



**Open Data Solution Architecture Template (SAT)**  
**v1.0.0 - Beta**

Change control

Modification	Details
Version 1.0.0 Beta	

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## 1 INTRODUCTION

This document contains the description for a Solution Architecture Document (SAT) for Open Data.

This SAT is based on EIRA v1.1.0

The ArchiMate source are embedded in this document in the “Archi format” as well as in “The Open Group ArchiMate Model Exchange File Format”.



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### 1.1 Purpose of this document

Enterprise and Solution architects can use this document to design solution architectures in the domain of Open Data.

### 1.2 List of acronyms used in this document

Table 1-1

ABB	Architecture Building Block
API	Application Programming Interface
DCAT-AP	Data Catalogue - Application profile
EIRA	European Interoperability Reference Architecture
HTTP	HyperText Transfer Protocol
JSON	JavaScript Object Notation
PSI Directive	Public Sector Information Directive
RDF	Resource Description Framework
SAT	Solution Architecture Template
SBB	Solution Building Block
SPARQL	SPARQL Protocol and RDF Query Language
URI	Uniform Resource Identifier
W3C	World Wide Web Consortium
XML	eXtensible Markup Language

## **2 GOAL, DESCRIPTION AND TARGET AUDIENCE**

This chapter gives the goals and a description on open data 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 guidance by defining a minimal, but holistic (legal, organisational, semantic and technical) interoperability architecture to implement mutual recognition of Open Data. The Open Data SAT should allow businesses, citizens and public administrations to have a common understanding of the most-salient building blocks.

### **2.2 What is public open data**

Open data refers to the practice of publishing (raw) data in a way that is accessible, reusable, machine readable and licensed permissively. It can be generated by a wide range of parties, including public authorities, the semi-public sector, businesses and the public. In the case of public authorities, such as European Union organisations, making their data available for public reuse supports economic development, openness and transparency.

As a matter of fact, public authorities produce, collect or pay for huge quantities of data, referred to as public data, public sector information (PSI) or government data. Most data like this is publicly available, and is gathered at taxpayers' expense and for their ultimate benefit. Therefore it should be made freely available for both access and reuse (pg7. Of the EU Open Data guide)

### **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:

**Table 2-1**

<b>Audience</b>	<b>Description</b>
Architect	Enterprise/solution architects in the need of understanding, implementing, or describing an Open Data solution.
Policy maker	Policy makers studying the implications due to policy changes of the PSI Directive
Public Administration / Members States	Public Administrations of the European Union that need to have a holistic view of the Open Data interoperability architecture

### 3 OPEN DATA INTEROPERABILITY MAPPED TO THE EIRA

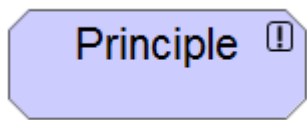
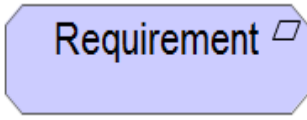
This chapter contains for each EIRA view the corresponding ArchiMate model and narrative. Next to the SAT's EIRA architecture building blocks, the ArchiMate model includes, where applicable, the related specifications, principles and requirements.

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

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

Table 3-1

Non-EIRA concept	Description
	A principle is defined as a normative property of all systems in a given context.
	A requirement is defined as a statement of need that must be realized by a system.

The following principles and requirements are used in this SAT:

1. **Linked Data Principle:** Linked data principles provide a common API for data on the Web that is more convenient than many separately and differently designed APIs published by individual data suppliers. Tim Berners-Lee, inventor of the Web and initiator of the linked data project, proposed the following principles upon which linked data is based.
  1. Use URIs to name things.
  2. Use HTTP URIs so that things can be referred to and looked up (dereferenced) by people and user agents. When someone looks up a URI provide useful information using open Web standards such as RDF or SPARQL.
  3. Include links to other related things using their URIs when publishing on the Web.
2. **Requirement - Open data must be provided with a license:** In most jurisdictions there are intellectual property rights concerning data that prevent third-parties from using, reusing and redistributing data without explicit permission. Even in places where the existence of rights is uncertain, it is important to apply a license simply for the sake of clarity. Thus, if you are planning to make your data available you should put a license on it – and if you want your data to be open this is even more important.
3. **G8 Open Data Charter Principle 1 - Open Data by Default:** all government data will be published openly by default
4. **G8 Open Data Charter Principle 2 - Quality and quantity:** data should be released as early as possible in its original form and fully described in clear language. This principle denotes the importance of metadata and user feedback to improve quality.



5. **G8 Open Data Charter Principle 3 - Usable by all:** data will be published in open formats for humans and machines wherever possible and will be free.
6. **G8 Open Data Charter Principle 4 - Releasing data for improved governance:** governments will share their technical expertise with each other and document their own open data initiatives.
7. **G8 Open Data Charter Principle 5 - Releasing data for innovation:** G8 governments will promote open data literacy and the provision of data in machine-readable formats.

### 3.2 How to use this SAT

An architect that uses this SAT typically wants to perform a gap-analysis between an existing solution and this Solution Architecture Template, or he/she wants to model a solution in the domain of Open Data and uses this document as guidance.



Although this SAT takes a lot of inspiration from the EU Open Data, it is written with a broader scope, it explains how any data provider and any data portal owner work together in providing access to Open Data.

#### 3.2.1 Gap Analysis

Using this SAT for gap analysis, the architect can map the building blocks of the solution to the ones in this SAT and identify which building blocks are missing. These building blocks can either indicate missing functionality or missing interoperability specifications.

#### 3.2.2 Building a solution

When building a solution, the architect is expected to use the four different EIRA views and provide a solution in the form of Solution Building Blocks (SBBs) for the Architecture Building Blocks (ABBs) that are indicated. This is done by replacing the Architecture Building Block (ABB) with an annotated Solution Building Block. The existing Solution Building Blocks (SBB) in this SAT should not be removed and replaced, however, the acknowledgement of reusing these building blocks can be done by removing the ABBs which they specialise.

