High-level Interoperability Requirements Solution Architecture Template (HL SAT) Design Guidelines

ISA² - 2016.32 European Interoperability Architecture. Maintenance

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TABLE OF CONTENTS

1 INTRODUCTION 6

1.1 PURPOSE OF THIS DOCUMENT 6
1.2 LIST OF ACRONYMS USED IN THIS DOCUMENT 6

2 GOAL, DESCRIPTION AND TARGET AUDIENCE 7

2.1 GOAL 7
2.2 WHAT ARE SOLUTION HIGH-LEVEL INTEROPERABILITY REQUIREMENTS 7
2.3 WHAT IS A SOLUTION ARCHITECTURE TEMPLATE (SAT) 7
2.4 TARGET AUDIENCE 8

3 DOCUMENTING SOLUTION HIGH-LEVEL INTEROPERABILITY REQUIREMENTS USING THIS SAT 9

3.1 ARCHIMATE MOTIVATION EXTENSION 9
3.2 KEY CONCEPTS IN EIRA 10
3.3 IDENTIFYING AND DOCUMENTING LEGAL INTEROPERABILITY REQUIREMENTS 15
3.4 IDENTIFYING AND DOCUMENTING ORGANISATIONAL INTEROPERABILITY REQUIREMENTS 22
3.5 IDENTIFYING AND DOCUMENTING SEMANTIC INTEROPERABILITY REQUIREMENTS 26
3.6 IDENTIFYING AND DOCUMENTING TECHNICAL-APPLICATION INTEROPERABILITY REQUIREMENTS 30
3.7 IDENTIFYING AND DOCUMENTING TECHNICAL–INFRASTRUCTURE HIGH-LEVEL REQUIREMENTS 34

4 REFERENCES 38

APPENDIX: EIRA METAMODEL VIEWPOINT 39

APPENDIX: LEGAL VIEW 40

APPENDIX: ORGANISATIONAL VIEW 41

APPENDIX: SEMANTIC VIEW 42

APPENDIX: TECHNICAL VIEW – APPLICATION 43

APPENDIX: TECHNICAL VIEW – INFRASTRUCTURE 44

1 INTRODUCTION

This document contains guidelines for documenting the High-Level Interoperability Requirements for a solution using a Solution Architecture Template (SAT). The proposed approach in this document is fully aligned with EIRA and allows for traceability between High-level and detailed interoperability requirements.

This SAT is based on EIRA v3.0.0

1.1 Purpose of this document

Enterprise and Solution architects can use this document to design solution architectures in the domain of High-Level Interoperability Requirements.

1.2 List of acronyms used in this document

Table 1-1

ABB	Architecture Building Block
EIRA	European Interoperability Reference Architecture
IoP	Interoperability
SAT	Solution Architecture Template
HL SAT	High-level Interoperability Requirements Solution Architecture Template
SBB	Solution Building Block
…	…

2 GOAL, DESCRIPTION AND TARGET AUDIENCE

This chapter gives the goals and a description on High-Level Interoperability Requirements and indicates the target audience and their potential use of this Solution Architecture Template (SAT).

2.1 Goal

The purpose of this SAT is to provide solution architects with guidance on how to identify and document the most salient High-Level Interoperability Requirements for a solution with a holistic (legal, organisational, semantic and technical) perspective.

2.2 What are Solution High-Level Interoperability Requirements

In EIRA, a High-level requirement is a statement of a need that must be realized by a solution. This statement is a description of a to-be implemented functional aspect. They do not include any reference to technology specifics like standards.

2.3 What is a solution architecture template (SAT)

A Solution Architecture Template (SAT) is a specification extending the EIRA providing support to solution architects in a specific solution domain. An SAT contains a motivation (principles, requirements), a goal and a description of the supported functionalities, a sub-set of the EIRA core Architecture Building Blocks (ABBs) covering the four views, a set of specific ABBs extending EIRA's views enabling specific functionalities to be provided by implementations derived from the SAT and the interoperability specifications of selected ABBs and a narrative for each EIRA view.

The benefits of a SAT are the following:

- Provides architects with a common approach to cope with a specific interoperability challenge. It also places the focus on the key-points you need to consider.
- An architect can create a solution architecture by mapping existing Solution Building Blocks (SBBs) to an SAT, based on the interoperability specifications that are provided. This is done by providing SBBs for the ABBs identified in the SAT.
- When an architect creates an SAT, he/she can define the interoperability specifications for the SAT’s ABBs and moreover recommend specific SBBs which produces faster and more interoperable results.
- An SAT can be created within and across the different views of the EIRA. An SAT can then support architects specialised in different interoperability levels."

2.4 Target audience

This document has the following target audience:

Audience	Description
Architect	Enterprise/solution architects in the need of understanding, implementing, or describing a High-Level Interoperability Requirements solution.
Policy maker	Policy makers studying the implications due to policy changes in the area of High-Level Interoperability Requirements.
Business Analysts	Business Analysts elicit requirements from internal and external Stakeholder and investigate the required service or functionality.

3 Documenting Solution High-Level Interoperability Requirements using this SAT

This chapter contains for each EIRA view the corresponding ArchiMate model and narrative. Next to the SAT's EIRA architecture building blocks, the ArchiMate model includes, where applicable, the related specifications, principles and requirements.

The models have been scaled down to fit with the text, they are included in bigger format in the appendix.

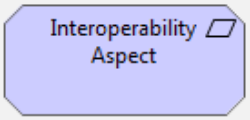
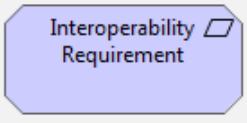
3.1 ArchiMate motivation extension

The motivation extension is used to model specific goals, principles, requirements and/or constraints and optionally also the sources of those intentions; stakeholders, drivers and assessments. Motivational concepts are used to model the motivations, or reasons, that underlie the design or change of some enterprise architecture. These motivations influence, guide, and constrain the design.

It is essential to understand the factors, often referred to as drivers, which influence the motivational elements. They can originate from either inside or outside the enterprise. Internal drivers, also called concerns, are associated with stakeholders, which can be some individual human being or some group of human beings, such as a project team, enterprise, or society.

The actual motivations are represented by goals, principles, requirements, and constraints. Goals represent some desired result – or end – that a stakeholder wants to achieve; e.g., increasing customer satisfaction by 10%. Principles and requirements represent desired properties of solutions – or means – to realize the goals. Principles are normative guidelines that guide the design of all possible solutions in a given context.[1]

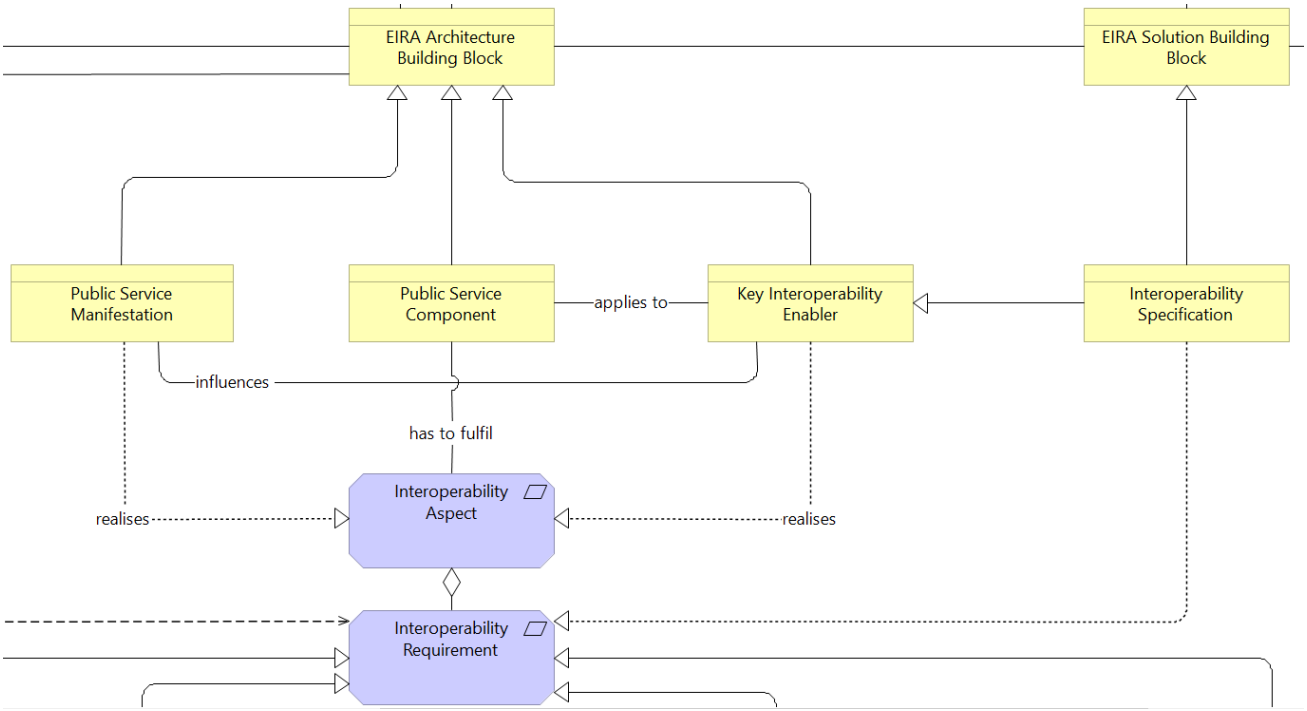
In addition to the standard EIRA concepts, the diagrams use the following concepts coming from the ArchiMate motivation extension

EIRA concept	Description
	An Interoperability aspect is an externally observable characteristic or a set of characteristics to be provided/supported by the solution that fulfills partially or internally a stakeholder interoperability need. (Source: PM2)
	In EIRA, the requirement of concern is the interoperability requirement. An interoperability requirement is defined as a statement of an interoperable need that must be realized by a system. In EIRA, this statement is a High-level description of a to-be implemented interoperability aspect. An interoperability requirement adds granularity to an interoperability aspect

[1] http://pubs.opengroup.org/architecture/archimate2-doc/chap10.html

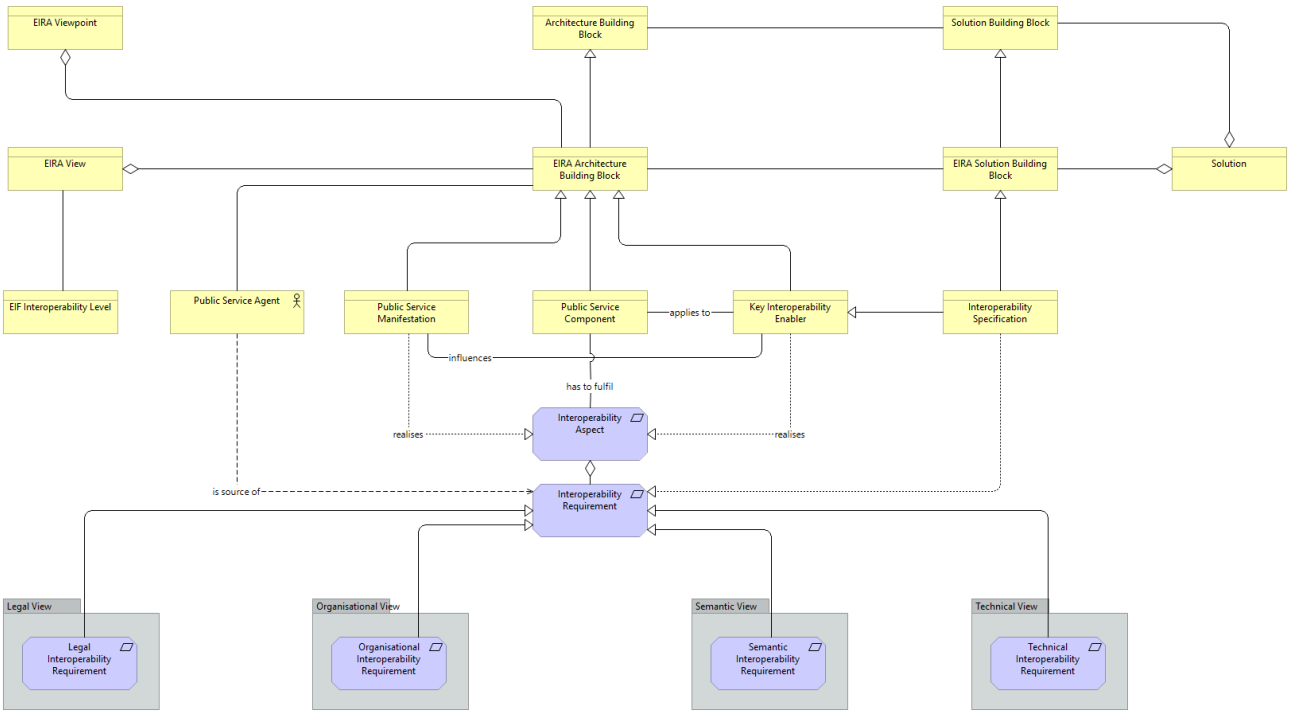
3.2 Key concepts in EIRA

In order to document Interoperability Requirements, the **Interoperability aspect** and **Interoperability requirement** ABBs from EIRA should be used.

