyond the question of different languages into the definition of the evidence type itself, the structure and the semantics of its contents.

There is a considerable difference between domains where harmonised evidence types and corresponding schemas and definitions exist and domains without such prior harmonisation, which pose a much larger challenge. The approach for matching required evidences (DC side) and available evidences (DP side) could consequently also differ between harmonised and non-harmonised sectors. DE4A is designing different data models, services and components in the context of the Semantic Framework of WP3.

A good example of the complexities involved are university degrees. Even if the Bologna Process harmonized the three cycles of higher education in the EU, the equivalence of studies and subjects is not established. Trying to offer equivalence between subjects in different degrees in different universities and different countries may be a titanic effort as it extends from the schema (a degree relates to a specific subject of study) to the definition (is it just the study, or is it more specialized, like a set of five subjects in a degree allows a specific mention in a Master’s degree) to the attribute domain (which would be the official list/catalogue of studies and subjects in the EU). Relevant on-going efforts (e.g. EAR project, ENIC-NARIC Network) will be considered in the Studying Abroad Pilot.

Goals

Needs a proper Impact goal from each sector. Hand over to respective domain sector MS leaders.

Critical Success Factors

Defined or redefined Impact goals and detailed timed planning.

Steps

DE4A present our findings to the right stakeholder via the right channels.

Scope

Stakeholder workshop within Project time frame. Clear who takes on what Output and outcomes of the project.

KPI

Each Output has a clear designated owner.

Timing and Effort

Before end of project by cooperation of WP6, MSC and Pilots.

Annex II. A Swedish DGT Benefits Model

The building blocks in Digital Services analyzed were My Proxies, My Cases, My Profile and My messages. They should together result in an infrastructure that enables services to end users who may be public sector companies, companies and / or citizens. The benefits that arise in each building block have been analyzed with the help of one uniform model based on economics. The following describe the estimated value of the benefits that are expected to arise in each building block category.

Benefits from Digital Services

1) Less resources invested. Through the building blocks within Digital services it is easier for public actors, citizens and companies to perform cases, which saves time. For example, the building block My Proxies do that as the power of attorney procedure takes less time, both for the principal and for the recipient of the power of attorney. By making services digital, other costs are also reduced. The estimated value of less invested resources is uncertain because rough estimates must be made for the number of minutes that each time saving entails.

2) Reduced lead time. As services become digital, lead time is reduced. The waiting time that normally arises from the time an activity is performed (for example, that a power of attorney is submitted) until the next step in the process takes place (the power of attorney is approved) is reduced. The benefit does not result in a pure cost saving, but the benefit is that companies and individuals do not have to wait for a decision or information. The estimated value of reduced lead time is uncertain, as the value of reduced lead time is difficult to estimate.

3) Better overview saves time. The building blocks within Digital Services create an overview of services in various ways, such as powers of attorney and matters with authorities. This makes it faster to get information about an issue linked to these services. This applies to citizens and companies as well as to the public sector, who have easier access to information from another authority regarding a case (provided that legal development also supports this handling). The estimated value of the benefit of the time savings is uncertain because rough estimates must be made about how much time better overview saves.

4) Better overview and control increase security. Gaining a better overview of services not only leads to a time saving but also to an increased sense of security and control, both for the owner of the case and for the public sector. This is because information is handled correctly and there is a more secure control of who is allowed to access information that is shared with citizens. The benefit is difficult to value, and therefore very uncertain, as the value of security and control is difficult to measure in kronor.

5) Other effects. Specific building blocks also create other benefits that are not found in the other building blocks. For example, My Agents makes it easier for companies to delegate certain tasks to employees, which means cost savings. Better information for citizens and a greater understanding of case decisions are other benefits that are expected to be created. Since the benefits are different, the degree of uncertainty in the estimates is also different, especially for qualitative benefits that can be difficult to measure by monetary means only.

The building blocks in Digital Services analyzed were My Proxies, My Cases, My Profile and My messages. They should together result in an infrastructure that enables services to end users who may be public sector companies, companies and / or citizens. The benefits that arise in each building block

have been analyzed with the help of one uniform model based on economics. The following describe the estimated value of the benefits that are expected to arise in each building block category.

