



## DBA pilot solution architecture

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# 1 Introduction

This document presents the solution architecture for the DBA pilot. It has been constructed in close cooperation with WP2 to ensure full alignment to the DE4A architecture. Its purpose is to guide the design and development of (adaptions to) required components by the pilot participants and to assist the ongoing cooperation and alignment with WP3 for semantics and WP5 for software components.

The solution architecture presented in this document is guided by several aspects of previous work, like D4.5<sup>1</sup> and the discussion papers on several topics of relevance to the DBA pilot. This previous work defines scope, working assumptions, preconditions, areas of interest, design choices etc. Not all of these have been copied into this document. This chapter highlights only the most important ones, without pretending to be complete. Please refer to these documents for more information on the DBA pilot<sup>2</sup>.

This document specifies the DBA solution architecture. Its purpose is to assist the design of the software architecture and development and configuration of the components needed:

- By WP5 for the common components.
- By the DC's for their specific application services, like the eProcedure portal and connection to the OOP TS and eIDAS.
- By the DP's for their specific application services, like the data services and connection to the OOP TS and eIDAS.

## 1.1 Scope and focus

The scope of this architecture is limited to the minimum viable product (MVP) that has been defined by the partners of the DBA pilot.

Pilot run 1:

- minimum viable functionality for the intermediation pattern (UC1)

Pilot run 2:

- extended functionality for the intermediation pattern (UC1)
- subscription & notification pattern (UC2)
- lookup pattern (UC2)

The second pilot run is out of scope of this version of the solution architecture. Furthermore:

1. The MVP implements the smallest possible functionality needed to run the DBA pilots for the first use case (starting a business abroad). All components that do not directly contribute to the MVP are out of scope for this architecture.
2. This solution architecture applies to the intermediation pattern only. Other patterns, like the subscription & notification pattern and the lookup pattern, have not been included.
3. The priority of the DBA pilot lies in solving two challenges: (1) piloting proper exchange of company data (evidence) and (2) piloting a solution for company representation, including powers

<sup>1</sup> See D2.4 PSA section 4.2 on the intermediation pattern and section 7 on the DBA pilot.

<sup>2</sup> Powers validation: [link](#), Explicit request & preview: [link](#), BRIS: [link](#), eIDAS: [link](#), Identity & record matching: [link](#), piloting in production: [link](#)

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validation. Other topics are relevant to the pilot as well, like the explicit request and preview functions, but they will be included in the simplest way possible.

4. The solution to implement should nevertheless be production-worthy as the goal of the DBA pilot is to pilot in production<sup>3</sup>.
5. The MVP support validating full powers only, meaning that the DP-Member State will check whether the natural person has the powers to apply for any public service in the DC-Member State. This means integration with the national mandate management system of this Member State to check the natural person is representative of company with full powers. Having full powers will allow to apply for any public service in the DC-Member State.

## 1.2 DE4A preconditions

The DBA solution architecture implements some DE4A-wide decisions:

1. The OOP TS consists of functionality for evidence exchange as well as the information desk. DE4A uses eDelivery for implementing the evidence exchange functionality. Other options for messaging have not been considered in constructing this solution architecture.
2. DE4A uses eIDAS. Other options have not been considered in constructing this solution architecture.

## 1.3 Design choices

The DBA pilot partners made several choices in implementing the DBA pilots:

1. The DBA pilot uses the eIDAS company identification attributes to communicate the represented legal person to the DP. As most Member States do not provide these attributes currently, they need to be added for piloting.
2. The DBA pilot will use the OOP TS for retrieving the company data needed for the eProcedure.
3. The DBA pilot will use CEF's reference software for the eIDAS node version 2.4. In case of Sweden: Sweden will use their custom version of the eIDAS node that should be compatible with eIDAS attribute profile 1.1<sup>4</sup>.
4. The DBA pilot will use the SEMPER extension that is compatible with the eIDAS node 2.4 for fine-grained powers validation in the second pilot run. Use of the SEMPER extension is allowed in the first pilot run as it soed not interfere with regular use of eIDAS, but it is not required and will not be piloted in the first pilot run<sup>5</sup>.
5. The DBA pilot will implement a pilot-eIDAS-network, meaning the Member States will implement dedicated pilot eIDAS nodes for cross-border authentication and powers validation that is isolated from the regular network of eIDAS nodes. As the project extends on the use of eIDAS with legal person attributes and powers validation, regular eIDAS nodes are not suitable for piloting. Furthermore, use of the dedicated eIDAS network allows for acceptance of non-notified eID for piloting only.

<sup>3</sup> Most pilot partners will pilot with real companies and real data on a pilot specific portal.

<sup>4</sup> Currently, Sweden has implemented profile 1.2. It needs to be assessed whether this version of the eIDAS profile is fully backwards compatible with version 1.1.

<sup>5</sup> Romania, The Netherlands and possibly Austria will implement the SEMPER extension from the start.

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## 1.4 eIDAS and OOP TS

The DBA pilot implements the reference processes of DE4A's project start architecture to meet the requirement of the DBA pilot. In designing the solutions for the processes, DBA distinguishes between the:

### 1. DBA eIDAS solution architecture

The architecture for using eIDAS to authenticate the natural person, gather company identification attributes and validate powers. See chapter 2.

### 2. DBA OOP TS solution architecture

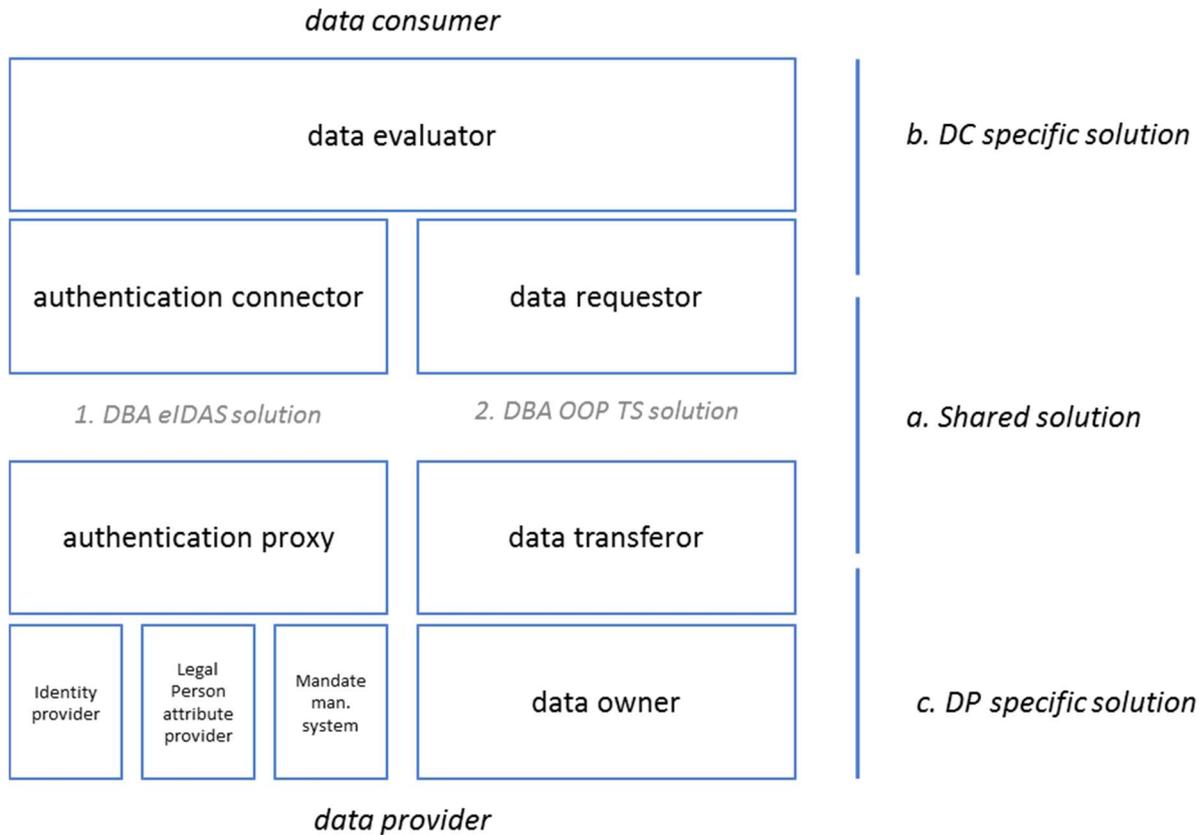
The architecture for using the OOP TS for exchange of company data between the data evaluator and the data owner<sup>6</sup>. See chapter 3.

Each of the (sub) solution architectures is divided in:

- a. Shared solution: the common part of the solution.  
The application services that are common to all DBA pilot use cases and scenarios. These are typically the application services that are part of the Once Only Technical System (OOP TS) and eIDAS. These components need to be deployed and configured by each of the piloting Member State. For the OOP TS common services (eDelivery), the DBA pilot expects WP5 to select, design and develop the components needed.
- b. DC-specific solution: the part of the solution the DC has to implement, including integration with the dedicated eIDAS network and the OOP TS.
- c. DP-specific solution: the part of the solution the DP has to implement, including integration with the dedicated eIDAS network and the OOP TS..

<sup>6</sup> Not to be confused with the SDG OOTS. DE4A produces a Technical System implementation with particularities and design and implementation choices related to the DE4A project scope.

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The eIDAS network is a – from the OOP TS – separate network of eIDAS nodes and their connections. It is linked to the OOP TS via the data evaluator that coordinates the eProcedure. There is no direct interaction between the eIDAS network and the OOP TS.

