D4.7 Doing Business Abroad - Initial running phase

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List of Acronyms

Abbreviation / acronym	Description
BRIS	Business Registers Interconnection System
DBA	Doing Business Abroad
DC	Data controller
DE	Data Evaluator
DE4A	Digital Europe 4 All
DO	Data Owner
DP	Data Processor
DPO	Data Protection Officer
Dx.y	Deliverable number y, belonging to WP number x
MoU	Memorandum of Understanding
MVP	Minimum Viable Product
MS	Member State
OOP TS	Once Only Principle Technical System
SDGR	Single Digital Gateway Regulation
SMP	Service Metadata Publisher
SSI	Self-Sovereign Identity
UC	Use Case
WP	Work Package

Executive Summary

This document embodies the 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 and 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. Real-life piloting was done in several intermediate weeks, depending on the availability of Data Owners, Data Evaluators and companies from several Member States.

The main achievements of the Doing Business Abroad pilot until this moment in time, are the SDGR-related analyses (conducted as part of the pilot's design) and the international infrastructure supporting the SDGR-principles implemented for the pilot, that have been piloted with real data from 2 Data Owners, 6 real companies and 1 real and 1 simulated eProcedure of 2 Data Evaluators.

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 majority of 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 straight-forward, fast, proven and secure operation that can be used for actual piloting 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 to be piloted in the second iteration: validating powers on a finer grained basis and processing notification on company events 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 multiple and significant 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. Having Use Case 1 piloted in intermediate periods during May until July 2022 with two DE/DO combinations, the next step is to focus on the remaining use case and the pilot with Fine Grained Powers Validation, and afterwards subscribing to and processing business events.

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 and the real-life pilot 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 SDGR (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.

Real life piloting is generating valuable insights about the SDGR, OO TS and full powers validation. It seems that the Explicit Request and Preview, although meant to provide users full control and required under SDGR in most cases, are hardly consciously read and used by most users. However, it was also observed that a few users, expressed the wish for more insight on the exact source and the exact usage of the data.

Users greatly appreciate the little effort and time it takes to complete the eProcedures thanks to the cross-border implementation of the Once-Only principle (supported on OOTS and eIDAS building blocks). Some confusion exists coming from having to work in several user interfaces and texts being in English (instead of their native language), but that does not reduce the excitement that was observed.

Involving companies turned out to be challenging. One explanation is that companies that want to start doing business across border exactly during the time when the pilot is running, are few. Taking into account the 2 DE/DO combinations that were piloted, this number of companies is even lower. It is expected that with piloting new DE/DO combinations later in the pilot, the number of companies that will be involved will grow as well.

Users do not always understand the concept of assurance levels for cross border authentication, when confronted with manual choices in the authentication procedure. The mechanisms themselves work fine though and are suitable for most piloted cross-border SME eProcedures (in which it will mostly be the legal representative initiating the eProcedure anyhow). Powers validation needs further development for eProcedures where – for example – approval of more than one representative is required or less than full-powers should be sufficient to start the procedure. Also further harmonization of mandate structures is an obvious next step in the domain of powers validation. Finally, the CompanyEvidence Type that was used in piloting, provides the Data Evaluators sufficient data for the eProcedures used in the pilot. It is to be expected that for other (not piloted) eProcedures, new (extended) evidence types will be introduced during large scale implementation of the SDG, containing – for example – information on representatives or containing unstructured (human readable) data.

Data Evaluators do appreciate the improved quality of the data. The fact that it is provided in a harmonized and digital fashion introduces great benefits to Data Evaluators, as automated processing is possible. This results in less errors and saves up to hundreds of manhours per year, provided that the OOP TS and eIDAS/Powers Validation mechanism is used for all relevant eProcedures the Data Evaluator offers (and benefits are therefore maximized).

Companies are very enthusiastic about the simplicity and speed of the piloted eProcedure. The OOP TS and eIDAS/Powers Validation mechanisms allow users to complete the eProcedure in less than 2 minutes, while traditional procedures take several days and sometimes even weeks to complete. The ease and speed are very much appreciated by representatives, as they seem to focus on completing the eProcedure in as little time as possible. For Data Owners, piloting seems to have little impact when they already have data services available. They seem not to experience major (dis)advantages, probably due to the used interaction pattern in this use case: apart from translating data to the appropriate structures to be used in the OO TS, the intermediation pattern that does not introduce any additional functionality for the Data Owners.

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 and cost/effort 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 (for example powers validation based on full powers) 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.

1 Introduction

1.1 Purpose of the document

This document is the report on the first running phase of the DE4A Doing Business Abroad pilot. The report is to be considered the first and intermediate report on the status of the DE4A Doing Business Abroad pilot, up until July 2022. This document covers the status of the pilot, covers the lessons learned until that moment and provides a preliminary evaluation of the interaction pattern (Intermediation) that is piloted in the first iteration of the project. Because the pilot is still being executed, the final running phase report (D4.8) of the pilot will be delivered towards the end of the project and covers all preparatory and piloting activities, including the evaluation of additional interaction patterns that will be piloted later in the second and final iteration.

The document must be considered a sequel to 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 iteration 2 of the pilot in more detail.

1.2 Structure of the document

This document is divided into four main sections:

- Chapter 1 – Introduction of the document and pilot running phase.
- Chapter 2 – Describing the current status and operationability of the pilot.
- Chapter 3 – Review of goal-achievement and benefits, and reflection on success-criteria and pilot-dimensions, based on actual metrics and findings from the first running phase with real data evaluators, data owners, real data and real companies.
- Chapter 4 – Explanation and reflection of pilot procedure execution.
- Chapter 5 – Conclusions and major achievements of the initial iteration.

2 Pilot status at the end of the first iteration

At the moment of reporting (August 2022) the project has extended the pilot timeframe from May 2022 to July 2022, due to several technical difficulties when deploying the piloting-infrastructure. Obtaining and installing certificates, configuring technical components and dealing with security-issues when deploying portals into piloting environments required much effort and pushed the starting date of the pilot backwards. There were many 'first time issues' that needed to be resolved, like configuration of SMP-components, opening of firewalls and setting up container environments. Reflection on these types of issues will be covered in Chapter 3.

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 cases 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.
  - In the first iteration, the use case will support full powers validation of representatives only. The second iteration extends this mechanism by introducing a Fine Grained Powers Validation method where representatives not necessarily need Full Powers to initiate the eProcedure on behalf of a company.
- Use case 2: doing business in another Member State
  - the core of this use case is subscribing to and processing of notifications on 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 (a procedure in Annex II of SDG) or apply for a service may still be possible with the service provider but will not be piloted.

Doing Business Abroad partners participate with Data Owners (DO) and Data Evaluators (DE), allowing to pilot these use cases in multiple DE/DO combinations. The table below displays the DE/DO combinations per use case that will be piloted, and the current status of their infrastructure.

Table 1: Overview of connections between participating Member States

UC-1 Starting a business in another Member State					
		Data Owner			
Name	Portal	AT	NL	RO	SE
BMDW (AT)	USP.gv.at				N/A
RVO (NL)	mijn.rvo.nl	N/A		launched 05-2022	N/A
ONRC (RO)	portal.onrc.ro		launched 05-2022		N/A
BVE (SE)	verksamt.se				

(green = ready for piloting UC1; yellow = moved to second iteration with Full Powers or Fine Grained Powers validation).

Data Owners and Data Evaluators in NL and RO have fully completed the deployment of, and the integration with the OOP TS components without any irregular challenges or issues besides the general challenges that when moving functionality to a production-environment. This achievement benefits both iteration 1 and 2 and is therefore of great importance.

Data Owners and/or Data Evaluators in SE and AT 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 has been completed just before ending the first iteration in May 2022 but could not be used during the first iteration. Instead, the portal was temporarily equipped with a simulated authentication and authorization mechanism without eIDAS. This allowed the portal to be used for testing until July 2022 (using the simulated eProcedure) and gaining experience on working with the DE4A infrastructure, but bringing the portal to the pilot environment provided great challenges (security, interference with other systems) during summer holidays the involvement had to be moved to the 2nd iteration.
- 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 Q4 2022.
  - Austria and Romania. This is expected to be completed by Q4 2022.
  - Austria and Sweden. This is expected to be completed by Q4 2022.
- The integration of the Austrian eIDAS pilot node and the Austrian Data Evaluator portal cannot be established before July 2022 and was moved to the 2nd iteration.
- Resource availability and functional questions prevented the Austrian DO to pilot before July 2022, so the involvement was moved to the 2nd iteration.
- Sweden did not have enough resources to complete development on the Data Owner side.

2.1.2 Pilot environments

DBA partners have together prepared several 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	N/A	offers simulated procedure
Romania	provides real data	offers simulated procedure
Austria	provides (near production) data	offers real procedure
The Netherlands	provides real data	offers real procedure

Remarks:

- Data Owners providing non-real data will not pilot with Data Evaluators offering real procedures, to prevent fictitious data contaminating real eProcedure portals. Therefore the Austrian DO will not pilot with the NL DE portal.

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 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).
- Security policies and administrative procedures of DE-organizations can be very strict, requiring multiple discussions and meetings to come to a decision. This applies especially for situations where production environments are involved, and firewall-settings need to be changed. On one occasion, an eProcedure portal had to be set up in a pre-production environment for piloting, as the production environment turned out to be impossible to use (by decision of the security department of the Data Evaluator).

Despite the delay, the preparations of the second pilot iteration have started according to planning. Because the activities for iteration 1 have finished late, the preparations for iteration 2 become more challenging. The following measures have been taken (and will be taken) to prevent further delays for iteration 2.

- The infrastructure basically consists of two parts: the 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 was implemented (Swedish DE portal). 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 proved 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, an eIDAS pilot node was being installed by another DE4A partner (Bolagsverket) than planned, and at a later moment in time.
- Wherever possible and beneficial, 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, as well as 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 DE4A 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 unnecessary discussion of topics that are out of scope or turned out to be of minor importance. The scope definition for both iteration 1 (MVP) and 2 have been established.
- For iteration 2, 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 iteration 2, 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 components themselves. In these cases (like in The Netherlands), functionality will be developed on a national level, in a fit-for-use fashion.
- For iteration 2, a new version of the OOP TS Common Components will be developed. This new version supports, next to the already introduced Intermediation Pattern, the Subscription and Notification pattern and the Lookup Pattern. The new version has changed on a technical level but is compatible with the first version in regard to the Intermediation Pattern. For part of iteration 2 (the Fine Grained Powers Validation) the additional functionality the new version offers, is not needed. To prevent any incompatibility-risks and possible delays, the Fine Grained Powers Validation part of the second iteration, will be piloted using the first version of the OOP TS Common Components and the leap to the second version will take place for the other part of the second iteration: processing notifications on business events, using the new interaction patterns.
- For iteration 2, the Subscription and Notification pattern will be piloted in non-production environments as the chances are slim to find a company that is willing to participate with a certain DE/DO combination and will also move, merge, go bankrupt etc exactly during the pilot running phase.
- In case major dependencies/interference of DE4A development to other projects and systems-migrations at DEs and DOs exist, specific isolated ‘project environments’ will be set up and used for piloting. These offer a more stable and controllable environment but likely also exist offering a ‘light-weight’ environment where the possibility to complete a full-fledged pilot might be limited. When choosing for these measures, the goals and success criteria of the DBA pilot will be carefully examined in order to maximise pilot results.

