# Guideline for developing Interoperable Social Protection programs

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## 1. Introduction

In order to articulate multidisciplinary measures, Social Protection programmes (SPP) require establishing inter-institutional coordination measures. To achieve this coordination, effective Integrated and Digital Social Protection Information Systems should comprise Interoperability mechanisms, which enable interconnecting the information systems managed by the different organisations involved in the Social Protection programme.

The weak capacity of many governments to plan and administer social protection and a lack of coordination between different ministries or sectors has sometimes lead to each agency or ministry elaborating their registry of beneficiaries, poverty ranking, targeting and delivery mechanism to cover the population.

Interoperability techniques have been applied in the social area for about a decade, in particular, to implement large conditioned cash transfers programmes. Also, social security institutions have been using interoperability mechanisms to implement services involving other public agencies - such as Health authorities and Tax administration – as well as the private sector, notably medical service providers and employers to collect contributions. In this line, some countries developed national interoperability platforms to implement general public e-government services.

This way, the application of Interoperability has enabled to implement high-impact nation-wide social programmes by allowing to effectively articulate institutions' capacities and specific functions under their mandate. However, an effective application of Interoperability requires institutional technical capacities as well as sectorial standards to reduce the barriers of defining specific system interconnection mechanisms as well as common vocabularies.

Despite the advances made in implementing Information Systems, the Social Protection area lacks Interoperability standards and application guidelines.

This technical paper presents approaches and guidelines to building interoperable Social Protection systems in a systematic and standardised way. These approaches would enable project managers and practitioners to interconnect Social Protection business processes and components already defined in various reference works in the area (Chirchir & Barca, 2020) (Lindert et al., 2020) (ILO, SWS, 2015) starting at the business process level.

The proposed guidelines aim to constitute a practical tool for practitioners, project managers and facilitate the implementation of integrated Social Protection Information Systems with distributed components through interoperability techniques and leveraging compatibility with mainstream models/approaches for implementing Social Protection programmes The idea is to enable project managers to define the interconnections at a business level (i.e. business-oriented or Organisational Interoperability). At the same time, developers would focus on the implementation aspects involving Technical interoperability techniques. For that, the paper presents differentiated business and technical interoperability perspectives.

Briefly, after defining the business processes and components in a Social Protection programme, a project manager would select the interoperability scenarios at a business level and independently from the technologies. Next, the development team could select the Technical Interoperability mechanisms implementing the former ones.

This approach makes the implementation decision more flexible and depending on the technical capacity. This way, it would improve the capacity for implementing interoperable Social Protection information systems, especially by institutions with diverse technological maturity.

This technical paper is organised as follows: Section 2 presents background on Interoperability, Section 3 presents a revised set of interoperable Business components, Section 4 presents a guide to establishing Business/Organisational Interoperability connections based on scenarios involving the business components introduced in Section 2, Section 5 presents technical interoperability mechanisms and their application for the scenarios of Section 4, and Section 6 presents step-by-step guidelines supporting the application of the practices described in Sections 4 and 5. The paper finalises with a summary and the bibliography.

### 2. Background on Interoperability

#### 2.1. General Concepts

From a purely technical perspective, Interoperability refers to the relationship between two or more communication technology applications or systems (communication hardware and communication equipment or software components) that can work together easily and automatically. The systems involved must have two attributes: the ability to communicate with each other (to transfer information) and understand the structure of the information transferred between entities (to make use of it). The information which is the object of the transfer may be of any kind: text, video, audio, software applications, crude data, etc., generally speaking resources and the associated meta-information.

All the actors involved, including governments, industry, users and consumers, social partners and others, have recognised the need for Interoperability and the benefits that its introduction could bring. However, although everyone agrees on the need, scope, and implementation of Interoperability, the incentives to push forward, and the technical and political barriers that obstruct it, certain controversial issues remain.

One of the principal concerns is implementing Interoperability and the definition of open standards that make it feasible. The development of standards and their widespread adoption is one of the principal mechanisms or approaches for the introduction of Interoperability, providing guidance and advice for those involved in the creation of digital data and services and establishing minimum norms that the systems must respect to be able to communicate and exchange information.

The International Conference on Interoperability (CI, 2008) made the following declaration: "In a global society and the light of the increase in the diversity of systems and applications, Interoperability is what makes the development of a mass-market possible avoids the undesirable effects of fragmentation. In this context, standards are a cornerstone to achieve a satisfactory level of Interoperability in this global market, which explains the reason why interoperability should be negotiated at the international level."

Therefore, the main ICT industry actors worked actively through associations and standardisation organisations in order to progress towards the development and adoption of open standards. In addition to investing important sums of money in the development of standards and ensuring that the software and hardware that they produce is compatible with them, these stakeholders are cooperating at previously unheard of levels to align their technologies in such a way that they can interoperate, and are making significant progress.

A set of principles has been developed (UNDP, 2007) to guide the development of ICTs in organisations and to provide selection criteria for standards to forward their development within an interoperability framework; seven key principles are described below:

- <u>Interoperability</u>: Guarantee a coherent medium for communication in order to create a flow of information between individuals, enterprises, governments and their partners. Only those specifications must be selected which are relevant for the interconnectivity of the systems, the integration of data, access services and contents.
- <u>Scalability</u>: Ensure easy use, adaptability and ability to respond of the applications when requirements change and demands fluctuate.
- <u>Reusability</u>: Establishment of processes and standards for similar procedures to try to develop reusable data services and structures.
- <u>Openness</u>: Focus on open standards, i.e. all standards and guidelines must be based on open standard principles. Whenever possible, open standards should be adopted at the same time as the technical specifications are established. Neutral standards independent of the provider and the product should be preferred to proprietary alternatives.
- <u>Market support</u>: ICT providers should be selected who base their developments on standards.
- <u>Security</u>: Ensure reliable information exchange able to conform to an established security policy.
- <u>Privacy</u>: Guarantee data privacy for citizens, enterprises and governmental organisations, respect and enforce respect of the legally defined restrictions concerning access and dissemination of information, and ensure that the services can provide a consistent level of protection for personal data.

The expected benefits of inter-organisational collaboration through interoperability comprise improved public services for citizens and businesses, facilitating the one-stop shop delivery of public services and reducing costs for public administrations, businesses, and citizens through the efficient and effective provision of public services.

#### 2.2. Interoperability dimensions

Interoperability can be approached from different angles, which determine the types, aspects, focus and dimensions of Interoperability. In addition, its application in complex organisational contexts involves taking into account the different organisational sectors involved in the interaction.

To better address the different perspectives, the Interoperability concept can be subdivided into dimensions or layers (Figure 1):

- **<u>Political context</u>**: Organization must have compatible visions, aligned priorities and must focus on the same objectives.
- <u>Legal interoperability</u>: Adequate synchronisation of the legislation applicable in collaborating organisations must include the fact that the electronic data generated in one organisation must be properly recognised when used by the receiving country.
- <u>Organisational interoperability</u>: This refers to the definition of business objectives based on business processes and tries to facilitate collaboration between administrations

or institutions that wish to exchange information and may have different structures and internal procedures.

- <u>Semantic interoperability</u>: Ensures that the precise significance of the information exchanged is comprehensible for any other application not initially developed for this purpose. Semantic Interoperability enables systems to combine the information received with information from other sources and process it coherently.
- <u>Technical interoperability</u>: Addresses critical aspects of linking computer and service systems. It includes key aspects such as open interfaces, interconnected services, the integration of data and middleware, the presentation and exchange of data, security and the accessibility of services.

The main Interoperability Frameworks, such as the European (EC, 2017), the Estonian (EST, 2011) and the US-SEI one (Novakouski and Lewis, 2012), comprise these dimensions, often focusing on the Legal, Organizational, Semantic and Technical interoperability.



Figure 1. Interoperability dimensions

### 2.3. ISSA Guidelines on Interoperability

The ISSA Guidelines on Interoperability - Chapter B.1 of the ISSA Guidelines on ICT - provide a high-level reference point for social security institutions applying interoperability techniques. They constitute a starting point from which institutions can develop their own policies and plans and address the challenges of interoperability through a consistent and standards-based approach.

The guidelines canvass the five dimensions of Interoperability: political, legal, organisational, semantic and technical. The guidance has been drawn from several guidelines and reports, and input from public administrations, private industry, professionals in social security institutions, and standards and specifications bodies such as W3C, OASIS and the Open Group.

# 3. Interoperable Business components of Social Protection programmes

The interoperable Business components consist of the main building blocks that could be developed separately and interconnected to implement a digital Social Protection system. They are mainly based on the various models and architectures for developing coordinated and digital social protection programmes (Chirchir and Barca, 2020) (Lindert et al, 2020) (ILO, 2015) (ILO et al., 2021), and social security systems (ISSA, 2019).