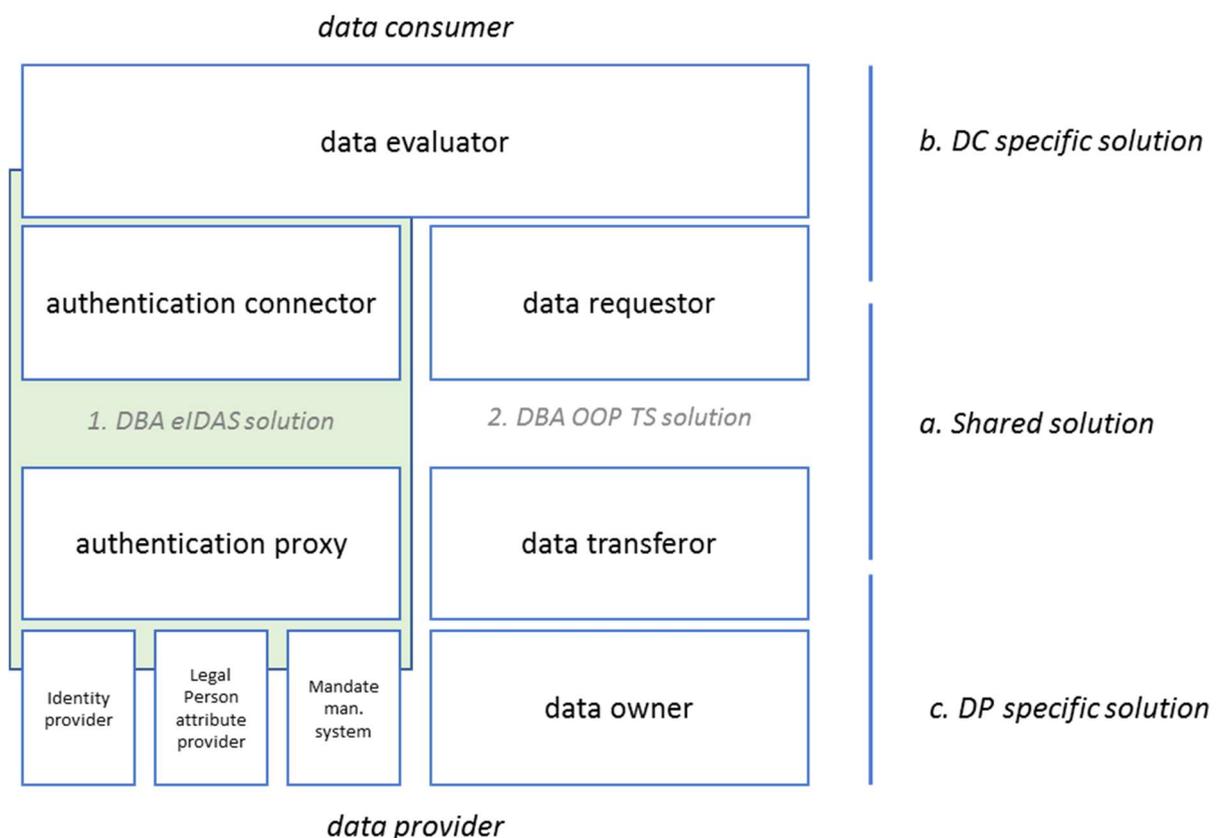
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## 2 DBA eIDAS solution

The roles defined in the PSA refer to the party’s involvement in the exchange of evidence. For DBA, besides that also the eIDAS domain is of utmost importance. As eIDAS does not deal with evidence exchange as such, but with information on identities and powers, additional roles are involved.

The additional roles for eIDAS are:

- Authentication connector:  
the actor that – typically at a Member State level – connects to the eIDAS network as a relying party. Via the authentication connector, the data evaluator can request authentication, identifying attributes of the company and a powers validation.
- Authentication proxy:  
the actor that connects the national (notified and non-notified) eID(s), attribute provider(s) and mandate management system(s) to the eIDAS network. The authentication proxy role coordinates the authentication (and powers validation) process. In the two Member State scenario, authentication takes place in the data providing Member State as the user, its eID and the company are all from the DP Member State<sup>7</sup>. Member StateMember State



<sup>7</sup> In the multiple Member State scenario’s the authentication proxy can be in another member state than the data provider is (not depicted in the figure below). The multiple member state scenario is out of scope of the DBA pilot.

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In the eIDAS domain the roles “authentication connector” and “authentication proxy” handle cross-border requests for authentication, company identification attributes (‘legal person’ in eIDAS) and powers validation. The authentication connector of the DC-Member State sends an authentication request to the DP-Member State. The authentication proxy coordinates all national activities (IdP, attribute provider, mandate management system) and returns the authentication result to the authentication connector.

Compared to current eIDAS practice, the use of eIDAS will be extended by the DBA pilot with:

- Requesting and sending legal person attributes (identifying the company that applies for the service). Although eIDAS has been able to send legal person attributes from the start, this functionality has been notified just twice (by IT and NL) not has not been used in production services.
- Validating powers of representation. This function is not part of the eIDAS network currently. In the first pilot iteration (MVP) the pilot partners validate full powers only. Sending natural person attributes and legal person attributes via eIDAS means the natural person may apply for any service in the DC Member State (‘DBA access policy rule’ – no attributes regarding the powers validation result will be transmitted, so the powers deARATION will be implicit). For the second pilot run, fine grained powers validation will be implemented, requiring extension of the eIDAS functionality in order to express the exact powers of representation (‘add powers validation attributes’). eIDAS will be extended with the SEMPER attributes for this purpose.

For more information, please see the DBA discussion paper on powers validation<sup>8</sup>.

The Data evaluator in the DBA pilot needs record matching on the company to determine whether the company has been registered at the company portal prior to the pilot start (without eIDASLegalpersonIdentifier)<sup>9</sup>. The DBA data consumer will use the second mandatory eIDAS attribute (LegalName) for that purpose. If needed the Data evaluator interacts with the user to do additional checks in the matching process. For the pilot, the pilot partners do not need an extension to eIDAS with additional legal person attributes. In any case, record matching at the data evaluator is an eProcedure portal (or data consumer) specific activity that does not need harmonisation across piloting partners.

The data owner does not need to do record matching on the company as it can use the eIDASLegalIdentifier to uniquely identify the company involved. This is a consequence of the pilot principle, that the authenticating proxy sends an eIDASLegalPersonIdentifier that the business register itself uses in its company registration.

Data evaluators and data owners do not need to do record matching on the *natural person*. Therefore, no additional eIDAS attributes of the natural person are needed.

For more information, please see, please see the DBA analysis on record matching<sup>10</sup>.

<sup>8</sup> See <https://newrepository.atosresearch.eu/index.php/apps/files/?dir=/DE4A-Project/06%20Workpackages/WP4%20Pilots/T4.2%20Business%20abroad/11%20Topic%20Powers%20validation&fileid=976406>

<sup>9</sup> This is different from the record matching in the other pilots that focus at natural person matching. Some DE’s may decide to implement this function in the final pilot run and not in the MVP. This is currently under examination by the data evaluators. Today, BE and AT expect to do record matching on the company at run-time at the DE. NL expects to do record matching prior to the pilot (adding the eIDASLegalPersonIdentifier to all foreign companies already registered at the eProcedure portal). SE and RO expect not to implement record matching as they will start with a clean sheet (empty company registry for pilot purposes).

<sup>10</sup> See <https://newrepository.atosresearch.eu/index.php/apps/files/?dir=/DE4A-Project/06%20Workpackages/WP4%20Pilots/T4.2%20Business%20abroad/16%20Topic%20Identity%20and%20record%20matching&fileid=976394>

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## 2.1 Shared solution

The shared solution consists of all common functionality that is part of the core eIDAS network. The pilot will rely on CEF eID to provide the required common components (eIDAS reference software) and the underlying specification (eIDAS message and attribute profile). Both are publicly available. The common eIDAS components need to be implemented – for as far as not already in place today – by the authentication connector and authentication proxy roles.

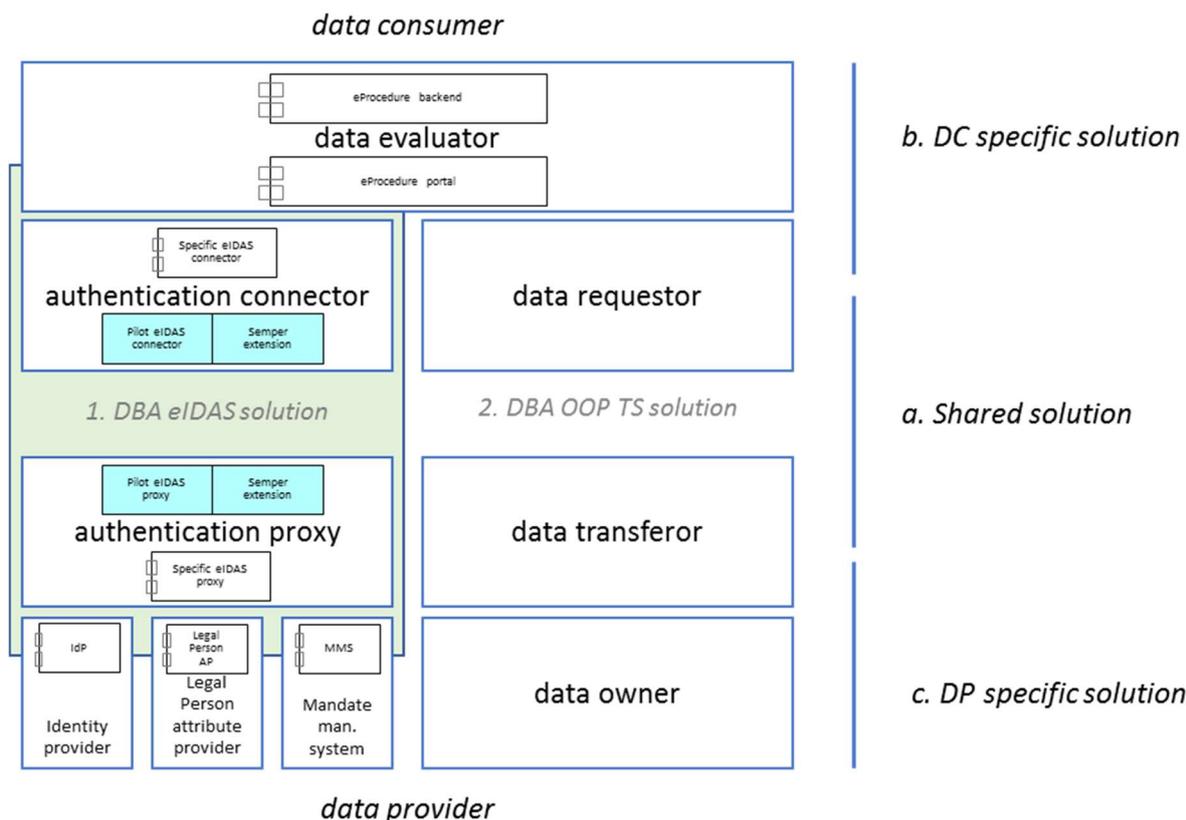
Please note, that in the second pilot run, piloting partners need to extend their eIDAS node with SEMPER attributes. The SEMPER extension to eIDAS uses the mechanism of ‘domain specific attributes’ that eIDAS supports already. In this way, the SEMPER extension does not break any eIDAS functionality already in place. The SEMPER extension does require maintenance and support during the lifetime of the DE4A project. Until end of 2020, the SEMPER project handled support & maintenance. As the SEMPER project has finished, currently there is no support & maintenance arrangement for SEMPER. This is a risk to the DE4A project.

