



► Room document*: 27

Labour Market Information Systems (LMIS):

Maximizing the potential of labour market data and analysis for effective policymaking



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► Acronyms

API	Application Programmer's Interface
BPS	Banco de Previsión Social
BRMM	Better Regional Migration Management project
BRMM2	Better Regional Migration Management project – Phase 2
CSPA	Common Statistical Production Architecture
DDI	Data Documentation Initiative
DE	Data Explorer
DF	Dataflow
DEL	Department of Employment and Labour
DLM	Data Lifecycle Manager
DSD	Data Structure Definition
DWI	Decent Work Indicators
DWT	Decent Work Team
EEO	European Employment Observatory
EES	European Employment Strategy
ENEI	Encuesta Nacional de Empleo e Ingreso
ETL	Extract, Transformation and Load
F.A.I.R.	Findable, Accessible, Interoperable, Reusable
FMLE	Federal Minister of Labour and Employment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GSBPM	Generic Statistical Business Process Model
GSIM	Generic Statistical Information Model
HCP	Haut Commissariat au Plan
HRDC	Human Resources Development Council
ICLS	International Conference of Labour Statisticians
ILO	International Labour Organization
INE	Instituto Nacional de Estadística
IT	Information Technology
ITC	Information Technology and Communications
ITC-ILO	International Training Center of the ILO

KILM	Key Indicators of the Labour Market
LFS	Labour Force Survey
LMI	Labour market information
LMIS	Labour Market Information System
MHRSD	Ministry of Human Resources and Social Development
MITRADEL	Ministerio de Trabajo y Desarrollo Laboral
MLSS	Ministry of Labour and Social Security
MoDEE	Ministry of Digital Economy and Entrepreneurship
MoL	Ministry of Labour
MoU	Memorandum of Understanding
MTPS	Ministerio de Trabajo y Protección Social
MTSS	Ministerio de Trabajo y Seguridad Social
NSA	National Statistical Agency
OECD	Organization for Economic Cooperation and Development
OMT	Observatório do Mercado de Trabalho
ONMT	Observatoire National du Marche de Travail
PEN	Promotion of Employment in Nigeria
SAMM	Southern African Migration Management Project
SDG	Sustainable Development Goals
SDMX	Statistical Data and Metadata eXchange
SfP	Skills for Prosperity
SIMEL	Sistema de Información del Mercado Laboral
SIS-CC	Statistical Information Systems – Collaboration Community
THAMM	Towards a Holistic Approach to Labour Migration Governance and Labour Mobility in North Africa project
ZamStat	Zambia Statistics Agency
ZAQA	Zambia Qualifications Authority

► Executive Summary

Since 2016, the Department of Statistics has been assisting countries in generating the capacities and incorporating the tools needed to implement a Labour Market Information System (LMIS). An LMIS is a network of institutions, people and information with mutually recognized roles, agreements and functions with respect to the production, storage, dissemination and use of labour market information and outcomes, in order to maximize the potential for the formulation and implementation of relevant policies and programmes.

The LMIS aims to systematically deliver timely labour market data essential for informed policymaking. The expanding engagement of countries and regional communities signifies the global momentum behind the LMIS, underlining its role in improving access to and management of labour market information.

This document provides a comprehensive overview of the LMIS, delving deep into its functionality, components, and the implementation framework developed by the Office for its development at a national or regional level.

The document also highlights the ongoing LMIS projects across different global regions, detailing the Office's significant role in offering technical support, capacity-building, and training endeavours. The integrated onsite and e-learning workshops combined with in-house developed tools underscores the Office's commitment to refining LMIS implementations tailored to diverse labour market context.

1. Introduction to Labour Market Information Systems

The identification of labour market issues in both developed and developing economies critically rests on the availability of data, information and analysis. Labour market information (LMI) provides an essential basis for employment and labour policies, and informs the design, implementation, monitoring and evaluation of policies that are better focused and targeted. LMI also contributes to a reduction in the transaction costs of labour markets as it helps overcome incomplete information of labour market agents.

1.1. Functions of an LMIS

Three main functions of a Labour Market Information System (LMIS) can be distinguished:

- (F1) The LMIS is responsible for labour market analysis;
- (F2) The LMIS is responsible for monitoring and reporting on employment and labour policies;
- (F3) The LMIS system provides a mechanism to exchange information or coordinate different actors and institutions that produce and utilize labour market information and analysis.

► Functions of an LMIS



The first function (F1) is purely analytical and as such is usually being undertaken, at least to some extent, by academic and research institutions, which may or may not have a focus on labour markets. However, the main purpose of LMIS that have been established outside academia is the production of information and analysis for policymakers and other labour market stakeholders. For example, the functions of the European Employment Observatory are stated as follows: “The European Employment Observatory (EEO) contributes to the development of the European Employment Strategy (EES) through the provision of information, comparative research and evaluation on employment policies and labour market trends in the countries covered by the EEO.”

Therefore, it is important that institutional arrangements are established to make the information and analysis widely available to the target group and to provide opportunities for labour market stakeholders to influence the agenda of the LMIS.

The LMIS can also be directly involved in monitoring and reporting on employment and labour policies (the second function, **F2**). If in addition to monitoring and reporting on policies the LMIS is used to conduct policy analysis and evaluations, the system would combine functions **F1** and **F2**. Both at the international and the national levels, the institutional role of the LMIS can be broadened to include a third function (**F3**), the exchange of information or coordination of the LMIS activities of labour market stakeholders, which include statistical agencies, research agencies and agencies involved in policy formulation and implementation including employers' and workers' organizations. This function may range from the dissemination of information on concepts, definitions and standards, to the allocation of resources regarding data collection or specific analytical activities (e.g. evaluations, econometric models).

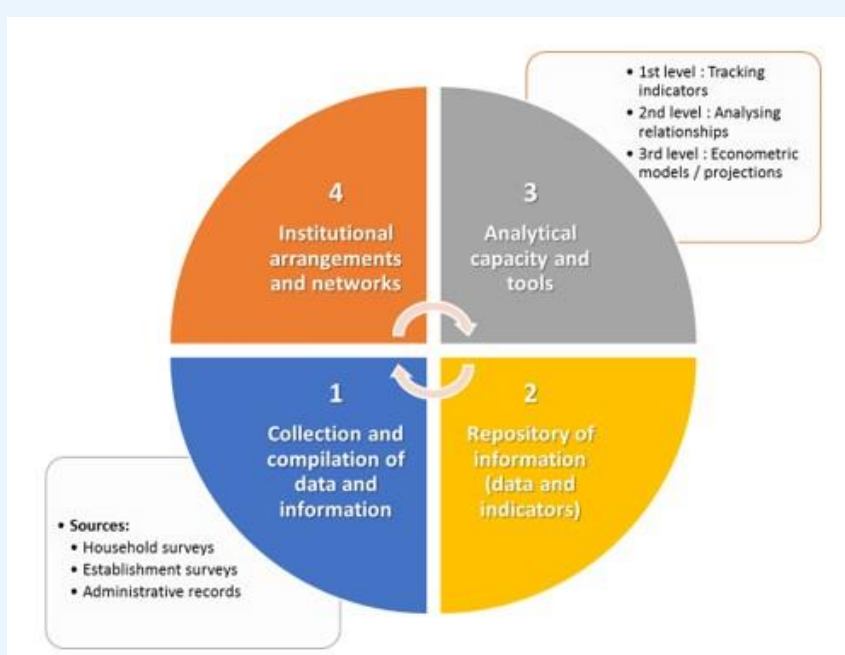
1.2. Components of an LMIS

► LMIS Components

LMIS consist of four main components:

- (C1) Collection and compilation of data and information.
- (C2) Repository of information.
- (C3) Analytical capacity and tools.
- (C4) Institutional arrangements and networks.