Interoperability Specifications (IoP specs) are added as specialisation of an Interoperability ABB, implemented in the form of an SBB and attached to an ABB as interoperability requirements. The final solution should only contain the implementation (the SBB) of the IoP Spec

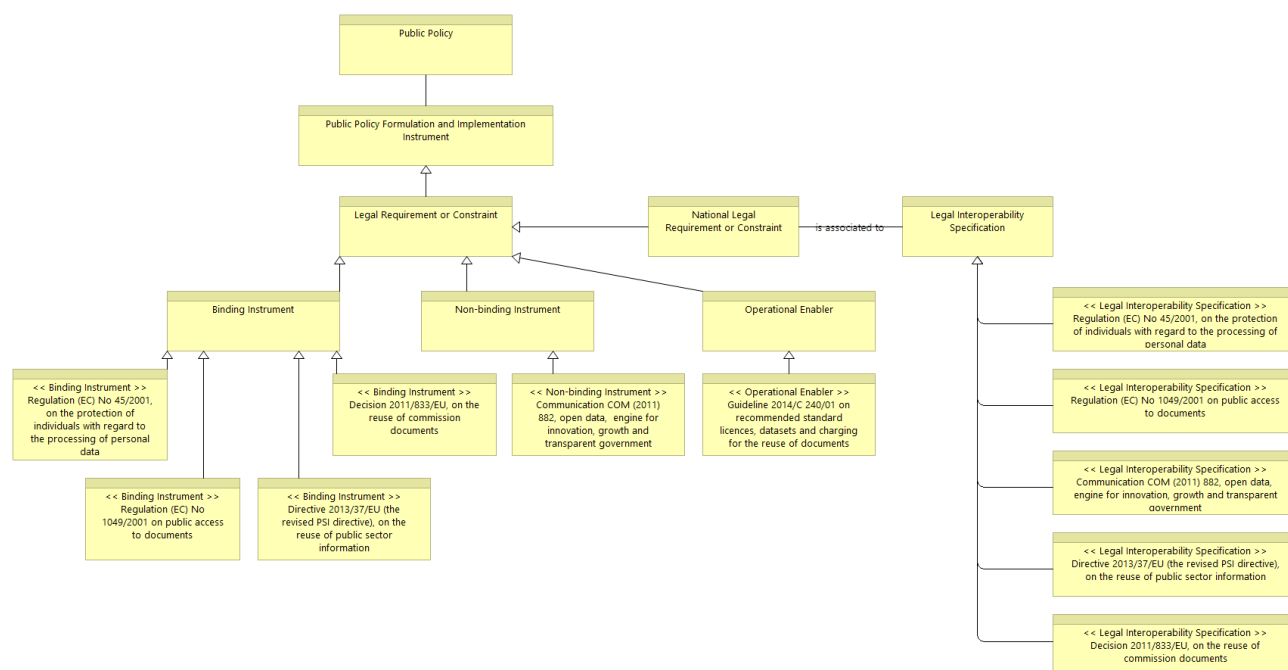
The result will be a solution architecture that will contain only SBBs, all ABBs should have been removed (in the case this SAT already provides SBBs for this ABB) or replaced by SBBs (solutions that implement that ABB).



The SAT is a document describing the needed Architecture Building Blocks for a desired solution. This should not be taken as restrictive but as advisory. When an Architecture Building Block (ABB) is present for which there is no implementation foreseen in the form of a Solution Building Block (SBB), it is *strongly* recommended, but not mandatory, to take this ABB into consideration in the final solution.

## 3.3 Legal View

The Legal view of the Open Data SAT consists of the following sub-set of EIRA Architecture Building Blocks (ABBs) as well as some predefined Solution Building Blocks (SBBs):



As documented in the “EU Open Data Portal – The basics for EU data providers”, public authorities produce, collect or pay for huge quantities of data, referred to as public data, public sector information (PSI) or government data. [...] Most data like this is publicly available, and is gathered at taxpayers’ expense and for their ultimate benefit. Therefore it should be made freely available for both access and reuse.

Directive 2003/98/EC on the reuse of public sector information, known as the PSI Directive, sets out the general legislative framework at European level for government data. In June 2013 a revision of the PSI Directive was adopted. The revised PSI Directive (Directive 2013/37/EU) brings about important improvements, as it introduces the default rule that public information will be available for free or at very low cost and it expands the scope to other institutions (museums, archives and libraries).

The EU is itself a producer and holder of PSI. Not only does it practise what it preaches, it also goes even further with the reuse policy put in place by the European Commission for its own information resources. Since 2006, under Decision 2006/291/EC on the reuse of Commission information, the Commission has allowed the reuse of its documents for commercial and non-commercial purposes at no charge.

Reuse is only allowed in full compliance with personal data protection rules. Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data applies.