### 2.1.1 Process realisation

The table below presents the components that implement the common application services for the DBA pilot.

Role	Process	Application service	Components
Authentication connector	Request authentication	Authentication initiation	<ul style="list-style-type: none"> <li>eIDAS connector</li> <li>SEMPER extension</li> </ul>
Authentication proxy	Provide authentication details (user)	User authentication	<ul style="list-style-type: none"> <li>eIDAS proxy</li> <li>SEMPER extension</li> </ul>

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### 2.1.2 Component description

Component	Short description of its use
eIDAS connector	<p>The component Member States implement to connect to the eIDAS network as a relying party. The connector accepts authentication requests from the service providers of the Member State and forwards the requests to the Member States that needs to authenticate the user. After authentication, the eIDAS connector receives the authentication results and sends them to the requesting service provider (relying party).</p> <p>The eIDAS connector can be implemented using CEF’s reference software or a custom implementation compliant to the eIDAS interoperability specifications. The CEF reference software implements – besides the eIDAS SAML profile – also the JSON/REST eIDAS Light protocol to connect to national infrastructure.</p>
eIDAS proxy	<p>The component Member States implement to allow authentication with their (notified) eID for services provided in other Member States. The eIDAS proxy receives authentication requests from relying Member States, coordinates authentication, retrieval of legal person attributes and powers validation. The eIDAS proxy then sends the result to the requesting eIDAS connector.</p> <p>Just like the eIDAS connector, the eIDAS proxy can be implemented using CEF’s reference software or a custom implementation</p>

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Component	Short description of its use
	compliant to the eIDAS interoperability specifications. The CEF reference software implements – besides the eIDAS SAML profile – also the JSON/REST eIDAS Light protocol to connect to national infrastructure.
SEMPER extension	The eIDAS interoperability architecture as well as the CEF reference implementation allow for extension of eIDAS with additional – domain specific – attributes. The SEMPER project used this option to include attributes on the powers requested ('powers validation request') and the result of powers validation ('the powers declaration'). The SEMPER extension leaves the eIDAS functionality untouched, but extends its use with an addition to the SAML profile and the Light protocol.

### 2.1.3 Requirements

The DBA pilot did not define any additional requirements for the common eIDAS components (connector, proxy and extension). The use of these component has been assessed to ensure the components fulfil the pilot's needs. The pilot partner conclude that the CEF reference software as well as the SEMPER extension fulfil the needs of the DBA pilot. Of course, while running the pilot additional requirements for the eIDAS domain may arise.

requirement	Iteration 1	Iteration 2
	MVP	Final version
MS support for a dedicated eIDAS pilot infrastructure.	Y	Y
Availability of CEF reference software version 2.4	Y	Y
Availability of CEF 2.4 compliant SEMPER extension	N	Y

Please note that Sweden has a custom implementation of the eIDAS node. Sweden needs to extend their custom implementation with SEMPER attributes for the second pilot run.

### 2.1.4 Component Implementation

The eIDAS components will be implemented by the pilot Member States as dedicated nodes for the DBA pilot to prevent interference with regular eIDAS production systems. Additionally, the dedicated pilot eIDAS network allows Member States to accept non-notified eID's for piloting purposes only. For more information on the use of the dedicated pilot network, please refer to the DBA discussion paper on this topic.

The versions to implement:

- eIDAS connector and proxy: CEF reference software 2.4 or custom implementation with eIDAS profile 1.1 (Sweden)<sup>11</sup>.
- SEMPER extension: compliant with CEF version 2.4.

<sup>11</sup> Currently, Sweden has implemented profile 1.2. It needs to be assessed whether this version of the eIDAS profile is fully backwards compatible with version 1.1.

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Both the CEF 2.4 reference software and the 2.4-compatible SEMPER extension are currently available. The custom implementation of eIDAS (SE) might need adaptation to cater for the legal person attributes and the (SEMPER) powers validation attributes.

### 2.1.5 Expected logical interfaces

The table below presents the interfaces expected for each of the components on a logical level. The interfaces as specified in the table are compliant with the eIDAS specification version 1.1, the eIDAS reference software 2.4 as well as the SEMPER extension.

Component	Expected interface
eIDAS connector	<p>IN (request from SP / specific connector to eIDAS connector)</p> <p>Attributes:</p> <ul style="list-style-type: none"> <li>- Service provider name (opt)</li> <li>- Required LoA</li> <li>- Required Natural Person attributes</li> <li>- Required Legal Person attributes</li> <li>- Proxy Member State ISO code</li> </ul> <p>OUT (response from eIDAS connector to SP / specific connector)</p> <p>Attributes:</p> <ul style="list-style-type: none"> <li>- LoA</li> <li>- Natural Person attributes</li> <li>- Legal Person attributes</li> <li>- Authentication status</li> </ul>
eIDAS proxy	<p>OUT (request from eIDAS proxy to eID / specific proxy)</p> <p>Attributes:</p> <ul style="list-style-type: none"> <li>- Service provider name (opt)</li> <li>- Required LoA</li> <li>- Required Natural Person attributes</li> <li>- Required Legal Person attributes</li> <li>- Connector Member State ISO code</li> </ul> <p>IN (response from eID / specific proxy to eIDAS proxy)</p> <p>Attributes:</p> <ul style="list-style-type: none"> <li>- LoA</li> <li>- Natural Person attributes</li> <li>- Legal Person attributes</li> <li>- Authentication status</li> </ul>
eIDAS connector including SEMPER extension	<p>Same as eIDAS connector without SEMPER extension, but additionally: powers validation request (scope of powers, type of representation allowed, type of powers accepted).</p> <p>Not required for MVP: in the MVP the pilot partners will validate full powers without explicit powers declaration. Authentication will fail as</p>

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Component	Expected interface
	soon as the representative does not have the powers to represent the company <sup>12</sup> .
eIDAS proxy including SEMPER extension	Same as eIDAS connector without SEMPER extension, but additionally: powers declaration (validation result, type of representation, type of powers). Not required for MVP <sup>13</sup> .

## 2.2 DC specific solution

The DC specific eIDAS architecture consists of the data evaluator specific services and the authentication connector specific services. The DC specific solution is different for every DC. Its solution architecture will be specified in the design documents of the DC pilot processes (one for each data consumer). Nonetheless the DC-specific solution at a higher level of abstraction shows similarities. These will be addressed in this section.

### 2.2.1 Process realisation

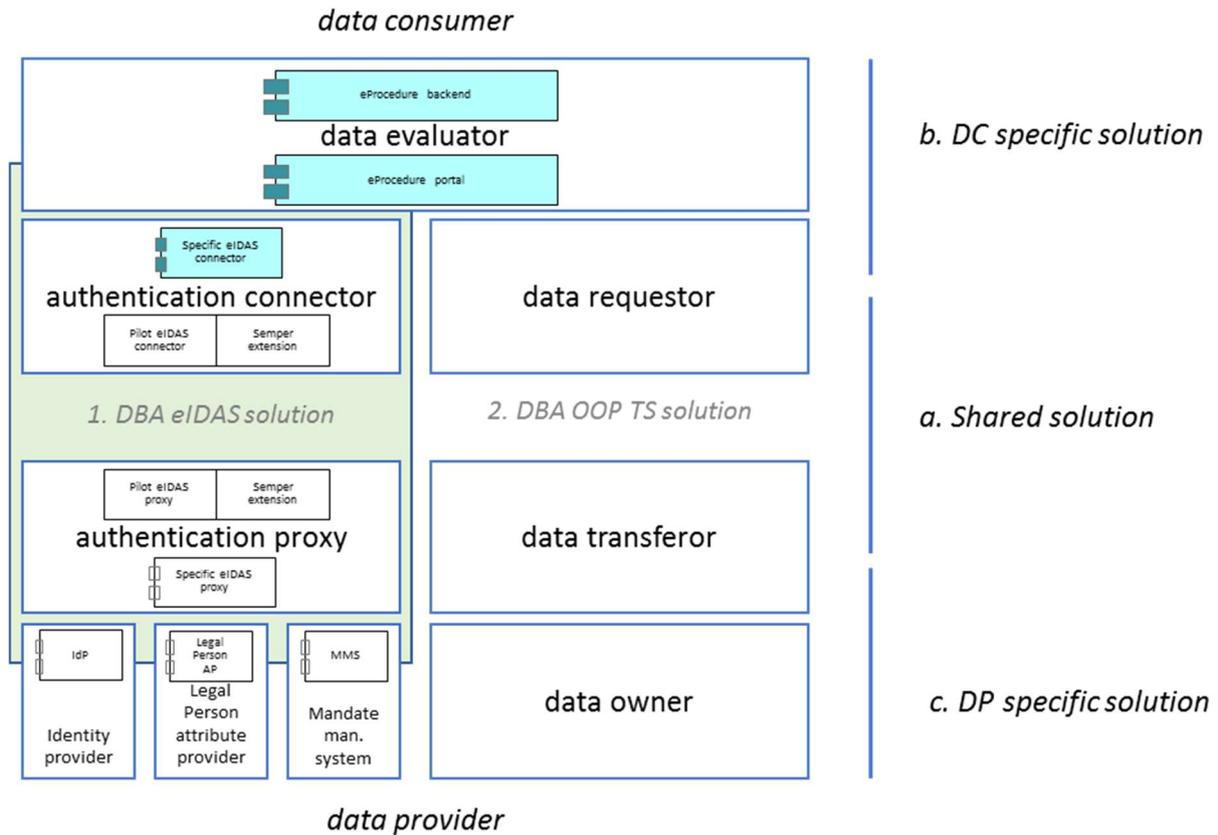
The table below presents the components that implement the application services for the DBA pilot.

