Flanders

Solution Architecture Template for Flanders' Agency for Domestic Affairs in the context of a data space and Linked Data (LDES)

Guidelines to finalise the partial solution model

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LIST OF ABBREVIATIONS

ABB	Architecture building block
API	Application programming interface
DBC	Digital business capability
DL-SAT	Detail-level solution architecture template
DPS	Digital public service
EIF	European Interoperability Framework
ELAP	European library of architecture principles
iTestBed	Interoperability Test Bed
LBLOD	Local decisions as linked open data
LV	Legal view
OV	Organisational view
SAT	Solution architecture template
SBB	Solution building block
SV	Semantic view
TV	Technical view
TVA	Technical view - application
TVI	Technical view - infrastructure
VAT	Value-added tax
VSDS	Vlaamse smart data space
WAN	Wide area networking

This document constitutes the guidelines to finalise the partial solution model developed during the intervention for the Flanders' Agency for Domestic Affairs **"Solution Architecture Template (SAT) for Flanders' Locally Taxes data space".**

1 INTRODUCTION

In February 2024, DG DIGIT initiated the intervention supporting the Flemish project Locally Taxed initiated by the Flemish Agency for Domestic Affairs. The intervention was focused on creating a SAT in the context of a data space. A smart use of local tax decisions is generated from more than 3,000 local governments within the Flanders region and is exchanged with the Flanders Government through a data space. This data is re-used in order to provide centralised information on local taxes and fiscal responsibilities to citizens across Flanders municipalities. The SAT developed during the project ensures that the data space is interoperable, thereby enhancing the exchange of local tax data between the municipalities and the central Flanders Government.

This document provides recommendations for finalisation of the partial solution design model and guidelines for future upscale of the model from a legal, organisational, semantic, and technical (application and infrastructure) perspective.

1.1 Key concepts of EIRA© & eGovERA©

Below is detailed the general terminology that is crucial for the overall understanding of the models:

- An **Architecture Building Block (ABB)** is a **fundamental concept** of the architecture that describes a single aspect of the overall model, including the characteristics and functionalities of an intermediate level of detail that are necessary for achieving interoperability in a conceptual manner. ABBs outline what needs to be done to facilitate interoperability but do not specify how it should be implemented. In the model, ABBs can be distinguished because they are written in normal font.

- A **Solution Building Block (SBB)** are specific technologies, standards, or products that can be used to implement the functionalities described by the ABBs. SBBs can be distinguished because they are written in bold font and in cursive letters.

1.2 Structure of the partial solution design model

The LBLOD-VSDS Locally Taxed partial solution design model is composed of the five eGovERA© views, based on the European Interoperability Framework (EIF) layers. The views of the model are the following:

- Architectural Principles View

- Legal View

- Organisational view

- Semantic view

- Technical view – application

- Technical view – infrastructure

The following sections intend to guide through each of the model views providing guidance and recommendations on how the partial solution design model needs to be completed for both finalisation and scale-up.

2 ARCHITECTURAL PRINCIPLES VIEW

This view sets the architecture principles part of the European Library of Architecture Principles (ELAP) that should be realised to achieve interoperability in digital public services. In addition, the view includes European Data Sharing principles which are a set of guidelines established by the European Union to promote the responsible and secure sharing of data among organisations. The "not implemented architecture principles catalogue" contains the principles that are not applicable to the specific digital public service including a rationale for its non-applicability.

The architectural principles view looks simple, but it is of critical importance in the success of the implementation of the solution.

2.1 Suggestions for finalisation

The architectural principles view is completed. No finalisation works are needed.

2.2 Recommended scale-up works

1. If in the future a decision is taken on connecting the data space with other regions within Belgium, it is recommendable to include the Architecture Principle on "**Multilingualism**" as applicable to the model (currently it is placed as non-applicable).
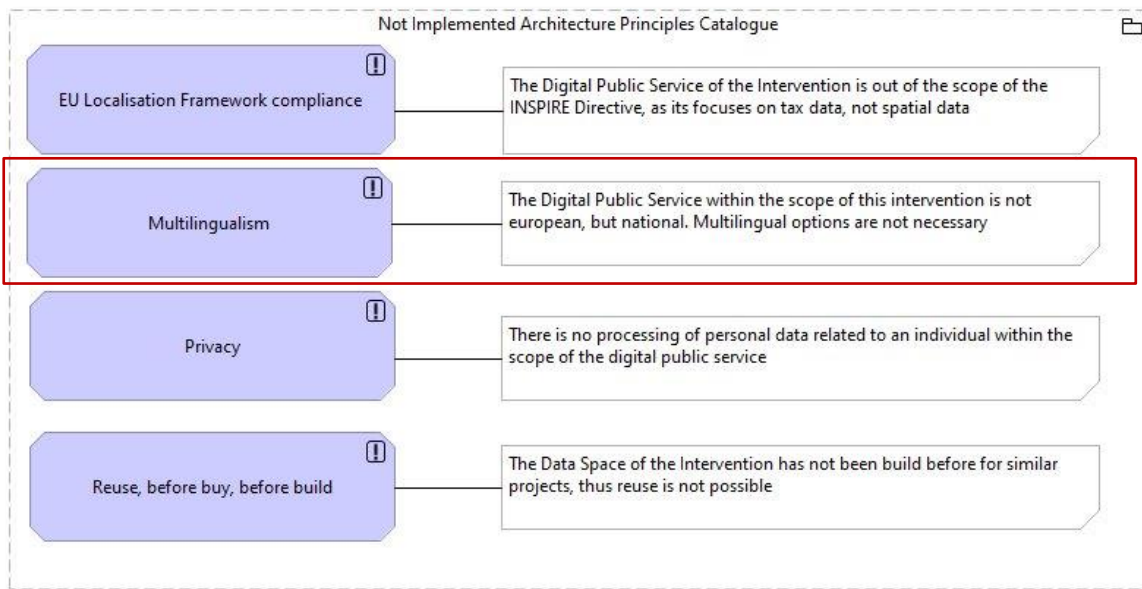

Figure 1. *Architectural Principles view* viewpoint within the Legal view

3 LEGAL VIEW

The legal view sets the legal basis that should be met to achieve legal interoperability (*Shared Legal Content*). More concretely, the view includes:

- **Legal agreements**. Contracts enabling collaboration between digital public services cross legal jurisdictions. They include the specialisation of *Legal Interoperability Agreements*, focused on formalising governance rules enabling collaboration between digital public services.

- **Public policies**. Main public policies *(Tax Cooperation and Control Public Policy, Tax Fraud and Tax Evasion Public Policy, Company Tax Public Policy, National VAT Rules Public Policy)* and their specific objectives which are formulated and implemented with the help of Legal Acts.