The diagram below shows a high-level view of the component architecture of Social Protection programs. In it, you can see the relationship between the shared information components (the Social and Beneficiary Registries, the Service Window System and the Payment Platform) with business processes in the social protection delivery systems. It also shows the interaction with other shared resources, such as Geographic and territorial Information Systems (GIS) and Notification, Grievance and Data Analytics platforms.





### 3.1. Revised Business Processes for Social Protection

Social Protection programs have similar business processes that can be broken down into stages.

This work analysed the business processes proposed by the World Bank in the Sourcebook on the Foundations of Social Protection Delivery Systems (and previous work) and by GIZ in the document "Building an integrated and digital social protection information system" and proposes a revised version by combining them.

Figure 3. Revised Social Protection Business Processes



**1. Outreach:** Involves informing people about social protection programs and potentially collecting individual and household level data on the socio-economic conditions of potential beneficiaries. Communication is a key aspect of Outreach, to inform the intended population about possible social programs that they may be eligible for and inform them about the processes for registering in the Social Registry. Communications should clearly emphasise that simply registering is no guarantee of eligibility or enrolment for that program or set of programs. They should clearly explain the processes involving the Social Registry, including the registration process (interview, home visit, questionnaire or application form), the type of information and documentation that would be needed, the processes for notification of potential eligibility or enrolment in social programs, processes for grievances and appeals, and so forth.

This way, Outreach seeks to generate awareness and understanding about the role and functioning of the Social Registry and its relation to social programs.

2. <u>Assess - Intake & Registration</u>: Involves the process of collecting self-reported information and documentation to register the population for consideration of potential eligibility for social programs. This phase represents the actual entry point into the Social Registry system. It includes several key elements, including (a) data collection and entry; (b) questionnaire and supporting documents; and (c) the interview process and home visits.

A key aspect of Intake and Registration is the *questionnaire (application form) and required documentation*. The questionnaire should gather relevant information needed to determine potential eligibility for the social program(s)

The *interview* process, sometimes combined with home visits, is another key step in the Intake & Registration phase in many Social Registries.

3. <u>Assess – Assessment of needs & Conditions</u>: Automating the processes for assessing needs and conditions to determine eligibility for social programs constitutes a critical "back-office" function of Social Registries. It is important to note that the determination of eligibility by the Social Registry is different from enrolment in the social program(s). Determination of eligibility involves assessing needs and conditions vis-à-vis basic

eligibility criteria for the social program(s). In contrast, Enrolment Decisions involves actual inclusion of eligible individuals or families in a specific program.

- <u>4.</u> Enrol Eligibility & Enrolment Decisions: Determining eligibility involves adding categorical and socio-economic information collected in the Social Register to assess individuals and family's needs and conditions against basic eligibility criteria. Determining eligibility is a different phase of enrolment decisions for a benefit. Enrolment decisions involve the actual inclusion of eligible individuals or families in a specific program. However, not everyone who is considered "potentially eligible" under those criteria will enrol in a particular program. There may be budget limitations or other criteria that determine enrolment decisions beyond the criteria that led to enrolment in the Social Registry.
- 5. Enrol Determine Benefits & Service Package: Determine benefits that apply to beneficiaries. If applicable, they are contacted and information is updated or specific information is entered. During this stage, the Beneficiary Registry associated with a Beneficiary Operations Management System (BOMS) is configured.
- 6. <u>Enrol Notification & On-boarding provide:</u> Beneficiaries are contacted and notified that they have been selected for a certain benefit. If applicable, the information required to provide the service is updated.

Depending on the program and the context, those households or beneficiaries that are not chosen are also contacted to inform them.

#### 7. Provide - Benefits and/or Services:

- a. <u>Payment strategy</u>: Definition of payment strategy. First, define whether electronic payments or manual payments will be made. In case they are electronic payments, they can be through the recharge of a card, a voucher or coupon, mobile money or transfer. In case they are manual payments they can be cash or vouchers. It is also defined whether the payments are outsourced through agents or financial entities or will the program itself make the payments.
- b. <u>**Payment:**</u> Depending on the program and broader social protection policies, this step involves ongoing interaction with beneficiaries to help ensure that beneficiary information is kept up-to-date and address complaints and appeals.

#### 8. Monitor & Manage – Beneficiary Monitoring:

- **a.** <u>Grievance Redress</u>: Grievance Redress Mechanisms (GRM) or Grievance Management Mechanisms or Systems are constructive and continuous feedback channels between beneficiaries and service providers. "Complaints" implies comments from beneficiaries, which include not only complaints but also information inquiries, suggestions and compliments. Complaint trend analysis can help stop problems before they become more serious or widespread by taking necessary corrective action if necessary.
- **b.** Compliance Monitoring: During the period the benefit is provided, the eligibility information is revalidated to ensure that the beneficiaries continue to meet the eligibility conditions to remain in the program. The information

updating protocols required to re-evaluate the eligibility conditions must be clear.

<u>9.</u> Monitor & Manage – Exit Decisions: When a beneficiary no longer meets the eligibility conditions, they withdraw from the program. In the same way that contacts are made when entering as a beneficiary, the necessary contacts are also made to inform the program's exit. In this step, the Beneficiary Registry is updated

#### 3.2. Shared Resources

Social protection programmes can use components and information resources that are shared with other programmes. Although a more extensive list of such shared resources was identified, the most relevant for the implementation of interoperable social protection programmes are the following:

- 1) One-stop shop
- 2) Social Registry
- 3) BOMS Registry
- 4) Payment Platform

The diagram below shows a high-level view of the component architecture of Social Protection programs and how the shared resources described below are located in it.





### 4. Business/Organisational Interoperability connections.

Organisational Interoperability concerns the interaction at the business process level and, therefore, involves specifying the interoperable business processes and interconnecting business components.

In turn, Organisational Interoperability is built on Semantic and Technical Interoperability. On the one hand, the technical level must provide standard technologies to interoperate at the organisational level with adequate efficiency and security levels. On the other hand, the common understanding and adequate processing and exchange of data sets depend on agreement on the concepts and their mutual relationships. These agreements and the procedures to reach them can only be addressed at the organisational level.

This chapter presents interoperability scenarios at the business level involving the business components defined before.

#### 4.1. Interoperability scenarios involving the Business Processes for SP

This section presents interoperability scenarios between the Business Processes for Social Protection (defined in Section 3.1) and other Systems, Registries and Platforms defined as shared resources (Section 3.2).

#### 4.1.1. Involving Registries and Platforms.

This section describes interoperability scenarios involving Business Processes for SP and registries and platforms, describing whether the interaction is synchronised or asynchronous and its purpose.

Component / Process (From)	Interoperability with Registries an Platforms (To)
1. Outreach	Social Registry
Assess	
2. Intake & Registration	Social Registry One-stop shop GIS
<b>3.</b> Assessment of needs & Conditions	Consistency with other external registries
Enroll	
<b>4.</b> Eligibility & Enrolment Decisions	Social Registry Social Security Health, Education Data analytics platform
<b>5.</b> Determine Benefits & Service Package	BOMS Registry One-stop shop
6. Notification & On-boarding	Notification platform
Provide	
7. Benefits and Services (Payment)	
a. Payment Strategy	Payment platform
b. Payment	Payment platform BOMS Registry Data analytics platform

Table 1. Business/Organisational Interoperability connections involving Registries and Platforms

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Monitor & Manage	
8. Beneficiary Monitoring	
a. Grievance Redress	Grievance platform One-stop shop
<b>b.</b> Compliance Monitoring (CCTs monitoring)	Consistency with other external registries Social Registry
<b>9.</b> Exit decisions	Registration of deaths
a. Notifications	Notification platform
b. Closing Cases	Social Registry BOMS Registry One-stop shop Data analytics platform

- **1. Outreach:** A first version of the Social Registry is built at this stage. It is updated with the possible beneficiaries of the different social protection programs, and, at the same time, it is taken as input with historical data. Therefore, the Interoperability is of reading and writing and, depending on how the process, can be synchronous or asynchronous
- **<u>2.</u>** <u>Assess Intake & Registration</u>: At this stage, the Social Registry is established. It complies with the collection of information and data entry. The interaction modality may be synchronous or asynchronous.

The information will be entered preferentially through the one-stop-shop service. Although it may be asynchronous, the use of this service is preferred that it be synchronous and that the information be updated when customers provide it.

In the case of having a geographic information system (GIS), it is updated at this stage and could be done asynchronously.