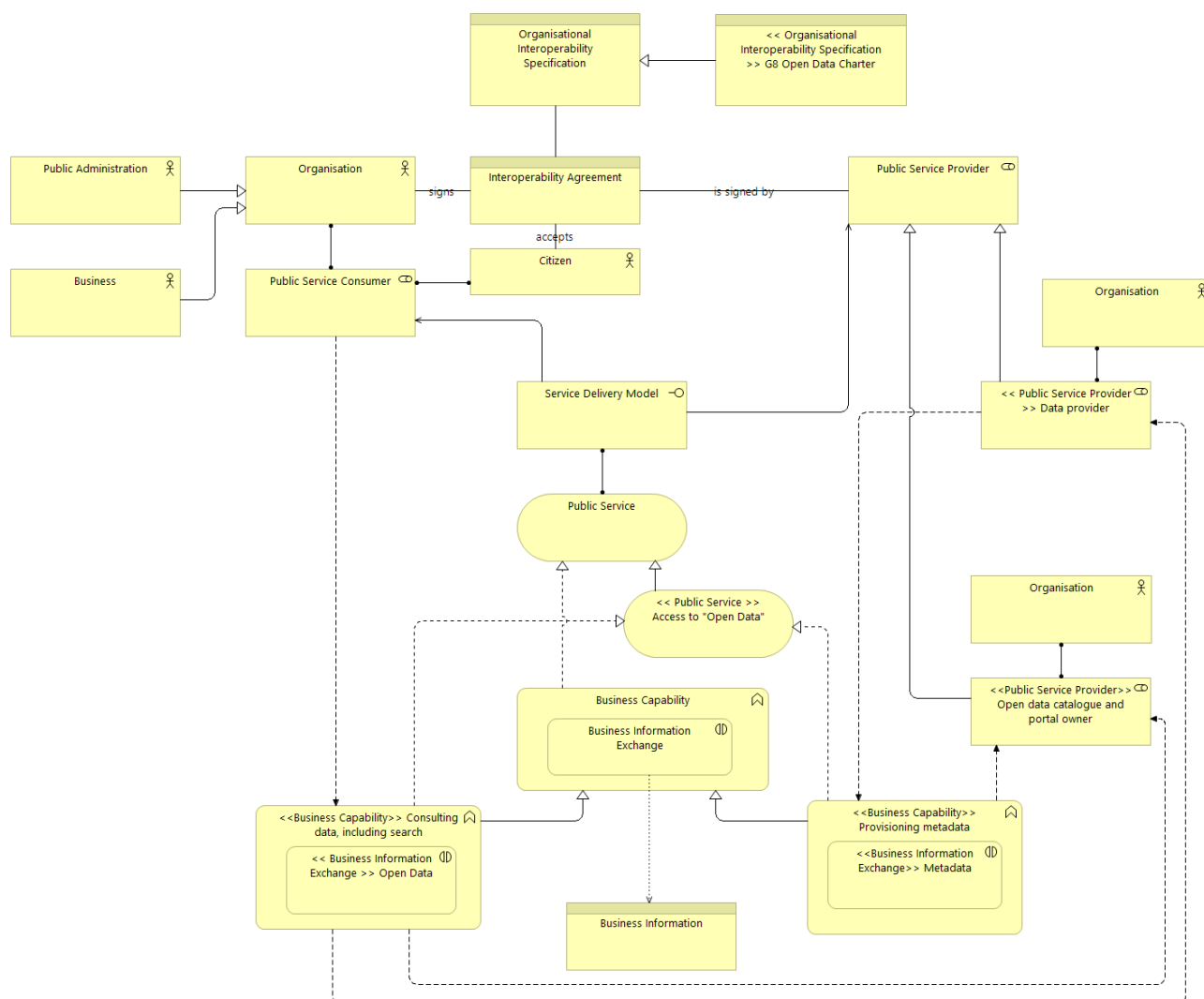
In December 2011, under revised Decision 2011/833/EU amending the abovementioned decision, it also committed to work to provide documents in machine-readable formats, [...] moreover, it set up an open data portal to promote accessibility and the reuse of data from Commission services. This portal is also open to data from other institutions and bodies and key agencies. In fact, ‘the Commission will explore how similar rules could be taken up by other EU institutions

(see Open data — an engine for innovation, growth and transparent governance (COM (2011) 882). The decision is complementary to the Commission policy on access to Commission documents (2) (Regulation (EC) No 2001/1049).

In the framework of its implementation plan for the Open Data Charter, the EU's commitments included identifying core datasets (budget, elections and statistics) at EU level, as well as preparing guidelines for EU Member States relating to publishing core and high-value datasets (Guideline 2014/C 240/01 on recommended standard licences, datasets and charging for the reuse of documents).

### 3.4 Organisational View

The Organisational view of the Open Data SAT consists of the following sub-set of EIRA Architecture Building Blocks (ABBs) as well as some predefined Solution Building Blocks (SBBs):



The Public Service in the case of Open Data is "Access to 'Open Data'" where we distinguish two Business Capabilities; consultation of data including search and the provisioning of Metadata.

"Consultation of data, including search", is the business capability where a citizen, business or public administration in the role of "public service consumer" can search for and use open data from either a "Data Provider" or an "Open data catalogue and portal owner" that have the role "public service provider".

"Provisioning of metadata" is the business capability where a "data provider" provisions its metadata to an "open data catalogue and portal owner".