- **Legal Acts.** Legislation at European and regional level (Flanders) are placed in *Legal Clauses*, which are the requirements that are contained in a legal document. Legal acts are mapped in the *LV-Binding power and jurisdiction* viewpoint and are classified into National/European, Binding/Non-binding, interoperability dimensions (structural, governance, behavioural) and business agnostic/domain specific/use case specific. Legal acts at national (Belgium) and local (municipality) level have not been included as agreed with Flanders stakeholders during the pilot project.

3.1 Suggestions for finalisation

The Legal view is completed. No finalisation works are needed.

3.2 Recommended scale-up works

1. To ensure the model is as future-proof, adaptable, and scalable as possible **regular maintenance and updating of decisions and legal acts** applicable to the service at regional level must be performed.
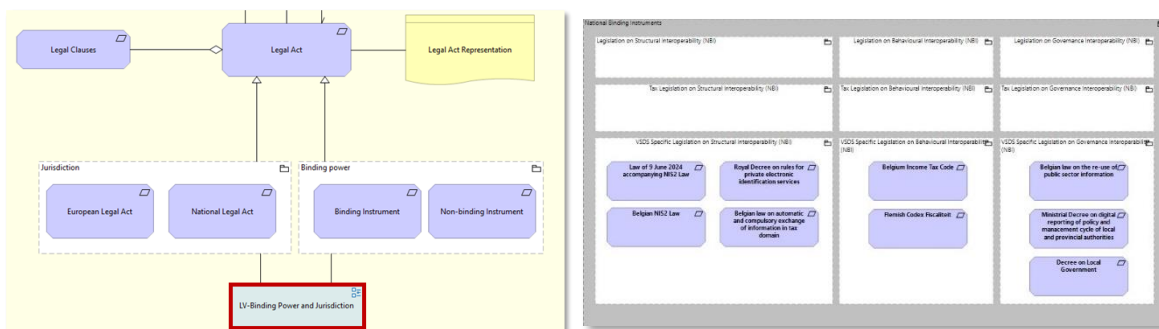

Figure 2. *LV-Binding Power and Jurisdiction* viewpoint within the Legal view

4 ORGANISATIONAL VIEW

The organisational view sets the basis that should be accomplished to achieve organisational interoperability (*Shared Organisational Content*). More concretely, the view includes:

- **Organisational agreements**. Contracts enabling any agreement to which the Public Administration or any intermediary is a party pursuant, including *Organisational Interoperability Agreements*. The solution model includes the viewpoint *OV-Organisational Agreements* mapping the business agnostic, domain and use case specific organisational agreements (supported by specific solutions).

- **Frameworks**. Interoperability, security and privacy frameworks that realise and influence the *Digital Governance Plan* included in the *Organisational Governance Content*.

- The **Digital Business Capabilities (DBCs)**. Capabilities your solution will need to implement to perform a specific function. The view includes the viewpoint *OV-Digital Business Capabilities Catalogue* detailing the business agnostic, domain and use case specific capabilities.

- The **Digital Public Services (DPSs).** Digital public services your solution will use and develop that are delivered according to the *Digital Public Service Delivery Model*. The view includes the viewpoint *OV-Digital Public Services Catalogue* detailing the business agnostic, domain and use case specific services applicable to the use case.

- **Information**. Business facts, assets, or opinions your solution will provide, require and manage that are exchanged in the context of the digital public services. The view includes the viewpoint *OV-Information Base* detailing the business agnostic, domain and use case services applicable to the use case.

4.1   Suggestions for finalisation

To finalise this view, it is recommended to:

1. Add applicable **Organisational Agreements SBBs,** if existing, regulating tax data exchanges across municipalities (currently only ABBs are mapped).
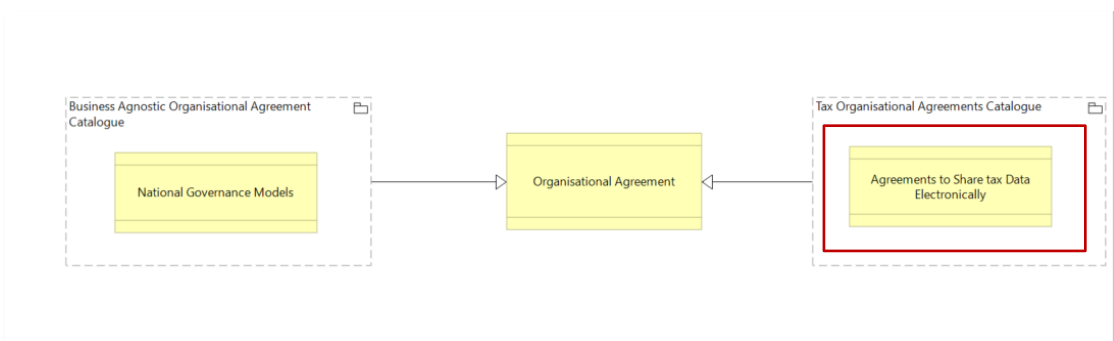

Figure 3. OV-*Organisational Agreements* viewpoint within the Organisational View

4.2   Recommended scale-up works

If in the future, a decision is taken to wider the scope of the model, it is recommended to update the Organisational View to the new context:

1. Add **Digital Business Capabilities** and **Digital Public Services** in case the scope of the data space is broadened to support other functionalities (i.e., tax calculator, use of artificial intelligence).
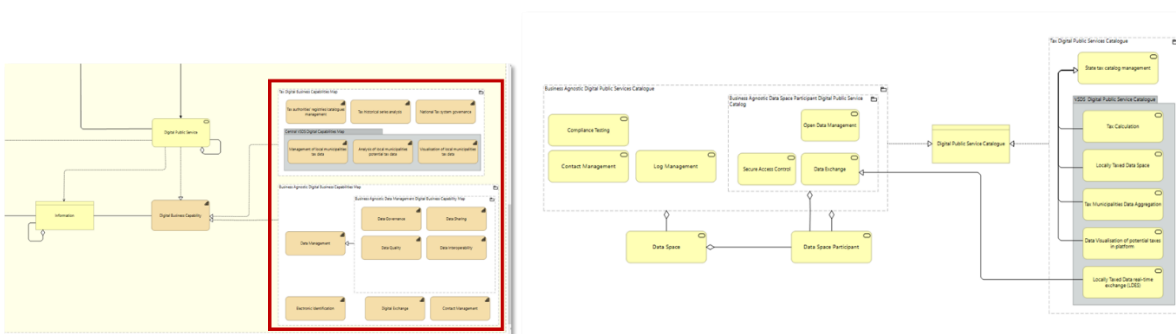

