OFFICE OF THE MINISTER OF STATE FOR ADMINISTRATIVE REFORM

E-GOVERNMENT UNIT

LGIRA – LEBANESE GOVERNMENT INTEROPERABILITY REFERENCE ARCHITECTURE

VERSION V1.0

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Glossary

ABBREVIATION	MEANING
LGIF	Lebanese Government Interoperability Framework. In the context of this document, it is referred to as the pilot for the LGIF or LGIF version 1 (LGIF V1).
LGIRA	Lebanese Governmental Reference Architecture. In the context of this document, it is referred to as the pilot for the LGIRA or LGIRA version 1 (LGIRA V1)
CDC	Company Data Conversion
LE	Legal Entity
CR	Commercial Registry
PSC	Point of Single Contact
SRLE	Single Register of Legal Entities in Lebanon
Registration institution	Any institution that is responsible for the registration of legal entities in Lebanon – the Commercial Registrar within the Ministry of Justice, but also any other institution that register legal entities of certain type that will be added to SRLE in the future.
Sole registration institution, Centralized registration institution	The recommended setup for the Commercial Registrar within the Ministry of Justice, where this institution should take over the registration of all Legal Entity types within Lebanon.
OSS	One Stop Shop
ID	Identification number
ULEID	Unique Legal Entity Identification Number
ESB	Enterprise Service Bus
DIP	Digital identity Platform
SPP	Service Provisioning Platform
BPMN	Business Process Modelling Notation, a diagraming notation used for representation of business processes.
LLC	Limited Liability Company
JSC	Joint Stocks Company

CA	Certificate Authority
ICT	Information and Communication Technology
PKI	Public Key Infrastructure
MoJ, MOJ	Ministry of Justice
MoF, MOF	Ministry of Finance
Tax authority	Ministry of Finance as responsible for managing the tax obligations of the entities.
NSSF	National Social Security Fund
MoE, MOE	Ministry of Economy
GoL, GOL	Government of Lebanon
SLA	Service Level Agreement
MoU	Memorandum of Understanding
ABB	Architectural Building Block of an interoperability setup

Executive summary

The "Design of the interoperability framework for the Lebanese commercial registration process" project is based on the Commercial Registry reform strategy that was implemented during the year 2014.

The main objective of the project is to lay down the fundamentals for the development of the Lebanese Governmental Interoperability Framework and its practical implementation for One Stop Shopping for commercial registration, as the first pilot service.

The Project had two aspects in focus. The first one related to the drafting of the first version of the Lebanese Governmental Interoperability Framework (LGIF) and the associated Lebanese Governmental Interoperability Reference Architecture (LGIRA) as the fundamental documents and concepts for a pan-governmental interoperability, and the second related to the implementation of the One Stop Shop for company registration as the first pilot composite service and practical proof of concept of the models and constructs defined by the LGIF and the LGIRA.

The European Interoperability framework was taken into consideration in producing the Conceptual Service model for the 1st version of the Lebanese Government Interoperability Framework (LGIF V1.0). Based on the information and findings from the questionnaires prepared by the project, an analysis was made in order to assess and take stock of the current organizational and technological setup with the different stakeholders that are the focus of the project.

The conceptual service model follows a bottom-up approach in the implementation of interoperability projects and provides common ground for adoption of the interoperability solution in different domains while minimizing the risks from the unequal technological and organizational maturity.

As one of the main cornerstones in producing the first version of the LGIF, governance model is defined which organizes the roles and responsibilities at three governance levels (strategy, build and operate level) that are assigned to the stakeholders in the OSS for Company Registration Interoperability Domain.

The project also focuses on the need of conversion of the legal entity (company) data from the current system to the new One Stop Shop, where the new registration system should operate with the most current and confirmed legal entity information. This includes other closely related issues such as designing of a unique legal entity registration form and the implementation of a new numbering scheme for unique cross-institutional identification of legal entities. Portion of the work is also focused on data definition and definition reconciliation in order to assure semantic interoperability in the OSS domain. The outcome is represented through data dictionaries that should be further maintained and expanded by the stakeholders involved in the process.

The organization of this document

This document is organized in the following specific chapters:

- Chapter 1 gives an overview of the LGIRA;
- Chapter 2 introduces the legal dimension of the LGIRA;
- Chapter 3 introduces the organizational dimension of the LGIRA;
- Chapter 4 introduces the semantic dimension of the LGIRA;
- Chapter 5 introduces the technical dimension of the LGIRA;
- "*ANNEX 1* – LGIF and LGIRA cross-referencing" introduces a model of relating the elements from the LGIF to the Lebanese Government Interoperability Reference Architecture;
- "*ANNEX 2 – LIST OF OFFICIAL STANDARDS RECOMMENDED*" introduces the standards that are endorsed on national level for the implementation and application of LGIRA.

1 LGIRA overview

An architecture is typically developed because key stakeholders have concerns that need to be addressed by the business and IT systems within the organization. The objective of the architecture is to address these concerns, by identifying and refining the requirements that the stakeholders have, developing views that show how the concerns and the requirements are going to be addressed, and showing the trade-offs that are going to be made in reconciling the potentially conflicting concerns of different stakeholders. Without the architecture, it is unlikely that all the concerns and requirements will be considered and met.

Lebanese Governmental Reference Architecture – LGIRA is based on European Interoperability Reference Architecture (EIRA). The Architecture is following main building blocks of the European model, but focuses on the Lebanese context.

The Lebanese Governmental Reference Architecture is the reference architecture for digital public services. It defines the required capabilities to enhance interoperability as a set of **Architecture Building Blocks (ABB)**. It is aligned with the European Interoperability Framework and is divided in four views:

- **Legal View** with focus on legislations, policies, guidelines and financial resources
- **Organizational View** with focus on providers and users of information, agreements between parties, and on the supporting business processes;
- **Semantic View** that is focused on the structure of the data which need to be exchanged;
- **Technical View** with focus on the applications needed to transform, translate and exchange data, interfaces needed to exchange the data, and on the supporting infrastructure and security services.

The LGIRA is SOA (Service-Oriented Architecture) based and has a strong focus on interoperability in public sectors.

Each view has a set of ABBs and relations pertaining to the legal, organizational, semantic and technical domain of an Interoperable Architecture. Each view has entry - and exit points from one view to another.

