



## D4.7 Doing Business Abroad - Initial running phase

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## List of Acronyms

Abbreviation / acronym	Description
DBA	Doing Business Abroad
DC	Data Consumer
DE	Data Evaluator
DE4A	Digital Europe 4 All
DO	Data Owner
DP	Data Provider
DR	Data Requestor
DT	Data Transferor
Dx.y	Deliverable number y, belonging to WP number x
MVP	Minimum Viable Product
MS	Member State
OOP TS	Once Only Principle Technical System
SDGR	Single Digital Gateway Regulation
WP	Work Package

## Executive Summary

This document embodies the intermediate report on the DE4A Doing Business Abroad pilot, providing preliminary conclusions and lessons learned from piloting the cross-border exchange of information in the context of the Single Digital Gateway. It is the first of two reports on this matter, covering preparatory activities towards real-life piloting the use cases for the Doing Business Abroad pilot. Preparations include the analysis on major topics (like use of eIDAS, company representation and interaction patterns), deployment of DE4A common components, integration into Member State specific solutions, testing of integrations between Member States and common infrastructure components, and involving companies to participate in the pilot.

The main achievements of the Doing Business Abroad pilot until this moment in time, are the pilot's design (including the SDGR-related analyses) and the pilot's implementation in terms of international infrastructure supporting the SDGR-principles.

The conducted analyses of challenges the SDGR introduces, such as powers validation, record matching, evidence definition and usability of interaction patterns, are to be considered an important prerequisite for implementing the SDGR.

The established international infrastructure confirms the conclusions and choices of these analyses and facilitates cross-border authentication and authorization of company-representatives, as well as the cross-border exchange of evidence about companies. This infrastructure was developed and extensively tested in a systematic approach, resulting in a proven and secure operation that can be used for actual piloting in the initial iteration of the first cross-border use case: starting a business in another Member State. The established infrastructure provides a good basis for extension with functionality for the second use case (that will be piloted in the second iteration): keeping the company data up to date with the Data Evaluator and processing of business events. Designs and architectures for the second use case have been completed and impact assessment on national infrastructures have been done as well, providing a good basis for development towards the second part of the pilot.

These results have been achieved despite many challenges, like prioritization and availability of resources due to the pandemic and the ongoing shaping of the SDGR Implementing Act. These, and other challenges posed risks for DE4A progress and timeline, and unfortunately resulted in some partners terminating their involvement in the DE4A programme. Five combinations of Data Owners and Data Evaluators have fully completed the development and test cycle for the first use case and are ready to run real-life pilots. The remaining use case, and combinations between other Data Owners and Data Evaluators will be ready later in 2022.

Evaluation of all preparatory activities regarding the implementation of the infrastructure to support SDG-use cases for companies, have led to important (preliminary) conclusions and lessons learned. Arguably the most important conclusion would be that the DE4A components used to facilitate the pilot for the SDG-use cases, proved deployable and implementable without any major or unexpected technical difficulties. Several tests have confirmed that the solution works and does what it is supposed to do: facilitate the cross-border request and exchange of evidence for business procedures mentioned in the [SDG Annex II](#) [3]. Furthermore, a proper and widely available solution for authentication and company representation is found to be an important prerequisite for European implementation of the SDG. With this respect, eIDAS including legal person attributes is already in place today and has proven fit for most of the cases to pilot. Unfortunately, use of eIDAS in real life is limited to natural person authentication only. For implementing the Annex II SDG-procedures for businesses, Member States should notify and accept company representation and legal person attributes as well in their production systems.

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Doing Business Abroad partners all faced different (national/local) challenges when implementing the international solution. These challenges were of both technical and organizational nature, and lead to different velocities per Member State when implementing the DE4A solutions. Using a general implementation approach where complexity is introduced gradually seems paramount. By aiming for a small and simple start and thereafter stepping towards increasingly complex milestones, partners can organize and focus their implementation-activities and confirm their results with other Member States before commencing a next step in the implementation. The approach also helped with the coordination and communication within Member States, as usually several authorities will be involved when implementing the SDG. Installing a project-team on Member State level to coordinate activities from different national authorities is an important success factor. Before starting actual implementation, this team should take several months to align resources and priorities within the Member State and perform preliminary technical/organizational assessments on both the SDG- and the eIDAS-domain.

Additional conclusions and lessons learned are expected from running pilots for all combinations and both use cases, having real companies and representatives involved.

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# 1 Introduction

## 1.1 Purpose of the document

This document is the report on the initial pilot running phase of the DE4A Doing Business Abroad pilot. It is to be considered the first and intermediate report on the status of the DE4A Doing Business Abroad pilot, up until January 2022. This document covers the status of the pilot in January 2022, covers the lessons learned until that moment and provides a preliminary evaluation of the interaction pattern that is piloted in the project. Because the pilot is still being executed, this report on the pilot's initial running phase will be submitted once more later in 2022 and covers all preparatory and piloting activities, including the planned improvement with additional interaction patterns that will be piloted later in 2022.

The document must be considered a continuation of previous deliverables ([D4.5 Use Case Definition](#) and [D4.6 Pilot Planning](#)) and expects the reader to be somewhat familiar with the content of these deliverables as more definitions and details on use cases, architecture and pilot objectives have been provided there. This report also provides occasional updates on these previous deliverables, by describing the scope and planning of activities for the second iteration of the pilot in more detail.