Figure 4. *Digital Business Capabilities Catalogue* and *Digital Public Services Catalogue* within the Organisational View

2. If the OSLO Model is modified or extended, it is recommendable to update the **Information view point** accordingly, as the OSLO Model has been used as the basis for the development said view point.
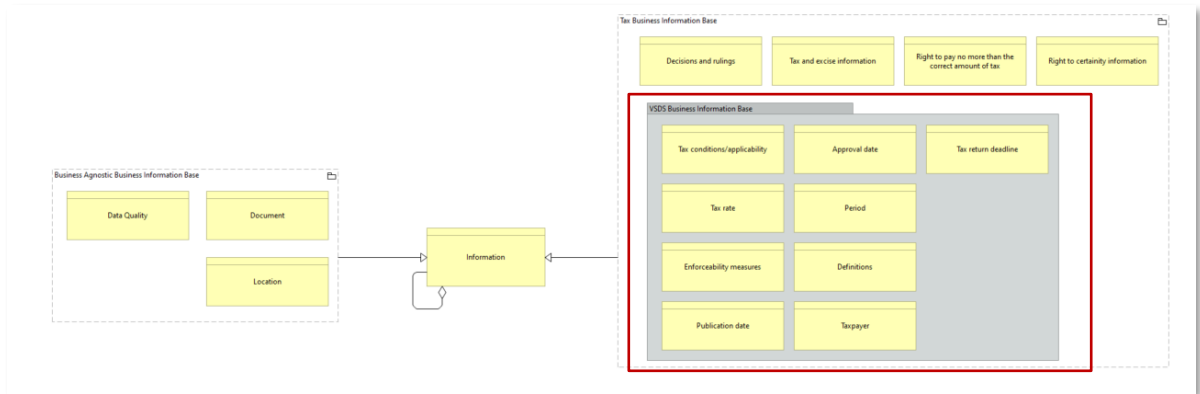

Figure 5. OV–Information Base viewpoint within the Organisational view

5   SEMANTIC VIEW

The semantic view sets the basis to accomplish knowledge interoperability *(Shared Knowledge Content).* More concretely, the view includes:

- **Semantic agreements**. Contracts that establish the common ontology or vocabularies that are the result of a matching or mapping process that is used to resolve the semantic discrepancies. They also consider *Semantic Interoperability Agreements*, which are a specialisation of *Semantic Agreements*. The view includes the viewpoint *SV- Semantic Agreements* detailing Data Space Semantic Agreements applicable to the case.

- **Data policies**. *Data Policies* are guiding frameworks in which data management can operate. Specific cases are mapped in the solution model, i.e., Open Data Policy, Security Policy, Permission Policy.

- **Data**. Data objects containing symbols obtained through an encoding process of business information or a legal act. In this view, the specialisations of *Data are* included such as *Metadata, Data model, Controlled Vocabularies,* and *Data Syntax* or *Data Format. Data mapping* and *Data representation* are also included.

- **Dataset and Dataset catalogues**. Datasets aggregate the data included (*Vlandereen Fiscal OSLO Model*). The view includes a few viewpoints (e.g. *SV-Datasets Catalogue [Traceability]*) detailing the datasets to be shared within the dataspace between data providers and consumers.

5.1   Suggestions for finalisation

The semantic view has been shared and constructed together with the representatives of the Flanders' Domestic Agency. Thus, most of the ABBs and SBBs have been already adjusted during the working sessions conducted during the intervention. No finalisation works are required in this view.

5.2 Recommended scale-up works

Increasing the granularity of dataset that municipalities are required to share within data spaces could define the minimum fields that data providers must include. To clarify these requirements, the *Municipality Dataset Catalogue* should be expanded:

1. Add the SBBs for the **Dataset "Municipality Dataset Catalogue"**, providing additional granularity to the model.
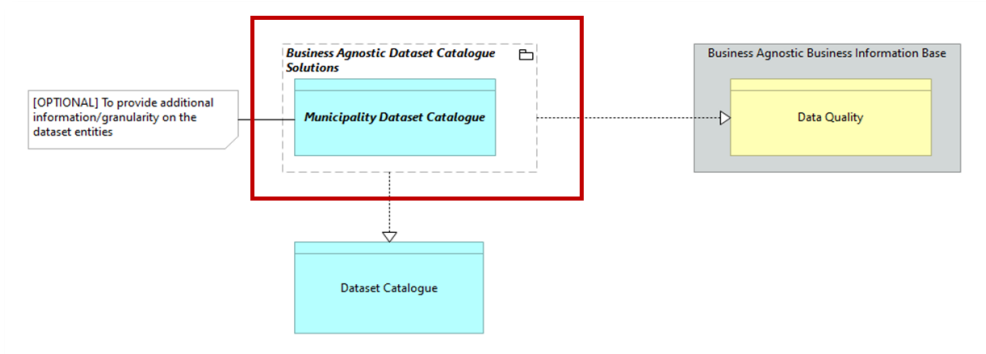

Figure 6. *SV-Datasets Catalogue [Traceability]* viewpoint within the Semantic view

6 TECHNICAL - APPLICATION VIEW

The technical application view sets the basis that Flanders should accomplish to achieve **application interoperability** (*Shared Application Content*). More concretely, the view includes:

- **Technical Agreements**. Includes *Technical Interoperability Agreements* and *Service Level Agreements.* The mapping of the agreements is included in the *TV-Technical Agreements* viewpoint. The view already includes the identified *Identity and Access Management Technical Interoperability Agreement Solutions, API Technical Interoperability Agreement Solutions,* and *Data Format, Representation and Syntax Solutions*.

- **Interoperable Digital Solution.** Includes the *Application Presentation enablers* of the target solution as well as the different solution services to achieve business digital services.

- **Shared Platform** puts together the Technical Application Enablers which the Central VSDS and Municipalities should use as part of the solution. It is built of three sets:

  - *Central VSDS/Municipalities Shared Platform* which corresponds to shared enablers considered in both sides (Central VSDS and Municipalities).

  - *Central VSDS,* corresponds to the enablers to be considered only in the Central VSDS*.

  - *Municipalities,* corresponds to the enablers to be considered only in Municipalities.