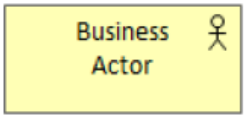
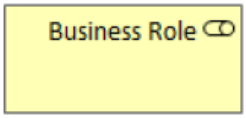
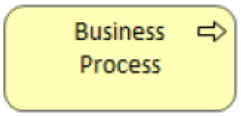
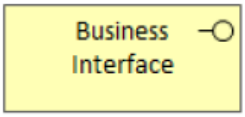
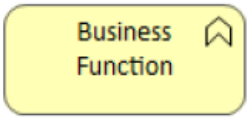
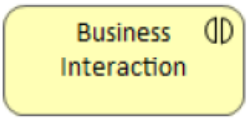
The LGIRA is technology neutral and provides common semantics that can be used for implementation of the Interoperable solutions. It provides guidance and support for the design of and communication about an interoperable solution with following benefits:

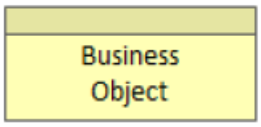
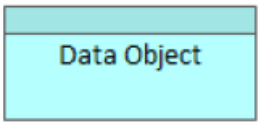
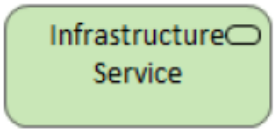
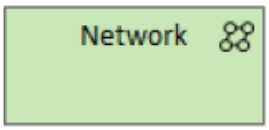
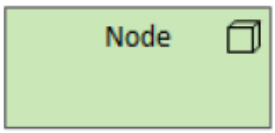
1. It provides common and unambiguous terminology and approach to cope with the interoperability needs of public services.
2. It allows identification of an existing solution building blocks and map them to the Interoperability Architecture.
3. It provides a holistic view on interoperability public services created within and across the different views of the LGIRA. It can support architects specialized in different architecture domains (organizational/business architecture, application architecture, data/semantic architecture, technology architecture).

4. In the future, specific interoperability requirements and solution building blocks can be added as recommended reusable solution building blocks. This allows an accelerated implementation.
5. It helps to consider service-oriented architecture design principles such as service abstraction, service reusability, de-coupling, service statelessness, service composability, etc.

The LGIRA uses the ArchiMate language as a notation. This part provides an overview of the ArchiMate model concepts that are used by the LGIRA. It then elaborates on how LGIRA ABBs can be seen as a specialization of ArchiMate model concepts.

The LGIRA uses the following ArchiMate model concepts:

Model Concept	Definition
	A **business actor** is defined as an entity that performs behavior in an organization such as business processes or functions.
	A **business role** is defined as a named specific behavior of a business actor participating in a given context. The actor performs the behavior of the role.
	A **business process** is defined as a unit of internal behavior or collection of causally-related units of internal behavior intended to produce a defined set of products and services
	A **business interface** declares how a business role connects with its environment.
	A **business function** describes internal behavior performed by a business role that is required to produce a set of products and services. It is performed by a single role within an organization.
	A **business interaction** is defined as a unit of behaviour performed as a collaboration between two or more business roles.
	A **contract** is defined as a formal or informal specification of an agreement that specifies the rights and obligations associated with a product.

	A **business service** is defined as the externally visible ("logical") functionality, which is meaningful to the environment and is realized by business behavior (business process, business function, or business interaction).
	A **business object** is defined as a unit of information that has relevance from a business perspective.
	An **application component** is defined as a modular, deployable, and replaceable part of a system that encapsulates its contents and exposes its functionality through a set of interfaces.
	An **application interface** declares how a component connects with its environment. An application interface specifies how the functionality of a component can be accessed by other components. An application interface exposes an application service to the environment. The application service may be exposed through different interfaces.
	An **application service** is defined as an externally visible unit of functionality, provided by one or more components, exposed through well-defined interfaces, and meaningful to the environment. An application service exposes the functionality of components to their environment.
	A **data object** is defined as a coherent, self-contained piece of information suitable for automated processing.
	An **infrastructure service** is defined as an externally visible unit of functionality, provided by one or more nodes, exposed through well-defined interfaces, and meaningful to the environment.
	A **network** is defined as a physical communication medium between two or more devices.
	A **node** is defined as a computational resource upon which artifacts may be deployed for execution.

Also, the LGIRA uses following relations:

Relationship	Description	Relationship	Description
	Composition		Access
	Aggregation		Specialization
	Used by		Association
	Realization		Triggering
	Assignment		

Each architecture view has a visual diagram, a narrative, and a set of focal architecture building blocks:

- The **visual diagram** depicts the architecture building blocks in the EIRA. It can be conceived as a part of the architecture model, which extends the ArchiMate model concepts. It shows how the LGIRA architecture building blocks are related to each other, and which ArchiMate concepts are used to depict them.
- The **narrative** is a textual description of the view providing natural language statements.
- The **focal** architecture building blocks are building blocks that create the interconnections with architecture building blocks related to other views.

The high-level overview, depicted bellow, visualizes the focal architecture building blocks of each view. It provides an introductory overview of the most important ABBs.

