



**OFFICE OF THE MINISTER OF STATE FOR
ADMINISTRATIVE REFORM**

E-GOVERNMENT UNIT



**LGIF – LEBANESE GOVERNMENT
INTEROPERABILITY FRAMEWORK**

VERSION V1.0

OCTOBER 2016

TABLE OF CONTENTS

TABLE OF FIGURES	3
GLOSSARY	4
EXECUTIVE SUMMARY	6
THE ORGANIZATION OF THIS DOCUMENT.....	7
1 LEBANESE GOVERNMENTAL INTEROPERABILITY FRAMEWORK OVERVIEW	8
2 UNDERLYING PRINCIPLES OF INTEROPERABILITY.....	10
2.1 SUBSIDIARITY AND PROPORTIONALITY	10
2.2 USER-CENTRICITY	11
2.3 INCLUSION AND ACCESSIBILITY.....	11
2.4 SECURITY AND PRIVACY.....	11
2.5 MULTILINGUALISM	12
2.6 ADMINISTRATIVE SIMPLIFICATION	12
2.7 TRANSPARENCY.....	12
2.8 PRESERVATION OF INFORMATION	13
2.9 OPENNESS	13
2.10 REUSABILITY	13
2.11 TECHNOLOGICAL NEUTRALITY AND ADAPTABILITY	14
2.12 EFFECTIVENESS AND EFFICIENCY.....	14
3 SERVICE MODEL.....	15
3.1 THE KEY CONCEPTS FOR THE SERVICE MODEL	15
3.2 DOMAIN INTEROPERABILITY.....	17
3.3 NATIONWIDE INTEROPERABILITY NODE.....	19
3.4 STAKEHOLDER PERSPECTIVE	20
3.5 SERVICE PATTERNS.....	23
3.5.1 <i>Source of information perspective</i>	24
3.5.2 <i>Data consumers perspective</i>	25
3.5.3 <i>Regional perspective</i>	26
3.5.4 <i>End user identity perspective</i>	28
3.5.5 <i>Information availability perspective</i>	30
3.5.6 <i>Commercial perspective</i>	31
3.5.7 <i>Sequential vs. parallel data exchange and processing perspective</i>	33
3.5.8 <i>Service orchestration perspective</i>	37
3.5.9 <i>Service results perspective</i>	40
3.6 SERVICE MATURITY LEVELS.....	41
4 INTEROPERABILITY DIMENSIONS.....	48

4.1	LEGAL INTEROPERABILITY	48
4.2	ORGANIZATIONAL INTEROPERABILITY.....	48
4.3	SEMANTIC INTEROPERABILITY.....	49
4.4	TECHNICAL INTEROPERABILITY.....	50
5	INTEROPERABILITY AGREEMENTS.....	51
6	INTEROPERABILITY GOVERNANCE MODEL.....	52
6.1	POSSIBLE GOVERNANCE MODELS AND STRUCTURES	53
6.2	GOVERNANCE AND RESPONSIBILITIES MATRIX.....	54
	ANNEX 1 – LGIF AND LGIRA CROSS-REFERENCING	57
	ANNEX 2 – DATA DICTIONARY	60

Table of figures

Figure 1 – Lebanese Governmental Interoperability Framework.....	8
Figure 2 - Conceptual Service Model	16
Figure 3 - Domain Interoperability logical diagram	18
Figure 4 - Nationwide Aggregation and Broker Node.....	19
Figure 5 – Stakeholders: Data providers.....	21
Figure 6 – Stakeholders: Data consumers.....	23
Figure 7 – Stakeholders: Enablers.....	23
Figure 8 – Number of data sources perspective	25
Figure 9 – Communication pattern for national services	27
Figure 10 – Communication pattern for regional services (services from other regional interoperability setup)	28
Figure 11 - Sequential pattern of information exchange.....	34
Figure 12 – Parallel pattern for information exchange.....	35
Figure 13 – Combined pattern for data exchange	36
Figure 14 – Service with a combined pattern with multiple levels.....	37
Figure 15 – Orchestration for institutional services	38
Figure 16 – Orchestration for domain services.....	39
Figure 17 – Orchestration for cross-domain services	40
Figure 18 - Governance model.....	52
Figure 19 - Local governance pattern	53
Figure 20 - Intermediary governance pattern	54
Figure 21 - Federated Governance pattern	54

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 diagramming 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

This document constitutes the first version of the Lebanese Government Interoperability Framework (LGIF) with all its constituents within the scope of the future OSS Commercial Registration reform. This LGIF will be in turn, the base for the successive LGIF versions that will be added on as more e-government services become available. The framework developed under this LGIF will progressively become the comprehensive LGIF covering the rules of data exchange for all entities of the Lebanese administration.

The main objective of the document 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 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).

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.

Portion of the work is also focused on data definition and definition reconciliation in order to assure semantic interoperability. The outcome is represented through data dictionaries that should be further maintained and expanded by the stakeholders involved in the process.

The specific objectives of this document are limited to the “One Stop Shop for the Commercial Registration” transaction focusing on the following:

- Produce the Lebanese Government Interoperability Framework (LGIF) document based on the 5 layers of interoperability
- Design the interoperability standards and procedures needed for the proposed OSS reforms at the commercial registry
- Prepare the basis for systematic exchange of company data between different administrations and starting by the institutions involved in the commercial registration process. This includes the Ministry of Justice (MOJ), Ministry of Finance (MOF), and National Social Security Fund (NSSF); and ensuring a smooth conversion and cleanup of existing records and databases kept by the above mentioned stakeholders.

The organization of this document

This document is organized in the following specific chapters:

- Chapter 1 offers a general overview over the LGIF;
- Chapter 2 introduces the general principals of the interoperability in Lebanon;
- Chapter 3 presents the service model designed for the Lebanese context;
- Chapter 4 introduces the dimensions that are considered for the Lebanese interoperability;
- Chapter 5 introduces the general principles of the interoperability agreements;
- Chapter 6 presents the interoperability governance model for the Lebanese context;
- “*ANNEX 1 – LGIF and LGIRA cross-referencing*” introduces a model of relating the elements from the LGIF to the Lebanese Government Interoperability Reference Architecture.

1 Lebanese Governmental Interoperability Framework Overview

Interoperability is recognized both as a prerequisite and a facilitator of efficient delivery of public services.

Interoperability addresses the need for:

- Cooperation among Institutions with the aim to establish public services;
- Exchanging information among Institutions to fulfil legal requirements or political commitments;
- Sharing and reusing information among Institutions to increase administrative efficiency and cut red tape for citizens and businesses.

The result should be:

- Improved public service delivery to citizens and businesses by facilitating the one-stop-shop delivery of public services;
- Lowered costs for public administrations, businesses and citizens due to the efficient delivery of public services.

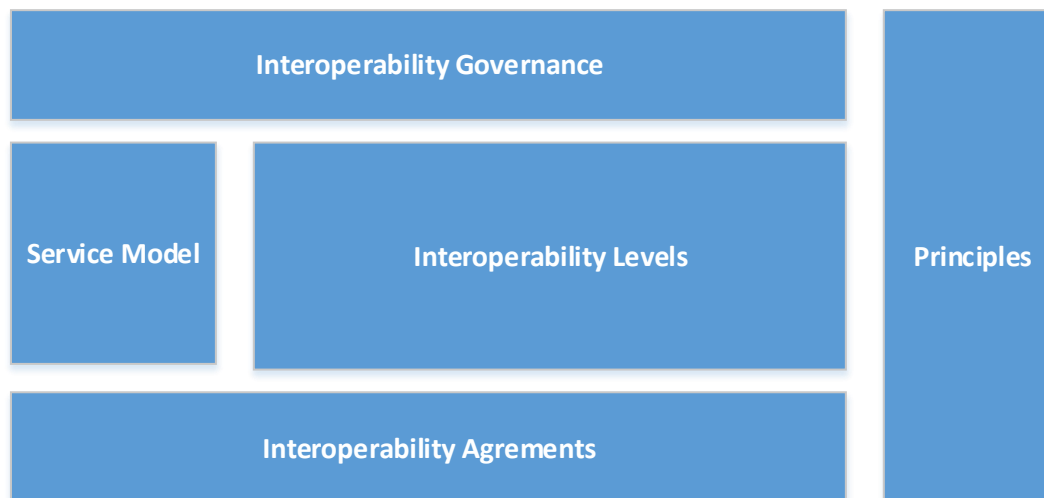


Figure 1 – Lebanese Governmental Interoperability Framework

The LGIF will be based on the set of principles that are relevant to the process of establishing e-Services and that should guide the Interoperability. These principles are:

- subsidiarity and proportionality
- user-centricity
- inclusion and accessibility
- security and privacy

- multilingualism
- administrative simplification
- transparency
- preservation of information
- openness
- reuse
- technological neutrality and adaptability
- effectiveness and efficiency

Although the fundamental principles have been taken from the European framework, what will follow is not a repetition of the European angle, but specifications of the application of these principles in the Lebanese context.

The conceptual Service Model must be defined in order to suggest ways to organize the creation and operation of the Interoperability systems. The model shall emphasize a building-block approach to setting up Lebanese public services, allowing for the interconnection and reusability of service components when building new services.

Both the structure of the organizations and the organization approach to governance - in other words, the placement of decision-making authority within the Public Administration should dictate the visibility and management of Interoperability Topology and Governance.

2 Underlying principles of interoperability

There are twelve general principles of good administration relevant to the process of establishing a Lebanese efficient public services. These principles describe the main context in which the Lebanese public services are decided and the way they are implemented. While these principles complement one another, they are different in nature since some have political nature some other have legal and technical.

The most general principle is the one of subsidiarity (chapter 2.1). The principles described from chapter 2.2 to 2.8 handle the end users' needs and their expectations, while the principles described from chapters 2.9 to 2.12 are handling the common activity of the public sector institutions. The details of every principle should be considered as specifications of the applications of these principles in a Lebanese context.

2.1 Subsidiarity and proportionality

Subsidiarity principle originates from the EU treaty¹. All information related to any political decision in Lebanon should be made as closely as possible to the citizen. Interoperability decisions shall be made on a state level only if they would be more efficient and practical compared to the situation when they are established in public sector institutions.

In Lebanon, application of subsidiarity principles means that centralized solutions should be used as little as possible. Centrally it is important to realize only joint infrastructure services (e. g. public key infrastructure, hosting and cloud infrastructures, etc.), and the systems providing joint services for citizens and businesses from public sector institutions (e. g. information portal, DAWLATI, etc.). Ministries should not force central solutions in their areas of government, where an institution may lose control of business processes. Neither does the central government prescribe technical solutions for local governments. Meanwhile subsidiarity principle does not restrict public sector institutions' cooperation in working out joint standard solutions.

Information systems should support the existing organizational structures and their objectives that is why it is not recommended having a unique physical merge of the information systems but

¹ The principle of subsidiarity is established in Article 5 of the Treaty on European Union (Maastricht). Referencing on this principle is in the direction of using one of the well-established principle in public administration and it is one of the basic principle in the EIF as well.

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

it is preferred to create independent information systems, linked through services and managed by interoperability.

2.2 User-centricity

Public services are intended to serve and to adapt on the needs of the citizens and the businesses. Therefore the expectations of the users are as follows:

- The access to User-Centered services in a secure and flexible way respecting the privacy of the users.
- Citizens and businesses deliver the information to the public sector only once in order to avoid asking the same data more than once.
- Public services in Lebanon should be available not only through the regular physical channels but also through electronic portals and online and in case if a service requires a cooperation between other institutions then it should be available to the user through one portal.
- To guarantee the access to the services anytime and from any place and in any way taking into consideration the security issues and the economic feasibility.

2.3 Inclusion and accessibility

The use of ICT should create for the citizens and the businesses equal opportunities through inclusive services that are publicly accessible without discrimination. The aim of the inclusion is to use the ICT possibilities to overcome social inequality, exclusion and economic disadvantages. Accessibility ensures that people with disabilities and the elderly can use the public services with the same level as all other citizens.

Inclusion and Accessibility must be part of the whole development lifecycle of the whole Lebanese public services in terms of design, content and delivery, according to e-accessibility specifications which are internationally recognized. Meanwhile it can be improved by combining new service channels with traditional ones, also to guarantee the opportunity for authorized third parties, who can act on behalf of the citizens and the businesses who are unable either permanently or temporary to use directly the public service.

2.4 Security and privacy

Citizens and businesses must be assured that they are interacting with public sector institutions in an environment of trust and in full compliance with the relevant regulations on privacy and data

protection. The public sector must guarantee to the citizens and to the businesses their privacy and the confidentiality of information provided by them.

Meanwhile the citizens and the businesses should have the right to verify the information that the public sector have collected and also to be informed if this information maybe be used for purposes other than those for which it was originally supplied.

2.5 Multilingualism

When developing public services in Lebanon, the designers of the user interface must carefully take into consideration the requirements of multilingualism and the expectations of the citizens and businesses which must be fulfilled in the languages that suits them most. This balance will improve the ability of the user interfaces of information systems to provide the public services in all the most widely used languages in Lebanon or at least in Arabic and English language.

In the user interfaces of information systems personalized for Lebanon, the default language should be Arabic and English. Multilingualism of information systems is not only the issue of user interface but also it concerns services, metadata of services, documentation, and data structure and data representation.

Public sector must also take into account the localization of the software and solutions to be appropriate for the citizens and businesses.

2.6 Administrative simplification

Public sectors institutions gathers large amount of information solely due to some legal obligations or requirements and not for the direct benefit of the institution itself. This raises the cost of the operation of the public sector institutions and increases the administrative burden.

For this reason, the use of different databases for collecting the same data should be eliminated and this can be done only by the cooperation between the institutions when establishing the public services.

2.7 Transparency

Citizens and business should be able to understand all the administrative processes, they should have the possibility to track any administrative procedures or application that they have submitted in order to have an overview regarding the progress of their application.

Transparency will also allow the citizens and the businesses to give a proper feedback regarding the quality of the public services provided and to contribute to their improvement and to the implementation of new services.