6.1 Suggestions for finalisation

1. In *Data Integration Solutions*, select or complement with a **data Integrations solution** used for preparing the data to be transmitted within de data space in the *TVA-Data Management Enablers* viewpoint
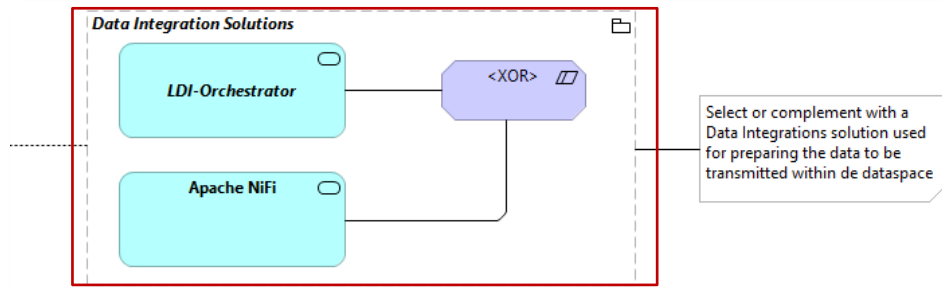
Figure 15. *TVA-Data Management Enablers [Traceability] viewpoint within the technical application view*

6.2 Recommended scale-up works

No scale-up works are needed.

7 TECHNICAL - INFRASTRUCTURE VIEW

The technical view – infrastructure sets the basis that to ensure infrastructure interoperability (*Shared Infrastructure Content*). More concretely, the view includes:

- **Technical Agreements**. (Same viewpoint as Technical – Application view). Includes *Technical Interoperability Agreements* and *Service Level Agreements.* The mapping of the agreements is included in the *TV-Technical Agreements* viewpoint. The view already includes the identified *Identity and Access Management Technical Interoperability Agreement Solutions, API Technical Interoperability Agreement Solutions,* and *Data Format, Representation and Syntax Solutions*.

- **Technology Interface,** defines the different technical interfaces which are required in order to expose or consume the technical services exposed by the solution. Moreover, **Computing Hosting, Networking, and Data Hosting Infrastructure** defines the infrastructure enablers to be considered as part of the solution. They are grouped by two locations:

    - **Central VSDS Flanders Location,** corresponds to the infrastructure enablers and services to be considered in the Central VSDS.

    - **Municipality,** corresponds to the infrastructure enablers and services to be considered in the Municipalities.

- **Cloud Computing Facility and On-Premise Facility**. This defines where the solution will be deployed, or the provider for the infrastructure. This is also divided into Central VSDS and Municipalities.

- **Wide Area Networking**. Defines the WAN networks used by the solution with the corresponding standards.

7.1 Suggestions for finalisation

1. *TVI-Cloud Computing Infrastructure Enablers [Traceability]* has been created as an example if a municipality uses public cloud for the infrastructure. If so, **select or complement with a new vendor and remove the others**. If cloud computing is not used, remove all the solutions of this view.
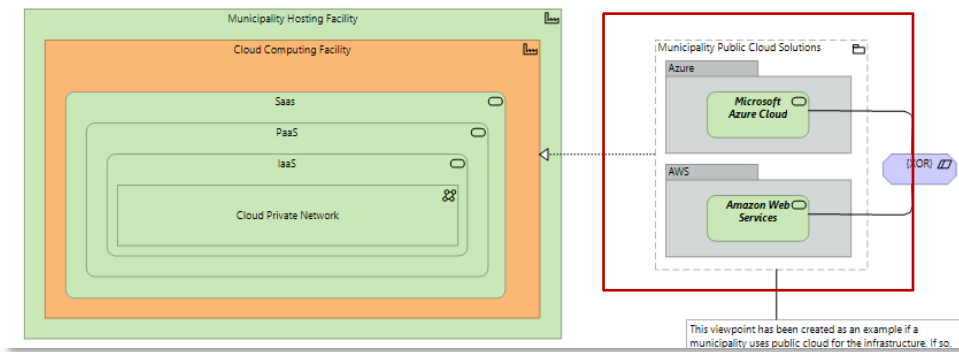
Figure 18. *TVI-Cloud Computing Infrastructure Enablers [Traceability]* viewpoint within the technical infrastructure view

