



## D4.8 Doing Business Abroad - Final running phase

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## List of Acronyms

Abbreviation / acronym	Description
BRZ	Austrian Federal Computing Centre
BRIS	Business Registers Interconnection System
BVE	Bolagsverket Sweden
DBA	Doing Business Abroad
DC	Data Consumer Member State
DE	Data Evaluator
DE4A	Digital Europe 4 All
DE4A OOP TS	Infrastructure of common components implementing the Once Only Principle as created by and used in the DE4A piloting context.
DO	Data Owner
DP	Data Provider Member State
DPO	Data Protection Officer
DR	Data Requestor
DT	Data Transferrer
Dx.y	Deliverable number y, belonging to WP number x
eIDAS	Electronic Identities And Trust Services (infrastructure)
EU	European Union
KvK	Kamer van Koophandel (Dutch Business register)
MoU	Memorandum of Understanding
MVP	Minimum Viable Product
MS	Member State
NRW	German state of Nordrhein Westphalia
ONRC	Oficiul Național al Registrului Comerțului – Romanian Trade Office
OOP TS	Once Only Principle Technical System
RVO	Netherlands Enterprise Agency
S&N	Subscription and Notification pattern
SDGR	Single Digital Gateway Regulation
SDG OOP TS	Infrastructure of common components implementing the Once Only Principle as to be used in real world large scale implementation.
SEMPER	Extension on eIDAS for advanced support of Powers validation
SME	Small and Medium sized Enterprises
SMP	Service Metadata Provider component in the DE4A OOP TS infrastructure
SSI	Self-Sovereign Identity
UCx	Use Case x
WP	Work Package

## Executive Summary

This document embodies the report on the DE4A Doing Business Abroad (DBA) pilot, providing final analysis of results obtained, conclusions and lessons learned from piloting the cross-border exchange of information in the context of the Single Digital Gateway (SDG). It completes preliminary reporting of results, lessons learned and conclusions from D4.7 Initial running phase report [4] .

DBA successfully piloted in real-life conditions two use cases along two iterations running respectively from May 2022 to July 2022 and from October 2022 to January 2023. Use Case 1 concerns registering a new business activity in another Member State (using the intermediation pattern), while UC2 focuses on the possibility for Data Evaluators (DE) to stay informed about changes in the foreign companies that registered a business activity with them (using the Subscription & Notification pattern). Both use cases make use of the DE4A Once Only Principle Technical System (OOTS) and eIDAS pilot infrastructure<sup>1</sup>. Where in the following text OOP TS is mentioned, the DE4A OOP TS is meant.

Company-representatives greatly appreciate the little effort and time it takes to complete the piloted eProcedures thanks to the cross-border implementation of the Once-Only principle (supported by OOP TS and eIDAS building blocks). Online validation of the Powers of Representation is an important step in the eProcedure, for which certain prerequisites must be met to be effective. Data Evaluators (DE) are happy to offer fully online procedures and recognize the benefits of using authentic, well-structured data and expect a reduction in time and cost when processing the registrations when broadly implemented. For broader implementation, additional evidence-types are expected to be needed. Data Owners (DO) can integrate existing API's for data delivery rather easily to support both use cases, but seem to experience less benefits from using the OOP TS than Data Evaluators seem to experience.

Use case 1 has been piloted in 6 DE/DO combinations within DBA, using a 50-50% mix of full powers validation and fine-grained powers validation. Six real company representatives piloted with real data while a total of 13 real representatives were involved in interviews for UC1. Additionally, 4 real representatives piloted in a side-project where Germany and The Netherlands piloted UC1. With this, in iteration 2 the involvement of companies more than doubled over the first iteration. Use Case 2 was piloted with 6 DE/DO combinations as well and 3 Data Evaluators were interviewed.

The pilots' planned iterations 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. Involving companies turned out to be very challenging. The main explanation is that companies that want to start doing business across border exactly during the time when the pilot is running, are few.

Companies are very enthusiastic about the simplicity and speed of the piloted UC1 eProcedure. The OOP TS and eIDAS/Powers Validation mechanisms allow users to complete the eProcedure within minutes, while traditional procedures can take several days and sometimes even weeks to complete. The immediateness, ease and speed are very much appreciated by representatives, as they seem to focus on completing the eProcedure in as little time as possible. They do not have to collect and upload documents, which saves valuable time and effort. Worth mentioning in this regard is that Explicit Request and Preview, although meant to provide users full control and required under SDGR in most cases, are hardly consciously read or used by most users, to save time. It is important to equip

<sup>1</sup> More details on the final technical architecture implemented for the pilot can be found here: [https://wiki.de4a.eu/index.php/DBA\\_2nd\\_iteration\\_Solution\\_Architecture](https://wiki.de4a.eu/index.php/DBA_2nd_iteration_Solution_Architecture)

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eProcedures with steps for authentication and Powers Validation that are as simple as possible and keep jargon like ‘assurance levels’ out of sight in order not to confuse users.

Data Evaluators do appreciate the improved quality of the data, as well as the possibility to stay informed about the company situation and changes. The fact that it is provided directly from the authentic source, in a harmonized and digital fashion introduces great benefits to Data Evaluators, as automated processing is possible, and no manual validation is necessary. This, combined with the possibility to stay informed (UC2), results in less errors and can save up to hundreds of person hours per year per Data Evaluator, 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). The possibility to use the OOP TS and eIDAS allows Data Evaluators to offer fully online procedures, which is considered to be a high-quality service.

The CompanyRegistration Evidence 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 and 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.

Powers validation as piloted fits the eProcedures that were piloted. Other eProcedures in some Member States will exist that require an extended approach for validation of the Powers of Representation, e.g. when more than one representative needs to confirm eProcedures across border.

For Data Owners, supporting UC1 seems to have little impact if they already have data services available. They seem not to experience major advantages or disadvantages, probably due to the used interaction pattern in this use case: apart from translating data to the appropriate structures to be used in the OOP TS, the intermediation pattern does not introduce any additional functionality for the Data Owners. Supporting Use Case 2 has been proven successful but seems (like Use Case 1) not to provide major benefits for the Data Owner.

Preparation of the infrastructure for piloting has had its fair share of challenges, but the OOP TS can be considered 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]. Also supporting subscription to business events and sending notifications is proven possible and valuable (especially for Data Evaluators and public authorities not having access to BRIS).

The solution for online authentication and validation the Powers of Representation turns out 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 eProcedures to pilot. Unfortunately, actual use of eIDAS in real life is mostly 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.

Setting up a proper and clear structure for maintenance and support for the infrastructure is paramount for the sustainability and success of the SDG OOP TS. The benefits of the infrastructure will only be secured if an adequate organisation operates to prevent errors, maintains components and certificates, and provides support when issues arise.

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# 1 Introduction

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## 1.1 Purpose of the document

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This document is the final report about the DE4A Doing Business Abroad pilot. It covers the final status of the pilot, the lessons learned and final evaluation of the piloted Use Cases.

The document must be considered a sequel to previous deliverables ([D4.5 Use Case Definition](#) [1], [D4.6 Pilot Planning](#) [2], and [D4.7 First iteration report](#) [4]) 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. It also considers recommendations made in [D4.13 Methodology and Mid-term Evaluation report](#) [5]) and provides input for the final evaluation of the pilot (D4.14 Pilots Final Evaluation Report).

## 1.2 Structure of the document

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This document is divided into five main sections:

- ▶ [Chapter 1](#) – Introduction of the document and pilot running phase.
- ▶ [Chapter 2](#) – Describing the final status and operability 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.
- ▶ [Chapter 4](#) – Explanation and reflection of pilot procedure execution.
- ▶ [Chapter 5](#) – Conclusions and major achievements.

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## 2 Final status of pilot

The DBA pilot has been completed in January 2023 by DBA-partners in Romania, Sweden, Austria and The Netherlands. During this period, UC1 and UC2 were piloted successfully.

Alongside the DBA pilot, Germany (state of Nordrhein Westphalia) and The Netherlands piloted UC1 during 2022 and resulted in 4 real Dutch companies registering with the city of Dusseldorf via a shared German portal (Wirtschaftsportal NRW).