2.8 Preservation of information

Electronic data, records and information held by the public sector institutions for the purpose of “Archiving” must be well preserved. The aim is to guarantee the readability, reliability and integrity of these digital records as part of the institutions’ activities and to guarantee the regular access as long as needed taking into consideration security and privacy matters. Preservation of the records is purely national matter when it comes to information sources owned and managed by public institutions.

In order to guarantee this long term preservation of electronic records and digital information, specific formats should be selected to ensure the long term accessibility, including the preservation of the associated electronic signatures and all other electronic certifications such as mandates.

2.9 Openness

Openness is the willingness of persons, organizations and interest groups to share information and stimulate dialogues in order to advance knowledge and use it to solve problems. While respecting data protection and privacy, Interoperability involves sharing information among all the interacting organizations and hence implies Openness.

Applying the principle of openness in Lebanon, while the public sector institutions work on developing the architecture of their information systems and the procurement of the required software, will generate the best results that can be shared, reused and interconnected within.

Therefore, the public sector institutions in Lebanon should aim for openness while taking into consideration the needs, the priorities, the budget and the market situation and several other factors in order to apply this principle.

2.10 Reusability

Public sector institutions collect, issue and process a set of information, data and solutions on daily basis in order to achieve and fulfill the needs of the citizens and businesses. When any institution faces a specific problem or needs a specific information regarding one or more procedure, it might benefit from the work of other institutions by getting an access to what is available and decide whether it is relevant to the problem or not.

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

This implies that public sector institutions in Lebanon must be willing to share within, their solutions, concepts, specifications, frameworks, components and tools. Applying the principle of Openness described above will facilitate this collaboration.

Reuse and sharing gradually will lead to a cooperation between the institutions using collaborative platforms to achieve mutually beneficial common goals.

2.11 Technological neutrality and adaptability

When establishing information systems, public sector should focus on the functional needs and defer all the decisions related to technology as late as possible in order to avoid imposing specific technologies or products on their partners and to be able to adapt to the rapidly evolving technological environment. Taking into account several aspects such as the use of free available software alternatives, using open standards for systems interfaces and the equal treatment of solutions as well the observation of the competition rules in public procurements.

2.12 Effectiveness and efficiency

In the information systems development, public sector should consider serving citizens and businesses in a very efficient and effective way by choosing the most productive solution to ensure the best value for taxpayer's money.

In order to achieve the best results there are several aspects that should be taken into considerations such as return on investment, increased flexibility and adaptability, decreased administrative burden, increasing the efficiency and reducing the risks, transparency, total costs, recognition of public sector achievements and improving the work environment.

3 Service model

The framework considers the government as a service centered organization, which means that all the activities of officials, institutions and external subjects that are part of the interoperable solution and are performed for a purpose of providing a service to a citizen, business or another institution are viewed as services. In that manner, the conceptual service model that will be applicable in the Lebanese context should be developed and justified in order to provide minimal risks and maximum impact on the adoption of the Interoperability as e-government enabler.

Service in a wider sense is an independent collection of consecutive functionalities of an organization. In a more narrow sense, a service (including an operational service) is a functionality by an organization supporting one or several organizational processes, and which an end user perceives as a whole.

E-Service is a service that is provided either partially or completely with the help of IT and communication technology.

Infrastructure service is a joint technical functionality used for providing one or several services or for information system management. In terms of the interoperability, it should be viewed as a shared facilitator for maximizing the utilization of the capital expenses in the Interoperability projects.

Public service is a service provided for citizens, institutions, businesses or other organizations by an organization. A public service is characterized by at least one of the following characteristics:

- provision and using of the service is a public interest of society as a whole
- in state and local government institutions, provision of services is regulated by legal acts

Public service in an electronic environment must be available for the end users in the following way:

- service is provided as close to the user as possible
- the user is able to use the service with minimum previous training
- as little information as possible is asked from the user
- for each user security of using is guaranteed.

Aggregate service or complex service is combined from reliable basic services. The user perceives a complex service as one service. If the complex service is provided by the service intermediary, the intermediary must have the right to use the basic services.

Authentication and authorization are functions that will enable digital identity. This is very important in order to have secure and reliable usage of the interoperable solution.

3.1 The Key concepts for the Service Model

This chapter proposes a conceptual model for the organization and creation of efficient delivery of public services. The model is derived from a survey of the existing Public administration organizations in Lebanon and already implemented interoperable solutions across EU States.

This demonstrates common aspects, success factors, and best practices. As a blueprint for the future implementations of Interoperable public services, this model helps in developing a common vocabulary and understanding regarding the main elements of a successful interoperable solution.

The model emphasizes a building-block approach to set up Interoperable public services, allowing for the interconnection and reusability of service components when implementing new services.

The main building blocks of the Service model are described below.

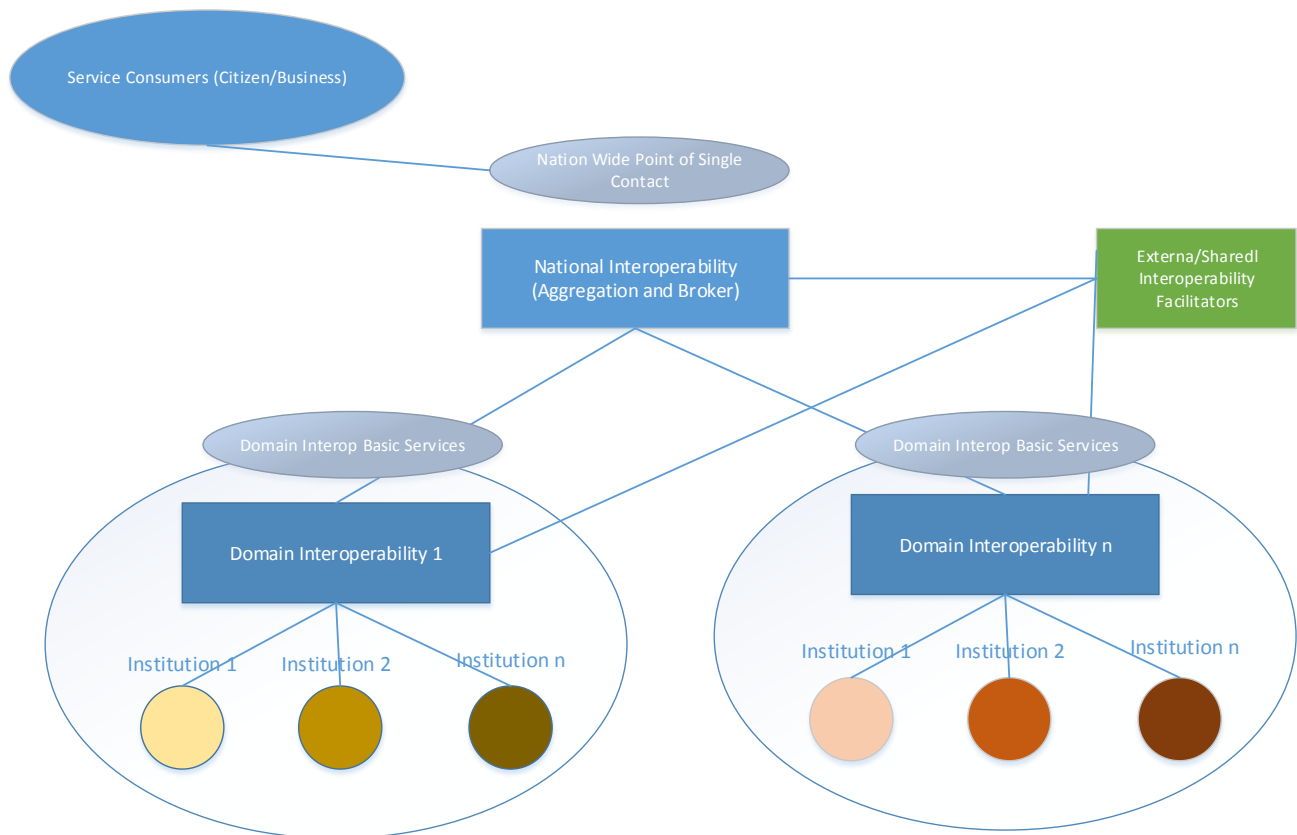


Figure 2 - Conceptual Service Model

Domain Interoperability represents the basic granularity of the interoperability which consists of services from one domain (i.e. Company registration, eHealth services etc.).

Domain Interop Basic Services are e-Services provided by the Domain Interoperability Node through Service Provisioning function of the Interoperable system. These services are constructed with the Base Registry services enabled by the Institutions included in the Domain Interoperability

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

Base Registries (Institutions) refers to a trusted authentic source of information under the control of an appointed public administration or organization appointed by government. According to the European Interoperability Framework 2.0, base registries are: *“reliable sources of basic information on items such as persons, companies, vehicles, licenses, buildings, locations and roads”* and *“are authentic and authoritative and form, separately or in combination, the cornerstone of public services”*.

Base registries are under the legal control of public administrations and are maintained by them, but the information should be made available for wider reuse with the appropriate security and privacy measures.”

National Interoperability (Aggregation and Broker) is the central node that should aggregate all domain interoperability segments. This node should act as nationwide point for aggregation and brokering the inter-domain services.

Aggregated/Orchestrated Services are inter-domain service that are using data from different domains. These services are enabled by the institutions across domains and are consumed through the Service Provision Function.

External/Shared Interoperability Facilitators are building blocks of the interoperable system that are common across all domains such as Billing system, e-Payment systems, Hosting infrastructure etc. These components are shared and could be owned by the government or could be external.

Service Consumers are citizens, businesses and administration. The possible scenarios for the interoperable services would include:

- Administration to Citizens – **A2C** scenario
- Administration to Businesses – **A2B** scenario
- Administration to Administration – **A2A** scenario

The adoption of the Interoperability should be an evolving process, starting with the OSS Commercial Registration Domain Interoperability project and building all the necessary solution blocks and later it should be assessed in order to determine which of the functions could be used as shared facilitators and could be assigned as nationwide solution blocks.

3.2 Domain Interoperability

Domain Interoperability should represent an independent block that could offer basic services to Service Consumers (Citizens/Business/Administration) that is ready to be included in the National Interoperability.

The Domain Interoperability segments will integrate the Institutions that are contributing to and/or consuming the services from the same or different Domain Interoperability segments.

The main function that Domain Interoperability Node should have are:

- Service Mediation function,
- Integration function,
- Digital identity management,
- Workflow and monitoring function and
- Service provisioning function.

The Domain Interoperability segments could use External/Shared Interoperability facilitators like billing systems, e-Payment systems, Public Cloud Hosting services that could be used for all Interoperability nodes (Domain and National). These components should be flexible for deployment. In the initial project if these functions do not exist, it should be considered to be implemented within Domain Interoperability Segment and later to be reused for other segments. In that scenario these components should be able to be deployed on the Institutions that would govern National Interoperability Node.

Figure 3 presents the logical diagram of the Domain Interoperability with its main functions.

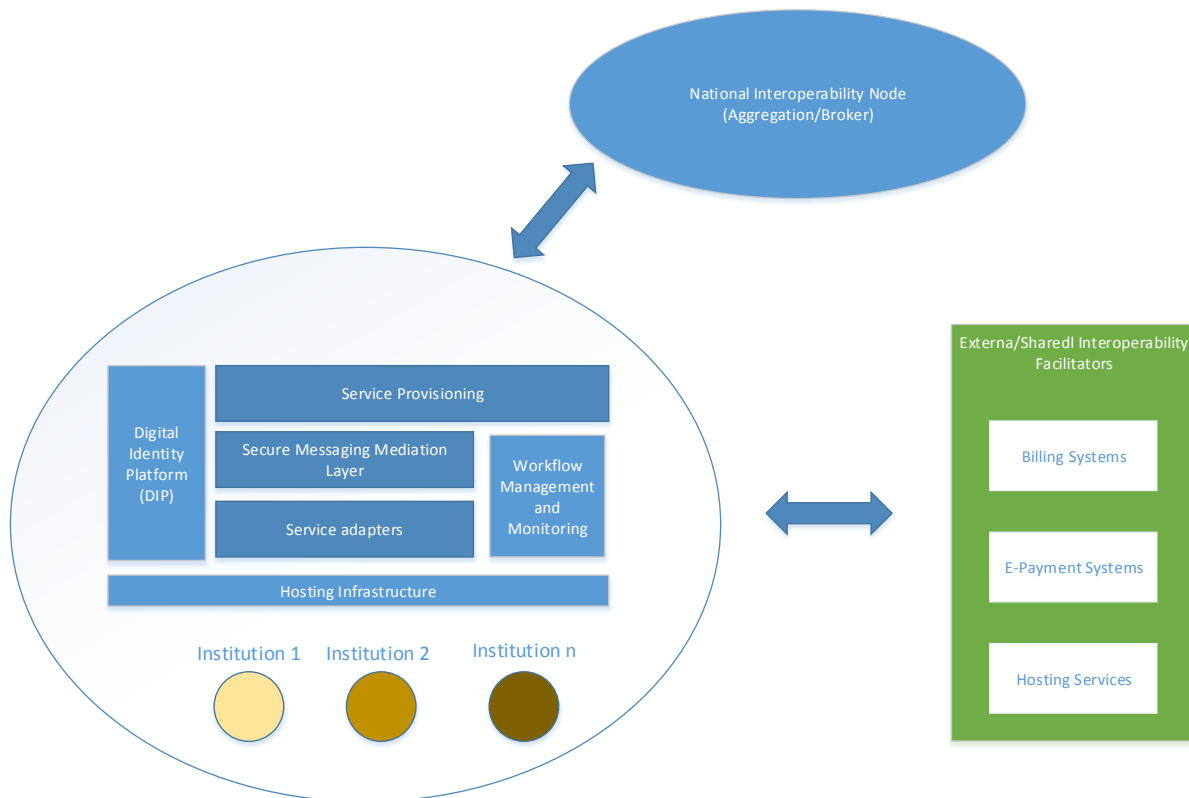


Figure 3 - Domain Interoperability logical diagram

The functions of the Domain Interoperable system should enable secure data exchange between Institutions in using the service from the service consumers.