Benefits from Digital Services

Benefit category	Benefit type	Total value 10 years*	Actors benefitted
1) Less resources invested.	Time and cost saving	350 MSEK	Public Agencies, Companies and Citizens
2) Reduced lead time.	Time and cost saving _	240 MSEK	Companies and Citizens
3) Better overview saves time.	Time and cost saving	60 MSEK	Public Agencies, Companies and Citizens
4) Better overview and control increases security	Better Services and New Service areas	470 MSEK	Public Agencies, Companies and Citizens
5) Other effects.	Better Services, New Service areas and Time and cost saving	330 MSEK	Public Agencies, Companies and Citizens
Total	**1 450 MSEK**		Public Agencies, Companies and Citizens

Figure 18: Benefits Estimation for Digital Government Transformation of Services

The benefits are presented in monetary terms and in the 2020 monetary value. The value of the benefits is reported as a total sum over a period of ten years. For an estimate of the size of the benefits for each year is referred to the building block appendices. Generally the benefit is low during the first years of the time period because it takes time before the use of building blocks becomes high.

The benefits that the building blocks in Digital Services create are both direct and indirect and can primarily be categorized as;

1) time and cost savings (efficiency gains)
2) better services and new uses (quality gains).

The benefits arise as efficiency gains and quality gains and goes to the public sector, businesses and citizens. That means the benefits not only leads to public finance effects. The quantified benefits of the building blocks in Digital Services are estimated to be worth 1.5 billion SEK over a ten-year period.

Benefits from Information Exchange

The building blocks within the category Information exchange include API management, Message management and Address register.

The quantified benefits within the category Information exchange are estimated at a total value of SEK 1.4 billion over a ten-year period at the end of the section. This is an uncertain point estimate because it values future benefits and is based on several assumptions.

1) Easier access to information.
2) More efficient management of information in the public sector.
3) More efficient information sharing in the public sector.
4) Uniform handling of information increases the security of consumers and between producers.
5) Increased benefit thanks to increased use. This benefit is difficult to quantify because it is difficult to say how much better a service will be due to more people using it. The value of the benefit is therefore very uncertain.

Benefits created by	Type of Benefit	Estimated value 10 years	Benefitted actors
1) Simplified Access	Time and cost savings	470 MSEK	Public Agencies, Companies and Citizens
2) More efficient Information handling in the public sector	Time and cost savings	330 MSEK	Public Agencies
3) More efficient Information sharing	Time and cost savings	470 MSEK	Public Agencies, Companies and Citizens
4) Unified information handling improves security and safety	Better Services and new services	60 MSEK	Public Agencies, Companies and Citizens
5) Increased reuse	Combination of more efficient use and quality improvements and increased usage.	80 MSEK	Public Agencies, Companies and Citizens
Total	**1410 MSEK**		Public Agencies, Companies and Citizens

Figure 19: Benefits from Information Exchange

Benefits in the Information Management category the building blocks in the category Information Management include Metadata Management and Indexing. This creates benefits that are a combination of efficiency and quality gains. The quantified benefits in Information Management are estimated at a total value of approximately SEK 500 million over a ten-year period.

The two building blocks do not individually lead to all the different effects, but together they contribute to all of them.

1) Easier access to information.
2) More efficient management of information in the public sector.
3) More efficient information sharing in the public sector.
4) Uniform handling of information increases the security of consumers and between producers.
5) Increased benefit thanks to increased use.

Benefit created by	Type of benefit	Estimated value over 10 years	Actors benefitted
1) Easier access to information.	Time and Cost saving	80MSEK	Public Sector, Companies and Citizens
2) More efficient management of information in the public sector.	Time and Cost saving	30MSEK	Public Sector
3) More efficient information sharing in the public sector.	Time and Cost saving	80MSEK	Public Sector
4) Uniform handling of* information increases the security of consumers and between producers.	Better Services and new services	180MSEK	Public Sector, Companies and Citizens
5) Increased benefit thanks to increased use.	Efficiency and quality gains	80MSEK	Public Sector, Companies and Citizens

Figure 20: Gains Through Better Information Handling

Note: * Includes the benefits of Metadata Management.

Benefits in the category Trust and security the building blocks within Trust and Security consist of Identity, Authorization, Trust Framework, Traceability and Accessibility. These building blocks to a large extent create indirect benefits by enabling and improving functions in other building blocks. The benefits that the building blocks create can primarily be categorized into:

This means that the benefits do not only lead to public finance effects. The quantified benefits within Trust and Security are estimated at a value of SEK 1.7 billion over a ten-year period.

1) Time savings through increased interoperability.

2) Standardization leads to increased efficiency.

3) Increased traceability and information security.

4) Internationalization of services, requirements and guidelines.

Benefit area	Type of Benefit	Total estimated value over 10 years	Actors
1) Time savings through increased interoperability.	Time and Cost	510 MSEK	Public Sector and Companies
2) Standardization leads to increased efficiency.	Time and Cost	360 MSEK	Public Sector and Companies
3) Increased traceability and information security.	Better Services and new services	610 MSEK	Public Sector, Companies and citizens
4) Internationalization of services, requirements and guidelines.	Time and cost savings as well as better services and new services	220 MSEK	Public Sector, Companies and citizens
Total	**1700 MSEK**		Public Sector, Companies and citizens

Figure 21: Estimation of Value for Trust and Security

Note: * Includes the benefits of Identity.