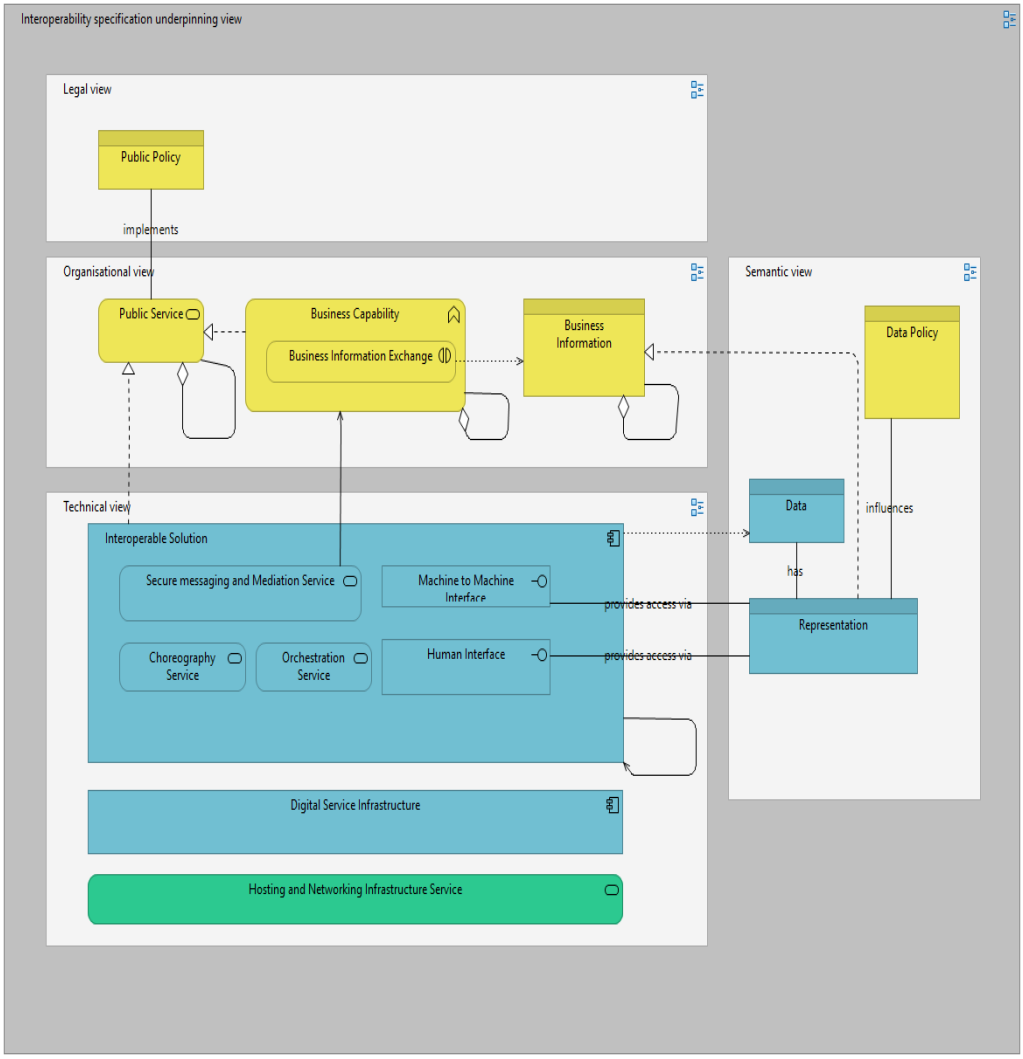


Figure 1 - LGIRA high level overview

2 Legal View

The Legal view models the most important public policy development enablers and implementation instruments that shall be considered in order to support legal interoperability. For each of the Interoperability solutions this should be clearly defined. On the diagram the legal view with all building blocks is given.

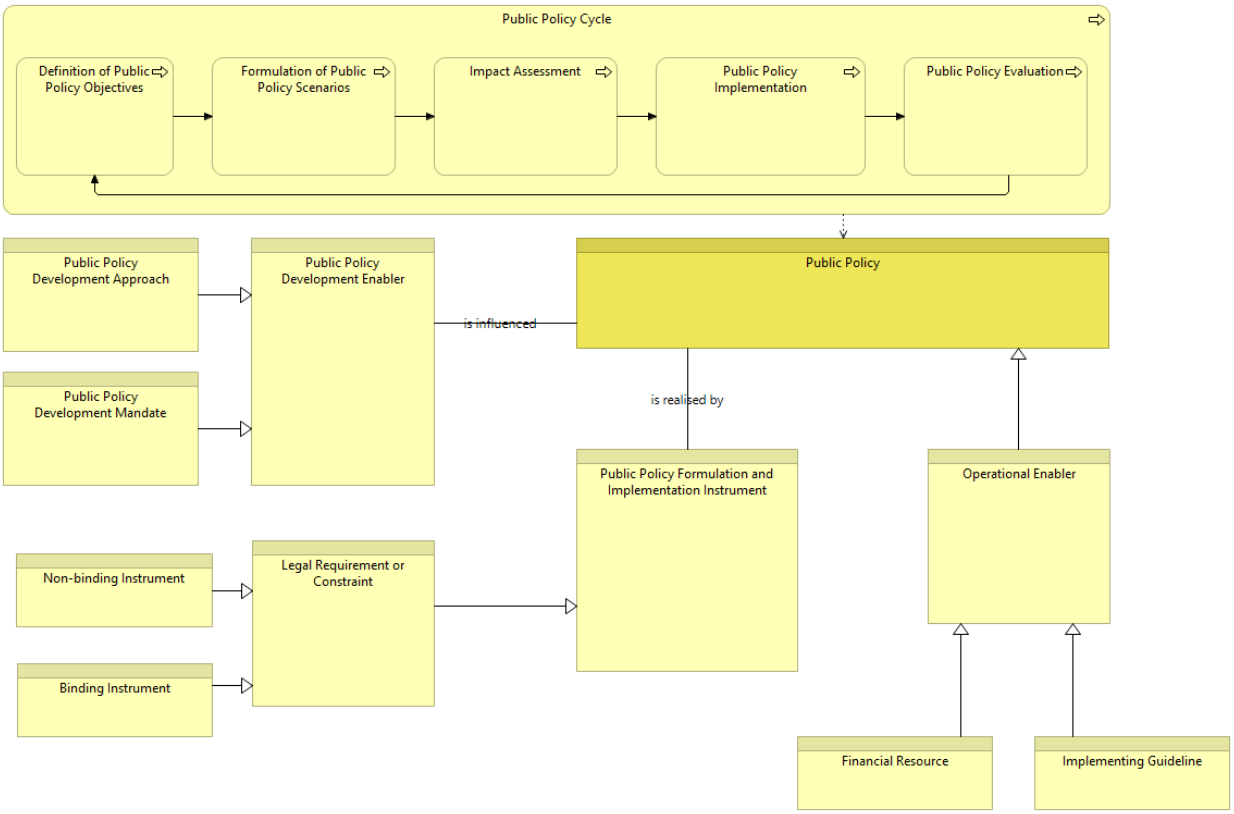


Figure 2 - Legal view visual diagram

Narrative: A [Public Policy] is the outcome of a specific [Public Policy Cycle] that aims at addressing the needs of a group of stakeholders. The Public Policy Cycle consists of the following subsequent steps: [Definition of Public Policy Objectives], [Formulation of Public Policy Scenarios], [Impact Assessment], [Public Policy Implementation], and [Public Policy Evaluation].

The [Public Policy] is developed taking into account [Public Policy Development Enablers], which include a specific [Public Policy Development Approach] and a [Public Policy Development Mandate]. The policy is formulated and implemented with the help of [Public Policy Formulation and Implementation Instruments], which can be [Binding / Non-Binding Instruments], [Legal Requirements or Constraints],

Focal architecture building block: *Public Policy* - A Public Policy is the whole of actions under a policy domain taken by a public authority to bring about social change in the medium

and long term. It is based on certain values and objectives and is implemented using a variety of methods. It applies on the territory within which the authority is authorized to act.