2.3 Achieved interoperability status

2.3.1 Use case 1 - Starting a business in another Member State

The table below displays the pilot execution of use case 1 over both the first and the final iteration.

Table 3: Use Case 1 pilot status

		MS acting as DP			
		AT	NL	RO	SE
MS acting as DC	AT				N/A
	NL	N/A			N/A
	RO				N/A
	SE				

Green = Piloted UC1 during first iteration and will pilot UC1 again in the final iteration, combined with Fine Grained Powers Validation

Yellow = Will pilot UC1 during final iteration combined with Fine Grained Powers Validation. AT will pilot with Full Powers in 2023.

Remarks:

- The tables above display the connectivity status as established in August 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
  - will not pilot UC1 based on full powers but will pilot UC1 based on Fine Grained Powers Validation, acting as DC Member State.
- Austria
  - Has an opportunity to integrate the Austrian eIDAS pilot node to the eProcedure portal by Q3/Q4 2022. After that, connections with NL and RO can be tested and confirmed with real users in the final iteration .
  - Has an eIDAS node implementation available that differs (in version) from the Dutch/Romanian/Swedish implementation. Adapting this node for Fine Grained Powers Validation is considered too costly. Will not pilot UC1 based on Fine Grained Powers Validation.
  - Intends to complete UC1 based on Full Powers Validation in 2023.

The following chart summarizes the status of possible pilot combinations between involved Member States for Use Case 1:

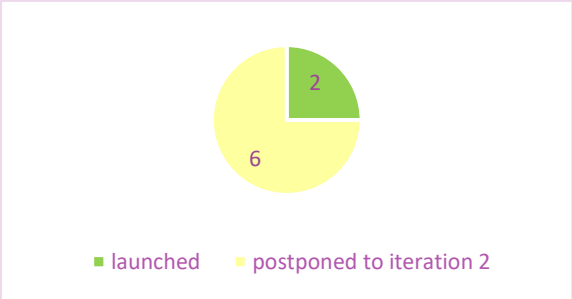

Figure 1: Overall status of DE/DO pilot combinations for UC1

2.3.2 Use case 2 Doing business in another Member State - prognosis

The next table displays the expected pilot combinations for Use Case 2 that will be piloted in the final iteration, and their actual interoperability status.

Table 4 : Use case 2 pilot involvement in Use Case 2

		MS acting as DP			
		AT	NL	RO	SE
MS acting as DC	AT		N/A		N/A
	NL				N/A
	RO		N/A		N/A
	SE		N/A		

Yellow = Will pilot UC2 during final iteration, while not ready when completing this report.

Remarks:

- Generic
  - UC2 will be piloted in a non-production environment. Notifications will be fabricated to prevent dependency on companies actually merging, moving, going bankrupt etc during the pilot phase.
- Sweden
  - will pilot UC2, acting as DC Member State.
- Austria
  - Will pilot UC2, acting as a DC and DP Member State. With this, Austria extends its involvement compared to scope descriptions defined in deliverables D4.5 (Use Case description) and D4.6 (Pilot Planning).
- The Netherlands
  - will pilot UC2, acting as DC Member State.
- Romania
  - Will pilot UC2 as DE and DO.

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 iteration 2 progresses, some adjustments in metrics are expected to be introduced, focusing on a more interview and observative approach for evaluation as the number of companies that are involved in the pilot are limited and therefore statistically not fully useful for solely quantitative analysis. During the evaluation of pilot runs many more lessons were learned during interviews and observations were used as the basis for this report.

Also, questions concerning Fine grained Powers Validation and Use Case 2 will be evaluated and detailed wherever necessary. No changes to metrics, success criteria and goals are expected when doing so.

3 Pilot success criteria related to pilot dimensions

This section addresses the evaluation of the four DBA pilot goals, success criteria and pilot dimensions, based on the first iteration pilot running phase observations and feedback received from participating real Data Owners, real Data Evaluators, real representatives of companies and real data. The success criteria results are summarised in relation to the metrics, and for applicable metrics comparison is provided of pilot results with target values that were defined in D4.6 Pilot Planning.

3.1 Goals and pilot success criteria

The Doing Business Abroad pilot evaluates several goals from a company, data owner and data evaluator perspective. In the previous project deliverable (D4.6 – Pilot Planning) these goals were linked to success criteria, for which metrics were defined. Questionnaires were used to collect data from participants that were involved in the first iteration.

Based on the data, metrics and success criteria, the assessment of the goals is summarized in the table below. In the next section, the results are addressed in more detail using the pilot dimensions structure, while the direct outcome of the metrics and success criteria are available in Annex 1 and 2.

Table 5: Summary of pilot goal evaluation

Actor	ID	Goal	Success criteria and metrics	Summary
Public authorities	A	Improve the quality of Company data within the service fulfilment process by re-using data from authentic sources, thereby reducing manual work and lowering processing costs.	Success criteria A1, A2 Metrics A1.1, A1.2, A1.3, A2.1, A2.2	- Public authorities recognize the mentioned benefits. The fact that data-exchange uses harmonized models is also appreciated and eases data-processing. - Part of the benefits are expected to be achieved only after usage for multiple eProcedures. - Benefits related to up-to-date data are yet to be confirmed in the final iteration.
Companies	B	Reduce manual work, lower transaction costs and improving enrolment speed for the company when using the Once Only Principle.	Success criteria B1, B2, B3, B4 Metrics B1.1, B2.1, B3.1, B4.1, B4.2	- Companies recognize the mentioned benefits. The difference in duration to enrol is extreme (minutes versus days or weeks). The simplicity of the procedure is appreciated by the participants. - It is important that certain administrative conditions are met (like having configured mandates correctly in Mandate Management Systems), in order to achieve this enrolment speed.
Project	C	Evaluate the OOP-components supporting the cross-border information flow:	Success criteria C1, C2, C3, C4	- Implementing (and maintaining) the pilot infrastructure using several components proofs feasible. Worth mention however is that the number of components used also introduces the fact that every component

Actor	ID	Goal	Success criteria and metrics	Summary
		- Assess (technical) impact on national services/registers already in place - Evaluate connections of national systems to the OOP TS	Metrics C1.1, C1.2, C2.1, C2.2, C3.1, C3.2, C4.1, C4.2	must be configured just right, and must be (securely) accessible too in order to make the whole solution work. During the preparations for the pilot, much time and effort went in to establishing this and this process is one of trial and error, with steps forward and backwards. It is expected that close monitoring the infrastructure is important, and it can be expected that certain trust certificates will expire unnoticed, causing the infrastructure to fail temporarily. - Involved authorities believe that the integration effort for this project is relatively high and cost-effectiveness is questionable if the integration would not be used on a broader basis (more eProcedures). - The benefits that Data Evaluators expect are up to hundreds of manhours per year, assuming use for more eProcedures and a sufficient volume of companies using this functionality. At the same time, public authorities believe that this functionality should simply be available to comply to regulations and to serve companies and citizens, regardless of profitability and savings. - The effort spent by DEs, DOs and other teams within Member States in order to prepare and perform the pilot varies greatly, depending on the infrastructure available and used, organisational setting and usage of production environments. Some Member States estimate having spent hundreds of hours, while other Member States spent thousands of hours for preparation and piloting. - Finally, public authorities point out that the pilot cost might not be representative for future implementations, as many 'first-time problems' (deployments, configurations, certificate obtainment, firewall-openings) had to be solved and future implementations benefit from the outcome, resulting in lower cost.
	D	Evaluate whether the solutions designed to the	Success criteria	- The data model used for exchange of information suffices for the piloted

Actor	ID	Goal	Success criteria and metrics	Summary
		DBA specific challenges have proven adequate in piloting the DBA eProcedures: - Usability of harmonised Company Evidence model - Degree to which powers must be validated - Scalability of solution for powers validation - Usability and security of Explicit Request and Preview - Need for record matching on Natural Persons - Adequacy of patterns to keep data up-to-date	D1, D2, D3, D4, D5 Metrics D1.1, D2.1, D3.1, D4.1, D5.1	eProcedures. Adding information about one or more representatives is considered to be a useful, and sometimes even a necessary extension for some additional (not piloted) eProcedures, as is the extension with unstructured (human readable) data. Harmonisation of data is considered to be a huge benefit. Harmonisation turned out to be relatively easy due to previous endeavours, i.e., BRIS. This might be in strong contrast to other sectors. - The usability of a familiar eID (if the user has one available) is preferred over the need to obtain a specific account for the foreign eProcedure portal, so eIDAS turns out to be beneficial for the piloted eProcedures. Full powers validation is necessary, quick and easy, assuming administrative prerequisites are met in the mandate management system in the DP Member State. There is still much to win in the domain of powers validation, as not all mandate models in the Member States are similar. Some MS are not familiar with a Full-Powers Mandate concept, while others use models where approval of multiple (or all) representatives is needed for certain procedures. - Explicit Request and Preview have been implemented but were rarely consciously used by company's representatives. Companies focus on finishing the procedure as fast as possible, fast-forwarding towards the final step in the procedure. Rarely, a user really studies the Explicit Request and the Preview to understand what is offered to them. Offering more (and legally required) information seems to lead to less reading. - Some eProcedures are set up for one-time-use, meaning that users are not always expected to return. In those situations, record matching is not relevant but might be useful to prevent doublures. Some portals do have record-matching on the legal-entity implemented and when used, it is considered to be an obvious function.

Actor	ID	Goal	Success criteria and metrics	Summary
				Record matching on natural persons was not applicable in the DBA-pilot. - Although piloting notifications of business events is part of the 2nd iteration, Data Evaluators regularly stated that they appreciate this functionality because nowadays, companies rarely inform the authority about any changes that occur (even though they are obliged to do so).