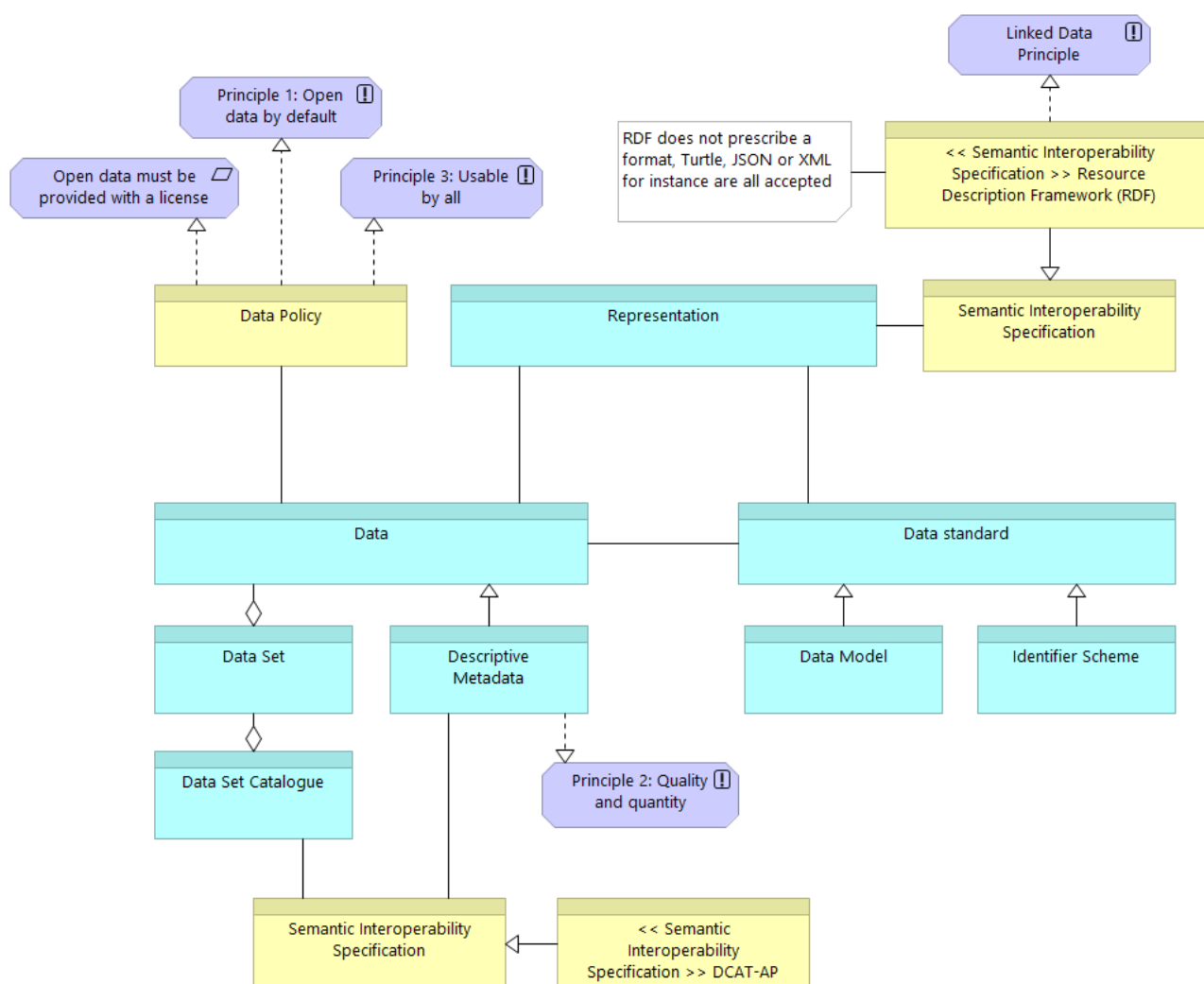
An interoperability agreement (typically in the form of a service level agreement or a collaboration agreement) will be established between the public service consumers of the “Access to ‘Open Data’” service and the public service providers. This can be a formal agreement where both parties sign the agreement, or an informal agreement, typically a citizen that (implicitly) accepts the agreement. This interoperability agreement will be described in a Service Delivery Model which defines how the organisation arranges the delivery of its services to service consumers.

The “G8 Open Data Charter” discusses the need and the principles of open data and is therefore added as organisational interoperability specification.

In some case, open data that is provided can be commented or rated by citizens, where these comments automatically become part of the metadata. We consider this case as an implicit approval of the data provider to include this metadata, the publication of this metadata is still under the responsibility of the data provider.

### 3.5 Semantic View

The Semantic view of the Open Data SAT consists of the following sub-set of EIRA Architecture Building Blocks (ABBs) as well as some predefined Solution Building Blocks (SBBs):



Although there is no specific Data Policy for Open Data, there is the requirement that Open Data must be provided with an open license for it to be open. Additionally, the principles of “Open data by default” and “Useable by all” apply and are linked to Data Policy. The Linked Data Principle is linked to “Resource Description Framework (RDF)” as Interoperability specification, since this is the **endorsed** specification for the representation of linked open data (level 5 on the 5-star deployment scheme for open data). Tabular data is often exchanged using Comma Separated Values (CSV) as format, but this format is listed on as level three in the 5-star deployment scheme for open data, it is not using RDF, nor is it linked data.

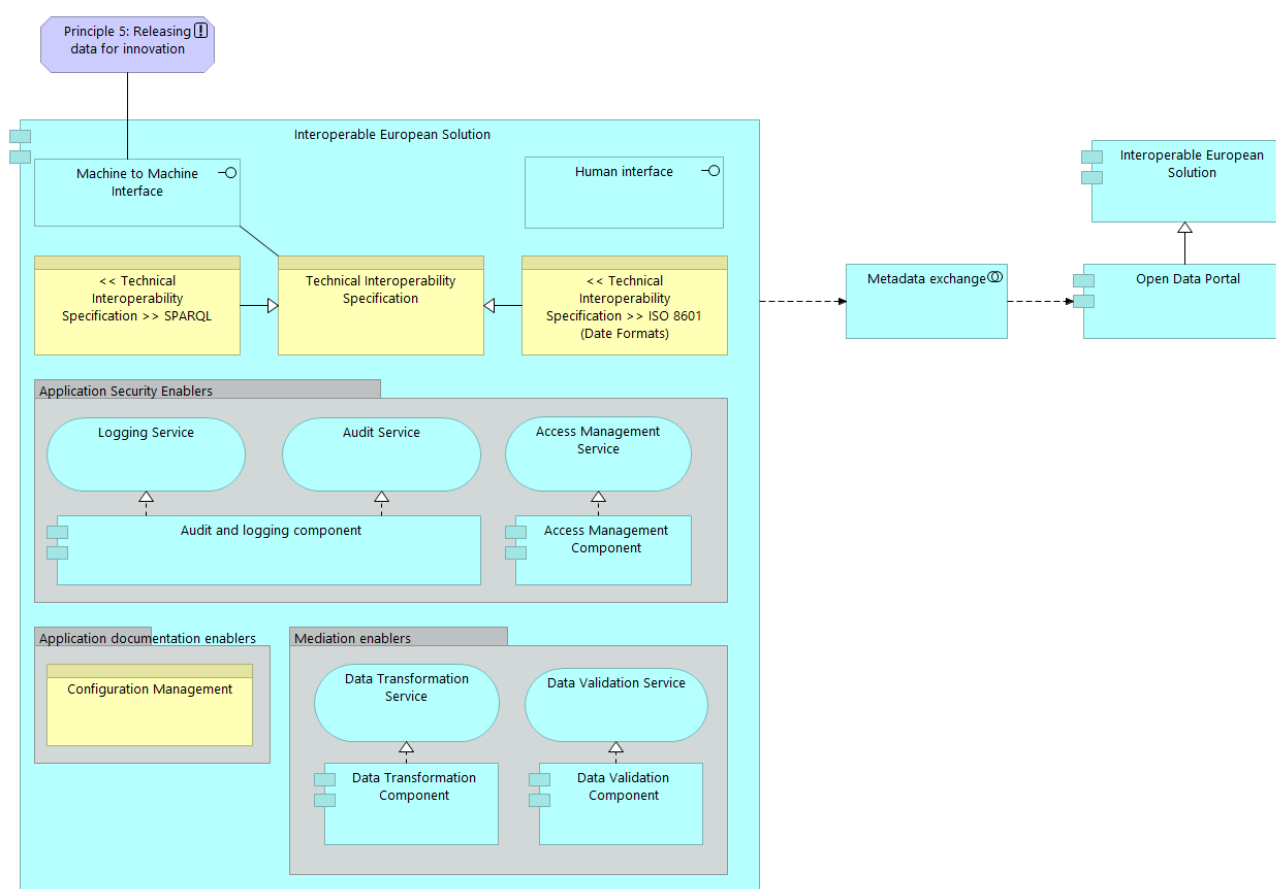
Data portals provide data sets containing Open Data, these datasets are presented in the form of a "Data Set Catalogue", where DCAT-AP is used as Semantic Interoperability Specification to provide the data model for the "Data Set Catalogue". DCAT-AP is also used as Semantic Interoperability Specification as Data Model Template to describe "Descriptive Metadata".