## 1.2 Structure of the document

This document is divided into four main sections:

- ▶ [Chapter 1](#) – Introduction
- ▶ [Chapter 2](#) - Current status of the pilot
- ▶ [Chapter 3](#) - Goals and Success criteria
- ▶ [Chapter 4](#) - Pilot procedures
- ▶ [Chapter 5](#) - Conclusions and major achievements of the initial iteration

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## 2 Current status of pilot

### 2.1 Catalogue of services and status

#### 2.1.1 Use cases and pilot scenarios

Previous deliverables ([D4.5 – Use Cases](#)) already defined the two use cases and six pilot scenarios for the DE4A Doing Business Abroad pilot. During the customization and integration phase for the first pilot iteration these have been refined (and some combinations were abandoned due to pilot partners having to leave the consortium). The use cases of the Doing Business Abroad pilot are:

- ▶ Use case 1: starting a business in another Member State
  - the core of this use case is the fulfilment of procedural obligations to start doing business in the Member State. Therefore, the pilot concentrates on the steps for a business to register with a service provider abroad.
- ▶ Use case 2: doing business in another Member State
  - the core of this use case is retrieving and updating company information by the service provider / processing business events. Therefore, the pilot focuses on the subscription process and the process of sending, receiving and processing event notifications.

Please note:

- ▶ The option to fulfil corporate tax duties or apply for a service may still be possible with the service provider but will not be piloted.
- ▶ The methods of validating the powers of the representative will be implemented as designed: in iteration 1 powers validation will be based on the representative having full powers, while in iteration 2 fine grained powers validation is added, allowing companies to differentiate in the procedures the representatives may apply for.

Doing Business Abroad partners participate with Data Owners (DO) and Data Evaluators (DE), allowing to pilot these use cases in multiple DE/DO combinations. Unfortunately, the partners Skatteverket (Sweden) and BOSA (Belgium) had to terminate their involvement in the DE4A Consortium due to lack of resources caused by other priorities. The table below displays the DE/DO combinations per use case that will be piloted with the remaining partners, and the current status of their infrastructure.

(green = ready for piloting UC1; yellow = not completely ready for piloting).

Table 1: Overview of connections between participating Member States

Data consumer				UC-1 Starting a business in another Member State				UC-2 Doing business in another Member State			
				Data Owner				Data Owner			
pilot scenario	Country	Name	Portal	AT	NL	RO	SE	AT	NL	RO	SE
DBA1	AT	BMDW	USP.gv.at		KvK	ONRC	BVE		N/A	N/A	N/A
DBA4	NL	RVO	mijn.rvo.nl	BMDW		ONRC	N/A	N/A		ONRC	BVE
DBA5	RO	ONRC	portal.onrc.ro	BMDW	KvK		BVE	N/A	KvK		BVE
DBA6	DE	BVE	verksamt.se	BMDW	KvK	ONRC		N/A	KvK	ONRC	

Data Owners and Data Evaluators have completed the deployment of, and the integration with the OOP TS components without any irregular challenges or issues. This achievement benefits both iteration 1 and 2 and is therefore of great importance.

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Data Owners and/or Data Evaluators being not completely ready for Use Case 1 (which is piloted in iteration 1) is mainly due to eIDAS related issues:

- ▶ The establishment of the Swedish eIDAS pilot node is still in progress. This is expected to complete by Q1 2022. Because the Swedish eProcedure portal (verksam.se) cannot use an eIDAS pilot node yet, the portal is temporarily equipped with a simulated authentication and authorization mechanism without eIDAS. This allows the portal to be used for piloting and gaining experience on working with the DE4A infrastructure.
- ▶ Due to usage of different versions/profiles, the eIDAS connection has not yet been established between available eIDAS pilot nodes of
  - Austria and The Netherlands. This is expected to be completed by Q2 2022.
  - Austria and Romania. This is expected to be completed by Q2 2022.
- ▶ The integration of the Austrian eIDAS pilot node and the Austrian Data Evaluator portal cannot be established before March 2022.

### 2.1.2 Pilot environments

DBA partners have prepared data services (DO) and eProcedure portals (DE) for piloting. The possibilities in each country to set up environments vary, mainly due to national or local legal constraints. Not all partners / Member States were allowed to pilot using real procedures using SDGR-oriented solutions prior to the SDGR coming into effect. The table below displays the situation per partner:

Table 2: Type of environments involved in the pilot iteration 1

	DO Data Source	DE eProcedure portal
Sweden	provides fictitious data	offers simulated procedure
Romania	provides real data	offers simulated procedure
Austria	provides real data	offers real procedure
The Netherlands	provides real data	offers real procedure

Remarks:

- ▶ The Swedish and Romanian Data Evaluator eProcedure portals are available in simulated portals and may be upgraded to real eProcedure portals later in 2022.
- ▶ Data Owners providing fictitious data will not pilot with Data Evaluators offering real procedures, to prevent fictitious data contaminating real eProcedure portals.

## 2.2 Strategy followed to mitigate infrastructure delays

The customization and integration phase for the first pilot iteration has faced some delays, pushing the start of the pilot running phase forwards. Explanations for these delays are:

- ▶ The implementation of the SDG principles touches on many complex challenges, which required more time than expected.
- ▶ Member States prioritized COVID-19 related activities over DE4A activities, resulting in less resources for DE4A activities.
- ▶ The DE4A common components were available later than expected, so deployment and integration on national level started later.
- ▶ Deployment of, and integration with the DE4A components is often performed by several organizations within Member States. This requires more time to align and coordinate and has proven to be reason for misunderstandings and discussions. National organizations that pilot

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partners collaborate with, might be less committed to the DE4A pilot (as they are not a formal partner in the consortium) which seems to reduce willingness to apply changes to infrastructural components.

- ▶ Obtaining certificates for secure piloting proved to take a long time (months).

Despite the delay, the preparations of the second pilot iteration have started according to planning. Because the activities for initial iteration are still in progress, the preparations for the second iteration are under pressure. The following measures have been taken (and will be taken) to prevent further delays for second iteration and reflect as well important elements of pilot learning.