A **Public Policy** is a course or principle of action proposed or adopted by a policy making body.

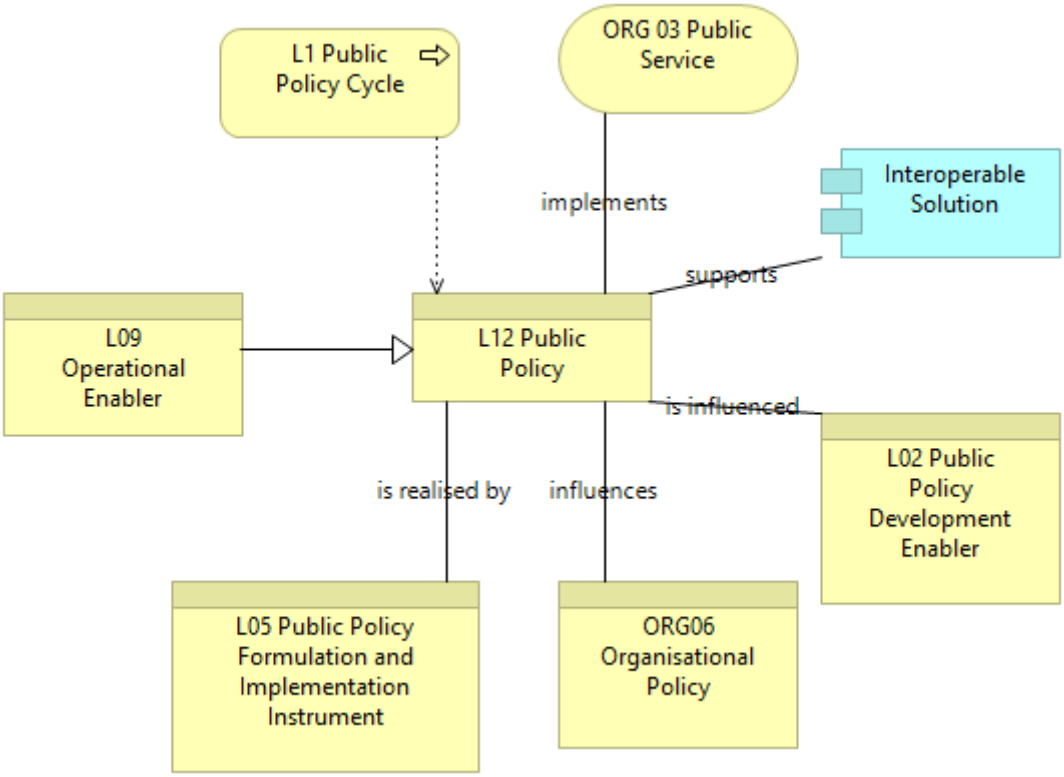


Figure 3 - Public policy dependencies

Public Policies Implementation Instruments are instruments that support the implementation of the policy and are in a form of **Legal Requirements**, **Legal Constraints**, and **Operational Enablers**.

- The **Legal Requirements** derive from a legal text that mandates the creation of interoperable systems. These requirements (as instruments) can be **Binding Instruments** (a legal instrument such as laws, bylaws etc. that expresses something which is obligatory) and **Non-Binding Instruments** (a legal instrument such as recommendations, opinions etc. that expresses something which is recommended, but not obligatory).
- The **Legal Constraints** are other legal texts that the interoperable systems need to comply with. Similar to the legal requirements, the legal constraints as instruments can be **Binding Instruments** (a legal instrument such as laws, bylaws etc. that expresses something which is obligatory) and **Non-Binding Instruments** (a legal instrument such as recommendations, opinions etc. that expresses something which is recommended, but not obligatory).

- **Operational Enablers** represent a person or thing that makes possible to implement the policy. This includes the **Financial Resources** (money in the form of cash, securities, creditors, loans, grants etc.) and **Implementing Guidelines** (Instructions that provide insight into how to implement a policy).

Each Public Policy is in a close relation with the **Public Policy Development Enablers** which represents an organization or thing that makes the policy process possible. This includes:

- the **Approach** which is the delegation model used to enforce the policy (centralized vs. decentralized);
- the **Mandate** which is the capacity and authority to carry out tasks within a specific policy domain.

The **Public Policy Cycle** represent the cycle of stages in the creation and execution of a public policy. This includes:

- **Definition of Public Policy Objectives**, where the objectives for the public policy are defined, meaning what should that policy regulate, at which level, with which results etc.;
- **Formulation of Public Policy Scenarios**, where a number of public policy options for addressing the problem and achieving the public policy objectives are developed;
- **Impact Assessment**, which is a key tool to ensure that the public policy process is carried out on the basis of transparent, comprehensive and balanced evidence;
- **Public Policy Implementation**, which represents the process of putting a public policy into effect after it was defined;
- **Public Policy Evaluation**, which represents a stage of assessment of how the public policy met its objectives (according to defined criteria). Depending on the findings, the assessment can result in a recommendation for changing or sometimes even abandoning the policy.

3 Organizational view

The Organizational view models the most important building blocks that shall be considered in order to support organizational interoperability among providers and users of a public service. For each of the Interoperability solutions this should be clearly defined. On the diagram the legal view with all building blocks is given.