► Components of an LMIS: diagram



1.2.1. (C1) Collection or compilation of data and information

Considering that LMIS should provide analyses of labour markets in their economic context, component **(C1)** consists not only of data on labour markets, but also on the broader economy. For example, data on trade flows and remittances are indispensable for an analysis of the labour market effects on economic crises.

► Main data sources

The main data sources of labour statistics consist of:

- (S1) Household surveys and population censuses.
- (S2) Establishment surveys.
- (S3) Administrative records.

Labour force surveys (a particular type of household survey focusing on labour-related questions) can be designed to cover virtually the entire population of a country, all sectors of the economy and all categories of workers, including own-account workers, contributing family workers and persons engaged in casual work or marginal economic activity. For this reason, household-based labour force surveys offer a unique advantage to obtain information on the labour market of a country and its structure. Other sources, such as population censuses, multi-purpose household surveys, establishment surveys, or administrative records (e.g. employment service records), differ in scope, coverage, units of measurement or methods of data collection.

Each source has advantages and limitations in terms of the cost, quality and type of information gained. For example, **establishment surveys** typically have poor coverage of very small or unregistered businesses but are a more reliable source on wages and earnings. Similarly, **administrative records** provide a low-cost source of labour market information, but this information is limited by the purpose of the registers, which may be different from the objective of an analyst or policymaker. Therefore, **effective LMIS draw on all sources.**

1.2.2. (C2) Repository of information

This information collected and/or derived from primary sources must be stored and made accessible to users by means of a software platform which will constitute the sole **repository of labour market information**. Inbound data flows of collected data should be verified in terms of both structural and logic consistency, transformed into new indicators as necessary and stored in the datawarehouse to be disseminated through several channels, including but not limited to graphical visualizations, statistical tables, bulk data download and application programming interfaces (API) for computer-to-computer interactions.

1.2.3. (C3) Analytical capacity

LMIS embody the **analytical capacity** to identify and interpret labour market developments and trends, and to relate these trends to policies or other factors influencing labour market outcomes. In terms of **analytical capacity**, LMIS can be developed at **three levels**. The **core or first-level LMIS consists of monitoring or tracking a set of indicators**. Activities that need to be undertaken to establish a core LMIS, such as the compilation of data, the establishment of appropriate repository, the production of

regular labour market reports and the dissemination of information and analysis, can be carried out by an LMI unit in a government department, in collaboration with labour market stakeholders, statistical agencies and research institutions. The unit should be staffed by labour market analysts, statisticians and staff dealing with the processing of data and information technology. The monitoring of indicators not only results in signals on the state of the labour market, but also provides a starting point for a range of additional analytical activities and studies, focusing on **relationships in the labour market and between the labour market and the broader economy (second-level LMIS)**. The analysis of relationships involves the use of quantitative methods (e.g. regression analysis), but may also employ qualitative methods (e.g. stakeholder-driven forums). In all cases, analytical activities will draw on or will need to be complemented by a first-level LMIS tracking labour market indicators. The **third and most advanced level of LMIS involves the use of comprehensive econometric models**, building on second-level analysis. Econometric models represent an analytical approach that allows for the generation of economy-wide, detailed and consistent projections of labour market developments. Econometric models, however, are demanding in terms of all components of LMIS (C1, C2, C3 and C4) and are therefore costly to develop and maintain. In many cases, the development of models is undertaken by specialized research institutes, while LMI units may be involved in running existing models and/or use results from modelling exercises for policy development purposes.

1.2.4. (C4) Institutional arrangements and networks

Institutional arrangements enable labour market actors to use information and analysis, and facilitate the creation of networks of users and producers, including government departments, employers' and workers' organizations, statistical agencies and research organizations. These arrangements are needed for the LMIS to effectively perform its analytical function, for example by providing access to data (from statistical agencies, administrative bodies and other entities), but also to allow for the effective dissemination of information and analysis.

1.3. LMIS Indicators framework

As discussed above, at a minimum, a first-level LMIS tracks a set of indicators, which constitute the basis for the development of more advanced systems. A widely used set of indicators are the **Decent Work Indicators** framework (DWI)¹. DWI covers not only access to full and productive employment, but also rights at work, social protection and social dialogue, as well as indicators of the economic and social context of decent work.

Amongst the more than 400 indicators and breakdowns in DWI, an initial group should be selected in order to: (1) present a core set of labour market indicators; and (2) improve the availability of the indicators to monitor new employment trends. This initial set of indicators is selected in consultation with national representatives from the Ministry of Labour, the National Statistical Office and other stakeholders, based on the following criteria: (a) conceptual relevance; (b) data availability; and (c) relative comparability across countries and regions. Following this initial set, new indicators will be progressively added based on demand and data availability.

¹ https://www.ilo.org/wcmsp5/groups/public/---dgreports/---integration/documents/publication/wcms_229374.pdf

2. Implementation framework for a national LMIS

The Office has introduced a comprehensive methodological framework to guide member states in the execution of LMIS projects. This refined framework presents a structured roadmap highlighting specific activities and elaborates on stakeholder engagement, identifying the principal leading agency and emphasizing the roles of other requisite agencies.

The **general objective** of the project is to develop a network of institutions, people and information with mutually recognized roles, agreements and functions with respect to the production, storage, dissemination and use of labour market information and outcomes, in order to maximize the potential for the formulation and implementation of relevant policies and programmes.

The ILO provides technical assistance to constituents willing to implement an LMIS in order to:

1. Improve and modernize the collection, processing, systematization and harmonization of information on labour, from different internal and external sources. Standardize statistical information on key market indicators to facilitate the reporting and management of labour market statistics in the country.
2. Provide labour market information that is relevant, accurate and timely at the highest level to decision makers.
3. Establish a suitable governance structure to make the System operate in an efficient and sustainable way with the participation of all the stakeholders in the production and use of LMI.
4. Identify the sources of information for the Labour Market Indicators, collect reference metadata and harmonize the definitions of the indicators and classifications used in all of them.
5. Build capacities in the technical personnel, in their different profiles, in the administration and use of the tools to implement the LMIS, including training in data modelling and SDMX.
6. Train analysts and decision makers in the interpretation of labour market indicators.
7. Deploy and manage a state-of-the-art data warehouse and dissemination system that is secured, scalable, expandable, and fully customizable.