- ▶ The infrastructure basically consists of two parts: eIDAS related infrastructure and Once Only Principle related infrastructure. The Data Consumer and Data Provider integrate to these infrastructures and establish cross border connections and exchange information. The OOP TS infrastructure is related strongly to the SDG and is meant for exchanging company-evidence, while the eIDAS infrastructure is a pre-requisite to work with DE systems and the OOP TS. In cases where the eIDAS infrastructure has not been completed but the OOP TS infrastructure is ready, the possibility to simulate authentication and authorization will be considered (for example, in the case of Swedish Data Evaluator in the first iteration). By mimicking these processes and providing functionality to manually enter a company ID (eIDASLegalIdentifier), it becomes possible to pilot with the OOP TS infrastructure only, albeit in a simulated piloting environment (and not a real eProcedure portal or data service offering real data). This approach allows for gaining knowledge of and experiencing working with the OOP TS.
- ▶ In cases where integration activities with DE/DO systems proves difficult due to resource or organizational challenges, the development outside/around these systems can be explored. By choosing this approach, the dependency of limited resources was reduced. Sweden for example, using an eIDAS pilot node proved difficult because of limited resources with the organization that would provide this. As a result, a new eIDAS pilot node is being set up by DE4A partner Bolagsverket.
- ▶ Wherever possible, already available infrastructure (components) will be reused. These components probably need some adaptation in order to be fit for DE4A use, but it often saves time compared to developing a completely new component. For example: The Netherlands managed to use available piloting environments to deploy the DE4A Connector and additional components to interact with the Data Owner.
- ▶ In situations where certain components or services that are needed to test are not available, these were temporarily circumvented to continue with testing and development. The example of Sweden mimicking the authentication temporarily was already provided in a previous bullet. Another example is a situation where a temporary fictitious Dutch Identity Provider was used in the Dutch eIDAS pilot infrastructure. This allowed testing of all other components in the infrastructure to take place, and secure progress.
- ▶ The use of a playground proved to be of major importance to secure progress. The DE4A playground consists of DE4A Connectors, Data Owner mocks and Data Evaluator mocks and other transaction monitoring tools. These can be used by Data Evaluators and Data Owners in Member States, for development and testing purposes. This way, it is assured that the integration to the Connector actually works before cross border testing starts with real DE4A infrastructure. Also, it makes it possible for Data Evaluators and Data Owners to start development and integration, even before DE4A Connector components actually are available in their countries. They can use the playground components instead, while the national infrastructure is being developed. The playground needs to be extensively tested, demonstrated and documented before Member States start using it for development and testing purposes.
- ▶ Establishment of an MVP definition turned out to be very important to create focus and manage expectations. By explicitly aiming for a minimum viable product, all partners were forced to focus on what the pilot is really about, but also on what is really feasible. An MVP definition reduced

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unnecessary discussion of topics that are out-of scope or turned out to be of minor importance. The MVP definition for both iteration 1 and 2 have been established.

- For second iteration, the Subscription & Notification and the Lookup patterns will be piloted. A DBA solution architecture is available, detailing the Project Start Architecture to a more detailed prescription for implementing these interaction patterns. The implementation consists of both common components and national components. For that iteration, certain common components (the 'subscription system' and the 'cross border event handler') are common for all Data Owners but will not be available as a common DE4A component: in order to pilot, Data Owners that do not have similar components already available on a national level, need to develop such functionalities themselves. In these cases (like in The Netherlands), functionality will be developed on a national level, in a fit-for-use fashion.

## 2.3 Achieved interoperability status

Taking the remaining Data Owners and Data Evaluators into account (see [section 2.1.1](#)), several DE/DO combinations remain available for piloting. The table below displays the interoperability status for the OOP TS domain, while the second table displays the eIDAS interoperability status between participating Member States.

**Table 3: Interoperability status between Data Owners and Data Evaluators, using the OOP TS**

		MS acting as DP (DE)			
		AT	NL	RO	SE
MS acting as DC (DO)	AT				N/A
	NL				N/A
	RO				
	SE				

**Table 4: Interoperability status of eIDAS pilot nodes for DBA partners**

		Proxy			
		AT	NL	RO	SE
Connector	AT				
	NL				
	RO				
	SE				

Green = Connection established and confirmed in extensive tests

Yellow = Connection partially established and confirmed in extensive tests

Red = Connection not established or confirmed in extensive tests

### Remarks:

- The tables above display the connectivity status as established in January 2021. The situation is all but static, and connectivity is being extended continuously so tables may not represent the actual situation when reading this document at a later moment.
- Sweden

- is aiming to pilot in second iteration with a simulated Data Owner, providing fictitious data. Sweden will therefore not piloting with Data Evaluators that offer a real eProcedure portal, being Austria and The Netherlands.
  - does not have a Data Owner (Data Service) fully available for testing yet.
  - does not have an eIDAS pilot node available yet.
- Austria
- Has a first opportunity to integrate the Austrian eIDAS pilot node to the eProcedure portal by March 2022. After that, connections with NL and RO can be tested and confirmed.
  - Has an eIDAS node implementation available that differs from the Dutch/Romanian implementation. For second iteration, adjustments are made to ensure connectivity and full compatibility between these nodes and allow for piloting.

## 2.4 Updates in Metrics

The pilot goals, success criteria and metrics as defined in the previous deliverable ([D4.6 Pilot Planning](#)) remain the same.

As the customization and integration phase for second iteration progresses, some adjustments in metrics are expected to be introduced as appropriate considering the extended piloting scope and evaluation recommendations from the first iteration.

One additional questionnaire (not directly related to the DBA success criteria and metrics) is introduced to evaluate aspects of the pilot in the technical domain. This questionnaire is available in the [Annex](#) of this document.

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## 3 Pilot success criteria related to pilot dimensions

### 3.1 Introduction

The analyses conducted with regards to challenges that the implementation of the SDGR introduces, as well as the realization of the infrastructure implementing the SDGR and conclusions of these analyses, proved very valuable. This chapter summarizes the lessons learned so far from these activities and provides suggestions for the implementation and adoption of the SDGR implementation.