- 3. <u>Assess Assessment of needs & Conditions</u>: When validating the information entered, as important as verifying the validity of the data and the consistency of the same within the form and with historical information to validate the consistency with other external records. This validation is preferably synchronised so that the information can be firm now. If not possible, it can be validated asynchronously, but intermediate states should be managed until the information can be fully validated.
- <u>4.</u> <u>Enrol Eligibility & Enrolment Decisions</u>: Read mode access to Social Registry, Health, Education or other external records may be required to apply benefit rules. Although these accesses can be carried out in asynchronous mode, they should be synchronised so that the rules can be applied synchronously.

The Social Security Registry is also updated if applicable; this update can be synchronised or asynchronous.

In case of having a Data Analytics Platform, it is updated asynchronously

5. Enrol - Determine Benefits & Service Package: The Registry of beneficiaries (BOMS) is built at this stage. It must be updated synchronously. The entry is made synchronously or asynchrony through the One-stop shot front-end.

6. <u>Enrol – Notification & On-boarding provide</u>: The Interoperability of this stage is with the Notifications Platform, updating it with the information of the beneficiaries who entered the program and those who must be notified that they were not chosen and for what reason. Interaction can be synchronous or asynchronous

#### 7. Provide - Benefits and/or Services:

- a. <u>Payment strategy</u>: In order to define the strategy to implement for the payment of benefits, access is made in reading mode and synchronously to the information on the Payment Platform.
- b. <u>Payment</u>: At the time of making the payment of the benefit or the delivery of the service, the Payment Platform is updated synchronously, as well as the Register of beneficiaries.

In case of having a Data Analytics Platform, it is updated asynchronously.

#### 8. <u>Monitor & Manage – Beneficiary Monitoring</u>:

- a. <u>Grievance Redress:</u> Information on the grievance platform is accessed in reading mode and then updated with the information entered through the one-stop service. Both interactions with the grievance platform and entry through the single window can be done both synchronously and asynchronously.
- b. <u>Compliance Monitoring:</u> In this stage, as in stage 3, it is required to validate the consistency of the information with other external records. External registers are accessed as read, preferably synchronously. If not possible, it can be validated asynchronously.

At this stage, the preparation of reports on the programs is required, for which it is necessary to access the Social Registry in reading mode. Such access can be both synchronous and asynchronous.

<u>9.</u> <u>Monitor & Manage – Exit Decisions</u>: The exit of a beneficiary from a program can occur for multiple reasons.

It is necessary to access the Death Registry in reading mode to update the information of deceased persons who should no longer receive benefits. The beneficiaries themselves can withdraw from the program through the one-stop service or the program itself. The benefit rules, may determine that some people no longer meet the eligibility rules to be beneficiaries. In all cases, the Social Register and the Beneficiary Register must be updated synchronously preferably.

In turn, the Notification Platform must be updated synchronously to notify beneficiaries who no longer have the benefit.

In the case of having a Data Analytics Platform, it is updated asynchronously.

The following figures show the interactions between the Social Protection business processes and the Social and Beneficiaries Registries.

Figure 5. Interactions between business processes and the Social Registry



Figure 6. Interactions between business processes and the Beneficiaries Registry



#### 4.1.2. Involving Business processes.

This section presents the interoperability scenarios involving delivery chain processes and describes the types of interactions (e.g. read or write).

Table 2. Business/Organisational	Interoperability c	connections involving	<b>Business Processes</b>
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Component / Process	Interoperable scenario (To)	
1. Outreach	External data sources (Soc Sec, Health, Edu, etc.) Public interface	
Assess		

•		
2. Intake & Registration	External data sources (Soc Sec, Health, Edu, etc.) [others who have information so they don't have to ask for it again] Public interface	
<b>3.</b> Assessment of needs & Conditions	Data validity, consistency of the form data with other proprietary systems	
Enrol		
4. Eligibility & Enrolment Decisions	Beneficiary rules	
<ol> <li>Determine Benefits &amp; Service Package</li> </ol>	[more data is requested] External data sources (Soc Sec, Health, Edu, etc.) [others who have information so they don't have to ask for it again] Data validity, consistency of the form data with other proprietary systems	
6. Notification & On-boarding	General notification system	
Provide		
7. Benefits and/or Services (Payment)		
a. Payment Strategy	External data sources	
b. Payment	Financial entities Identification services	
Monitor & Manage		
8. Beneficiary Monitoring	Public interface (data update)	
a. Grievance Redress	Public interface (complaints entry)	
b. Compliance Monitoring (CCTs monitoring)	Data validity, consistency of the form data with other proprietary systems	
9. Exit decisions	Beneficiary rules	
a. Notifications	General notification system	
b. Closing Cases		

**1.** Outreach: In the outreach stage, it is possible to read different external systems, from which information is taken to identify the potential beneficiaries of social protection programs. Some of the Systems identified at this stage are the Social Security Systems, Health and Education Systems.

At this stage of the process, a public interface is provided on the potential beneficiaries to be accessed by other systems that require it.

2. <u>Assess - Intake & Registration</u>: In the Registration stage, other external Systems are accessed in reading mode to do not request information that is already available in other systems and was previously requested from the potential beneficiary. If it is required to request the information again, these systems are accessed to validate the information and maintain consistency between the information a customer provides in different systems. As in the outreach stage, a public interface is provided by other systems to access or validate the information.

- 3. <u>Assess Assessment of needs & Conditions</u>: In this stage, the information entered is validated. Different dimensions are validated. Firstly, the validity of each of the data collected. Secondly, the consistency of the data entered with an integral view of the form, that is, cross-references are validated within the form itself. Thirdly, the corresponding data is validated against other information available in the program, such as historical information.
- **<u>4.</u>** <u>Enrol Eligibility & Enrolment Decisions</u>: It is necessary to access the repository of rules for the different benefits in reading mode to determine the eligibility conditions and make possible the enrolment rules for a particular benefit.
- 5. Enrol Determine Benefits & Service Package: As in steps 1 and 2 of the process, other external registers are accessed in reading mode to validate the new information requested at this stage. The purpose continues to be not to request information that is already available in other systems and that was previously requested from the beneficiary. If it is necessary to request the information again, these systems are accessed to validate the information and maintain consistency between the information provided by a beneficiary in different systems.

As in stage, data validations, consistency between them and consistency with previously recorded information are performed.

6. <u>Enrol – Notification & On-boarding provide</u>: If there is a notification system, it is updated with the information necessary to notify the beneficiaries that they are eligible and those who have registered and who are not ultimately entitled to the benefit.

#### 7. Provide - Benefits and/or Services:

- a. <u>**Payment strategy:**</u> external services are accessed in reading mode, to obtain information to define the payment strategy to follow.
- b. <u>**Payment:**</u> National identification systems are accessed in reading mode if they exist to validate the identity of the beneficiaries before making the payment. The information on payments to Financial Institutions that correspond to payments can be made to beneficiaries is updated.

#### 8. <u>Monitor & Manage – Beneficiary Monitoring</u>:

- a. <u>Grievance Redress</u>: A public interface is provided so that other systems can access and submit complaints or inquiries from beneficiaries. A public interface is also provided to allow the updating of the information entered in other external systems.
- **b.** <u>Compliance Monitoring</u>: The data is revalidated as in stage 3, data validations are carried out, consistency between them and consistency with previously registered information. This is done for ensuring that the eligibility conditions continue to be valid.
- 9. Monitor & Manage Exit Decisions: The benefit rules are accessed to identify those beneficiaries who are no longer eligible for a specific benefit and the general notification system is updated so that those beneficiaries whose data do not comply with the conditions of access to a specific benefit are notified.

#### 4.2. Interoperability scenarios involving shared resources

#### 4.2.1. One-stop shop (i.e. front-end) components

One-stop-shop components are defined as a single front-end to various Government Organisations or Services. The main functionalities are presented and how it interacts with different process components and with other Registries and Platforms.

The main functionalities of a One-stop-shop are the following:

#### Table 3. Main one-stop-shop functionalities

	Insert and updating of Registry data	
Scope	Information on the catalogue of programs, including information on the rights to certain benefits that a particular individual has	
Inquires about specific procedures or benefits and benefits application		
	Social or psychological assistance	

- **<u>1.</u>** Insert and updating of Registry data: The Social Register and the Beneficiary Register are updated when a person registers or withdraws from a program through one-stop-shop services.
- 2. Information on the catalogue of programs: Using the One-stop shop, customers can consult both on the catalogue of available social protection programs and their particular situation when they are enrolled in a specific program. The Social Registry or the Beneficiary Registry is accessed in a reading form, as appropriate to answer customers' inquires.
- **3. Inquiries and applications:** When a customer makes a complaint about a specific procedure or benefits, it is done through the One-stop shop, which through the delivery chain in its various stages, is in charge of interoperating with the corresponding Registries to respond to the persons. It may require reading access to the Complaints Registry or the Beneficiaries Registry. The access modality can be both synchronous and asynchronous. When the complaint is effectively made, the Complaint Register is updated. This interaction is preferable if it is synchronised.
- **<u>4.</u>** <u>Social or psychological assistance:</u> When a beneficiary applies for psychological assistance, it is done through the Single Window Server, who through the delivery chain in its various stages is the one in charge of interoperating with the corresponding Registers to respond to the beneficiary. It may require reading access to the Beneficiary Registry. The access mode can be both synchronous and asynchronous.