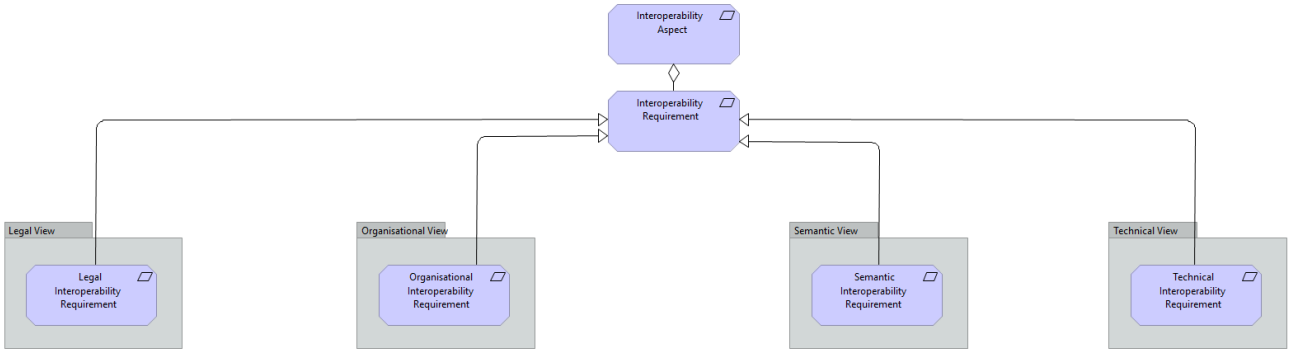


- An Interoperability Specification is a document containing agreed normative statements for solution building blocks used in an information exchange context. It can refer to existing standards or specifications.

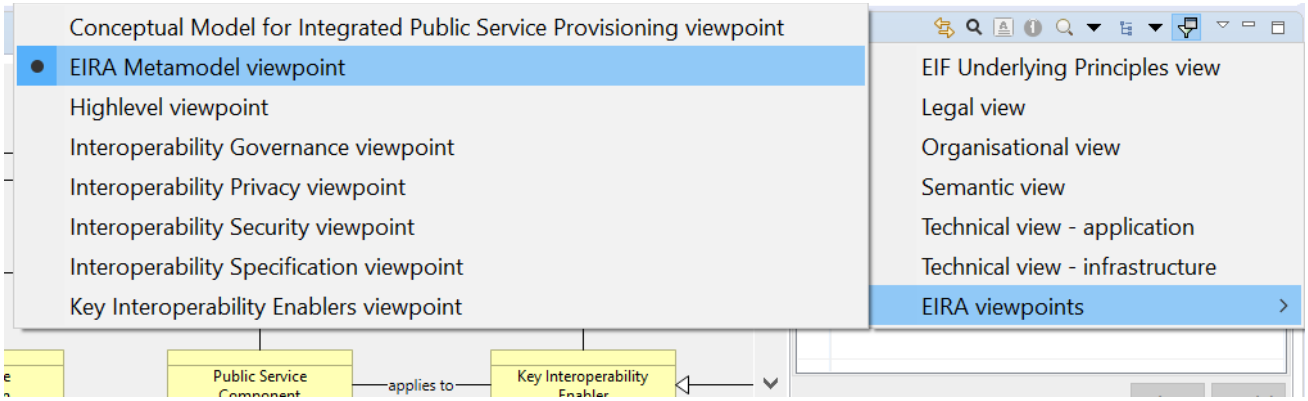
EIRA Metamodel viewpoint:



For modeling purposes of Interoperability requirements, the EIRA **Interoperability aspect** and **Interoperability requirement** ABBs are in focus:



- Interoperability Requirements are specialized as Legal, Organisational, Semantical and Technical Interoperability requirements
- In the CarTool, go to the EIRA Window, choose Select view, EIRA viewpoints, select **EIRA Metamodel viewpoint** from the dropdown list:



Interoperability aspects are expressed using the following table format:

<verb expressing the interoperability aspect> <object>

For example:
<Use> <of mutualized authentication services>

Interoperability Requirements are expressed using the following table format:

ID	Name	Type	Status	Size	Priority	Implementation	Dependencies
Unique ID	Description of requirement	Legal	Approved	Medium	high	Mandatory	Interoperability Requirement ID

Interoperability Requirement attributes or properties

ID: Unique identifier for the interoperability requirement.
Name: Short and descriptive name.
Type: Requirement type, Legal, Organisational, Semantical or Technical
Status: For example, approved or pending approval.
Size: An indication of the level of effort needed or how hard it will be to implement the requirement. (Big, Medium, Small)
Priority: Statement of the relative importance of the interoperability requirement, either to the system (mandatory, critical, optional) or to the other requirements (high, medium, low)
Implementation: Indicate if implementing the interoperability requirement is recommended or mandatory.
Dependencies: Mention dependencies with other interoperability requirements for traceability purposes.

Example of interoperability requirements for the interoperability aspect
<Use> <of mutualized authentication services>

ID	Requirement	Type	Status	Size	Priority	Imp.	Dep.
6.	Web application containing sensitive or Personal data shall use EU Login to enforce strong authentication	T	A	M	H	M	none
7.	If EU Login is not implemented, the web application shall implement a strong authentication mechanism that meets requirements established by the Password Technical Specification and the Identity & Access Management Technical Standard	T	A	B	M	R	none

Example of interoperability requirements for the interoperability aspect
<Protect> <Privileged functionalities>

ID	Requirement	Type	Status	Size	Priority	Imp.	Dep.
10.	Administrator functionality and / or interfaces **shall not** be accessible to unauthorized users.	T	A	B	M	R	none
11.	Administration panels and/or administration configuration pages **should** require a re-authentication for an administrator profile already logged on the application.	T	P	S	M	R	none

Example of interoperability requirements for the interoperability aspect
<Minimize> <Privileges>

ID	Requirement	Type	Status	Size	Priority	Imp.	Dep.
37.	All user accounts and resources (such as processes) **shall** only have the lowest level of rights needed to perform their tasks.	T	P	M	H	M	none
38.	When technically possible, accounts supporting automated application functionalities **should** prevent interactive login, making it impossible to use these accounts for non-automated operations.	T	A	M	M	R	none

3.3 Identifying and documenting Legal interoperability requirements

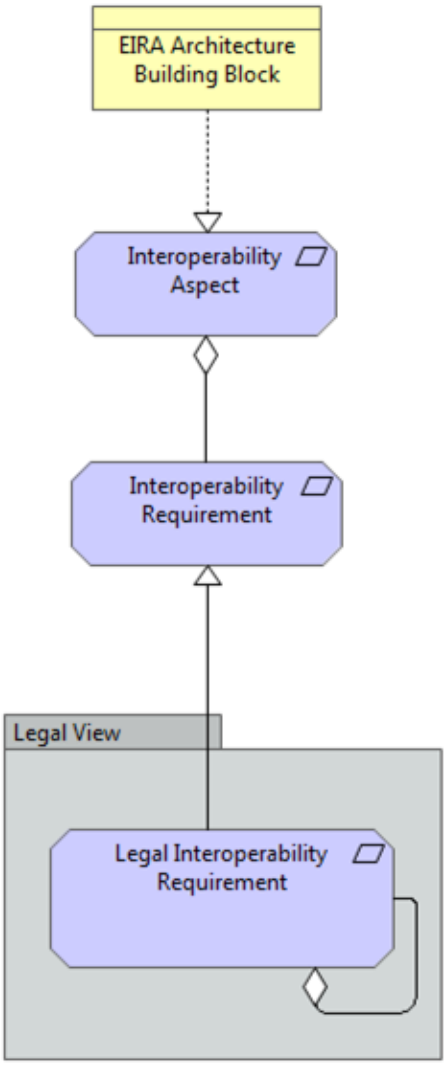
- The EIRA© Legal ABBs are a source for the identification and documentation of legal interoperability requirements for a targeted solution.
- In the context of the Open Group Enterprise Architecture Framework TOGAF©, interoperability requirements should be identified and documented in a specific ADM© cycle with a focus on interoperability. In such cycle the legal interoperability requirements should be addresses in the Architecture Vision phase.

The EIRA legal view models the most salient ABBs that shall be considered in order to support legal interoperability.

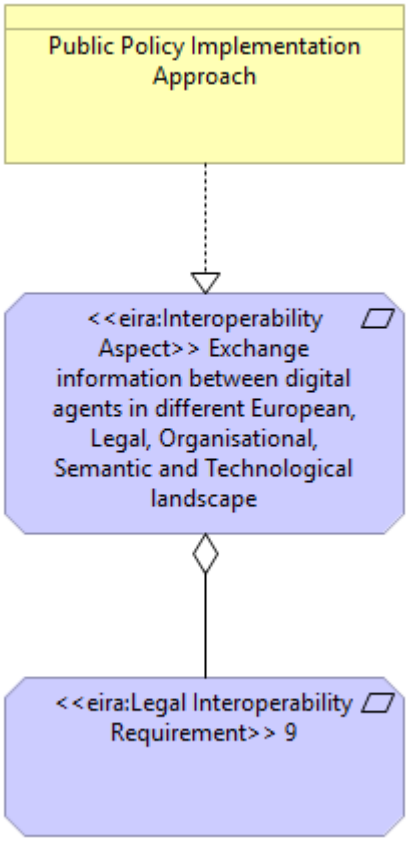
When documenting interoperability requirements using a SAT, the author should document all "legal requirements or constraints" as well as "operational enablers" as part as "public policy formulation instruments", documents that are used to realise a public policy. In case that these legal documents are on EU level, but applicable on national level, you should model them as Legal requirements and constraints. More information can be found in the TOGAF Interoperability ADM cycle document.

Below an example of how the Legal Interoperability Requirements can be modeled, first we identify the EIRA ABB:

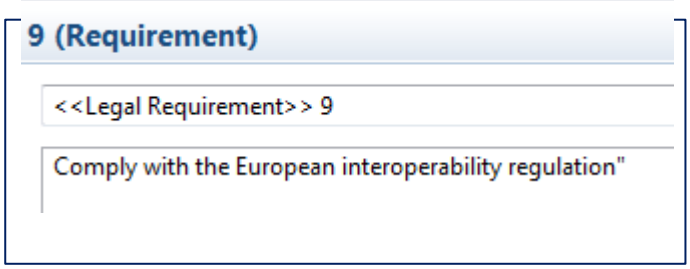
EIRA Building Blocks



Example of Legal Interoperability Requirement



Legal Interoperability Requirements text to be added to the **Properties** window.



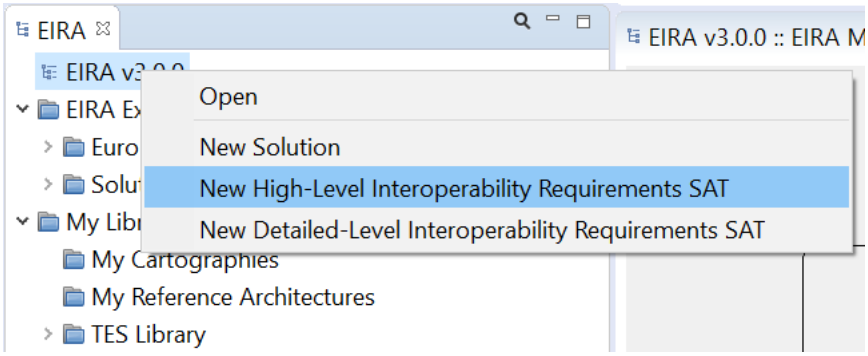
Example values for the interoperability legal requirement attributes:

Name	Value
(blank)	
ID	9
Requirement	Compliance capability needs to be enforced.
Type	Legal
Status	Approved
Size	Medium
Priority	High
Implementaion	Mandatory
Dependencies	none

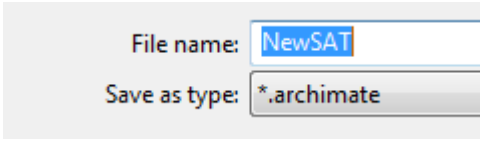
Approach/Steps:

In the CarTool modeling tool, right click the EIRA icon in the tree-view ('Models' Window).

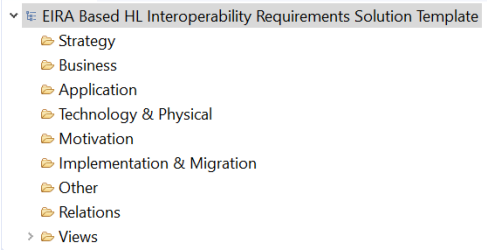
Select 'New Solution Architecture Template (SAT)



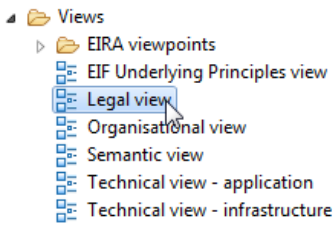
Next, enter file name and location:



A new EIRA Based HL Interoperability Requirements Solution Template will be displayed in CarTool.