The benefits are presented in monetary terms and in the 2020 monetary value. The value of the benefits is reported as a total sum over a period of ten years. For an estimate of the size of the benefits for each year is referred to the building block appendices. Generally the benefit is low during the first years of the time period because it takes time before the use of building blocks becomes high. In the middle of the time period is calculated the use has become relatively high and the benefit is then at its highest thanks to that the effect of discounting is mild compared to the latter part of the time period. The estimated value of the benefits is generally uncertain as it is based on values of future - not yet fully developed - services and functions. The value is also uncertain because it is based on several assumptions, including that many authorities will use the building blocks. The values should therefore be seen as the best, yet uncertain, point estimates where the actual realized value can come to deviate.

The benefits that the building blocks in Digital Services create are both direct and indirect and can primarily be categorized as;

1) time and cost savings (efficiency gains)

2) better services and new uses (quality gains).

The benefits arise as efficiency gains and quality gains and goes to the public sector, businesses and citizens. That means the benefits not only leads to public finance effects. The quantified benefits of the building blocks in Digital Services are estimated to be worth 1.5 billion SEK over a ten-year period. The benefits fall out broad in society and goes to the public sector, companies and citizens. This is an uncertain point estimate because it values future benefits and is based on several assumptions. The

value includes the benefits from My Proxies and My Cases though not the benefits of My Profile (ID and Domicile data) and My Messages described so far only qualitatively. My Profile is still in such an early stage of development that the benefits has not yet been fully quantified.

he benefits created by the building blocks in Digital Services arise through, in summary, four different effects. The first three points create benefits such as is included in the category of time and cost savings and the fourth creates benefits in category better services and new uses. In addition to these are created also benefits through other effects, but which are less general. They are included in point five as other effects.

Benefits from Information Exchange

The building blocks within the category Information exchange include API management, Message management and Address register. The building blocks create benefits mainly through time and cost savings (efficiency gains) but also through better services and new areas of use (quality gains), such as a feeling of increased security and safety. The building blocks also create additional benefits thanks to the increased degree of use, which makes the building blocks more useful (positive network effects). This creates benefits that are a combination of efficiency and quality gains.

The quantified benefits within the category Information exchange are estimated at a total value of SEK 1.4 billion over a ten-year period. This is an uncertain point estimate because it values future benefits and is based on several assumptions. The benefits are distributed over several actors: the public sector, companies and citizens and thus do not only mean public finance effects. The quantified value includes the benefits from API management but not the benefits from Message Management and Address Register, which have so far been described qualitatively. This is because the building blocks are still in such an early stage of development that the benefits have not yet been quantified. The benefits that the three building blocks create arise through five different types of effects.5 The first three points create benefits that are included in the category time and cost savings, while the last two are included in the categories better services and new uses and a combination of efficiency and quality gains that arise due to increased use of services and building block functions that make them more useful. The building blocks do not lead to all these effects on their own, but together they contribute to all of them.

1) Easier access to information. The building blocks within Information Exchange make it easier for consumers of information (both public and private actors) to access information. This leads to time savings through reduced work to find, share, understand and use information. It will also be easier to work with and match information from various public sources. The estimated value is uncertain because rough estimates are required of how many minutes the time saving leads to.

2) More efficient management of information in the public sector. Common frameworks and guidelines lead to time and cost savings as public actors do not have to develop or develop their own systems and rules for handling information. For example, an authority that wants to share data via a portal does not need to develop and manage its own data portal when there is a joint solution by the authority. This saves both time and costs. How much value this benefit creates is uncertain as, among other things, there is a lack of information on how many authorities would develop their own data portal without the building blocks.

3) More efficient information sharing in the public sector. Clear and common guidelines make it easier and more efficient for public actors to share information with each other. This means that different public actors do not have to store large amounts of data that is easily accessible via another public actor. This creates a more efficient information sharing, which leads to time savings because players do not have to spend time managing their own data collections. It also leads to time savings in that users of the information avoid confusion in cases where different information is provided in different

data sources. How much value these time savings lead to is uncertain because rough estimates must be made about how much time more efficient information sharing saves.

4) Uniform handling of information increases the security of consumers and between producers. By handling information uniformly in the public sector, the security of consumers of information increases because they know that the data, they are using is accurate, current and sourced from the right source. Uniform and secure systems for sharing information also mean that producers of information (public actors) can be confident that the information they share is handled securely and only shared with authorized users. The benefit of increased security is difficult to measure in kronor. The value of this benefit is therefore associated with great uncertainty. As this benefit is an increase in quality, it does not directly lead to cost savings.