The following table shows the Interoperability between the One-stop-shop component and the different processes of the delivery chain.

Table 4. Business/Organisational Interoperability involving the One-stop.shop

Component / Registry (From)	Interoperable scenario (Through)	Interoperability with Registries & Platforms (How)	(То)
	2. Intake & Registration	insert	other registries - single access point
Front-end One-stop- shop	5. Determine Benefits & Service Package	update	other registries - if common data is updated
	8.a. Grievance Redress	insert	Grievance platform
	9.b. Closing Cases	update	other registries - deregistration if applicable

#### 4.2.2. Social and Beneficiary Registry

The Social Registry is defined as the repository where the information that supports the registry and eligibility for social protection programs is entered. It has many attributes for each person, which allows analysis of social programs.

The Beneficiaries Registry is the repository where the information that supports the registration and eligibility for a particular benefit is entered. All the information associated with the benefit is included. The information is inserted once the benefit is determined and the Registry is updated at different stages of the process. Its elimination is performed when the specific benefit is finished.

The following table shows how each delivery chain process interacts with the Social Registry.

Component / Registry	Interoperability connection (From)	Interoperability with Registries & Platforms (How/To)	
	1. Outreach	insert	Partial Social Registry
2. Intake & Registration		update the registry	Partial Social Registry
Social Registry	4. Eligibility & Enrolment Decisions	read the registry	Partial Social Registry
	9.b.Closing Cases	update the registry	Partial Social Registry
	5. Determine Benefits & Service Package	Insert	Partial Beneficiaries Registry
Federated Beneficiaries Registry	7. Benefits and/or Services (Payment)	update the registry	Partial Beneficiaries Registry
	9.b.Closing Cases	delete	Partial Beneficiaries Registry

**Table 5.** Interactions between Business Processes and Registries and Platforms

Registries can be implemented following a federated architecture instead of the simpler centralised one.

In a federated Registry, each organisation only writes to its partial record and accesses the rest in read mode. The data of a person or a beneficiary for a specific program are only found in a partial record.

#### Figure 7. Federated Registry



The implementation decision depends on the balance between sharing information, maintaining local consistency and availability, and local implementation and operation. On the one hand, if the organisation or programme always enters the information, a centralised Registry model is more suitable than the federated one. On the other hand, the federated architecture is justified if several organisations need to access online the information updated by others.

#### 4.2.3. Payment Platform

The payment platform is a unified and unique platform for paying benefits. Since multiple programs sometimes offer payments in the same place and sometimes to the same beneficiaries, there is an opportunity to share resources for payment delivery, save costs, and improve coordination.

A payment platform does not have a presentation layer; it is a global back-end. It handles sensitive information, for which it is necessary to consider the implications of data protection, either with the legal coverage of the country or through informed consent to share data with third parties.

The main functionalities of the Payment Platform are presented and how it interacts with different parts of the process and with other registers and platforms

#### Table 6. Main payment platform functionalities

	Receipt of beneficiaries (payment list)
Scope	Identity authentication
	Transfers to third parties to effect payment
	Benefits query

**<u>1.</u>** <u>**Receipt of beneficiaries**</u>: The different systems that use the payment platform must interoperate by adding the list of beneficiaries that the platform has to pay.

- **<u>2.</u>** <u>Identity authentication:</u> Requires that you perform an ID check. Identity authentication can be done manually, by contrasting against a physical document or automated by interoperating with global identity services.
- 3. <u>Transfers to third parties to effect payment:</u> Depending on the strategy defined for a specific program, payment can be made manually or automated through collection networks, financial entities or electronic wallets.

Automated mechanisms require interoperation either by accessing public interfaces offered by third parties or by inserting data directly.

The interaction can be with the banks so that the beneficiary charges in his bank account, with service payment providers where the beneficiary presents himself to collect in person or through electronic wallets so that the beneficiary can credit his payment or through companies of Telecommunications to receive the payment linked to the telephone.

In turn, the platform offers a public interface so that any of these mechanisms mentioned can consult information to pay for a particular beneficiary to the extent that it has the required authorisations.

In all cases, whether payment is made manually or automated, confirmation about the person who made the payment and the update of said information must be received in the Register of Beneficiaries.

**<u>4.</u>** <u>**Benefits query:**</u> The payment platform must always answer a beneficiary's query regarding how much it has to collect or respond if there were any problems with the payment. These queries are typically made from the one-stop service that interoperate with the Payment Platform to get the answers.

The following table shows the Interoperability between the Payment Platform and the different processes of the delivery chain.

Component / Registry	Interoperable scenario (From)	Interoperability with Registries & Platforms (How)	(То)
	7.a Payment Strategy	read	financial entities
Payment Platform	7.b Payment	insert	financial entities collection networks electronic wallet

 Table 7. Interactions between Business Processes and the payment platform

### 5. Technical Interoperability.

The Interoperability framework includes technical standards and patterns for social protection programmes and a list of existing standards and standardisation bodies from reference sectors relevant to Social Protection.

# 5.1. Background - Overview of principles for implementing modular software.

#### 5.1.1. Technical Interoperability – Definitions.

Technical Interoperability generally covers the technical issues (hardware, software, and telecommunications) necessary to interconnect computer systems and services.

It includes key aspects such as open interfaces, interconnection services, data and middleware integration, data presentation and exchange, resource location and retrieval, accessibility, security, and application and service integration. Different standards and specifications for mass use can be identified for each of these areas.

<u>Interconnection</u>: Defines the policies and technologies for connection of systems through communication protocols such as TIC/IP, HTTP, FTP, SMTP, SOAP, REST and other protocols widely used on Internet.

<u>Data representation</u>: Some of the most commonly used data representation standards are: universal systems for the encoding of characters such as Unicode, XML (eXtensible Mark-Up Language), mechanisms for the transformation and presentation of documents such as XSL (eXtensible Stylesheet Language), consistent extensions such as S/MIME (Secure/Multipurpose Internet Mail Extensions), among others.

<u>Data exchange</u>: Enables exchanging information between systems that may use different data formats and coding by transforming them. Data exchange operations may be synchronous as well as asynchronous.

<u>Presentation of information</u>: Through the use of standardised file formats such as TXT, PDF, JPEG, PNG, HTML, XHTML, XML, etc., which can be easily understood and used by heterogeneous systems in order to represent information from multiple sources accurately.

<u>Metadata</u> for the description of procedures and data: Description mechanisms such as the Entity Relationship Model are employed to structure the information in relational data base f or XML schema, which also permit definition of the structure and contents of different types of documents.

<u>Localisation</u> and recovery of information: This refers to the mechanisms used to search and localise resources (directory services such as DNS, or protocols such as LDAP to query networks, as well as to metadata standards and controlled vocabularies which enable the consistent description of resources, such as RDF (Resource Description Framework) or the definition of anthologies such as OWL (Ontology Web Language).

<u>Business services</u>: Each business process comprises a set of integrated and coordinated services, the use of Web services being recommended for their implementation. We must consider the

proposals of the organism responsible for defining and ensuring the interoperability of the Web services known as WS-I (Web Services Interoperability Organization) (WS-I).

<u>Integration of applications</u>: Allows successful interoperability and organisation of the information flow between heterogeneous applications, i.e. ensure communication between the various applications.

<u>Integration of services</u>: The so-called service-oriented architectures (SOA) are used to integrate services and business processes. SOA is a software architecture concept that defines the use of services to provide support for business processes. It permits the creation of highly scalable information systems which reflect the business of the organisation. It provides a well-defined framework for the representation and recourse to services (usually Web services) which facilitates interaction between different systems whether owned or belonging to third parties.

### 5.2. Requirements for applying Technical Interoperability

#### 5.2.1. Functional requirements

<u>Evolving adoption levels</u>. Considering the diverse degree of technology evolution, each organisation should establish evolving adoption levels and plans.