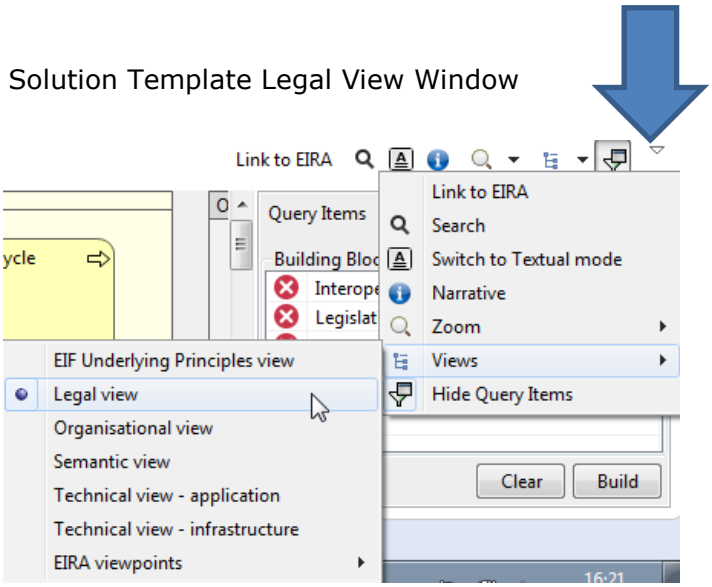
Next, select Views, Legal view:



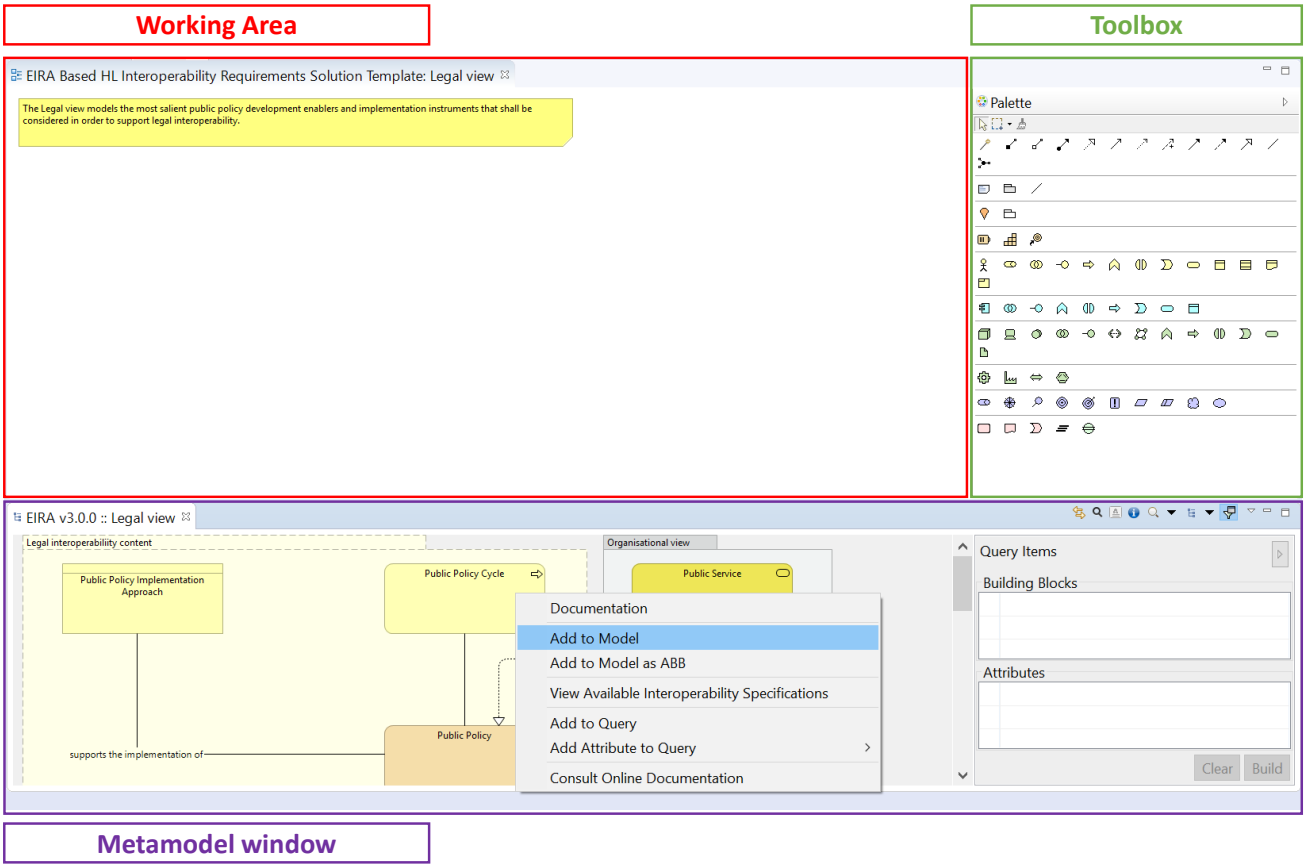
The EIRA Based HL Interoperability Requirements Solution Template Legal View Window opens.

The EIRA Organisational View Metamodel can be accessed by choosing the dropdown options as shown in figure on the right.

Select Views, Legal view.

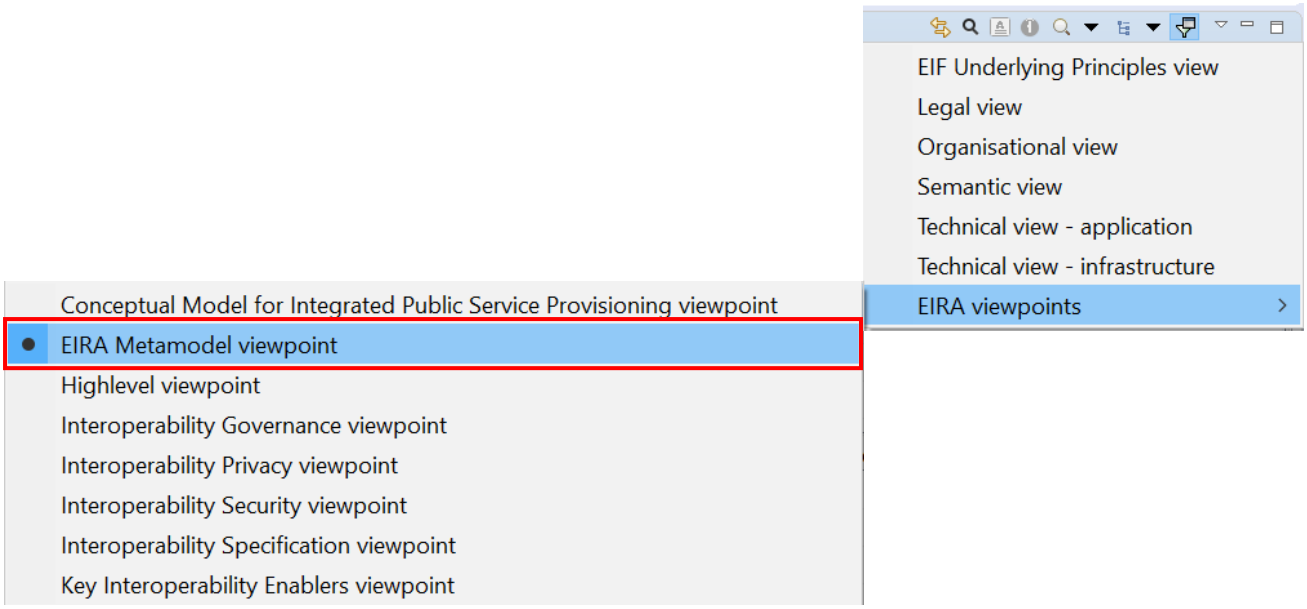


ABBs from the Metamodel window can be added to the Working Area (right-click the element and select 'add to Model'), together with elements from the Toolbox on the right side of the screen to model the Legal Interoperability Requirements:



EIRA Metamodel Viewpoint:

In CarTool, go to the EIRA Window, choose Views, EIRA viewpoint, select **EIRA Metamodel viewpoint** from dropdown:



EIRA ABB Definition:

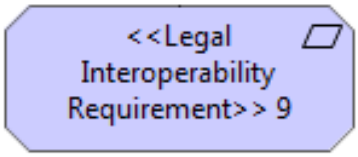
Choose a Legal ABB for which you want to define Interoperability Legal requirements.

Define Interoperability aspect

Choose the Interoperability aspect from the EIRA Interoperability Requirements View and define the interoperability aspects for the EIRA ABB chosen in above step. Link the ABB (yellow) to the stereotyped ABB (blue) with a "realizes" connector.

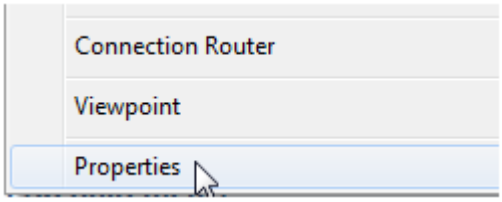
Interoperability Requirements Definition:

Choose the Interoperability Requirement ABB from the EIRA Metamodel viewpoint. Double-click on the Interoperability Requirement ABB or use the Properties window to enter the name and definition. Link the Interoperability Requirement to the Interoperability l aspect using an "aggregates" connector. Make sure to add a unique identifier in the name Field and also add it as a property.

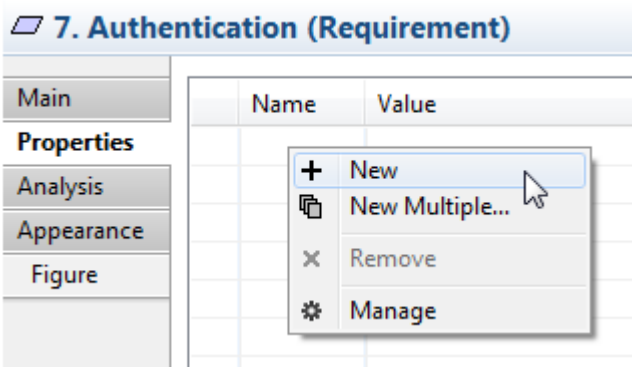


Setting properties:

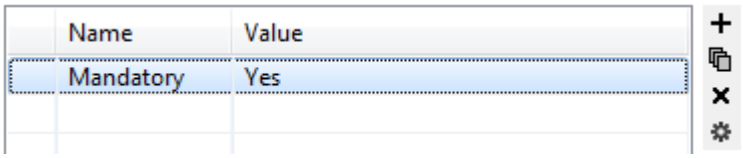
Properties can be added to the Archimate elements by right-clicking the element and choosing 'properties'.



Next, in the properties window, select the Properties Tab. Right click an empty Name or Value cell and Select 'New'.



The property name and value can now be entered.



Add additional properties (attributes) as needed repeating the steps above.

Following properties can be used:

- **ID**
- **Name**
- **Type**
- **Status**
- **Size**
- **Priority**
- **Implementation**
- **Dependencies**

3.4 Identifying and documenting Organisational Interoperability requirements

- The EIRA© organizational ABBs are a source for the identification and documentation of organizational interoperability requirements for a targeted solution.

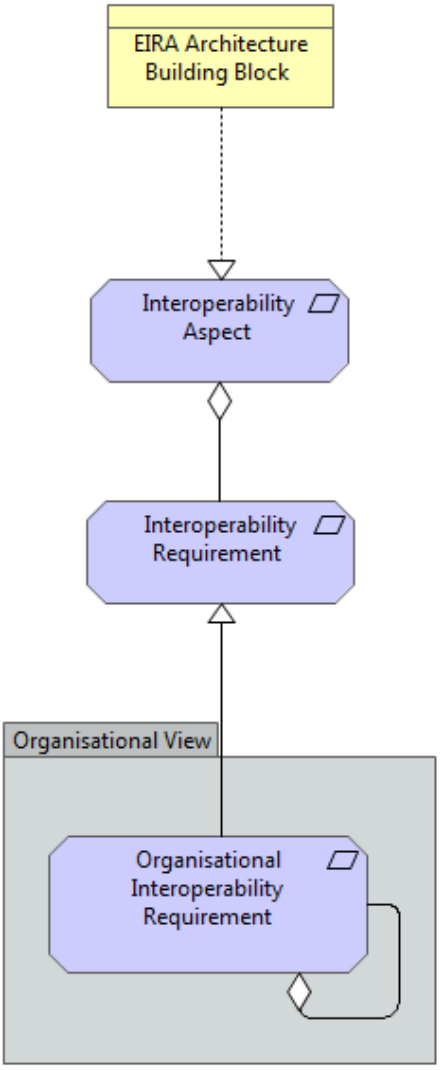
- In the context of The Open Group enterprise architecture framework TOGAF©, interoperability requirements should be identified and documented in a specific ADM© cycle with a focus on interoperability. In such cycle the organizational interoperability requirements should be addressed in the Business Architecture phase.

The EIRA Organisational view models the most salient building blocks that shall be considered in order to support organisational interoperability among providers and users of a public service. When documenting requirements using a SAT, the author should document requirements concerning the actors that play a role in the provisioning or consumption of the public service.