This chapter is organized as follows. Section 2.1 outlines the key activities and milestones to the LMIS project's timeline; Section 2.2 summarizes the overall technical support rendered by the ILO team; Section 2.3 describes the LMIS toolkit, a short introduction to the main platform and companion software solutions for LMIS data modelling, storage, and dissemination; Section 2.4 provides an overview of the regular capacity building activities carried out jointly with ITC-ILO in the last four years.

2.1. Key activities in the implementation of LMIS Projects

The **main activities** carried out after an official request from the Government has been received, in order to build capacities in the required personnel and make the LMIS available to the public, can be summarized in the following list:

1. Assessment of the viability for an LMIS in the country, based on the data availability and institutional situation.

2. Signature of a Memorandum of Understanding and Project Document between the Government (represented by the lead agency implementing the LMIS) and the ILO (represented by the Country/Regional office).
3. Establish governance structure and appoint operational roles.
4. Define system architecture and deployment of data warehouse platform (LMIS.Stat).
5. Conduct a training workshop oriented to Data Production aimed at statistical staff, economists and data and metadata managers.
6. Publish the LMIS Master Plan.
7. Perform knowledge transfer for the configuration and administration of the LMIS.Stat platform by IT staff.
8. Carry out an SDMX and Data Modelling workshop, aimed at data and metadata managers of all the data providers for the LMIS.
9. Train data managers and producers in data preparation and ETL² to the platform.

► **Box 1. Implementation checklist for a national LMIS**

Checklist for the implementing agency

- Submit an official request to ILO
- Conduct an assessment of data availability and institutional readiness
- Sign a Memorandum of Understanding (MoU) with ILO
- Formulate a governance structure and allocate specific operational roles
- Initiate a data warehouse platform
- Organize targeted workshops for data managers and IT focal points to enhance understanding of data production, modelling, preparation, and platform integration
- Compile, prepare, and upload existing data to the platform
- Tailor and configure the LMIS platform for live production

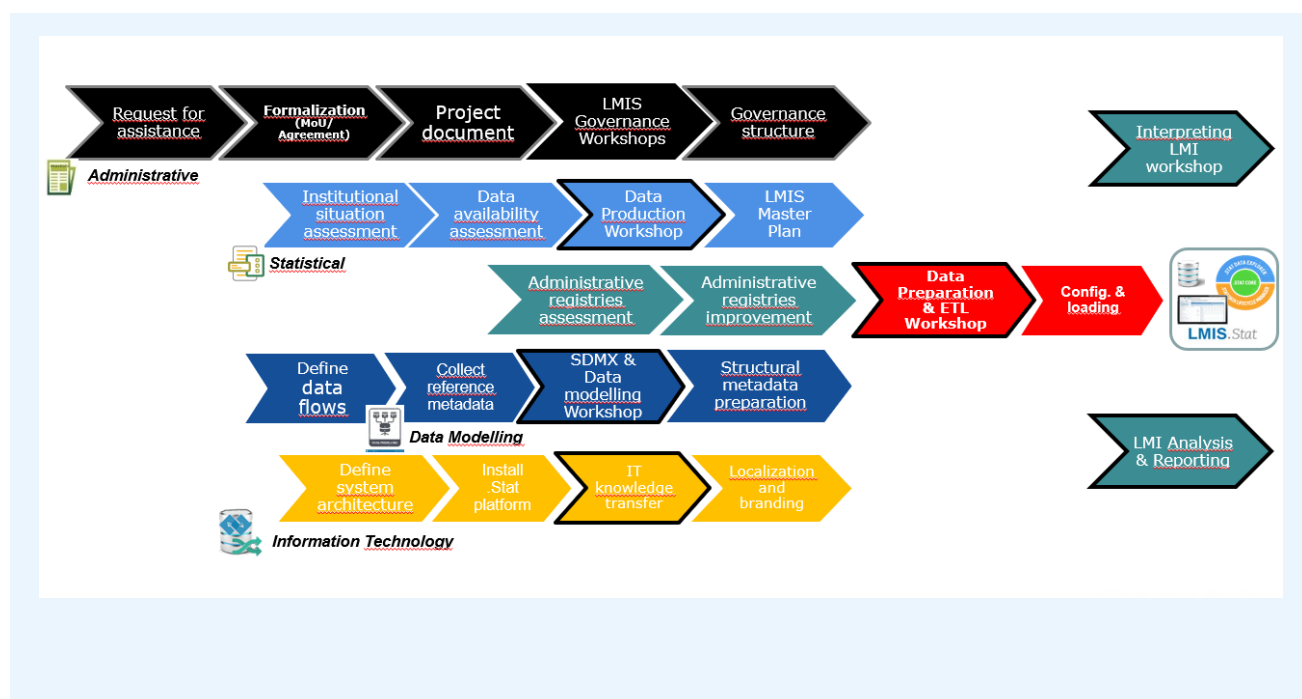
As shown in the implementation roadmap in Figure 1, there are four lines of action (or “tracks”) which are developed mostly in parallel, with few dependencies to observe among them:

Administrative Track.

It begins with the official request from the Government to the ILO requesting for assistance to implement a LMIS. Right after its reception, a MoU between the ILO and the leading Agency has to be signed, and the Agency must prepare the Project document. After the “Governance” workshop a manual describing the governance structure should be published.

² Extract, Transformation and Load of data

► Figure 1. Implementing roadmap for a LMIS



Statistical Track.

After the signature of the MoU, the “Data availability and institutional situation” assessment is carried out, typically spanning 3-4 days in-country. This process aims to sensitize and align objectives of the primary stakeholders of the LMIS, and to generate the inputs for the “Data Production” workshop. During this phase, meetings with the IT team, responsible for the .Stat Suite application hosting, are also conducted.

The “Data Production” workshop usually takes 4 or 5 full days and organized for all the “incumbents”, i.e., data providers, data analysts and data users, from the leading Agency and the main stakeholders. During this activity, the indicators framework(s) are defined, and all the compilation and calculation methods are discussed. The harmonized list of disaggregation criteria must be initiated in this workshop. The main outcome of this workshop is the “LMIS Master Plan” to be produced by the leading agency.

Data Modelling Track.

Once the Data Production workshop concludes and a draft Master Plan detailing data flows, disaggregation criteria, and reference metadata is in place, the “SDMX and Data Modelling” workshop which congregates during 3 to 5 days is organized for data-related stakeholders, in particular the data manager(s). IT focal point(s) are also welcome and should participate for them to get a better understanding of the “statistical business”.

Information Technology Track.

Simultaneously, post-MoU, this track focuses on setting up and customizing the .Stat Suite platform.

It is vital that these tracks conclude around the same timeframe, as the last activity of the assistance, the “Data Preparation and ETL” workshop requires prior completion of the tracks ensuring an established governance, a published Master Plan, the SDMX and Data modelling training, and the

readiness of the .Stat Suite platform for data and metadata upload. This workshop takes 3-5 days and is oriented to data managers and IT focal points.

After this workshop there will be a follow-up virtual activity providing remote assistance to the configuration and upload of the system, on demand.

Two optional activities, “Administrative registries” assessment and a workshop on “Interpreting labour market indicators” can be carried out at any moment, as needed.