### 3.2 Learning towards adaption

#### 3.2.1 Lesson learned from analysing and designing national integration of cross-border OOP

Table 5: Lessons learned from analysis and design

ID	Topic	Suggestions for adoption	Lessons learned
1	Design process	DBA advises Member States to invest time to bring together the eIDAS and OOTS knowledge. This requires organising and prioritising as this knowledge is scarce.	Designing national integration required in-depth knowledge of both eIDAS and OOTS. This knowledge (specifically the combination of both) is not broadly available in Member States. Knowledge of both domains should be brought together in order to prevent designs based on false assumptions of the other domain.
2	Scoping	DBA advises the European Commission and Member States not to solve all user scenario's at once, but to focus on the most frequently used ones. One should first focus on core functionality only. And at the same time organise follow-ups on improvements and additions to address later on.	The project encountered many complex issues and topics that needed to be solved in the pilot design phase. The pilot lead has organised a series of meetings to address these topics.  To keep focus at the core research questions and to limit resources needed, the pilot partners agreed to simplify whenever adequate, e.g. focussing at the most important evidence type instead of all possible types, accepting request for one single evidence type at the time (instead of allowing requests for multiple evidence types), limiting to full powers validation to start with. The pilot secured progress and focus by scoping strictly.
3	Company representation	DBA advises the European Commission to clarify in advance which version of the eIDAS specification should be implemented for the SDGR to prevent incompatibility between Member States.	Use of eIDAS including legal entity attributes (company representation) is not widespread in the EU. Currently, there are just two eID schemes notified including legal person attributes. For piloting, the partners set up a pilot network of eIDAS nodes including legal person attributes to allow piloting of eProcedures for companies. In preparing for the pilot, Member States turned out to communicate company representation in different ways. Especially regarding the use of the eIDAS representative attributes (representative prefix). Furthermore, during pilot preparation eIDAS node 2.4 became available. This version of the CEF reference software enforced the eIDAS 1.2-specification that turned out to be in

ID	Topic	Suggestions for adoption	Lessons learned
			conflict with the agreed use of eIDAS attributes in the DBA pilot. The eIDAS 1.2 specification regarding representation is not necessarily backwards compatible. As a result, this raised additional confusion and led to inconsistent deployments.
4	Powers validation	<p>DBA advises Member States to focus at implementing full-powers validation flows to start with. Adding more fine-grained powers validation is required for 100% implementing the eProcedures, but also requires a more advanced solution.</p> <p>Furthermore, DBA advises the European Commission to facilitate validating full powers using the currently available eIDAS. This requires an additional policy rule (please see DBA design documentation regarding this topic).</p>	Validating full powers has been proven to be a first (and good) step in implementing cross-border OOP for businesses (requiring company representation). It allows for moving ahead with eIDAS as is available today and seems fitting for SME's (it will be an official representative initiating business abroad most of the time).
5	Record matching	DBA advises Member States to use the national company IDs as eIDASLegalIdentifier when extending the pilot to SDG-wide implementation.	The pilot partners agreed to provide the national company registry numbers as eIDASLegalIdentifier in the authentication flow (eIDAS authentication proxy role). This diminished the need to do record matching on companies at the Data Owner. There was no substantial need to do record matching on the natural person by the data owners of the DBA pilot.
6	Explicit request	DBA advises Data Evaluators to integrate (1) request to consent and (2) Explicit Request into one joint question to the user to prevent adding to the confusion - of course in case both are applicable at the same time.	In some cases, users need to express consent for the retrieval of attributes (GDPR). In almost all cases when using the OOTS, the user needs to express Explicit Request (SDGR). Although legally sound, in practise the difference between both is difficult to understand for Data Evaluators. DEs furthermore expect that users will ignore such requests and just click "ok".
7	Multiple-MS scenario's	DBA advises Member States to make an early start with the analysis of the SDG-implementation where data exchange involves more than 2 Member States.	The pilot involved 2 Member States in the exchange of information on companies and representatives. The level of complexity for analysis increases vastly with each additional Member state that is involved in the exchange of information on representatives and companies. An example of a 3 MS-scenario could be a natural person (representative) from MS A, representing a legal person (represented) also from Member State A, which applies for a service from a Service Provider in Member State B and having to hand over evidence that is available in Member State





ID	Topic	Suggestions for adoption	Lessons learned
			C. Such an analysis introduces a level of complexity that exceeded the constraints of the pilot.
8	eIDAS non-notified eID	DBA advises the European Commission and the Member States without notified eIDs to agree on a temporary solution for using non-notified eIDs in SDG-procedures.	Most of the participating Member States did not operate a notified eID at the moment of piloting. On a bilateral basis non-notified eIDs were accepted for piloting purposes, although pilot partners expressed their doubts regarding acceptance of non-notified eIDs for large scale SDG. Notification of eIDs is a strong prerequisite for implementing SDG. Mandatory eID-notification as expected under the new eIDAS regulation (eIDAS revision) will not be available in time for SDG-implementation.
9	Sector-specific systems	Integration of the OOTS with sectoral systems (BRIS in this pilot) has proven to be not so straight forward as many expected at the start of the project.	For the DBA pilot alignment to - or integration with - BRIS has been an important topic from the start of the project. Much time has been spent on workshops, desk research and analysis. In the end, re-use of BRIS has been limited to semantics. Re-use of information flows, building blocks, etc. was not possible due to difference in legal framework, governance, authorities involved, solution implemented, etc. The solutions have been developed for different purposes and hence are not easily aligned.
10	User interaction design	DBA advises the European Commission to provide wireframes in order to have generic steps (like Explicit Request and Preview) implemented in a similar way by all MS.	Several data evaluators needed to implement the same logic in their specific systems, including user interaction (general explanation, Explicit Request, Preview). The user interaction design across participating Member States turned out to show some differences in informative texts, detail of explanation, use of buttons, etc. This may lead to confusion for the user that deals with multiple data evaluators as well as a slow learning curve. DBA decided to provide a pilot-wide reference in the form of wireframes produced in collaboration with WP5 to allow for more uniformity across the pilot.