The summary above is based on data collected during the first iteration, where:

- Use Case 1 was piloted (Registering a company/business activity abroad)
- The Intermediation (IM) pattern was used
- Mandates were validated on a Full Powers basis
- Exactly 2 Member States were involved in each combination of DP/DC Member State
- 2 Data Evaluators (RO and NL) participated in actual pilot runs
  - 1 piloted using a real eProcedure portal
  - 1 piloted using a simulated eProcedure portal
- 2 Data Owners (RO and NL) participated in actual pilot runs, both using real data
- A total of 6 small and medium sized companies participated (3 Dutch, 3 Romanian)

While Annex 1 and 2, provide a detailed overview of the collected metrics and their processing in success criteria, the following table provides a summary of the quantitative results:

Table 6: Overview of quantitative metric results for UC1

Goal	A	B	C	D
Number of success criteria	2	2	4	5
Number of metrics	5	4	8	5
Number of scale-type metrics with targets	5	4	4	0
Number of scale-type metrics on or over targets	5	4	4	0
Percentage of scale-type metrics on/above targets	100%	100%	100%	N/A
Average number of responses per metric within goal	2.4	6	1,5	3,6

It is important to mention that some metrics were optional and not all respondents provided feedback because some DEs or DOs had not progressed sufficiently to provide valuable feedback, explaining the average number of responses per metric not being round numbers.

Looking at the success criteria from a quantitative perspective, the results of the pilot can be interpreted as a complete success: all quantitative metrics and success criteria met or exceeded the threshold.

But one must take into account that the number of involved participants is limited and might therefore not be of statistical relevance. It makes (therefore) sense to consider the outcome of the pilot to be positive. A study of the qualitative input that was collected will provide more details on what can be learned will be provided in the next sections.

3.2 Pilot dimensions

The foundation for this section can be found in the questionnaires that the participants filled in, and the interviews that were conducted. The structure used to provide more details, is according to the dimensions described in the previous pilot deliverable D4.6 – pilot planning [2].

In total, questionnaires were received from

- 6 representatives (3 Dutch, 3 Romanian),
- 3 Data Evaluators (1 Dutch, 1 Romanian, 1 Swedish)
- 2 Data Owners (1 Dutch, 1 Romanian)

All were interviewed in Teams-meetings.

The following table summarizes all success criteria, quantitative (scale based) metrics relevant for UC1, and their collected results. Success criteria of a qualitative nature have been processed in the next sections directly, as have the results of the interviews.

Table 7: Detailed overview of quantitative metric results for UC1

Me-tric	Description	Target	Group	Number of responses collected	Results
Success criterion - The DE recognizes the company data is of higher quality, more reliable and easier to process when using the OOP TS to retrieve company data directly from the DO.			Dimensions – U, A, L, V		
A1.1	The appreciation the DE expresses on the Company data being (considerably) more reliable, equally reliable or (considerably) less reliable than before. (e.g. being available in an electronic and more structured format, being more complete, correct and meaningful).	More than 50% of respondents appreciates the reliability (average of all perspectives) of company data as (considerably) more reliable than in the baseline.	DE	3	100% of the collected answers of respondents confirms, averaging on considerably more reliable
A1.2	The appreciation the DE expresses on processing of the Company data requires (considerably) more, equally or (considerably) less effort than before (e.g. amount of work for interpreting and judging, solving exceptions).	More than 50% of respondents appreciates the effort (average of all perspectives) of processing company data as (considerably) less than in the baseline.	DE	3	67% of the collected answers of respondents confirms, averaging on less effort

Me-tric	Description	Target	Group	Number of responses collected	Results
A1.3	The estimated benefit (effort to resolve exception, manually changing data, communication cost) the DE gets from company data that is always up to date, being (considerably) much to (considerably) limited.	More than 50% of respondents estimates the benefits (average of all perspectives) of always having up-to-date company data as Medium or (considerably) high benefit.	DE	2	100% of the collected answers of respondents confirms, averaging on considerably high benefits
Success criterion - The DE recognizes the method of powers validation to provide reliable proof of the representative being sufficiently authorized to represent the company.			Dimensions – U, A, L, V		
A2.1	The appreciation the DE expresses on the reliability of the powers validation method, providing more, equally or less reliable proof that the representative is entitled to represent the company. (e.g. is recognized to be authentic, included no language barriers, needs less correcting)	More than 50% of respondents appreciates the reliability (average of all perspectives) of the powers validation method as (considerably) more reliable than in the baseline.	DE	2	83% of the collected answers of respondents confirms, averaging on considerably more reliable
A2.2	The appreciation the DE expresses on the reduction in effort to verify the powers of the representative, being much, considerable, little or none (e.g. easier to interpret and verify).	More than 50% of respondents appreciates the effort (average of all perspectives) of verifying the powers of the representative as (considerably) less than in the baseline.	DE	2	50% of the collected answers of respondents confirms, averaging on less effort
Success criterion - The user acknowledges the procedure for applying for a service to be effective and efficient			Dimensions – U, A, L, V		
B1.1	The appreciation the user expresses on the effort to effectively complete all elements of the enrolment procedure, varying from (very) much effort to (very) little effort (e.g. collecting company information, language barriers, communication, problem solving, required effort, simplicity of the procedure).	The appreciation the user expresses on the effort to effectively complete all elements of the enrolment procedure, varying from (very) much effort to (very) little effort (e.g. collecting company information, language barriers, communication,	Company	6	100% of the collected answers of respondents confirms, averaging on very little effort

Me-tric	Description	Target	Group	Number of responses collected	Results
		problem solving, required effort, simplicity of the procedure).			
Success criterion - The user acknowledges the method to proof their authorization as effective and efficient			Dimensions – U, A, L, V		
B2.1	The satisfaction the user expresses on the adequacy of the method used for providing the DE with convincing proof of being entitled to represent a company (e.g. reliability of powers validation method, language barriers, simplicity and robustness of the method).	More than 50% of respondents appreciates the effort (average of all perspectives) to complete the enrolment/registration procedure adequate or better.	Company	6	92% of the collected answers of respondents confirms, averaging on very adequate
Success criterion - The user acknowledges the duration of completing the online eProcedure activities to apply for a service as acceptable.			Dimensions – V, A		
B3.1	The satisfaction the user expresses on several aspects the duration of the process to apply for a service or registration (e.g. company data collection, authentication data, eProcedure activities).	More than 50% of respondents appreciate the duration (average of all activities) to complete the enrolment/registration procedure as (very) satisfactory.	Company	6	92% of the collected answers of respondents confirms, averaging on very satisfied
Success criterion - The user saves time and/or cost when completing the eProcedure using the OOP TS, compared to the baseline.			Dimensions – V, A		
B4.1	The amount of time and money saved on applying for a service.	More than 50% of respondents complete the application for a service with lower cost and/or in less time than compared to the baseline.	Company	6	100% of the collected answers of respondents confirms, averaging on less
B4.2	The time spent by the user on the eProcedure portal activities	More than 50% of respondents complete the application for a service in less time than	Company	6	100% of the collected answers of respondents

Me-tric	Description	Target	Group	Number of responses collected	Results
		compared to the baseline.			confirms, averaging on less
Success criterion - The DO believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits			Dimensions – U, A, V		
C1.1	The estimate of the DO on the benefits of the OOP TS usage (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the OOP TS.	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DO	2	100% of the collected answers of respondents confirms, averaging on benefits exceed cost
Success criterion - The DE believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.			Dimensions – U, A, V		
C2.1	The estimate of the DE on the added value of the OOP TS usage (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the OOP TS.	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DE	2	50% of the collected answers of respondents confirms, averaging on benefits exceed cost
Success criterion - The DE believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.			Dimensions – U, A, V		
C3.1	The estimate the DP Member State on the benefits of online powers validation (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the MMS.	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	MS	0	No responses collected yet
Success criterion - The DE believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.			Dimensions – U, A, V		
C4.1	The estimation the Member State expresses on the effort, cost and time involved in setting up a node and deploying a DE4A Connector being	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	MS	0	No responses collected yet

Me-tric	Description	Target	Group	Number of responses collected	Results
	(considerably) more, on par or (considerably) less than expected.				
Success criterion – The DE believes that the Company Evidence Model has proven adequate for cross-border exchange of information on companies for the DBA eProcedures.			Dimensions – U, V, L		
D1.1	The appreciation the DE expresses on the extent to which the Company Evidence model satisfies their needs for information on the company.	None (research topic)	DE	3	81% of the collected answers of respondents confirms, averaging on adequate
Success criterion – The DE believes that the solutions to validate powers proven adequate for the eProcedures involved in piloting.			Dimensions – U, L		
D2.1	The appreciation of the DE on the applicability of the full powers validation method to their services.	None (research topic)	DE	3	44% of the collected answers of respondents confirms, averaging on sufficient

In the next section, the results of collected (quantitative and qualitative) information through questionnaires, observations and interviews have been processed into conclusions on Use Case 1. Annex 1 and 2 provide more detail and information on all success criteria and metrics, while the figure below displays the graphical distribution of responses per qualitative success criterion. Some remarks need to be taken into account:

- The values have been translated to a satisfactory scale for simplicity (originally, each metric has its own specific scale, like amount of effort or amount of benefit).
- For metrics C3.1 and C4.1, responses have not (yet) been received. These can/will be addressed in iteration 2.
- Also, metrics D3.1, D4.1 and D5.1 are more qualitatively oriented are not displayed
- Metrics C1.2, C2.2, C3.2, C4.2 are related to inquiry the spent effort (in manhours/cost) are not displayed in this figure.