Principle 2: Quality and quantity indicates the importance of Meta Data.

"Data Models" and "Identifier Schemes" are both Data Standards that are applicable, where "Data Models" includes formal data names, comprehensive data definitions, proper data structures and precise data integrity rules and "Identifier Schemes" are used to define the values of identifiers.

### 3.6 Technical View – Application

The Technical application view of the Open Data SAT consists of the following sub-set of EIRA Architecture Building Blocks (ABBs) as well as some predefined Solution Building Blocks (SBBs):

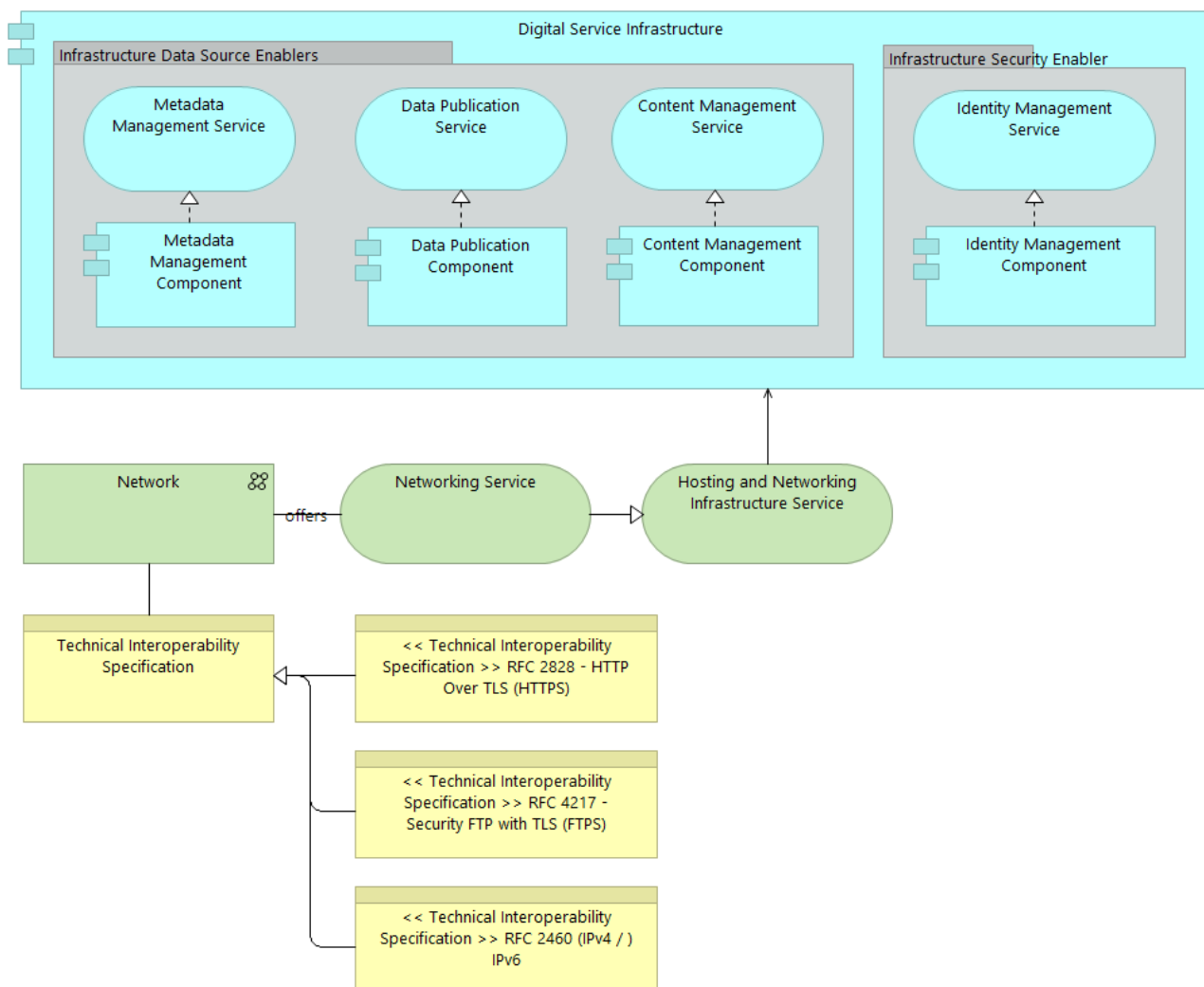


The fifth principle of the G8 Open Data Charter tells us the following: G8 governments will promote open data literacy and the provision of data in machine-readable formats. This is expressed by the SPARQL technical specification on the machine-to-machine interface. Date formats are specified by the ISO 8601 Technical Specification. Any solution will want to include logging and auditing as well as access management to ensure that only authorised users can perform actions on IT resources. Data transformation and data validation services and components are used for the routing, transformation, validation and exchange of data.