### 3.2.2 Lessons learned from implementing and testing the DE4A OOTS

Table 6: Lessons learned from implementation and test

ID	Topic	Suggestions for adoption	Lessons learned
1	Planning and organising tasks	DBA advises to allocate a multi-month phase for establishing alignment, priorities, financial means etc. for all organizations involved.  Furthermore, it is necessary to have a coordinating team (equipped with sufficient	The components to be used (in the pilot) were distributed over several authorities in a Member State, requiring the commitment from all authorities. This commitment is not obvious and must be secured beforehand. Also, as the systems are distributed, the teams working on the systems are distributed as well. Collaboration took more



ID	Topic	Suggestions for adoption	Lessons learned
		knowledge about the solution) in each Member State to make sure that legal, semantical, technical and managerial issues are being resolved in a timely manner.	time and, in each team, keeping DE4A prioritized was challenging. 
2	Handing over	DBA advises the European Commission to put additional efforts in explaining the workings of the SDG OOTS components to public authorities involved. The better the solution is understood by all, the smoother the SDG implementation will be.  The national complexity that the SDG imposes on Member States (e.g. record matching) is easily underestimated.	Design documents and specifications have sometimes been interpreted by different pilot partners in different ways. During preparation of the pilot or during interoperability testing such differences surfaced. It would be better to have a comprehensive common understanding of all the design details prior to the testing phase. The approach followed in DE4A was to take the time for handing over Solution Architecture to other workpackages, and make sure that everything was understood.
3	Documenting 	DBA advises the European Commission to invest in proper and clear documentation for developers in Member States, so they can get the OOTS up and running with the least amount of effort. Documentation should not be too cryptic and short, but definitely must not be too extensive. Feedback on the documentation from first movers has proven to be very useful in the DBA pilot.  Additionally, installing a small central team of technical experts providing support to technical experts in Member States, could be considered.	For developers of the common components, there's a lot of logic behind its internal routines, structure, configuration, etc. Deploying these components by the Member States in the DBA pilot raised several questions regarding the use of Docker images, configuration items that needed to be set correctly, required firewall and DNS settings, etc.
4	Configuring	DBA advises Member States to prepare for the steps to be taken to request the certificates needed to operate the OOTS.  DBA advises the European Commission to investigate whether the process for acquiring the OOTS certificates can be simplified.  DBA advises the European Commission to design a procedure for communication	The components needed for SDG rely heavily on use and exchange of certificates for server authentication, signing, etc. The process of acquiring the certificates turned out to be time-consuming and error-prone (all details must be in place when requesting the certificates). Furthermore, the procedure of requesting certificates is regulated in a way it requires signatures of responsible people within the requesting institution that do not on a daily basis work with - and understand the use of -

ID	Topic	Suggestions for adoption	Lessons learned
		between Member States in case of change of certificates and to provide for certificate-rollover to guarantee OOTS-connectivity.	certificates. Or people that are not available immediately (company executives).
5	Integrating DE and DO	DBA advises Member States to take the impact on existing systems into account. Including existing items on backlogs that might need to be resolved before being able to connect to the OOTS.	When integrating to the DT/DR, expect to run into existing problems in the DO/DE systems that need resolving as well. This will involve extra work, although the work is not directly being created due to integration with the DT/DR. The problems in the DE/DO systems were existing already, but were not causing real issues until then (problems were accepted) but might need to be resolved in order to achieve good integration to the DT/DR.
6	Interoperability testing	Wider OOTS implementation requires more inter-Member State coordination regarding exchange of connectivity details, configuration and cross-border interoperability testing. Planning of these activities requires much attention and flexibility from the Member States. DBA advises to take this into account when connecting the decentralised SDG OOTS components. eIDAS lessons learned with regards to exchange of certificates for example, are also relevant.	The speed of development varies per Member State. Therefore, readiness for cross-border testing (and piloting, for that matter) is also distributed in time. Member State A can have their DE ready months before Member State B has (due to several national impediments). Testing on fixed moments in time for all DEs and all DOs has proven not realistic, so going for a phased pilot launch has been proven as the right approach.
7	Interoperability testing	Establish clear readiness criteria for the DE/DO and the DE4A Connector before starting Connectathons.	The DBA pilot has proven that a lot of settings need to be configured correctly to allow successful cross-border evidence exchange. During interoperability testing (Connectathons) Member States sometimes had different views on what components or parameters had to be set in order to start testing. As a result, not in all cases the complete flow could be tested at once.
8	Interoperability testing	DBA advises the European Commission to coordinate exchange of test credentials between Member States. Many-to-many "requesting and sending of eIDs on a bilateral basis" should be prevented.	Proper interoperability testing is only possible with the required test eID means. These national eID means have not always been easily available (depending on the MS-specific situation - dependencies on IdPs may exist). This hindered cross-border interoperability testing at some occasions. The effect of lacking test credentials will be much greater in case of large scale implementing the SDGR.
9	Reliance on eIDAS	DBA advises the Member States to setup and test national eIDAS deployment prior to	DBA piloting - just as SDG implementation - relies on use of eIDAS. Unfortunately, eIDAS is not fully up and running in all Member States. In preparing

ID	Topic	Suggestions for adoption	Lessons learned
		implementing the SDGR in order to prevent delays.	for the DBA pilot, Member States had to setup eIDAS as well (pilot network of eIDAS nodes). In interoperability testing, several eIDAS related setup-issues needed to be solved.
10	SDG implement- -ing acts	DBA advises the European Commission and Member States to be aware no such thing as 'a final version' exists in the area of inter-Member State information exchange. Moving forward step-by-step with versions currently available is crucial to progress. Note that continuous alignment with all European initiatives during single steps is not feasible and will delay each initiative started.	DBA pilot implementation has been delayed by numerous discussions (within Member States and between Member States) on alignment with the SDG OOTS that was being sketched at the same time. Although this approach (to minimize dependency on ongoing lengthy discussions at SDG level) had been deliberately chosen and agreed upon at the start of the DBA project (to enable real piloting and provide input to SDG), in practise discussions were raised over and over again and caused prioritization challenges for the pilot activities of partners.
11	Cooperation	DBA advises to facilitate technical experts of the Commission and the Member States to easily ask each other questions, respond, etc. using a tool for this purpose, e.g. Slack.	Slack seems to be a good means to have developers of different MS / WPs collaborate.