Role	Process	Application service	Components
Data evaluator	Request authentication	Authentication initiation (collaboration: eProcedure portal)	eProcedure portal and backend (different for each DC participant)
Authentication connector	Request authentication	Authentication initiation (collaboration: eProcedure portal)	Specific eIDAS connector (different for each Member State).

<sup>12</sup> A Member State operating a SEMPER extended eIDAS connector in the first pilot run may choose to send (1) a regular eIDAS authentication request and (2) to send a SEMPER extended eIDAS request. In case of (1) the SEMPER extended connector will receive a regular eIDAS response from the eIDAS proxy service in the other Member State. The SEMPER extension will be 'idle' then in the first pilot run (MVP). In case of (2), the non-extended proxy will ignore the SEMPER attributes in the authentication request. It will return a regular eIDAS response as well. That's why Member States may choose to deploy the SEMPER extension in the first pilot run without using the SEMPER functionality yet.

<sup>13</sup> A Member State may choose to install the SEMPER extension to the eIDAS proxy in the first pilot run already. But as long as the requesting Member States (the connectors) don't request a SEMPER powers declaration, the SEMPER extension remains idle.

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### 2.2.2 Component description

Component	Short description of its use
eProcedure Portal	<p>The eProcedure portal (like MijnRVO.nl – see the DC-specific detailed pilot process documents) should connect to the national eIDAS connector. This requires the eProcedure portal to add the eIDAS login option to the login-webpage and the interface to the specific eIDAS connector (see below). As the DBA Pilot will use a dedicated network of eIDAS nodes, the eIDAS login option should be separated from the regular eIDAS login option (in case already available on the eProcedure portal). The DBA login option should invoke the dedicated eIDAS connector in stead of the regular one (a different URL).</p> <p>Of relevance here is the type of eIDAS authentication request that the portal should implement:</p> <ul style="list-style-type: none"> <li>- authentication at <i>LoA substantial</i></li> <li>- requesting the natural person attributes (at least the mandatory ones)</li> <li>- requesting the legal person attributes (at least the mandatory ones)</li> </ul> <p>After receiving the authentication response, the MS specific portal should:</p> <ul style="list-style-type: none"> <li>- deny the user access in case of an “authentication failed”.</li> </ul>

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Component	Short description of its use
	- grant the user access in case of an “authentication successful”. In case of the latter, the data evaluator grants the user access to all eServices of the portal.
eProcedure back-end	The eProcedure back-end handles all eProcedure specific functions, like registering the company in the company portal and assessing F-tax.
Specific eIDAS connector	The specific eIDAS connector transforms the national eID protocol into the eIDAS protocol. Member States usually implement one or more components to ‘bridge’ eIDAS to the national eID infrastructure. As from CEF eIDAS reference software 2.0, Member States may use the eIDAS Light protocol for this.

### 2.2.3 Requirements

The table below presents the requirements that the data evaluator and the authentication connector must implement. These concern the DC specific implementation only.

Role	requirement	Iteration 1	Iteration 2
		MVP	Final version
<b>Data evaluator</b>	The eProcedure portal adds an eIDAS login option for piloting.	Y	Y
	The eProcedure portal connects to a <i>dedicated</i> eIDAS pilot node.	Y	Y
	The eProcedure portal requests eIDAS legal person attributes (mandatory ones)	Y	Y
	The eProcedure portal grants the user access on behalf of the company in case of an “authentication successful” response.	Y	Y
	The eProcedure portal additionally constructs a fine-grained powers validation request.	N	Y
	The eProcedure portal validates the Powers declaration received.	N	Y
<b>Authentication connector</b>	MS implements eIDAS connector 2.4. In case of a custom implementation (like Sweden) an attribute profile 1.1-compliant version of the connector will be used for piloting.	Y	Y
	MS implements SEMPER extension to the eIDAS connector.	N	Y

### 2.2.4 Component implementation

This section is fully DC-specific. Please refer to the detailed process design documents.

### 2.2.5 Expected logical interfaces

This section is fully DC-specific. Please refer to the detailed process design documents.

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## 2.3 DP specific solution

In the intermediation pattern the user will authenticate to the data evaluator only. This will be done by invoking the eIDAS proxy of the data providing Member State. The data providing Member States implements several eIDAS-related roles for this purpose: authentication proxy, Identity Provider, Attribute Provider and Mandate Management System.

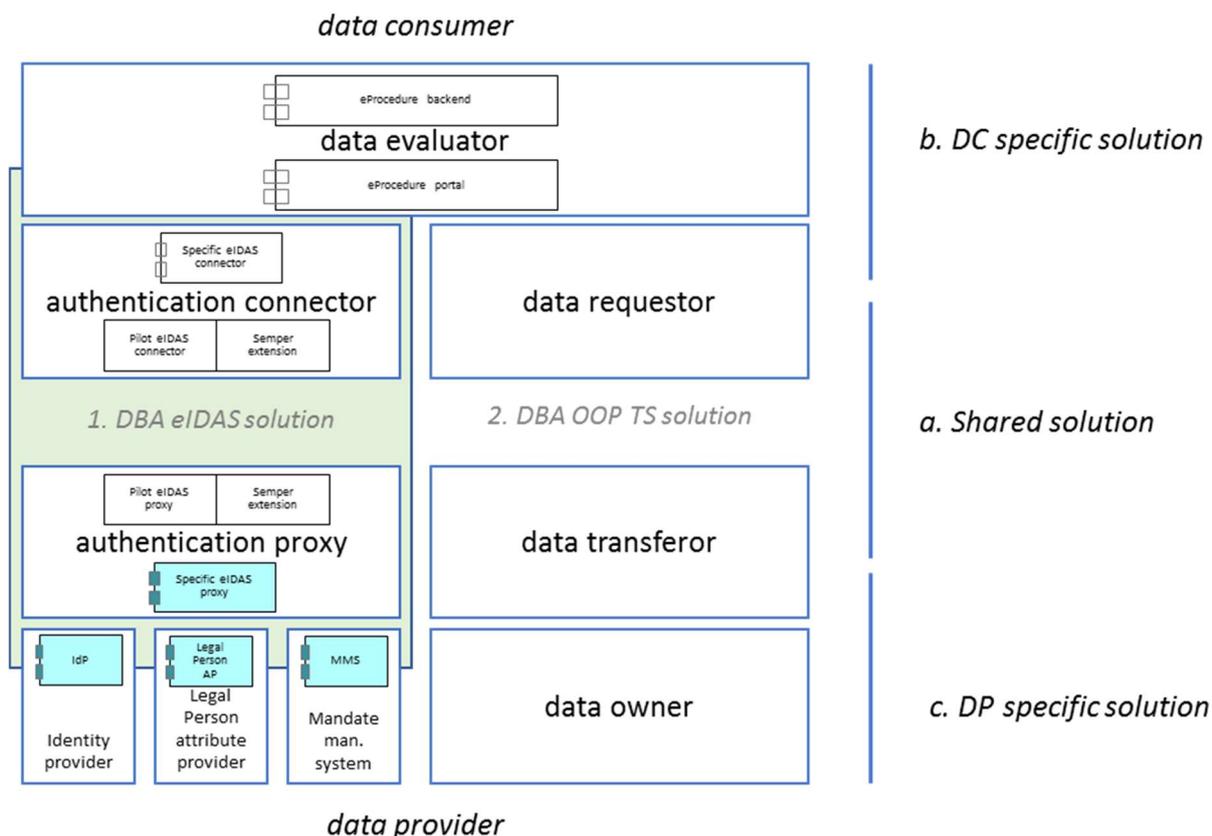
The DP specific eIDAS architecture consists of the Member State specific eID components as well as the eIDAS proxy components needed to bridge the national eID to the eIDAS network. The DP specific solution is different for every DP. The DP specific solution architecture will be specified in the design documents of the pilot processes (one for each data provider). Nonetheless the DP-specific solution at a higher level of abstraction show similarities. These will be addressed in this section.

### 2.3.1 Process realisation

The table below presents the components that implement the application services for the DBA pilot.

Role	Process	Application service	Components
Authentication proxy	Provide authentication details	User authentication	Specific eIDAS proxy (different for each Member State).
Data owner (Identity Provider)	Provide authentication details	User authentication	IdP
Data owner (Legal person attribute provider)	Provide authentication details	User authentication	Legal Person AP
Data owner (mandate management system)	Provide authentication details	User authentication	MMS

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### 2.3.2 Component description

Component	Short description of its use
Specific eIDAS proxy	The specific eIDAS proxy transforms the eIDAS protocol into national eID protocol. Member States usually implement one or more components to 'bridge' eIDAS to the national eID infrastructure. As from CEF eIDAS reference software 2.0, Member States may use the eIDAS Light protocol for this. Furthermore, the eIDAS proxy coordinates the login process at the DP Member State by triggering the IdP, Legal Person AP and MMS.
IdP	The Identity Provider handles authentication of the natural person. The IdP may be notified under eIDAS, but does not need to be notified to be used in the DBA pilot.
Legal Person AP	Member States need to provide the identifying attributes of the legal person (eIDASLegalPersonID and eIDASLegalName) to the specific eIDAS proxy. The Legal Person attributes may be integrated in the national eID scheme. For example, in eRecognition (NL) the mandate management system also provides the legal person attributes. MMS and Legal Person AP are one and the same component then.
MMS	The source of powers of the natural person to represent the company. In the DBA MVP, this source must be used to verify full powers only. In the MVP the declaration of powers that results

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Component	Short description of its use
	from validating full powers is implicit: in case the authentication is successful, the user will have full powers to represent the company.

### 2.3.3 Requirements

The table below presents the requirements that the data provider must implement.

Role	requirement	Iteration 1 MVP	Iteration 2 Final version
<b>Authentication proxy</b>	MS connects an IdP to the eIDAS proxy node for authenticating the natural person	Y	Y
	MS connects attribute provider (AP) to eIDAS node for eIDAS legal person attributes (in case not integrated in the MMS).	Y	Y
	MS connects mandate management system (MMS) to eIDAS node for validating full powers. Note: AP and MMS could be the same data source.	Y	Y
	MS validates full powers	Y	Y
	MS adds fine-grained powers validation	N	Y
	MS implements CEF eIDAS proxy 2.4.  In case of a custom implementation (like Sweden) an attribute profile 1.1-compliant version of the connector will be used for piloting.	Y	Y
	MS implements SEMPER extension to the eIDAS connector.	N	Y

### 2.3.4 Component implementation

This section is fully DP-specific. Please refer to the detailed process design documents.