Increased benefit thanks to increased use. Through the time and cost savings that the building blocks create, and that the existing services for information exchange are improved, the total use of the building blocks within the category Information exchange is expected to increase. As more public actors join the building blocks and thus begin to follow the guidelines and recommendations for the building blocks, the services and functions become more useful for all actors, partly because more data is available thanks to the larger number of connected. It creates benefits for both existing and new users and increases the incentives for additional players to join. This is an example of a positive user spiral where an increase in the number of connected producers (public actors in this case) positively affects the number of producers who want to join. This benefit is difficult to quantify because it is difficult to say how much better a service will be due to more people using it. Value of the benefit is therefore very uncertain.

Benefits in the Information Management category the building blocks in the category Information Management include Metadata Management and Indexing. They create benefits mainly through time and cost savings but also through better services and new uses (increased quality), such as a feeling of increased security and safety. The building blocks also create additional benefits thanks to the increased degree of use which makes the building blocks more useful (positive network effects). This creates benefits that are a combination of efficiency and quality gains. The quantified benefits in Information Management are estimated at a total value of approximately SEK 500 million over a ten-year period. This is an uncertain point estimate as it values future benefits and is based on several assumptions. The value is distributed over several actors: the public sector, companies and citizens. The quantified value includes the benefits of Metadata Management but not the benefits of Indexing. The benefits from indexing have so far instead been described qualitatively because the building block is still at such an early stage of development that the benefits have not yet been quantified. Below is a summary of the expected effects that lead to the benefits created in these building blocks.

Since these building blocks aim to support the building blocks in the category Information Exchange, it is possible to make the same categorization of the five effects that lead to benefits for the building blocks in the category Information Management as for the building blocks in Information Exchange. The two building blocks do not individually lead to all the different effects, but together they contribute to all of them.

1) Easier access to information. The building blocks make it easier for consumers of information (both public and private actors) to access information. This leads to time savings through reduced work to find, share, understand and use information.

2) More efficient management of information in the public sector. Data owners do not need to create guidelines and systems for information management themselves. This saves time and costs for the public sector.

3) More efficient information sharing in the public sector. More efficient information sharing in the public sector is created by a uniform handling of data. This leads to a more efficient coordination of information in the public sector, which leads to time savings.

4) Uniform handling of information increases the security of consumers and between producers. Uniform handling of information creates qualitative benefits through a feeling of increased security and safety. Because the benefit is qualitative, it does not directly lead to cost savings.

5) Increased benefit thanks to increased use. Increased use of the building blocks leads to a positive user spiral which means that the usefulness of the building block increases thanks to more people using the building bloc.

A more detailed explanation of the building blocks' individual benefits as well as more details about the benefits and their calculations can be found in the appendix for each building block. The benefits consist of both efficiency gains and quality gains, which means that they do not only lead to public finance effects. An estimate of when in time these benefits are expected to be realized can be found in the respective building block appendix. 1.4 Benefits in the category Trust and security the building blocks within Trust and Security consist of Identity, Authorization, Trust Framework, Traceability and Accessibility. These building blocks to a large extent create indirect benefits by enabling and improving functions in other building blocks. The benefits that the building blocks create can primarily be categorized into

1) time and cost savings and

2) better services and new areas of use

3) increased quality, such as a feeling of increased integrity and security.

This means that the benefits do not only lead to public finance effects. The quantified benefits within Trust and Security are estimated at a value of SEK 1.7 billion over a ten-year period. This is an uncertain point estimate as it values future benefits and is based on several assumptions. The value is distributed over several actors: the public sector, companies and citizens. The quantified value includes only the benefits from Identity, and not the benefits from Authorization, Trust Framework, Traceability and Availability. The benefits in these building blocks have instead so far been described qualitatively because those building blocks are still in such an early stage of development that the benefits have not yet been quantified. Below is a summary of the expected effects that lead to the benefits created in these building blocks. The benefits that the building blocks in Trust and Security are created through four different types of effects. The first is included in the category time and cost savings while the latter three are included in the category of better services and new uses.

1) Time savings through increased interoperability. The building blocks increase the interoperability between services in the public sector and between the public and private sectors. For example, the Identity building block creates increased interoperability between internal and external identification systems. This leads to time savings, but the exact amount of time saved is uncertain.

2) Standardization leads to increased efficiency. Through common administrative regulations and common standards for review and validation, time and costs associated with information sharing are saved. Producers of information do not need to develop business-specific rules and routines for information sharing but can make use of the commonly developed standards. Within the Identity building block, these benefits are created primarily through increased validation support for e-signatures and e-stamps.