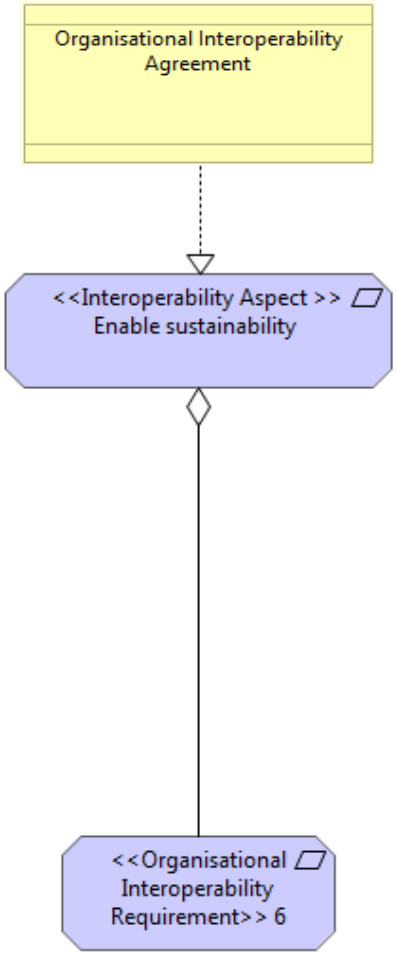
These actors are either citizens, business or organisations. The public service often has some sort of agreement on the service that is being offered. This agreement can be official, like a service level agreement, or on an informal base.

Below an example of how the Organisational Interoperability Requirements can be modeled:

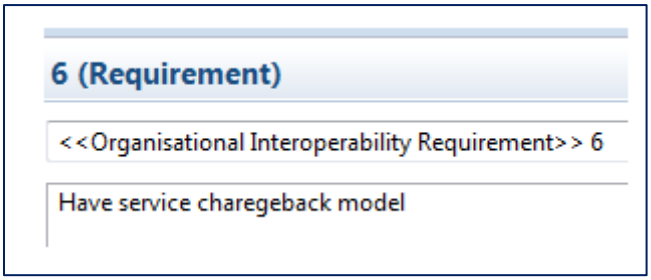
EIRA Building Blocks



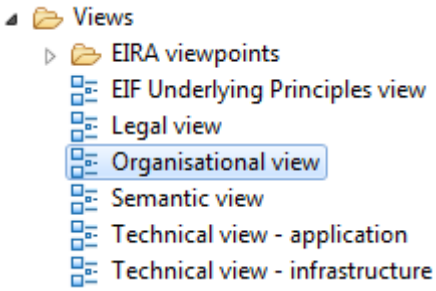
Example of Organisational Interoperability Requirement



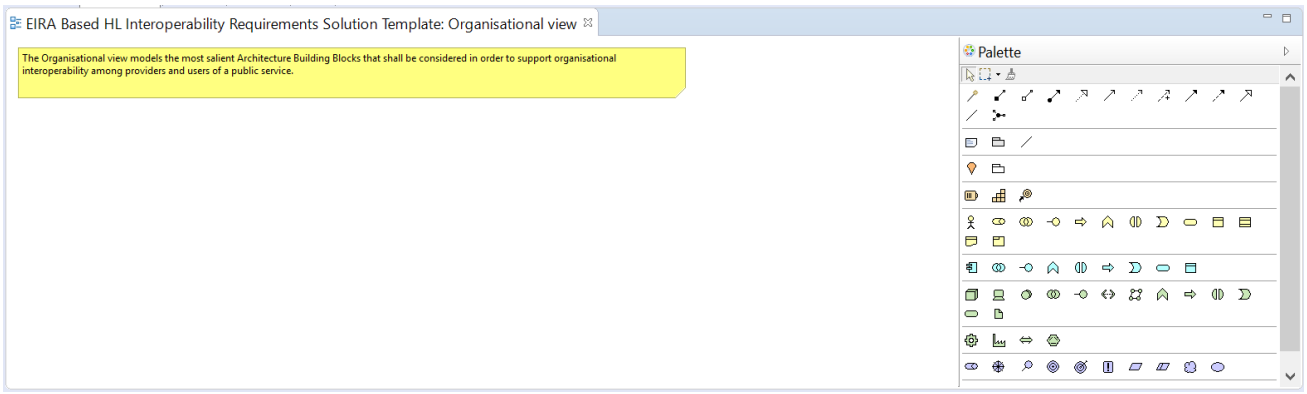
Organisational Interoperability Requirements text to be added in the **Properties** window.



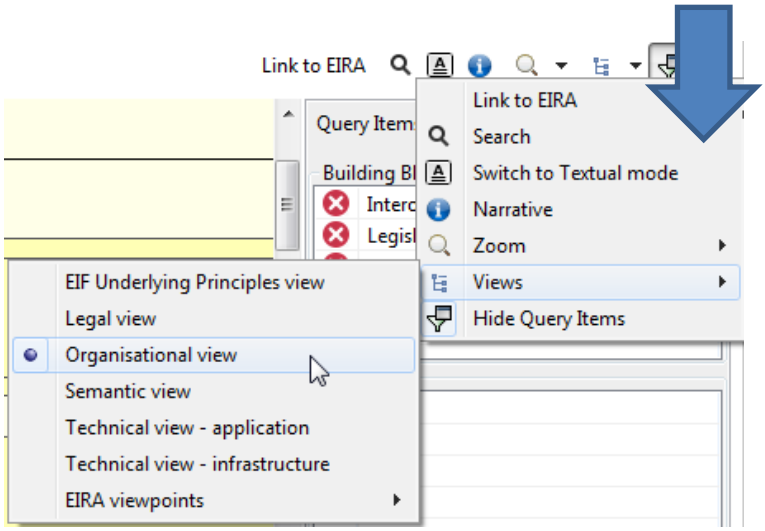
In CarTool, select Views, Organisational view:



The EIRA Based HL Interoperability Requirements Solution Template Organisational View Window opens.



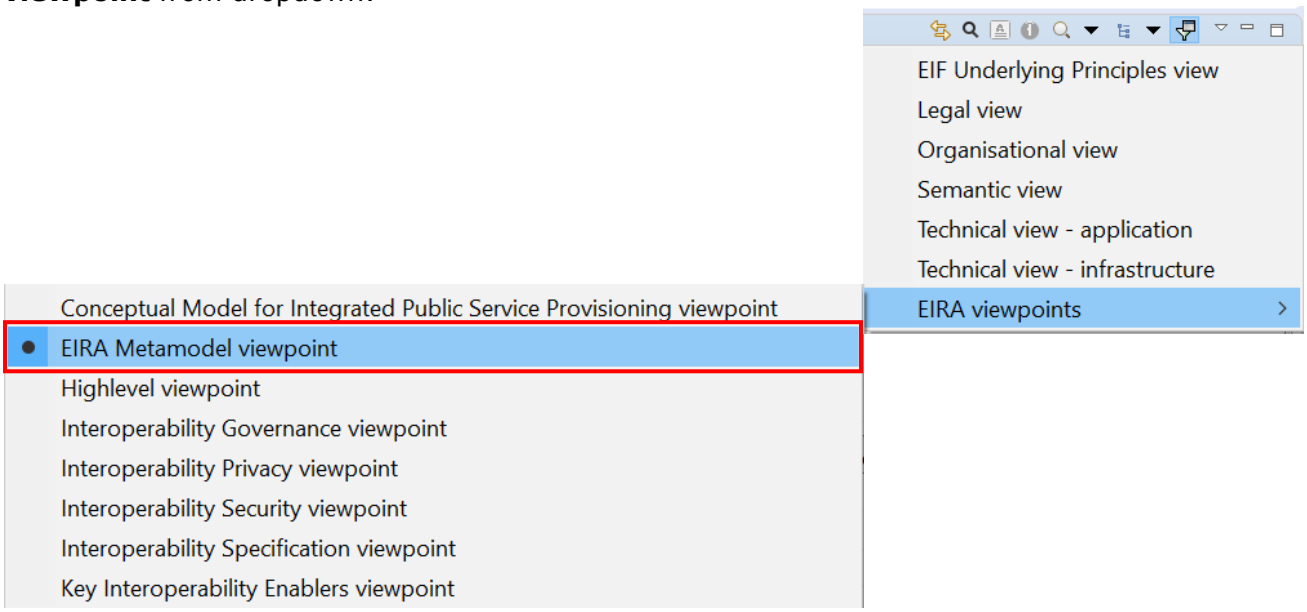
The EIRA Organisational View Metamodel can be accessed by choosing the dropdown options as shown in figure on the right. Select Views, Organisational view.



ABBs from the Metamodel window can be added to the Working Area (right-click the element and select 'add to Model'), together with elements from the Toolbox on the right side of the screen to model the Organisational Interoperability Requirements.

EIRA Metamodel Viewpoint:

In CarTool, go to the EIRA Window, choose Views, EIRA viewpoint, select **EIRA Metamodel viewpoint** from dropdown:



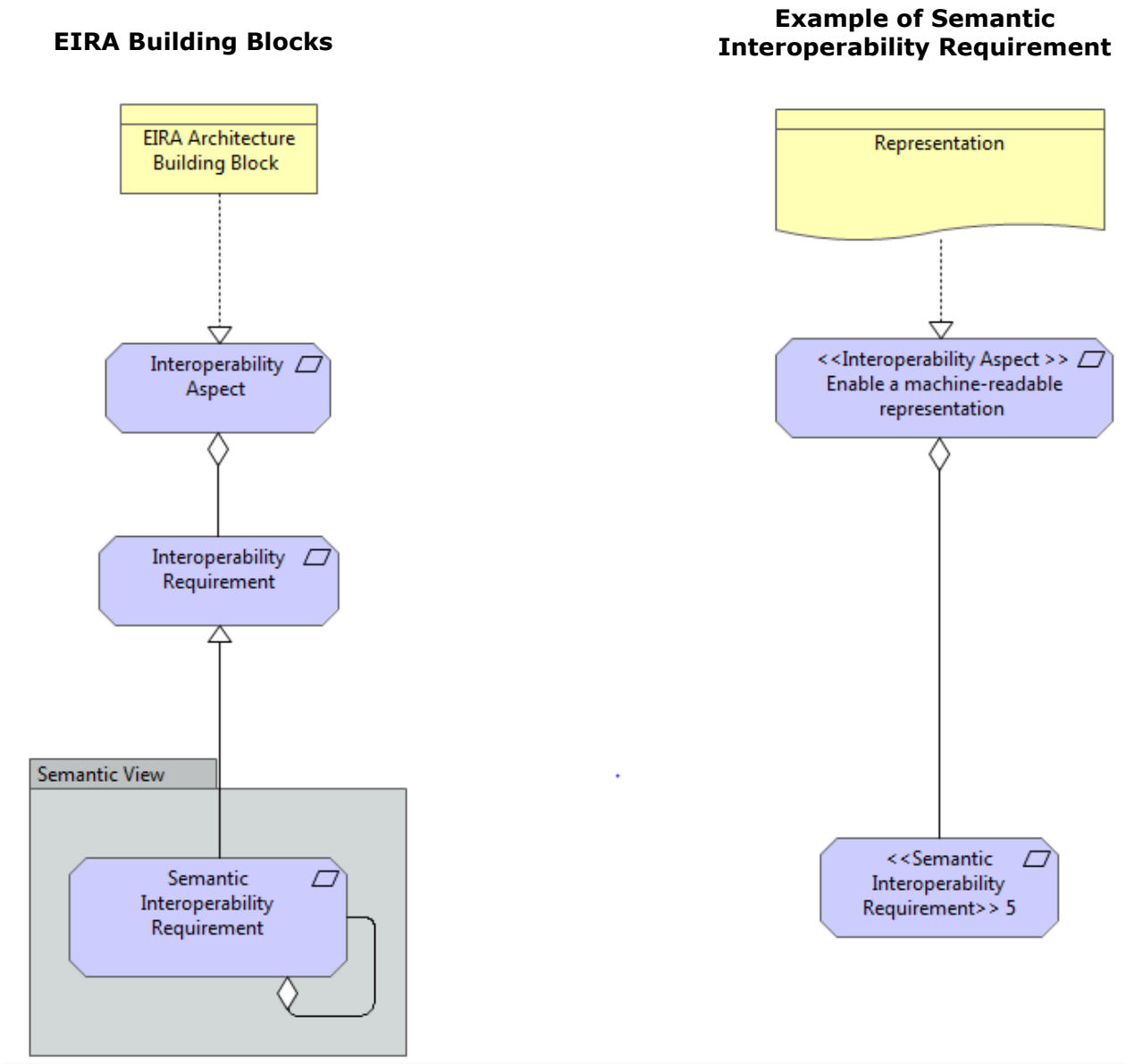
3.5 Identifying and documenting Semantic interoperability requirements

- The EIRA© semantic ABBs are source for the identification and documentation of semantic interoperability requirements for a targeted solution.

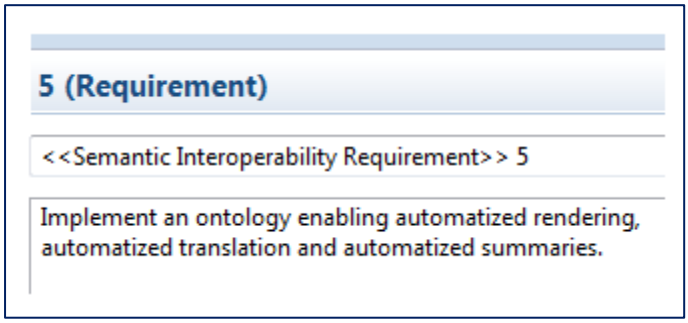
- In the context of The Open Group enterprise architecture framework TOGAF©, interoperability requirements should be identified and documented in a specific ADM© cycle with a focus on interoperability. In such cycle the semantic interoperability requirements should be addressed in the Information Systems Architectures phase.