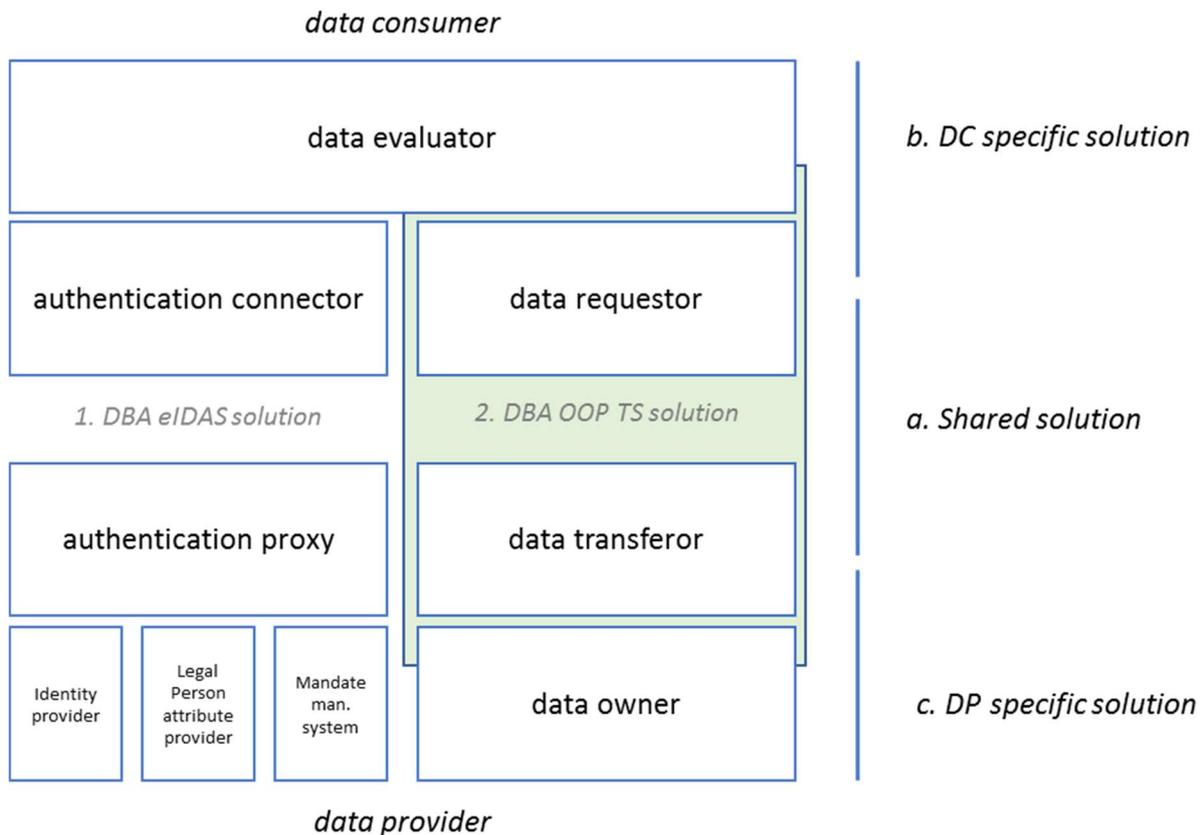
### 2.3.5 Expected logical interfaces

This section is fully DP-specific. Please refer to the detailed process design documents.

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### 3 DBA OOP TS solution

The shared solution for the OOP TS consists of all common functionality of the OOP technical system. Most of the common OOP TS components need to be implemented by the data requestor and data transferor, although the OOP TS uses two central components as well<sup>14</sup>.



#### 3.1 Shared solution

The OOP TS domain (WP5) should provide the data requestor and data transferor with the components needed for cross-border evidence exchange. Although this is very complex at a technical level, from a business logic perspective it is not due to MVP-limitations. In the MVP the DBA pilot uses just one type of evidence ('company dataset') that all DC's and DP's involved will use. There will be just one data provider per Member State: the business register, which is the authentic source of company information. The DC will request just one Member State for the evidence at a time (only one evidence will need to be requested to the data owner for the procedure and that will contain all the needed information by the data evaluator). Please see the DBA evidence data definition for more information on the data-elements included in the company data evidence.

<sup>14</sup> The "data requestor" and "data transferor" refer to organisation roles. Member States may implement several roles in a single organisation. E.g. in The Netherlands RVO will take on the rol of data evaluator, data requestor and data transferor.

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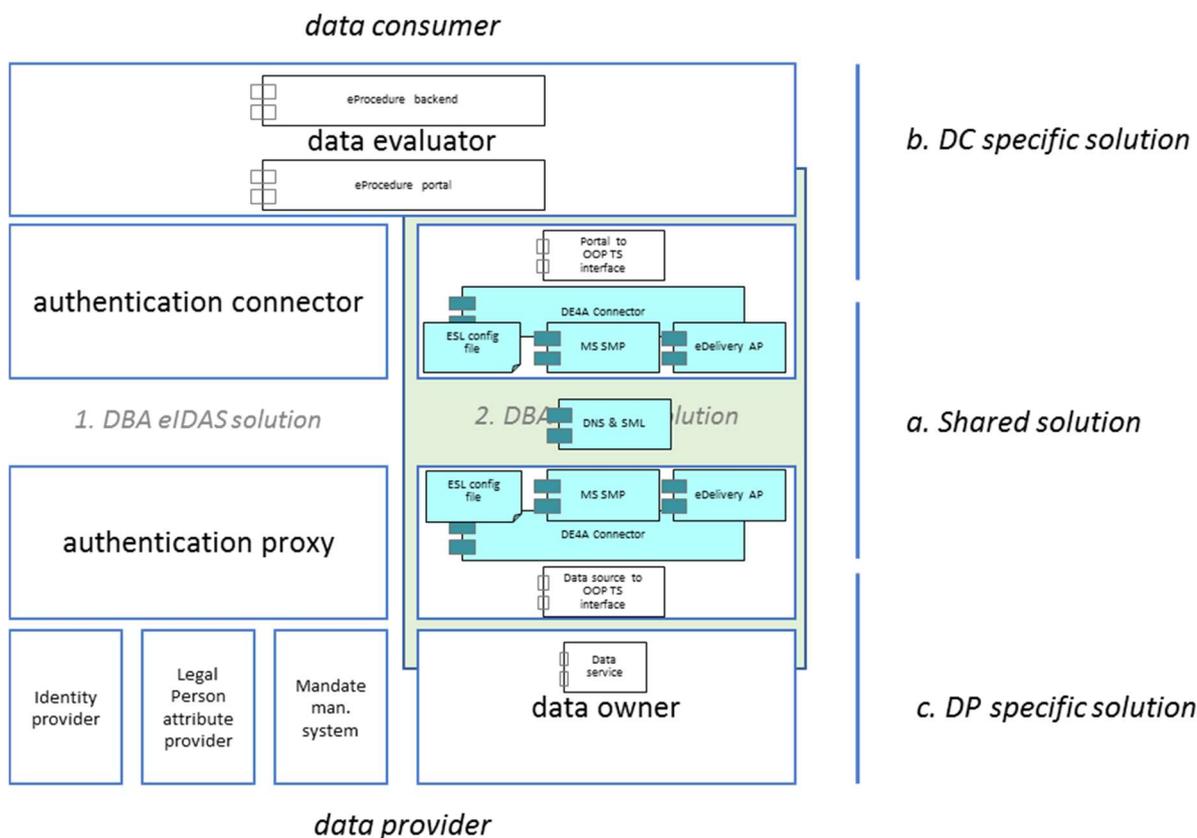
Although the explicit request and the preview functions will be implemented by the DC in its eProcedure portal, DBA expects guidelines for doing so (MVP) and reference software to ease the implementation (second pilot run). That's why the requirements for these functionalities have been included in this section.

### 3.1.1 Process realisation

The table below presents the components that implement the application services for the DBA pilot. Encryption and signing will be done at the level of the eDelivery AS4 gateways (no E2E encryption foreseen).

Process	Application service	Components
Lookup routing information (DC)	Inquire routing information (collaboration : information desk)	<ul style="list-style-type: none"> <li>• DE4A connector</li> <li>• Evidence service locator (ESL) configuration file</li> <li>• SMP</li> <li>• DNS &amp; SML</li> </ul>
Request evidence (DC)	Message encryption e-signature creation service data exchange service	<ul style="list-style-type: none"> <li>• DE4A Connector</li> <li>• eDelivery AS4 gateway</li> </ul>
Forward evidence (DC)	Message decryption e-signature verification and validation service data exchange service	<ul style="list-style-type: none"> <li>• DE4A Connector</li> <li>• eDelivery AS4 gateway</li> </ul>
Evaluate evidence request (DP)	Message decryption e-signature verification and validation service data exchange service	<ul style="list-style-type: none"> <li>• DE4A Connector</li> <li>• eDelivery AS4 gateway</li> </ul>
Communicate non-availability of OOP (DP)	data exchange service	<ul style="list-style-type: none"> <li>• DE4A Connector</li> <li>• eDelivery AS4 gateway</li> </ul>
Transfer evidence (DP)	Message encryption e-signature creation service data exchange service	<ul style="list-style-type: none"> <li>• DE4A connector</li> <li>• Configuration file to find the participant identifier</li> <li>• SMP</li> <li>• DNS &amp; SML</li> </ul>

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### 3.1.2 Component description

Component	Short description of its use
Evidence service locator (ESL) configuration file	As the DBA pilot’s MVP uses just one type of evidence, with just one data provider per Member State (on NUTSO level), there is no need for dynamic discovery of the data provider and its data services. For the DBA pilot it is sufficient to use a simple configuration file with the required elements (Member State and participant id).
SMP	For each evidence request and response, information on the receivers Access Point (URL) and its certificates are needed. Each Member State hosts an SMP for this purpose. Before sending a request or response, the sending party queries the SMP of the receiver to get this info. For initial testing purposes the SMP may be hosted centrally to ease implementation (to be decided by WP5).
DNS & SML	As there are multiple SMP’s, the sending party needs to know where to find the SMP of the receiver to get the actual metadata. This location can be found in the centrally CEF-hosted DNS, that will be queried by the access point of the sending Member State.  DNS entries will be created from the registration of SMP’s: the SML, which is also centrally hosted by CEF.
eDelivery AS4 gateway	This component – also referred to as eDelivery access point – handles the secure transfer of the data, including encryption and

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Component	Short description of its use
	decryption as well as signing/sealing and validating signatures/seals.
DE4A Connector	The DE4A connector is the reference software that data requestors and data transferors can use to connect to the OOP TS. This eases the work by abstracting the communication with the components.