Service mediation function enables message exchange between information systems from the Institutions included in the Domain Interoperable segment. The commonly accepted message exchange concept is a service bus topology.

The integration of this concept with the legacy systems currently operating within the institutions is enabled by the service adapters. These adapters act as connection points to the Interoperable system. The whole layer that allows these connections should be developed and implemented by following the Service Oriented Architecture (SOA) loosely coupling principles.

3.3 Nationwide Interoperability Node

Nationwide Interoperability Node should be the central aggregation point in order to provide Aggregated and Orchestrated cross-domain services. At same time, it should act as a broker for the information exchange between Domains.

The Nationwide Interoperability node should unify all domain interoperability initiatives and should be governed by the Institution that is responsible for the Interoperable building blocks.

On the Figure 4 the Nationwide Aggregation and Broker Node is shown with its functions.

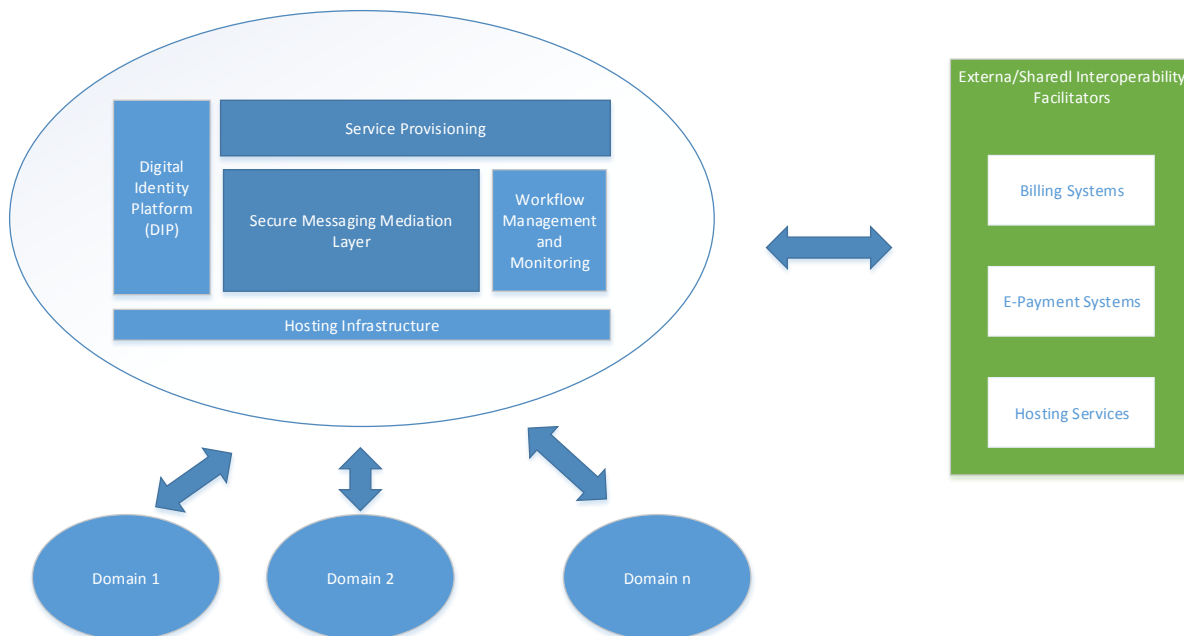


Figure 4 - Nationwide Aggregation and Broker Node

The role of nationwide service mediation function is to exchange data between different domains enabling cross-domain services. The workflow management will enable aggregation and orchestration of the services.

The service provisioning would be enabled by a nationwide portal that will unify all services into service catalogue. All customers should use the services through their own personalized environment.

For the purpose of a centralized identification of the users, the existence of a unique digital identity per person on the nation-wide level is very important. This requires unification of all digital identity systems at some later stage of the maturity of the Interoperable system.

3.4 Stakeholder perspective

The central focus of the interoperability and service provisioning is a platform that should provide bases for standardized exchange of data in various formats and for various purposes. The purpose of this platform and its services is to satisfy the needs for data of a wide range of entities² and citizens across the whole country, but also outside its borders.

An interoperability setup requires direct or indirect involvement of different profiles of people and entities involved in the data exchange, but also the ones that can affect the operation and efficiency of the platform and the services it supports. Looking through the perspective of participants in the process of data exchange, the following groups of stakeholders can be identified:

Service (data) providers

These entities are the sources of information of interest which is exchanged through a service. They can be the direct owners of the data, but they can also be the hosting providers of data that is owned by of some other entity. In all cases the exchange should be possible only with a consent of the owner of the information.

Primarily the platform shall support data exchange where only the governmental institutions are in a role of data providers. In perspective, it is expected that a wide range of entity types would be involved in the data exchange. The interoperability setup shall support data exchange with

² Within this chapter of the document, an “entity” is an individual person, a business, an organization etc. that has a role within the interoperability setup.

any type of entity in the role of data providers as long as it satisfies the requirements, including commercial entities, foreign entities etc.

The following entity types shall be expected at some point to play the role of data providers within the interoperability setup:

- **Governmental institutions and agencies** across all of Lebanon, its regions, or local (municipal) level.
- **Other local entities** (within Lebanon) such as banks, credit bureaus, private agencies etc.
- **Foreign entities** such as governmental institutions and agencies of other countries, banks, credit bureaus, private agencies etc.

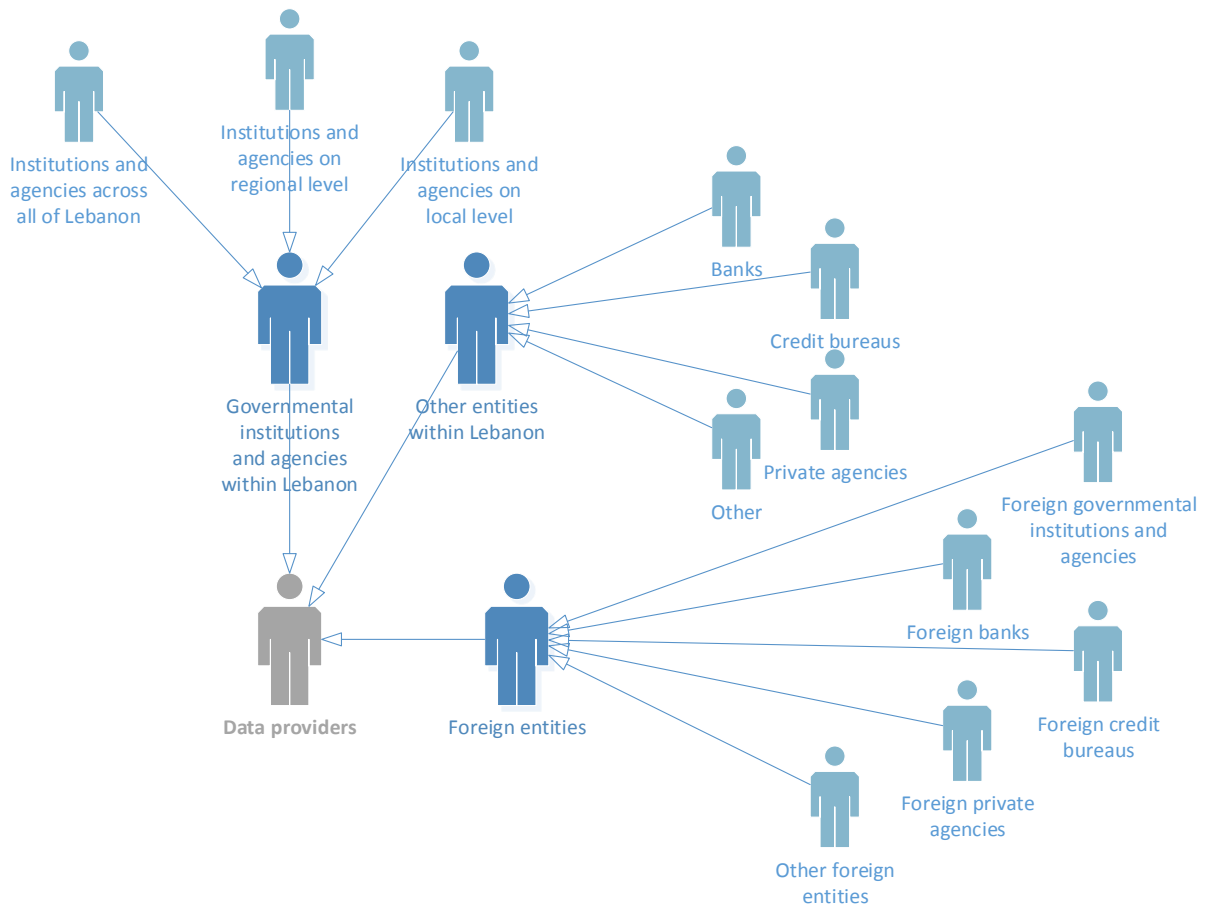


Figure 5 – Stakeholders: Data providers

Service (data) consumers

These entities are the direct beneficiaries of the interoperability setup and the data exchange services. The services and the data being exchanged are implemented as a consequence of the data consumers' need of information.

Primarily, the platform shall support data exchange where only the governmental institutions are in the role of direct data consumers. In perspective, it is expected that a wide range of entity types will be involved in the data exchange. The interoperability setup shall support data exchange with any type of entity in the role of data consumer as long as it satisfies the requirements, including commercial entities, foreign entities etc.

The following entity types shall be expected at some point to act in the role of data consumers within the interoperability setup:

- **Governmental institutions and agencies** across all of Lebanon, its regions, or local (municipal) level;
- **Other local** (within Lebanon) **entities** which includes both, businesses and people;
- **Foreign entities** which include foreign governmental institutions, but also foreign businesses and people.

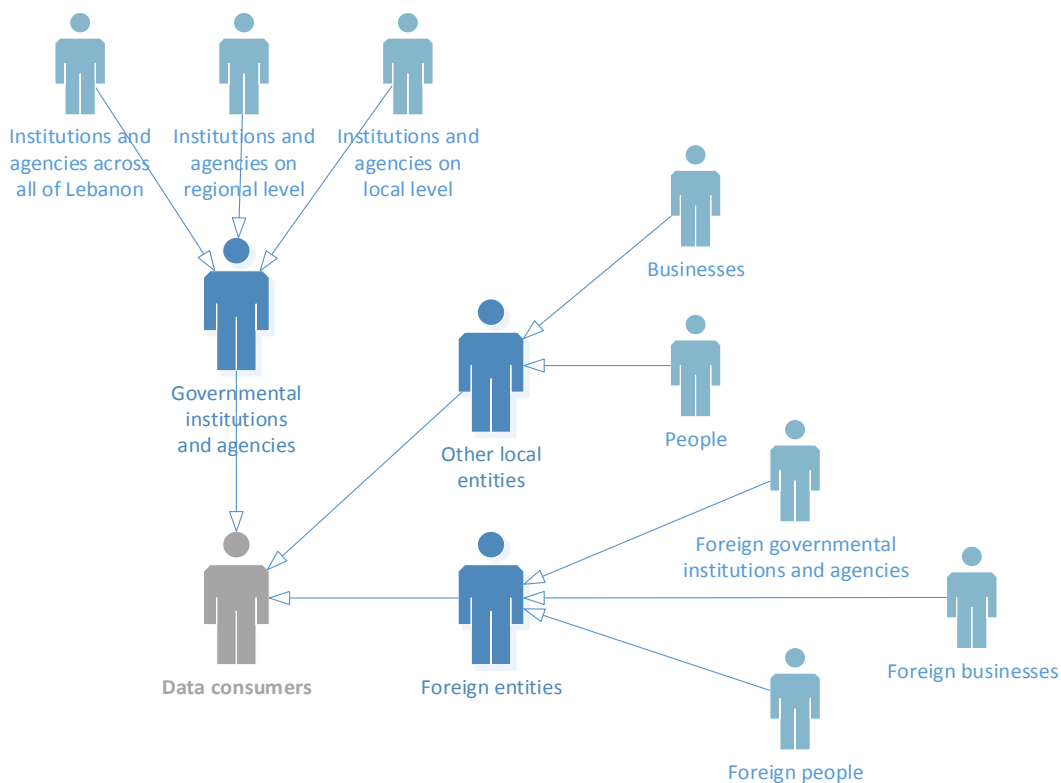


Figure 6 – Stakeholders: Data consumers

Enablers

The enablers for the interoperability setup are the stakeholders who have a role (direct or indirect) in supporting, assisting or facilitating the data exchange within the interoperability setup, including the maintenance and improvement of the interoperability infrastructure. The following entity types shall be expected to act in the role of enablers for the interoperability setup:

- Governmental institutions and agencies which perform the role of:
 - **Infrastructure providers, system owners or administrators** of the interoperability setup that enable, support and facilitate the data exchange within the interoperability setup;
 - **Policy and legislation makers** concerned with the policies that govern the exchange of data;
- **Other local** (within Lebanon) **entities** which provide support for the interoperability. E.g. Certificate Authorities that issue digital certificates that can be used for signing documents exchanged in the interoperability setup;
- **Foreign entities** which can also provide some kind of support for the interoperability. E.g. Foreign Certificate Authorities who issue digital certificates that are also accepted within the interoperability setup in Lebanon.

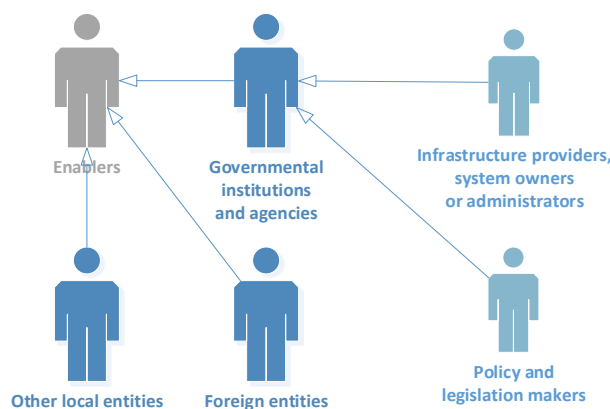


Figure 7 – Stakeholders: Enablers

3.5 Service patterns

The interoperability setup represents a common platform that shall support the implementation of a wide range of different services. The platform shall be universal in the context of Lebanon and shall provide full support for fast and relatively low-cost implementation of additional services.