3) Increased traceability and information security. Through common administrative regulations and common standards for review and validation, it is ensured that all parts of the infrastructure comply with nationally approved criteria for information sharing. This creates greater confidence in the

infrastructure for all actors. This benefit is difficult to quantify and evaluate as the value of increased security is difficult to measure in kronor. The value of this benefit is therefore very uncertain. As the benefit leads to increased quality, it does not directly lead to cost savings.

4) Internationalization of services, requirements and guidelines. By internationalizing services, the areas of use for building blocks are increasing. For example, the Identity building block will make it possible for Swedish citizens to log in to foreign e-services through eID. This leads to time savings through reduced administration. The fact that information is handled in line with guidelines at EU level also means security for producers. Both for the handling is correct and because the rules will not change in the foreseeable future. That the frameworks relating to trust and security are consistent with international one's guidelines also enable the development of international collaborations on information sharing. This benefit is difficult to quantify and evaluate, which makes the value of this benefit very uncertain.

Annex III. Other relevant EU Projects Governance

The following projects have also been taken into consideration:

Link	Description	DE4A WP6 assessment
https://www.glass-h2020.eu/	GLASS is a Horizon 2020 project funded by the EU that aims to provide a distributed framework for sharing common services of public administrations across the EU. It started on January 1st, 2021, and will complete its funded phase on December 31st 2023.	Project has similar use cases to DE4A, but their definition of governance might be different. There is not much public information on their website, but some partners (e.g. EEMA) are common to both projects, so maybe it is worth exploring further in D6.3.
https://interlink-project.eu/	Innovating government and citizen co-delivery for the digital single market (INTERLINK) received funding from the European Union's Horizon 2020 research and Innovation programme and it aims to create new collaborative governance model that promotes the reuse and sharing of existing public services.	This project is mainly focused on co-creation and co-production of public services. Besides use cases are rather different from DE4A with the main focus on healthcare, collaborative childcare and local services. May still be useful for connecting to cities and regions projects and actors requirements.
https://www.engage-eu.eu/	Envisioning a New Governance Architecture for a Global Europe (ENGAGE) has also received funding from the European Union's Horizon 2020 research and innovative programme focus is on challenges of global governance and international relations, as well as the acceptability of advancing EU external action among EU citizens.	Governance in this case is treated at a strategic level and in the international policy assessment context with particular focus on the EU's capabilities, governance structures and strategic objectives.

https://eceps.ut.ee/	ECePS – the ERA Chair in e-Governance and Digital Public Services – has received funding from the European Union's Horizon 2020 research and innovation programme and deals with research on e-governance, public e-services and data-driven public innovation.	Although it is biased with experience in Estonia, research is very relevant for DE4A WP6, especially when it comes to quality of existing e-governance solutions and services, user uptake of e-government solutions and services, evolution and improvements to existing services, or the context (political, social and economic) of the digitalization of government.
https://www.decido-project.eu/	Decido is a three-year EU-funded project that has received funding from the European Union's Horizon 2020 research and innovation and aims to boost the use of EOSC (European open science cloud) by Public Authorities. Although it is not similar to DE4A, some objectives are relevant e.g. encouraging Public Authorities to use appropriate infrastructures, services, data and methodologies.	Some results, e.g. set of pathways, recommendations and a business plan directing Public Authorities through the transition, might be relevant for DE4A.
https://www.toop.eu/	Its position paper [3] already identified several cross-border initiatives that have some sort of governance model in place. Finland and Estonia, for example, started their cooperation by setting up the Nordic Institute for Interoperability Solutions in 2016. On a wider scale, they mention European Criminal Records Information System (ECRIS), established in 2012, which is also an example of electronic	DE4A will reuse the existing GOFA work from this project.

	interconnection of Member States, although without service co-delivery to citizens and business.	
https://www.co-val.eu/	Five frameworks of public service reform are analysed: New Public Administration; New Public Management; Public Value; New Public Service; and New Public Governance. Project is also proposing an alternative way in harnessing the transformative potential of Public Service	This project might be more relevant for business model of DE4A and indirect challenges for long-term governance, such as for example those stemming from Government as a Platform approach.
Cybersecurity4Europe, ECHO, CONCORDIA and SPARTA https://cybercompetencenetwork.eu/	These four pilot projects address the Horizon 2020 Cybersecurity call "Establishing and operating a pilot for a European Cybersecurity Competence Network and developing a common European Cybersecurity Research & Innovation Roadmap". One of their tasks is to assess governance option for this new structure that will have one central agency, network of national nodes and large community of stakeholders.	New agency has been established in Bucharest, while Digital Europe Programme (DEP) will finance set up of many national nodes. Governance model and rules, at the time of writing of this deliverable, are still under construction to be considered for D6.3 if possible.
https://scoop4c.eu/	Appropriate collaborative governance to enable cross-government collaboration has been subject of stakeholder workshops.	List of governance issues presented by the Spanish government can be reused e.g.: Roles & Responsibilities, Platform Behavior, Authorization Policy, Service Catalog & Details (SLA), Audit policies, Notification & Notice, Temporary suspension Means etc.