### 2.1 Catalogue of services and status

#### 2.1.1 Use cases and pilot scenarios

Previous deliverables ([D4.5 – Use Cases](#)[1]) 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 scenarios 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<sup>2</sup>
  - 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.
  - The use case has been performed with validation of the Powers of Representation, for representatives having either full powers or limited mandates (Fine-Grained Powers) to represent a company.
- ▶ Use case 2: doing business in another Member State<sup>3</sup>
  - 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. Lookup was not piloted, as it technically is identical to the Intermediation pattern and added no learning value compared to UC1. Allocating the available resources to creation of new learnings was found most sensible.

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 was not piloted due to absence of a tax agency as a pilot partner.

<sup>2</sup> More details can be found here:

[https://wiki.de4a.eu/index.php/Use\\_Case\\_%22Starting\\_a\\_Business\\_in\\_Another\\_Member\\_State%22\\_\(DBA\\_UC1\)](https://wiki.de4a.eu/index.php/Use_Case_%22Starting_a_Business_in_Another_Member_State%22_(DBA_UC1))

<sup>3</sup> More details can be found here:

[https://wiki.de4a.eu/index.php/Use\\_Case\\_%22Doing\\_Business\\_in\\_Another\\_Member\\_State%22\\_\(DBA\\_UC2\)](https://wiki.de4a.eu/index.php/Use_Case_%22Doing_Business_in_Another_Member_State%22_(DBA_UC2))

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The following combinations of Data Owners and Data Evaluators were piloted between both iterations:

Table 1: Overview of piloted combinations and Use Cases

UC-1			UC-2	
Starting a business in another Member State			Doing Business in another member State	
Data Evaluator	Data Owner	Powers Validation	Data Evaluator	Data Owner
RVO (NL)	ONRC (RO)	Full Powers*	RVO (NL)	ONRC (RO)
ONRC (RO)	KvK (NL)	Full Powers*	BVE (SE)	ONRC (RO)
ONRC (RO)	BRZ (AT)	Full Powers	RVO (NL)	BRZ (AT)
BVE (SE)	ONRC (RO)	Fine Grained	BVE (SE)	BRZ (AT)
ONRC (RO)	KvK (NL)	Fine Grained	BRZ (AT)	ONRC (RO)
BVE (SE)	KvK (NL)	Fine Grained		

\*Combination completed in July 2022 (first iteration)

Other combinations between DEs and DOs were not piloted due to resource availability and prioritisation, as Data Owners and Data Evaluators had to choose to address other projects or were faced with an unexpected reduction in resource availability. Despite this, the number of piloted combinations increased from 2 to 10 with the second iteration, including a new Use Case and supporting an additional evidence exchange pattern to keep DEs informed of business events.

### 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 legal constraints. Not all partners / Member States were allowed to pilot using real procedures using SDGR-oriented solutions prior to the SDGR coming fully into effect. The table below displays the situation per partner. For Use Case 2, all environments were simulated.

Table 2: Type of environments involved in the pilot

	DO Data Source	DE eProcedure portal
Sweden	N/A	offers simulated procedure (UC1/2)
Romania	provides real data	offers simulated procedure (UC1/2)
Austria	provides near real data	offers simulated procedure (UC2)
The Netherlands	provides real data	offers real procedure (UC1) offers simulated eProcedure (UC2)

## 2.2 Suggestions to mitigate infrastructure delays

Evaluating the pilot, the following suggestions are shared to prevent delays<sup>4</sup> when implementing the pilot-eIDAS<sup>5</sup> and OOP TS infrastructure. The general advice is to apply a pragmatic and agile approach, and not stop when an issue arises and wait for the ideal solution/components become available but allow the temporary use of less-than-ideal solutions/components as a step towards the final implementation.

<sup>4</sup> See examples and causes for delays in the first iteration in section 2.2 of D4.7 [4]

<sup>5</sup> For the pilot specific eIDAS nodes were used.

- ▶ 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 to 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 pilot-infrastructure has not been completed but the OOP TS infrastructure is ready, the possibility to simulate authentication and authorization could be temporarily implemented. By mimicking these processes and providing functionality to manually enter a company ID (eIDASLegalIdentifier), it becomes possible to experiment with the OOP TS infrastructure only, albeit in a simulated piloting environment. This approach allows for gaining knowledge of and experiencing working with the OOP TS, towards final implementation.
- ▶ Wherever possible and beneficial, already available infrastructure (components) could be reused. These components probably might need some adaptation to be fit for 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 could temporarily be circumvented to continue with testing and development. An example of one Member State mimicking the authentication temporarily was already mentioned in a previous bullet. Another example is a situation where a temporary fictitious 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 Minimum Viable Product definition turned out to be very important to create focus and manage expectations<sup>6</sup>. By explicitly aiming for a minimum viable product, all partners are forced to focus on what the implementation is really about, but also on what is really feasible.
- ▶ 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 testing. 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.

<sup>6</sup> More detail on major design decisions for this MVP can be found here:  
[https://wiki.de4a.eu/index.php/DBA\\_UC1\\_major\\_design\\_decisions](https://wiki.de4a.eu/index.php/DBA_UC1_major_design_decisions)

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## 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.

Table 3: Use Case 1 pilot execution

		MS acting as DP			
		AT	NL	RO	SE
MS acting as DC	AT				
	NL				
	RO				
	SE				

Green = Piloted UC1

The next diagram shows the distribution of Powers Validation and use of data and environments for the piloted combinations.

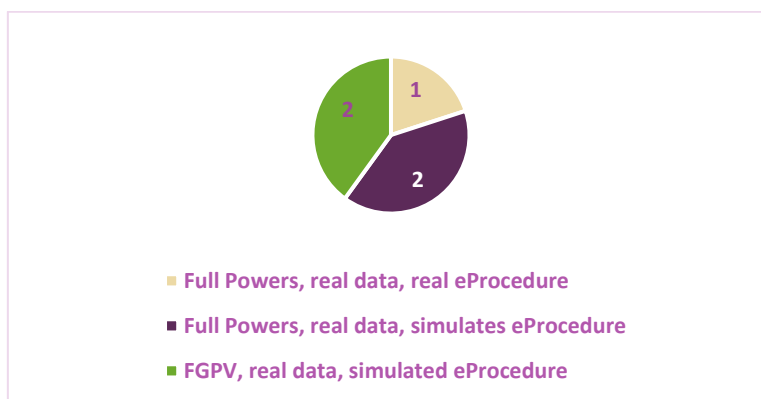


Figure 1: Distribution of combinations piloting UC1

Next to these combinations, UC1 was piloted with a German DE and a Dutch DO alongside the DBA project, using Full Powers validation, real data and real eProcedure (see [https://wiki.de4a.eu/index.php/Germany\\_and\\_The\\_Netherlands](https://wiki.de4a.eu/index.php/Germany_and_The_Netherlands)). This pilot was set up and evaluated in a light-weight fashion where no formal goals, success criteria, metrics and thresholds were defined but only ambitions and learning goals were expressed during the start of the project. The approach was chosen as it met the policy-makers ambitions, increased feasibility to complete the pilot in 2022 and provided sufficient learning opportunities. The results of this pilot are mentioned on several occasions but are not included in the structured goal evaluation in sections 3.1 and 3.2.

### 2.3.2 Use case 2 – Doing business in another Member State

The table below displays the pilot execution of use case 2.

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

		MS acting as DP			
		AT	NL	RO	SE
MS acting as DC	AT				
	NL				
	RO				
	SE				

Green = Piloted UC2

#### Remarks:

- ▶ Generic
  - UC2 has been piloted in a non-production environment. Notifications were simulated to prevent dependency on companies actually merging, moving, going bankrupt (for example) during the pilot phase.
- ▶ The Netherlands
  - Used a light-weight standalone solution for piloting in order to support piloting with simulated notifications.
- ▶ Romania
  - Focused on the DO-role in order to secure the needed DO role for UC2 among the DBA partners.

## 2.4 Updates in Metrics

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

One minor correction was made to the target of metric C4.1, to have it properly aligned with the metric itself. The new target is phrased: 'More than 50% of respondents find the cost being (far) less than expected.' (was 'More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.').

The final approach to evaluate metrics and success criteria was predominantly of a qualitative nature, where much information was collected during interviews with representatives from companies, data owners and data evaluators. These interviews allowed the pilot team to get an in-depth understanding of the experiences and perspectives of all representatives. The number of pilot runs was considered too low to evaluate based on quantitative results only.

In line with the qualitative approach, the level of detail in the metrics has been reduced. Initially, input on several individual aspects were to be collected with each metric. The new approach focuses on the main topic in the metric and uses the details as examples in the interview, to help the respondent understand the essence of the question. This makes the collected input easier to process and introduces less confusion for the respondents.