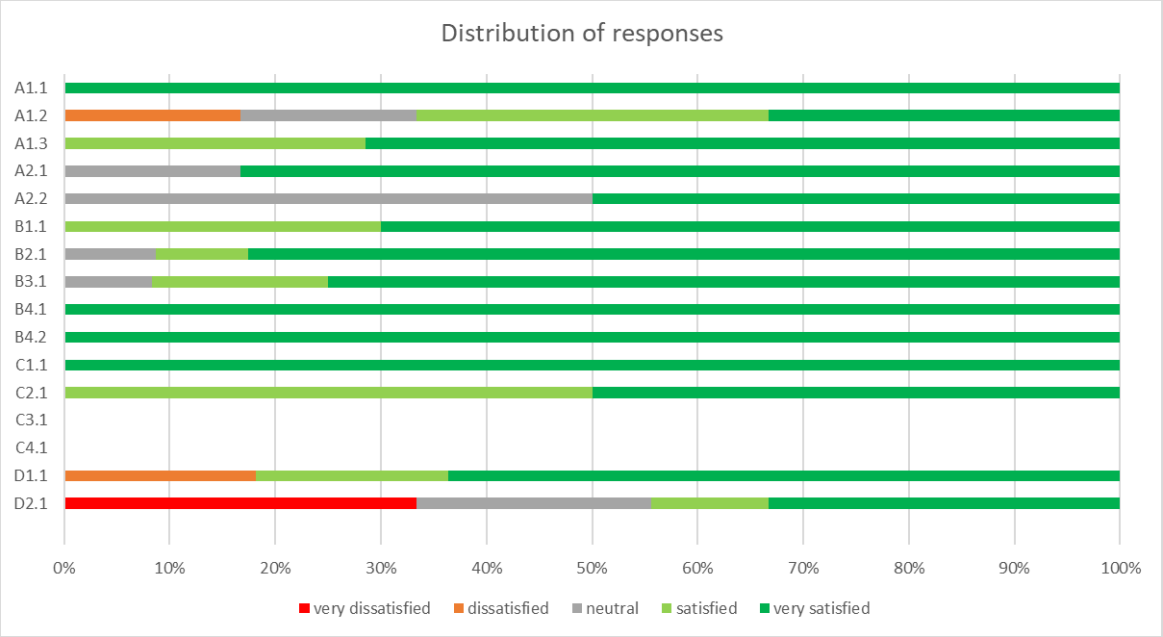

Figure 2: Distribution of scale-based responses

3.2.1 Use

3.2.1.1 Company perspective

Representatives that participate in the pilot are in general very positive about the ease of use. The extent to which they can judge the usability, depends on the portal(s) they have piloted in. Representatives that piloted in simulated portals sometimes had a reduced set of functionalities available compared to those that piloted in a production portal. Also, for part of the procedures (like eIDAS portals or eHerkenning suppliers), software of third parties had to be used and this is beyond the influence of the DE4A programme.

There are a few topics worth discussing:

- In general, representatives quickly navigated through the steps in the portal, aiming to complete the registration in the least amount of time. The eagerness to complete the procedure quickly usually led to the situation that the provided information was not read thoroughly. In general, texts longer than 2 or 3 sentences, will not be read by most participants. Also, if the word 'automated' is present in the text, users tend to go forward without reading. One representative, when afterwards confronted with this behaviour, suggested to offer an 'Are you sure?' pop-up on certain moments in the eProcedure in order to increase awareness.
- Representatives are not always familiar with the concept of levels of assurance in the cross border authentication procedure. Also, when having to manually choose the representation in structure for mandates, representatives tend to struggle. An explanation can be found in the fact that levels of assurance, and mandate structures used for cross border authentication are not used on a daily basis. Another possible explanation is that participating companies were small or medium sized companies and do not have to deal with these matters, and some Member States do not have a notified eID (and possibly not eIDAS) yet.
- In order to access the eProcedure, the representative needs to get the mandate registration in their country properly arranged. Once that is in place, the process of authentication and authorizing is very smooth, quick and adequate. The process to arrange the proper mandate registration differs per Member State but can be cumbersome. Although the part of arranging mandates in the local Mandate Management System is out-of-scope for the pilot, it is worth mentioning that representatives need to perform various administrative tasks (like arranging

mandates, adapting existing branch structures etc) that may not be straight-forward. On one occasion, a representative bailed out during this process, as it was too much of a struggle.

- As a result of integration of the eProcedure with eIDAS and the OOP TS, representatives are forced to use several types of user interfaces when completing the eProcedure and are confronted with 'flickering screens' caused by redirections during the actual forwarding to other eIDAS related websites. This is for example because the authentication and authorization functionality (in eIDAS) is not offered by the DE, but by the DP Member State. This functionality can even be offered by multiple individual vendors. The 'switching to another environment' is not something representatives totally seem to understand. Also, the information shown on screens can introduce the feeling of 'repetition' because the information seems – at first glance – to be the same as was shown on previous screens. The representatives, although probably not always completely understand what is going on in this regard, don't seem to be too bothered by it. As long as it works, seems to be their motto.
- Representatives expressed the wish to have more insight and control over the source of the data, as well as the extent to which data will be used by the Data Evaluator. Regarding the source-aspect, this can partly be explained by a pilot design decision to have the source automatically chosen (and not offer a choice to the user via the IDK) while the intermediation pattern does offer functionality for this.
- Representatives are usually able to read English text. Some representatives would consider text in their mother tongue to be an improvement of the already friendly eProcedure.
- For representatives from Member States that have a notified eID, the use of this familiar eID is preferred over the need to obtain a specific account to work in the foreign eProcedure portal.

3.2.1.2 Data Evaluator perspective

Two of four Data Evaluators completed the integration of their portal to both the eIDAS pilot node and the DE4A Connector to the level where they were able to pilot. Two Data Evaluators were not able to pilot during the first iteration due to the limited set of moments per year allowing for releasing to production and priorities of other projects. The integration itself does not seem to be the problem.

Some things are worth mentioning are:

- Integrating the Explicit Request and Preview based on a generic design caused no problems. The functionality is very limited, simple and low-cost to implement.
- Logging was kept very basic and close to the existing logging mechanisms in the DE systems. To implement a global logging-system seems to be useful for error-tracking but introduces more challenges on security (as more connections to the outer world need to be established) and seemed not be cost-effective.
- Some Data Evaluators, although seeing the advantages, also think that the integration with the OOP TS increases technical complexity (of the total solution to support the user-processes). In case of failing components, it is harder to solve these or provide work-arounds.
- The DBA solution seems to be an enabler for certain process-steps with some of the Data Evaluators, likely leading to redesign (improvement) of certain DE-procedures. For example, certain validations (of company-data, or of mandates) are not really performed in the current (conventional) processes, but will be when using the OOP TS and eIDAS.
- Record matching to recognize previous registrations in the DE-portal and prevent doublures in databases, was based on the use of the CompanyRegistrationID. The principle itself works as expected. Some eProcedures used in the pilot, however, were not meant for recurring visits and therefore the record matching functionality is of limited value. It is worth mentioning on the other hand, that for some (not piloted) eProcedures matching on CompanyRegistrationID might not be enough, as some portals need matching of the Natural Person as well.

3.2.1.3 Data Owner perspective

Two of four Member States were able to get the Data Owner role ready for piloting during the available timeframe. One Member State completed development and test but needed more time for a management decision on the environment to use for piloting.

In all cases, additional functionality was built on top of existing data services in order to complete the integration to the OOP TS. This integration-layer between the data-service and the DE4A Connector takes care of processing requests, translation of data-structures to the canonical data model and error-handling. Because of this implementation-choice, any change in data service of a business-register, must be processed in the extra layer that was developed.

On one occasion, multiple business registers within one Member State are involved, that might require a new technical layer to process requests and execute distributed querying to the proper Business Register. Alternatively, the user might be offered a choice of Business Registers to use (this is standard intermediation functionality). In the DBA pilot however, Member States having multiple Business Registers already had an integration layer available that could be used.

Business Registers don't experience many advantages or disadvantages, mainly because existing data services were used, and no user interaction is present at the side of the Data Owner because of the interaction pattern used for this pilot: the intermediation pattern. In general Business Registers are in favour of a wider use of company data.

Looking forward to the 2nd iteration where the Subscription and Notification Pattern will be piloted, the expectation that not many companies will be found that will actually change (address, status etc.) during the window of piloting, must be taken into account. The notifications from the business register, normally triggered by such changes, will therefore be simulated in order to properly test the Subscription & Notification pattern with sufficient volume.

3.2.1.4 Usefulness of common components and products from other work packages

The valuation the developers and testers gave to the usefulness of the provided common components is displayed in the table below.

Table 8: Valuation of common components usability by developers and testers

Components	Perceived quality of specs/software	Ease of integration	Potential to include in sustainability plan	Degree of adequacy for Pilot purpose	Overall assessment
	(Rates from: No opinion, Very low, Low, Neutral, High, Very high)				
Solution Architecture	4,50	5,00	4,00	4,50	4,50
Information Exchange Model	4,50	4,50	4,00	4,50	4,38
Canonical data models	4,50	4,50	4,00	5,00	4,50
DE4A Connector	3,67	4,00	4,00	3,33	3,75
Playground					
Mocked DE	4,33	4,67	4,50	3,67	4,29
Mocked DO	4,33	4,67	4,50	3,67	4,29
Central SMP	4,00	3,67	4,50	2,67	3,71
Kafka server	4,33	4,33	4,50	3,67	4,21
SSI Authority agent	N/O	N/O	N/O	N/O	N/O

Components	Perceived quality of specs/software	Ease of integration	Potential to include in sustainability plan	Degree of adequacy for Pilot purpose	Overall assessment
	(Rates from: No opinion, Very low, Low, Neutral, High, Very high)				
SSI User agent (mobile)	N/O	N/O	N/O	N/O	N/O

Values are: No opinion, Very low (1), Low (2), Neutral (3), High (4), Very high (5)

Developers and testers valued the quality of support and products produced by other work packages as displayed in the table below.

Table 9: Valuation of products and support from other work packages

Topic	Rating
(DE) To which degree does the canonical model fit the expectation for evidence information required by your procedure? (*)	4
(DO) How easy was to implement transformation to canonical evidence? (*)	4,5
Quality of support and communication channel (Slack) provided by common components WP during the integration and testing (*)	4,3
Quality of technical documentation (*)	3,6
Contribution of testing methodology and Connectathons for testing with other MS to the successful launch of the pilots (*)	4,3

Values mean: Absolutely inadequate (1), Inadequate (2), Sufficient (3), Adequate (4), Perfectly adequate (5)

3.2.2 Value

3.2.2.1 Company perspective

Companies appreciate the short duration of the entire online eProcedure. Usually, the piloted eProcedure has been completed within 2 minutes while, according to Data Evaluators, the current procedures could take days or weeks to complete.

The part of arranging proper configuration of the mandates within the home Member State (which is not part of the piloted process) that was mentioned in section 3.2.1.1 however, decreases the experienced value of the solution. From a DE4A pilot-perspective however, this process is out of scope and something that cannot be changed by the DE4A project, nor can it be influenced in favour of the pilot. In some Member States, the functionality concerning mandate management and validation is developed and maintained by private parties, which are not DE4A partner.

Also the simplicity of all steps in the piloted process is something that users like. One of the representatives was at the time actually working on opening a branch in another Member State and could therefore easily compare the differences.