Annex IV. DBA Impact Assessment Template

Powers validation DC

Roles and process steps

Roles:

Role	Organization
Data evaluator	[…]

In the table below the DC process steps are depicted. For each step the national procedure (how the process step is performed) is described:

Process step	National procedure
Request authentication (DE)	[…]
Establish user identity (DE)	C.f. first iteration pilot
Redirect user to another channel (DE)	C.f. first iteration pilot

National solution architecture

Description of components required to implement fine grained powers validation on the DC-side (please see DBA Solution architecture Fine grained powers validation - Components):

Component	Description
[…]	[…]

In addition to the design decisions as described in the DBA Solution architecture the following design choices are made:

#	Component	Design choice	Motivation
1	[…]	[…]	[…]

All requirements as stated in de DBA Solution Architecture Power validation - Functional requirements are met. Or, if requirements are not filled in, are changed or new requirements are added please elaborate:

#	Component	Requirement
1	[…]	[…]

The name of the national service to use for fine grained powers validation and the mapping to the DBA harmonised service(s) is depicted below:

National service to pilot	Translates to harmonised service for requesting Powers of representation
[…]	[SDGR 1 Notification of business activity, permission for exercising a business activity, changes of business activity and the termination of a business activity not involving insolvency or liquidation procedures / SDGR 2 Registration of an employer (a natural person) with compulsory pension and insurance schemes, SDGR 3 Registration of employees with compulsory pension and insurance schemes / SDGR 4 Submitting a corporate tax declaration / SDGR 5 Notification to the social security schemes of the end of contract with an employee, excluding procedures for the collective termination of employee contracts / SDGR 6

National service to pilot	Translates to harmonised service for requesting Powers of representation
	Payment of social contributions for employees / SDGR+ 1 Starting of a company or opening a branch in another member state / SDGR+ 2 Initial registration of a business activity with the business register]

Gap analysis

The gaps between the as-is and to-be situation are described below.

#	Component	Change description	Change owner	Precondition
1	[…]	[…]	[…]	[…]

Powers validation DP

Roles and process steps

Roles:

Role	Organization
Authentication proxy	[…]
IdP	[…]
MMS	[…]
Legal attribute provider	[…]

In the table below the DP process step is depicted and the national procedure (how the process step is performed) is described:

Process step	National procedure
Provide authentication details (User)	[…]

Wireframes:

[…]

National solution architecture

Description of components required to implement fine grained powers validation on the DP-side (please see DBA Solution architecture Fine grained powers validation - Components):

Component	Description
[…]	[…]

In addition to the design decisions as described in the DBA Solution architecture the following design choices are made:

#	Component	Design choice	Motivation
1	[…]	[…]	[…]

All requirements as stated in de DBA Solution Architecture DBA 2nd iteration Solution Architecture - DE4A #Functional_requirements are met. Or, if requirements are not filled in, are changed or new requirements are added please elaborate:

#	Component	Requirement
1	[…]	[…]

The authorization profiles used to validate the user's powers of representation regarding a specific harmonised service are listed below:

Harmonised service	Translates to national authorization profile in MMS
SDGR 1 Notification of business activity, permission for exercising a business activity, changes of business activity and the termination of a business activity not involving insolvency or liquidation procedures	[…]
SDGR 2 Registration of an employer (a natural person) with compulsory pension and insurance schemes	[…]
SDGR 3 Registration of employees with compulsory pension and insurance schemes	[…]
SDGR 4 Submitting a corporate tax declaration	[…]
SDGR 5 Notification to the social security schemes of the end of contract with an employee, excluding procedures for the collective termination of employee contracts	[…]
SDGR 6 Payment of social contributions for employees	[…]
SDGR+ 1 Starting of a company or opening a branch in another member state	[…]
SDGR+ 2 Initial registration of a business activity with the business register	[…]

Gap analysis

The gaps between the as-is and to-be situation are described below.