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## 3 Pilot success criteria related to pilot dimensions

This section addresses the evaluation of the four DBA pilot goals, success criteria and pilot dimensions<sup>7</sup>, based on 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](#) [2].

As a reminder it is mentioned that results of the German-Dutch pilot are not processed in the tables in this section, due to use of a different (light weight) evaluation structure in that pilot.

### 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[2]) these goals were linked to success criteria, for which metrics were defined.

Based on the data, metrics and success criteria, the assessment of the goals is summarized in the table below. In the [next section](#) 3.2, the results are addressed in more detail, 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	Goal		Success criteria and metrics	Summary
	ID			
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	<ul style="list-style-type: none"> <li>- Public authorities recognize the mentioned benefits. The fact that data-exchange uses harmonized models is also appreciated and eases data-processing.</li> <li>- Part of the benefits are expected to be achieved only after usage for multiple eProcedures and high volume of cross border registrations.</li> <li>- Receiving business notifications is considered useful and helps to maintain a high quality of service, although the number of notifications on the rather limited set of foreign companies is expected to be low.</li> <li>- Data Evaluators experience more benefits than Data Owners.</li> </ul>
			Metrics A1.1, A1.2, A1.3, A2.1, A2.2	
Companies	B	Reduce manual work, lower transaction costs and improving enrolment speed for	Success criteria B1, B2, B3, B4	<ul style="list-style-type: none"> <li>- Companies recognize the mentioned benefits. The difference in duration to enrol is extreme (minutes versus days or weeks). The simplicity</li> </ul>

<sup>7</sup> Naming of pilot dimensions has been modified in this chapter with respect to D4.7 DBA Initial Running Phase [4] in order to focus more explicitly on the different types of pilot users.



Actor	Goal		Success criteria and metrics	Summary
	ID			
		the company when using the Once Only Principle.	Metrics B1.1, B2.1, B3.1, B4.1, B4.2	of the procedure is appreciated by the participants. <ul style="list-style-type: none"> <li>- 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.</li> <li>- Online authentication- and authorisation steps in the eProcedure should be offered in a very simple way, as most representatives are not too familiar with jargon and details.</li> <li>- Working with fine grained power mandates is adequate, and will likely be relevant for larger companies (has less value for SMEs). Representatives of SME's did not feel more in control when Fine Grained Powers Validation was applied.</li> </ul>
Project	C	Evaluate the OOP-components supporting the cross-border information flow: <ul style="list-style-type: none"> <li>- Assess (technical) impact on national services/registers already in place</li> <li>- Evaluate connections of national systems to the OOP TS</li> </ul>	Success criteria C1, C2, C3, C4	<ul style="list-style-type: none"> <li>- Implementing (and maintaining) the pilot infrastructure using several components proved feasible. Worth mention however is that the number of components used also introduces the fact that every component must be configured exactly 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 the process is one of trial and error, with steps forward and backwards. It is expected that organising close monitoring and maintaining the infrastructure is paramount, and it can be expected that certain trust certificates will expire unnoticed, causing the infrastructure to fail temporarily and thereby affecting many eProcedures.</li> <li>- Involved authorities believe that the integration effort for this project is relatively high (see <a href="#">Annex 1</a>), and cost-effectiveness is questionable if the integration would not be used on a broader basis (more eProcedures). On the other hand, authorities recognize that implementation is simply needed to realise national policy for fully digital services that help entrepreneurs.</li> <li>- The benefits that Data Evaluators expect are up to hundreds of person-hours per year, assuming use for more eProcedures and a</li> </ul>

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Actor	Goal		Success criteria and metrics	Summary
	ID			
			Metrics C1.1, C1.2, C2.1, C2.2, C3.1, C3.2, C4.1, C4.2	<p>sufficient volume of companies using this functionality. At the same time, public authorities believe that this functionality should simply be implemented to comply to regulations and to serve companies and citizens, regardless of profitability and savings.</p> <ul style="list-style-type: none"> <li>- 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 and functions available and used, the organisational setting and usage of production environments<sup>8</sup>. Some Member States estimate having spent hundreds of hours, while other Member States spent more than thousand hours for preparation and piloting.</li> <li>- Finally, public authorities point out that the pilot cost are likely not 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. Also, use of simulated environments reduced the efforts that were needed to pilot. This can also be deduced from the pilot with Germany: based on the findings and experiences of the previous implementations the German OOP TS implementation was completed in 6 months.</li> </ul>
Project	D	Evaluate whether the solutions designed to the DBA specific challenges have proven adequate in piloting the DBA eProcedures: - Usability of harmonised	Success criteria D1, D2, D3, D4, D5  Metrics D1.1, D2.1,	<ul style="list-style-type: none"> <li>- The data model used for exchange of information suffices for the piloted 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</li> </ul>

<sup>8</sup> In general DEs have more integration to do (for the intermediation patten) as they integrate to both eIDAS and OOTS, and have to implement Explicit Request and Preview functionalities. DO's 'only' have to integrate to the OOTS but, according to the OOTS IA, Preview must be provided by the DO, so the difference decreases.

Actor	ID	Goal	Success criteria and metrics	Summary
		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	D3.1, D4.1, D5.1	<p>relatively easy due to previous endeavours, for example BRIS. This might be in strong contrast to other sectors.</p> <ul style="list-style-type: none"> <li>- 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. 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 concept, while others use models where approval and copies of passports of multiple (or all) board members are needed for certain procedures. In these cases, the online powers validation mechanism still allows the DE to offer fully online eProcedures for companies with just one board member.</li> <li>- Fine Grained Powers Validation is effective, but likely applies to larger companies (and less to SMEs).</li> <li>- 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 probably legally required) information seems to lead to less reading.</li> <li>- 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 data-doubling. Some portals do have record-matching on the legal-entity implemented and when used, it is considered to be an obvious function. Record matching on</li> </ul>

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Actor	Goal		Success criteria and metrics	Summary
	ID			
				<p>natural persons was not applicable in the DBA-pilot.</p> <ul style="list-style-type: none"> <li>- Receiving notifications is considered to be useful and helps the DE provide their services adequately. The share of foreign companies registered with a public authority may be rather low, so the number of notifications is expected to be small. Also, the added value of the S&amp;N mechanism is considered higher for public authorities that do not have access to BRIS, as BRIS already notifies changes in Limited-type companies.</li> </ul>

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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	5	8	5
Number of scale-type metrics with targets	5	4	4	0
Percentage of scale-type metrics below target	40%	0%	50%	N/A*
Percentage of scale-type metrics fully on/over target	60%	100%	50%	N/A*
Rounded average number of responses per metric within goal	3	8	4	4

\* These metrics had no target, as they were more research oriented

Looking at the success criteria from this quantitative perspective, the results of the pilot must be interpreted as a success: many of the metrics were fully over the target, while most others were in the very edge of the target. Only few metrics were just below target (mainly in the domain of the DO and because metrics hit 50% while the target was stated as 'more than 50%'). The next section will discuss in more detail why the advantages of using the OOTS seem to be more present for Data Evaluators than for Data Owners.

One must take into account that the number of involved participants is limited. This was recognized during piloting and led to a change in evaluation approach to a more qualitative oriented approach (based on interviews). A study of the qualitative input that was conducted provided more lessons learned, which are 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.

In total, interviews in online meetings were conducted with:

- ▶ 3 real NL and 3 RO representatives in UC1 based on Full Powers Validation
- ▶ 1 fictitious AT representation in UC1 on Full Powers Validation
- ▶ 7 real representatives in UC1 based on Fine Grained Powers Validation
- ▶ 4 Data Evaluators
- ▶ 3 Data Owners

The following table summarizes all success criteria, quantitative (scale based) metrics relevant for both use cases 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.

The majority of metrics are on or above target. Metrics that are not, usually average on a value where respondents think efforts are in balance, or solutions being sufficient (but not more than this).

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Table 7: Detailed overview of quantitative metric results assessment

Metric	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 <sup>9</sup>		
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 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 respondents confirms, averaging on less effort.
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	3	33% <sup>10</sup> of respondents confirms, averaging on 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	More than 50% of respondents appreciates the reliability (average of all perspectives) of the powers validation method as	DE	3	67% of respondents confirms, averaging on more reliable

<sup>9</sup> U, A, L, V: Use, Adoption, Learning, Value (Use and Value are reorganized under “Company” and “Administrative users and Member State” perspectives further below).