An organisation can start applying certain technologies to implement functionalities or services and afterwards evolve the systems to adopt unavailable others. When applying technologies not present initially, the organisation can expand their adoption level to the next level of the architecture and expand the benefits achieved.

<u>Interoperability Platform.</u> Guarantee the access and operation of the information exchange services developed by the participating entities in the Interoperability Platform

<u>Security and privacy</u>. The fact that an interoperability connection is established between two organisations does not imply that the databases of each of them would be completely open to the free access of the other. On the contrary, all transactions must be under the own control of each organisation through the interoperability platform, ensuring that only the data authorised for each specific operation can be transferred.

Additionally, when required, scheduled interoperability transactions must be enabled only for the use of persons or entities explicitly authorised to do so, with the support of highly reliable digital certificates and signatures, according to the agreement established between the organisations. It is recommended to automatically generate a historical record of all transactions that have occurred or been blocked, which will make it possible to carry out monitoring and audits on all the activity carried out.

<u>Sensitive data</u>. Carry out the exchange of sensitive data sets to interoperate through information exchange services integrated into the interoperability platform

<u>Definition and adoption of technical standards</u>. Various existing standards for information structure and semantics technologies, as well as for the publication of services, should be widely considered. As far as possible, the use of alternative standards for a predefined period should be considered in some way by organisations that do not meet the technical or organisational conditions for immediate adoption of the recommended standards, thus enabling their partial and early entry into the network.

<u>Diversity of platforms and open source</u>. There are different technological platforms in use in organisations in terms of operating systems, databases and service-oriented architectures. This diversity must be considered in the future in order to enable implementations for multiple platforms.

#### 5.2.2. Design principles - Non-functional requirements

The following design principles constitute non-functional requirements for developing component-oriented systems.

- Low coupling: By low coupling, it is meant that the modules are related "what is necessary" with other modules.
- High cohesion: It is understood that the modules perform a specific task and are not overloaded with tasks that other modules could do
- Scalability: The ability of an IT system or service to handle a growing workload, for example, more connections or users.
- Maintainability: It measures the ease with which the product can be maintained (in this case, the software or IT service), with the aim of: Developing new requirements, Isolating defects and their causes, correcting these defects and meeting the demands of the changing environment.
- Security: Degree of protection of data, software and technology platform from possible losses, prohibited activities or use for purposes not previously established.
- Reuse: Design the components so that they can be reused within the system itself or in others

# 5.3. Technical mechanism of Technical Interoperability in Social Protection programmes

The different mechanisms of interaction identified and analysed are described below. These are generic mechanisms to be instantiated in each specific implementation that is made. The following table summarises the technical mechanisms:

Mechanism	Sub-types	Variants	Protocols
	Call Registry. Call Health. Call Platform	Only for read. Insert/update/delete	Web Services REST or SOAP REST could be used for read.
Call	Call process from the Front-end (One- stop-shop)	Variants according to the process.	Web Services REST or SOAP
	Call GIS (Geographic Information System)	Only for read. Insert/update/delete	Web Map Service (WMS)

Table 8. Technical interoperability mechanisms for Social Protection programmes

			Web Feature Service (WFS) REST depending on the server
Data Exchange	With Registries With Platform With GIS	Only for read. Insert/update/delete With Acknowledge	XML format. File exchange, Web Services.
Shared data services	Shared Registry Shared Platform	Only for read. Insert/update/delete	Web Services for read. Replicated databases for Insert/update/delete
Replicated data	Replicated Registry	Only for read Insert/update/delete	Replicated databases.

The following sections describe the technical interoperability mechanisms and the implementation options.

#### 1.2.1 Call

Remote calls interconnect distributed systems. The implementation can be done through a SOAP or REST service. It is also specified if it is synchronous or asynchronous depending on the business case that is being implemented.

Calls can be implemented through an internal component of the application that consumes a web service. This internal component is part of the logical layer of the architecture that should be encapsulated and isolated for the consumption and exposure of web services. This non-functional requirement is intended to protect access to the organisations' main systems.

The following aspects should be considered:

- <u>Security:</u> Secure data exchange mechanisms that provide a common secure environment for interoperable operations (e.g. mechanisms to authenticate operations and data)
- <u>Service Level Agreement:</u> With the assistance of specialised units in each case, the technology unit shall establish the service level agreements that cover external services.
- <u>Semantic interoperability</u>. A strategy to develop semantic interoperability resources should be established and implemented to promote interoperability by providing unambiguous data descriptions, defining duties and responsibilities to carry out a strategy on semantic interoperability resources. The semantic interoperability strategy must be based on institutional models and standards.

There are different types of Call mechanisms:

#### 1.2.1.1 Call Registry

<u>Parameters</u>: The web service receives the reference to the Registry (Social, BOMS, Single, Social Security, Education, Death, other external), the operation to perform (insert, update, delete, read), and whether it is required to be synchronous or asynchronous.

<u>Interoperability Protocol</u>: The implementation can be done through a SOAP or REST service.

#### 1.2.1.2 Call Health

<u>Parameters</u>: The web service receives the reference to the Health system, and whether it is synchronous or asynchronous.

<u>Interoperability Protocol</u>: The implementation can be done through a SOAP or REST service compatible with HL7 FHIR, and other health standards.

#### 1.2.1.3 Call Platform

<u>Parameters</u>: The web service receives the reference to the Platform (Notification, Payment, Grievance), the operation to perform (insert, update, delete, read) and whether it is required to be synchronous or asynchronous.

Interoperability Protocol: The implementation can be done through a SOAP or REST service.

#### 1.2.1.4 Call GIS

<u>Parameters</u>: The web service receives the operation to perform (insert, update, delete, read) and whether it is required to be synchronous or asynchronous.

<u>Interoperability Protocol</u>: The implementation can be done through a SOAP or REST service compatible with GIS standards (WMS-Web service maps for read and WFS-Web feature service for insert, update and delete).

#### 1.2.1.5 Call Process from One-stop shop

<u>Parameters:</u> Process services are invoked from the one-stop-shop service. The stage of the process that is invoked (Intake & Registration, Determine benefits & Service package, Grievance Redress, Closing Cases) is passed as a parameter, and whether it is required to be synchronous or asynchronous.

<u>Interoperability Protocol</u>: The implementation can be done through a SOAP or REST service.

#### 1.2.1.6 Call Process from Payment Platform

<u>Parameters:</u> From the Payment Platform, services of the process are invoked. The stage of the process that is invoked (Payment) is passed as a parameter, and whether it is required to be synchronous or asynchronous.

<u>Interoperability Protocol</u>: The implementation can be done through a SOAP or REST service.

#### 1.2.2 Data Exchange

From a business point of view, administrations and other entities exchange information. This mechanism should allow the secure exchange of messages, records, forms and other types of information between the different systems. Security is potentially one of the main barriers to interoperability if it is not harmonised and consensual between organisations.

In addition to exchanging data, this mechanism must also handle specific security requirements such as electronic signatures, certification, encryption, and time stamping.

- **Signed and certified**: both the sender and the recipient have been identified and authenticated through agreed mechanisms,
- Encryption: the confidentiality of the exchanged data is guaranteed;
- Audit: electronic records are recorded and archived to ensure a legal audit trail

The following aspects should be considered:

- <u>Authentication:</u> One of the key prerequisites for implementing secure data exchange is leveraging internal identification and authentication infrastructures.
- <u>Format:</u> Generate a technical specification that includes, for each exchange channel, the information model of the data to be exchanged (that is, the metadata schema and validation rules), service-oriented characterisation (that is, service-oriented architecture (SOA) interfaces), operational data exchange models (data packages) using standard languages and formats (e.g. XML, JSON, etc.).
- <u>Standard</u>: Standardised data exchange mechanisms must be established and implemented to achieve economy of scale in implementation. In particular, the design and implementation should foster institutional mechanisms and prevent the emergence of fragmented business applications.
- <u>Compliance</u>: Data exchange mechanisms should comply with data protection regulations and the coordination agreements established with other organisations

There are different types of Data Exchange:

1.2.2.1 Data Exchange Registry for insert and update

<u>Parameters</u>: The Data Exchange receives the reference to the Registry (Social, BOMS, Single, Social Security) and the operation to perform (insert, update). Asynchronous is required.

<u>Interoperability Protocol</u>: The implementation can be done through a physical way, file or web service

#### 1.2.2.2 Data Exchange Registry for delete

<u>Parameters</u>: The Data Exchange receives the reference to the Registry (Social, BOMS, Single, Social Security) and whether it is required to be synchronous or asynchronous. <u>Interoperability Protocol</u>: The implementation can be done through a physical way, file or web service

#### 1.2.2.3 Data Exchange Registry for read

<u>Parameters</u>: The Data Exchange receives the reference to the Registry (Social, BOMS, Single, Social Security, Health, Education, other external). Asynchronous is required. <u>Interoperability Protocol</u>: The implementation can be done through a physical way, file or web service

#### 1.2.2.4 Data Exchange Platform

<u>Parameters</u>: The Data Exchange receives the reference to the Platform (Notification, Payment, Data Analytics) and the type of operation to perform (insert, update, delete, read). Asynchronous is required.