For companies, the value of the eIDAS/Powers Validation and the OOTS solution is considered to be major. The feedback in the interviews and questionnaires was all (extremely) positive.

3.2.2.2 Data Evaluator perspective

Data Evaluators look forward to the benefits from having validated data available in a harmonized, structured and easy to process format. It saves time and produces less errors when processing in the portal and other systems. This benefit is expected to lead up to hundreds of hours saved per year on processing and correcting, assuming that the solution is used for all DE processes (not just the process that was piloted). This is also the downside: if implemented for just one procedure, the solution would probably not be cost-effective. Also, some Data Evaluators expect the majority of benefits to become present after a learning curve (that has already started with the DEs while piloting).

Data Evaluators consider both the eIDAS/Powers Validation and the OOTS solution to be reliable and fast. For some, the powers validation method suffices for the piloted procedure, but in the future a more advanced/extended method is required for other procedures. For example procedures where more than one representative must approve, although it is worth mentioning that these types of procedures were out of scope for the pilot.

The CompanyEvidence Type that was piloted, fits the direct needs of the Data Evaluators for the piloted procedure. This means that mandatory attributes in the DE-systems were covered. For some DE's the evidence contains more attributes than strictly needed. While for others, there was a wish for more (optional) information (sometimes more than partnered business registers could possibly provide). The model used for piloting turned out to be a good middle-way for the piloted procedures. So it is to be expected that (many) more evidence-types will come into existence once the SDG will be implemented for all SDG procedures for businesses.

3.2.2.3 Data Owner perspective

The Data Owners, usually already providing standard data services, will not notice much of the solution that is piloted. The main added value would be that the data in the Business Registers is used more often and for the right purposes, which means an increased 'right-to-exist' for Business Registers (although the volume in piloting is probably too low to really make an impact).

Another value could be that there will be less manual work for processing requests, and handling errors.

3.2.3 Learning towards adoption

Lessons learned were documented in meeting minutes, notes, on the DE4A wiki and derived from e-mail conversations.

3.2.3.1 Lessons learned from analysing and designing national integration of cross-border OOP

Table 10: 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.

ID	Topic	Suggestions for adoption	Lessons learned
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 scheme's 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 2.5 became available. This version of the CEF reference software enforced the eIDAS 1.2-specification that turned out to be in 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	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. 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).	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 ID's as eIDASLegalIdentifiers 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 -	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

ID	Topic	Suggestions for adoption	Lessons learned
		of course in case both are applicable at the same time.	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 complex MS-scenario could be a natural person (representative) from MS A, representing a legal person (represented) from Member State B, which applies for a service from a Service Provider in Member State C and having to hand over evidence that is available in Member State D. 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 available be 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 (Common Component Design & Development) to allow for more uniformity across the pilot.

3.2.3.2 Lessons learned from implementing and testing the DE4A OOTS

Table 11: 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 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.	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 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 work packages, and make sure that everything was understood.
3	Documen-ting	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 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	Configu-ring	DBA advises Member States to prepare for the steps to be taken	The components needed for SDG rely heavily on use and exchange of certificates for server

ID	Topic	Suggestions for adoption	Lessons learned
		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 between Member States in case of change of certificates and to provide for certificate-rollover to guarantee OOTS-connectivity.	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 - 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	Interopabi-lity 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	Interopera bility 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 (Connecthatons) 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.

ID	Topic	Suggestions for adoption	Lessons learned
8	Interopera bility 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 on 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 implementing the SDGR in order to prevent delays.	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 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 -ting 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	Coopera-tion	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.

3.2.3.3 Technical, semantic, organizational and legal knowledge shared with work packages

Table 12: Lessons learned from semantic, technical and organizational/legal activities

ID	Topic	Suggestions for adoption	Lessons learned
1	Communi-cation	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 Once 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

ID	Topic	Suggestions for adoption	Lessons learned
			understandable way the huge difference that OOP makes.

3.2.3.4 Pilot learning for sustainable impact and new governance models

Table 13: Lessons learned on new government models

ID	Topic	Suggestions for adoption	Lessons learned
1	Harmoni-sation	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	Harmoni-sation	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.

3.2.3.5 Pilot learning for involving and interaction with users and authorities

Table 14: Lessons learned on recruitment and interaction

ID	Topic	Suggestions for adoption	Lessons learned
1	Company involve-ment	DBA advises to include a written agreement/guarantee in the procedure to involve companies, stating the exact consequences of involvement.	Despite information on (low) consequences being available via multiple channels, companies are reluctant to participate in the pilot. The fear of participation impacting tax-declarations is mentioned most, especially in situations where real data and real eProcedures are used in the pilot.
2	Pilot evaluation method	DBA advises to focus on qualitative evaluation only in pilots where a limited number of participants (DE/DO/companies) are expected to be involved.	Quantitative evaluation is useful for pilots where a large number of participants are involved. In DBA, only 4 DEs, 4 DOs and less than 50 companies were involved, making the quantitative analysis not meaningful enough. The volume is too low to be a representation of the real world and it seems to make sense to maximize (qualitative) input for learning via interviews and observations.
3	Recruit-ment process	DBA advises to start recruiting participants for piloting at least a year before pilot runs start, and make an effort	Getting users involved in the pilot proves to be very difficult. The actions to try and involve users are not complex or hard, but to actually get commitment from users takes a long time and

ID	Topic	Suggestions for adoption	Lessons learned
		(reservation) to keep users involved.	there is no telling what effect/result the (quality and quantity of the) efforts will have.

3.3 Technical common criteria

Table 15: Reflection per Technical Common Criteria

ID	Topic	
1	Openness	The entire DE4A common component documentation is publicly available on the DE4A wiki. eIDAS documentation is also publicly available. Documentation on DE/DO systems is however not publicly available, which is in line with other documentation of DEs and DOs.
2	Transpa-rency	Procedures and results of the pilot, as well as the actual status of connections and readiness have been (and still are) publicly available on the DE4A wiki, and on the DE4A.EU website. Using these sources, interested parties can follow along and study the details of the pilot.
3	Reusability	The DBA pilot used existing data sources at the side of the DO, and building blocks like eIDAS and SEMPER, SMPs and DE4A building blocks. The evidence exchanged during the pilot concerned data is already available in business registers. As another aspect of reusability, users from Member States that have a notified eID, appreciate the usability of this familiar eID instead of having to obtain a specific account to use in the eProcedure across borders.
4	Technologi-cal neutrality and data portability	The DBA partners used software provided by the technical work package in the DE4A project. This concerns for example the connector and the SMP. Member States we free to choose an AS/4 gateway, although the DE4A Connector included by default a Phase4 AS/4 gateway and not all other implementations were extensively tested with the DE4A Connector, except Domibus as reference implementation. This caused no real problems for the DBA partners and all partners used the default Phase4 gateway. Data Evaluators and Data Owners chose their own standards and software and developed an integration to the DE4A common components using the proposed APIs to the Connector and other common components.
5	User-centricity, inclusion and access-ibility	In DBA, this aspect is applicable for the DE eProcedure Portal and eIDAS. The usability of each portal depends on the standards applied by the DE. Each portal has its own design-language and standards. Also, for simulated portals, sometimes a more lean-and-mean setup was applied on order to cut cost and time. For eIDAS, standard user-interfaces were used, as supplied by various suppliers (which were out of scope for the pilot). On the user centricity aspect, not too much can be said without touching the constraints that exist from DE-portals and other standards. What was observed however, was that users generally don't like to read the entire texts on the screen. Texts like in the Explicit Request, although legally perfectly sound, are hardly ever read by users. While switching between user interfaces introduces some confusion, it does not seem to bother representatives too much (as long as it works, seems to be the motto). Offering all texts in the mother-tongue of the users, seems to be a possible improvement of accessibility.

ID	Topic	
6	Security and privacy	On several occasions achieving publicly available portals, or just establishing connections between DE4A Connectors, turned out to be difficult and very time-consuming. Many issues were encountered in opening up firewalls and obtaining certificates. To secure safety, organisations have many policies and administrative procedures in place which, however very useful and necessary, are a major cause for delays. For privacy-protection, a MoU and DPO were installed before and during the project. Also, recordings from pilot-runs were blurred so no personal or company data could leak to unauthorized actors. No incidents occurred during pilot runs. Users would appreciate an increased insight and control of the (DO) data source (i.e. know exactly what data and what source is used) and – usage (by the DE. i.e. which data, for which procedures exactly and for how long). This can partly be explained by a design-choice and delimitation of the pilot scope.
7	Administra-tive simplifica-tion	As stated in previous sections, both the DE and companies recognize the simplicity of the procedure. It is faster, safer, more secure and with less activities than the traditional procedures. Also, processing the data is easier because of higher data quality, resulting in less errors that need to be resolved. Still, a proper understanding of assurance levels and structures to define the representation relationship in mandates, as well as the fact that the representative willingly chooses to use the OOP TS (explicit request), remain aspects that might need improving. On the other hand, representatives generally seem to be interested in only wanting to complete the procedure as quickly as possible so there is no guarantee that extra effort to improve these aspects, will result in the desired increase of understanding.
8	Effective-ness and efficiency	Data Evaluators and Companies recognize the fact that less manual work is involved in the piloted procedure and that the duration of the procedure is massively reduced.

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-stap 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 16: 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 Transferrers, 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 four Data Owner / Data Evaluator combinations were confirmed and in total 11 Connectathons for the OOP TS track were organized. For the eIDAS track, three Connectathons (and several bilateral technical investigations) were organized between Austria, Romania, Sweden and The Netherlands, leading to three confirmed connections between Sweden, Romania and The Netherlands, and connections between Austria and both Romania and The 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 17: 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 18: 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	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 a few representatives for each user group, although not for all. Companies were also actively approached in cases DBA partners had access to companies in their professional networks, or private networks. 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 face when they just want to participate to help learning (and not aim to actually do business abroad). Finding companies that, at the moment of piloting, are actually planning to do business abroad seems difficult too. This is a timing-challenge of the pilot. For DBA, several channels were used to try and involve companies. For example the Dutch embassy in Romania was approached to help in the recruitment.
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	Completed	This activity is meant for representatives joining the pilot. There seem to be challenges in this domain as procedures (out-of-scope for the pilot) are sometimes cumbersome.
DBA-UI-5	Set up microsite (templates)	Completed	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. (https://www.de4a.eu/doingbusinessabroadpilot)
DBA-UI-6	Implement microsites	Completed	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. (https://www.de4a.eu/doingbusinessabroadpilot)

Activity id	Activity	Status	Comment
DBA-UI-7	Finalize questionnaire forms	Completed	Questionnaires as designed in the D4.6 pilot planning 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). (https://www.de4a.eu/doingbusinessabroadpilot)
DBA-UI-8	Set up and share newsletters	Completed	Newsletters and press-releases are available on the DE4A website (https://www.de4a.eu/news).
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) and will only be involved in final iteration, so therefore this user involvement activity has not been completed yet.