<sup>10</sup> DEs expect high benefits per case where information is updated, but expect the volume of notifications to be rather low.

Metric	Description	Target	Group	Number of responses collected	Results
	entitled to represent the company. (e.g. is recognized to be authentic, included no language barriers, needs less correcting)	(considerably) more reliable than in the baseline.			
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	3	33% of respondents confirms, averaging on less effort <sup>11</sup>
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, problem solving, required effort, simplicity of the procedure).	Company	6	100% of respondents confirms, averaging on very little effort
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	More than 50% of respondents appreciates the effort (average of all perspectives) to complete the enrolment/registration procedure adequate or better.	Company	13	92% of respondents confirms, averaging on very adequate

<sup>11</sup> Two DEs expect to have the same effort for powers validation as in current solutions, while one expects much less effort after implementing the piloted solution.

Metric	Description	Target	Group	Number of responses collected	Results
	and robustness of the method).				
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 <sup>12</sup>	83% 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 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 compared to the baseline.	Company	6	100% of respondents 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	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DO	3	0% <sup>13</sup> of respondents confirms, averaging on benefits

<sup>12</sup> 6 companies evaluated the entire process. Additional companies evaluated FGPV only (and not the retrieval of data via the OOTS).

<sup>13</sup> DO feedback shows that they do not expect major benefits from implementing the OOTS. Benefits are expected to be on par with, or below cost. Still Dos mention that implementation is mandatory, so benefits are not the most important factor.



Metric	Description	Target	Group	Number of responses collected	Results
	spent to integrate the OOTS.				in balance with 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 OOTS usage (considerably) exceeding, being on par or being (considerably) less than the cost and effort spent to integrate the OOTS.	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DE	4	100% 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	3	66% of the 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		
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.	More than 50% of respondents find the cost being (far) less than expected.	MS	4	0% <sup>14</sup> of the respondents confirms, averaging on cost being on par with expectations
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		

<sup>14</sup> Member States expect the cost to be on par with the benefits.

Metric	Description	Target	Group	Number of responses collected	Results
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	66% 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 powers validation (full and fine-grained) method to their services.	None (research topic)	DE	3	33% 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 both use cases. [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 quantitative 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).
- ▶ 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.

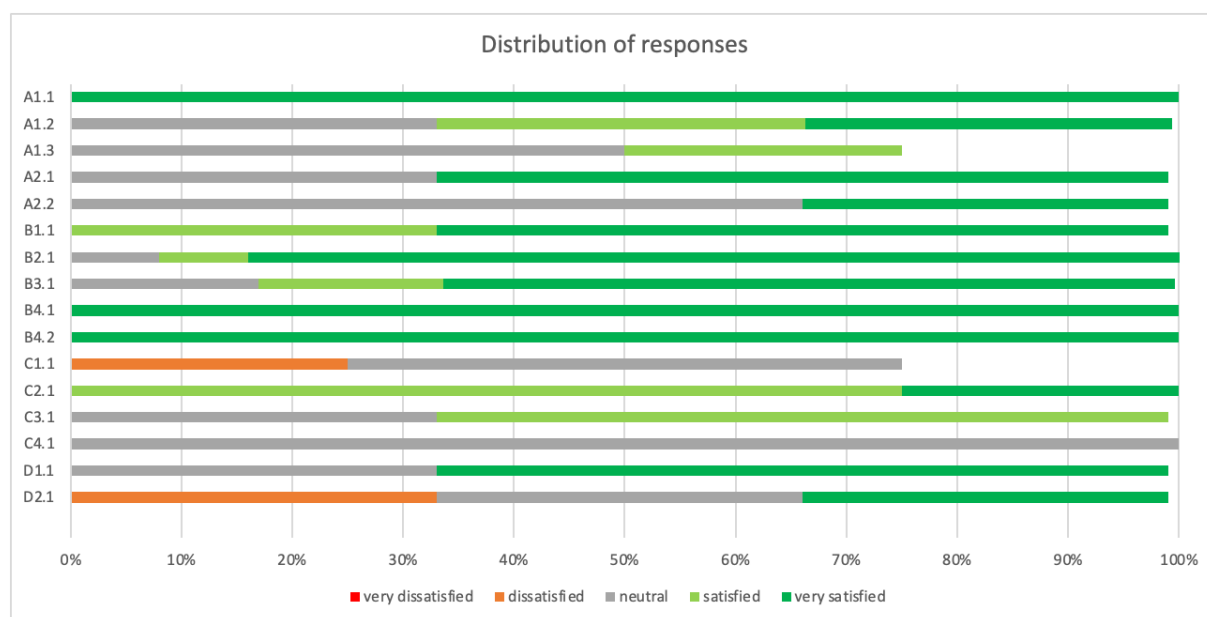


Figure 2: Distribution of scale-based responses

### 3.2.1 Company Perspective

In total, a number of 13 companies were involved in piloting and interviews. Six of the representatives (from NL and RO) completed eProcedures fully and were interviewed about Use Case 1. One company using fictitious data completed Use Case 1 based on Full Powers as well. In the pilot between Germany and The Netherlands, 4 Dutch companies executed the German eProcedure. Observations are included in this section as well. The total number of involved companies (including the companies in the German/Dutch pilot) increased from 6 to 17 (283%) during the second iteration.

Nine fictitious companies were used to complete Use Case 1 based on Fine grained Powers Validation and based on these pilotings, 7 companies were interviewed specifically on the FGPV mechanism.

#### 3.2.1.1 Use

Representatives that participated in the pilot are in general very positive about the ease of use, immediate results and the fact that they do not have to collect and upload documented proof. 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:

- 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 jargon like '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 don't have to deal with these matters, and some Member States don't have a notified eID (and possibly not eIDAS) yet. It is advised to implement authentication and authorisation steps in eProcedures as simple as possible, using simple texts and without bothering representatives with unnecessary information. More positive response was observed in portals having applied a simple implementation for these steps.
- 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 (sometimes in different languages) 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) are not offered by the DE, but by the

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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. Least preferred seems to be a mixture of languages (which was found in one of the portals and all representatives made the same observation).
- 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.

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### 3.2.1.2 Value

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 fact that immediate results are provided for powers validation, instead of having to collect and upload documents about mandates, adds to the positive experience.

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 partners.

The value of finer grained powers validation seems not to exist mainly for SMEs, as distributed mandates are less common. During interviews with representatives of SMEs, some respondents of mid-size enterprises would choose to perform important activities (like registering a new business activity across border) themselves rather than delegating the task to an employee. Respondents expect Fine Grained Powers Validation to be of value for large companies.

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 OOP TS solution is considered to be major. The feedback in the interviews and questionnaires was all (extremely) positive.

### 3.2.1.3 Success stories

Among the involved companies, several success stories supporting the SDG-ambition have been found.

- ▶ A Romanian entrepreneur, selling trainings in Romania and other European countries, was very familiar with current procedures of foreign public authorities. When piloting, the entrepreneur completed the eProcedure (including authentication and authorisation) within 2 minutes. He was very surprised to learn that the procedure was fully completed and expressed enthusiastically that he could not wait for the SDG solution to be implemented across Europe. That would save him a lot of time.
- ▶ A Dutch entrepreneur was involved in the pilot, and after completing the eProcedure she was surprised and asked what the pilot team possibly could learn from a procedure so simple and short. This is perhaps the greatest compliment to the SDG that exists, as the ambition of the SDG is exactly to lower barriers.

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### 3.2.2 Administrative users and Member State perspective

In total 4 Data Evaluators and 3 Data Owners, spread over 4 member States (AT, NL, RO, SE) were involved and interviewed during the pilot. The scope of involvement as displayed in [section 2](#) was the basis for the interviews.

#### 3.2.2.1 Data Evaluator Use

Overall the Data Evaluators are positive about the perceived benefits when integrating to the OOP TS and eIDAS. Integrating production systems was obviously more challenging than working with simulated environments. This has occasionally led to the decision to work in isolated environments, in order to reduce (or prevent) interaction with (and dependency of) other systems and projects, especially if systems make use of common local components.

Use case 2 was piloted using simulated eProcedures and in a light-weight fashion due to the nature of working with simulated notifications. Some Data Evaluators aim to use the results of piloting for future developments to improve data quality.