► **Box 2. Implementation milestone for a national LMIS**

LMIS Milestones

► M1	Project presentation	Administrative Track
► M2	Data availability assessment	Statistical Track
► M3	MoU Signature	Administrative Track
► M4	Publish LMIS governance manual	Administrative Track
► M5	Nomination of data manager	Administrative Track
► M6	Nomination of IT focal point	Administrative Track
► M7	Data production workshop	Statistical Track
► M8	Publish LMIS Master Plan	Statistical Track
► M9	Data analysis capacities development	Statistical Track
► M10	SDMX & Data modeling workshop	Data Modeling Track
► M12	Define structural metadata	Data Modeling Track
► M13	Setup LMIS infrastructure	IT Track
► M14	IT knowledge transfer	IT Track
► M15	Data preparation & ETL workshop	Data Modeling Track
► M16	Upload indicators’ data	Statistical Track
► M17	Upload indicators’ metadata	Statistical Track

► **M18** **LMIS in production**

2.1.1. Assessment of data availability and institutional situation

Data is a *sine qua non* resource for an LMIS. Without labour market information it is not possible to establish an LMIS.

Its availability depends on two aspects: 1) existence of an operation that generates or compile data from which labour market indicators can be calculated; and 2) the producer/owner of this data is keen on sharing the information with the LMIS.

Prior to initiate the LMIS project it is necessary to confirm that these two requirements are met in the country. The regional statistician of the ILO quite often knows what happens in this regards in the countries under their responsibility, but sometimes it is necessary to conduct a short mission to verify the situation on site. The mission must identify the available sources of information for the Labour Market Indicators, ensure the availability of reference metadata for the different datasets and suggest the establishment of provision agreements with the data providers willing to share their data. The occasion is also an opportunity to meet with those data producers who are unwilling to share their data and try to raise their awareness of the importance of LMIS.

2.1.2. Signing of Memorandum of Understanding (MoU)

The first step in the LMIS implementation project is the signature of a Memorandum of Understanding (MoU) between the ILO, represented by the Country Office, DWT or Regional Office director, and the leading Agency representative, in order to formalize the project execution. The MoU describes the nature of the project and establishes the legal framework under which it will take place.

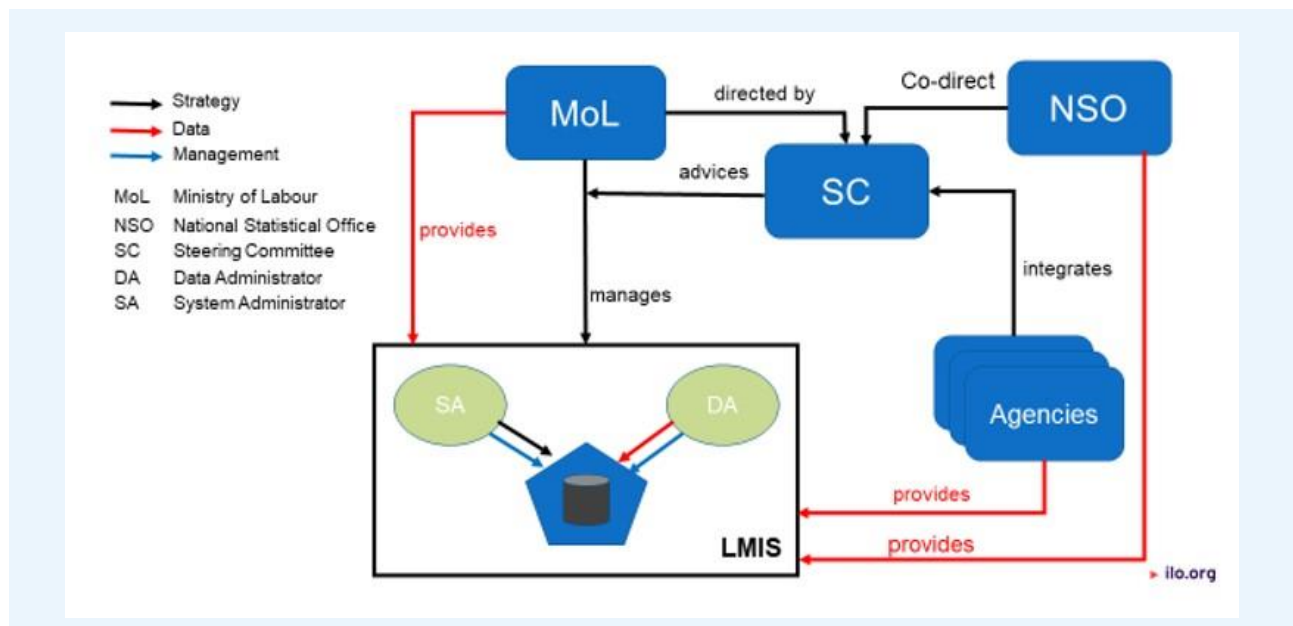
Besides, the Agency team must prepare the Project Document (ProDoc) which describes the project from a technical point of view, including a description of current situation, overall goal of the project, specific goals, overall and specific expected benefits, definition and scope of requirements, technological infrastructure, and training activities.

2.1.3. Establishment of governance structure and appoint operational roles.

2.1.3.1. Organizational structure

An example of a straightforward institutional arrangement is the establishment of an LMIS Advisory Panel (or a Steering Committee) joining policymakers, the statistical agency and workers' and employers' organizations.

► Example of LMIS governance structure



A strong role of the LMIS with regard to policies (F2) and coordination (F3) necessitates institutional linkages between the system and the process of formulating and monitoring national socio-economic plans, including national employment policies, poverty reduction strategies and other development plans. This may also involve the selection of a set of indicators that are monitored to track progress in the achievement of labour market objectives, or the setting of targets for certain indicators. Institutional arrangements could also encompass institutions involved in the implementation of policies.

At the core of LMIS operation, two roles are fundamental for a successful operationalization: the “Data administrator” and “IT focal point”. These roles can be assigned to individuals, although small teams of at least two people are advisable to be safe in case of any of them leaving.

2.1.3.2. Data Administrator

Main tasks:

- Actively participate in training workshops and, in particular, in the definition of the data model during the Data Preparation Workshop.
- Manage structural metadata for the entire LMIS platform.
- Manage the reception of data and metadata from the different suppliers, internal and external to MoL
- Ensure the quality of the datasets and metadata received, and that they are in the correct format for uploading.
- Compile indicators derived from micro-data or aggregated data for down-loading
- Configure "default" views for dataflow queries
- Configuring and maintaining dataflow categories and categorisations
- Perform indexing of dataflows and maintenance of search engine
- In general, provide all data and metadata management tasks for LMIS.

Act as a first line of support for data users and providers, and as a focal point for escalating issues to ILO specialists.

Dedication:

Full time since the beginning of the project.

Profile:

Experienced and with a "taste" for working with data, they could be a statistician, economist or sociologist who is used to processing data. Advanced undergraduates in these fields can fill the role perfectly well. It can also be a computer scientist who understands the "statistical business". In general, computer scientists are the quickest to "learn" and adapt to the role, but they must have a "taste" for working with data. A developer is probably not suitable for this role, nor is an infrastructure specialist.