At the time of the initial implementation of the platform it shall include a small range of services (with the registration in the Commercial Registry being the pilot service for the platform), but it is expected this to quickly develop and include an extensive set of diverse services. When designing and implementing the platform for the different services it should support, the perspectives explained in this chapter and its subchapters shall be carefully considered.

3.5.1 Source of information perspective

At the time of the initial implementation of the interoperability platform in Lebanon only a few (“pilot”) services shall be available. Each of these services will most probably have only one source of information. The platform shall support any kind of services, including services with multiple data sources.

A data source (information source) is considered to be each unique system that provides digital information for one or multiple services. This includes situations where multiple systems are within one institution, where each of these systems is considered to be a distinct data source.

Regarding the number of sources of information needed, the services can be organized in the following groups:

- **Services with one source of information**
 These are services where all the information needed for the result of the service is received from only one system which represents a unique data source for that service.

- **Services with multiple sources of information**
 These are services where the information needed for the result of the service is received from two or more systems, each of them representing a data source for that service. Each of the data sources can be within the same domain, within another domain, but also outside of Lebanon (please consider chapter 3.5.3 for more about the regional perspective). There can also be multiple data sources within the same institution or infrastructure.

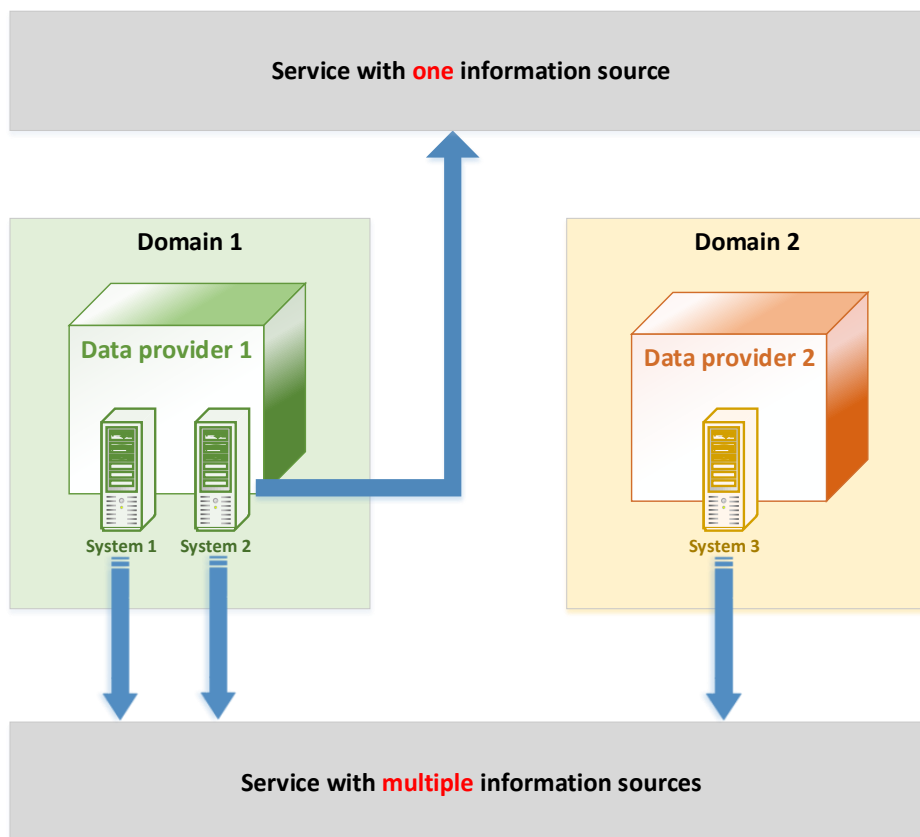


Figure 8 – Number of data sources perspective

It should be noted that the workflow of activities and the sequence of the communication with the different data sources depends on the service, its purpose and expected results. Please refer to chapter 3.5.7 for more information on this aspect.

3.5.2 Data consumers perspective

The intention of the effort for an interoperability platform on a national level is to set the infrastructure needed for exchange of the huge amount of information that are kept within the governmental institutions. The long term vision also predicts using information from foreign institutions, but also from trusted private entities, all in favor of offering more attractive and useful services for the final users.

Having in mind the diversity of information, it is expected that various profile types of data consumers (final users of the services) would benefit from the interoperability platform and the services it supports. This includes the following profiles:

- **Institutions**

The processes that any institutions performs (including services that institution offers to its clients) often require information from other institutions. The interoperability setup and the services will allow these institutions to obtain the needed information in standardized, faster, more efficient and cheaper way. The institutions as data consumers and the services they need are the focus of the initial implementation of the services for the interoperability platform.

- **Businesses**

The businesses are in a frequent interaction with the governmental institutions for the purpose of carrying out their legal obligations, but also improving their internal processes and products (objects or services) they offer to the market. During its whole lifecycle from the moment of creation to the moment of its closure, the business is required to perform numerous actions of filing to different registries, obtaining permissions and other documents from different institutions etc. The government and its institutions are expected to use the interoperability setup to improve all stages of the business lifecycle by offering adequate services.

Furthermore, the setup shall allow the businesses to obtain information that they could use in their everyday operation a decision making processes. E.g. a business can obtain information about the financial stability, payment records and other similar records of a potential partner.

- **Citizens**

Similar to the businesses, the citizens are also in frequent contact with governmental institutions, regardless whether they act upon a legal obligation they have, or they use a service or obtain information from an institution.

3.5.3 Regional perspective

The regional context is based on the location of the data provider (institutions that provide the information or the effort needed for the service) compared to the location of the data consumer (the institution that requested the information). Please note that if a service is consumed through a portal (e.g. a Point of Single Contact portal), the location of the portal is considered to be the location of the data consumer. Furthermore, the location of the portal does not depend on the actual physical location of the portal's infrastructure, but rather on the institution or entity has the ownership over the portal (the portal can be hosted anywhere in the world). The regional aspects also considers whether the data is obtained from one or several institutions (and their systems) and whether these institutions are within the same interoperability setup.

Considering the context of Lebanon, the governance of the services provided by Lebanese institutions shall be centralized and the location of the data providers and the data consumers shall be irrelevant. The only regional aspect that must be considered is for services that require exchange of information with institutions outside of the national borders (e.g. with another regional or national interoperability setup). Consequently, the following groups can be identified all of which shall be fully supported by the interoperability platform design:

- **National services**

The information used for the national services are obtained through communication with one or several institutions that are based within the borders of Lebanon. If the data consumer and all the data providers for a service are based within Lebanon, the data exchange and processing is entirely performed within the Lebanese interoperability environment.

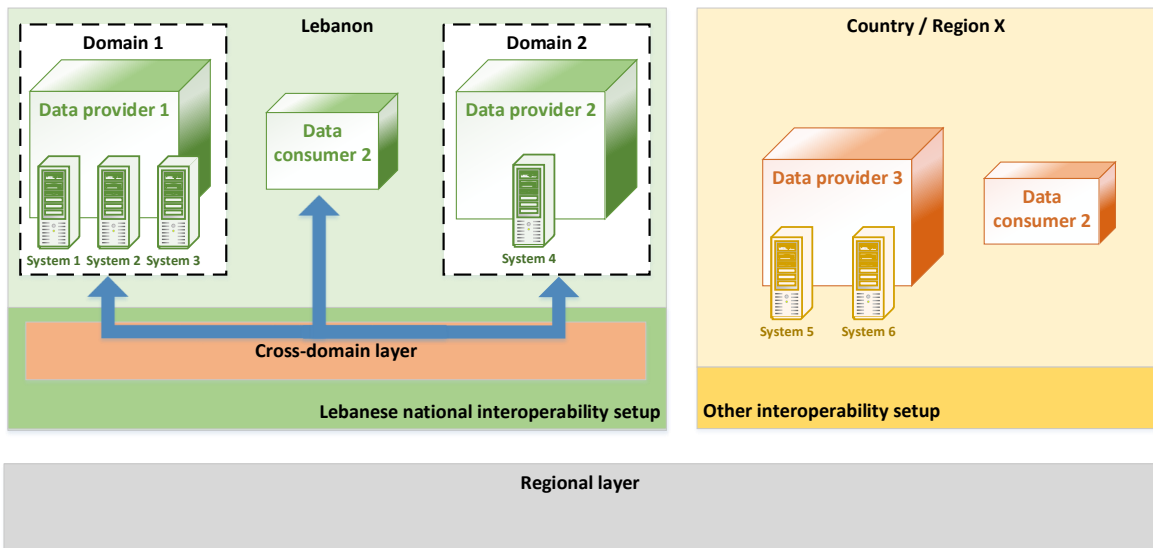


Figure 9 – Communication pattern for national services

- **Regional services**

The interoperability setup of Lebanon shall be designed with support of further integration with other regional interoperability initiatives. In these cases, all data exchange with external interoperability setups is directed through the cross-domain layer of the Lebanese national interoperability platform, and then the domain environment and the particular data source that can provide the desired information. The data sources within the domains shall not be accessed directly, without involvement of the cross-domain layer.

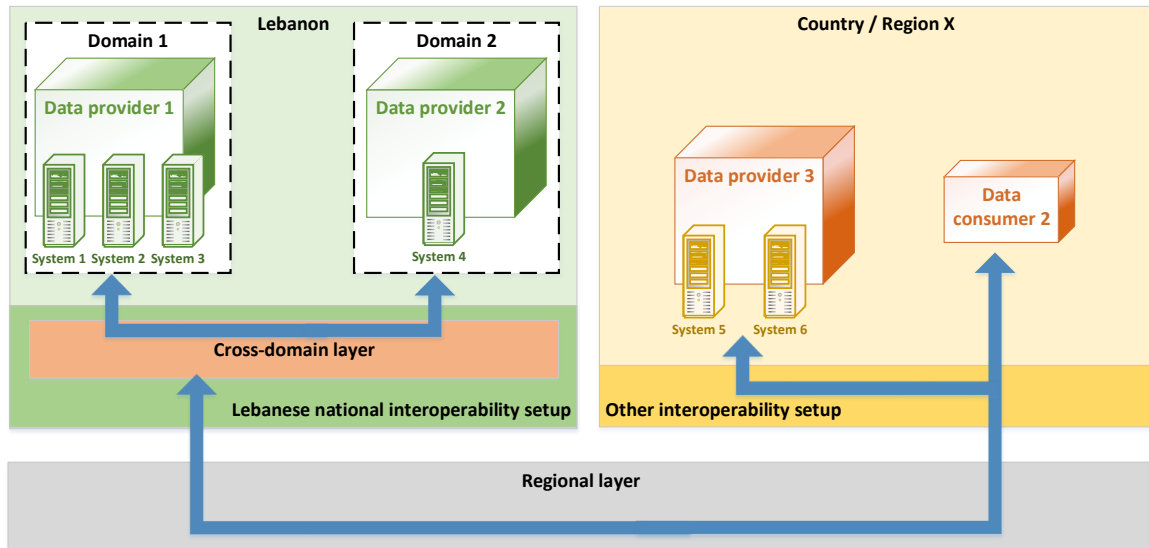


Figure 10 – Communication pattern for regional services (services from other regional interoperability setup)

3.5.4 End user identity perspective

Depending on the type of service and the sensitivity of the information that are provided for the final user, different levels of user identification shall be required.

Different levels of user identification are elaborated further in this chapter. Please note that the **registration of a user** as anonymous creation of a user account in the system that can be used to access services. The actual **identity confirmation** of a user is considered to be a separate action. Also there is a difference between an **access to a service** (the user is able to see a service, sometimes even buy transactions for that service, but cannot access the benefits of the service) and the actual **consumption of a service** where the user can access the benefits the service provides.

Some services provide public information that shall be available to anyone, while other services shall be available only to a specific group of people with specific background. The interoperability platform shall support the following levels of user identification:

- **Users with unproven identity**

Some services provide information that are considered public where anyone who requested the information is allowed to get these information for free or for a fee. In these cases, the data providers are not interested who is requesting the information. Therefore, these services shall be accessible by anyone (a user might get access to these services at

the time of registration of a user account) and the users are not required to prove their identity in order to use the service.

Depending on the service, the user might be requested to have a **registered account** (with confirmed or unconfirmed identity of the user) that he needs to use to access the service, while other services shall be accessible on a **public environment** by any user (registered or unregistered).

- **Users with pre-confirmed identity**

Some services shall be available only to registered users that are not anonymous (users with user accounts that at some point have confirmed their real identity). In these cases the identity confirmation for a user account is a pre-requisite for a user to be allowed to access a service. This situation requires the user to associate a valid digital certificate to his user account, or to personally prove his identity by visiting the premises of the institution responsible for the user account management within the interoperability setup and providing an adequate identification document.

- **Users that confirm their identity at the time of consuming a service**

In some situations, the access to a service shall be granted to every registered user (including registered users that do not have their identity confirmed), but at the time of using a service the user is required to confirm its identity. Therefore the registered user shall be requested to attach a valid digital signature before he is allowed to access the results (the benefits) of a service. In these situations the access to a service does not depend on whether the user's identity is confirmed, but this confirmation is rather a pre-requisite for consuming the service.

- **Users with pre-confirmed identity** (as a prerequisite to access a service) that also **confirm their identity at the time of consuming a service** (as a prerequisite to consume a services)

For some types of services only registered users with confirmed identity (users with user accounts that at some point have confirmed their real identity) can access the service, but also at the time of the consumption of the service the user will need to once again confirm his identity by providing an adequate digital certificate.