Things 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. Logging was implemented to support error-tracking, which turned out very useful during testing.
- ▶ 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. Also organising good maintenance and support on the OOP TS is crucial.
- ▶ 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.
- ▶ Fine Grained Powers validation allows DEs to provide better access to company representatives, even if they don't have full powers. The fact that powers validation is online and executed by the Member State that is best equipped to do so, is of even more value to the DE.
- ▶ Regarding the use of the Subscription and notification pattern in UC2, DEs see value in being able to stay informed and adjust their service delivery if needed. They do expect the number of received notifications to be rather low as relatively few foreign companies are registered in their databases and the frequency of changes in companies may be low. Still, a preference to use the pattern exists.
- ▶ Record matching to recognize previous registrations in the DE-portal and prevent data doubling 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.

#### 3.2.2.2 Data Evaluator Value

Data Evaluators (including the German DE) 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). On several occasions the implementation led to

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immediate process improvements on the DE-side, or to food for thought on process improvements. 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 OOP TS solution to be reliable and fast. For some, the powers validation method suffices for the piloted procedure or for companies with just one person in the board, but in the future a more advanced/extended method is required for other procedures. For example, procedures where all board members must approve the opening of a branch in another Member State. These types of procedures were out of scope for the pilot.

The notifications on changes in companies are more valuable for public authorities not having access to BRIS. Still, public authorities that do have access to BRIS benefit because BRIS only addresses Limited companies and the Subscription and Notification pattern could be used for any type of company.

The CompanyRegistration Evidence 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 DEs will re-evaluate which attributes they really need for their eProcedure and (many) more evidence-types will come into existence once the SDG will be implemented for all SDG procedures for businesses (including evidence from other authentic sources than just business registers).

### 3.2.2.3 Data Owner Use

Three Member States were able to get the Data Owner role ready for piloting UC1 during the available timeframe, while two Member States focused on setting up the Data Owner to support Use Case 2.

In all cases, additional UC1 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, in UC1, 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 pattern 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 in regard to UC1, 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 but believe more benefits will be experienced by the Data Evaluators.

Regarding UC2, Data Owners sometimes have similar functionality available for national companies. The S&N pattern used in the pilot seems to be more advanced and detailed than these mechanisms, and the setup may therefore be used as an example to advance existing national functionality. Data Owners have not been able to re-use existing functionality to establish the pilot functionality but were able to use existing UC1 APIs to verify the existence of a company for which a subscription was requested.

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### 3.2.2.4 Data Owner Value

The Data Owners, usually already providing standard data services, did not notice much of the UC1 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.

Still, Data Owners generally believe the added value is greater for Data Evaluators. They would provide services connected to the S&N pattern to help out Data Evaluators, increase support for national companies to do business across border and, of course, if legislation dictates so. Created added value is then not financial and internal, but for other parties and about user friendliness.

### 3.2.2.5 Success stories

From the interviews with the public authorities involves, the following stories stands out.

- ▶ The possibility to stay informed about relevant events happening to a company that receives a service of public authorities involved in the pilot, is considered valuable. Public authorities are able to timely evaluate their service delivery and can adjust when needed, in order to keep a high standard of service. For some public authorities, the piloted Subscription and Notification mechanism is more advanced than existing similar mechanisms on a national level and the concepts used for piloting provide inspiration for examining upgrades to existing national systems. Public authorities see the piloted mechanism as a step towards providing fully online services that make it more attractive for foreign companies to do business in their country.
- ▶ The German state of Nord Rhine Westphalia managed to implement the entire OOTS and eIDAS infrastructure needed for piloting, and the integration to the portal (Wirtschaftsportal) of both solutions within an extremely short timeframe. The total duration was less than six months. Worth mentioning is that the implementation was even done partly during the summer holiday period, which is known as a period where resource availability is low. The German project was very well organized and benefited from the available documentation and experience with the DE4A infrastructural components. Germany, now having hands-on experience themselves, can now start further implementation within the Member State.

### 3.2.2.6 Usefulness of common components and products from other work packages

Data Owners and Data Evaluators integrated the OOTS and eIDAS to their systems. The valuation the developers and testers involved gave to the usefulness of the provided common components (used in the DE4A pilot) 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 sustainability plan	Degree of adequacy for Pilot purpose	Overall assessment
<b>(Rates from: No opinion, Very low, Low, Neutral, High, Very high)</b>					
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
<b>Playground</b>					

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Components	Perceived quality of specs/software	Ease of integration	Potential to include sustainability plan	Degree of adequacy for Pilot purpose	Overall assessment
	<b>(Rates from: No opinion, Very low, Low, Neutral, High, Very high)</b>				
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
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)

### 3.2.3 Overall lessons learned and Pilot Adoption Considerations

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

#### 3.2.3.1 Lessons learnt 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 OOP TS knowledge. This requires organising and prioritising as this knowledge is scarce.	Designing national integration required in-depth knowledge of both eIDAS and OOP TS. 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	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.

ID	Topic	Suggestions for adoption	Lessons learned
		should first focus on core functionality only. And at the same time organise follow-ups on improvements and additions to address later on.	To keep focus at the core research questions and to limit resources needed, the pilot partners agreed to simplify whenever adequate, e.g. focussing at the most important evidence type instead of all possible types, accepting request for one single evidence type at the time (instead of allowing requests for multiple evidence types), limiting to full powers validation to start with. The pilot secured progress and focus by scoping strictly.
3	Company representation	DBA advises the European Commission to clarify in advance which version of the eIDAS specification should be implemented for the SDGR to prevent incompatibility between Member States.	Use of eIDAS including legal entity attributes (company representation) is not widespread in the EU. Currently, there are just two eID 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 implementing more eProcedures, but also requires an extended 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 <a href="#">DBA design documentation</a> [1] 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).  Powers validation UI should be implemented as simple as possible, in order not to confuse the representative.  There will be eProcedures that require confirmation (and authentication) of all board members of a company. For these, a more extended solution must be made available in the future.
5	Record matching	DBA advises Member States to use the national company ID's as eIDASLegalIdentifiers when	The pilot partners agreed to provide the national company registry numbers as eIDASLegalIdentifier in the authentication flow (eIDAS authentication proxy

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ID	Topic	Suggestions for adoption	Lessons learned
		extending the pilot to SDG-wide implementation.	role). This diminished the need to do record matching on companies at the Data Owner. There was no substantial need to do record matching on the natural person by the data owners of the DBA pilot.
6	Explicit request	DBA advises Data Evaluators to integrate (1) request to consent and (2) Explicit Request into one joint question to the user to prevent adding to the confusion – of course in case both are applicable at the same time.	In some cases, users need to express consent for the retrieval of attributes (GDPR). In almost all cases when using the OOP TS, the user needs to express Explicit Request (SDGR). Although legally sound, in practise the difference between both is difficult to understand for Data Evaluators. DEs furthermore expect that users will ignore such requests and just click “ok”.
7	Multiple-MS scenario’s	DBA advises Member States to make an early start with the analysis of the SDG-implementation where data exchange involves more than 2 Member States.	The pilot involved 2 Member States in the exchange of information on companies and representatives. The level of complexity for analysis increases vastly with each additional Member state that is involved in the exchange of information on representatives and companies. An example of a 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 be available in time for SDG-implementation.
9	Sector specific systems	Integration of the OOP TS 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.  Also, not all public authorities have access to BRIS and BRIS does not cover all types of companies. However, there seems to be an overlap as well, for which public

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ID	Topic	Suggestions for adoption	Lessons learned
			authorities that do have access to BRIS, must develop cross-checking functionality to identify conflicts.
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 Common Component Design & Development Work Package to allow for more uniformity across the pilot.