### 3.2.3 Technical, semantic, organizational and legal knowledge shared with Workpackages

Table 7: Leassons learned from semantic, technical and organizational/legal activities

ID	Topic	Suggestions for adoption	Lessons learned
1	Communication	Use visual tools to show the benefits of OOP to users, e.g. presentations and videos.  Prepare the creation of an animation by setting up a good storyline and slides that illustrate the flow of the animation.	Implementation of the Uncle Only Principle might be interpreted as abstract by users / companies that might benefit from it. From a user perspective, there's not too much to see in the OOP-process. OOP might be interpreted as 'not a big deal' by the user. Large parts of the solution are "complexity under the hood". Hence, additional efforts are needed to explain in an understandable way the huge difference that OOP makes.

Further lessons learned on technical, semantic, organization and legal knowledge will be completed in a further submission of this deliverable (complementing specific legal and semantic aspects covered in previous pilot deliverables).

### 3.2.4 Pilot learning for sustainable impact and new governance models

Table 8: Lessons learned on new government models

ID	Topic	Suggestions for adoption	Lessons learned
1	Harmonisation	DBA advises the European Commission to organise the harmonisation process of services for cross-border powers validation (see SEMPER project results and DBA pilot for harmonization examples).	For fine-grained powers validation, Member States need to agree on a harmonised set of services. In the DBA pilot: the SDG procedures of Annex II to start with.
2	Harmonisation	DBA advises the European Commission to organise the harmonisation process of event types for cross-border subscription & notification. See DBA pilot Solution Architecture for an example of harmonisation.	For subscribing and notifying on company events / changes there needs to be a specified set of harmonised company event types.

## 4 Pilot Procedures

### 4.1 Cross border testing approach

#### 4.1.1 General approach

To establish and confirm the cross border connection between Data Owners and Data Evaluators, two tracks were defined in the [Pilot Planning deliverable](#), which were each divided into several milestones. The milestone sequences were designed to introduce complexity in cross-border communication in a step-by-step fashion, allowing involved Member States to focus on one challenge at a time and keep the complexity manageable. To summarize, the tracks and milestones that were used are:

Table 9: MS tracks and milestones as defined in D4.6 Pilot planning

Milestone	eIDAS track	OOP TS track
1	eIDAS for natural persons up and running	"Hello Europe" in lab (using a playground with DE/DO Mocks)
2	eIDAS for legal persons up and running	"Hello Europe" between two connected Member States
3	powers validation implemented	full scale cross-border communication between all Member States
4		ready to start pilot

These tracks were meant for all Member States to use synchronously. This however, turned out to be unrealistic because all Member States seem to have their own challenges, leading to different speeds of development. The general approach, where tracks and milestones were defined, remained useful, however for each combination of Data Owner and Data Evaluator a separate timeline turned out to be necessary.

#### 4.1.2 Connectathons

Member states performed unit-tests themselves before attempting cross-border testing. Specific meetings, named Connectathons, were held to test and confirm connection (at Milestone-level) between all Data Owners, Data Transferors, Data Requestors and Data Evaluators. In these meetings, structured testing (see [D4.6 Pilot Planning](#), for testcases) was applied to confirm connections for both the eIDAS track and the OOP TS track, making sure that cross-border communication and error handling works as expected. In case of errors and issues, the technical experts attending the meeting used the time available to investigate and solve issues like configuration errors. In case experts could not solve the issue right away, they defined actions to perform between two Connectathons, e.g. configuration of firewalls and local DNS components. For issue-solving, experts shared screens and collectively studied log files in involved Member States.

Knowledge developed in the earlier Connectathons was shared with other DBA partners and DE4A pilots, in order to smoothen future Connectathons and establish remaining connections sooner. Also, test cases and presentations to structure these Connectathons were re-used for future meetings, securing a constant quality of the established connection between components.

Up until the moment of reporting, the OOP TS connection between a total of 5 Data Owner / Data Evaluator combinations were confirmed and in total 8 Connectathons for the OOP TS track were organized. For the eIDAS track, three Connectathons (and several bilateral technical investigations) were organized between Austria, Romania and The Netherlands, leading to one confirmed connection between Romania and The Netherlands, and connections between Austria and both Romania and The

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Netherlands with issues remaining to be resolved. [Chapter 2](#) of this document provides more detail of the connection status of each DBA partner.

## 4.2 End users engagement progress and dissemination / impact activities

### 4.2.1 End user involvement

The [pilot planning deliverable](#), section 4.4, described the user involvement activities. To summarize, the following user groups are targeted for participation in/evaluation of the pilot:

- ▶ Employees of the Data Evaluator in all DBA Member States
- ▶ Employees of the Data Owner in all Member States
- ▶ Representatives of companies in all Member States, where 3 subgroups were identified:
  - real representatives of real companies, aiming to *actually do business* in another Member State (also called invited companies)
  - real representatives of (invited) real companies, aiming to *contribute for learning purposes* (also called companies of professional/private networks)
  - fictitious representatives of fictitious companies, to be used for piloting simulated/fictitious DE/DO combinations (also called fictitious companies)

The table below displays the participation of each of these groups in specific pilot DE/DO combinations. The table remains unchanged compared to the planned involvement.

Table 10: Targeted participant groups

			Data Provider Member State			
			Romania	Sweden	The Netherlands	Austria
			Real data	Fictitious data	Real data	Real data
Data Consumer Member State	RO	Simulated eProcedure		Fictitious companies	Dutch companies of professional network	Austrian companies of professional network
	SE	Simulated eProcedure	Romanian companies of professional network		Dutch companies of professional network	Austrian companies of professional network
	NL	real eProcedure	Invited Romanian Companies			Invited Austrian Companies
	AT	real eProcedure	Invited Romanian Companies		Invited Dutch Companies	

#### 4.2.2 Engagement activities

The table below shows the activities that were identified to recruit participants, as well as the status of each activity.