<u>Interoperability Protocol</u>: The implementation can be done through a physical way, file or web service

#### 1.2.2.5 Data Exchange GIS

<u>Parameters</u>: The Data Exchange receives the type of operation to perform (insert, update, delete, read). Asynchronous is required.

<u>Interoperability Protocol</u>: It must be compatible with GIS standards (WMS-Web service maps for read and WFS-Web feature service for insert, update and delete). The implementation can be done through a physical way, file or web service

#### 1.2.3 Replicated data

Organisations can use data replication to access and update third-party data. This type of mechanism enables operating with remote data, as it was local.

This mechanism can be used by maintaining the source data model or by performing transformations and model changes. In turn, it can be the replication of the information synchronously or asynchronously.

A technical specification must be generated that includes, for each replica, the object and relationship information model (that is, the metadata schema) and non-functional requirements (that is, performance, security, periodicity, etc.).

The main technical approaches to follow are shared files and shared/replicated databases. The technology unit must develop a communications plan that provides adequate information on the implementation of the replicas in the different service areas within the institution.

The following sub-type of Replicated data mechanism can be distinguished:

#### 1.2.3.1 Replicated Registry

<u>Parameters</u>: The replica receives the reference to the Registry (Social, BOMS, Single, Social Security, Health, Education, other external), the operation to perform (insert, update, delete, read), and whether it is required to be synchronous or asynchronous.

#### 1.2.4 Shared data services

Organisations can use shared data services to implement shared information systems, such as registries. Shared data services enable to ensure data consistency and encourage data reuse.

As an entire information system, implementing shared data services involves defining Data Management roles and responsibilities.

Interoperable shared data services should be based on corporate models and standards, such as the corporate interoperability framework and plan, the SOA-based interoperability application model, and corporate technical standards.

A technical specification must be generated that includes, for each candidate shared data service, the object and relationship information model (i.e., the metadata schema), service-oriented characterisation (i.e., service-oriented architecture interfaces (SOA)) and non-functional requirements (i.e. performance, security, etc.);

The main technical approaches to implement shared data services are file sharing, shared databases, service-oriented architecture (SOA) data services, and master data solutions.

There are different types of shared data services:

1.2.4.1 Shared Registry data services

<u>Parameters</u>: The shared data receives the reference to the Registry (Social, BOMS, Single, Social Security), the operation to perform (insert, update, delete, read), and whether it is required to be synchronous or asynchronous.

#### 1.2.4.2 Shared Platform data services for read

<u>Parameters</u>: The shared data receives the reference to the Platform (Payment, Grievance) and whether it is required to be synchronous or asynchronous.

# 5.4. Technical interoperability connections based on the organisational interoperability scenarios

This section presents technical interoperability connections implementing the previously organisational interoperability scenarios involving business process components, Registries and Platforms and other systems.

Component / Process	Interoperabili ty with Registries & Platforms	Technical Mechanism	Usage details
1. Outreach	Social Registry	Call Social Registry for insert and update	web service SOAP insert
		data exchange for insert and update Social Registry	insert asynchronous
		data exchange for read	asynchronous
		call Social Registry for read	web service SOAP or REST asynchronous
Assess			
2. Intake & Registration	Social Registry	Call Social Registry for insert and update	web service SOAP synchronous blocking

Table 9.	Technical inte	properability	connections ir	nplementing	ı organisational	interoperability	v scenarios
		, op or alo mey		npromonang	gaineadonai	in the open aloning	

		data exchange for insert and update Social Registry	asynchronous
		shared Social Registry data services	insert asynchronous
	One-stop shop	Call process from One-stop shop to Intake & Registration	web service SOAP or REST preferably synchronous and blocking
	GIS	Call GIS for read	web service REST asynchronous
		data exchange for update GIS	specific format asynchronous
3 Assessm	Other registry	Call other external registry for read	web service SOAP or REST preferably synchronous and blocking
ent of needs		replicated data	read
& Conditions		external registries	asynchronous
	Social Registry	Call Social Registry for insert and update	update web service SOAP preferably synchronous
Enroll			
<ul><li>4. Eligibility</li><li>&amp; Enrolment Decisions</li></ul>	Social Registry	Call Social Registry for read	read web service SOAP or REST preferably synchronous
		shared Social Registry data services	read asynchronous
	Social Security Registry	Call Social Security Registry for insert and update	update synchronous or asynchronous
		data exchange for update Social Security Registry	update asynchronous
	Health, Education	Call Health and Education Registry for read	web service SOAP or REST preferably synchronous and responsive
	Data analytics	replicated data	read
	platform	analytics platform	asynchronous
5. Determine Benefits & Service	BOMS Registry	Call BOMS Registry for insert	web service SOAP responsive synchronous blocking

	One-stop shop	Call process from One-stop shop to Determine Benefits & Service Package	web service SOAP or REST preferably synchronous and blocking
6. Notification & On-boarding	Notification platform	Call Notification platform for insert and update	web service SOAP synchronous or asynchronous
		data exchange for insert and update Notification Platform	update asynchronous
Provide			
7. Benefits and/or Services (Payment)			
a. Payment	payment	shared data services of the Payment Platform	read
Strategy	platform	Call payment platform for read	asynchronous
	payment platform	data exchange for insert and update Payment platform	synchronous
b. Payment	BOMS Registry	Call process from Payment platform to Payment	web service SOAP or REST synchronous and blocking
		data exchange for update BOMS Registry	synchronous or asynchronous
	Data analytics platform	data exchange for update Data analytics platform	asynchronous
Monitor & Manage			
8. Beneficiar y Monitoring			
a. Grievance Redress	Grievance platform	Call Grievance platform for read	web service SOAP or REST synchronous or asynchronous
		shared data services of the Grievance Platform	read
	One-stop shop	Call process from One-stop shop to Grievance Redress	web service SOAP or REST synchronous or asynchronous
b. Compliance Monitoring	Other registry	Call other external registry for read	web service SOAP preferably synchronous and blocking

(CCTs		replicated data	read
monitoring)		data exchange for read	read
		external registries	asynchronous
	Social Registry	Call Social Registry for read	read web service SOAP or REST synchronous or asynchronous
		replicated data	read
9. Exit decisions	Deaths Registry	Call Deaths Registry for read	web service SOAP preferably synchronous and responsive
		replicated data	read
a. Notifications	Notification platform	Call Notification platform for insert and update	web service SOAP synchronous or asynchronous
		data exchange for insert and update Notification platform	update asynchronous
b. Closing Cases	Social Registry	Call Social Registry for insert and update	web service SOAP synchronous blocking
		data exchange for insert and update Social Registry	asynchronous
	BOMS Registry	data exchange for Delete BOMS Registry	preferably synchronous and responsive
		Call BOMS Registry for delete	web service SOAP or REST responsiveness synchronous blocking
	One-stop shop	Call process from One-stop shop to Closing Cases	web service SOAP or REST preferably synchronous and blocking
	Data analytics platform	data exchange for update Data analytics platform	asynchronous

<u>1.</u> <u>Outreach</u>: To insert in the Social Registry, the technical mechanisms that can be used are: a) Call Registry (Social Registry, insert, synchronous or asynchronous) implemented with a SOAP service

b) Data Exchange Registry for insert or update (Social Registry, insert asynchronous)

2. <u>Assess - Intake & Registration</u>: Three possible mechanisms are proposed to update the Social Registry:

a) *Call Registry* (Social Registry, insert or update, synchronous) implemented with a SOAP service

b) Data Exchange Registry for insert or update (Social Registry, insert or update, asynchronous)

d) Shared Registry data services (Social Registry, insert, asynchronous)

At this stage, the information will preferably be entered through the one-stop-shop service. Although it can be asynchronous, the use of this service is preferred that it be synchronous.

a) Call process from One-stop shop (Intake & Registration, synchronous or asynchronous) implemented with a SOAP service

In the case of having a geographic information system (GIS), it is updated at this stage and can be done asynchronously.