#	Component	Change description	Change owner	Precondition
1	[…]	[…]	[…]	[…]

Subscription and notification pattern DC

Roles and process steps

Roles:

Role	Organization
Data evaluator	[…]
Data requestor	[…]

Process design - Subscription

In the table below the DC process step is depicted and the national procedure (how the process step is performed) is described:

Process step	National procedure
Initiate subscription (DE)	[…]
Change subscription (DE)	[…]
Lookup event provider routing information (DR)	Generic, see DBA Solution Architecture
Send subscription request (DR)	Generic, see DBA Solution Architecture
Exception: Forward subscription error (DR)	Generic, see DBA Solution Architecture
Forward confirmation (DR)	Generic, see DBA Solution Architecture
Log subscription information (DE)	[…]

Process design – Notification

In the table below the DC process step is depicted and the national procedure (how the process step is performed) is described:

Process step	National procedure
Validate event notification (DR)	Generic, see DBA Solution Architecture
Determine event response (DE)	[…]
Request change of subscription (DE)	[…]
Dismiss event (DE)	[…]
Trigger evidence lookup (DE)	[…]
Notify Responsible Organization (DE)	[…]

National solution architecture

In the figure below the specific components and their relation to the common components are visualised.

[…]

Description of components to implement subscription and notification on the DC-side (please see DBA Solution architecture Subscription and notification components):

Component	Description
[…]	[…]

In addition to the design decisions as described in the DBA Solution architecture the following design choices are made:

#	Component	Design choice	Motivation

1	[…]	[…]	[…]

All requirements as stated in de DBA Solution Architecture Subscription and notification pattern - Functional requirements are met. Or, if requirements are not filled in, are changed or new requirements are added please elaborate:

#	Component	Requirement
1	[…]	[…]

The steps to be taken by DC after receiving a notification on a specific event are listed below:

Harmonised event	Steps to be taken
Company ended its operations	[request change of subscription / dismiss event / trigger evidence lookup / notify responsible organisation]
Company changed its legal form	[request change of subscription / dismiss event / trigger evidence lookup / notify responsible organisation]
Company merger or takeover	[request change of subscription / dismiss event / trigger evidence lookup / notify responsible organisation]
Company moved to another location	[request change of subscription / dismiss event / trigger evidence lookup / notify responsible organisation]
Company administration changed	[request change of subscription / dismiss event / trigger evidence lookup / notify responsible organisation]
Company registration evidence has changed	[request change of subscription / dismiss event / trigger evidence lookup / notify responsible organisation]

Gap analysis

The gaps between the as-is and to-be situation are described below.

Component	Change description	Change owner	Precondition
[…]	[…]	[…]	[…]

Subscription and notification pattern DP

Roles and process steps

Roles:

Role	Organization
Data owner (subscription provider)	[…]
Data transferor	[…]

Process design - Subscription

In the table below the DP process step is depicted and the national procedure (how the process step is performed) is described:

Process step	National procedure
Validate subscription request (DT)	[…]
Evaluate subscription request (DO)	[…]
Exception: Prepare subscription error message (DO)	[…]
Exception: Send subscription error message (DT)	[…]
Register subscription (DO)	[…]

Process step	National procedure
Confirm subscription (DO)	[…]
Send subscription confirmation (DT)	[…]

Process design – Notification

In the table below the DP process step is depicted and the national procedure (how the process step is performed) is described:

Process step	National procedure
Identify event (DO)	[…]
Check subscriptions (DO)	[…]
Prepare notification message and subscriber list (DO)	[…]
Resolve service metadata (DT)	[…]
Send event notification (DT)	[…]

National solution architecture

In the figure below the specific components and their relation to the common components are visualised.

[…]

Description of components to implement subscription and notification on the DP-side (please see DBA Solution architecture Subscription and notification components):

Component	Description
[…]	[…]

In addition to the design decisions as described in the DBA Solution architecture the following design choices are made:

#	Component	Design choice	Motivation
1	[…]	[…]	[…]

All requirements as stated in de DBA Solution Architecture Subscription and notification pattern - Functional requirements are met. Or, if requirements are not filled in, are changed or new requirements are added please elaborate:

#	Component	Requirement
1	[…]	[…]

The mapping of the harmonised events to the corresponding national events, to be used by the event handler component, is listed below:

Harmonised event	Corresponding national event(s)
Company ended its operations	[…]
Company changed its legal form	[…]
Company merger or takeover	[…]
Company moved to another location	[…]
Company administration changed	[…]
Company registration evidence has changed	[…]

Gap analysis

The gaps between the as-is and to-be situation are described below.