Metadata exchange is a form of 'Application Collaboration' with Open Data portals.

## 3.7 Technical View – Infrastructure

The Technical infrastructure view of the Open Data SAT consists of the following sub-set of EIRA Architecture Building Blocks (ABBs) as well as some predefined Solution Building Blocks (SBBs):



A “Content Management Service” enables the organisation and categorisation of information resources so that they can be stored, published and reused in multiple contexts, its functionality is encapsulated by the “Content Management Component”. A “Data Publication Service” data available to other services or users, its functionality is encapsulated by the “Data Publication Component”. A “Metadata Management Service” enables the creation, storage, categorisation and retrieval of metadata, its functionality is encapsulated by the “Metadata Management Component”.

An Identity Management Service provides functionalities for the authentication of users. The eIDAS Regulation provides the following definitions:

8. ‘electronic identification’ means the process of using person identification data in electronic form uniquely representing either a natural or legal person, or a natural person representing a legal person;
9. ‘authentication’ means an electronic process that enables the electronic identification of a natural or legal person, or the origin and integrity of data in electronic form to be confirmed;

## **4 FUTURE WORK**

The current release of this SAT is considered as a Beta version in anticipation of future improvements in terms of identifying additional interoperability specifications for its defined ABBs. This activity is foreseen to be structured as follows:

1. Identify the set of ABBs that, in the domain of this SAT, are considered as key interoperability enablers.
2. Ensure that for each such key ABB there is an identified interoperability specification. The identification of such specifications shall be the result of expert analysis and review.

Feedback and input in relation to this work, as well as any other suggestions for improvement, are more than welcome. Please direct any such input you may have as an email to [DIGIT-EIRA@ec.europa.eu](mailto:DIGIT-EIRA@ec.europa.eu).



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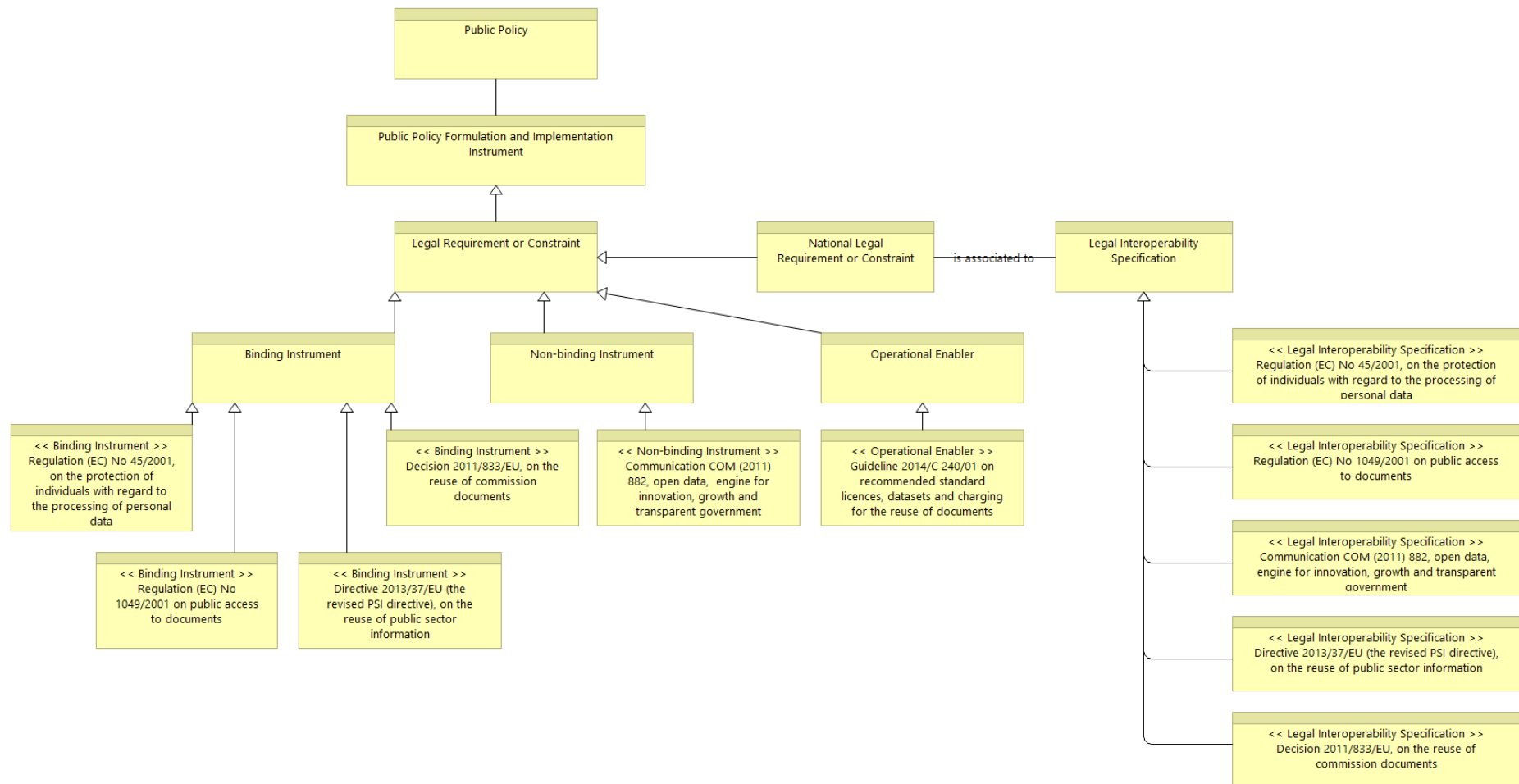
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## **6 ACKNOWLEDGEMENTS**