### 3.2.3.2 Lessons learned from implementing and testing the DE4A OOP TS

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 early on in the project. 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 OOP TS 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	Documenting	DBA advises the European Commission to invest in proper	For developers of the common components, there's a lot of logic behind its internal routines,

ID	Topic	Suggestions for adoption	Lessons learned
		<p>and clear documentation for developers in Member States, so they can get the OOP TS 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.</p> <p>Additionally, installing a small central team of technical experts providing support technical experts in Member States, could be considered.</p>	<p>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. Use of DE4A wiki to exchange configuration details revealed as highly useful for Connectathons and piloting.</p>
4	Configuring	<p>DBA advises Member States to prepare for the steps to be taken to request the certificates needed to operate the OOP TS.</p> <p>DBA advises the European Commission to investigate whether the process for acquiring the OOP TS certificates can be simplified.</p> <p>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 OOP TS-connectivity.</p>	<p>The components needed for SDG rely heavily on use and exchange of certificates for server authentication, signing, etc. The process of acquiring the certificates turned out to be time-consuming and error-prone (all details must be in place when requesting the certificates). Furthermore, the procedure of requesting certificates is regulated in a way it requires signatures of responsible people within the requesting institution that do not on a daily basis work with – and understand the use of – certificates. Or people that are not available immediately (company executives).</p>
5	Integrating DE and DO	<p>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 OOP TS.</p>	<p>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.</p>
6	Interoperability testing	<p>Wider OOP TS implementation requires more inter-Member State coordination regarding exchange of connectivity details, configuration and cross-border interoperability testing. Planning</p>	<p>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</p>

ID	Topic	Suggestions for adoption	Lessons learned
		of these activities requires much attention and flexibility from the Member States. DBA advises to take this into account when connecting the decentralised SDG OOP TS components. eIDAS lessons learned with regards to exchange of certificates for example, are also relevant.	moments in time for all DEs/DOs has proven not realistic, so going for a phased pilot launch has been proven as the right approach.
7	Interoperability testing	Establish clear readiness criteria for the DE/DO and the DE4A Connector before starting Connectathons.	The DBA pilot has proven that a lot of settings need to be configured correctly to allow successful cross-border evidence exchange. During interoperability testing (Connectathons) Member States sometimes had different views on what components or parameters had to be set in order to start testing. As a result, not in all cases the complete flow could be tested at once.
8	Interoperability testing	DBA advises the European Commission to coordinate exchange of test credentials between Member States. Many-to-many “requesting and sending of eIDs on a bilateral basis” should be prevented.	Proper interoperability testing is only possible with the required test eID means. These national eID means have not always been easily available (depending on the MS-specific situation – dependencies on IdPs may exist). This hindered cross-border interoperability testing 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 implementing 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 OOP TS 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.

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ID	Topic	Suggestions for adoption	Lessons learned
11	Cooperation	DBA advises to facilitate technical experts of the Commission and the Member States to easily ask each other questions, respond, etc. using a tool for this purpose, e.g. Slack.	Slack seems to be a good means to have developers of different MS / WPs collaborate.

### 3.2.3.3 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	Communication	Use visual tools to show the benefits of OOP to users, e.g. presentations and videos.  Prepare the creation of an animation by setting up a good storyline and slides that illustrate the flow of the animation.	Implementation of the 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 understandable way the huge difference that OOP makes.
2	Data minimisation	DBA advises to work with evidence types for exchange of information, allowing for some information to be exchanged that a DE might not need.	Article 14 of the SDG states that only evidence (attributes) should be exchanged, that a Data Evaluator needs. DBA piloted with a set of attributes, defined as a CompanyEvidence Type, to exchange information. In this evidence, specific attributes may exist that a specific DE does not need. This approach simplified communication and exchange, compared to specifically request and exchange each attribute (or define specific sets of attributes per DE).

### 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	Harmonisation	DBA advises the European Commission to organise the harmonisation process of services for cross-border powers validation (see SEMPER project results and DBA pilot for harmonization examples).	For fine-grained powers validation, Member States need to agree on a harmonised set of services. In the DBA pilot: the SDG procedures of Annex II to start with.
2	Harmonisation	DBA advises the European Commission to organise the harmonisation process of event	For subscribing and notifying on company events / changes there needs to be a specified set of harmonised company event types.

ID	Topic	Suggestions for adoption	Lessons learned
		types for cross-border subscription & notification. See DBA pilot Solution Architecture for an example of harmonisation.	
3	Maintenance and support	DBA advises to organise proper and clear structures for support and maintenance of the OOP TS.	As the use of the OOP TS also introduces dependencies for public authorities, a proper and clear structure for maintaining the OOP TS and supporting authorities must be established, ultimately when the first DE/DO integration within a Member State is ready.

### 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 involvement	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 many participants are involved. In DBA, only 4 DEs, 4 DOs and less than 50 companies were involved requiring a more qualitative approach over a primarily quantitative approach, in order to maximise learning benefits.
3	Recruitment process	DBA advises to start recruiting participants for piloting at least a year before pilot runs start and make an effort (reservation) to keep users involved.	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 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.



ID	Topic	
2	Transparency	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 <a href="#">DE4A wiki</a> [6], and on the <a href="#">DE4A.EU website (www.de4a.eu)</a> . Using these sources, interested parties can follow along and study the details of the pilot.
3	Reusability	<p>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.</p> <p>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.</p> <p>Also the opposite approach applies: one of the Member States aims to re-use developed software for the pilot, to improve data quality within the organisation (after the DE4A LSP has finished).</p>
4	Technological 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 were 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 accessibility	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.
6	Security and privacy	<p>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.</p> <p>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.</p> <p>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.</p>

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ID	Topic	
		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	Administrative simplification	<p>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. In some cases, introduction of working with the OOP TS also initiates process improvement within DE processes.</p> <p>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.</p>
8	Effectiveness 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.

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## 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, tracks with milestones for the following topics were established:

- ▶ OOP TS UC1 (Intermediation pattern)
- ▶ OOP TS UC2 (S&N pattern)
- ▶ eIDAS (Full Powers Validation)
- ▶ eIDAS (Fine Grained Powers Validation)

These tracks were **initially meant** for all Member States to use synchronously [2]. This however, turned out to be unrealistic because all Member States turned out to have their own challenges, leading to different speeds of development. Usually, availability of resources and priority conflicts with local projects result in frequently changing timelines. These changes also impact timelines of other Member States that are being interacted with.

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. For piloting several use cases using each specific (version of) component in the infrastructure, close monitoring and flexibility in planning was required to prevent conflicts in compatibility. The complexity in planning is expected to be present (and perhaps even stronger) when implementing the OOP TS on a European scale.

#### 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\[2\] section 4.3.7](#), 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 work 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 relying both on internal documentation as well as the DE4A Wiki which also was used to make available large amounts of technical information, 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.

During preparation for piloting the use cases, 30-40 Connectathons for eIDAS and the OOP TS were performed).

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

#### 4.2.1 End user involvement

The [pilot planning deliverable\[2\]](#), section 4.4 defined the user involvement activities. To summarize, the following user groups are targeted for participation in and evaluation of the pilot for Use Case 1:

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- ▶ 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/selected) 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 UC1 pilot DE/DO combinations.

Table 16: Involved participant groups use case 1

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

In both iterations, involvement of real SMEs turned out to be difficult, as SME's must be wanting to register a business activity in exactly the pilot timeframe and exactly the pilot Member States, to participate in the pilot. Next, not all SMEs apply distribution of mandates, especially for cross border procedures. Changing the approach to involve SMEs does not affect this limited number of available companies, as entrepreneurs act as, and when they see a chance for business.

For Fine Grained Powers Validation in UC1, fictitious companies were used to prove the cross-border functioning of this Powers Validation Mechanism. Recordings were evaluated with real representatives of real companies.

For Use Case 2, piloting was done with simulated notifications as the availability of companies actually merging, going bankrupt or moving during the piloting timeframe was expected to be zero. For this reason, Data Evaluators used simulated eProcedures by default. Data Evaluators have been the main focal group for evaluation.

## 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 17: Status of user involvement activities

Activity id	Activity	Status	Comment
DBA-UI-1	Prepare invitation for user categories	Completed	Member States aiming to work with real representatives have sent out invitations to companies or placed invitations on websites in order to attract attention.
DBA-UI-2	Invite users (all types)	Completed	<p>Companies were actively approached in cases DBA partners had access to companies in their professional networks, or private networks.</p> <p>Recruiting companies was 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 was a continuous challenge of the pilot.</p> <p>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.</p>
DBA-UI-3	Set up user management (lists and control sheets)	Completed	Registration of participants and their involvement in specific DE/DO combinations is available.
DBA-UI-4	Organize eIDs and mandates for real users	Completed	
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.
DBA-UI-6	Implement microsities	Completed	<a href="https://www.de4a.eu/doingbusinessabroadpilot">https://www.de4a.eu/doingbusinessabroadpilot</a>
DBA-UI-7	Finalize questionnaire forms	Completed	Questionnaires as designed in the <a href="#">D4.6 pilot planning</a> deliverable[2] have been transformed into interview guides.
DBA-UI-8	Set up and share newsletters	Completed	Newsletters and press-releases are available on the DE4A website ( <a href="https://www.de4a.eu/news">https://www.de4a.eu/news</a> ).
DBA-UI-9	Design walkthroughs of	Completed	Walkthroughs for eProcedures are available for several portals (like Mijn.RVO.nl). Also, instructions

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Activity id	Activity	Status	Comment
	filled in questionnaires		for pilot participants, addressing both the pilot and questionnaires, are available in general.
DBA-UI-10	Design fictitious company cases with users	Completed	For Use Case 2, cases and simulated notifications have been created.