Whether a user will be allowed to get access to a service does not only depend on whether his identity is confirmed. Some services shall be available only to a specific group of people (e.g. attorneys) meaning that the users might be requested to provide additional documentation (e.g. a proof of his status as an attorney) or get a confirmation of his identity by an adequate authority (e.g. Bar association).

3.5.5 Information availability perspective

The availability of the information to users of different profiles highly depends on the type of that information and the type of the user that requests access to the information. The legislation in Lebanon, but also internal guidelines and politics of the owner of the information can strongly affect whether information is available, who can access it and when can the information be accessed.

Depending on the rules that set the availability of the information, the services that provide this information can be:

- **Services that provide Publicly available information**

The access to the service of this kind and its results should be allowed to everyone, including users whose identity was never confirmed (anonymous users or users that have a registered electronic account, but haven't confirmed their identity according to the perspective elaborated in chapter 3.5.4). E.g. this kind of electronic services can be placed on a public website where anyone can access and use them anonymously, or they can be within a protected part of a site where all registered users (with or without a confirmed identity) are given access by default (at the time of initial registration of the account, but also whenever the access is additionally requested).

Please note that regardless the information is defined as publically available, whether a payment is required depends on different factors elaborated in chapter 3.5.6.

- **Services that provide Information available only to identified users**

In order to decide whether the access should be granted, the person requesting the access has to be identified. According to the perspective elaborated in chapter 3.5.4, the person can be pre-identified or identified at the moment of accessing and using a service. Which level of identification is required would depend on the type of service and the established rules associated with this service.

Depending on whether the user expected to prove his identity also has to provide additional information, the services can be organized in the following groups:

- **Services that provide information to any identified person**

In this case all identified users are granted access and can use the service and view the information it provides.

- **Services that provide information to a specific group of people**

In this case the service (and the information it provides) shall be available only to a limited group of people, maybe even to specific people. Sometimes the identification of a user is not sufficient and he is required to satisfy an additional condition. E.g. if the access to a service is granted only to attorneys and notaries, it is necessary to confirm that the identified user is actually an attorney or a

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

notary. This can be done by requesting the user to provide adequate documents, by comparing the user data with a list of licensed attorneys and notaries or by getting a confirmation from a third party entity (e.g. association of professionals with a particular occupation). If this information is available in an electronic format, the comparison of information can be done automatically, through another electronic service.

3.5.6 Commercial perspective

The initial perspective of the interoperability setup is focused on allowing the institutions to fulfil their obligations of providing information and services to other institutions, businesses or citizens. This would bring many benefits, most notable a higher level of general availability of the government related services and information for all data consumers, but also the ease of use of these services. Furthermore, the availability of this information from different institutions is expected to stimulate the creativity of the institutions and the government to constantly offer better and more useful information and services that are of value to the potential data consumers.

This effort of improvement and development requires further investment in the interoperability setup, especially in implementation of new services. The setup proposed, including technical and organizational improvements requires further maintenance and support in order to ensure uninterrupted operation. This setup also requires further development for the purpose of offering more services with better quality. The interoperability setup and its services, shall not be jeopardized by possible lack of finances. Therefore, the commercial aspect of the services should be considered as a possible source of financing for the management and the development of this setup.

Considering the commercial aspects of providing a service, the following groups can be identified:

- **Free services**

These services can be provided either to a limited set of users, or to everyone. In this case, the access to a service does not involve a payment of a fee. In some situations, while an institution might be legally obligated to publically provide a set of information, the institution could decide to provide a set of information online for free in order to minimize the paper based requests and the workload in their offices (especially if it involves information that does not have commercial value or cannot be legally offered for a fee).

Please note that in some situations the service could be offered for free to a limited group of consumers (e.g. the governmental institutions), while the same service could also be offered to another group of consumers (e.g. businesses, citizens) on commercial bases for a fee.

- **Compensated services** (an institution gives access to their information in exchange of access to other institutions' information)

In order to minimize the situations where one institution offers a service to another institution for a fee (for situation when a payment is required and there is no legal obligation to share the data between the institutions for free), the institutions should consider compensating their services. This situation requires an institution to provide access to a service for free to another institution, while the other institution will provide access to its own service as a compensation.

This situation is especially common in the regional services, where an institution from one country provides the service for free to a foreign institution and as a compensation it can access adequate services and information offered by that foreign institution.

- **Commercial services**

A clear distinction should be made between public and free data and services. The free data and services are offered to the public without any financial compensation. On the other hand, it is common practice for public data to be offered on commercial bases, where the payment is generally received for preparing and organizing the data in a more suitable (adequate) form, preparation of a report which includes combined data or making the information official by adding a stamp and signature of the institution to the documents that the institution provides. Furthermore, a payment can be received for making the data available in a requested form for third parties, including cases when these entities are reselling this data as part of their own services.

Please note that the same service can be offered to two different groups of consumers for different fees (e.g. lower fee for the governmental institutions, a higher fee for the businesses or citizens).

The businesses and the citizens shall be the target of the commercial services offered. All institutions shall aim towards further improvement and development of new, more attractive services for their consumers. This should consequently bring higher service consumption and increased income that can be used for everyday operation and even further development.

In some situations a commercial service (with a fee involved) can be offered from one institution to another, especially if the information is of a value that cannot be compensated with adequate service in the opposite direction.

An institution can offer a commercial service as a combination of results from its own data and data from another institution, where the income from the fee is separated adequately according to the agreement between the institutions.

3.5.7 Sequential vs. parallel data exchange and processing perspective

The service as a business process represents a set of activities that are performed in a pre-defined order (workflow). In the context of interoperability, at least some of the activities of the service would involve exchange of data with different data sources and use the received data for processing and generating the final outcome. Depending on the rules and requirements for a particular service, the exchange of data can be performed in one of the following methods.

Sequential exchange pattern

During the sequential exchange of data, the service requests a dataset and does not send a request for the next dataset before the first dataset is received. As soon as the request for data is received by the data provider, the data provider performs a local process (which can also include some data exchange with other systems and institution) in order to produce the requested dataset. As soon as the dataset is completed, it is sent to the main service.

When the requested dataset is received, the process can continue and the service can request the next dataset.

This pattern is used in situations when the request for a dataset depends on a previously received dataset (data from the received dataset is needed for the next request). In such situations often there is a need of processing the received dataset in order for the process to continue with the request of the next dataset. The total waiting time is a sum of the time needed for each dataset to be prepared and sent back by the data provider.

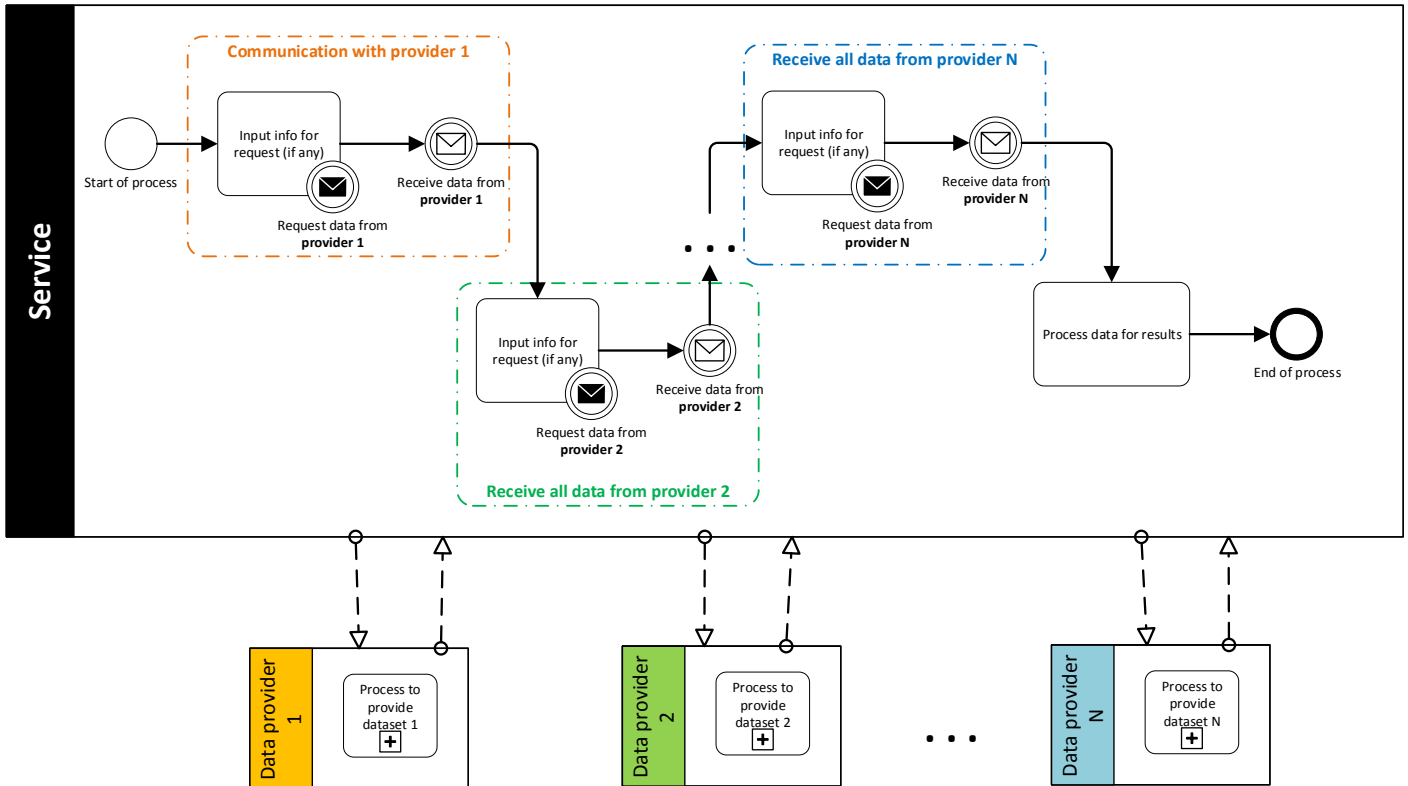


Figure 11 - Sequential pattern of information exchange

Parallel exchange pattern

In the parallel exchange of data, the request for data is sent to all the data providers at once and the process continues after all the responses are received. The following diagram represents a simple example of parallel data exchange.

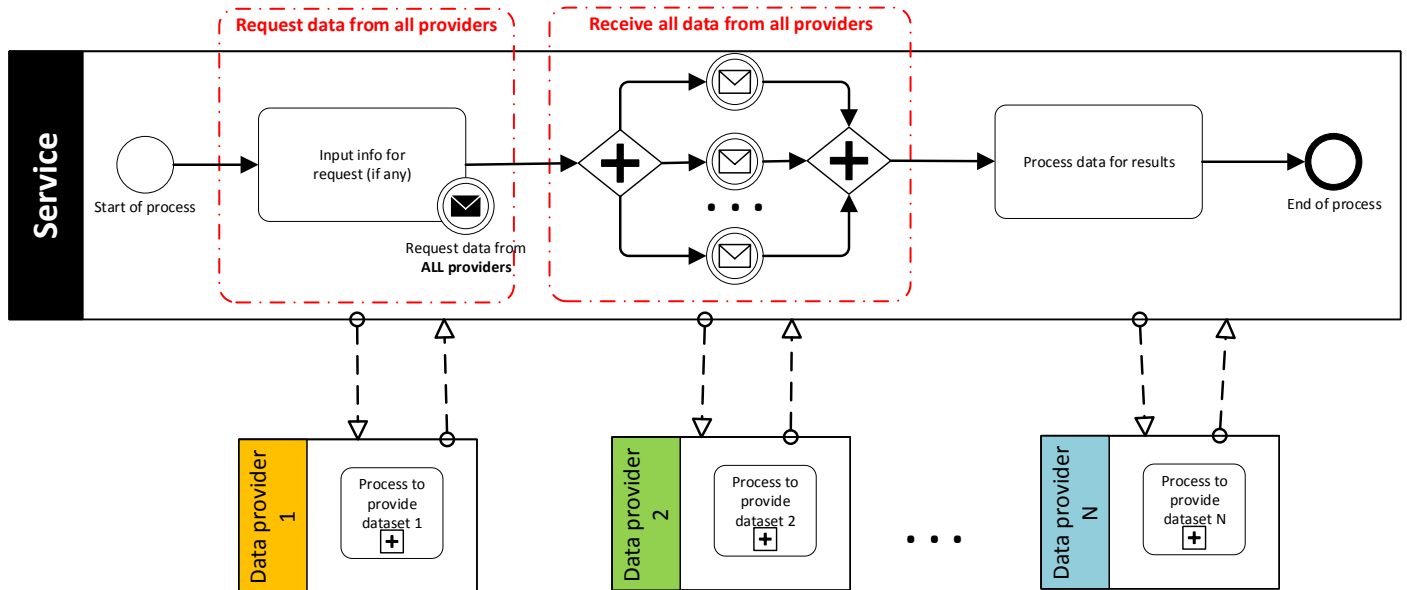


Figure 12 – Parallel pattern for information exchange

Similarly to the serial pattern, as soon as a data provider receives the request, it performs a local process (which can also include some data exchange with other systems and institutions) in order to produce the requested dataset. As soon as the dataset is completed, it is sent to the main service. Depending on the complexity and a possible need of human interaction, some processes for producing of datasets can take considerably longer time than others. The waiting time for the main service is the actual time needed for the dataset that takes the longest to be prepared and sent to the main service.

As soon as all the requested datasets are received (as soon as the last dataset is received), the workflow of the service continues and the received data is processed in order to produce the final result.

The main objective of this pattern is process optimization with a goal to improve the efficiency of the process and decrease the time needed for completion. This is done by exploiting situations when two or more datasets are independent (the request of one dataset does not depend on whether another dataset from the group is received or processed). The waiting time after the requests are sent is the time needed for receiving the dataset that takes the longest to be prepared and sent back by the data provider.