Please note that for the DBA pilot the information desk can be implemented as a simple configuration file (service URI needed to retrieving routing information from SMP). This is deemed appropriate by the DBA pilot for the MVP. No dynamic discovery is needed. Furthermore, as the data providers are business registers (just one data provider per Member State) it is acceptable to use this configuration file.

For the first pilot run the follow components do not need to be implemented:

- Issuing Authority Locator (IAL): DBA has just one fixed authority per Member State for the company data. The authority will be included in the metadata configuration file.
- Evidence Service Locator (ESL): no dynamic mechanism for locating and understanding the evidence service is required in the first pilot run. The participant will be known in advance and included in the ESL configuration file.
- Cross-border Access Authorisation Registry (CAAR): The CAAR helps the DP to check if the request has the required authorization. This is not needed for the MVP of the DBA pilot as the pilot network will be limited to just the pilot partners only. Furthermore only a limited set of real companies will be invited to participate in the pilot and the company information is to a large extent available to anyone . The DP's will not validate the DC's authorisation to request the information in the first pilot run. In the final pilot run, the DP's may validate the authority if needed to prevent non-participating authorities to avoid paying the fees for the company data.
- Multilingual Ontology repository (MOR): due to the harmonisation of evidence, DBA will not implement a translation mechanism. The attributes are well defined and understood by the data evaluators participating in the pilot. All data elements (attributes) of the Company data evidence will be transformed into the canonical evidence as defined in the DBA pilot. This means all labels of the data-elements will be in English. Some values will be translated into English as well, as for other elements there is no use in translation. E.g. the legal form of the company is Member State specific and will not be translated or transformed. In any case, translation and transformation will be done by the data owner in its data services.

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### 3.1.3 Requirements

The table below presents the requirements for the common application services in the OOP TS domain. Please note that the requirements for the second pilot run (not MVP) have been included as a sketch only (and have been greyed out). It is likely additional requirements for the second pilot run will be defined later on in the project.

Application Service	requirement	Iteration 1 MVP	Iteration 2 Final version
<b>Data Exchange Service</b>	Provides supports for requesting a specific (canonical) evidence type, where an evidence type is defined as a fixed collection of evidence data- elements.	Y	Y
	Supports evidence requests, including in the request the following data- elements: <ul style="list-style-type: none"> <li>• data evaluator</li> <li>• data evaluating Member State</li> <li>• company code (eIDAS LegalPersonIdentifier)</li> <li>• company name (eIDAS LegalName)</li> <li>• eIDAS natural person minimum dataset</li> <li>• data providing Member State</li> <li>• data provider</li> <li>• requested canonical evidence type</li> </ul>	Y	Y
	The request and the response are uniquely relatable.	Y	Y
	The exchange of evidence is uninterrupted. The user will wait online for the evidence to be available at the DC.	Y	Y
	The response message supports the Doing Business Abroad evidence type (XSD to be provided by WP3).	Y	Y
	The service response is either the evidence(success) or a failure message.	Y	Y
	The service supports functional and technical error codes in case of failed request processing.	Y	Y
	The endpoint to which the request will be sent is available 99,5% except for scheduled maintenance (mainly a responsibility of the data requestor)	N	Y
	The service provides a response within 10 seconds.The actual performance depends on several factors and should be assessed by performance testing.	N	Y
	The service supports encrypted exchange of the request and the response between Member States (DR & DT) as well as between DE & DR and between DT & DP. The service establishes a trust relation between DP and DC. If needed a certificate scheme is developed, managed and maintained.	Y	Y
Supports logging & audit trail of the following data: <ul style="list-style-type: none"> <li>• Data consumer</li> <li>• Data provider</li> <li>• Entity concerned (company id)</li> <li>• Evidence type (e.g. company registration evidence)</li> <li>• Hash of the evidence (not the evidence itself)</li> <li>• Date and time of exchange</li> <li>• Result (success, fail)</li> <li>• Reason for fail (...)</li> </ul>	N	Y	
<b>Inquire routing information</b>	Minimum functionality needed for correct routing on a technical level.	Y	Y

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Application Service	requirement	Iteration 1 MVP	Iteration 2 Final version
Message encryption	Basic message encryption	Y	Y
Message decryption	Basic message decryption	Y	Y
e-Signature Creation Service	Basic message signing / sealing	Y	Y
e-Signature Validation Service	Basic verification of signatures/seals	Y	Y

Although each eProcedure portal will implement the explicit request and preview function individually, the DBA pilot does define requirements for a common user interaction in the MVP.

Application Service	requirement	Iteration 1 MVP	Iteration 2 Final version
Evidence preview	Contains UX guidelines for the preview web page that Data Evaluators need to implement in their system: <ul style="list-style-type: none"> <li>The preview allows the user to optionally view the evidence retrieved.</li> <li>The preview is able to display the Doing Business Abroad evidence type.</li> <li>The preview allows the user to accept or deny the evidence transfer.</li> <li>The UX guidelines specify the user interaction components (button or checkbox, placement of text with relation to interaction components...)</li> <li>The UX guidelines specify the visual design requirements (font, colour, images, ...)</li> <li>Contains text that needs to be displayed to inform user about the preview.               <ul style="list-style-type: none"> <li>The text is compliant to legal requirements (SDG, pilot situation, ...)</li> <li>The text is compliant to user centricity requirements (understandable, ...)</li> </ul> </li> <li>Include wireframes (GUI mockups)</li> </ul>	Y	Y
	The Preview service should be available as reference software (to be implemented by data evaluator or data requestor).	N	Y
	The preview allows an 'image' data element to be shown to the user, e.g. an image of the original document (formatted data).	N	Y
	The preview allows for smart formatting of structured data with plugins provided by the data provider (including company logo, etc.).	N	Y
	The preview allows the user to select a reason for denial (e.g. error in data).	N	Y
	The preview provides for a feedback mechanism to the data provider in case there is an error in the data.	N	Y
	The preview has logic for handling legal exceptions to the preview obligation, meaning that the preview will only be offered in cases that this is required by SDGR.	N	Y
	Explicit request	Contains UX guidelines for the explicit request web page that Data Evaluators need to implement in their system:	Y

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Application Service	requirement	Iteration 1 MVP	Iteration 2 Final version
	<ul style="list-style-type: none"> <li>The GUI allows the user to proceed with the evidence retrieval or to select an alternative channel (the previous existing in-person procedure).</li> <li>The UX guidelines specify the user interaction components (button or checkbox, placement of text with relation to interaction components...)</li> <li>The UX guidelines specify the visual design requirements (font, colour, images, ...)</li> <li>Contains text that needs to be displayed to inform user about the explicit request.               <ul style="list-style-type: none"> <li>The text is compliant to legal requirements (SDG, pilot situation, ...)</li> <li>The text is compliant to user centricity requirements (understandable, ...)</li> </ul> </li> <li>Include wireframes (GUI mockups)</li> </ul>		
	The Explicit Request service should be available as reference software (to be implemented by data evaluator or data requestor).	N	Y
	Supports logging & audit trail of the following data: <ul style="list-style-type: none"> <li>Data consumer</li> <li>Data provider</li> <li>Entity concerned (company id)</li> <li>Evidence type (e.g. company registration evidence)</li> <li>Date and time of explicit request</li> <li>Result (approved, denied)</li> <li>Reason for denial (...)</li> </ul>	N	Y
	The explicit request GUI and reference software have logic for handling legal exceptions that exist for an explicit request, meaning that the option to explicit request will only be offered in cases that this is required by SDGR.	N	Y

### 3.1.4 Component implementation

CEF hosts a central DNS & SML that is widely in use today. DBA expects DE4A to use these components as well. The Evidence service locator (ESL) configuration file, SMP, eDelivery AS4 gateway and DE4A Connector need to be implemented and hosted by the data requestors and data transferors.

### 3.1.5 Expected logical interfaces

Component	Expected interface
Evidence service locator (ESL) configuration file	IN (from DE4A connector to ESL configuration file): <ul style="list-style-type: none"> <li>Member State</li> <li>Canonical evidence type</li> </ul> OUT from ESL configuration file to DE4A connector): <ul style="list-style-type: none"> <li>participant ID</li> </ul>

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Component	Expected interface
SMP	IN (from DE4A connector to SMP): <ul style="list-style-type: none"> <li>- Participant ID</li> </ul> OUT (from SMP to DE4A connector): <ul style="list-style-type: none"> <li>- Service URL</li> <li>- Certificate to use</li> </ul>
DNS & SML	IN (from DE4A connector to DNS): <ul style="list-style-type: none"> <li>- Member State</li> <li>- Participant ID</li> </ul> OUT (from DNS to DE4A connector): <ul style="list-style-type: none"> <li>- SMP location</li> </ul>
eDelivery AS4 gateway	IN (from DE4A connector to eDelivery AS4 gateway): <ul style="list-style-type: none"> <li>- evidence request</li> </ul> OUT (from eDelivery AS4 gateway to DE4A connector): <ul style="list-style-type: none"> <li>- Evidence response</li> </ul>
DE4A Connector for locating the data owner <sup>15</sup>	IN (from data evaluator to DE4A connector): <ul style="list-style-type: none"> <li>- Data providing Member State</li> <li>- Requested evidence type</li> </ul> OUT (from DE4A connector to data evaluator): <ul style="list-style-type: none"> <li>- Data provider ID</li> </ul>
DE4A Connector for requesting the evidence	IN (from data evaluator to DE4A connector): <ul style="list-style-type: none"> <li>- Data evaluator ID</li> <li>- Requested evidence type</li> <li>- Company identification (eIDASLegalPersonID, eIDASLegalName)</li> <li>- Data provider ID</li> </ul> OUT (from DE4A connector to data evaluator): <ul style="list-style-type: none"> <li>- Evidence (XML)</li> </ul>

<sup>15</sup> The data evaluator needs to contact the DE4A connector twice: (1) to request the ID of the data owner and (2) to request the evidence from the data owner.