2. Select or complement with the **official container registry solutions** used by the Flanders' government in the *TVI-Containers Infrastructure Enablers [Traceability]* viewpoint.
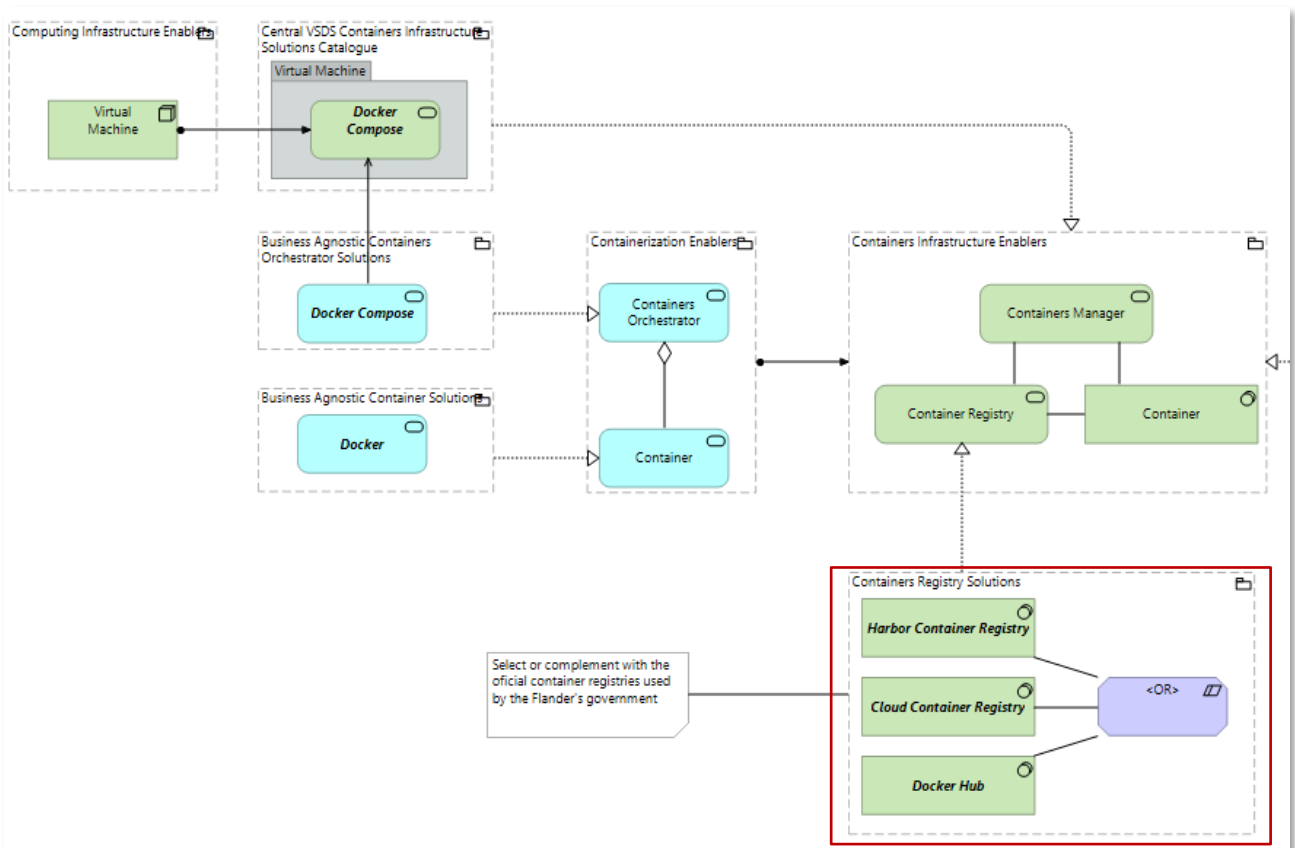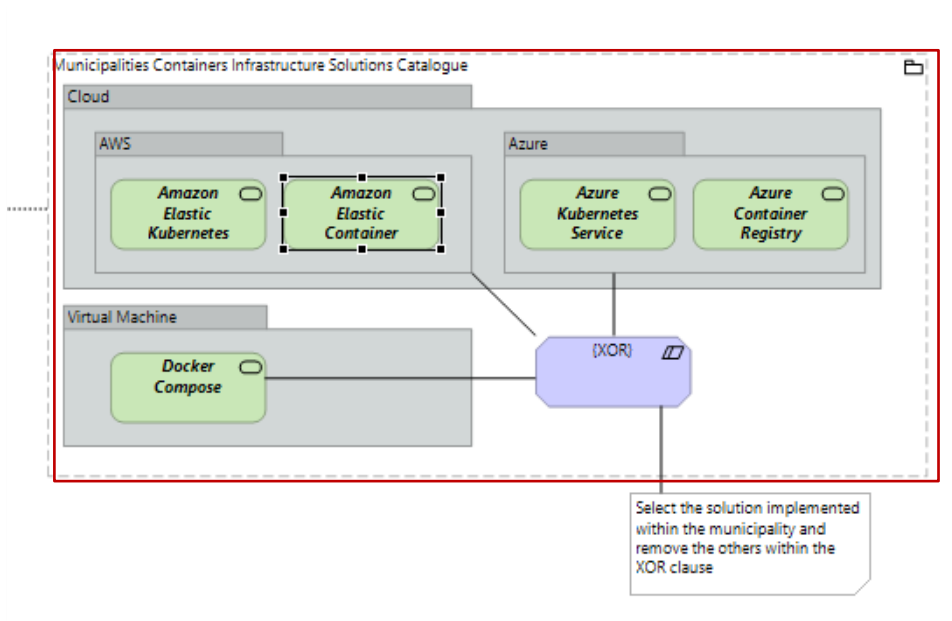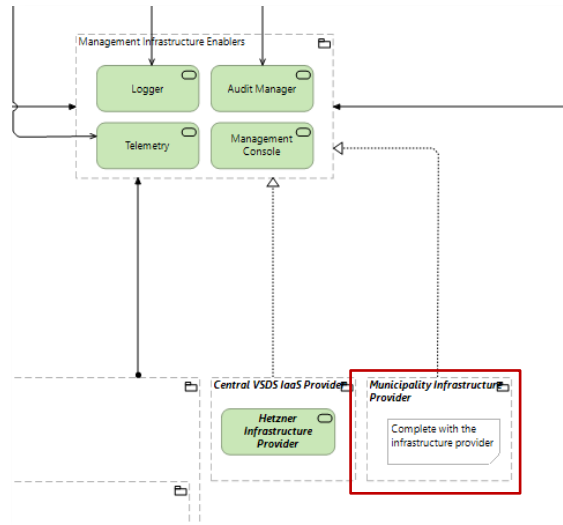

Figure 19. *TVI-Containers Infrastructure Enablers [Traceability]* viewpoint within the technical infrastructure view

3. In the *TVI-Containers Infrastructure Enablers [Traceability]* viewpoint, **select the solution implemented** within the municipality and remove the others within the XOR clause.

Figure 20. *TVI-Containers Infrastructure Enablers [Traceability]* viewpoint within the technical infrastructure view

4. In the *TVI-Data Management and Knowledge Discovery Infrastructure Enablers [Traceability]* viewpoint, **select the type of your databases** and complete with the SBB corresponding to your database implementation.
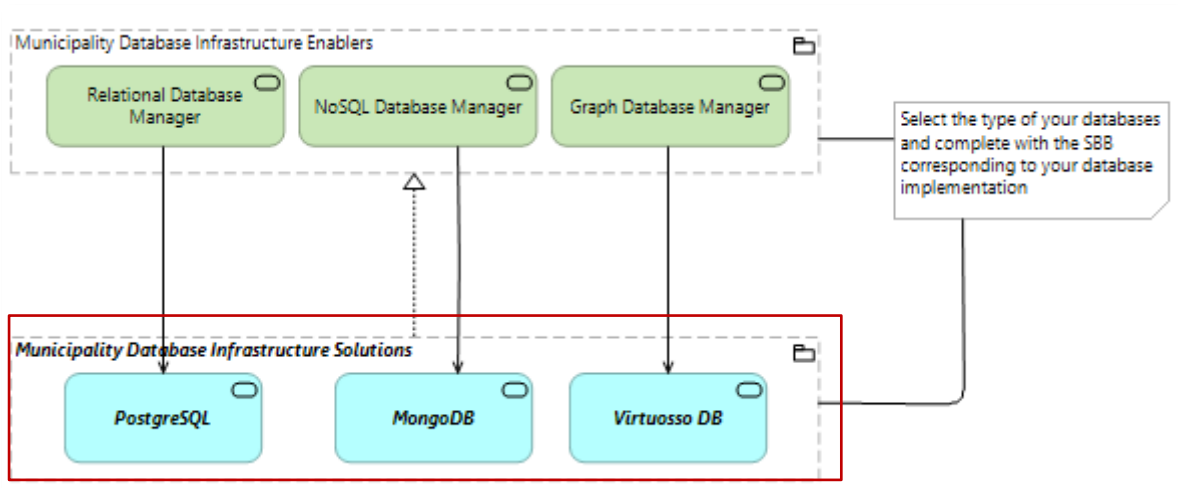
Figure 21. *TVI-Data Management and Knowledge Discovery Infrastructure Enablers [Traceability]* viewpoint within the technical infrastructure view

5. In the *TVI-Management Infrastructure Enablers [Traceability]* viewpoint, **complete the infrastructure provider** within Municipality Infrastructure Provider.