Combined exchange pattern

Often there are situations when the workflow of the service (governed by the rules for that service) includes both situations described above for the sequential and the parallel patterns. The

ultimate goal for optimization of a processes for these cases leads to a combination of both patterns, all in favor of increasing the efficiency of the process to maximum and minimizing the completion time. The following diagram presents an example of a simple process that uses both patterns for its design.

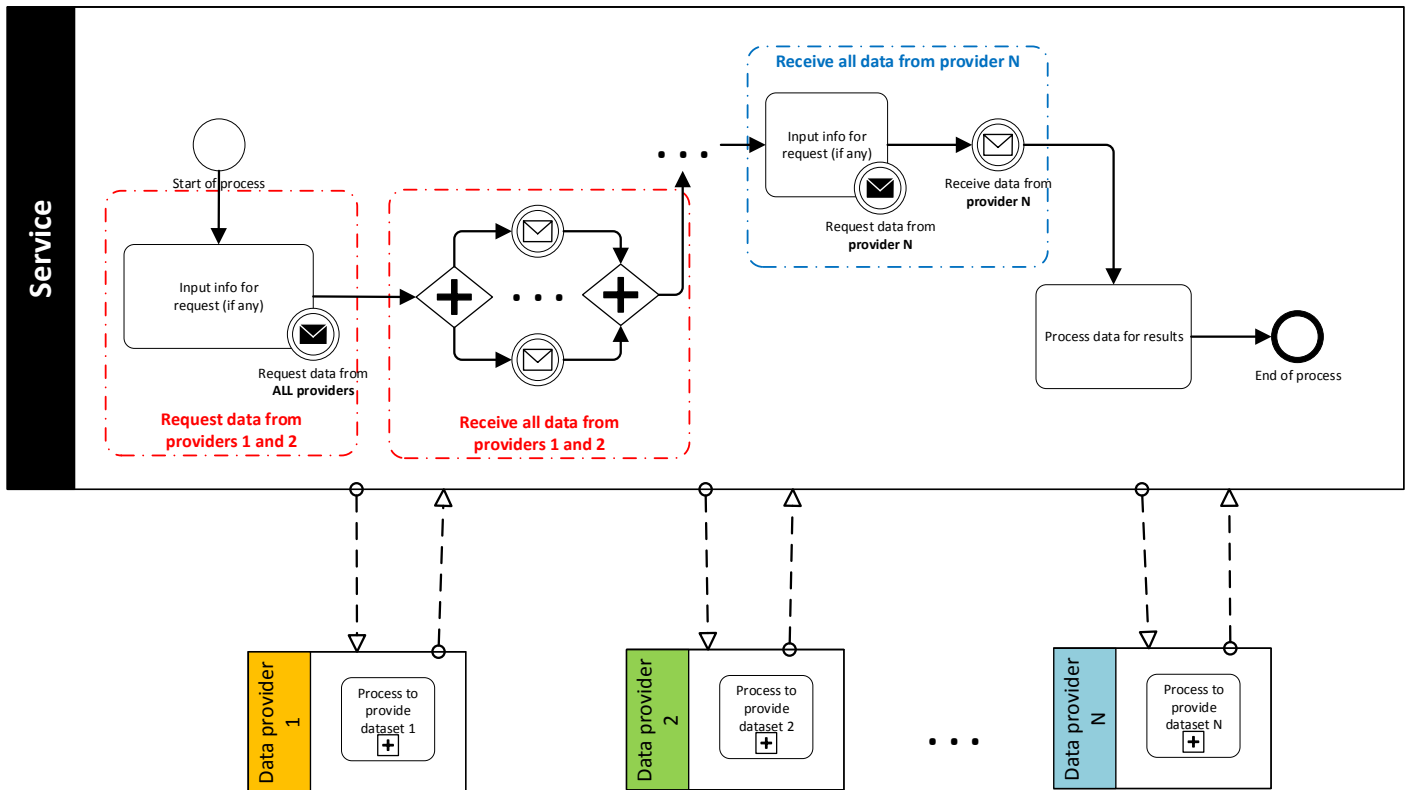


Figure 13 – Combined pattern for data exchange

Depending on the complexity of the service, the design of its workflow can include multiple combinations of usage of the suggested patterns, even on multiple levels (as the following example of process workflow shows).

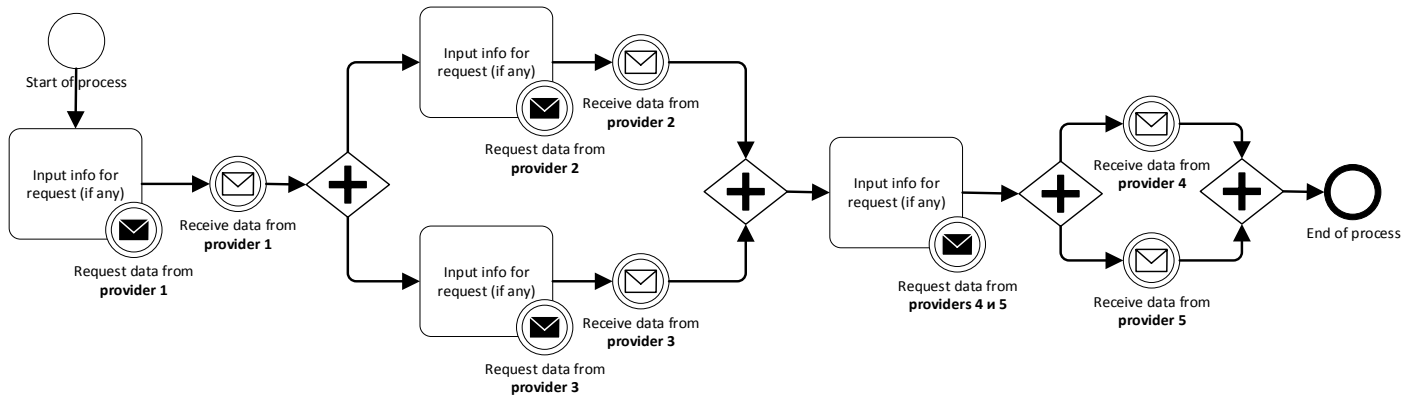


Figure 14 – Service with a combined pattern with multiple levels

Processing of data

Similar to the exchange of data, the processing of the received data can also be optimized. The service should force processing of the data as soon as possible. The level of optimization depends on the rules and requirements for a particular service and can be done by implementing the following general rules:

- If the dataset that is received is used as a sole source for the processing and this data is not combined with any other data, then the processing can be performed as soon as the data is received;
- If the dataset that is received during processing is combined with other dataset in order to produce the results, then the processing should start as soon as all the necessary datasets are received.

3.5.8 Service orchestration perspective

As previously discussed, the interoperability setup shall support services with different levels of complexity. This includes the services with several tasks within a complex workflow. The service orchestration represents the responsibility to organize the individual tasks within a service in order to reach the final result for the service.

One of the key difficulties for an interoperability setup of this kind is the governance of the particular services, but also the management of the service catalogue and the technological setup as a whole. Considering the present institutional setup in Lebanon and the level of independency of the institutions, it is considered that the orchestration of tasks for each service highly depends on the institution and the domain where that service is implemented.

The implementation of each service should be perceived through the institutional and domain perspective (as defined in chapter 3.1) and should be done in the following way:

Institutional services

The **institutional services** include tasks that are entirely performed within the same institution, regardless whether these tasks include data exchange, or require manual intervention from an employee or representative of the institution. In this case, all information and effort is based within this institution. The service can require involvement of one or more applications and require data from one or multiple systems (information sources), all of which are native to the same institution.

The institutional services shall entirely be orchestrated within the specific domain native for the type of service. Please consider the example in Figure 15. Service 1 is implemented within Domain 1 and includes 2 tasks. Each of these tasks require information from a specific system, but both of these systems are native to Institution 1. The tasks performed for Service 1 shall be orchestrated by the Domain 1 mediation layer.

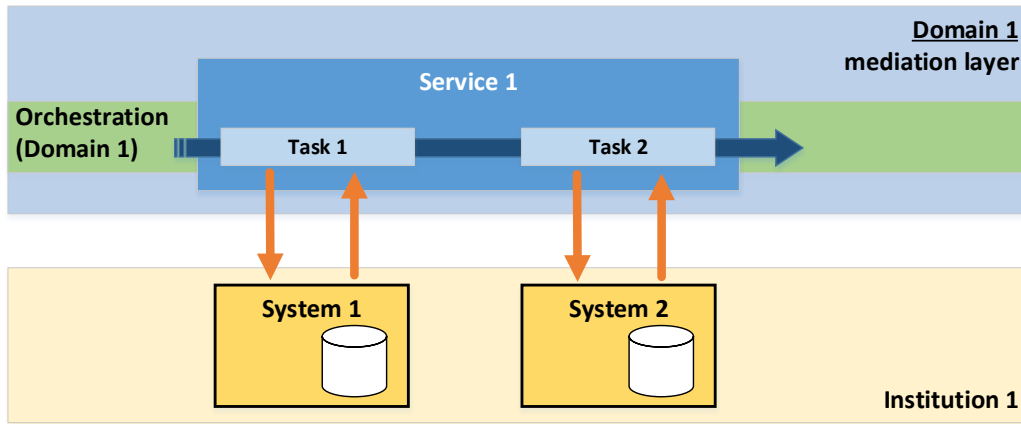


Figure 15 – Orchestration for institutional services

Domain services

The **domain services** include tasks that are performed with involvement of two or more different institutions, all of which are a part of the same domain. These tasks can include data exchange, or require manual intervention from an employee or representative of the institutions. The service can require involvement of one or more applications and require data from one or multiple systems (information sources), all of which are native to one of the institutions involved.

The domain services shall entirely be orchestrated within the specific domain native for the type of service. Consequently, for a service to be considered as a domain service, all involved institutions must be a part of the same domain.

Please consider the example in Figure 16. Service 2 is implemented within Domain 1 and includes 3 tasks. Each of these tasks require information from a specific system, Task 1 from System 1 (native to Institution 1), Task 2 from System 2 (native to Institution 1) and Task 3 from System 3 (native to Institution 2). In this case, Institution 1 and Institution 2 are both a part of Domain 1. The tasks performed for Service 2 shall be orchestrated by the Domain 1 mediation layer.

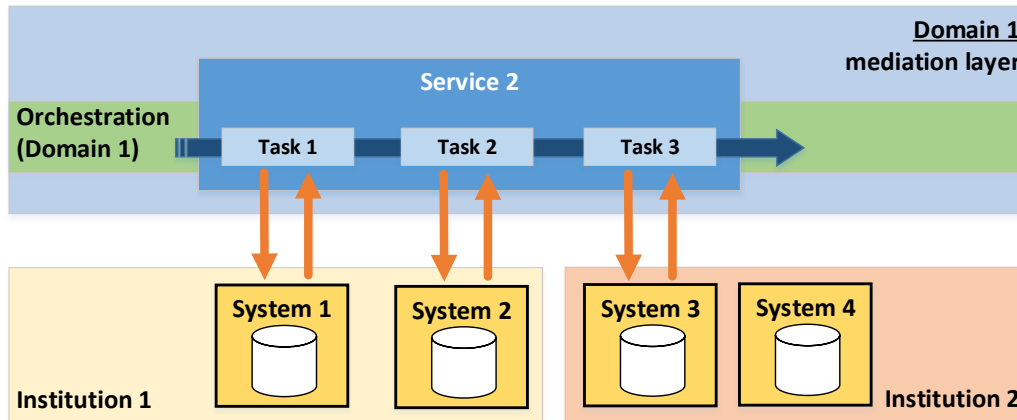


Figure 16 – Orchestration for domain services

Cross-domain services

The **cross-domain services** include tasks that are performed with involvement of two or more different institutions, where at least one of these institutions does not belong to the same domain as the other institutions involved. These tasks can include data exchange, or require manual intervention from an employee or representative of the institutions. The service can require involvement of one or more applications and require data from one or multiple systems (information sources), all of which are native to one of the institutions involved.

The cross-domain service shall be orchestrated within the cross-domain mediation layer. This orchestration defines the flow of tasks of the service on the cross-domain level. Each of these tasks requires execution of exactly one institutional or domain service. As in all other cases, the orchestration of the institutional and domain services is done within the specific domain native for the type of service (within the domain mediation layer for the specific domain).

Please consider the example in Figure 17. Service 4 is implemented on the highest logical level (the Cross-domain mediation layer) and it includes 3 tasks. The execution of these tasks is orchestrated by the Cross-domain mediation layer. Furthermore, each of these high-level tasks require execution of one specific service: Service 2 for Task 1, Service 3 for Task 2 and Service 1 for Task 3.

Service 1 is already introduced in the example in Figure 15 as an institutional service within Domain 1, while Service 2 in the example in Figure 16 as a domain service within Domain 1.

The orchestration for these services and their internal tasks remains unchanged as described in those examples. Service 3 from this example is implemented within Domain 2 and its orchestration is done by the Domain 2 mediation layer.