2.1.3.3. IT Focal point

Main tasks:

In the first 2 to 3 weeks, during the implementation of the system:

- Define the architecture of the .Stat platform together with the ILO specialist.

- Prepare the infrastructure to host the .Stat Suite platform (2 servers), including installation of the base software, DBMS and configuration of the network infrastructure and domain names for the microservices.

- Install and configure .Stat database (MS SQL Server)

- Participate in the installation and configuration of the .Stat application in conjunction with the ILO specialist.

- Carry out the localisation and branding of the platform, with the support of the ILO specialist.

- Configure authentication service (list of users and their login credentials)

During the development of the project:

- Participate in the "Data Production", "SDMX and Data Modelling" and "Data Preparation and ETL" workshops (preferably).

Once the platform is up and running:

- Be the IT focal point for the support of the .Stat platform.

- Maintain the platform infrastructure

- Install and configure .Stat system upgrades, with support from the ILO specialist whenever necessary.

- Managing the authentication system (users and access credentials)

- Administering the .Stat database server

- In general, configure and maintain all aspects of LMIS' central infrastructure.

- Act as the first line of IT support for users and the data manager, and as a focal point for escalating problems to the ILO specialist.

During the first weeks full time commitment is not required, but at least this project should be their main task, being able to participate in the workshops. Once the platform is up and running the dedication is partial and on demand.

2.1.4. Defining system architecture and deploying .Stat Suite

This activity normally starts with an introduction to .Stat Suite architecture followed by a demonstration. Participants required in this activity are key IT focal point including normally system and network administrators, database admin, and application developers. During this initial introduction, we focus on a high level system architecture and infrastructure requirements. We also collect information from the participants about their preferences on the type of systems, technologies, and use cases in general.

After this kick-off meeting, we will present a draft system design with minimum requirements for the organization to prepare their infrastructure. Once it's ready, we start the assessment and deployment process either through remote assistance or on-site if resources permit.

During the deployment, we work closely with the IT focal point, providing detailed explanation on all the components of .Stat Suite. In general, local IT staffs are gaining hands on experience on the deployment routine with instructions from ILO experts, and sometimes even with the support from the SIS-CC community. At the end of the deployment, not only a running .Stat system is installed and configured according to a local environment, but also all necessary knowledge to maintain and manage the system and users are transferred to the IT staffs in the organization, in order to achieve and form a self-sufficient and autonomous technical support team locally.

After .Stat Suite is deployed, we continue to support users and IT team while data managers start using the system to upload data and metadata. We also support the organization where customization and localization are necessary. Over the period of data preparation, we regularly provide technical support and assistance for troubleshooting system or data issues. Very often, fine tuning the configuration and some minor adjustment to the system are expected during testing and data preparation.

When .Stat is populated with data and metadata, prior to production release, we will conduct a final assessment of the system, ensuring the system is up-to-date, secured, and properly configured. Any network and accessibility issue should be solved and verified so that both internal data managers and external users have sufficient and proper access to the LMIS system.

Through the entire LMIS system design and deployment process, ILO is closely engaged with IT focal point to ensure a well configured and secured system is ready for production.

2.1.5. Conducting a data production workshop

After identifying the available data sources, the Data production workshop is the instance where all the different criteria around the LMI must be unified.

It will include an analysis of the available data sources (according to the results of the *Assessment of data availability and institutional situation*, considering the LMI that can be obtained from each of them, as well as its strengths and limitations.

After the data sources analysis, the work will be focused on defining the set of indicators (variables and classifications) to be included in the LMIS.

► Main data sources strengths and limitations

	Strengths	Limitations
Population census	<ul style="list-style-type: none"> ➤ Comprehensive enumeration, coverage of the whole population ➤ Allows for the production of reliable information on small groups 	<ul style="list-style-type: none"> ➤ Very costly ➤ Short questionnaires prevent collection of detailed info on specific topics
Household surveys	<ul style="list-style-type: none"> ➤ Comprehensive coverage of population ➤ Detailed questioning permits precise measurement of statistical concepts for short reference periods 	<ul style="list-style-type: none"> ➤ Sampling prevents reliable estimates for small groups ➤ Lower quality of data on income, "sensitive" and employer-related topics ➤ Cannot provide estimates of vacancies, training needs, etc
Establishment surveys	<ul style="list-style-type: none"> ➤ Comprehensive coverage of larger businesses ➤ Payroll records provide consistent and reliable data for income and employment by industry ➤ Only source for data on vacancies, training needs, etc 	<ul style="list-style-type: none"> ➤ Typically poor coverage of very small and unregistered businesses ➤ Requires constant updating of registers (births and deaths) ➤ Difficult identification of small or informal units ➤ High non-response rates ➤ Sampling prevents reliable estimates for small groups ➤ Data items are limited by the information in establishment's registers
Administrative records	<ul style="list-style-type: none"> ➤ Total count allows maximum detail ➤ Inexpensive to compile statistics 	<ul style="list-style-type: none"> ➤ Purpose? ➤ Coverage? ➤ Data quality?

In some cases, especially when dealing with administrative registries, it might be necessary to carry out a consultancy (following the methodology developed by the LMIS team) with the aim of leveraging the use of administrative records as statistical data sources.

During the workshop, the participants will learn how the selected indicators are to be calculated following the international recommendations and best practices, in particular those emerging from the International Conference of Labour Statisticians (ICLS).

Usually, the main set of LMI will be part of the Decent Work Indicators framework, which comprises ten substantive elements (and an additional one on the economic and social context) corresponding to the four strategic pillars of the Decent Work Agenda.

► Strategic pillars of the Decent Work Agenda

The four strategic pillars of the Decent Work Agenda are:

- Full and productive employment
- Rights at work
- Social protection
- Promotion of social dialogue.

The Decent Work Agenda includes a cross-cutting objective of gender equality. Thus, the Decent Work Indicators will be disaggregated by sex, whenever possible.

► Decent Work Indicators framework

SUBSTANTIVE ELEMENTS OF DECENT WORK	
1. Employment opportunities	2. Adequate earnings and productive work
3. Decent working time	4. Combining work, family and personal life
5. Work that should be abolished	6. Stability and security of work
7. Equal opportunity and treatment in employment	8. Safe work environment
9. Social security	10. Social dialogue, employers' and workers' representation
Economic and social context of decent work	

Other reference frameworks, like the SDGs, or Labour Migration indicators, are also taken into account during the workshop, as well as any indicators suggested by the LMIS stakeholders.

2.1.6. Publication of the LMIS Master Plan

After the Data production workshop, it is necessary to set out the content of the LMIS in a comprehensive document, including all the details of the data and metadata to be integrated in the datawarehouse.