User involvement was initiated 10 weeks in advance of the planned start of each pilot combination. 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 2 DE/DO combinations mentioned in Chapter 2 of this document, more activities have been completed (and activities have been executed mote 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, an international event was organized (in collaboration with other work packages in the DE4A project). Preparations were set up as a joined venture between DE4A and the EuroChambers (and later Digital SME Alliance) organization. Another event where participant recruitment happened was during the EEMA Annual Event in London. Also, a relationship with the Dutch embassy in Romania was established in order to find Romanian companies, willing to participate in the pilot.

4.3 Pilot governance and internal progress report

The pilot running phase was expected during May/June/July 2022, while actual pilot runs were organized in specific weeks during this period. In advance of every new DE/DO combination the privacy measures as defined in the MoU were checked and installed, and the Data Protection Officer was informed and invited to regular (weekly) pilot lead meetings where progress and issues were reported. Before piloting, a press-release was made available on the DE4A website.

Pilot Runs were organized by the Pilot Supervisory Team, which existed out of the representatives of the DBA partners. Pilot running sessions were organized via Teams meetings. A number of sessions were recorded (to collect evidence) and recordings were saved on a secure location (with limited access).

No issues existed during the pilot runs, that required any intervention from the DPO.

The Executive Board was informed on every meeting about the progress of the pilot runs.

4.4 Knowledge exchange among pilot partners

DBA pilot partners met on a weekly basis to discuss progress, planning and issues. Notes were collected in PowerPoint slides, and issues/lessons learned were collected at the DE4A wiki (which was also used for further developing this report). On several occasions, additional meetings were organized in order to discuss certain topics in more detail. These meetings were mainly in an online fashion, due to COVID-19 restrictions.

Connectathons were used to confirm connectivity and pilot-readiness, while developers used Slack to collaborate online, in order to resolve issues and prepare Connectathons.

The DBA pilot set up and maintained a wiki-environment, providing information on the status and progress, but also on solution architectures for the first and second pilot iteration. The wiki was also used to collaborate on the production of official pilot deliverables.

4.5 Stabilisation of pilot experience and user support

The results and preliminary conclusions of the first pilot run are included in this report and will be shared on the DE4A wiki. The DBA-results will be combined with the results of the other DE4A pilots, in order to produce a more general perspective on piloting the SDG.

Reflecting on the pilot procedure, the intention was to have the companies receive documentation first, then execute the pilot eProcedure on their own, followed by completing a questionnaire and afterwards the DBA-representative would interview the company-representative.

While preparing pilot-runs in more detail however, it made more sense to schedule an online meeting with the company-representative after they had received the documentation, and supervise the company representative during the online meeting. This way, the DBA-representative was able to actually observe the activities and possible struggles of the company-representative and learn from the actual experience. Also, the questionnaire was completed during this online session, and the questions were used as guidelines for discussions on certain topics, resulting in filled-in questionnaires but especially in input of a qualitative nature.

Because of this online collaboration, DBA-representatives could help the company-representative out (only) in case they ran into an issue. This way of online collaboration when executing a pilot-run seems to work really well and is appreciated by both the company-representative and the DBA-representative.

4.6 Planned improvement following received feedback

Feedback is available from the 'customization and integration phase' of the pilot, as well as the first iteration running phase. The feedback points towards several possible improvements.

4.6.1 Functional and technical improvement

The pilot exists of 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 combined with the intermediation pattern
- subscription & notification pattern
- lookup pattern

Looking at the observations and interviews, it becomes clear that the company-representatives want to spend as little time as possible to complete an eProcedure. Previous sections already pointed out that the Explicit Request and Preview functionality, legally sound and meant for 'users being in control' do not actually contribute to that direction for most people. Furthermore, functionality is often developed in the style of the eProcedure portals and/or eIDAS screens provided by sometimes external private parties.

Summing up the possible functional improvements:

- Explicit Request and Preview functionality could be redesigned so users are more tempted to read relevant statements and understand the choice that they are about to make.
- Record matching worked for some eProcedures but is not always useful as some eProcedures are meant to use only once. On the other hand, some eProcedures seem to need a more complex record-matching method because registration seems to include Natural Person attributes (as well). The principles of record-matching could be extended for large scale production.
- Simplify the eProcedure on functionality that relates to choosing appropriate mandate levels and representation structures for the eProcedure.

Although the intermediation pattern will be used in the second pilot iteration (as starting point for subscribing to updates), it is not expected that all these optimisations will be implemented in iteration 2. Improvements on choosing appropriate mandates and representation structures will be implemented wherever possible.

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 iteration 2. 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.

4.6.2 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.
- As stated before, possibly the metrics for evaluating the new interaction patterns will be altered (in a more qualitative direction) and detailed during the 'customization and integration' phase for iteration 2. This will lead to changes in the questionnaires as well.
- The procedures for pilot-runs will be altered towards ‘online collaboration sessions’ with company-representatives, in order to maximize the learning opportunity from each pilot-run. Initially, the idea was to have the representative execute the procedure all by themselves, complete the questionnaire and afterwards schedule an interview.
- The questionnaires (and metrics) are sometimes too fine-grained. During interviews when filling in the questionnaire, the respondents do not (want to, or are able to) distinguish the several aspects within certain metrics and choose to generalize their input . For the second iteration, a simpler and more generalized setup will be considered.

5 Conclusions and major achievements of initial iteration

The pilot has completed the first iteration pilot running phase with most of its partners. Partners that were not able to complete preparation in time faced organisational and technical issues like the unavailability of resources and strict security policies for bringing environments to production.

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, extensively tested and thereafter used for real-life piloting with several companies, Data Owners and Data Evaluators. The need for receiving notifications about changes in business register entries was validated during analysis, design and interviews, regarding both changes in company data and company-concerned events. Analysis shows that this need cannot fully be fulfilled by BRIS.

The exercise of analysing, 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, although some still have to make the final adjustments in order to be able to actually pilot. 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. The cost and effort spent on implementing the eIDAS and DE4A OOTS pilot infrastructure varies widely over the Member States and depends heavily on the available infrastructure in each Member State.

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

Based on structured tests and actual pilot runs, the intermediation pattern has proven useful for the piloted business procedures as defined in the SDG Annex II[3]. The piloted procedures have shown simplicity and speed, as well as lower cost for both companies and public authorities. For the Data Evaluators, a broad implementation is a requirement in order to achieve cost-effectiveness. For Data Owners, the intermediation pattern seems to have little impact if integration to the OOP TS uses existing data services and an integration layer.

The higher data quality results in less processing-errors for the Data Evaluator compared to the current way of executing procedures. Companies seem to focus on completing the online procedure as fast as possible and have little attention to read texts about – for example – the Explicit Request. Perhaps adding pop-ups and providing texts in the mother-tongue of the user increases awareness. 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.

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. 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. Arranging the appropriate mandate registration in the local Mandate management System proves to be challenging for representatives but is not part of the piloted process. Still, there is room for improvement in that domain.

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Annex 1 – Metrics

Table 19: Metrics

Me-tric	Description	Target	Group	# of respon-dents	Answers					Metric result
A1.1	The appreciation the DE expresses on the Company data being (considerably) more reliable, equally reliable or (considerably) less reliable than before. (e.g. being available in an electronic and more structured format, being more complete, correct and meaningful).	More than 50% of respondents appreciates the reliability (average of all perspectives) of company data as (considerably) more reliable than in the baseline.	DE	3	**Consi-derably more reliable**	**More reliable**	**As reliable**	**Less reliable**	**Consi-derably less reliable**	
	The appreciation the DE expresses on the reliability of company data, judging from the following perspectives:									
	- Availability in electronic format				3					
	- Availability in structured format				3					
	- Completeness of available data				3					
	- Correctness of available data				3					
	- Meaningfulness of available data				3					
A1.2	The appreciation the DE expresses on processing of the Company data requires (considerably) more, equally or (considerably) less effort than before (e.g. amount of work for interpreting and judging, solving exceptions).	More than 50% of respondents appreciates the effort (average of all perspectives) of processing company data as (considerably) less than in the baseline.	DE	3	**Conside rably less effort**	**Less effort**	**Same effort**	**More effort**	**Conside rably more effort**	
	The appreciation the DE expresses on the effort required to process Company data during the approval of the application for a service, judging from the following perspectives:									
	- Interpretation of data				1	1	1			
	- Solving errors and exceptions				1	1		1		
A1.3	The estimated benefit (effort to resolve exception, manually changing data, communication cost) the DE gets from company data that is always up to date, being (considerably) much to (considerably) limited.	More than 50% of respondents estimates the benefits (average of all perspectives) of always having up-to-date company data as Medium or (considerably) high benefit.	DE	2 (1 chose to provide input after iteratio n 2)	**Conside rably high benefits**	**High benefits**	**Medium benefits**	**Little benefits**	**Hardly any benefits**	
	The benefits the DE estimates the fact that Company data is always up-to-date, judging from the following perspectives:									
	- Manual effort to maintain Company data				1	1				
	- Number of errors and exceptions due to Company data being deprecated				2					
	- Solving errors and exceptions due to Company data being deprecated				1	1				
	- Communication effort and cost to retrieve up-to-date Company data				1					
A2.1	The appreciation the DE expresses on the reliability of the powers validation method, providing more, equally or less reliable proof that the representative is entitled to represent the company. (e.g. is recognized to be authentic, included no language barriers, needs less correcting)	More than 50% of respondents appreciates the reliability (average of all perspectives) of the powers validation method as (considerably) more reliable than in the baseline.	DE	2 (1 chose to not provide input as full powers is not part of their national legal frame-work)	**Conside rably more reliable**	**More reliable**	**As reliable**	**Less reliable**	**Conside rably less reliable**	
	The appreciation the DE expresses on the reliability of powers validation method used in the pilot, judging from the following perspectives:									
	- Authenticity of proof				2					
	- Accessibility of proof (language, structure)				1		1			
	- Correctness of proof				2					