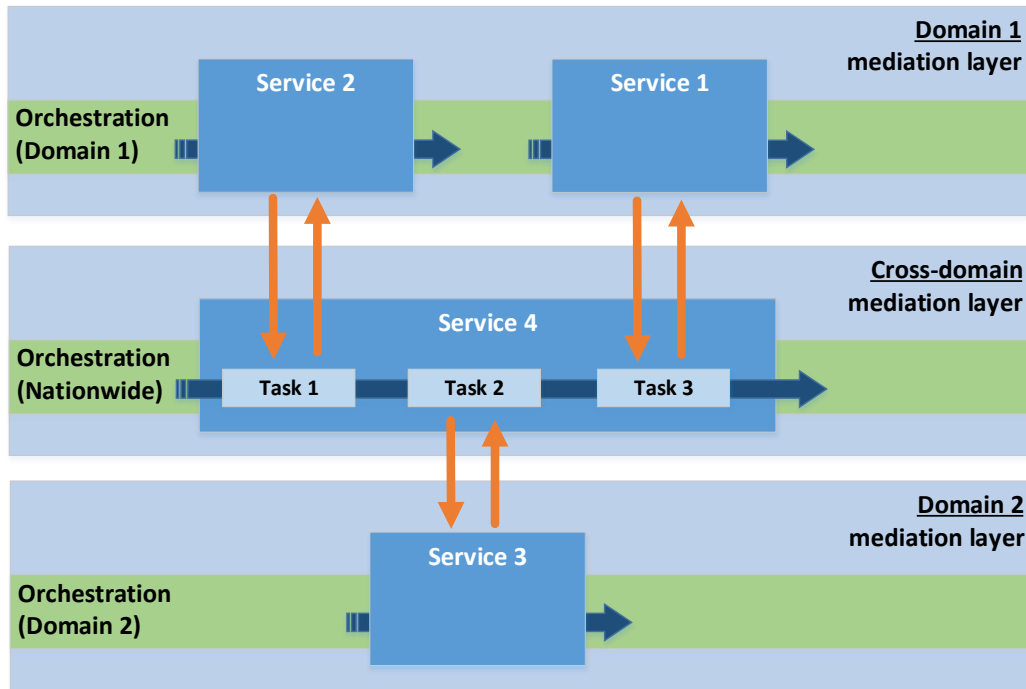


Figure 17 – Orchestration for cross-domain services

3.5.9 Service results perspective

The goal of each service is reached by providing the expected result (in a form of information or other value) to the final user. Concerning the results of a service, there shall not be any limitation. A service can combine different results, all of them obtained in a different way, from different sources and representing a different type of result. The results can be obtained by the user progressively throughout the process, or combined at the end of the process.

Generally speaking, the results of the services can be perceived as:

- **Confirmation of submission as result** - in some situation the result of the service is a simple confirmation of a successful submission of information to the service provider. This is the case of services that provide opportunity of electronic filing and other submissions of data to public registries or other governmental systems;
- **Plain information as result** – for these services, the result is a set of information that are not processed or combined, but rather presented in the same form as received from the information source;

- **Processed results** – in this case the results represent a combination of information obtained from one or more data sources that are given an additional value by organizing them, combining them (data mash-ups) and presenting them in a form that is more meaningful and useful for the final consumer. This includes additional processing of the obtained information, reorganization, combination of the data, but also using complex calculations and business intelligence.

3.6 Service maturity levels

In the interoperability framework, organizations are considered service providers, no matter to what extent they can use for that purpose means of IT. Depending on the maturity of the service provided and the options available for the service consumers, the following service maturity levels³ can be identified:

Maturity Level 1

"Maturity Level 1" of the e-service shall enable a "registered or not registered user – service consumer" to:

- Access information and documents:
 - Access the page related to the administrative transactions;
 - Read about required information, documents, process of the transaction, duration, fees etc.;
 - Download, if exists, a standardized or non-standardized form (PDF or MS Word form);
 - Possibly access a link to an external e-service of another administration (provided on an external internet location).

All subsequent steps are performed manually, including filling in and signing the forms, preparing additional documents, submission of the application/request with additional documents, further contact with employees of the institution, the evaluation process in the institution, preparation of the answer, providing the answer/decision and possibly an outcome document from the institution etc.

³ The service maturity levels are based on the ones already established by the “DAWLATI – Architecture Vision” document by OMSAR’s E-Government Unit (from October 2015).

Maturity Level 2

"Maturity Level 2" of the e-service shall enable a "registered or not registered user – service consumer" to:

- Access information and documents:
 - Access the page related to the administrative transactions;
 - Read about required information, documents, process of the transaction, duration, fees etc.;
 - The user shall be able to fill in online, download and print the forms associated with the service (in PDF form, or as a web form but without a possibility of submission);
 - Possibly access a link to an external e-service of another administration (provided on an external internet location).

All subsequent steps are performed manually, including signing the forms, preparing additional documents, submission of the application with additional documents, further contact with employees of the institution, the evaluation process in the institution, preparation of the answer, providing the answer/decision and possibly an outcome document from the institution etc.

Maturity Level 3

"Maturity Level 3" service shall provide opportunity to electronically send a request/submission and perform evaluation, but the whole process cannot be completed fully online mostly due to a lack of opportunity to exchange legally acceptable electronic documents.

"Maturity Level 3" service shall enable a "registered user – service consumer" to:

- Access information and documents:
 - Access the page related to the administrative transactions;
 - Read about required information, documents, process of the transaction, duration, fees etc.;
 - Read information and guidelines about consuming the service electronically;
- Consuming a service:
 - Initiate the e-service;
 - Fill in a web form/forms (provide the requested information);
 - Upload supporting documents (chosen from the personalized documents or scanned for this transaction) related to the chosen e-service;
 - Submit the form and the supporting documents (electronic submission);
 - Make changes to the information and documents submitted (in case changes are requested by the service provider);
 - After submission, the system shall automatically generate a receipt containing at least the unique transaction ID and all the information filled-in and submitted by the service consumer. This receipt shall be available for the user in an electronic form.

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

- Monitor the evaluation process and decision:
 - Track the e-service status updated automatically by the system or manually by the service provider (a representative of the institution, e.g. a civil servant);
 - Access, view, download and print the initial response/decision for the submission with information about the arranged appointment;
- Have interaction with other users (direct or indirect):
 - Communicate with the registered user – service provider concerning incomplete information or documentation in the submission, or when changes are needed;
 - Communicate with the registered user – service provider for the purpose of setting up an appointment.

"Maturity Level 3" service shall enable a "registered user – service provider" to:

- Evaluate a submission
 - Review a list of submissions. Filter submissions according to their status, where the statuses depend on the type of service (newly submitted, evaluation in progress, closed cases etc.)
 - Review the information and documents for a submission (the user shall be allowed to access the submission, its data and documents on multiple occasions);
 - Perform initial evaluation (if needed)
 - Prepare information for the answer (if information are requested);
 - Make a decision (positive, or negative, for a submission that requires a decision)
 - Give a response after the internal evaluation process and/or preparation of the information (if information are requested) with information about the arranged appointment;
- Have interaction with other users (direct or indirect):
 - Communicate with the registered user – service consumer concerning incomplete information or documentation in the submission, or when changes are needed;
 - Communicate with the registered user – service consumer for the purpose of setting up an appointment.

The actions performed by the "registered user – service provider" can be organized on multiple stages by introduction of additional users with different levels of seniority and responsibilities. Depending on the actual process of response for the actual service, the evaluation/preparation of response for a particular submission can be performed by multiple users with same or different roles (one user after the other, or all users at the same time).

Please note that since no original form and documents are provided to the service provider, the whole process cannot be completed without manually presenting the original documents. After the submission is initially evaluated and accepted, a personal meeting shall be arranged between the service provider and service consumer. During this meeting several out of system actions shall be performed:

- The service consumer shall provide the original forms and documents;

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

- The information and documents shall be compared to the submission by the service provider and in case there are discrepancies, the service consumer shall make the necessary changes in the system and get a new appointment;
- After a successful comparison the service provider shall deliver the output document (certificate, report, information paper etc.) and mark the case in the system as completed.

For some services the evaluation process and / or the preparation of the response can be performed automatically by the system by using the submitted information. In such cases direct involvement of the "registered user – service provider" might not be necessary.

The software application used for support of the “Maturity Level 3” services shall:

- Fully support the process of actions for the particular service;
- Automatically retrieves personal data (from the user profile information) and fills them in the corresponding fields of the web form which is being filled by a user;
- Have a mechanism that associates distinct statuses for each individual phase of the submission from the moment of initiation of the service, through preparation of the submission, its evaluation and preparation of the answer, up to the moment of distribution of the answer to the service consumer. Depending on the status of the submission, certain functionality shall be available to certain users;
- Obtain and store complete information about the services, exchange of data and the actual data exchanged;
- Keep information about the "registered user – service consumer" and the users - "registered user – service provider" that worked on the particular submission;
- Provide capability to a specific user (supervisor) to review the work of other users - "registered user – service provider" and reassign tasks (for services that have automatic assigning of submissions to particular users);
- Generate a receipt after the submission from the service consumer and make this document available for the service consumer.

Maturity Level 4

"Maturity Level 4" service shall provide opportunity to complete the whole process and consume a service without a need to visit an office of the institution – service provider. The only exception is if a hard copy of the output document (certificate, report, information paper etc.) is needed, which can only be provided in person.

"Maturity Level 4" service shall enable a "registered user – service consumer" to:

- Access information and documents:
 - Access the page related to the administrative transactions;
 - Read about required information, documents, process of the transaction, duration, fees etc.;
 - Read information and guidelines about consuming the service electronically;

- Consuming a service:
 - Initiate the e-service;
 - Fill in a web form/forms (provide the requested information);
 - Upload supporting documents (chosen from the personalized documents or scanned for this transaction) related to the chosen e-service;
 - Submit the form and the supporting documents (electronic submission);
 - Make changes to the information and documents submitted (in case changes are requested by the service provider);
 - Confirm the integrity of the sent forms and documents by using an acceptable digital certificate:
 - For documents that require signature from individual persons, the digital certificates of those persons (all of the signees) have to be used;
 - For documents issued by other institutions, a digital certificate of the institution or a representative of that institution has to be used.

In some cases the institution – service provider might decide to completely trust the sender concerning the integrity of the submission, in which case the sender's identity must be confirmed. In this case it is assumed and required the sender to keep a copy of the original documents (with signatures);
 - Confirm user's identity by using an acceptable digital certificate, or some other form of confirmation from an authority acceptable for the institution – service provider. Please note that for some type of services the confirmation of the integrity of the submitted documents and forms might be sufficient and the confirmation of user's identity might not be required;
 - Make online payment for the service (if required). Please note that some services might allow the payment to be performed outside of the system before the submission, or before the output document is provided to the service consumer;
 - After submission, the system shall automatically generate a receipt containing at least the unique transaction ID. This receipt shall be available for the user in an electronic form. If possible, the receipt shall be signed with a digital certificate of the institution – service provider or a representative of the institution;
- Monitor the evaluation process and decision:
 - Track the e-service status updated automatically by the system or manually by the service provider (a representative of the institution, e.g. a civil servant);
 - Access, view, download and print the response/decision (output document) for the submission or a report with the requested information;
- Have interaction with other users (direct or indirect):
 - Communicate with the registered user – service provider concerning incomplete information or documentation in the submission, or when changes are needed;
 - Communicate with the registered user – service provider for the purpose of setting up an appointment.

"Maturity Level 4" service shall enable a "registered user – service provider" to:

- Evaluate a submission

OMSAR E-Government Unit	 دولة لبنان	LGIF – Lebanese Government Interoperability Framework
--	---	--

- Review a list of submissions. Filter submissions according to their status, where the statuses depend on the type of service (newly submitted, evaluation in progress, closed cases etc.)
- Review the information and documents for a submission (the user shall be allowed to access the submission, its data and documents on multiple occasions);
- View and check the digital certificates attached (if any);
- Perform initial evaluation (if needed);
- Perform full evaluation;
- Prepare information for the answer (if information are requested);
- Make a decision (positive, or negative, for a submission that requires a decision)
- Give a response after the internal evaluation process and/or preparation of the information (if information are requested);
- Print the output document;
- Have interaction with other users (direct or indirect):
 - Communicate with the registered user – service consumer concerning incomplete information or documentation in the submission, or when changes are needed;
 - Communicate with the registered user – service consumer for the purpose of setting up an appointment.

The actions performed by the "registered user – service provider" can be organized on multiple stages by introduction of additional users with different levels of seniority and responsibilities. Depending on the actual process of response for the actual service, the evaluation/preparation of response for a particular submission can be performed by multiple users with same or different roles (one user after the other, or all users at the same time).

For some services the evaluation process and / or the preparation of the response can be performed automatically by the system by using the submitted information. In such cases direct involvement of the "registered user – service provider" might not be necessary.

The software application used for support of the “Maturity Level 4” services shall:

- Fully support the process of actions for the particular service;
- Have a mechanism that associates distinct statuses for each individual phase of the submission from the moment of initiation of the service, through preparation of the submission, its evaluation and preparation of the answer, up to the moment of distribution of the answer to the service consumer. Depending on the status of the submission, certain functionality shall be available to certain users;
- Obtain and store complete information about the services, exchange of data and the actual data exchanged;
- Keep information about the "registered user – service consumer" and the users - "registered user – service provider" that worked on the particular submission;
- Provide capability to a specific user (supervisor) to review the work of other users - "registered user – service provider" and reassign tasks (for services that have automatic assigning of submissions to particular users);

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

- Support integration through web services with external back office systems that support the whole or a part of the process for evaluation and preparation of an answer
- Support online payments;
- Generate a receipt after the submission from the service consumer and make this document available for the service consumer. If possible, automatically attach a digital certificate of the institution – service provider or a representative of the institution;
- Generate the final output document after the final decision from the service provider and make this document available for the service consumer. If possible, automatically attach a digital certificate of the institution – service provider or a representative of the institution.

Please note that the output document (certificate, report, information paper etc.) from a service for a submission shall be provided in two forms:

- As an electronic document, if possible with an attached digital certificate of the institution – service provider or a representative of the institution;
- As a paper (hard-copy) document which shall later be manually stamped and signed by the adequate authorized persons. The service consumer shall be allowed to manually pick up this document from an office of the institution (if possible, an office of his choice).

4 Interoperability dimensions

4.1 Legal interoperability

When information is exchanged between the Institutions to provide public services, the legal validity of such information must be maintained and data protection must be respected. In the segment of the legal interoperability, the framework advises on founding the basis for the strategy and initiatives to the Interoperability through aligning and developing public policy. Also, taking into account all legislation on the data exchange and protection and at the same time utilizing the most appropriate instrument to enable the information exchange. *The information exchange could be regulated with bilateral and/or multilateral contracts, as far none of the regulative are broken or do not exist.*

Recommendation 14. Public administrations should carefully consider all relevant legislation relating to data exchange, including data protection legislation, when seeking to establish a public service.