► **Content of an LMIS Master Plan**

I.	INTRODUCTION
II.	LMIS COMPONENTS
III.	GENERAL MAPPING OF INFORMATION SOURCES
IV.	PHASES AND CRITERIA FOR THE INCORPORATION OF INDICATORS
V.	THEMATIC AREAS
VI.	INDICATORS
	a. PHASE I INDICATORS
	b. PHASE II INDICATORS
	c. ...
	<i>(For each indicator it should include the definition, preferred and alternate data sources, calculation method, interpretation guidelines and disaggregation criteria)</i>
VII.	CLASSIFICATIONS & OTHER DISAGGREGATION CRITERIA
	<i>(For each concept to be used as a breakdown for the indicators it should include the definition and the categories with codes, names and descriptions. All variants used, i.e. different age bands or classification's versions, must be listed in this section)</i>
VIII.	RECOMMENDATIONS AND REMAINING CHALLENGES
IX.	REFERENCES
Annex 1	STATISTICAL TABLES
	<i>(For each indicator it should include the valid combinations of breakdowns, e.g. Labour force participation rate by sex and age, Labour force participation rate by sex and education level, Labour force participation rate by sex and economic activity, etc.)</i>
Annex 2	DATA VISUALIZATIONS AND DASHBOARDS

The two initial sections are meant to provide a context to the document in the framework of the LMIS project.

All data sources to be used should be described in Section III, highlighting their strengths and weaknesses. In case phases for the loading of indicators have been defined, these should be made explicit, with a timeline as clear as possible and explaining the reasons why it is set up in that way.

The thematic areas and which indicators belong to each of them constitute an important input for the design of the data access paths in the data model. They are to be described in Section V.

The core of the Master Plan is the list of indicators in Section VI, with a comprehensive description including, but not limited to, its definition, preferred and alternate data sources, calculation method, interpretation guidelines and disaggregation criteria.

Section VII is a cross-referenced list of all the classifications and disaggregation criteria mentioned along the indicators' descriptions in the previous section. This is an essential resource for the data harmonization process since will be the input to define the unique Concept Scheme for the system. It should include the concept definition and the categories with codes, names and descriptions (i.e., code lists). All variants used, i.e., different age bands or classification's versions, must be listed in this section as well. This information must be available for the SDMX and Data production workshop.

Section VIII should list the remaining challenges at the moment of writing the Master Plan, as well as any recommendations for the data modelers or data producers following the specifications in the Plan.

Annex 1, the list of statistical tables, is also a mandatory resource for the data modelling work. This list establishes which are the “valid” combinations of indicators (measures) and breakdowns (disaggregation), thus defining the valid “data cubes”. This is an essential input for the forthcoming SDMX and Data Modelling workshop.

Annex 2 is optional, but it is quite useful to have it in the document if the visualizations have already been defined by the time the Master Plan is being edited.

2.1.7. Workshop on SDMX and Data Modelling

This workshop is designed to equip data managers and analysts from all key data stakeholders with the skills necessary to model labour market indicators effectively. Participants will practice the creation of a harmonized single concept scheme, learn the consolidation of code lists from varied sources, and acquire proficiency in modeling data tables within the SDMX framework. The duration typically ranges between 3-5 days, depends on participants' prior familiarity with SDMX.

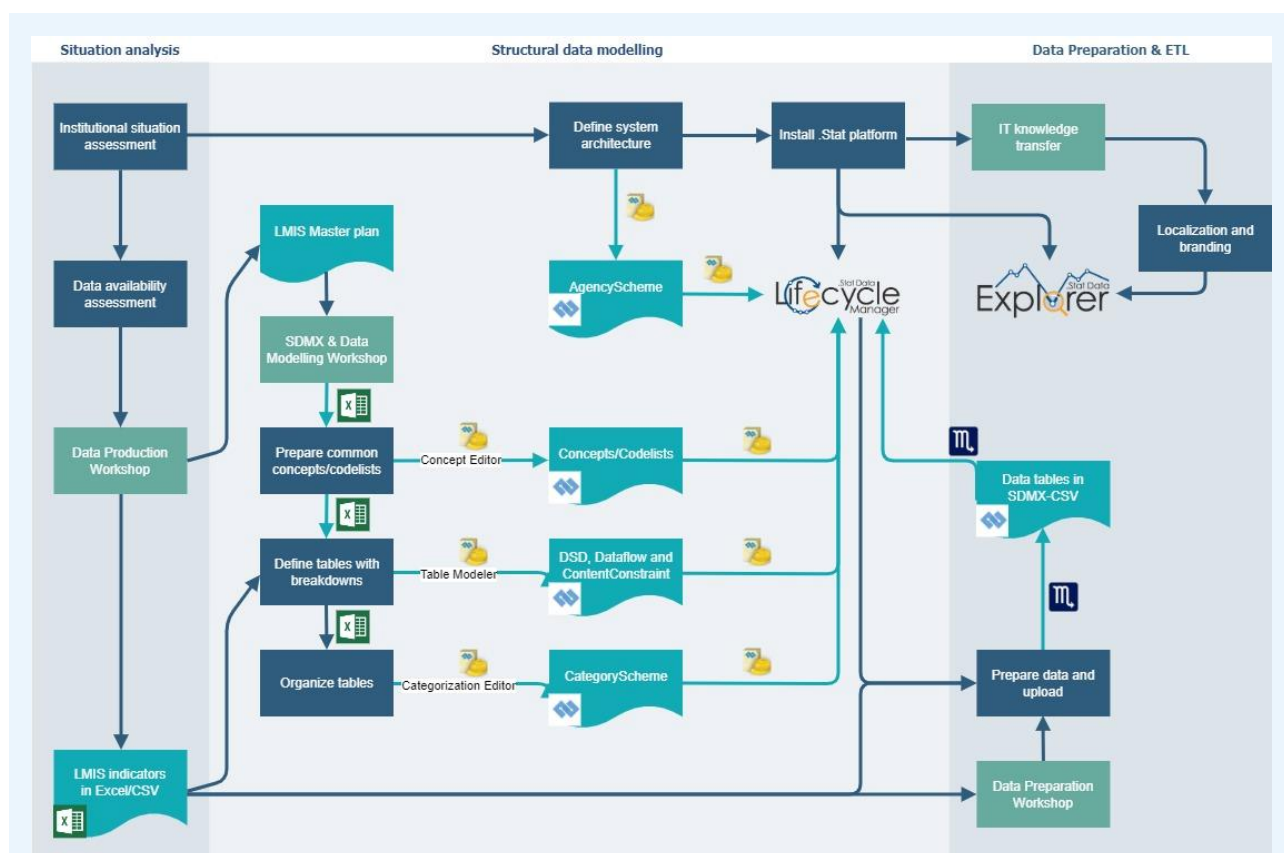
Before starting the workshop, it's imperative that the LMIS Master Plan is available. On-site training is highly recommended, as a substantial portion of the training involves hands-on exercises. By the end of the workshop, participants will have crafted all essential structural metadata artifacts in SDMX, including concepts, code lists, data structural definitions, and data flows based on their country's LMIS context.

The "Statistical Data and Metadata Exchange" (SDMX) is promoted as the data modeling standard for LMIS due to its efficacy in harmonizing diverse data sets. At its core, SDMX allows to use a single concept scheme and shared code lists, which are crucial for achieving data harmonization across various data sources. Defining the data model based on the SDMX information model, it ensures that labour market indicators, regardless of their origin from different data sources, are consistent and comparable.