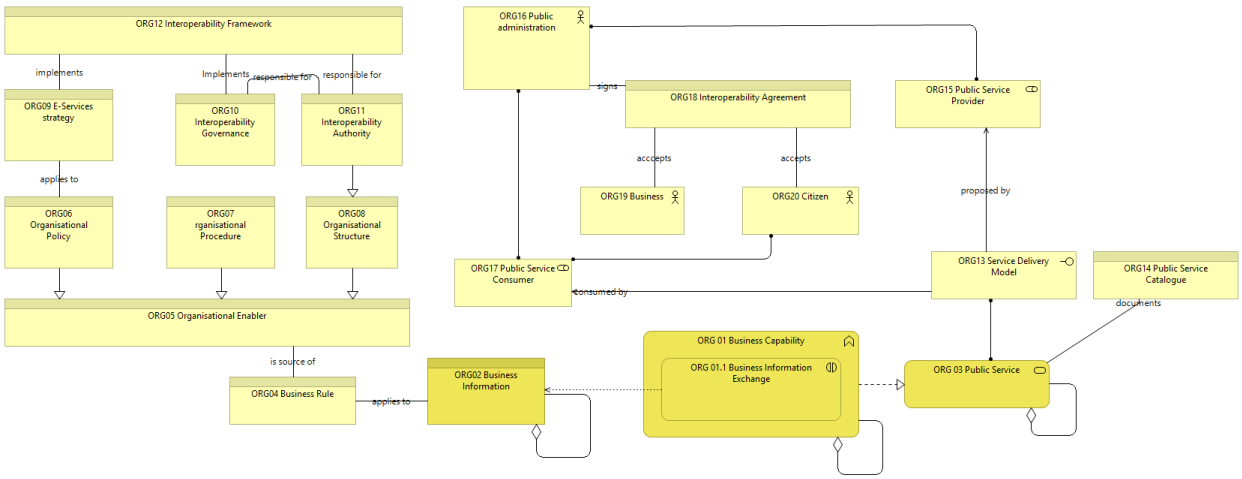


Figure 4 - Organizational view visual diagram

Narrative: [Public Administrations] in the role of [Public Service Providers] supply [Public Services] to [Citizens] and [Businesses] and/or [Public Administrations] which have the role of [Public Service Consumer]. The [Public Service] is delivered according to its [Service Delivery Model]. [Public Services] are documented in [Public Service Catalogues] that can be used among others for service portfolio management.

[Service Providers] can sign an [Interoperability Provider Agreement] to agree on how to deliver a [Public Service] to its users. The delivery of these public services is realized through [Business Capabilities] using [Business Information Exchanges] and [Business Information]. [Business Information] is subject to [Business Rules] which shall be used as guidelines in defining [Organizational Enablers] like [Organizational Structures], [Organizational Procedures] or [Organizational Policies] of the [Organizations] involved.

The [Interoperability Organizational Authority] is responsible for [Interoperability Governance] which implements the [Interoperability Framework]. [Interoperability Framework] implements [e-services strategies] which are domain and/or cross-domain specific.

Focal architecture building blocks: Public Service, Business Capability, Business Information Exchange and Business Information.

- **Public Services** are economic activities that public authorities identify as being of particular importance to citizens, businesses and public administrations and that

would not be supplied (or would be supplied under different conditions) if there were no public intervention. *Basic Services* that are offered without requiring the aggregation of other public services. Basic services can be aggregated to form *aggregated services*.

- A **Business Capability** is the expression or the articulation of the capacity, materials and expertise an organization needs in order to perform core functions.
- A **Business Information Exchange** is an exchange of a piece of data or a group of pieces of data with a unique semantics definition in a specific context.
- **Business Information** is a piece of data or a group of pieces of data with a unique semantics definition in a specific business context.

The building blocks in the organizational interoperability view should be considered in all Interoperability implementations and initiatives. Some of the building blocks might be established at the initial stage of adopting the LGIF and should be basis for establishing the domain specific building blocks. The following describe the definition of the Organizational Interoperability architecture building blocks:

An **Interoperability Framework** is a set of interoperability principles, rules, and guidelines in an organization.

Interoperability Governance is an organizational procedures for the governance of interoperability usually under the mandate/approach of a public policy. For this building block the governance model is set and agreed with the stakeholders in the LGIF with the defined governance levels.

An **Interoperability Organizational Authority** is an organization holding the responsibility for interoperability governance under the mandate/approach of a Public Policy.

An **Organizational Policy** defines a set of principles, rules, and guidelines in an organization that should be included in the Interoperability solution. This should comprehends the foundation of the environment for the Interoperable service.

An **Organizational Procedure** is a step-by-step description of the tasks required to support and carry out organizational policies. When making the Interoperable solution all the processes should be analyzed and complete map and documentation of the business process analyses should be generated. Distinction of the basic services and aggregated services must be made. A *Business Process* is a sequence of linked activities that creates value by turning inputs into a more valuable output. *Business Process Model* is a model that defines the business process, by the definition of strict steps of the business processes, precise rules, and the description of the processed data. **Business Information Exchange** is an interaction between two or more public administrations, businesses or citizens. **Business Information** is an information or object which can be exchanged between public administrations, businesses and citizens. *Business Transaction* is an Atomic unit of interaction between two or more public administrations, businesses or citizens.

A **Public Service Consumer** is a Public Administration, Business or Citizen consuming public services.

A **Public Service Provider** is a Public Administration providing Public Services financed through public resource.

An **Interoperability Agreement** is the means through which organizations (public administrations, or businesses) formalizes the cooperation with one another. These agreements aim at the development of interoperability solutions, which meets the functional / technical requirements and needs of one another. The agreement should include purposes and goals, terms and conditions, governance, and the description of the channel(s).

A **Business** is an organizational entity that provides and/or consumes Public Services. This includes non-governmental organizations and not-for-profit organizations.

A **Service Delivery Model** defines how the organization arranges the delivery of its services to service consumers. This includes:

- How will the service be delivered (e.g. multi-channel, SPOCs, only once)?
- How will the interaction between the service provider and service consumer take place?
- How will certain situations be handled (e.g. incident management)?
- How will the support & maintenance look like? [ITIL v3]

A **Public Service Catalogue** is a repository, with information on all public services. It represents the collection of the offered public services.

4 Semantic view

In order to understand the Institutions between them in information exchange in providing the services, they need to have agreed semantics and syntax. For that Semantic Interoperability view is providing guidance and architectural building blocks for designing and implementing Interoperable solution. On the diagram bellow the ABBS for the semantic interoperability layer are given.

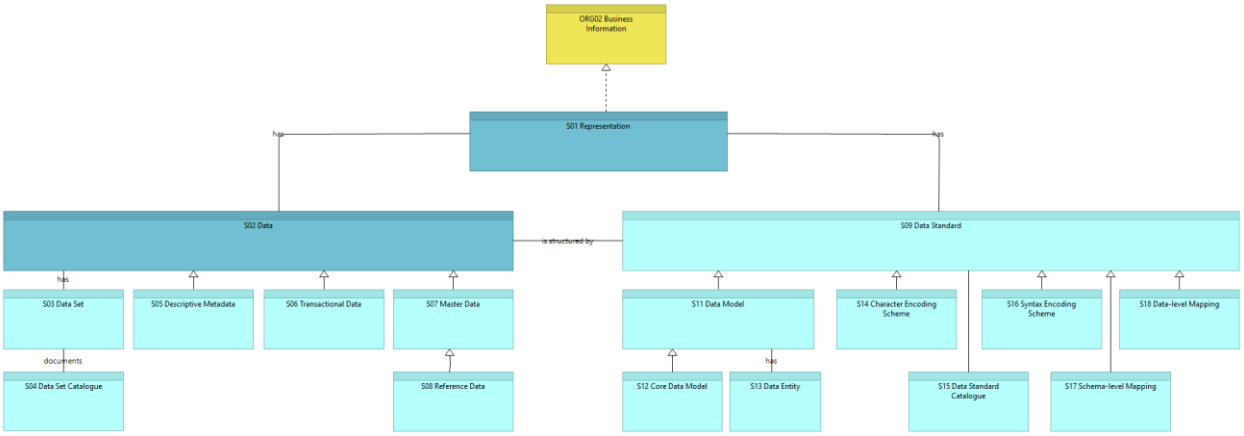


Figure 5 - Semantic Interoperability Layer

The Semantic view models the most important building blocks that should be considered in order to support semantic interoperability of information exchanges between administrations.