- a) *Call GIS* (read, asynchronous) implemented with a REST service *Data exchange GIS* (update, asynchronous)
- <u>3.</u> <u>Assess Assessment of needs & Conditions</u>: When validating the information entered, as important as verifying the validity of the data and its consistency within the form and with historical information is to validate the consistency with other external registries. This validation can be implemented with different mechanisms

a) *Call Registry* (other external Registries, read, synchronous) implemented with a SOAP service

- b) Call Health Registry (read, synchronous) implemented with a SOAP service
- c) Replicated Registry (other external Registries, read)
- d) Data Exchange Registry for read (other external Registries, asynchronous)

Also at this stage if applicable, the Registry is updated

- 1. *Call Registry* (Social Registry, update, synchronous) implemented with a SOAP service.
- <u>4.</u> <u>Enrol Eligibility & Enrolment Decisions</u>: At this stage, the Social Registry is accessed to verify the potential beneficiaries. This interaction is preferably synchronous.

a) *Call Registry* (Social Registry, read, synchronous) implemented with a SOAP or REST service.

b) Data Exchange Registry for read (Social Registry, asynchronous)

Access to Health, Education or other external records may be required to apply benefit validation rules.

a) *Call Health Registry* (read, synchronous) implemented with a SOAP or REST service b) *Call Registry* (Educational, read, synchronous) implemented with a SOAP or REST service.

c) *Call Registry* (other Registries, read, synchronous) implemented with a SOAP or REST service.

d) Replicated Registry (Health Registry, read)

e) Replicated Registry (Educational Registry, read)

f) Replicated Registry (other external Registries, read)

The Social Security Registry is also updated if applicable, this update can be synchronised or asynchronous.

a) *Call Registry* (Social Security Registry, update, synchronous or asynchronous) implemented with a SOAP service.

b) Data Exchange Registry for insert or update (Social Security Registry, update, asynchronous)

If you have a data analysis platform, it is updated asynchronously.

- a) Data Exchange Platform (Data analytics Platform, update, asynchronous)
- 5. <u>Enrol Determine Benefits & Service Package</u>: At this stage, the Registry of Beneficiaries (BOMS) is effective. Which must be updated synchronously.
  - a) Call Registry (BOMS Registry, insert, synchronous) implemented with a SOAP service

The entry is made synchronously or asynchronously through the One-stop shop

- a) Call process from One-stop shop (Determine Benefits & Service Package, synchronous or asynchronous) implemented with a SOAP or REST service
- <u>Enrol Notification & On-boarding provide:</u> The interoperability of this stage is with the Notification Platform, updating it with the information of the beneficiaries who entered the program and those who should be notified that they were not chosen and for what reason.
   a) Call Platform (Notification, insert or update, synchronous or asynchronous)

implemented with a SOAP service.

b) *Data Exchange Platform* (Notification, insert or update, synchronous or asynchronous)

#### 7. Provide - Benefits and/or Services:

- a. <u>Payment strategy</u>: In order to define the strategy to implement for the payment of benefits, access is made in reading mode and synchronously to the information on the Payment Platform.
  - 1. *Call Platform* (Payment, read, asynchronous) implemented with a SOAP or REST service.
  - 2. Shared Platform data services for read (Payment, asynchronous)
- b. <u>Payment</u>: At the time of making the payment of the benefit or the delivery of the service, the Payment Platform is updated synchronously, as well as the Register of beneficiaries.
  - 1. Data Exchange Payment Platform (Payment, synchronous)
  - 2. *Call process from Platform* (Payment, synchronous) implemented with a SOAP or REST service
  - 3. *Data Exchange Registry for insert or update* (BOMS Registry, update, synchronous or asynchronous)

In case of having a Data Analytics Platform, it is updated asynchronously.

a) Data Exchange Platform (Data Analytics, update, asynchronous)

#### 8. Monitor & Manage – Beneficiary Monitoring:

- i. <u>Grievance Redress:</u> Information on the grievance platform is accessed in reading mode and then updated with the information entered through the one-stop service.
  - 1. *Call Platform* (Grievance, read, synchronous or asynchronous) implemented with a SOAP or REST service.
  - 2. Shared Platform data services for read (Grievance, asynchronous)
  - 3. *Call process from One-stop shop* (Grievance Redress, synchronous or asynchronous) implemented with a SOAP or REST service.

- ii. <u>Compliance Monitoring:</u> It is required to validate the consistency of the information with other external records. External registers are accessed in read mode, preferably synchronously. If not possible, it can be validated asynchronously.
  - 1. *Call Registry* (other external Registries, read, synchronous) implemented with a SOAP service
  - 2. Call Health Registry (read, synchronous) implemented with a SOAP service
  - 3. Replicated Registry (other external Registries, read)
  - 4. Data Exchange Registry for read (other external Registries, asynchronous)

During this stage, the preparation of reports on the programs is required, for which it is necessary to access the Social Registry in reading mode. Such access can be both synchronous and asynchronous.

- a) Call Registry (Social Registry, read, synchronous) implemented with a SOAP or REST service
- <u>9.</u> <u>Monitor & Manage Exit Decisions</u>: The Death Registry is accessed in reading mode to update the information of deceased persons who should no longer receive benefits
  - 1. *Call Registry* (Death Registry, read, synchronous) implemented with a SOAP service.

The beneficiaries themselves can withdraw from the program through the one-stop service or the program itself.

a) Call process from One-stop shop (Closing cases, synchronous) implemented with a SOAP service.

After analysing the benefit rules, may determine that some people no longer meet the eligibility rules to be beneficiaries. In all cases, the Social Register and the Beneficiary Register must be updated synchronously preferably.

- a) *Call Registry* (Social Registry, update, synchronous) implemented with a SOAP service
- b) Data Exchange Registry for insert or update (Social Registry, update, asynchronous)
- c) *Call Registry* (BOMS Registry, delete, synchronous) implemented with a SOAP service
- d) Data Exchange Registry for delete (BOMS Registry, synchronous)

In turn, the Notification Platform must be updated synchronously, so that citizens who no longer have the benefit are notified.

a) *Call Platform* (Notification, update, synchronous or asynchronous) implemented with a SOAP service.

b) Data Exchange Platform (Notification, update, asynchronous)

In case of having a Data Analytics Platform, it is updated asynchronously.

a) Data Exchange Platform (Data Analytics, update, asynchronous).

### 6. Step-by-step guidelines.

This section presents guidelines supporting the implementation of interoperable Social Protection programmes in projects and organisations. The guidelines connect the tasks presented in the previous sections to build the organisational and technical interoperability connections.

The guidelines address three main aspects: (i) the enabling environment, (ii) the business level and data management considerations, and (iii) the technical interoperability.

### 6.1. Enabling environment

# Guideline 1. Establish an enabling environment for interoperable Social Protection programmes.

The project and/or organisation establish an enabling environment for implementing interoperable Social Protection programmes, particularly covering political and legal interoperability.

**The enabling environment comprises** political and legal interoperability support and the organisational structure, roles, and responsibilities to implement interoperable Social Protection programmes.

The key principles to apply in these tasks are Good Governance and inter-institutional collaboration.

Inter-institutional interoperability requires agreement between the organisations involved and political alignment to promote the joint implementation and coordination of social programmes, taking into account the institutional competencies of the individual institutions and making full use of their operational capacities.

Legal interoperability should be used wherever possible to provide a formal structure to the interoperable social protection programmes. This implies adequate synchronisation of the standards on which cooperation is based to ensure that the jurisdictions, competencies and responsibilities of the organisms participating in projects involving interoperability are clearly defined. The data from any one of them is given its proper legal weight and recognition. The form that this legislation takes will correspond to different organs depending on the application of the interoperability.

The highest authorities within the organisation should approve regulations concerning legal interoperability to ensure that they have maximum political and institutional support.

One of the leading legal aspects concerns data protection regulations. Their implementation should lead to appointing units responsible for enforcing the regulations and agreements and establishing the necessary collaborative structures and associated mechanisms.

There are many challenges at the legal level. Interoperability may be affected by differences in legislation in areas such as administrative law, identification and authentication, the protection of intellectual property rights, responsibility, data privacy, the transparency of public relations between the administration and public administrations, citizens, businesses and other actors and the reuse of public sector information in shared registries.

The organisational structure, roles and responsibilities to implement interoperable social protection programmes involve different units and staff corresponding to the dimensions. While legal units should manage regulatory aspects and agreements, the business areas should address organisational interoperability matters, data management units should address the data and semantic interoperability, and the ICT unit should address the technical interoperability and implementation tasks.

#### Guideline 2. Define technical standards on interoperability.

The project and/or organisation define technical standards for interoperability technologies to foster the consistency and compatibility of the implemented systems.

The technical standards comprise standard technologies on networking and data communications, data integration and interoperability, enterprise services, and the presentation layers of applications.