Figure 22. *TVI-Management Infrastructure Enablers [Traceability]* viewpoint within the technical infrastructure view

6. In the *TVI-Networking Infrastructure Enablers [Traceability]* viewpoint, within Virtual Machine Networking Solutions, complete with **SBBs of internal network** in case the municipality uses on-premises data centre. Select the solution under the OR clause, and remove the ones not used.
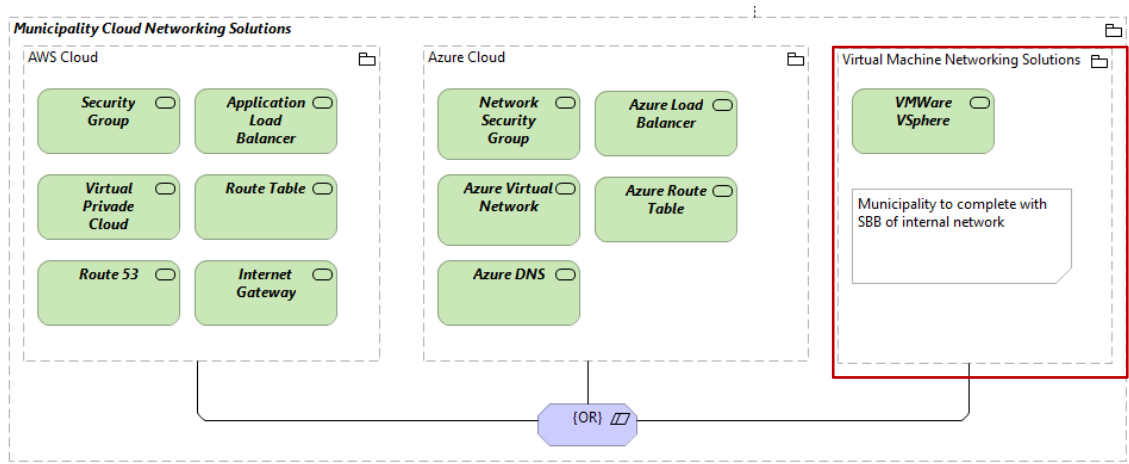
Figure 22. *TVI-Networking Infrastructure Enablers [Traceability]* viewpoint within the technical infrastructure view

7.2 Recommended scale-up works

No scale-up works are needed.

8   ITEST BED FOR CONFORMANCE TESTING OF THE MODELS

Powered by the European Commission, the iTest Bed[1] is offered as a **shared platform** that can be used for free by any project developing interoperability solutions for the delivery of cross-border public services. It is a complete platform consisting of both software and hardware components with the purpose of facilitating testing. The particular focus in this case is conformance and interoperability testing, ensuring that tested systems conform to a specification's requirements and can interoperate consistently with conformant peer systems.

> *Please note that currently, the validator is being updated. Consequently, the errors displayed are in the process of being corrected, as the model adheres to the EIRA notation and includes the expected elements from models derived from the eGovERA BA.*

The iTestBed instance for Interoperable Architecture (EIRA and eGovERA) is available here. This available service ensures the validation of the analysis and design model.

Figure 26. *EIRA validator home page*

iTest Bed is used to ensure compliance 1) of the analysis model against EIRA/eGovERA preconditions; 2) the solution model (Design) against the analysis model, and 3) the solution completeness against EIRA/eGovERA preconditions. The process implemented in each case as detailed below.

8.1   Validate the analysis model against EIRA/eGovERA standards

This use case involves validating that the developed analysis model complies with the fundamental EIRA/eGovERA standards.

1.   Firstly, the analysis model, referred to as the Detail Level Solution Architecture Template (DL-SAT), is verified by selecting the "*Detail-level SAT Completeness (basic level)*" option. Furthermore, it is essential to specify the version of EIRA/eGovERA utilised in creating the model to ensure alignment during the validation process.

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[1] ITest Bed – Interoperable Europe Portal page:https://interoperable-europe.ec.europa.eu/collection/interoperability-test-bed-repository/solution/interoperability-test-bed
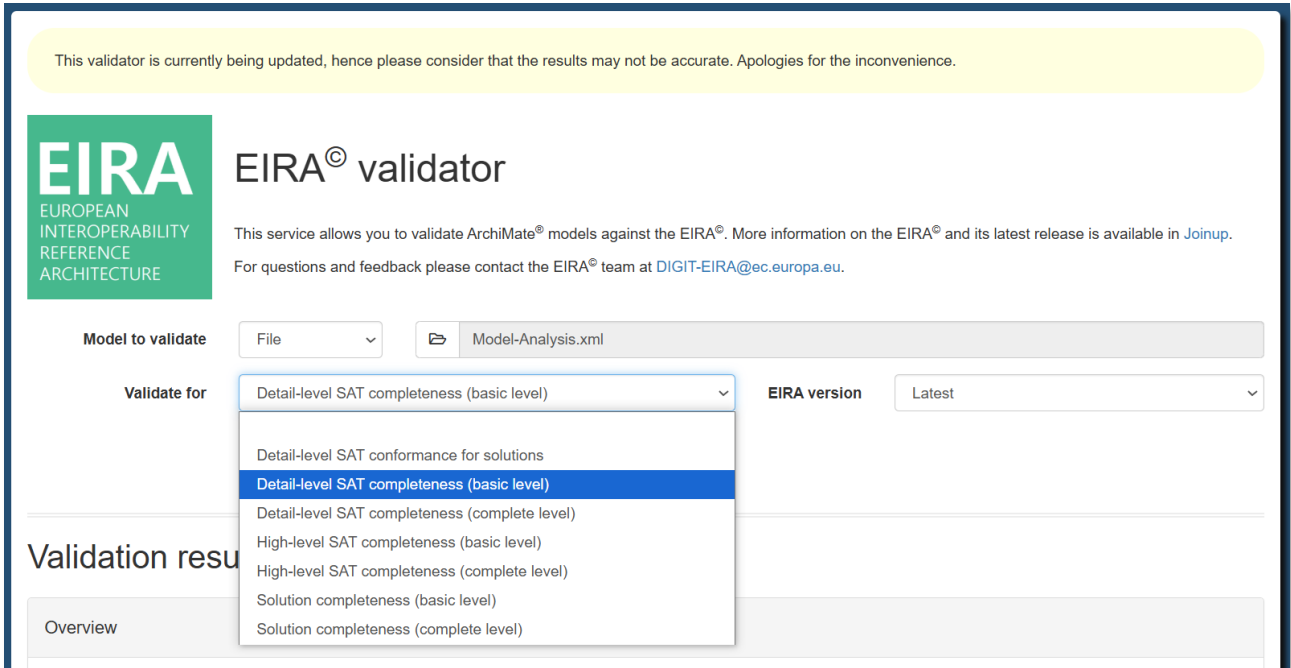
Figure 27. *Analysis model validation process*