Narrative: [Business Information] is realized by a [Representation] of [Data] which is structured according to [Data Standards].

[Data] can be grouped in [Data Sets], which can be documented in [Data Set Catalogues]. [Master Data], [Transactional Data], and [Reference Data], and [Descriptive Metadata] are specializations of [Data]. [Data] is structured according to [Data Standards]. [Data Standards] have the following specializations: [Data Model]/[Core Data Model] consisting of among others [Data Entities], [Character Encoding Scheme], [Syntax Encoding Scheme], [Data-level Mapping], [Schema Level Mapping] or [Identifier Scheme]. [Data Standards] are documented in [Data Standard Catalogues].

[Representation] and [Data] are influenced by [Data Policies], which are [Organizational Policies], which is in turn are influenced by [Public Policies]. [Data Policies] can incorporate [Privacy Policies], [Licensing Policies], [Charging Policies], or [Metadata Management Policies].

Focal architecture building blocks: Representation and Data.

Representation is the means through which the other building blocks (data, data sets, etc.) are physically realized. This can be done through modelling notations, schemas and other resources.

Data is facts represented as text, numbers, graphics, images, sound, or video. Data is the raw material used to represent information, or from which information can be derived.

On the diagram bellow the elements of the data structure are shown.

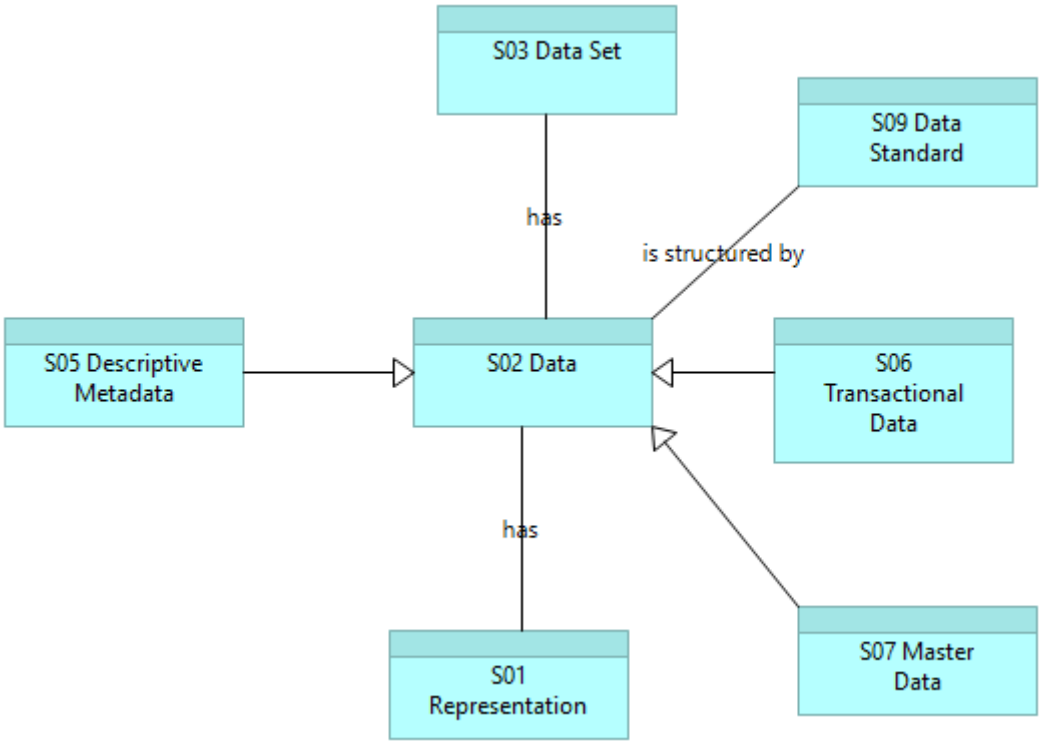


Figure 6 - Data structure

The building blocks of the semantic interoperability should establish common understanding between institutions and their legacy information systems. The definition of the ABBs in this layer follows.

Business Information is a piece of business data or a group of pieces of business data with a unique business semantics definition in a specific business context. A **Representation** is a physical embodiment or manifestation of data. On the diagram bellow the relationship between business information, data and data standard is shown.

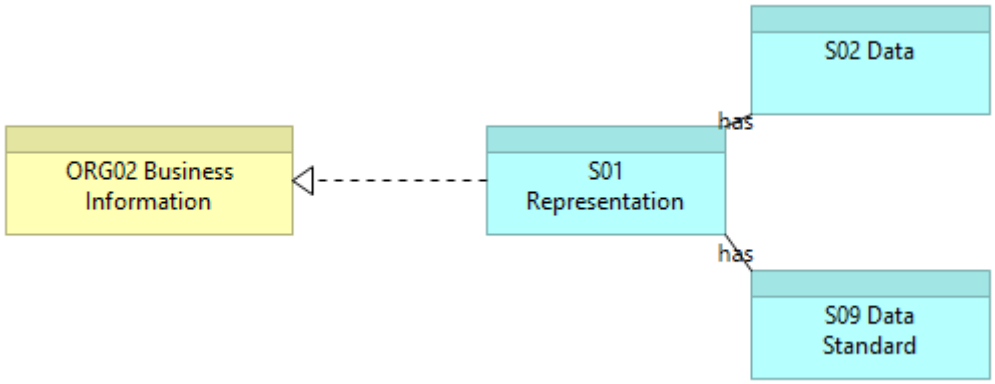


Figure 7 - Relationship between business information, data and data standard

Data is facts represented as text, numbers, graphics, images, sound, or video. Data is the raw material used to represent information, or from which information can be derived. A **Data Set** is a collection of data, published or curated by a single agent, and available for access or download in one or more formats. A **Data Set Catalogue** is a curated collection of datasets. **Descriptive metadata** describes a resource for purposes such as discovery and identification. It can include elements such as title, abstract, author, and keywords. **Transactional Data** is data that covers the business information related to business transactions and information exchanges. **Master Data** is the authoritative, most accurate data that is available about key business entities, used to establish the context for business transactions and transactional data. **Reference Data** is any data used to organize or categorize other data, or for relating data to information both within and beyond the boundaries of the enterprise. Usually consists of codes and descriptions or definitions.