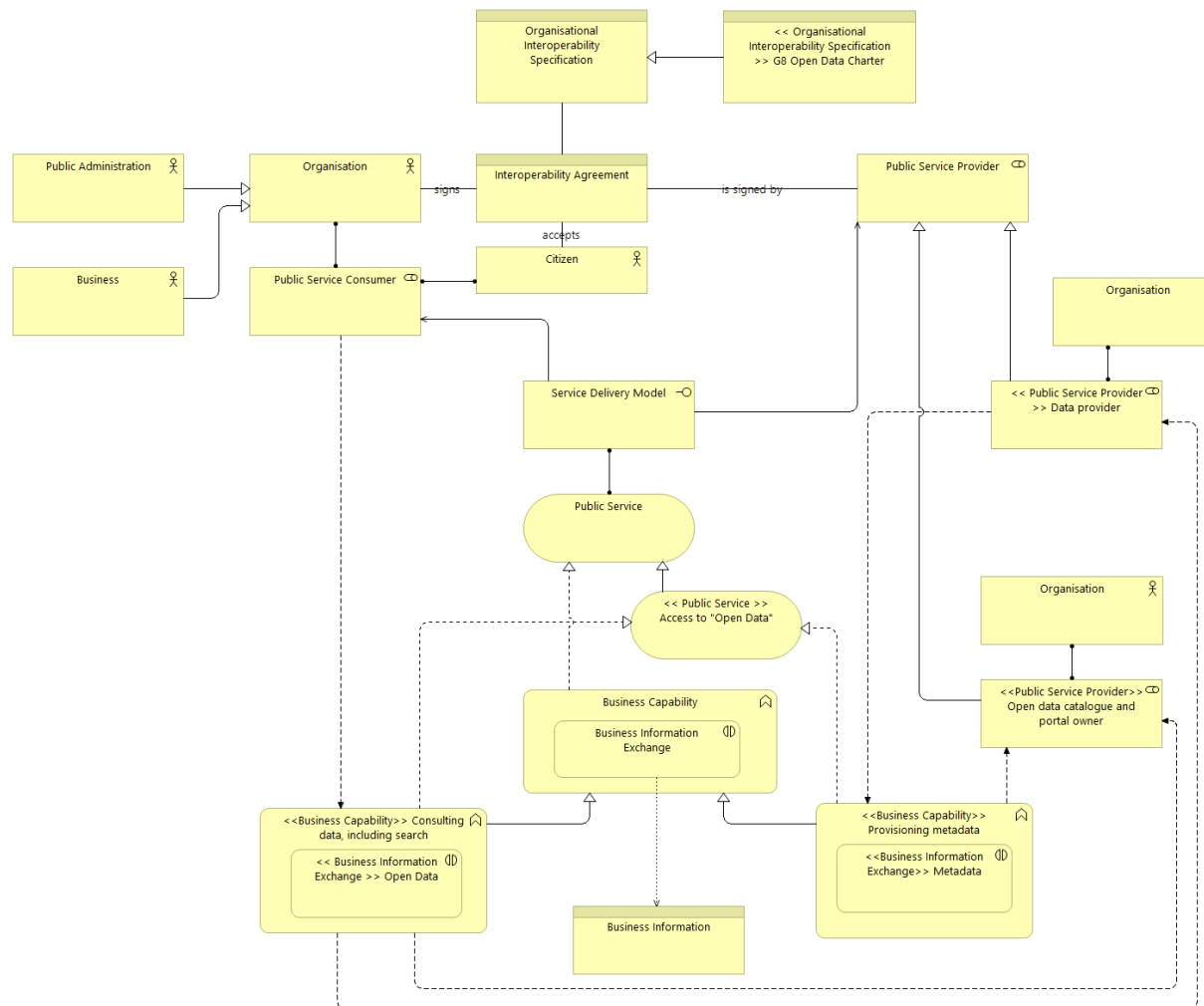
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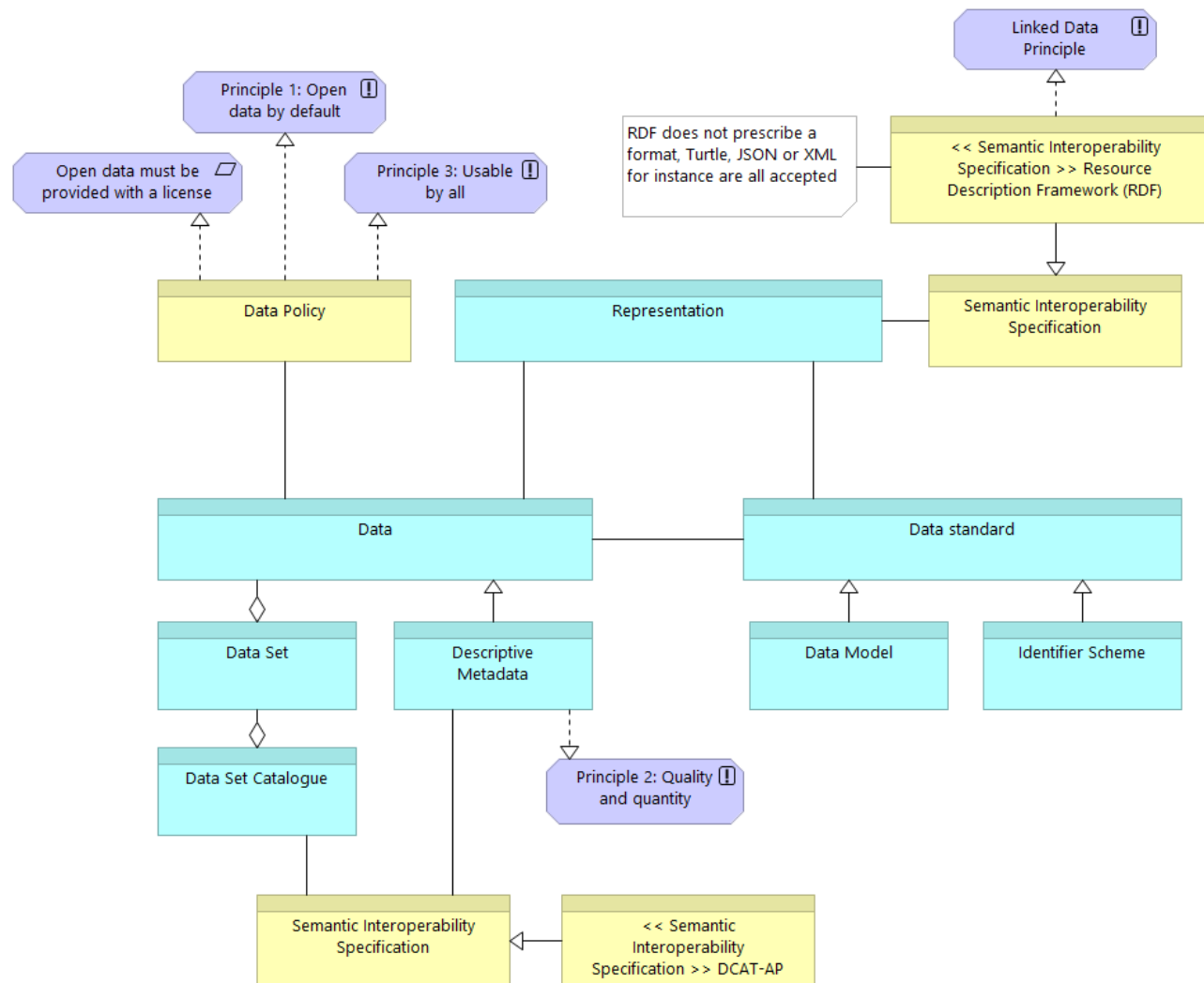
## 7 APPENDIX: LEGAL VIEW