The EIRA semantic view models the most salient ABBs building blocks that should be considered in order to support semantic interoperability of information exchanges between administrations, businesses and citizens.

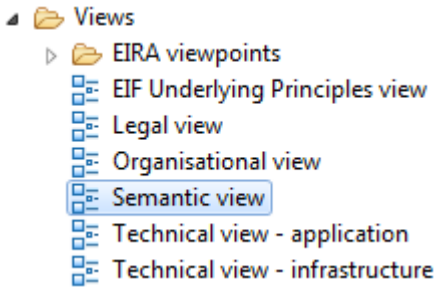
Below an example of how the Semantic Interoperability Requirements can be modeled:



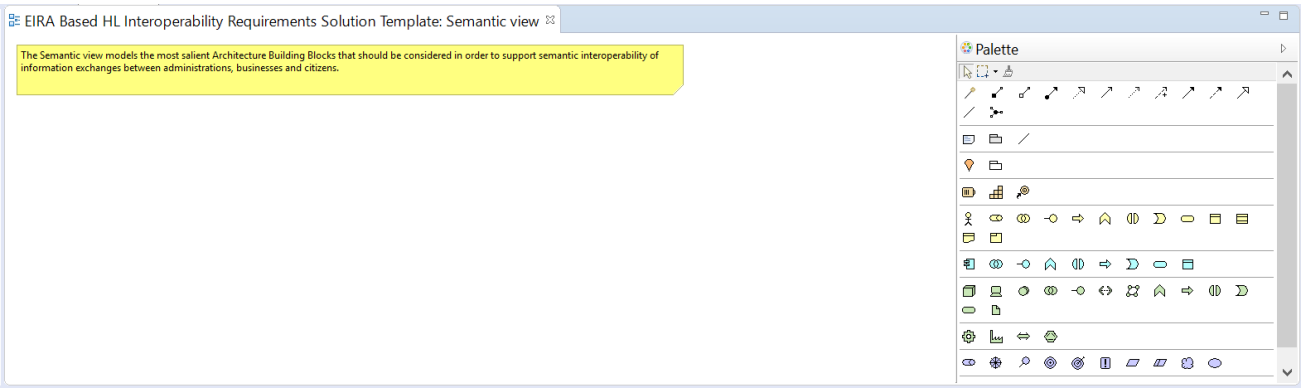
Semantic Interoperability Requirements text to be added in the **Properties** window.



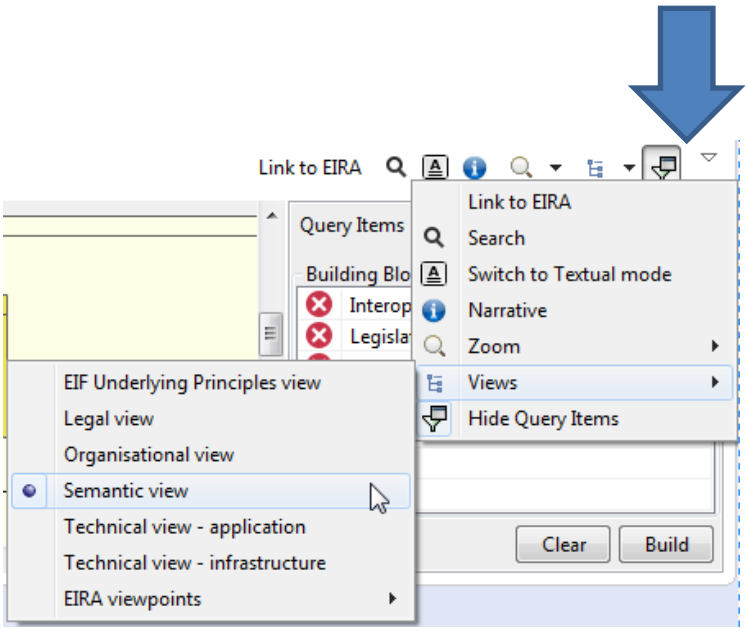
In CarTool, select Views, Semantic view:



The EIRA Based HL Interoperability Requirements Solution Template Semantic View Window opens.



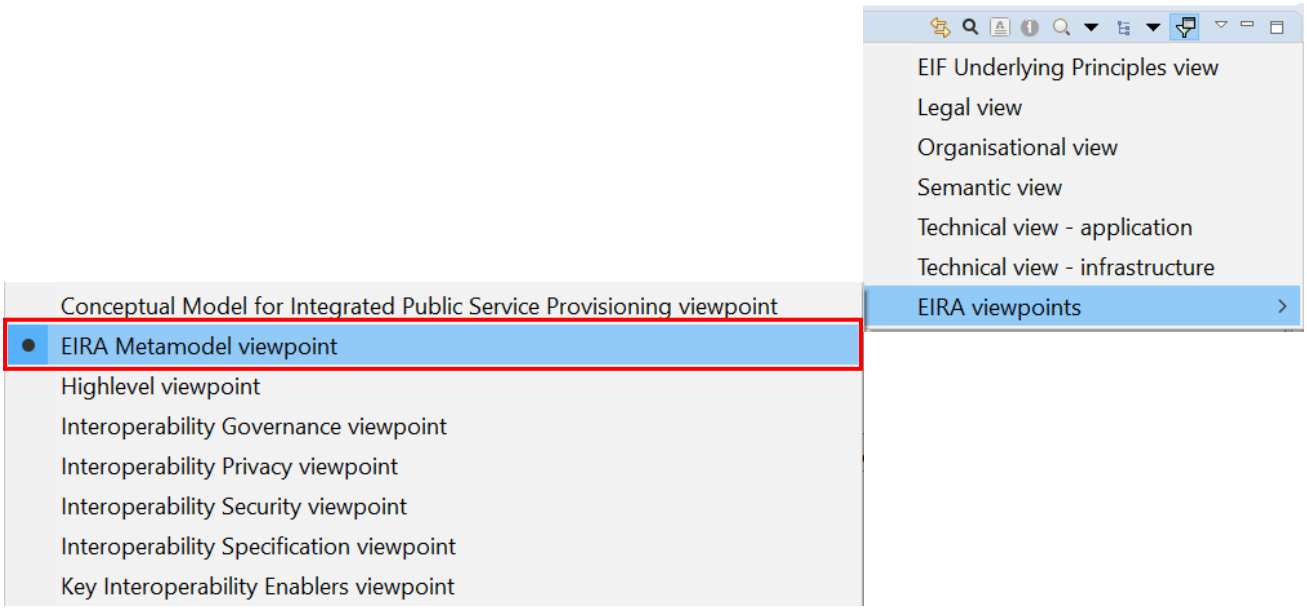
The EIRA Semantic View Metamodel can be accessed by choosing the dropdown options as shown in figure on the right. Select Views, Semantic view.



ABBs from the Metamodel window can be added to the Working Area (right-click the element and select 'add to Model'), together with elements from the Toolbox on the right side of the screen to model the Semantic Interoperability Requirements.

EIRA Metamodel Viewpoint:

In CarTool, go to the EIRA Window, choose Views, EIRA viewpoint, select **EIRA Metamodel viewpoint** from dropdown:



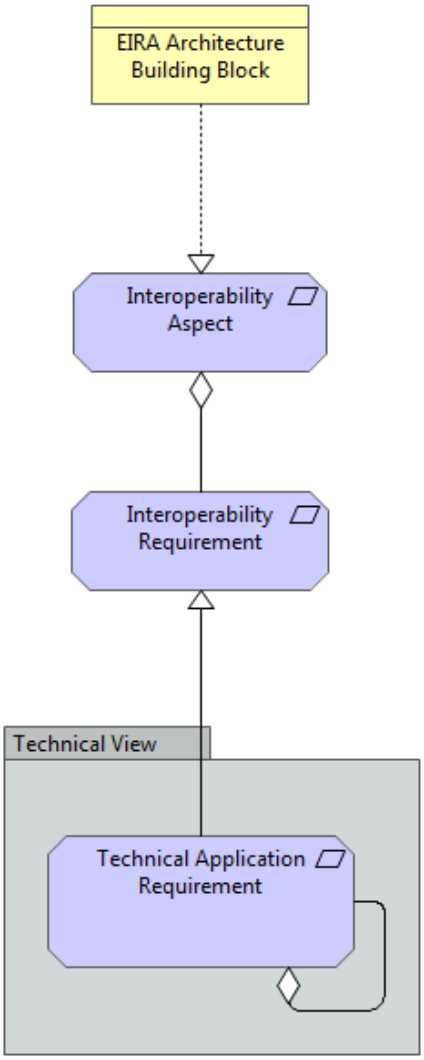
3.6 Identifying and documenting technical-application interoperability requirements

- The EIRA© Technical architecture – application part ABBs are a source for the identification and documentation of technical interoperability requirements for a targeted solution.

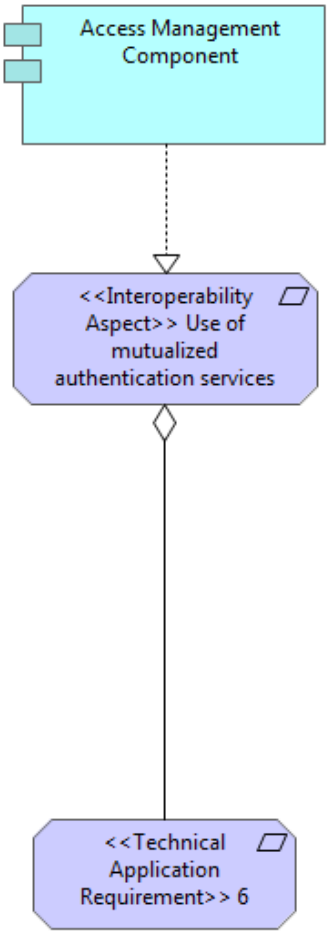
- In the context of The Open Group enterprise architecture framework TOGAF©, interoperability requirements should be identified and documented in a specific ADM© cycle with a focus on interoperability. In such cycle the technical interoperability requirements should be addressed in the Information Systems Architectures phase.

The EIRA technical - application view contains the most salient ABBs that need to be considered in order to support technical interoperability when building an Interoperable European Solution. An Interoperable European Solution can support one or more public policies.
Below an example of how the Technical View - Application Interoperability Requirements can be modeled:

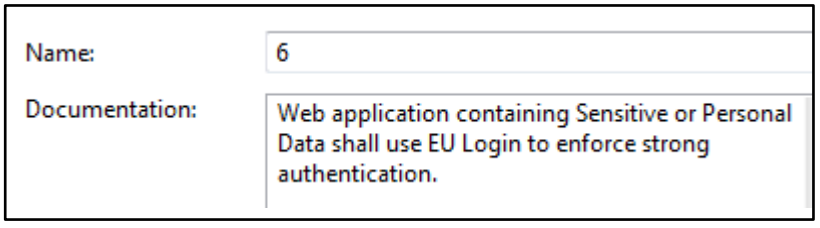
EIRA Building Blocks



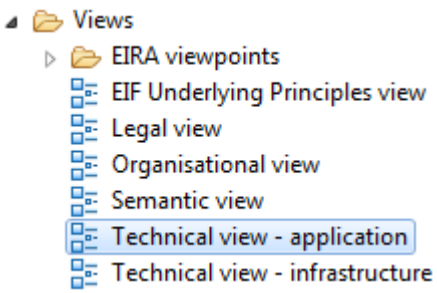
Example of Technical View - Application Interoperability Requirement



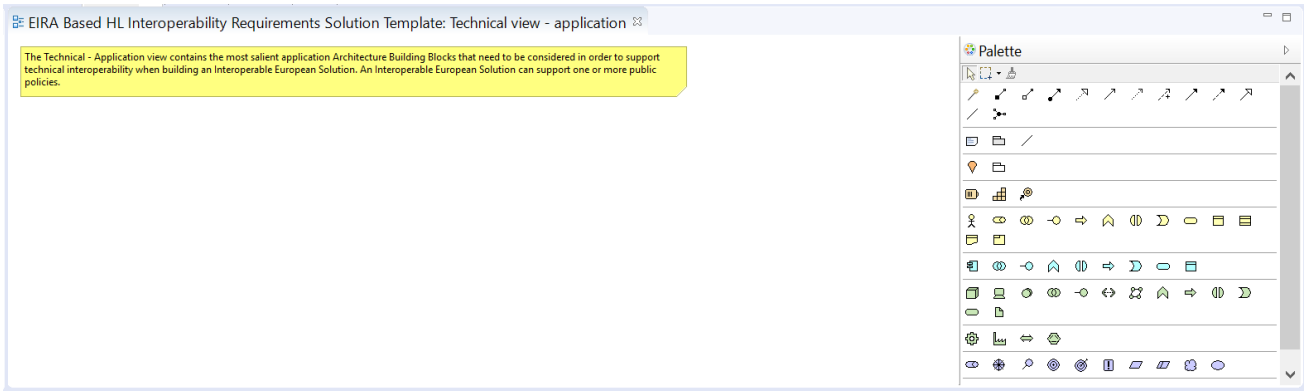
Technical Interoperability Requirements Text to be added in the **Properties** window.