A **data standard** is a structural metadata specification that describes or defines other data. Structural metadata indicates how compound objects are put together. It can consist of among others data models, reference data, and identifier schemas.

A **Data Model** includes formal data names, comprehensive data definitions, proper data structures and precise data integrity rules. A Data model is a specialization of the **Core Data model** which is context-neutral data model that captures the fundamental characteristics of an entity. The Entity described in the Data model is a classification of objects found in the real world described by the Noun – persons, places, things, concepts, and events – of interest to the enterprise.

The data standard has its **Character Encoding Scheme** that reflects the way a chosen character set is mapped to bytes for manipulation in a computer and **Syntax Encoding Scheme** that indicates that the value is a string formatted in accordance with a formal notation. Also, the data standard has a **Schema-level Mapping** is a mapping between related classes and properties and a **Data-level Mapping** is a mapping between specific data elements (or data values).

The data standard is cataloged in the **Data Standard Catalogue**.

5 Technical view

The technical view represents the architecture of the solution with all application and infrastructure building blocks. These ABBs are required in order when building the Interoperable solution. On the diagram bellow all ABBs with their enablers are shown.

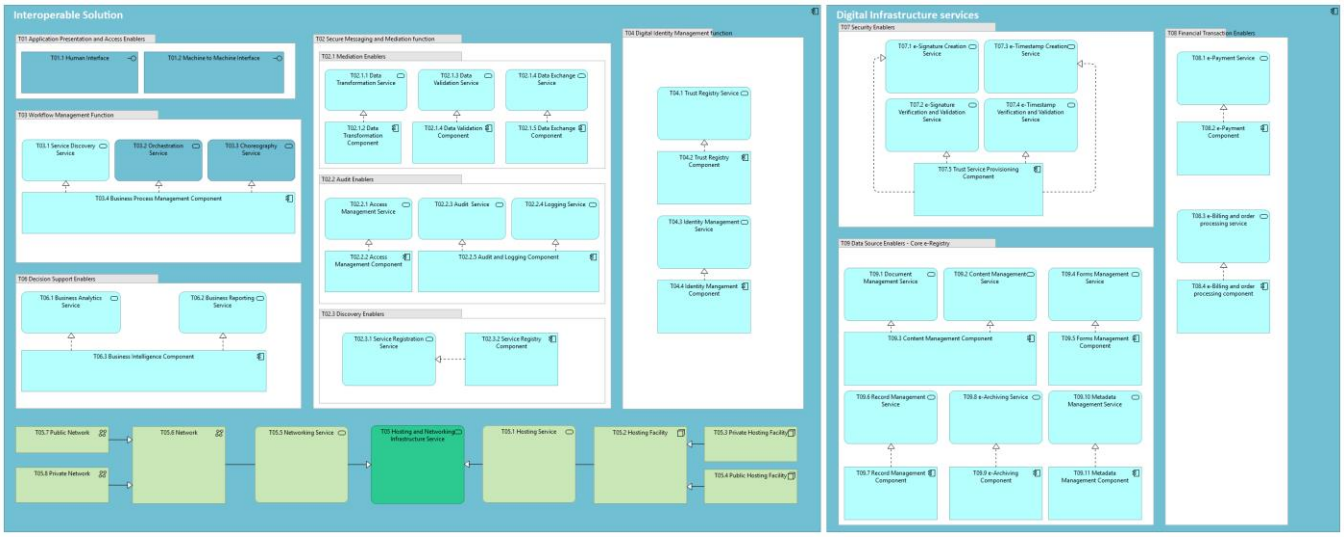


Figure 8 - Technical view ABBs

Narrative: An [Interoperable Solution] can be accessed through [Machine to Machine Interfaces] or [Human Interfaces] in the [Application Presentation and Access Enablers]. Data can be exchanged with the support of [Secure Messaging and Mediation function] composed of [Mediation Enablers] containing the logic for data transfer and validation. [Interoperable Solution] can execute complex business processes through [Workflow Management Enablers]. Access control is managed through the services offered by [Security and Access Enablers].

Trust between systems is established with [Security Enablers] realized using Signature validation and verification such as [e-Signing Creation Service], [e-Signature Verification and Validation Service] and e-timestamping services such as [e-Timestamp Creation Service], [e-Timestamp Verification and Validation Service]. Identity management is realized with [Identity Management Service]/ [Identity Management Component].

The [Data-source enablers] is providing information needed for the Interoperable services and it is supported by the [Financial transaction enablers].

The [Interoperable Solutions] is deployed and operated through [Hosting and Networking Services Infrastructures], provided by a [Public / Private Hosting Facility], and make use of a [Public / Private Network] to exchange data.

Focal architecture building blocks: Human Interface and Machine to Machine Interface, Choreography Service and Orchestration Service, Hosting and Networking Infrastructure Service and Digital Infrastructure services.

An **Application Presentation and Access Enabler** is an interface for accessing the Interoperable European Solution and for facilitating the exchange of information. A Human Interface is a specific interface between the human users of an IT system and the programs providing screen or printed results. It is frequently regarded as a dedicated set of programs, separate from those which extract and process data. A Machine to Machine Interface is a description of a boundary between a system and other systems, usually including the mechanisms by which information is transferred.

A **Secure Messaging and Mediation function** enables data exchange between the systems in providing the Interoperable services. A Mediation Enabler is a service or component for the routing, transformation, validation and exchange of data. Additionally, An Audit Service provides support for the principle of accountability that is holding users of a system accountable for their actions within the system and detection of policy violations. The audit policy defines the elements of an information system which need to be traced, for example to assure traceability of actions: what, how, when, where and with what. A Logging Service traces all events and user actions impacting a data entity throughout its lifecycle (from its creation to its disposal). It can be used to reproduce a certain state of a data entity at a certain moment in time. An Access Management Service provides the mechanisms to ensure that only authorized users can access and perform actions on IT resources.