User involvement was typically 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.

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.

### 4.3 Pilot governance and internal progress report

The actual pilot runs were organized in specific weeks and not all pilot combinations, topics and use cases required strong measures to secure privacy. For UC2 and UC1 FGPV, recordings of simulated pilot runs and notifications were used and additionally anonymised (using blurring of data). These recordings were shared with respondents to conduct interviews. Using this approach, all privacy risks were prevented/mitigated.

In advance of every new DE/DO combination where data on companies and/or representatives were used, the privacy measures as defined in the Memorandum of Understanding (MoU) were checked and enforced, and the Data Protection Officer was informed and invited to some of the 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. Several 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 Data Protection Officer (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 and maintained 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.

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](#) [6], 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. On the wiki, general descriptions of the pilot, use cases, status and solution architectures for both iterations have been documented.

Germany, who started piloting later with The Netherlands, used many of the documents, designs and analyses that were made available during the DBA pilot. With this information, it was possible to quick

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start the pilot with Germany (the pilot was technically implemented and performed within 6 months). Germany accessed information through the wiki and through a separate instance of OwnCloud.

## 4.5 Stabilisation of pilot experience and user support

The DBA results will be combined with the results of the other DE4A pilots, 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 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 (first iteration), and during the second iteration 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 very well and is appreciated by both the company-representative and the DBA-representative.

## 4.6 Suggestions for extended functions post-pilot

Feedback from the pilot points towards several possible improvements.

### 4.6.1 Functional and technical improvement

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' don't actually contribute to that direction for most company representatives. 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.

### 4.6.2 Suggestions for 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.

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The procedures for recruiting users should become a continuous process, 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.

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## 5 Conclusions and major achievements

The DBA pilot has been completed successfully and yielded valuable insights in relation with its main objective which is to lower barriers for companies starting business and/or doing business cross-border.

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.

Based on the executed eProcedures, interviews with all parties and representatives involved and on actual observations, using the OOP TS leads to many of the expected benefits the SDG regulation intends to create. Simpler eProcedures, shorter durations, immediate results, high quality of service and less effort for processing seem the most important benefits that were observed.

The piloted eProcedures have shown simplicity and speed, as well as lower cost for both companies and public authorities acting as Data Evaluator. The higher data quality results in less processing-errors for the Data Evaluator compared to the current way of executing procedures. Both of these groups of findings are directly aligned with the fulfilment of the pilot's main business goals (see D4.5 Use Case Definition [1]). A broad implementation is however a requirement to be cost-effective.

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, as for example not all public authorities have access to BRIS and BRIS does not cover all types of companies. Evaluating the Subscription and Notification pattern shows that benefits are present, but there seems to be a caveat. As the number of foreign companies in DE-systems is relatively low, the number of notifications will be low as well. Still, Data Evaluators would like to receive notifications so they can maintain a high quality of service delivery.

For Data Owners, integrating the OOP TS usually involves use of existing data services and an integration layer. Data Owners don't encounter big challenges, but also experience less benefits of the OOP TS than DE's seem to experience. However, thanks to DO integration with OOP TS, companies can benefit from fast and secure access to data stored only once in these authentic sources and automated transfer many times to service providers all over Europe.

Companies seem to focus on completing the online procedure as fast as possible (service enrolment speed) 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.

The used local infrastructure heavily determines the required effort for DE and DO integration. Member States therefore 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. 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.

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 was allowed for piloting the DBA procedures.

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Full Powers validation is probably sufficient for SME's but large companies are expected to benefit from Fine Grained Powers validation and it makes sense to maintain this as a goal in the domain of validation the Powers of Representation. SEMPER specifications proved to 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.

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.

Setting up a proper and clear structure for maintenance and support for the infrastructure is paramount for the sustainability and success of the SDG OOP TS. The benefits of the infrastructure will only be secured if an adequate organisation operates to prevent errors, maintains components and certificates, and provides support when issues arise.

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## Annex I – Metrics

Metric	Description	Target	Group	# of respondents	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	3	Considerably more reliable	More reliable	As reliable	Less reliable	Considerably less reliable	
	The appreciation the DE expresses on the reliability of company data, judging from the following perspectives:										
	- Availability in electronic format										
	- Availability in structured format										
	- Completeness of available data										
- Correctness of available data											
- Meaningfulness of available data											
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	1	Considerably less effort	Less effort	Same effort	More effort	Considerably 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										
- Solving errors and exceptions											
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	3	1	Considerably 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										
	- Number of errors and exceptions due to Company data being deprecated										
	- Solving errors and exceptions due to Company data being deprecated										
- Communication effort and cost to retrieve up-to-date Company data											
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)	DE	3	3	Considerably more reliable	More reliable	As reliable	Less reliable	Considerably less reliable	

	<p>The appreciation the DE expresses on the reliability of powers validation method used in the pilot, judging from the following perspectives:</p> <ul style="list-style-type: none"> <li>- Authenticity of proof</li> <li>- Accessibility of proof (language, structure)</li> <li>- Correctness of proof</li> </ul>	of the powers validation method as (considerably ) more reliable than in the baseline.				2		1				
A2.2	<p>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).</p> <p>The appreciation the DE expresses on the effort required to verify the powers of the representative, judging from the following perspectives:</p> <ul style="list-style-type: none"> <li>- Interpretation of data</li> <li>- Solving errors and exceptions</li> </ul>	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	3		Considerably less effort	Less effort	Same effort	More effort	Considerably more effort		
B1.1	<p>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).</p> <p>The appreciation the user expresses on the effort required to complete the enrolment/registration procedure, judging the following activities:</p> <ul style="list-style-type: none"> <li>- Collecting company data</li> <li>- Solving language barriers</li> <li>- Providing required data to the DE</li> <li>- Solving problems</li> <li>- Simplicity of the procedure</li> </ul>	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	Reasonable effort	Much effort	Very much effort		
B2.1	<p>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).</p> <p>The appreciation the user expresses on the effort spent to proof to be sufficiently authorized, judging from the following perspectives:</p> <ul style="list-style-type: none"> <li>- Reliability of method</li> <li>- Accessibility of method (language)</li> <li>- Simplicity of method</li> <li>- Robustness of method</li> </ul>	More than 50% of respondents appreciates the effort (average of all perspectives) to complete the enrolment/registration procedure adequate or better.	Company	13		Very adequate	Adequate	Sufficient	Inadequate	Very inadequate		
						4	2					
						9	2	1				

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	Sufficient	Unsatisfied	Very unsatisfied	
	The satisfaction the user expresses on the duration of the following activities in the procedure to enrol/register:									
	- Collect and provide company data									
	- Collect and provide proof of authorisation									
	- Completing the forms in the eProcedure portal									
- Dealing with Explicit Request & Preview										
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	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.					
	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										
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	3	Benefits exceed cost considerably	Benefits exceed cost	Benefits are in balance with cost	Benefits are lower than cost	Benefits are considerably lower than cost	
	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										
C1.2	The effort (manhours) involved to integrate the data service to the DE4A Connector. To be provided only if costs are not confidential.	none	DO	3	This varies between 100 and 750 depending on the use of existing data services, averaging on 500.					