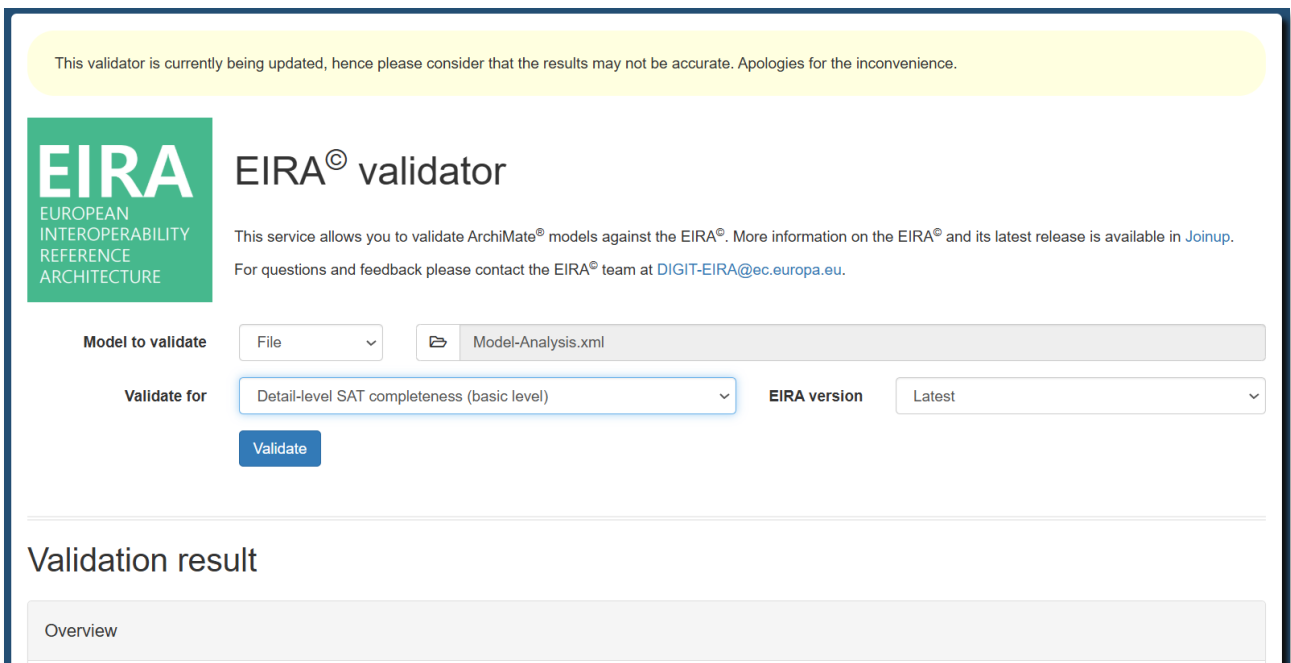2. Once the validation method has been set up, the analysis model in xml format needs to be uploaded to iTest Bed:

Figure 28. *Analysis model validation process – model upload*

3. Subsequently, the user should click the "*Validate*" button. The validation process will initiate and may take a few seconds to complete. The results will then be displayed as illustrated in the image below:

Figure 29. *Analysis model validation process – report*

The "*Overview*" section includes the metadata for the transaction/validation:
   a. **the version used**: the version of EIRA and consequently eGovERA used.
   b. **the findings**: the # of errors/warnings found.
   c. **the result**: if its successfull or not. If no errors, it is a SUCCESS, if there is 1 error, it is a FAIL.

4. The iTest Bed displays the validation results online, beneath the "*Overview*" section, specifically within the "*Details*" section. Additionally, users can download the results in various formats by selecting the "*Download report*" option. As shown in the image below, the report can be downloaded in three different formats: XML, PDF and CSV.
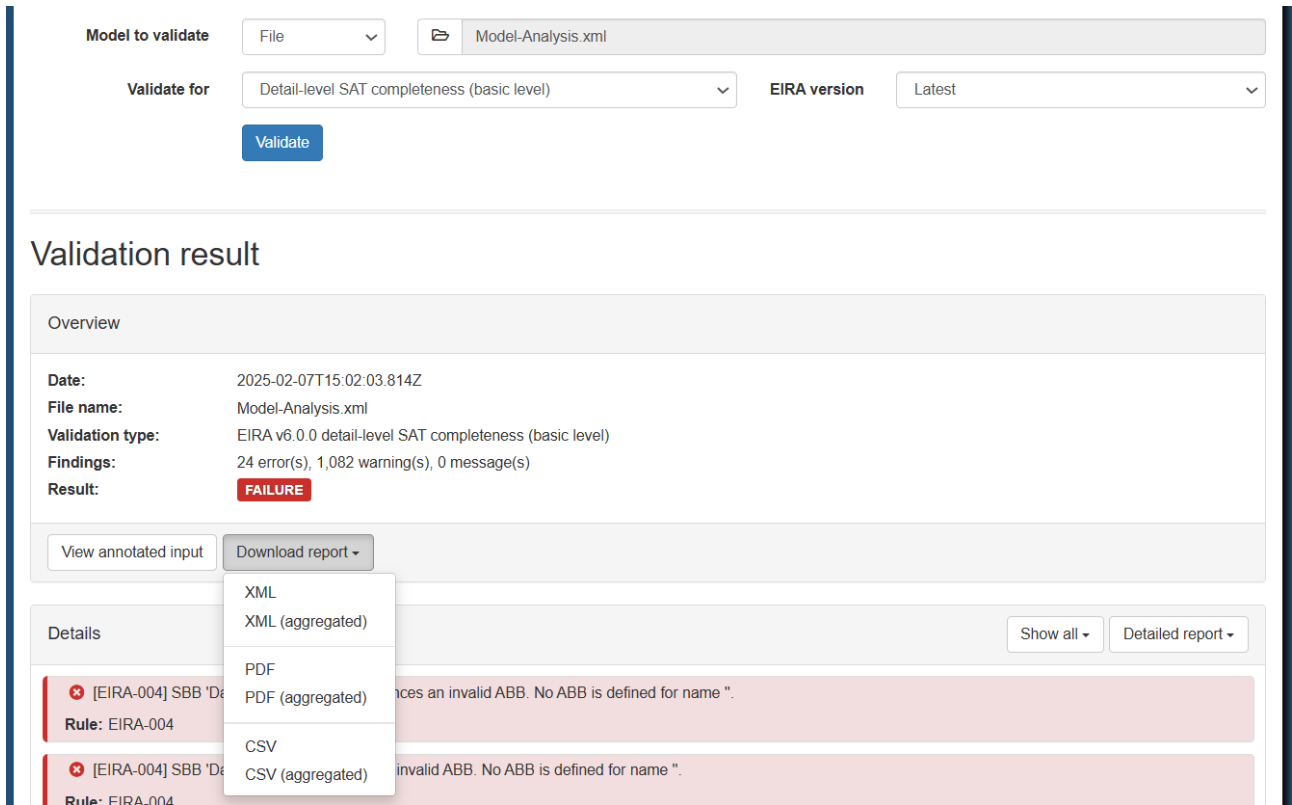
Figure 30. *Analysis model validation process – report download*