The **Digital Identity Management** helps in providing and managing with digital identities in the Interoperable system. An Identity Management Service provides functionalities for the authentication and authorization of the users. A Trust Registry Service enables the discovery of essential information about e.g. supervised/accredited trust service providers issuing certificates for electronic signatures, for website authentication; supervised/accredited trust services for eSignature, or Timestamp creation and validation; supervised/accredited trust services for eSignature preservation.

An Infrastructure Security Enabler is a service or component for enabling e-Signature, e-Seal, e-Timestamp, identity management and trust registry. An e-Signature Creation Service is used by a natural person to sign data in electronic form. An e-Timestamp Creation Service is used for the verification of timestamps used for establishing evidence that a give piece of data existed at a given point in time.

An Infrastructure Data Source Enabler is a service or component for enabling the management of forms, records, documents, content, and metadata. This is usually core system within Institutions in form of e-Registry.

A Financial Transaction Enablers are a services or components for enabling e-payment and billing and order processing. This components should provide shared services when payment and billing is a part of the orchestrated interoperable service.

ANNEX 1 – LGIF and LGIRA cross-referencing

The established concepts in the Lebanese Government Interoperability framework are described in details in the reference architecture. The complete mapping with the concepts with the ABBs in the reference architecture, and later with the Domain Architectural Blueprint is done by using a unique number in the ABBs.

The overall mapping on the technical layer is done on the foundation of the Conceptual Service Model. The basic functions defined in the conceptual service model will be basis in defining the main groups of ABBs and their components. With each of the ABBs having unique Reference Number, will be cross mapped with the LGIF functions.

The Domain and Cross Domain Interoperable solution will be made from the ABBs having the same general characteristics, so in the LGIRA these blocks will be same. Only specialization will be made if needed for particular ABB in the Domain/Cross Domain Interoperable Architectures.

From the conceptual model the following functions are mapped with the ABBs in the technical layer from the reference architecture:

Conceptual model function	**LGIRA Architectural Building Block ABB**	**Domain/Cross Domain Interoperability zone**
Service Mediation function	T02 Secure Messaging and Mediation function T02.1 Mediation Enablers T02.1.1 Data Transformation Service T02.1.2 Data Transformation Component T02.1.3 Data Validation Service T02.1.4 Data Validation Component T02.1.4 Data Exchange Service T02.1.5 Data Exchange Component T02.2 Audit Enablers T02.2.1 Access Management Service T02.2.2 Access Management Component T02.2.3 Audit Service	Domain and Cross Domain

Conceptual model function	LGIRA Architectural Building Block ABB	Domain/Cross Domain Interoperability zone
	T02.2.4 Logging Service T02.2.5 Audit and Logging Component T02.3 Discovery Enablers T02.3.1 Service Registration Service T02.3.2 Service Registry Component	
Digital identity management	T04 Digital Identity Management function T04.1 Trust Registry Service T04.2 Trust Registry Component T04.3 Identity Management Service T04.4 Identity Management Component	Domain and Cross Domain
Workflow and monitoring function	T03 Workflow Management Function T03.1 Service Discovery Service T03.2 Orchestration Service T03.3 Choreography Service T03.4 Business Process Management Component	Domain and Cross Domain
Service provisioning function	T01 Application Presentation and Access Enablers T01.1 Human Interface T01.2 Machine to Machine Interface	Domain and Cross Domain

ANNEX 2 – LIST OF OFFICIAL STANDARDS RECOMMENDED

Title	Version / Revision	Field	Short description	Authority	Notes
Business Process Model and Notation (BPMN)	2.0	Process design	BPMN is a graphical representation for specifying business processes in a business process model.	Object Management Group	Shall be used for graphical presentation of the process flow of the electronic services implemented on the national Lebanese interoperability setup.
International Standard Industrial Classification (ISIC)	4	Economic activities of legal entities	ISIC of All Economic Activities is a United Nations industry classification system. It represents a standard for classification of the economic activities of entities which is used in the fields of production, employment, gross domestic product and other statistical areas.	United Nations	In February 2016 different institutions in Lebanon use ISIC revision 3.1. Implementation of revision 4 is recommended.
ISO 3166-1	N/A	Country codes	ISO 3166-1 is part of the ISO 3166 standard published by the International Organization for Standardization (ISO), and defines codes for the names of countries, dependent territories, and special areas of geographical interest. The official name of the standard is Codes for the representation of names of countries and their subdivisions – Part 1: Country codes.	International Organization for Standardization	The country code of Lebanon is used for international exchange of legal entity data, as a part of the identifier of the legal entity.
Service Oriented Architecture (SOA)	N/A	Software development	Service Oriented Architecture (SOA) is a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains.	The OASIS group and the Open Group	The software development paradigm that shall be used in developing the Interoperable solutions
Web Services Definition Language (WSDL)	WSDL 2.0	Software development	The Web Services Description Language (WSDL) is an XML-based interface definition language that is used for describing the functionality offered by a web service.	World Wide Web Consortium	Used for the development of the Interoperable solutions

RFC 7303 (XML and XSD)	XML 1.0	Software development	XML stands for EXtensible Markup Language and it was designed to describe data. An XML Schema describes the structure of an XML document. The XML Schema language is also referred to as XML Schema Definition (XSD).	World Wide Web Consortium	Used for the development of the Interoperable solutions
SAML	SAML 2.0	Software development	Open-standard data format for exchanging authentication and authorization data between parties, in particular, between an identity provider and a service provider.	OASIS Security Services Technical Committee	Used for the development of the Interoperable solutions
RFC 2818 (HTTPS)	N/A	Software development	Protocol for secure communication over a computer network which is widely used on the Internet.	Network Working Group	Used for the development of the Interoperable solutions
RFC 6176 (TLS)	March 2011	Software development	Cryptographic protocol designed to provide communications security over a computer network.	Internet Engineering Task Force (IETF)	Used for the development of the Interoperable solutions
WS-Security, WSS	Version 1.1	Software development	Extension to SOAP to apply security to Web services. It is a member of the Web service specifications and was published by OASIS.	OASIS	Used for the development of the Interoperable solutions
ArchiMate (IEEE 1471)	Version 2.1	Architecture modelling	An open and independent enterprise architecture modeling language to support the description, analysis and visualization of architecture within and across business domains	The Open Group	Used for modelling and describing the Interoperable solutions