Table 11: Status of user involvement activities

Activity id	Activity	Status	Comment
DBA-UI-1	Prepare invitation for user categories	Completed	Member States aiming to work with real representatives have sent out invitations to companies or placed invitations on websites in order to attract attention.
DBA-UI-2	Invite users (all types)	Completed	<p>Where applicable employees maintaining databases and working in processes of the DE and DO, were approached to invite them to participate in the pilot. This resulted in several representatives for each user group, although not for all.</p> <p>Companies were sometimes actively approached in the cases DBA partners had access to companies in their professional networks, or private networks.</p> <p>Recruiting companies seems especially challenging for DE/DO combinations where real data and real eProcedures will be used. Representatives seem concerned that pilot participation will lead to administrative and legal consequences that they are not prepared to carry, when they just want to participate to help learning (and not aim to actually do business abroad). Finding companies that, at the the moment of piloting, are actually planning to do business abroad seems difficult too. This is a timing-challenge of the pilot.</p>
DBA-UI-3	Set up user management (lists and control sheets)	Completed	Registration of participants and their involvement in specific DE/DO combinations is available.
DBA-UI-4	Organize eIDs and mandates for real users	In progress	This activity is meant for representatives joining the pilot. This activity is still in progress and eIDs for representatives are being prepared as the start of the pilot for a DE/DO combination approaches.
DBA-UI-5	Set up microsite (templates)	Completed	<p>A microsite, providing information about the DBA pilot, an animation explaining the DBA process and offering forms to apply for participation is available at the DE4A website.</p> <p>(<a href="https://www.de4a.eu/doingbusinessabroadpilot">https://www.de4a.eu/doingbusinessabroadpilot</a>)</p>
DBA-UI-6	Implement microsities	Completed	<p>A microsite, providing information about the DBA pilot, an animation explaining the DBA process and offering forms to apply for participation is available at the DE4A website.</p> <p>(<a href="https://www.de4a.eu/doingbusinessabroadpilot">https://www.de4a.eu/doingbusinessabroadpilot</a>)</p>



Activity id	Activity	Status	Comment
DBA-UI-7	Finalize questionnaire forms	Completed	Questionnaires as designed in the <a href="#">D4.6 pilot planning</a> deliverable have been refined and implemented into online forms in the DE4A DBA website (A microsite, providing information about the DBA pilot, an animation explaining the DBA process and offering forms to apply for participation is available at the DE4A website. ( <a href="https://www.de4a.eu/doingbusinessabroadpilot">https://www.de4a.eu/doingbusinessabroadpilot</a> ))
DBA-UI-8	Set up and share newsletters	Completed	Newsletters are available on the DE4A website ( <a href="https://www.de4a.eu/news">https://www.de4a.eu/news</a> ).
DBA-UI-9	Design walkthroughs of filled in questionnaires	Partially completed	Walkthroughs for eProcedures are available for several portals (like Mijn.RVO.nl). Also, instructions for pilot participants, addressing both the pilot and questionnaires, are available in general. Additional work is required, especially for eProcedure portals that have not been finished at the moment of creating this report.
DBA-UI-10	Design fictitious company cases with users	Not completed	This activity applies to Data Owners that will work with fictitious data sources (mostly due to legal restrictions). For DBA, this applies to the Swedish Data Owner in particular. This data source is not ready yet (at the moment of creating this document), so therefore this user involvement activity has not been completed yet.

User involvement was initiated 10 weeks in advance of the planned start of pilot combinations. Depending on the actually expected starting date of each specific Data Owner/Data Evaluator combination, the intensity of the activities mentioned in the table above was set. This means that for those 5 DE/DO combinations mentioned in [Chapter 2](#) of this document, more activities have been completed (and activities have been executed more actively) than for the other combinations. The knowledge gained in DE/DO combinations is shared with other DBA DO/DE-combinations as well as with other DE4A pilots, in order to smoothen future activities to recruit participants.

In addition to the planned activities to recruit users, preparations for an international event were made (in collaboration with other work packages in the DE4A program). Preparations were set up as a joint venture between DE4A and the EuroChambers organization, but had to be cancelled due to changes in priorities. The preparations made were useful for future events that DE4A aims to organize.

### 4.3 Planned improvement following received feedback

Before addressing possible improvements, it must be noted that the paragraphs in this section are based on planning and preparation experiences only. As stated earlier in [Chapter 2](#), actual piloting is yet to be done. Still, feedback is available from the 'customization and integration phase' of the pilot, allowing for some reflection and reporting on possible improvements. It is to be expected that additional feedback from the pilot runs will lead to the identification of more improvements on many aspects of the pilot procedures, as well as technical and functional properties of the OOP TS and SDG implementation.

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### 4.3.1 Functional and technical improvement

The pilot comprises two pilot iterations.

Functional scope of the first pilot iteration:

- ▶ eIDAS for full powers validation
- ▶ Intermediation pattern

Functional scope of the second pilot iteration:

- ▶ eIDAS for fine grained powers validation
- ▶ Subscription & notification pattern
- ▶ Lookup pattern

It is likely that the running phase may lead to some ideas to optimise the intermediation pattern. Although the intermediation pattern will be used in the second pilot iteration (as starting point for subscribing to updates), it is not expected that these optimisations actually will be implemented in iteration 2.

Looking at the goal of the pilot, the objective is to learn as much as possible. To maximise "learning" the second pilot iteration will direct efforts towards experimenting with the new functionalities defined within scope of the second iteration. eIDAS full powers will be replaced by fine grained powers validation, allowing companies to differentiate in the procedures company representatives may apply for. Furthermore, the subscription and notification pattern allows data evaluators to receive information on business events that might impact the procedure. Finally, the lookup pattern allows the evaluator's back office to request updates or additional information on the company required to assess the impact on the procedure or prevent fraud.

When resources are scarce it seems to make more sense to direct the effort to implement this additional functionality and learn new things, which can be considered for future European implementation of the OOP TS.