A2.2	The appreciation the DE expresses on the reduction in effort to verify the powers of the representative, being much, considerable, little or none (e.g. easier to interpret and verify).	More than 50% of respondents appreciates the effort (average of all perspectives) of verifying the powers of the representative as (considerably) less than in the baseline.	DE	2 (1 chose to not provide input as full powers is not part of their national legal frame-work)	**Considerably less effort**	**Less effort**	**Same effort**	**More effort**	**Considerably more effort**	
	The appreciation the DE expresses on the effort required to verify the powers of the representative, judging from the following perspectives:									
	- Interpretation of data				1		1			
	- Solving errors and exceptions				1		1			
B1.1	The appreciation the user expresses on the effort to effectively complete all elements of the enrolment procedure, varying from (very) much effort to (very) little effort (e.g. collecting company information, language barriers, communication, problem solving, required effort, simplicity of the procedure).	More than 50% of respondents appreciates the effort (average of all perspectives) to complete the enrolment/registration procedure as reasonable (or less) effort	Company	6	**Very little effort**	**Little effort**	**Reason-able effort**	**Much effort**	**Very much effort**	
	The appreciation the user expresses on the effort required to complete the enrolment/registration procedure, judging the following activities:									
	- Collecting company data				6					
	- Solving language barriers				3	3				
	- Providing required data to the DE				5	1				
	- Solving problems				5	1				
	- Simplicity of the procedure				2	4				
B2.1	The satisfaction the user expresses on the adequacy of the method used for providing the DE with convincing proof of being entitled to represent a company (e.g. reliability of powers validation method, language barriers, simplicity and robustness of the method).	More than 50% of respondents appreciates the effort (average of all perspectives) to complete the enrolment/registration procedure adequate or better.	Company	6	**Very ade-quate**	**Ade-quate**	**Suffi-cient**	**Inade-quate**	**Very inade-quate**	
	The appreciation the user expresses on the effort spent to proof to be sufficiently authorized, judging from the following perspectives:									
	- Reliability of method				5	1				
	- Accessibility of method (language)				5	1				
	- Simplicity of method				6					
	- Robustness of method				4		2			
B3.1	The satisfaction the user expresses on several aspects the duration of the process to apply for a service or registration (e.g. company data collection, authentication data, eProcedure activities).	More than 50% of respondents appreciate the duration (average of all activities) to complete the enrolment/registration procedure as (very) satisfactory.	Company	6	**Very satisfied**	**Satisfied**	**Suffi-cient**	**Unsatis-fied**	**Very unsatis-fied**	
	The satisfaction the user expresses on the duration of the following activities in the procedure to enrol/register:									
	- Collect and provide company data				5	1				
	- Collect and provide proof of authorisation				5	1				
	- Completing the forms in the eProcedure portal				4	2				
	- Dealing with Explicit Request & Preview				4		2			
B4.1	The amount of time and money saved on applying for a service.	More than 50% of respondents complete the application for a service with lower cost and/or in less time than compared to the baseline.	Company	6	Total duration took less than 2 minutes on average. Traditional process takes days or weeks to complete.					
	The amount of money and time spent by the user, on applying for a service, including collecting evidence and proof of the authorisation, and transportation cost.									

B4.2	The time spent by the user on the eProcedure portal activities The amount of time spent by the user, on the following steps executed in the eProcedure portal: - Authorisation and authentication - Collecting and providing evidence - Finalizing registration in forms	More than 50% of respondents complete the application for a service in less time than compared to the baseline.	Company	6	Total duration took less than 2 minutes on average. Traditional process takes days or weeks to complete.					
C1.1	The estimate of the DO on the benefits of the OOP TS usage (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the OOP TS. The estimate expressed by the DO on the benefits compared to the cost and effort that is required to integrate with the DE4A Connector, considering the following expected benefits for the DO: - Less manual effort for processing - Lower communication cost - Lower risk for error due to manual processing and language challenges - Shorter duration for processing	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DO	2	**Benefits exceed cost considerably** 1 1 1 1	**Benefits exceed cost** 1 1 1 1	**Benefits are in balance with cost**	**Benefits are lower than cost**	**Benefits are considerably lower than cost**	
C1.2	The effort (manhours) involved to integrate the data service to the DE4A Connector. To be provided only if costs are not confidential. A rough indication of the effort involved to integrate the DO data service to the DE4A Connector. This is an optional metric, in case the costs are confidential.	none	DO	2	This varies between 100 and 750 depending on the use of existing data services, averaging on 500					
C2.1	The estimate of the DE on the added value of the OOP TS usage (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the OOP TS. The estimate expressed by the DE on the benefits compared to the cost and effort that is required to integrate with the DE4A Connector, considering the following expected benefits for the DE: - Less manual effort for processing during evaluation of the application, as well as fulfilment of the service requested - Lower communication cost - Lower risk for error due to manual processing and language challenges - Shorter duration for processing - More complete, valuable, consistent and correct data available - Data being always up-to-date - Trustworthiness of the data	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DE	2 (and one DE means that costs are not representative)	**Benefits exceed cost considerably** 1 1 1 1 1 1 1	**Benefits exceed cost** 1 1 1 1 1 1 1	**Benefits are in balance with cost**	**Benefits are lower than cost**	**Benefits are considerably lower than cost**	
C2.2	The cost (manhours) involved to integrate the eProcedure portal to the DE4A Connector and have additional functionality developed to comply to the SDGR article 14. To be provided only if costs are not confidential. A rough indication of the effort involved to integrate the DE eProcedure portal to the DE4A Connector This is an optional metric, in case the costs are confidential.	none	DE	2	This varies between 100 and 1250 depending on the type of portal (production/pre-production), averaging on 700.					

C3.1	The estimate the DP Member State on the benefits of online powers validation (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the MMS. The estimate expressed by the Data Providing Member State on the benefits compared to the cost, effort and time involved in connecting a Mandate Management System in the national eIDAS node, considering the following expected benefits: - Higher reliability of powers validation - Shorter duration of powers validation - Less manual effort for powers validation	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DP	0 (will be addressed in iteration 2)						
C3.2	The effort (manhours) involved to integrate the Mandate Management System to the eIDAS node. To be provided only if costs are not confidential. A rough indication of the cost involved to integrate the Mandate Management System to the eIDAS Connector. This is an optional metric, in case the costs are confidential.	none	DP	2	The estimations vary between 100 and 600, depending on the existing and used infrastructure and organisational setting, averaging on 350. Also including setting up the eIDAS pilot node infrastructure itself, the maximum estimated effort that was collected as a response, is about 1250 manhours.					
C4.1	The estimation the Member State expresses on the effort, cost and time involved in setting up a node and deploying a DE4A Connector being (considerably) more, on par or (considerably) less than expected. The estimate expressed by the Member State on benefits compared to the cost, effort and time involved in setting up and deploying the DE4A Connector, considering the following expected benefits: - Lower communication cost - Shorter process duration - Reliable communication - Connection to reliable data sources	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	MS	0 (this will be collected in the 2nd iteration)						
C4.2	The effort (manhours) involved to set up and deploy the DE4A Connector. To be provided only if costs are not confidential. A rough indication of the cost involved to set up and deploy the DE4A Connector. This is an optional metric, in case the costs are confidential.	none	MS	2	the estimations vary between 100 and 1250 depending on the infrastructure and setting the connector could be deployed and used, averaging on 650.					
D1.1	The appreciation of the DE on the extent to which the Company Evidence Model fits their needs, being (considerably) less than expected, as expected or (considerably) more than expected. The appreciation the DE expresses on the extent to which the Company Evidence model satisfies their needs for information on the company, in order to process the request for service adequately, judging the following elements: - Legal entity identification - Legal entity attributes (dates, status etc) - Contact points - Activities - Branch (not included in first pilot iteration) - Address - Information on representative(s)	None (research topic)	DE	3	**Very adequate**	**Adequate**	**Sufficient**	**Inadequate**	**Very inadequate**	
					3					
					3					
					1	1		1		
					2			1		
					1	1		1		
					3					
					1			1		
D2.1	The appreciation of the DE on the applicability of the full powers validation method to their services, being (considerably) less than adequate to (considerably) more than adequate.	None (research topic)	DE	3	**Very adequate**	**Adequate**	**Sufficient**	**Inadequate**	**Very inadequate**	

	The appreciation the DE expresses on the extent to which the Powers validation method satisfies their needs, judging the following elements:									
	- Usability for the piloted procedure				1	1			1	
	- Usability for other services of the DE				1		1		1	
	- Validation level (fine-grained)				1		1		1	
D3.1	The user's appreciation on various virtual scenarios concerning repeatedly using the OOP TS (for updates or requesting evidence with multiple data owners).	None (research topic)	Company	6						
	The thoughts and considerations of the user when presented various options to use Explicit Request and Preview, in different scenario's like				**No involvement, just get the actual data**	**Just ask and show me only the very first time, during enrolling to the procedure**	**Ask and show me every time, but for data sources at once**	**Ask and show me every time, but for data sources at separately**		
	- Explicitly request and preview to collect evidence from multiple DOs				1	5				
	- Recurring ER/P in case of updates on Company Information.				1	5				
D4.1	The appreciation of the DE on the need to do record matching on Natural Persons and Legal Persons on their part.	None (research topic)	DE	3						
	The thoughts and considerations of the DE on the need, adequacy and effectiveness to perform record matching on Legal Persons and/or natural Persons (representatives) within their processes.				Some eProcedures were meant for one-time use and are not expecting recurring customers. For eProcedures where recurring customers were expected, matching on Legal Person identification sufficed. On one occasion, matching on (also) Natural Person identification would be necessary.					
D5	Have the mechanisms for keeping the Company data up-to-date proven adequate and effective for the Data Evaluator?	None (research topic)	DE	3						
	The appreciation of the DE on the effectiveness of the mechanism to keep Company Data up-to-date in their systems. This metric only applies to the second iteration.				Although this topic is reserved for iteration 2, some Data Evaluators expressed themselves positively on this topic and expect benefits on data quality.					
	The thoughts and considerations of the DE on effectiveness of the OOP Ts to keep company data up-to-date in their local systems.									