8.2 Validating the design model against the DL SAT (analysis model)

Once the analysis model is validated, the validation of the design model is ready to be started. With the design model finished, the process is as follows:

1. First, in the home page of the validator (Validator home page), the "*Validate for*" needs to be set as "*Detail-level SAT conformance for solutions*":
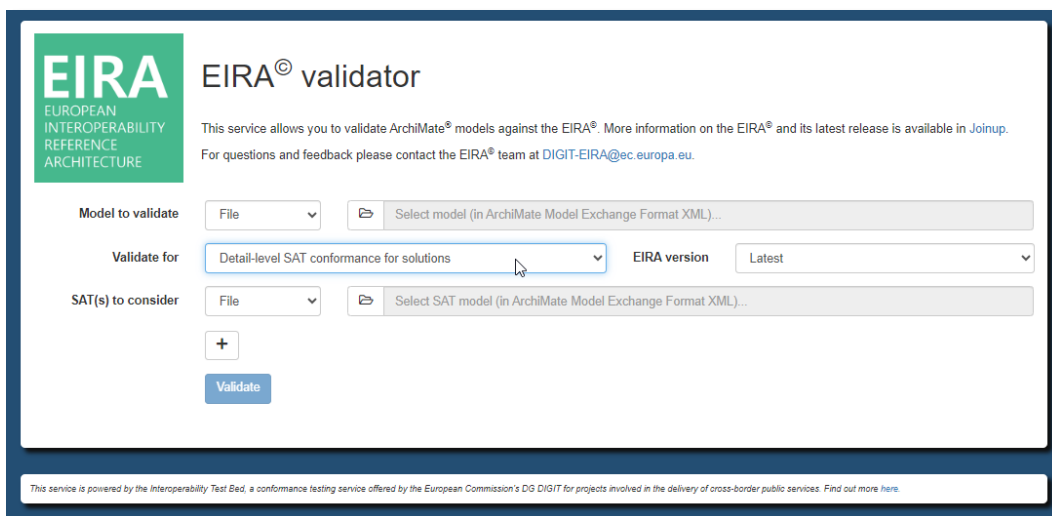

Figure 31. *Validating the solution model against the analysis model*

2. After setting the "*Validate for*", the user needs to upload the analysis model as de "*SAT Model*", and the design model as the "*Model to validate*":

Figure 32. *Validating the solution model against the analysis model – setting up the validation*

3. The last step once validation method set up, is click to "Validate". The process will follow and the report will be provided.

Figure 33. *Validating the solution model against the analysis model – Validation report*

The objective of this process is to ensure that the proposed solution conforms to the requirements specified in the analysis model.

8.3   Validating the solution completeness

The solution design models can also be validated for overall completeness and adherence to the general considerations outlined by EIRA and eGovERA, ensuring that the models meet all necessary compliance requirements. For such a purpose, the validator needs to be set with one of the configurations marked in the image below:
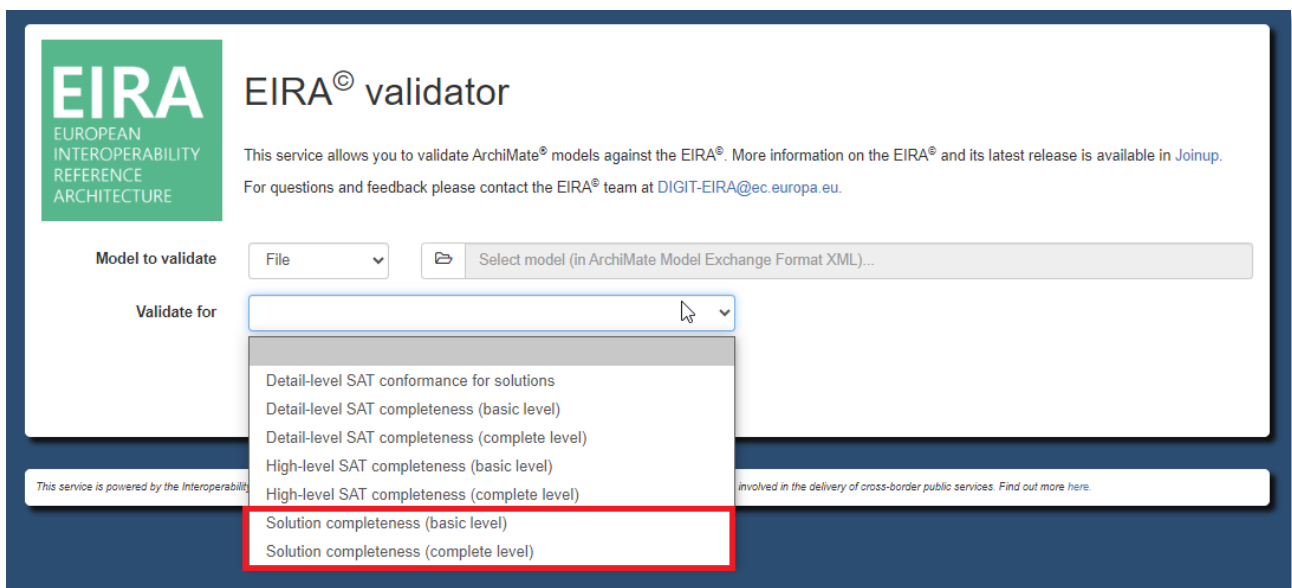
Figure 34. Setting validator for *validating the solution model completeness*

In this method, the validation is conducted against the DL SAT (analysis model) to ensure that the solution includes the basic and minimum required elements. For example, it checks whether the SBBs correctly reference the appropriate ABBs (realising) and ensures that there are no ABBs missing from the solution. This aspect is currently under analysis and may be subject to change, among other considerations.

Figure 35. *Validating Solution model Completeness - report*

Once the report is provided, it can be downloaded as shown in the previous section.