In CarTool, select Views, Technical View - Application:

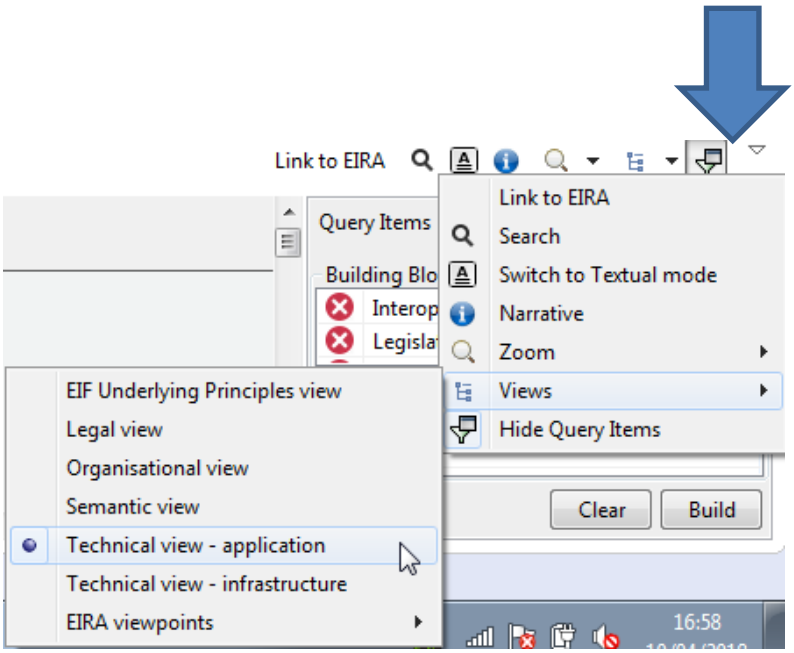


The EIRA Based HL Interoperability Requirements Solution Template Technical View – Application Window opens.



The EIRA Technical View - Application Metamodel can be accessed by choosing the dropdown options as shown in figure on the right.

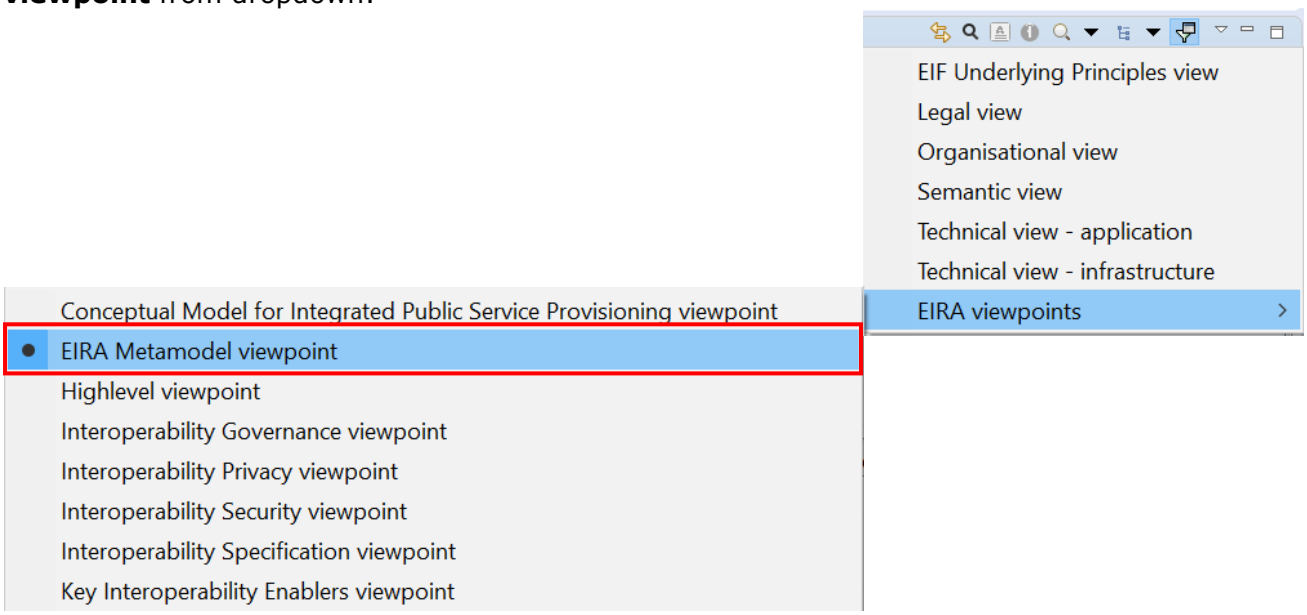
Select Views, Technical View - Application.



ABBs from the Metamodel window can be added to the Working Area (right-click the element and select 'add to Model'), together with elements from the Toolbox on the right side of the screen to model the Technical Interoperability Requirements.

EIRA Metamodel Viewpoint:

In CarTool, go to the EIRA Window, choose Views, EIRA viewpoint, select **EIRA Metamodel viewpoint** from dropdown:



3.7 Identifying and documenting technical–infrastructure high-level requirements

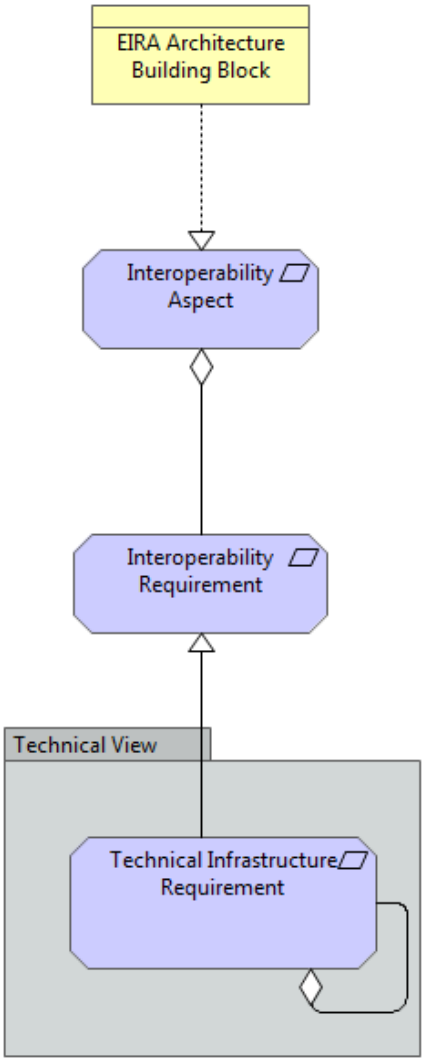
- The EIRA© Technical architecture – Infrastructure part ABBs are source for the identification and documentation of technical interoperability requirements for a targeted solution.

- In the context of The Open Group enterprise architecture framework TOGAF©, interoperability requirements should be identified and documented in a specific ADM© cycle with a focus on interoperability. In such cycle the technical interoperability requirements should be addressed in the Technology Architecture phase.

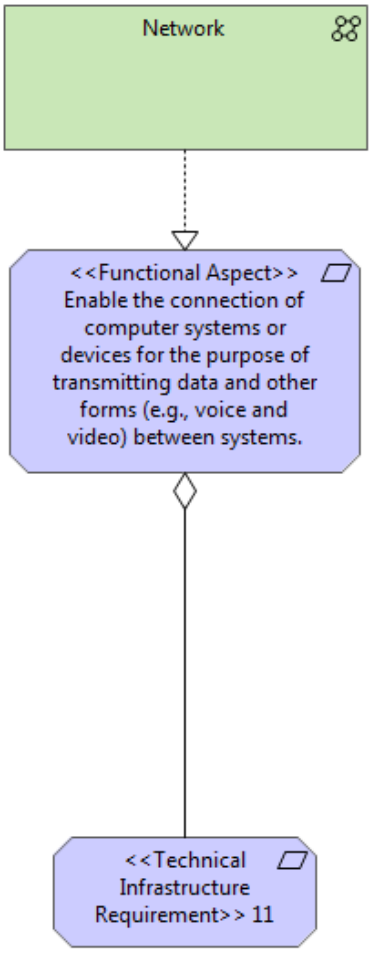
The EIRA technical - Infrastructure view provides an architecture content metamodel for the most salient ABBs, which shall be considered in order to support technical interoperability when building an Interoperable European Solution.
The difference with the application part of the Technical view is that the ABBs in the infrastructure view are considered to be relevant for solutions in any sector of government.

Below an example of how the Technical View - Infrastructure interoperability Requirements can be modeled:

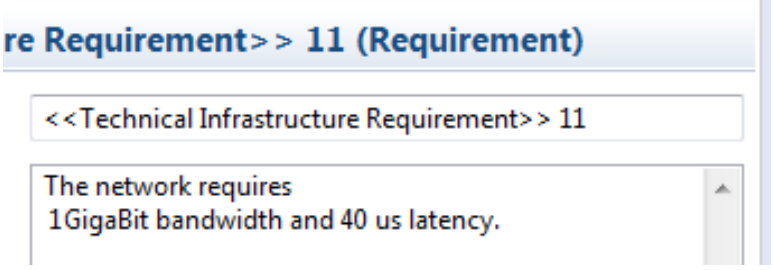
EIRA Building Blocks



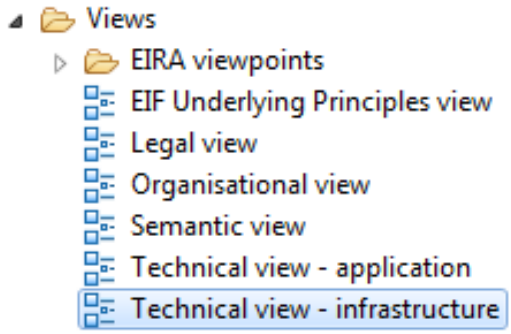
Example of Technical View - Infrastructure Interoperability Requirement



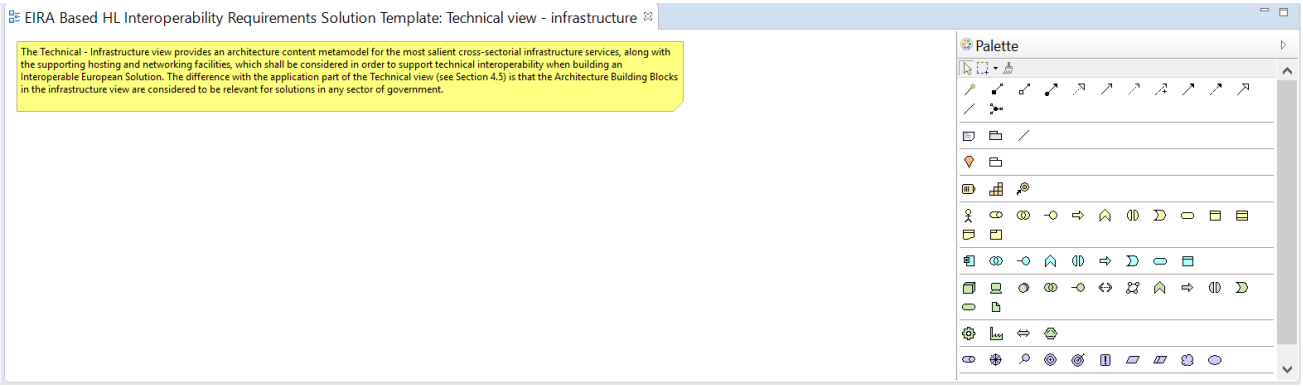
Technical Interoperability Requirements text
To be added in the **Properties** window.



In CarTool, select Views, Technical View - Infrastructure:

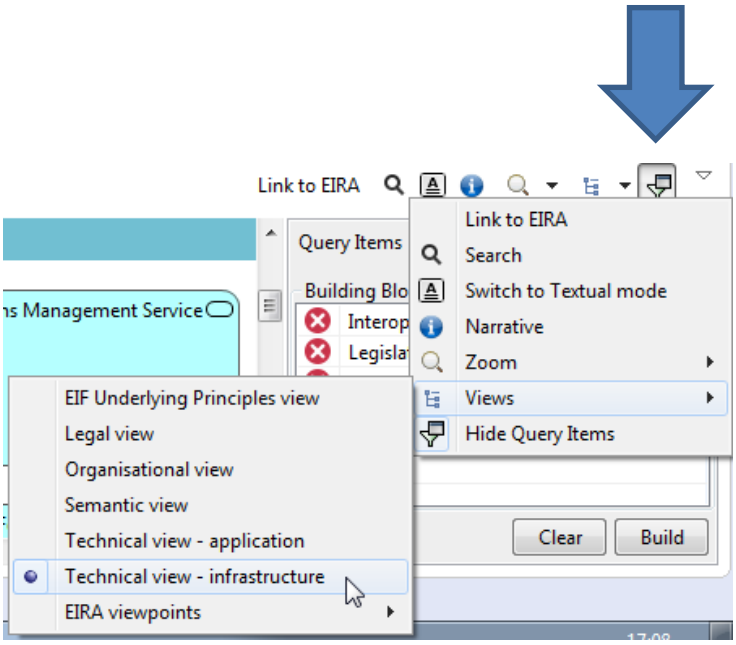


The EIRA Based HL Interoperability Requirements Solution Template Technical View – Infrastructure Window opens.



The EIRA Technical View - Infrastructure Metamodel can be accessed by choosing the dropdown options as shown in figure on the right.