This way, the pilot intends to generate as much input as possible to the future development of the SDG instead of technically fine-tuning the DE4A common components. Technical optimizations will however be summarized in the final report and could be addressed before European implementation of the OOP TS.

### 4.3.2 Pilot procedures improvement

Activities and effort spent on recruiting users to become involved in the pilot have learned that these activities are very timing-sensitive.

On the one hand, it seems hard to involve users and therefore, all effort should start long before the actual start of running a pilot. On the other hand, the pilot seems to be relevant for users (especially companies) for a short moment in time: the moment that they see a business opportunity. The users will not necessarily wait for the pilot to start, in order to initiate doing business across border.

Several considerations for the remaining period of executing the pilot procedures are:

- ▶ The procedures for recruiting users should become a continuous process, in order to offer as many companies as possible the opportunity to participate and if they can, schedule their cross-border business initiation in line with the running period of the pilot. This will not be possible for business activities having a limited window of opportunity, but might result in several additional users that can participate in the pilot.
- ▶ Additional promotion to involve users might be necessary. Data Owners and Data Evaluators seem often equipped to execute their core task (register business or providing services) but are not necessarily the best organization to broadcast the opportunity to join the pilot. DE4A has expertise available that might have to be used more extensively and team up with the DE and DO of the DBA partners.

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- As stated in [Chapter 2](#), possibly the metrics for evaluating the new interaction patterns will be extended and detailed during the 'customization and integration' phase for the second iteration. This will lead to changes in the questionnaires as well.

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## 5 Conclusions and major achievements of initial iteration

The pilot has arrived at the starting point of actually piloting with real life participants. Pilot partners managed to analyse the most important challenges for the implementation of the SDGR (like record matching, evidence-definition and powers validation), and developed an international infrastructure for cross-border exchange of company evidence by deploying and integrating DE4A common components to business registers and service providers. Also, a cross-border authentication and powers validation infrastructure for piloting was established, using eIDAS pilot nodes. This infrastructure was designed, implemented and extensively tested until the point where the operation of the infrastructure was considered proven and reliable to facilitate real-life piloting. It supports the exchange of harmonized datasets about company-registrations, while the designs and assessments have been completed to extend the infrastructure for cross-border notifications about changes in company-registrations. The infrastructure established for first iteration of the pilot, is expected to provide a good starting point for these extensions.

The exercise of analyzing, developing and testing the infrastructure as well as all legal and organizational preparation lead to the conclusion that the DE4A common components have proven to be deployable and can be integrated to national infrastructures. All DBA partners managed to do so without running into any abnormal major technical or legal difficulties. Experienced delays originated in the complex and innovative nature of the project which takes more time than expected, as well as in prioritization challenges within Member States.

Based on structured tests and analysis, the intermediation pattern has proven useful for the business procedures as defined in the [SDG Annex II](#). The need for receiving notifications about changes in business register entries was validated during analysis and design, regarding both changes in company data and company-concerned events. Analysis shows that this need cannot fully be fulfilled by BRIS. For the DBA pilot, a small set of events and changes in company data has been selected for piloting, using the Subscription & Notification pattern.

The availability of an EU-wide operational eIDAS network and notified eIDs for representing companies (including powers validation) are prerequisites for implementing the SDG. As almost none of the Member States have notified eIDs for companies, temporary use of non-notified eIDAS were allowed for piloting the DBA procedures. Using company identifiers from national business registers as eIDASLegalPersonIdentifier, solves the quest for record matching on company level at the Data Provider. Regarding the check on mandates of representatives, fine grained powers validation should be the goal and SEMPER specifications match the requirements for this goal. Starting with a simpler full-powers validation turns out to be a feasible and sensible first step.

Establishing a harmonized dataset that embodies the evidence to be exchanged cross-border turns out to be time-consuming. Having the evidence match the needs of Data Evaluators and making sure that this can be provided by Data Owners requires much analysis but is key in making the cross-border exchange of information valuable and durable. Focusing on a first limited, yet still valuable, set of data increases feasibility and secures progress.

Member States establish their own maximum velocity for implementing the necessary infrastructural, legal and procedural changes. Velocities differ between Member States because each Member State has a different starting point and therefore faces different challenges. Establishing coordination on Member State level for SDG implementation activities proves to be an important factor for success. A European strategy to implement the SDG should allow for individual national timelines, while still having all Member States converge to a clear endpoint in time in order to secure progress and make sure that the solution will become available for European citizens and companies. Applying a general

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step-by-step strategy for implementing the SDG infrastructure, gradually increasing complexity, has proven to help with focus and management of the implementation.

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## Annex

### Annex I – Additional questionnaire on specifications, software and procedures

Components 	Perceived quality of specs/software	Ease of integration	Potential to include in sustainability plan	Degree of adequacy for pilot purpose	Overall assessment (automatic calculated or request to responder)	Comments (in case very low or low rate)
	(Rates from: Not relevant, No opinion, Very low, Low, Neutral, High, Very high)					
Solution Architecture						
Information Exchange Model						
Canonical data model						
DE4A Connector						
DE4A Playground						
• Mocked DE						
• Mocked DO						
• Central SMP						
• Kafka server						
SSI Authority agent						
SSI User agent (mobile)						

#	Criteria	Evaluation	
		Rate (*)	Comments
1	(DO) How easy was to implement transformation to canonical evidence? (*)		
2	Quality of support and communication channel (Slack) provided by common components WP during the integration and testing (*)		
3	Quality of technical documentation (*)		
4	Contribution of testing methodology and Connectathons for testing with other MS to the successful launch of the pilots (*)		

(\*) Rate= Absolutely inadequate, Inadequate, Sufficient, Adequate, Perfectly adequate

#	Criteria	Evaluation
		Comments
5	Please, indicate organizational challenges (or other) that have impacted on the delivery according to plan (free text)	
6	Please, indicate what resulted most complex from your organization point of view in terms of pilot activities for launching the pilot (free text)	