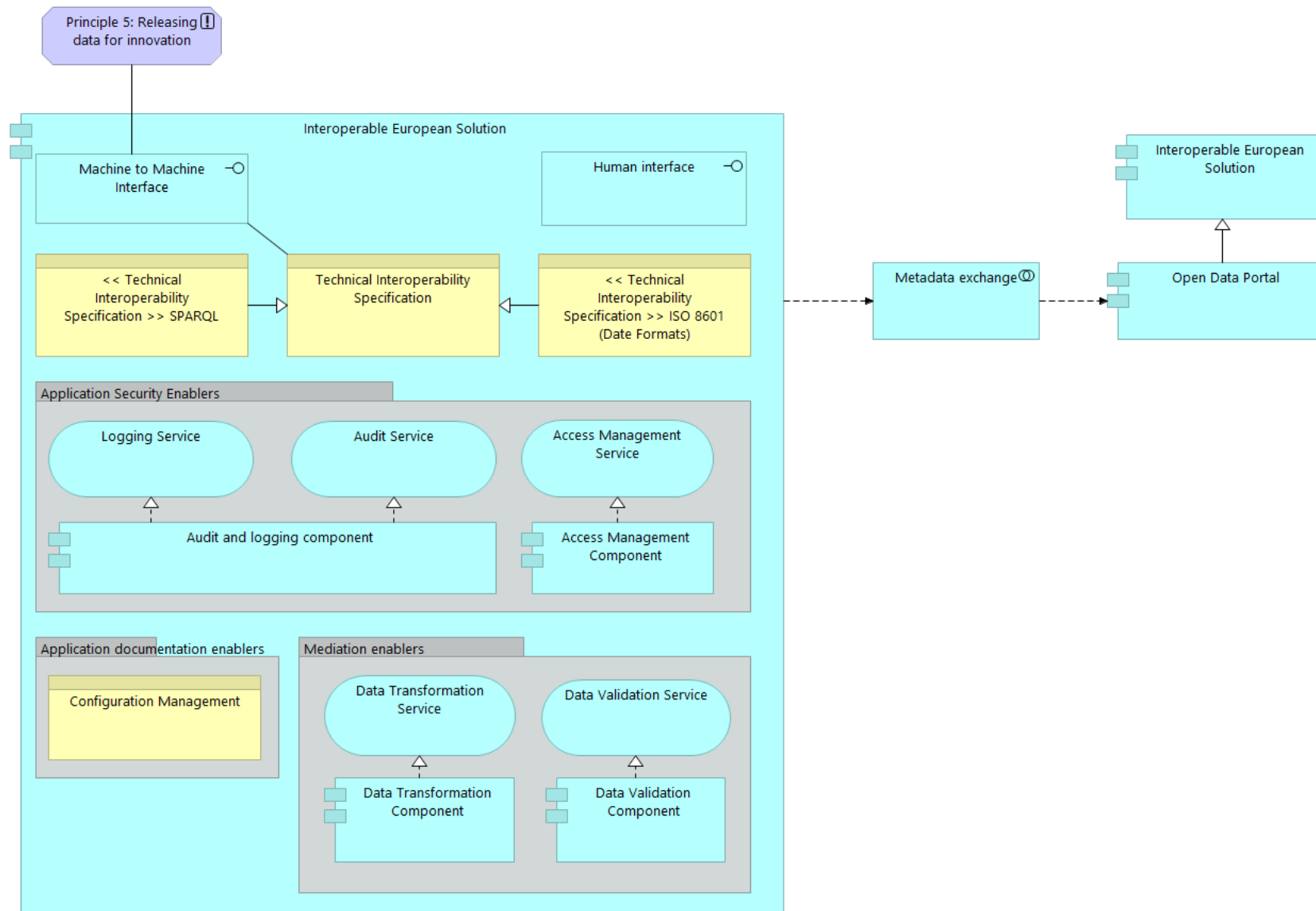
## 8 APPENDIX: ORGANISATIONAL VIEW



## 9 APPENDIX: SEMANTIC VIEW



## 10 APPENDIX: TECHNICAL VIEW – APPLICATION



## 11 APPENDIX: TECHNICAL VIEW – INFRASTRUCTURE