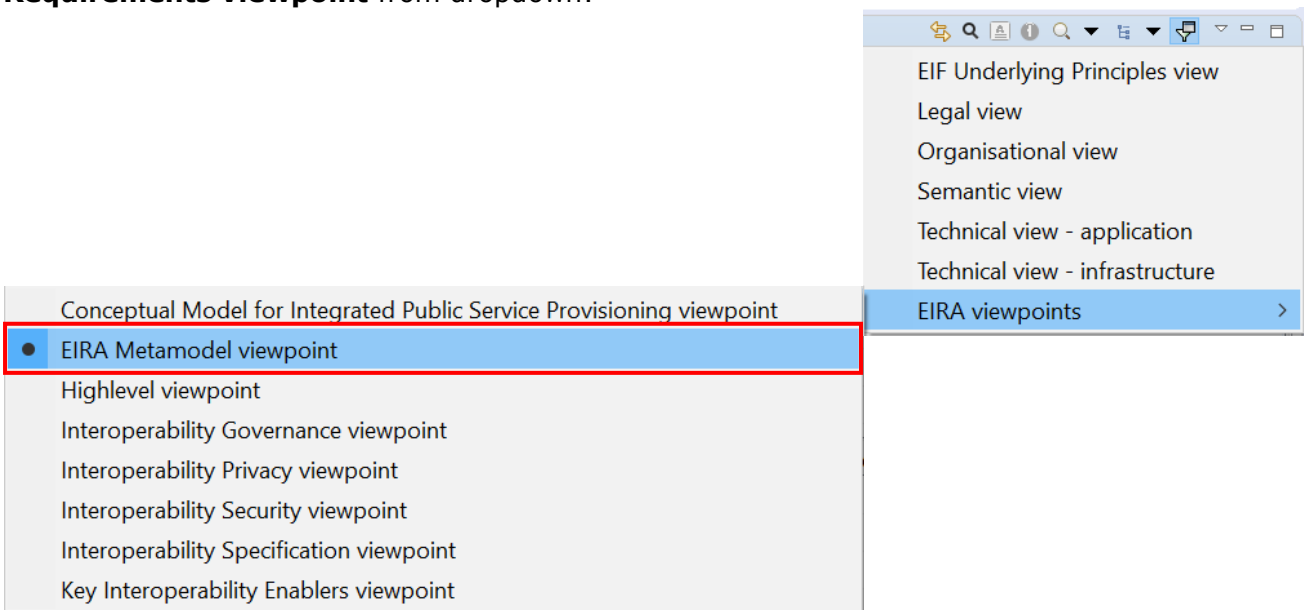
Select Views, Technical View – Infrastructure.



ABBs from the Metamodel window can be added to the Working Area (right-click the element and select 'add to Model'), together with elements from the Toolbox on the right side of the screen to model the Interoperability Requirements.

EIRA Metamodel Viewpoint:

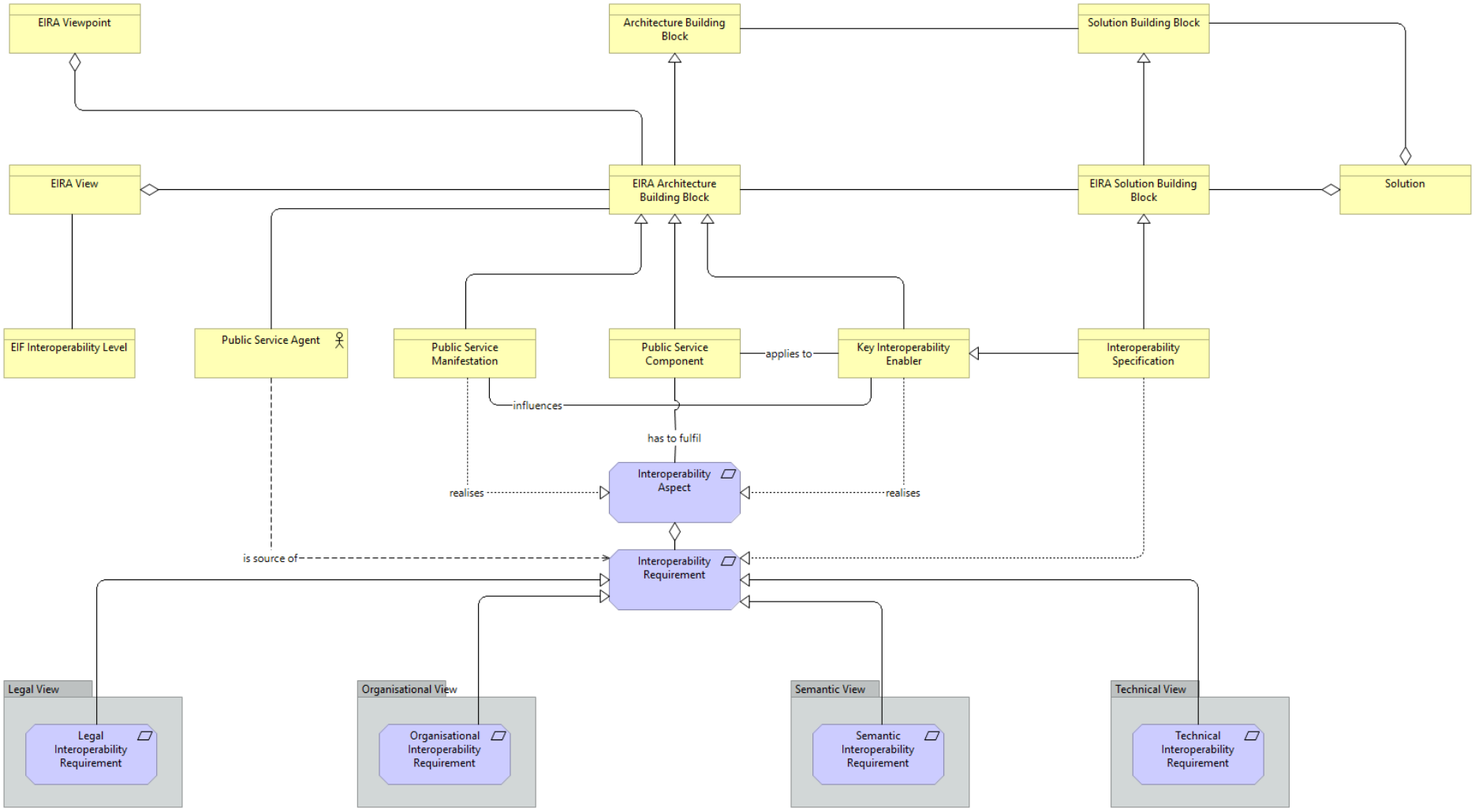
In CarTool, go to the EIRA Window, choose Views, EIRA viewpoint, select **Interoperability Requirements viewpoint** from dropdown:



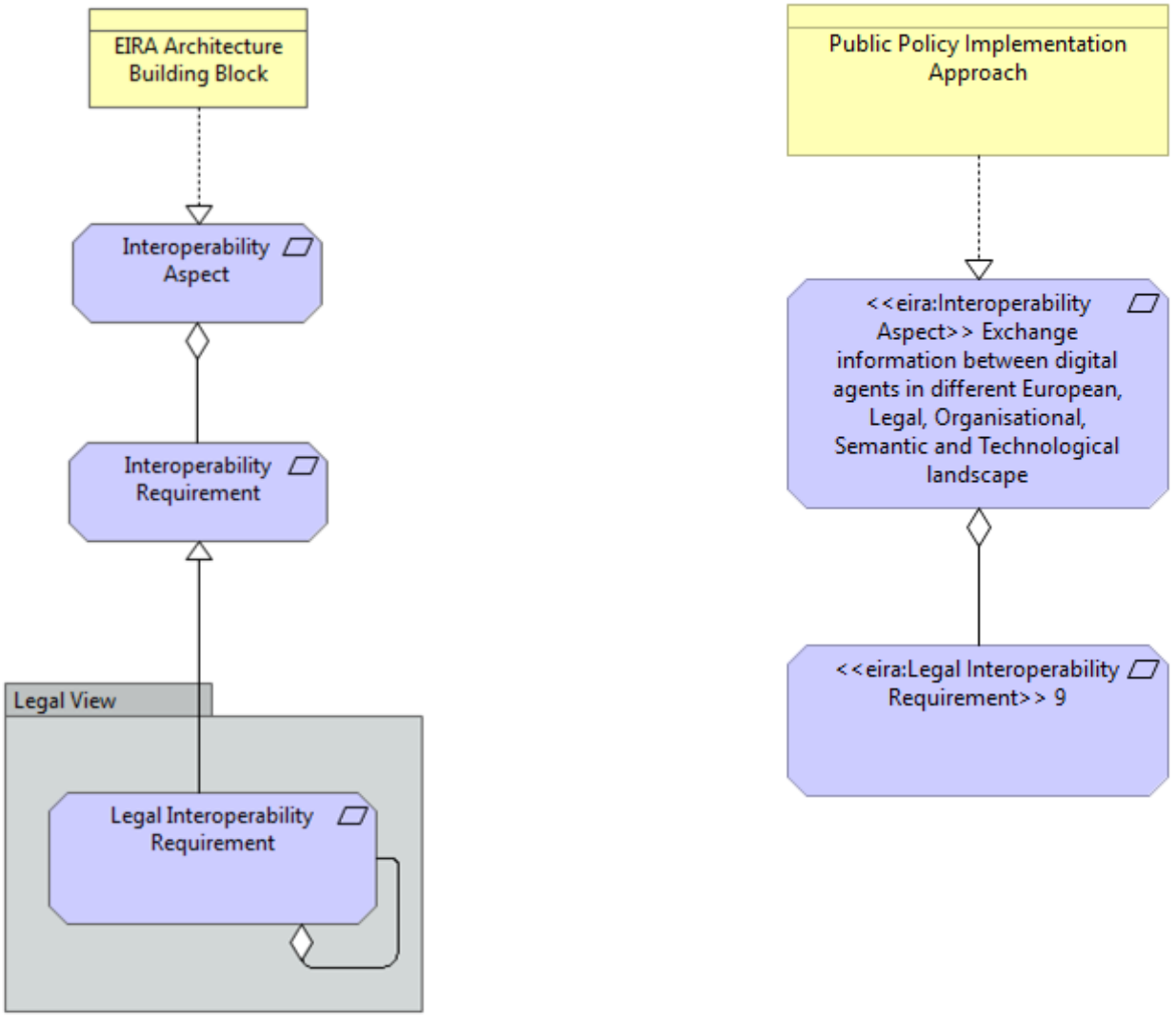
4 REFERENCES

- European Interoperability Reference Architecture (EIRA)
  https://joinup.ec.europa.eu/asset/eia/
- European Interoperability Framework (EIF)
  http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf
- ArchiMate®
  http://www.opengroup.org/subjectareas/enterprise/archimate
- Archi®
  http://www.archimatetool.com/