As focal point of the legal interoperability view, Public policy emerged. The policy should be first step when interoperability initiative starts. On the basis of the public policy, the funding, risks, impacts and other guidelines should be defined.

4.2 Organizational interoperability

Organizational interoperability means the ability of all organizations (governmental intuitions), to provide a service through information systems to each other and to the public. In other words, it is the ability of organizations to act together proceeding from a common integral view and on behalf of a common agreed objective.

Organizational interoperability implies integrating business processes and related data exchange. Organizational interoperability also aims to meet the requirements of the user community by making services available, easily identifiable, accessible and user-focused.

The recommendation of the EIF are:

Recommendation 15. Public administrations should document their business processes and agree on how these processes will interact to deliver a public service.

Recommendation 16. Public administrations should clarify their organizational relationships as part of the establishment of a public service.

Recommendation 17. Public administrations working together to provide public services should agree on change management processes to ensure continuous service delivery.

Service orientation, on which the conceptual model for public services is built, means that the relationship between service providers and service consumers must be clearly structured. This involves finding instruments to formalize mutual assistance, joint action and interconnected business processes in connection with cross-institutional service provision. *Examples of such instruments are Memoranda of Understanding (MoUs) on joint actions and cooperation and/or Service Level Agreements (SLAs) signed between participating public administrations.*

Aligning business processes implies documenting them, in an agreed way, so that all public administrations contributing to the delivery of public services can understand the overall business process and their role in it.

A document of interoperability architecture of the information systems of the public sector must contain a part, handling organizational interoperability. It must cover at least the following aspects:

- A list of business processes with their short descriptions, their mutual interoperability and interoperability with external processes
- Governance information according to the governance model.

4.3 Semantic interoperability

Recommendation 18. Public administrations should support the establishment of sector specific and cross-sectorial communities that aim to facilitate semantic interoperability and should encourage the communities to share results on national and European platforms.

Semantic interoperability is the ability of different organizations to equally understand the meaning of information. What makes semantic interoperability complicated is the fact that the ways software systems are used, the aims and contexts are different, and that is why data submission and encoding are usually non equal.

In the context of the EIF, semantic interoperability encompasses the following aspects:

- Semantic interoperability is about the meaning of data elements and the relationship between them. It includes developing vocabulary to describe data exchanges, and ensures that data elements are understood in the same way by communicating parties.
- Syntactic interoperability is about describing the exact format of the information to be exchanged in terms of grammar, format and schemas.

A starting point is to create sector-specific sets of data structures and data elements that can be referred to as semantic interoperability assets. Once these are created, the cooperating organizations will need to agree on the meaning and the form of the information to be exchanged.

The assets of semantic interoperability are reusable metadata (XML schemes, data models etc.) and comparative data (classificatory, taxonomies etc.). Ensuring semantic interoperability of two information systems presupposes the existence of their mutual semantic vocabulary. The semantic vocabulary should ensure semantic conversions, as a result of which the information systems could use each other's data adequately. Semantic interoperability should be a collection of multilateral agreements and rules, which simplifies mutual linking of the systems in the semantic dimension.

4.4 Technical interoperability

Technical interoperability covers the technical aspects of linking information systems. It includes aspects such as interface specifications, interconnection services, data integration services, data presentation and exchange, etc.

When developing Interoperable solution, technical interoperability should guide the process of discovery and reusing of the existing systems and components, and designing and building the new technological components that will enable the data exchange and consumption through electronic way.

The technical interoperability should define the concepts that will be used in the reference architecture in order to enable all functions of the Interoperable solution. The *Presentation and Access* functions should be the point for consumption of the electronic services, either by humans and/or other IT systems. To support composite and complex services, the technical interoperability dimension should define concepts for *workflow and orchestration*. At the core of the interoperability is the *data exchange* function which shall enable mediation and communication between the Institutions. Also, the infrastructure such as hosting and network and security functions shall be taken into consideration in the reference architecture.

Recommendation 19. Public administrations should agree on the formalized specifications to ensure technical interoperability when establishing European public services.

All concepts above shall be defined and detailed in the Lebanese Governmental Interoperability Architecture, which shall provide blueprint for the implementation of the Interoperability projects.

5 Interoperability Agreements

Providing interoperable public services requires cooperation among different public administrations at the different interoperability levels described in the previous chapter. For each level, the organizations involved should formalize cooperation arrangements in interoperability agreements.

At legal level, interoperability agreements are rendered specific and binding via legislation, including bilateral and multilateral agreements. At organizational level, interoperability agreements can, for example, take the form of MoUs or SLAs that specify the obligations of each party participating in cross-institutional business processes. Interoperability agreements at organizational level will define expected levels of service, support/escalation procedures, contact details, etc., referring, when necessary, to underlying agreements at semantic and technical levels.

At semantic level, interoperability agreements can take the form of reference taxonomies, schemes, code lists, data dictionaries, sector-based libraries and so forth. At technical level, interoperability agreements include interface specifications, communication protocols, messaging specifications, data formats, security specifications or dynamic registration and service discovery specifications.

While interoperability agreements at legal and organizational level will usually be very specific to the public service concerned, interoperability agreements at technical level and semantic level can often be mapped onto existing formalized specifications.

Recommendation 21. Public administrations should use a structured, transparent and objective approach to assessing and selecting formalized specifications.

6 Interoperability governance model

According to the recommendations 24 and 25 from European Interoperability Strategy, an interoperability model of governance should be established. The governance should cover all interoperability aspects in order to enable the continuity of the interoperable services.

Recommendation 24. Public administrations should ensure that interoperability is ensured over time when operating and delivering a public service.

Recommendation 25. Public administrations should establish a framework for the governance of their interoperability activities across administrative levels.

The proposed model addresses three levels of governance which is determined by the existing organization of the Lebanese government and technological and organizational maturity of the institutions that will be included in the Interoperability system. On the Figure 18 the governance model is shown.

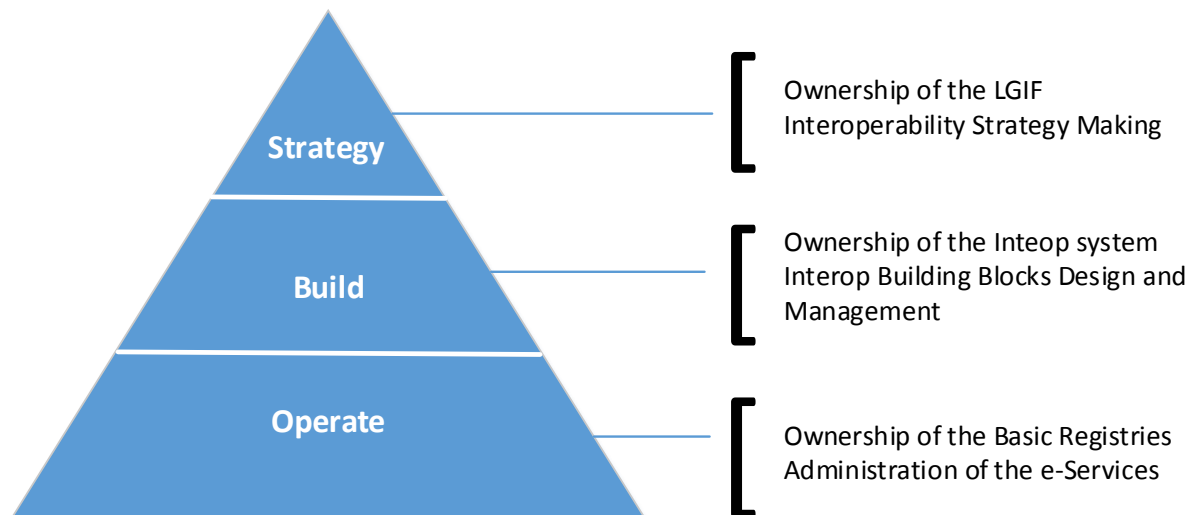


Figure 18 - Governance model

The three levels of the governance cover:

1. **Strategy level of governance** which covers the ownership of the Lebanese Governmental Interoperability Framework – LGIF. The organization that will have this governance level will be responsible for the LGIF lifecycle, its continuous improvement and change management.

Also, this governance level covers the Interoperability strategy for developing of new Interoperability domains, new Interoperable services and the complete lifecycle of the existing services.

2. **Build level**, which covers ownership of the Interoperable solution building blocks. The institutions that will have this level of governance should be responsible for designing the building blocks of the Interoperable system, as well the operations management. The mandate for this governance level should be given to organizations that have high technological and organizational maturity.
3. **Operate Level**, this governance level covers the integration with the Interoperable system as well the administration and operations management of the e-services within the Domain. This governance level should be assigned to the Institutions that are responsible for the services within the domain.

6.1 Possible governance models and structures

Governance, in context of this solution, refers to the set of services, policies, and best practices that allow IT organizations to effectively control the definition, creation, use, amendment, and exit -- the life cycle -- of business processes and the constituent parts from which they are composed.

Governance processes should promotes reuse, facilitate the definition and enforcement of policies, and eases the task of life cycle management.

Governance patterns identify who has the responsibility to monitor, define, and authorize changes to existing services and decide when a new service in their area is required.

- **Sole Governance** - An interaction may lie wholly within the area of the business (the service provider) that is responsible of its own governance and it is not accessible from outside of it.
- **Local Governance** - The interaction (as shown in the illustration below) is performed completely within one organizational part. The service is made accessible to other business areas through a specific interface and everyone who uses the service has to comply with the conditions of use set by this environment. Aside of the interface, the governance is done solely by the owner (service provider).



Figure 19 - Local governance pattern

- **Intermediary Governance** - The interaction occurs within a special business area whose role is to facilitate interactions between other business units. Business areas request and

provide services, and the interactions between them are governed separately, or jointly, in the intermediary area.

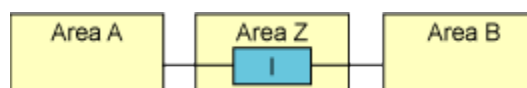


Figure 20 - Intermediary governance pattern

- **Federated Governance** - Each subset of an interaction spanning multiple divisions is governed by the respective division; these subsets collaborate using agreed interfaces.



Figure 21 - Federated Governance pattern

In context of Lebanon, on global level, it is recognized that there should be Intermediary governance for the part of the Interoperable system with OMSAR acting as enabler of the Domain Interoperable nodes as well for the Nationwide Node, but also federated Governance distributed within domains where Institutions within specific domain have technological and organizational maturity.

6.2 Governance and responsibilities matrix

The governance model should apply on the Lebanese Government Organizations that will be part of the Domain Interoperability System for the OSS Company registration project. In order to be clearly defined, a governance matrix is recommended to be used.

	CR Committee	OMS AR	MoJ	MoF	NSSF	BAR
LGIF/LGIRA	S	B,O	-	-	-	
Adding New OSS eServices ⁴	S	-	-	-	-	
Hosting Infrastructure	-	-	-	B,O	-	
Nationwide	-	B,O	-	-	-	

⁴ Initially the focus is put on the One Stop Shop concept and the related electronic services. The same policies, rules and perspectives should be used for the introduction and implementation of any new electronic services in the future.

interoperability						
OSS domain interoperability	-	B*	-	O*	-	
Nationwide Digital Identity Platform	-	B,O	-	-	-	
OSS domain Digital Identity Platform	-	B*	-	O*	-	
Nationwide Point of Single Contact (DAWLATI v2.0)	-	B,O	-	-	-	
Bar Digital Identity Platform	-	-	-	-	-	B,O
Billing	-	-	-	B,O	-	-
Nationwide Workflow	-	B,O	-	-	-	
Domain Workflow	-	B*	-	O*	-	
OSS Company Registration Service	S	B*	Owner	O*	-	

Please note that the responsibilities marked with an asterisk (*) symbol are specific for the particular domain that is the focus of this project (OSS and legal entity registration and information sharing related services). For other domains, the responsibilities shall be given to institutions that are directly involved for that domain and that have the capacity to answer the requirements.

As it can be seen from the table, the different levels of governance are delegated to different Institutions. This is done in order to create more efficient and effective environment in initiating, designing, building and operating the Interoperable solutions either they are on the Domain or Nationwide level.

The strategy level of governance will be assigned to the CR Committee which means that for the OSS Company Registration Domain Interoperability should initiate the adoption of the LGIF. As such, it will play the role of steering the LGIF adoption. All the new e-services in future, or the upgrade of existing services shall be initiated from this body.

As the adoption expand through other domains, this body shall continually evolves its governance in Nationwide Interoperability strategy body. In order to be efficient throughout the LGIF lifecycle, all the stakeholders important for the Interoperability should be represented in this body.

OMSAR is the most relevant organization that shall be entrusted with building the Interoperable System, Nationwide and Domain Specific interoperability components, Nationwide and Domain

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

specific Digital Identity function and Nationwide and Domain Specific Workflow. Furthermore, OMSAR shall operate the LGIF and LGIRA on national level, but also the national interoperability components, including the national Digital Identity Platform and the Point of Single Contact.

The Ministry of Finance shall be entrusted with building and operating the Hosting Infrastructure and the Billing component, while it shall also operate the OSS domain interoperability, OSS domain Digital identity Platform and the Domain workflow. The Ministry of Justice shall act as an owner of the OSS company registration service, while the operating responsibility for this service shall be responsibility of the Ministry of Finance.

The Bar associations shall be responsible for building and operating their own Digital Identity Platforms.

ANNEX I – 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	Domain and Cross Domain

Conceptual model function	LGIRA Architectural Building Block ABB	Domain/Cross Domain Interoperability zone
	T02.2 Audit Enablers T02.2.1 Access Management Service T02.2.2 Access Management Component T02.2.3 Audit Service 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	Domain and Cross Domain

OMSAR E-Government Unit		LGIF – Lebanese Government Interoperability Framework
--	---	--

Conceptual model function	LGIRA Architectural Building Block ABB	Domain/Cross Domain Interoperability zone
	T03.4 Business Process Management Component	
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 – Data Dictionary

The evolving Data Dictionary is described in the **Lebanese Government Interoperability - Data Dictionary document**.