Beyond data harmonization, SDMX brings additional advantages. It enhances data accessibility, paving the way for stakeholders to seamlessly share and exchange labour market information. SDMX allows to define F.A.I.R. (Findable, Accessible, Interoperable, Reusable) vocabularies, a crucial aspect for interoperability and enabling computer-to-computer operations. By embedding standardized structural metadata and reference points, SDMX also enhances data interpretability, ensuring that users can effortlessly comprehend and employ the data. Additionally, its foundation on open-source principles translates to reduced IT developmental costs. Through its comprehensive framework, SDMX not only ensures data coherence but also streamlines operations, making it an indispensable tool for global labour statistics management.

After this workshop is completed, the team will be able to complete the data model, and create all the structural metadata and upload it to the .Stat Suite platform.

► **Figure 2. LMIS Information flow**



► **Table 2. Modeling template for a single concept scheme**

ID	Name	Codelist Representation	Role
REF_AREA	Reference area	CL_AREA	Core Dimension
FREQ	Frequency	CL_FREQ	Core Dimension
INDICATOR	Indicator	CL_INDICATOR	Core Dimension
SEX	Sex	CL_SEX	Breakdown
AGE	Age groups	CL_AGE	Breakdown
EDU	Highest level of education completed	CL_EDU	Breakdown
ECO	Economic activity (ISIC 1-digit)	CL_ECO	Breakdown
OCU	Occupation (1-digit)	CL_OCU	Breakdown
SIE	Status in employment	CL_SIE	Breakdown
DIS	Disability status	CL_DIS	Breakdown
GEO	Geographical area	CL_GEO	Breakdown
TIME_PERIOD	Time period		TIME
OBS_VALUE	Observation value		MEASURE

UNIT_MEASURE	Unit of measure	CL_UNIT_MEASURE	Core Attributes
UNIT_MULT	Unit multiplier	CL_MULT	Core Attributes
DECIMALS	Decimals	CL_DECIMALS	Core Attributes
OBS_STATUS	Observation status	CL_OBS_STATUS	Attributes
NOTES	Table footnotes		Attributes

2.1.8. Data Preparation and ETL Workshop

This workshop is designed to provide data managers, .Stat system administrators, and data providers from various stakeholders, the required skills to prepare their data in SDMX format and upload it to the central data warehouse. Given the diverse origins of data, the training emphasizes harmonizing formats, reconciling inconsistent attribute coding/naming, and preparing for regular data updates. The ideal duration for this workshop is 5 days, including at least 3 days of hands-on exercises. Furthermore, given the practical nature of the training, an on-site format is highly recommended.

By the end of this workshop, participants should be adept at navigating and exercising the data preparation process for the LMIS platform, ensuring seamless data uploads.

The data preparation for LMIS platform has the typical three phase ETL (Extract, Transformation and Load) process:

2.1.8.1. Extraction

Data sourced from diverse origins undergoes the initial extraction process. The procedure involves: Retrieving data, which may span various formats, and subsequently staging it. Some of this data might be derived. Collaborative engagement between data managers and providers to ensure alignment of indicators with the master plan. Upon alignment, the next step is to finalize a consistent data format with the required breakdowns. In the absence of alignment, the recommendation is to resort to a flat CSV approach, leveraging codelists for data extraction.

2.1.8.2. Transformation

At this phase, data finds its way to a centralized staging area, ensuring that naming conventions are uniformly understood by all stakeholders. The SMART tool can be very useful here as it transforms incoming data into the SDMX-CSV format as well as recodes the records towards the defined reporting attribute. And the mapping files, once created for recoding, are archived for future re-use. For automation, the SMART.cmd tool can be deployed to create batch applications, streamlining the transformation process.

2.1.8.3. Loading

The final ETL process is the loading phase, characterized by channeling the transformed data to the .Stat platform, with a preference for batch loads facilitated by APIs. And ideally, this API-driven transfers from the outbound stage to the platform happening concurrently with the transformation phase.

It is also recommended to institute a scheduler synchronizing with the reporting frequency, which ensures that new data sets trigger the batch application for processing and relocation to an outbound folder.

To maintain informed over upload processes, monitoring tools, especially email alerts from .Stat Suite are important to follow.

2.2. LMIS support from the ILO team

The Office offers multiple layers of support for the development and implementation of LMIS from both the STATISTICS team at headquarters and regional advisers. While the specifics can vary based on individual country or regional needs and the evolving priorities of the ILO, the general support structure includes:

1. **Technical assistance.** The ILO dedicated team provides expertise in designing, developing and rolling out LMIS. This covers all the main activities in the LMIS implementation, including system architecture, data platform solutions, data availability assessment, data modelling and preparation, and other technical tasks.
2. **Capacity building.** Essentially, at least 4 workshops and training sessions are provided to strengthen the capabilities of the involved stakeholders on data production, SDMX & data modeling, Data preparation and ETL, and IT knowledge.
3. **Methodological framework.** Standardized framework has been developed to guide countries in their LMIS implementation process and harmonize their data with international standards like SDMX. This ensures consistency, comparability, and best practices are adhered to.
4. **Collaborative tools and platforms.** Specific data toolkits and software solutions have been developed inhouse or shared by other international communities, which aid in various aspects of data collection, formatting, uploading, and analysis.
5. **Stakeholder engagement.** The ILO team also assists countries in identifying and engaging with essential stakeholders, ensuring that all relevant parties are involved in the LMIS project. This can involve setting up governance structures, operational roles, and more.

2.3. LMIS Toolkit

As it has been mentioned, a LMIS aims to the production, storage, dissemination and use of labour market related information and results. Those constitute the core phases of a statistical process, as defined by the Generic Statistical Business Process Model (GSBPM).

Therefore, the implementation of a LMIS will require processes and tools, mainly for data collection and processing, and for storage, management and dissemination of both data and related metadata, but should not be difficult to integrate in any statistical production environment. A set of open source and free to use tools are provided and supported by the ILO for the implementation of the different components.

LMIS' indicators are to be produced from different data sources (See 0). Depending on the level of integration with the production system, some transformations may be required in this source data, either to compute the indicators from microdata or to transcode some of them to match the coding scheme of the repository. For both functionalities, **ILOSTAT SMART** (Statistical Metadata-driven Analysis and Reporting Tool) is provided by the ILO at no cost.

For reference metadata management and exchange, the standard DDI template provided by IHSN and the associated Metadata Management Toolkit, also available at no cost, are suggested. It is also possible to define an ad-hoc metadata template for the LMIS using .

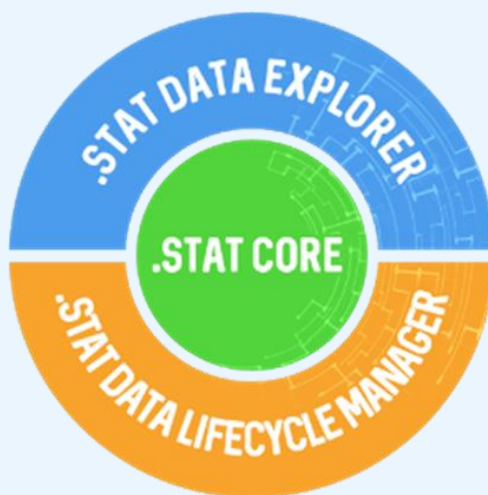
2.3.1. Repository of Indicators

The tool recommended for storage and dissemination of LMIS indicators is **.Stat Suite**. This powerful platform is available for those countries implementing LMIS through an agreement between ILO and OECD and the Statistical Information Systems – Collaboration Community (SIS-CC).