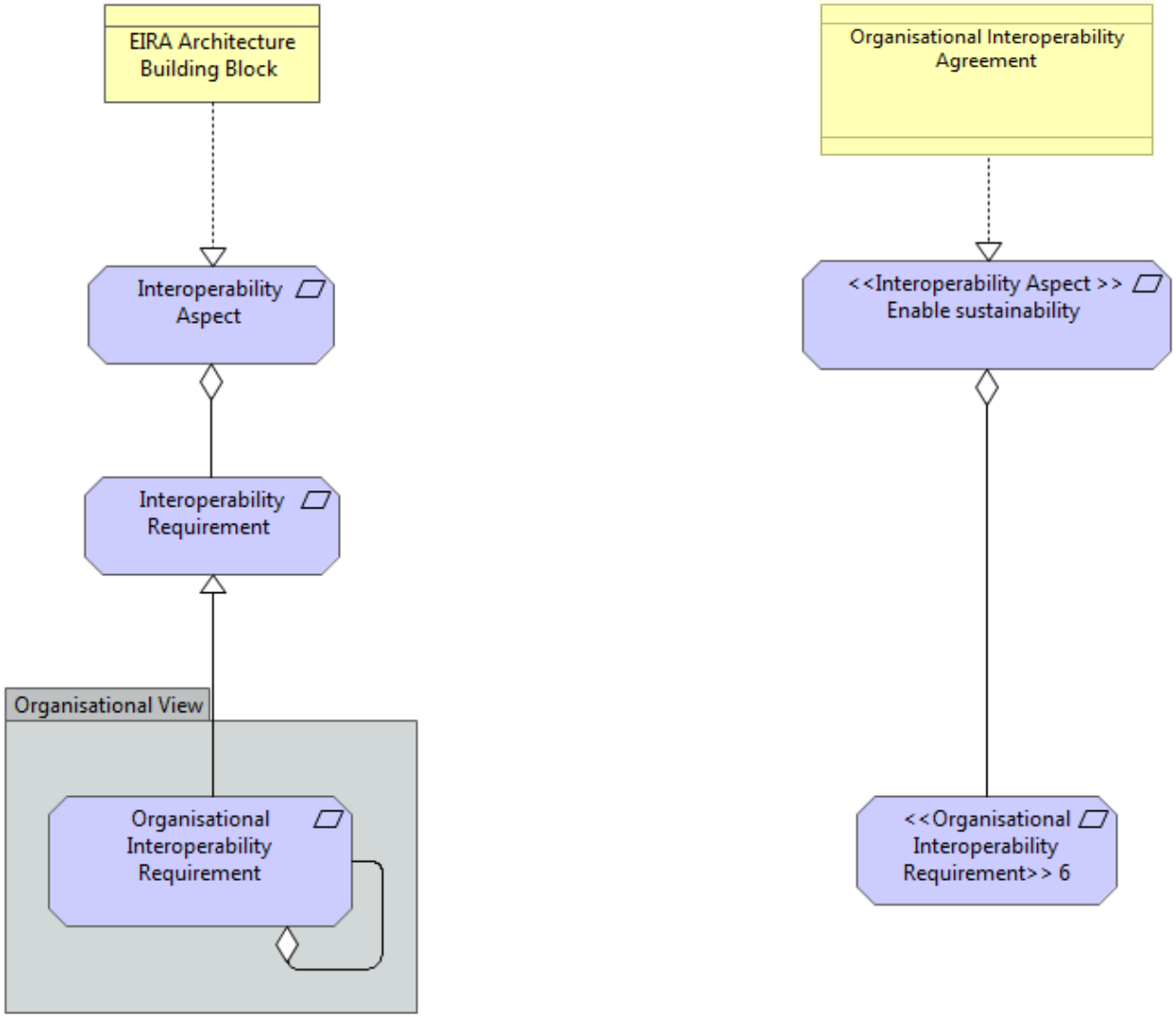
APPENDIX: EIRA METAMODEL VIEWPOINT



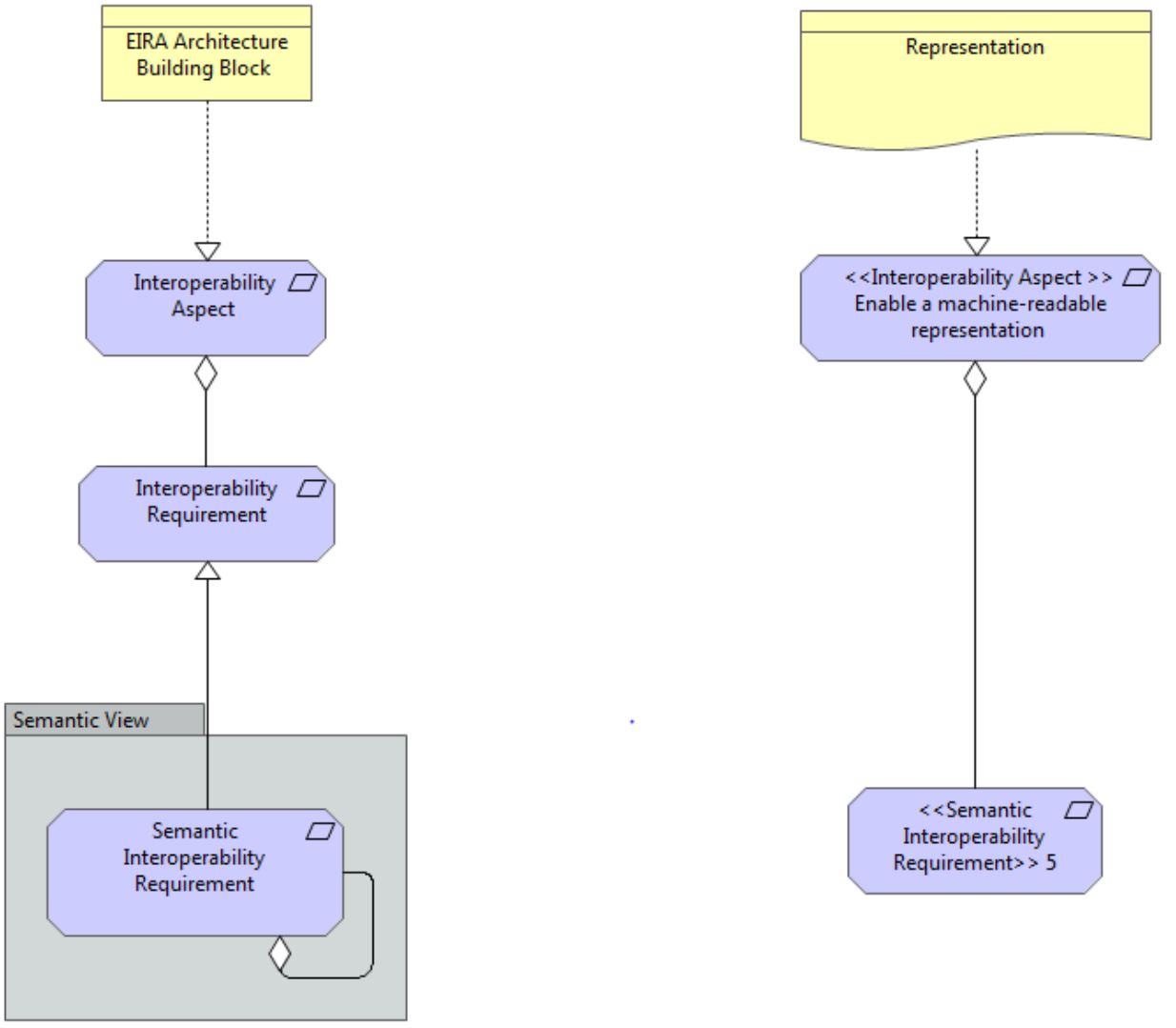
APPENDIX: LEGAL VIEW



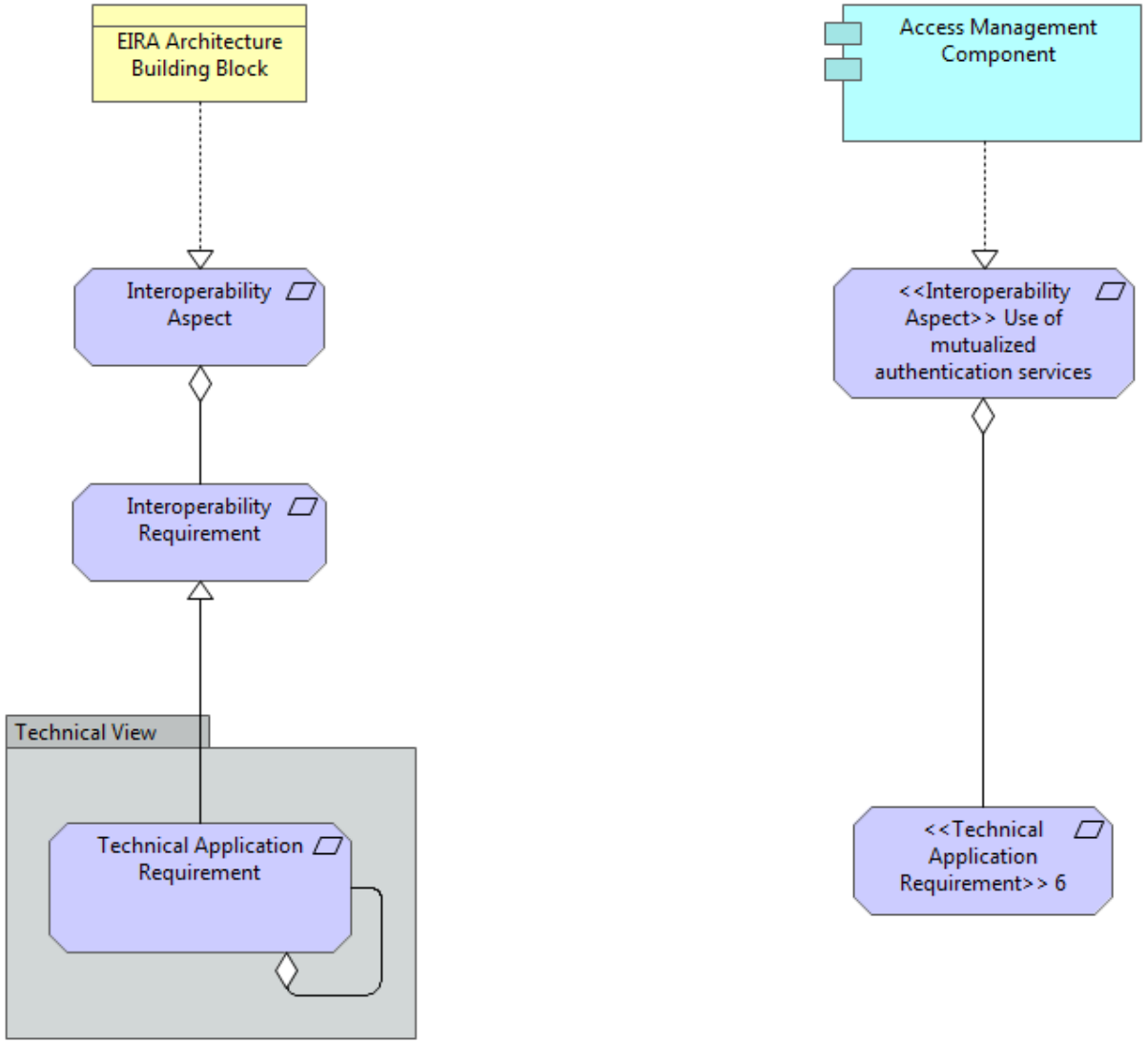
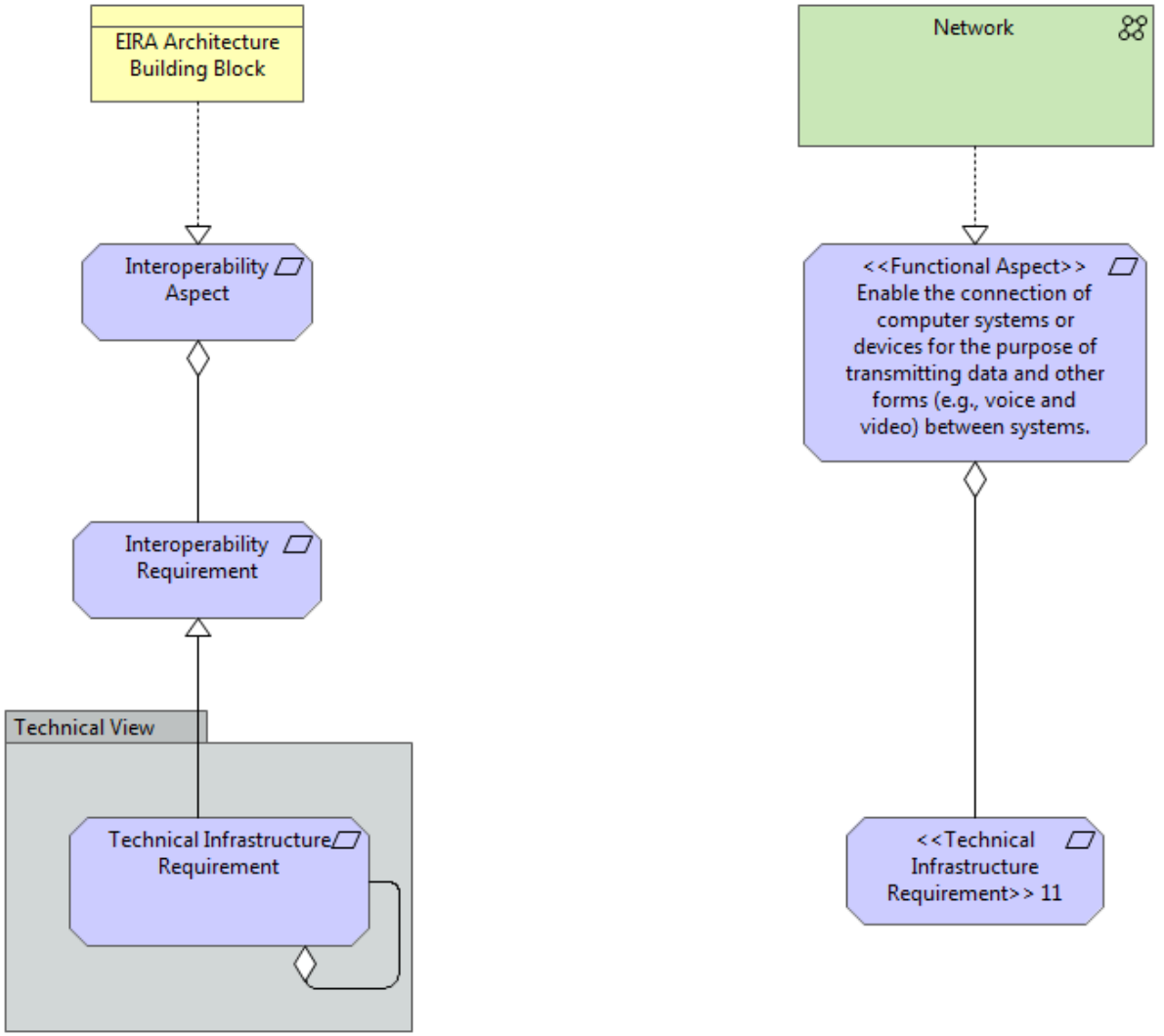
APPENDIX: ORGANISATIONAL VIEW



APPENDIX: SEMANTIC VIEW



APPENDIX: TECHNICAL VIEW – APPLICATION



APPENDIX: TECHNICAL VIEW – INFRASTRUCTURE