	<p>A rough indication of the effort involved to integrate the DO data service to the DE4A Connector.</p> <p>This is an optional metric, in case the costs are confidential.</p>										
C2.1	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>- Less manual effort for processing during evaluation of the application, as well as fulfilment of the service requested</li> <li>- Lower communication cost</li> <li>- Lower risk for error due to manual processing and language challenges</li> <li>- Shorter duration for processing</li> <li>- More complete, valuable, consistent and correct data available</li> <li>- Data being always up-to-date</li> <li>- Trustworthiness of the data</li> </ul>	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DE	4		Benefit s exceed cost consid erably	Benefit s exceed cost	Benefit s are in balanc e with cost	Benefit s are lower than cost	Benefit s are consid erably lower than cost	
C2.2	<p>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.</p> <p>A rough indication of the effort involved to integrate the DE eProcedure portal to the DE4A Connector</p> <p>This is an optional metric, in case the costs are confidential.</p>	none	DE	4		This varies between 100 and 1250 depending on the type of portal (production/pre-production), averaging on 700.					
C3.1	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>- Higher reliability of powers validation</li> <li>- Shorter duration of powers validation</li> <li>- Less manual effort for powers validation</li> </ul>	More than 50% of respondents estimate the benefits to (vastly) exceed the cost and effort.	DP	3		Benefit s exceed cost consid erably	Benefit s exceed cost	Benefit s are in balanc e with cost	Benefit s are lower than cost	Benefit s are consid erably lower than cost	
C3.2	<p>The effort (manhours) involved to integrate the Mandate Management</p>	none	DP	3		The estimations vary between 100 and 600, depending on the existing and used					

	<p>System to the eIDAS node. To be provided only if costs are not confidential.</p> <p>A rough indication of the cost involved to integrate the Mandate Management System to the eIDAS Connector.</p> <p>This is an optional metric, in case the costs are confidential.</p>					<p>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.</p>					
C4.1	<p>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.</p>	<p>More than 50% of respondents estimate the cost (far) less than expected</p>	<p>MS</p>	<p>4</p>	<p>Far less than expected</p>	<p>Less than expected</p>	<p>On Par</p>	<p>More than expected</p>	<p>Much more than expected</p>		
	<p>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:</p>						<p>4</p>				
	<p>- Lower communication cost</p>										
	<p>- Shorter process duration</p>										
	<p>- Reliable communication</p>										
<p>- Connection to reliable data sources</p>											
C4.2	<p>The effort (manhours) involved to set up and deploy the DE4A Connector. To be provided only if costs are not confidential.</p>	<p>none</p>	<p>MS</p>	<p>4</p>	<p>The estimations vary between 100 and 450 depending on the infrastructure and setting the connector could be deployed and used, averaging on 250.</p>						
	<p>A rough indication of the cost involved to set up and deploy the DE4A Connector.</p>										
	<p>This is an optional metric, in case the costs are confidential.</p>										
D1.1	<p>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.</p>	<p>None (research topic)</p>	<p>DE</p>	<p>3</p>	<p>Very adequate</p>	<p>Adequate</p>	<p>Sufficient</p>	<p>Inadequate</p>	<p>Very inadequate</p>		
	<p>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:</p>										
	<p>- Legal entity identification</p>										
	<p>- Legal entity attributes (dates, status etc)</p>										
	<p>- Contact points</p>										
	<p>- Activities</p>										
	<p>- Branch (not included in first pilot iteration)</p>										
	<p>- Address</p>										
<p>- Information on representative(s)</p>			<p>2</p>		<p>1</p>						
D2.1	<p>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.</p>	<p>None (research topic)</p>	<p>DE</p>	<p>3</p>	<p>Very adequate</p>	<p>Adequate</p>	<p>Sufficient</p>	<p>Inadequate</p>	<p>Very inadequate</p>		



	<p>The appreciation the DE expresses on the extent to which the Powers validation method satisfies their needs, judging the following elements:</p> <ul style="list-style-type: none"> <li>- Usability for the piloted procedure</li> <li>- Usability for other services of the DE</li> <li>- Validation level (fine-grained)</li> </ul>					1		1	1	
D3.1	<p>The user's appreciation on various virtual scenarios concerning repeatedly using the OOP TS (for updates or requesting evidence with multiple data owners).</p>	None (research topic)	Company	6		<p>No involvement, just get the actual data</p>	<p>Just ask and show me only the very first time, during enrolling to the procedure</p>	<p>Ask and show me every time, but for data sources at once</p>	<p>Ask and show me every time, but for data sources separately</p>	
	<p>The thoughts and considerations of the user when presented various options to use Explicit Request and Preview, in different scenarios like</p>									
	<ul style="list-style-type: none"> <li>- Explicitly request and preview to collect evidence from multiple DOs</li> <li>- Recurring ER/P in case of updates on Company Information.</li> </ul>									
					1					5
D4.1	<p>The appreciation of the DE on the need to do record matching on Natural Persons and Legal Persons on their part.</p> <p>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.</p>	None (research topic)	DE	3	<p>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.</p>					
D5	<p>Have the mechanisms for keeping the Company data up-to-date proven adequate and effective for the Data Evaluator?</p>	None (research topic)	DE	3	<p>Data Evaluators appreciate the S&amp;N mechanism and prefer to have this available. They also mention that the volume of notifications they expect is small, as the number of foreign companies in their databases is limited and not all MS have this S&amp;N mechanism implemented yet. Some of the company-types are also covered by BRIS, but not all public authorities have access to BRIS.</p>					
	<p>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.</p>									
	<p>The thoughts and considerations of the DE on effectiveness of the OOP Ts to keep company data up-to-date in their local systems.</p>									

## Annex II – Success criteria

	Success Criterion	Result
<b>A1</b>	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.	<p>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.</p> <p>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.</p> <p>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).</p>
<b>A2</b>	The DE recognizes the method of powers validation to provide reliable proof of the representative being sufficiently authorized to represent the company.	<p>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.</p> <p>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.</p> <p>The solution is considered to be one that should simply be available, regardless of the cost or profitability.</p> <p>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 board member 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).</p>
<b>B1</b>	The user acknowledges the procedure for applying for a service to be	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.

	<p>effective and efficient</p>	<p>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 the 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.</p> <p>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 OOP TS) 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.</p> <p>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.</p>
<p><b>B2</b></p>	<p>The user acknowledges the method to proof their authorisation as effective and efficient</p>	<p>Users appreciate the use of an eID that is familiar to them, instead of having to obtain a separate account for the portal abroad.</p> <p>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 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.</p> <p>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.</p> <p>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.</p>

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		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.
<b>B3</b>	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.
<b>B4</b>	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.
<b>C1</b>	The DO believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.	DOs see little benefits of integration the OOP TS and expect the benefits mainly to exist for the Data Evaluators. Depending on the availability of existing APIs for sharing data, the cost for integration is not huge.
<b>C2</b>	The DE believes the cost and effort for integrating to the DE4A Connector will eventually be outweighed by the benefits.	<p>The cost and effort spent by Data Evaluators differs widely. This is for the following reasons:</p> <ul style="list-style-type: none"> <li>• Some DEs used real production environments while others used simulated environments</li> <li>• Member States have different infrastructures available for use with the OOP TS</li> <li>• 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</li> <li>• The security policies for establishing publicly available portals differ per organisation</li> <li>• Mandatory use of existing infrastructure introduces dependencies, interference and prioritization issues for development and testing.</li> </ul> <p>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</p>

		<p>that the DE4A infrastructure may not be the final OOP TS infrastructure and expect additional cost for the final SDG implementation.</p> <p>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.</p> <p>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.</p>
<b>C3</b>	The DPMS believes the cost and effort for integrating to the Mandate Management System will eventually be outweighed by the benefits.	<p>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 1<sup>st</sup> 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.</p>
<b>C4</b>	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.	<p>Interviews point towards the efforts for DE4A not always being a true representation for full fledged 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 fledged implementation over all eProcedures and DE/DO portals/services in order to make the implementation of the SDG cost-effective.</p> <p>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.</p>
<b>D1</b>	Has the Company Evidence Model proven adequate for cross-border exchange of information on companies for the DBA eProcedures?	<p>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.</p> <p>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</p>

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		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.
<b>D2</b>	Have the solutions to validate powers proven adequate for the eProcedures involved in piloting?	<p>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.</p> <p>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.</p>
<b>D3</b>	Have the explicit request and preview requirements as specified in the SDGR proven suitable for company eProcedures (representation scenarios)?	<p>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.</p> <p>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.</p>
<b>D4</b>	Have the mechanisms for record matching at the DC and DP proven adequate and effective for the DBA eProcedures?	<p>The record matching principle in DBA is to use the CompanyRegistrationID to check on previous registration of a company, in the DE-systems.</p> <p>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.</p> <p>For those Data Evaluators where returning visitors were applicable, the mechanism based on CompanyRegistrationID sufficed.</p>
<b>D5</b>	Have the mechanisms for keeping the Company data up-to-date proven adequate and	Data Evaluators appreciate this functionality and prefer to have this available as it helps them to maintain good standards of service provisioning. They do expect the volume of notifications to be rather low, as the number of foreign companies in their databases is relatively low and the frequency of notifications per company is also limited.

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	effective for the Data Evaluator?	
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