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## 3.2 DC-specific solution

The DC specific solution is different for every DC. The DC specific solution architecture will be specified in the design document of the pilot processes (one for each data consumer – to be included in the D4.6 deliverable). Nonetheless the DC-specific solution at a higher level of abstraction show similarities.

The DC specific architecture consists of the evaluator and requestor specific services. The requestor specific services are typically implemented at Member State level.

The data evaluator:

- Integrates with the OOP TS via the DE4A connector
- Orchestrates logic (invoke eIDAS and OOP TS)
- Manages explicit requests
- Creates and sends evidence requests
- Receives evidence
- Manages previews, approval and denial, including deletion of the evidence
- Checks the evidence
- Allows for completion by the user if needed
- Submits and validates the application for company registration
- Returns acknowledgement of receipt to the user
- Manages errors

The data requestor:

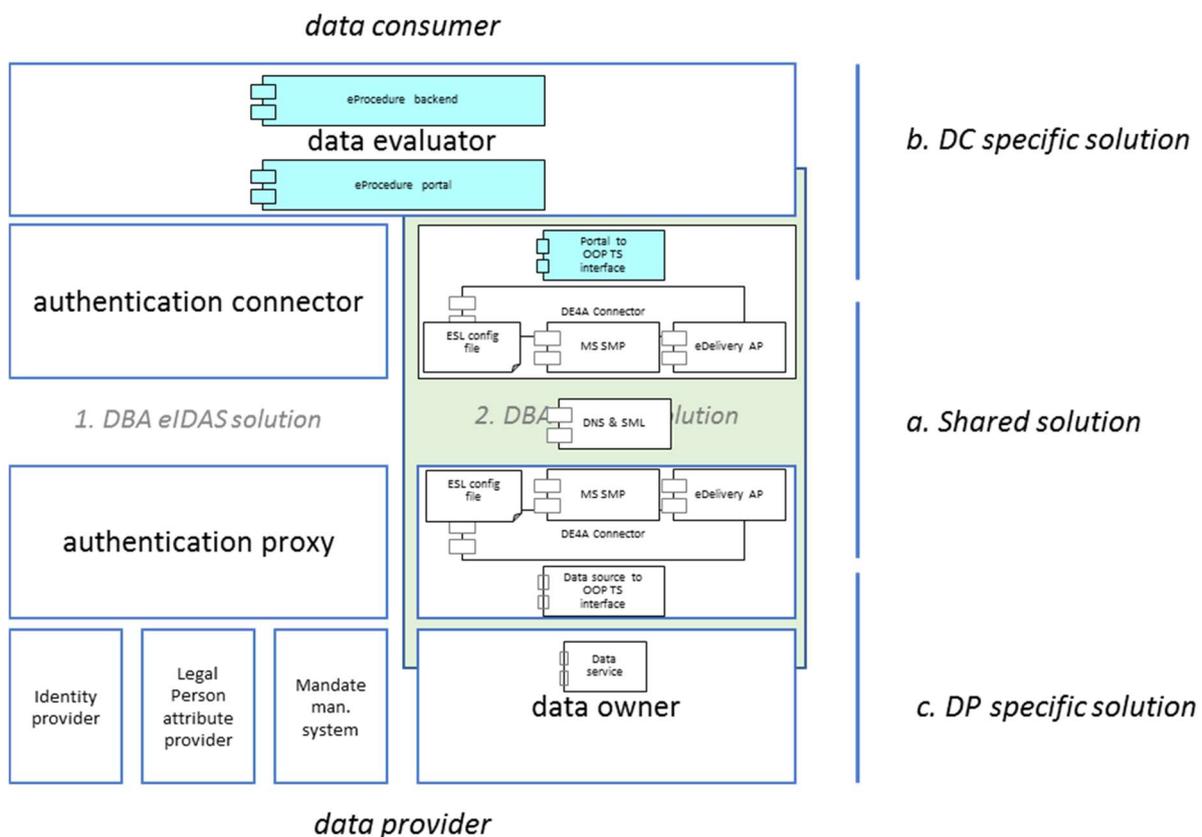
- Interacts with the information desk
- Parses the evidence request and response
- Encrypts and decrypts the request & response
- Manages errors

### 3.2.1 Process realization

Process	Application service	Components
Establish user identity	Identity/record matching	eProcedure backend
Redirect user to another channel	Alternative channel	eProcedure portal
Prepare preview	Evidence preview	eProcedure portal
Evaluate evidence	Evidence status tracker Requirements/evidence matching	eProcedure portal
Delete evidence	Evidence shredder	eProcedure portal
Request public service	eProcedure initiation	eProcedure portal
Abort eProcedure	eProcedure termination	eProcedure portal
Request OOP transfer of evidence	Explicit request	eProcedure portal portal to OOP TS interface
Follow evidence status	Evidence status overview	eProcedure portal

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		portal to OOP TS interface
Preview evidence	Evidence preview	eProcedure portal
Receive acknowledgement of receipt	eProcedure confirmation	eProcedure portal portal to OOP TS interface
Submit eProcedure	eProcedure submission	eProcedure portal
Receive public service result	receive (public) service result	eProcedure portal



### 3.2.2 Component description

Component	Short description of its use
eProcedure portal	The eProcedure portal should be adapted to support the use of the cross-border evidence in the process. For that purpose it should facilitate the user in the OOP-process and connect to the OOP TS. Connection to the OOP TS is typically implemented via a Portal-to-OOP TS-interface that may utilise national OOP-protocols and infrastructure.
eProcedure backend	The eProcedure backend handles all eProcedure specific logic. For the DBA pilot this backend functionality basically remains

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Component	Short description of its use
	unchanged. One addition to the backend may be the record matching on the company (for companies registered prior to the pilot) <sup>16</sup> .
Portal to OOP TS interface	Member States may (but do not need to) implement an interface from national OOP protocols to the DE4A data model (DE4A connector). Such an interface guarantees that the data evaluator can use the same (national) OOP protocols and services for cross-border use as well.

### 3.2.3 Requirements

The requirements below need to be implemented by the data evaluator and/or data requestor.

Application Service	requirement	Iteration 1	Iteration 2
		MVP	Final version
<b>eProcedure Initiation</b>	The eProcedure portal has web page with the option to start the eService to pilot.	Y	Y
	The eProcedure portal is connected to (national) OOP TS.	Y	Y
<b>eProcedure termination</b>	The eProcedure portal has web page with information on the termination of the eService mentioning the alternative channel.	Y	Y
<b>eProcedure save and resume</b>	Not to be implemented by DBA		
<b>eProcedure confirmation</b>	The eProcedure portal confirms use of the evidence received to the user.	Y	Y
<b>eProcedure submission</b>	The eProcedure portal has web page to inform user that it applies for the eService when proceeding. The representative should be made aware that confirmation has legal consequences for the company involved.	Y	Y
<b>Alternative channel</b>	The eProcedure portal has a web page stating that the alternative channel is out of scope for the pilot.	Y	Y
<b>Procedural requirements determination</b>	The eProcedure portal implements requirements validation in case that's required for the eProcedure, e.g. validate whether the company concerned is up and running and didn't file for bankruptcy.	Y	Y
<b>Requirements/evidence matching</b>	The DBA pilot will probably use just one canonical evidence, so no evidence matching is required.	-	-
<b>Available evidence determination</b>	The eProcedure portal checks whether the portal's registry has the company information available already (in that case it will not retrieve the evidence again). This may happen when a company wants to apply for a another eService at this eProcedure portal.	Y	Y

<sup>16</sup> This is required for eProcedure portals that have companies registered already without the eIDASLegalPersonID (probably BE and AT). SE and RO choose to start with an empty company registry for piloting and therefore don't need record matching. NL examines the possibility to add the eIDASLegalPersonID to all foreign companies prior to the pilot start. If successful, NL does not need record matching either.

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Application Service	requirement	Iteration 1	Iteration 2
		MVP	Final version
<b>Evidence status overview</b>	The eProcedure portal shows whether evidence retrieval has been successful or failed.	Y	Y
	The eProcedure portal shows more detailed information on status of evidence exchange.	N	Y
	In case of a fail: the eProcedure shows information on the reason for non-availability of the evidence.	N	Y
<b>Evidence request tracker</b>	Session management to be implemented by eProcedure portal to make sure each request receives a response.	Y	Y
<b>Evidence shredder</b>	eProcedure portal specific function to delete all received data.	Y	Y
<b>Evidence status tracker</b>	Provides information on success and failure only.	Y	Y
	Provides more detailed information on the reason for failing.	N	Y
<b>Explicit request</b>	The data evaluator implements the UX guidelines to be provided by WP5	Y	Y
	The data evaluator may implement the explicit request component to be provided by WP5.	N	Y
<b>Evidence preview</b>	The data evaluator implements the UX guidelines to be provided by WP5	Y	Y
	The data evaluator may implement preview component to be provided by WP5.	N	Y
<b>Identity/record matching</b>	The data evaluator may implement a function for checking whether the company has been registered at the company portal prior to pilot start. These companies cannot be found by their eIDASLegalPersonIdentifier and should be matched using their legal name (and possibly one or more user provided attributes).	Y	Y

### 3.2.4 Component implementation

This section is fully DC-specific. Please refer to the detailed process design documents.

### 3.2.5 Expected logical interfaces

This section is fully DC-specific. Please refer to the detailed process design documents.

## 3.3 DP-specific solution

The DP specific solution consists of the data provider's data service and the connection of this data service to the OOP TS. The DP specific solution consists of:

#### 1. Data owner specific services:

The application services that are specific to a single data owner. The DBA pilot intends to agree on the definition of one evidence type for use case 1 that all data providers can provide and data evaluators will use. Providing the attributes of this evidence type might need adaptation of current

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data services. Furthermore, the data owner needs to connect its data services to the national OOP TS components.

## 2. Data Transferor specific services:

The Member State specific parts of eIDAS and the OOP TS that may be needed for integration of eIDAS and the OOP TS into current national OOP-networks (if applicable).