**The key principles** to apply in these tasks are the international standards (e.g. W3C, OASIS), the institutional interoperability framework and the service-oriented-architecture (SOA)-based interoperability application model.

The institutional standards for technical interoperability should cover:

- Standard technologies on networking and data communications, covering data transport and related protocols such as TIC/IP, HTTP, FTP, SMTP, SOAP and others used on Internet-based applications;
- Data integration and interoperability, covering technologies to describe data structure and formatting, improve data exchange operations' effectiveness. Some of the main standards are Unicode, XML, XML Schema, XSL, S/MIME, RDF (for web resource description) and OWL (for semantic relationships of concepts);
- Enterprise services, which enable data exchange between business applications and the implementation of reusable services and shared processes. Reusable services should be implemented using web services and should follow the standards of WSDL, UDDI, SOAP, WS-\* and the interoperability-oriented recommendations of WS-i. Service composition and orchestration should be implemented using WSBPEL. Enterprise platforms, which enable integration of heterogeneous applications, should be based on ESB systems. The overall integration architecture should be service-oriented architecture (SOA);
- The presentation layers of applications, which include data that should be accessed from different utility software (such as web browsers or text viewers). Data representation standards include the file formats TXT, PDF, JPEG, PNG, HTML, XHTML and XML;

#### 6.2. Business and semantic Interoperability, and Data Management

#### Guideline 3. Identify the business components to build a business architecture.

The project and/or organisation identify the business components to build a business architecture for the Social Protection programmes using the Interoperable business components.

The development of the business architecture for the Social Protection programmes comprises identifying the relevant business components based on the ones presented in Section 3.

The key principle to apply in these tasks is business process modelling.

# *Guideline 4.* Define business connections for the organisational interoperability between the components in the architecture.

The project and/or organisation define business connections for the organisational interoperability between the components in the architecture.

The business connections for the organisational interoperability comprise defining interoperability connections between business components based on scenarios presented in Section 4.

The key principles to apply in these tasks are practised for quality interoperable componentbased design as well as the interoperability model established for the project or organisation.

More concretely, based on the business components previously identified, the project manager and/or business experts should:

- Define business interoperability connections between Business Processes and Registries, based on the scenarios presented in Sections 4.1.1 and 4.2.2.
- Define business interoperability connections between the One-stop-shop front-end and the involved Business Processes based on the scenarios presented in Sections 4.1.1 and 4.2.1.
- Define business interoperability connections between Business Processes and shared Platforms based on the scenarios presented in Sections 4.1.1 and 4.2.2.
- Define business interoperability connections between Business Processes and External systems based on the scenarios presented in Sections 4.1.1, and 4.1.2.

#### *Guideline 5. Consider Data Management and Semantic Interoperability aspects.*

The project and/or organisation consider Data Management and Semantic Interoperability aspects.

In the context of social protection programmes, Semantic interoperability concerns developing common definitions and interpretations for the data to be processed by various projects. Social protection operations involve a wide range of concepts that could be interpreted differently despite having the same name (e.g. family group, members of the same household, unemployed person, old-age pension, health benefits, social security contributions, etc.). Thus, to improve understanding of the concepts, it is useful to represent the relations between them, principally those of "sub-groups" (e.g., rural workers are a sub-group of workers, etc.).

In particular, implementing common persons' identification means constitutes one of the key Semantic Interoperability aspects.

**The Data Management and Semantic Interoperability aspects comprise** defining Data Management and Data Governance models for the interoperable information systems as well as addressing the issues of the Semantic interoperability.

**The key principles** to apply in these tasks are the Data Management and Governance and Data Integration models notably based on the DAMA DMBOK.

The projects/organisations developing interoperable social protection programmes should implement a common persons identification model.

Defining Data Management and Governance models in the context of interoperable social protection programmes involves addressing the following aspects for the data involved in interoperability connections:

- Establishing clear Data ownership and data stewardship definitions.
- Defining data models and establishing correspondence rules between data structures and transformations if necessary.
- Defining data quality conditions
- Defining common identifications for persons, programmes, and other key elements.
- Establishing an agreed periodicity for updates.
- Defining the data protection conditions and the enforcement mechanisms.

The Semantic Interoperability for social protection programmes should be based on metadata, which consists of a model of the main business concepts involved in interoperable operations (e.g. data sharing, data exchange, service invocation) and relationships among them, to define a unique meaning for these concepts throughout the organisation to facilitate the automatic treatment of data. If the interoperability operations involve different institutions, the corresponding inter-organisational metadata should be specified.

#### 6.3. Technical level.

# *Guideline 6. Define Technical Interoperability connections between the business components in the architecture*

The project and/or organisation define Technical Interoperability connections between the business components

**The Technical Interoperability connections comprises** defining technical interoperability connections between business components based on the mechanisms presented in Section 5.

The key principles to apply in these tasks are the interoperability model and standards established for the project or organisation.

More concretely, based on the previously defined business connections between the components in the architecture, the ICT technical staff should use the mechanisms presented in Section 5.3 following the guidance in Section 5.4.

#### Guideline 7. Interoperability with other systems.

The project and/or organisation implement interoperability connections with other systems by defining connections at technical level.

The implementation of interoperability connections with other existing systems comprises defining technical interoperability mechanisms presented in Section 5 to connect business components with other existing systems not mentioned specifically in Sections 4 and 5.

The key principles to apply in these tasks are the interoperability model and standards established for the project or organisation.

More concretely, the ICT technical staff should use the mechanisms presented in Section 5.3 to implement the interoperability connections with other systems, for instance employers' systems for registration and collection of contributions if corresponds.

#### Guideline 8. Federated registries.

The project and/or organisation consider the implementation of federated registries, in particular single registries by interconnecting specific ones.

The implementation of federated registries comprises the definition of a data architecture and data management practices as well as the technical interoperability mechanisms.

The key principles to apply in these tasks are the corresponding Data management and Data governance models as well as the interoperability model.

Implementing Federated registries mainly involves:

- Defining the architecture for the federated information system, the allowed transactions on the specific registries (i.e. create, read, update, and delete) and data quality rules.
- Defining common metadata for the specific registries.
- If needed, establishing a transactional mechanism enabling the distributed update among the specific registries.
- Establishing the replication and materialisation rules between the registries by applying the mechanism Replicated data.

#### Guideline 9. Interaction with e-government services.

The project and/or organisation define interacts with e-government services in order to coordinate public e-services with other organisations.

The main objectives are defining a strategy to systematically develop inter-institutional social services. The strategy may involve using national e-government platforms as well as implementing joint inter-institutional services with specific organisations.

The interaction with e-government services comprises the identification, prioritisation and specification of e-government services and related processes to be implemented, the specification of a service-oriented architecture (SOA) for the e-government services, and the enforcement of the corresponding regulations and standards within the inter- institutional services.

The key principles to apply in these tasks are the national e-Government and Interoperability standards and frameworks.

The strategy should establish the e-government layers in which the institution's processes and services will be integrated:

- Access layer, which includes the channels through which users will access public services (e.g. mobile, web, kiosks, etc.);
- E-government layer, which consists of one stop shop portals with single-sign-on integrating different websites and e-services provided by government agencies as well as by other partners;
- E-business layer, which includes shared data systems (e.g. Master Data, Reference Data, etc.), web services endpoints, Middleware platforms and technologies, and generic software tools (e.g. CRM, ERP, Groupware, document management systems, geographic systems, etc.);
- Infrastructure layer, including network and support technologies.

The implementation of e-government services should comprise the following technical features:

- Specialised techniques according to how institution's processes participate in e-Government and inter-institutional services, differentiating producer vs. consumer and reading-only data vs. reading and writing;
- The Middleware technologies to be used, such as ESBs, web services, etc.;
- The security model, including the authentication, access control and authorisation to the business process operations involving multiple organisations;
- Enforce quality of services (QoS) of processes involving multiple organisations and according to established SLAs;
- Metadata management for common concepts and data, especially for shared data systems.
- The data consistency model of distributed transactions among institutions, which may range from strict consistency models to eventual consistency ones.

## 7. Summary

The implementation of interoperable Social protection programmes is increasingly important. It constitutes a key enabler for developing large-scale social programmes and tackling the issues of silos and fragmented systems. It also enables to carry out a component-based and incremental implementation of the involved software applications. This way, interoperability techniques promote the reusability and interconnections of software solutions independently from the developer.

However, adopting interoperability practices involves addressing many challenges, not only at the implementation level, but also concerning the business, legal and data management areas.

This paper presents a guideline to implement interoperable Social protection programmes considering the main business processes and components described in the literature and techniques applicable by projects and organisations with diverse development. The guideline is based on widely adopted interoperability models and good practices in social protection and social security areas.

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