Annex 2 – Success criteria

Table 20: Success criteria

	Success Criterium	Result
A1	The DE recognizes the company data is of higher quality, more reliable and easier to process when using the OOP TS to retrieve company data directly from the DO.	Data Evaluators are positive about the data quality, reliability and ease of processing. The fact that data has been validated already by a business register is considered to a good foundation for reliability. Data being harmonized, structured and digitally available eases processing in the Data Evaluator processes. Data evaluators expect savings up to hundreds of hours per year, if the OOTS and eIDAS/Powers Validation solution is implemented across the board. On the other hand: if implementation is limited to just a few procedures, the cost may be too high to make a good business case. The volumes of companies doing business across border might be low, so extensive re-use of the solution and integration is necessary to increase the benefits. Data evaluators expect much less errors in processing the data, resulting in a massive reduction of processing effort. Data Evaluator sometimes expect the benefits to be present after a learning curve, and also see that the downside of using the OOTS is that the infrastructure is more complex than before. Should something fail, it is quickly out of their reach to solve problems. Good governance and support are therefore considered important. Data Evaluators recognize that other eProcedures might require another type of evidence to be exchanged.
A2	The DE recognizes the method of powers validation to provide reliable proof of the representative being sufficiently authorized to represent the company.	Data Evaluators appreciate the extra security for validating the powers online. In conventional processes the mandates are not always checked (this is not preferred, but it seems not always possible to verify the mandates for foreign companies/representatives). Depending on the processes at the Data Evaluator side, the method used during piloting might also introduce a reduction in effort to process a registration. Data evaluators also notice that the dependency on the infrastructure increases with the use of the solution. Should the infrastructure fail at some point, then there is no easy workaround. The solution is considered to be one that should simply be available, regardless of the cost or profitability. The solution covers certain eProcedures, but Data Evaluators also point out that there are situations where a more advanced method is needed. For example in situations where the approval of more than one representative is needed. And finally, a harmonized model for mandates should be set up. During the pilot, differences between Member States were identified (like for example the Full Powers mandate not being common in all Member States).
B1	The user acknowledges the procedure for applying for a service to be effective and efficient	Over-all, the users greatly appreciate the speed and simplicity of the procedure. The automatic retrieval of company-information makes enrolling very easy and rather effortless. Using just the mouse for the majority of the procedure contributes to that experience. Users seem eager to complete the entire process as quickly as possible and sometimes don't read all available text/explanation that is available on the pages. Despite this, feedback pointed towards providing additional information and control to the users. For one, they would like to more clearly know upfront the exact source of information that is retrieved. This feedback can partly be explained due to a design-choice in the pilot, where the business-register (source) was automatically chosen. The intermediation pattern itself foresees in functionality, where users choose a source for the information by themselves. One other additional wish for more control concerns de actual use of the data (of the company). Users want a clear understanding for which procedures the information is used and want to be able to control that. Throughout the eProcedure, users use several systems (without knowing it). For example the use of eIDAS and several subsystems and the use of the DE-portal. Because of this, the user is confronted with several user-interface designs and, while switching between systems, flickering displays. Also, the information on these screens (obtained data from eIDAS versus obtained data via the OOTS) might at first glance look like it is the same (which it is not). This does not really bother the user but introduces confusion to a certain extent. The majority of screens has been set up in English. While most users are expected to be able to read/write English, user feedback shows that the possibility to have all texts in their own language would be even better and increases accessibility.
B2	The user acknowledges the method to proof their authorisation as	Users appreciate the use of an eID that is familiar to them, instead of having to obtain a separate account for the portal abroad. For some users, mandates and the different levels of assurance for cross border authentication that exist (and required) are unknown territory. Without help, they don't necessarily know what to do, or

	effective and efficient	what to arrange in order to use eIDAS and Powers Validation across border. This is partly because the use of assurance levels, mandates and powers validation is not an everyday activity. But also, notified eIDs (let alone for companies) have not yet been accomplished in all member States. Once correctly set up in the DP Member State, the procedure for validating the powers of the representative is considered to be quick, effective and reliable. This is something the representatives appreciate very much as they want to spend as little time on the procedure, as possible. Setting up the mandates in the Data Providing Member State can be somewhat complex and cumbersome. Users need to obtain proper means to use the company eID, and then arrange that they (as a Natural person) get the proper mandate. On some occasions users needed to change current registrations in order to complete the mandate registration. Keeping in mind that for most users' mandates are uncharted territory, some users bailed out when preparing for the pilot. To summarize; the method for powers validation itself works perfectly, once the registration of mandates is in place. But users are unfamiliar with mandates/assurance levels and even with help, the preparation can be cumbersome.
B3	The user acknowledges the duration of completing the online eProcedure activities to apply for a service as acceptable.	Users having real-life experience with conventional procedures to do business abroad, are excited about the ease and speed to enrol in eProcedures across border. They hope to see the solution implemented all over Europe soon.
B4	The user saves time and/or cost when completing the eProcedure using the OOP TS, compared to the baseline.	Users are excited about the small amount of effort and time it takes them to complete the eProcedure. On one occasion, the user was actually in the process of starting a branch in another Member State (outside of the pilot), so he was in a good position to determine the differences. The regular procedure takes much longer and introduces frustration.
C1	The DO believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.	DOs provided feedback, confirming that the benefits outweigh the effort.
C2	The DE believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.	The cost and effort spent by Data Evaluators differs widely. This is for the following reasons: • Some DEs used real production environments while others used simulated environments • Member States have different infrastructures available for use with the OOTS • The amount of political effort to secure commitment and priority for the implementation differed enormously, forcing some DEs towards rework, workarounds or extra work to make things possible • The security policies for establishing publicly available portals differ per organisation • Mandatory use of existing infrastructure introduces dependencies, interference and prioritization issues for development and testing. The majority of DEs expects that the cost and effort spent on the pilot are not representative for future implementations. There is much effort in solving 'first-time problems' and it is expected that future implementations/integrations will benefit from the (lessons learned and infrastructure of the) pilot. On the other hand, DEs are aware of the fact that the DE4A infrastructure my not be the final OOTS infrastructure and expect additional cost for the final SDG implementation. DE's mention that the real benefit (and cost-effectiveness) is expected when the solution is re-used at a large scale. Once other eProcedures and DE's use the infrastructure, the benefits will eventually outweigh the cost and effort, according to DE's. One DE concluded that for an infrastructure like this, benefits may not have to outweigh cost and effort. For one, the SDG has a legal foundation, so the infrastructure and integration are simply a requirement. Also, the goal of the SDG (reducing barriers) is probably more important than the cost.
C3	The DPMS believes the cost and effort for integrating to the Mandate Management System will eventually be outweighed by the benefits.	There were no explicit responses on MS level, as not all MS involved in DBA were able to complete the efforts on this topic. For the Member States that were able to complete this for the 1st iteration, there were no explicit interviews 'on MS level' but mainly with the DE and DO representatives. Combining the input from all DE/DO representatives, the benefits eventually outweighing the cost and effort, depends heavily on the national infrastructure already in place. Having an infrastructure available can be considered both beneficial and limiting at the same time. On the one hand, leaning on infrastructure already in place has cost/speed advantages, but the fact that the infrastructure is already used by many other national systems can introduce many dependencies and priority-discussions.

C4	The participating Member States believe the cost and effort for setting up and deploying the DE4A Connector in their national infrastructure will eventually be outweighed by the benefits.	Interviews point towards the efforts for DE4A not always being a true representation for full fledge implementation. Many 'first-time-problems' needed to be tackled and respondents expect that future implementations will greatly benefit from the experience and knowledge that were gained during the DE4A project. Respondents also pointed out, that there is a need for a full fledge implementation over all eProcedures and DE/DO portals/services in order to make the implementation of the SDG cost-effective. Finally, the cost and effort vary greatly, depending on re-use (or mandatory re-use) of existing national infrastructure. See success criterion C3 for more explanation.
D1	Has the Company Evidence Model proven adequate for cross-border exchange of information on companies for the DBA eProcedures?	Overall, DEs could work with the data available in the CompanyEvidence data model. For most DE's there was more information available in the model, than was mandatory for their systems. Some attributes were not needed at all for some DEs, while these were mandatory for other DEs. Despite these differences, all DE's managed to make the information work in the eProcedures that they used for piloting. Mapping the CompanyEvidence data model to the data models in the DE-systems may prove challenging, according to one DE. Although the information sufficed for the DE's, there is room for extending and improving the evidence model, by including information on (all) representatives of the company, and by including unstructured (human-readable) data. It is expected that for other procedures, extensions like these (and others) need to be introduced. It is therefore very likely that several evidence models will be introduced during the large scale implementation of the SDG. Mapping of attributes to databases in several systems took quite some effort. European governance on these models should be arranged beforehand.
D2	Have the solutions to validate powers proven adequate for the eProcedures involved in piloting?	For the piloted eProcedures, the powers validation mechanism (more than) sufficed. During evaluation some Data Evaluators pointed out that there will be eProcedures where a more advanced/extended powers validation mechanism is required. For example eProcedures that require the approval of multiple representatives. Additionally, there is an observation regarding the harmonization of mandates throughout Europe. Some Member States are not familiar with the concept of Full Powers, for example. And also differences in the way segmentation in powers have been set up, might occur. For a full-fledged roll-out of the SDG, (a first version of) harmonized catalogue might be necessary.
D3	Have the explicit request and preview requirements as specified in the SDGR proven suitable for company eProcedures (representation scenarios)?	There seems to be an eagerness with users to complete online procedures as fast as possible. Texts and functionality concerning the Explicit Request and Preview were hardly ever used (read completely and/or consciously considered). This seems to have nothing to do with the functionality or intentions itself, but more with the wish observed with users, to spend as little time and effort to the eProcedures, as possible. . These observations were discussed with several users during the questionnaire and interview after the pilot run. Users confirmed this eagerness and mentioned that words like 'automatic' in texts, immediately triggers them to move forward. One suggestion from a user was to perhaps add an extra 'are you sure?' pop-up for the explicit request and preview, to get more attention.
D4	Have the mechanisms for record matching at the DC an DP proven adequate and effective for the DBA eProcedures ?	The record matching principle in DBA is to use the CompanyRegistrationID to check on previous registration of a company, in the DE-systems. The Data Evaluators stated during evaluation, that not all portals or procedures are meant for recurring logins/visits. Record matching is therefore not always applicable. Also, for some portals the use of 'just' the CompanyRegistrationID is insufficient as some kind of relation to the Natural Person that logged in (before) needs to be in place. For those Data Evaluators where returning visitors were applicable, the mechanism based on CompanyRegistrationID sufficed.
D5	Have the mechanisms for keeping the Company data up-to-date proven adequate and effective for the Data Evaluator?	This mechanism was not piloted during the first pilot iteration. Some Data Evaluators however, stated that they expect this functionality to be very useful and valuable. It is very uncommon for companies (abroad) to inform Data Evaluators on any changes. This leads to errors (returned mail) that require processing. The question is however, if this functionality will be profitable. Will the volume of changes (and cost for corrections) be high enough to make the benefits greater than the cost?