Component	Change description	Change owner	Precondition
[…]	[…]	[…]	[…]

Lookup pattern DC

Roles and process steps

Roles

Role	Organization
Data evaluator	[…]
Data requestor	[…]

In the table below the DC process steps are depicted and the national procedure (how the process step is performed) is described:

Process step	National procedure
Determine required cross-border evidence (DE)	[…]
Lookup routing information (DR)	Generic, see DBA Solution Architecture
Request evidence (DR)	Generic, see DBA Solution Architecture
Establish non-availability of OOP (DR)	[…]
Forward evidence (DR)	Generic, see DBA Solution Architecture
Evaluate evidence (DE)	[…]

National solution architecture

The components of the national solution architecture are the same as in the first iteration. Please see deliverable D4.5 for the visual representation and the description of the DP national solution architecture components.

In addition to the design decisions as described in the DBA Solution architecture the following design choices are made:

#	Component	Design choice	Motivation
1	[…]	[…]	[…]

All requirements as stated in de DBA Solution Architecture Lookup Pattern - Functional requirements are met. Or, if requirements are not filled in, are changed or new requirements are added please specify:

#	Component	Requirement
1	[…]	[…]

Gap analysis

The gaps between the as-is and to-be situation are described below.

Component	Change description	Change owner	Precondition
[…]	[…]	[…]	[…]

Lookup pattern DP

The DP national solution architecture for the Lookup pattern is identical to the architecture used in the first iteration DBA pilot. Please see deliverable D4.5 for the DP national solution architecture.

Annex V. List of Outputs and Outcomes

The following is the current snapshot of Outputs and outcomes (internal document). The intention is to have them updated in the DE4A Wiki [28] before the end of 2022.

Managed Item	Component	Output	Outcome	How (PRNA)	Policy/Legal	Organisational/Semantic	Technical/Semantic	Handover
Common Services	Usage of third party specifica	No	Updated what parts of Rolling plan for st	SDG-WG	SDG-WG	N/A	SDG-WG & DEP-Rollii	Yes
	API, Description of the softw	Yes		SDG-WG		N/A	SDG-WG	Yes
	DE4A Logs and error messag	Yes		SDG-WG		N/A	SDG-WG	Yes
Common Components	DE4A Connector	No	Updated AS4 GW Products	Market	Strategic ensure several o	N/A	SDG-WG	Yes
	DE4A SSI Authority Agent		Updated ESSIF	EBSI until eUDI-wallet	SDG-C guarantee freedom		SDG-WG	No
	DE4A SSI Edge Agent		Updated ESSIF	EBSI until eUDI-wallet	SDG-C guarantee freedom			No
Testing Infrastructure	Testing Process	Needed	DEP Testing Infrastructure	DEP tools existing IHE like				
	SDG-Playground SGAD	Yes						
Application Components	eProcedure Portal							
	Information Desk							
	Evidence Interchange Management							
	Trust Architecture							
	Data Logistics							
	Evidence Portal							
	Evidence Retrieval							
	Authority Agent							
	User Agent							
	Cross-border Subscriptions							
	EProcedure Back-office							
Interoperability Services	Server & URL	Yes		DEP tool handled by SDG-WG				Yes
	MOR	Yes/Maybe	which license			DEP/Publications Office		MS
	Certificates						O	MS
IST	a) Application Service is the I	Yes				(O)	O	
IST	b) Functional classification o	yes				O	(O)	
GitHub	Inquire Routing Information						O	
	Cross-border Evidence Matching					(O)	O	
	Evidence Exception UI						O	
	Explicit Request						O	
	Persistent URL Generation						O	
	Evidence Shredder				T		O	
	eProcedure Save and Resume					O	(O)	
	eProcedure Submission					(O)	O	
	eProcedure Termination					O	(O)	
	Message Decryption					(O)	O	
	Message Encryption					(O)	O	
	e-Signature Verification and Validation Service						O	
	Alternative Channel					O	(O)	
	e-Signature Creation Service						O	
	Data Exchange Service					O	(O)	
	eProcedure Confirmation					O	(O)	
	Authentication Initiation						O	
	Procedural Requirements Determination				(O)	O		
	Legal Basis Check (2x)				(O)	(O)	O	
	Evidence Request Tracker						O	
	Evidence Status Tracker						O	
	Available Evidence Determination					(O)	O	
	Requirements/Evidence Matching (2x)					(O)	O	
	Evidence Status Overview					O	(O)	
	Evidence Lookup						O	
	Extended Identity Matching UI						O	
	eProcedure Initiation						O	
	Evidence Preview					(O)	O	
	User Authentication (UI)						O	
	Identity/Record Matching						O	
	Authority Check						O	
	Prepare Preview Before Transfer					(O)	O	
	Prepare Preview After Receiving					(O)	O	
	Receive (Public) Service Result						O	
	Error Handler					(O)	O	

Figure 22: Snapshot of Outputs and outcomes

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