The data owner:

- Integrates to the OOP TS
- Receives and validates the evidence request
- Extracts evidence
- Creates and sends evidence response
- Manages errors

The data transferor:

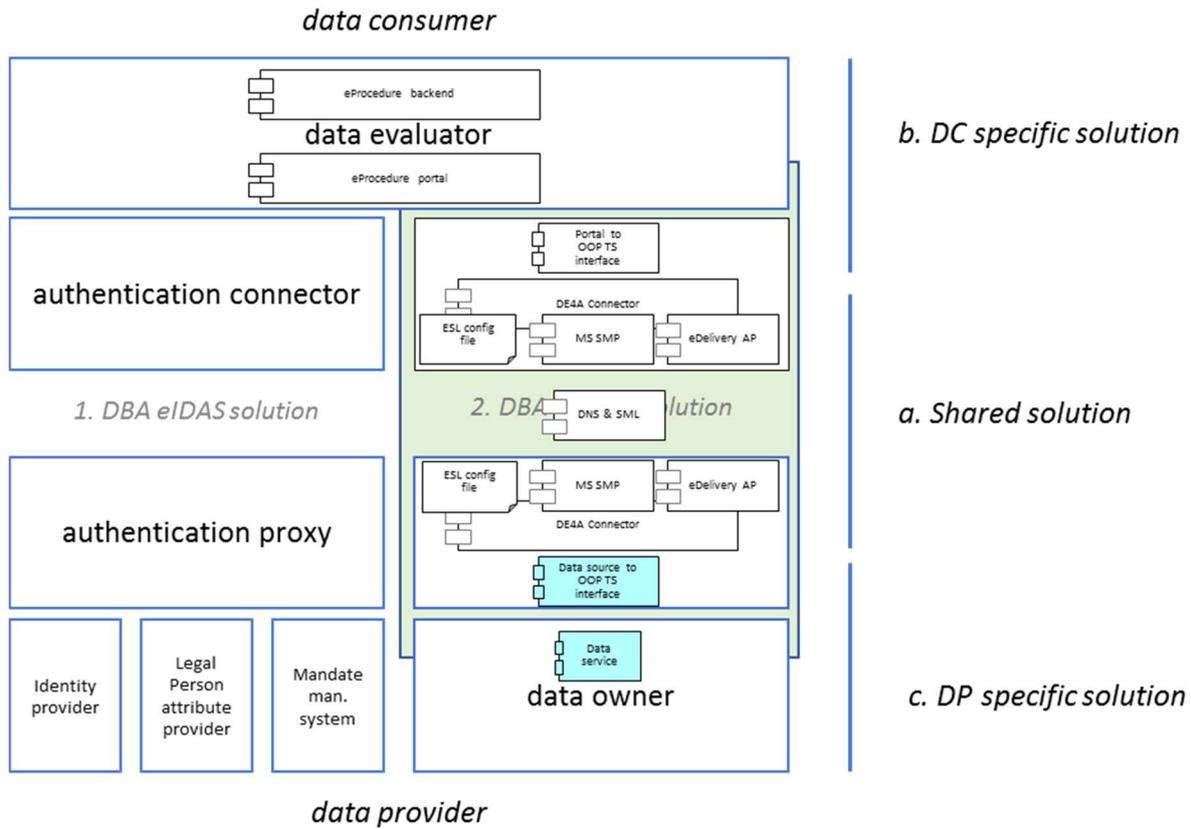
- Interacts with the information desk
- Parses the evidence request and response
- Encrypts and decrypts the request & response
- Manages errors

### 3.3.1 Process realization

Message encryption/decryption and e-signature in the table refer to the encrypting and signing of messages between the data transferor and data owner and is considered as national infrastructure.

Process	Application service	Components
Evaluate evidence request	Data exchange service Message decryption e-signature verification and validation	Portal to OOP TS interface
Extract evidence	Evidence lookup	Data service
Transfer evidence	Data exchange service Message encryption eSignature creation service	Portal to OOP TS interface

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### 3.3.2 Component description

Component	Short description of its use
Data service	The webservice of the data provider that will output the evidence requested.
Data service to OOP TS interface	Member States may (but do not need to) implement an interface from national OOP protocols to the DE4A data model (DE4A connector).

### 3.3.3 Requirements

The table below presents the requirements for the DP-specific part of the solution. These requirements need to be fulfilled by the data owner and/or data transferor.

Application Service	requirement	Iteration 1	Iteration 2
		MVP	Final version
<b>Evidence lookup</b>	Adapt the DP data service to provide the DBA canonical evidence.	Y	Y
	Connect the data service to the OOP TS.	Y	Y
<b>Message decryption</b>	Basic message decryption for decrypting messages from the data transferor to the data owner and vice versa.	Y	Y

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Application Service	requirement	Iteration 1 MVP	Iteration 2 Final version
<b>Message encryption</b>	Basic message encryption for encrypting messages from the data transferor to the data owner and vice versa.	Y	Y
<b>eSignature creation service</b>	Basic message signing / sealing	Y	Y
<b>eSignature verification and validation service</b>	Basic eSignature / eSeal verification	Y	Y

### 3.3.4 Component implementation

This section is fully DP-specific. Please refer to the detailed process design documents.

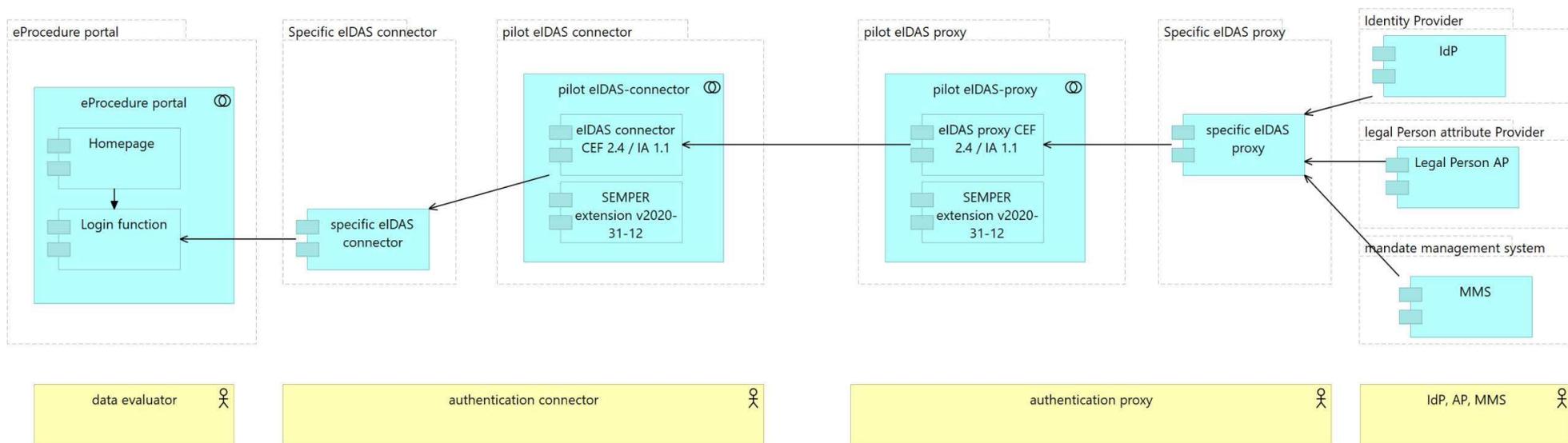
### 3.3.5 Expected logical interfaces

This section is fully DP-specific. Please refer to the detailed process design documents.

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## 4 Appendix: archimate component diagrams

### 4.1 DBA eIDAS solution architecture



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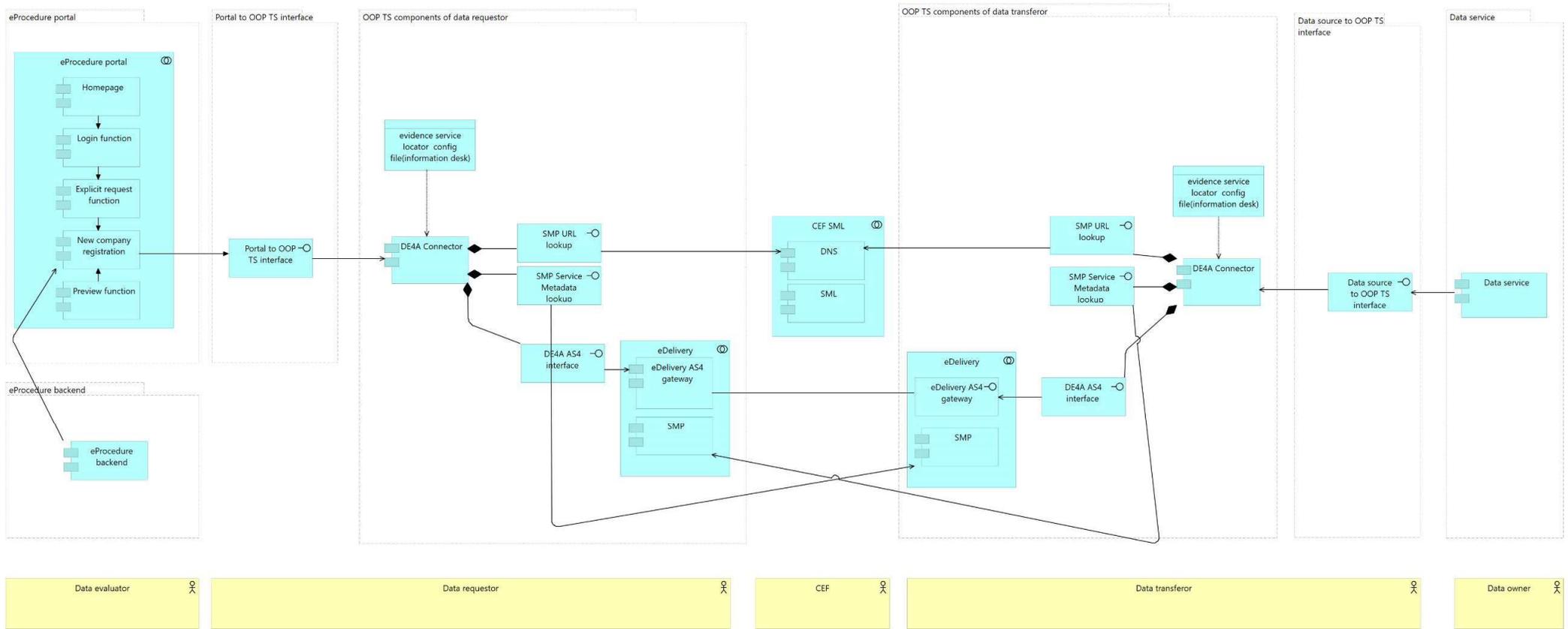
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## 4.2 OOP TS solution architecture



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