Amongst many **reasons** why .Stat has been selected as the tool for implementing a LMIS, it worth mentioning:

1. **High quality product:** .Stat is one of the most advanced statistical information systems' platform currently used in the official statistics community. Its architectural design and development process follows the recommendations and best practices in application lifecycle management to obtain a robust and reliable product.
2. **Affordable investment:** Under the “umbrella” of ILO’s membership to the SIS-CC, a country implementing a LMIS can use the product and receive first level support and free upgrades. The only investment required to the country are the expenses associated to the deployment of the platform and training on .Stat administration and data/metadata management.
3. **Community values:** The SIS-CC promotes a series of values that are aligned with ILO principles, like Partnership (Collaboration rather than a vendor/client relationship), Transparency (Information openly and transparently shared among members), Commitment (To respecting the coordinated work plans put in place), Industrialisation (Outputs developed according to best practices in application lifecycle management), and Standards (Foster and promote internationally defined standards, such as [SDMX](#), [GSBPM](#), [GSIM](#), and [CSPA](#)).
4. **Sustainability:** The collaborative approach for development, and the number of institutions using the software minimize the risk of support or further development being interrupted, an inconvenient situation that unfortunately is quite common when contracting external developers.

► .Stat Suite main modules



► .Stat Suite modular architecture

The architecture of .Stat Suite is composed by three modules:

- **.Stat Core:** In the centre of the architecture, includes the functions related to data and metadata storage, configuration and the SDMX, Share and Search web services.
- **.Stat Data Lifecycle Manager (DLM):** As already mentioned, the DLM is the “backoffice” interface for data and metadata management.
- **.Stat Data Explorer (DE):** The DE, entirely composed by Reusable Components for the Web (RCW), is the user’s interface to search, visualize (in several formats) and share LMIS data.

.Stat provides four main functions:

1. **Data Upload:** The Data Lifecycle Manager (DLM) is a front-end application to load and process data into the Data Warehouse. Data can be in csv, Excel or sdmx format.
2. **Data Storage:** Based on Microsoft SQL server and a standard star schema data warehouse technology.
3. **Data Exit:** A single exit point serves all outputs from the Data Warehouse exposing the data to several dissemination tools through a set of Web Services to Search data, Visualize and Share results. SDMX based web services allows interfacing with a number of re-usable web components for data visualization and reporting.
4. **Data Analysis:** .Stat allows for the extracting of data to various analytical tools for further data analysis.

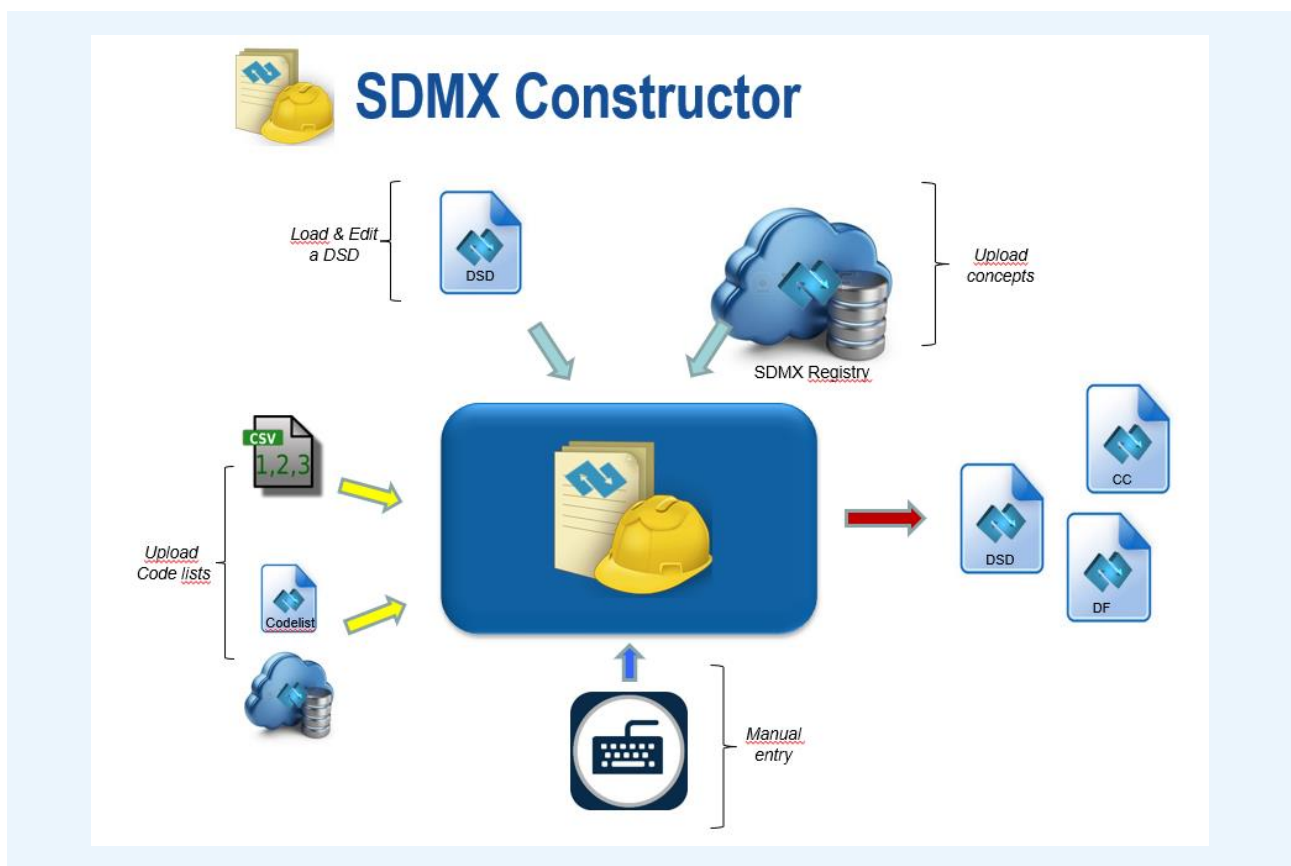
The interaction between both DLM/DE and .Stat Core is 100% based on **SDMX** standard web service, ensuring interoperability for data integration to/from other systems implementing such standard.

2.3.2. Structural metadata preparation

The **SDMX Constructor** allows the creation and edition of the main SDMX structural metadata artefacts (DSD, Codelist, Dataflow, etc) according to the data model defined.

It operates at the structural data modeling and preparation phase, acting as a backend interface for direct interoperability with the .Stat DLM through its SDMX API entry-point. Within this system, existing artifacts in the DLM can be fetched for both review and modification, while freshly designed or modified artifacts can be effortlessly uploaded through the API.

► SDMX Constructor

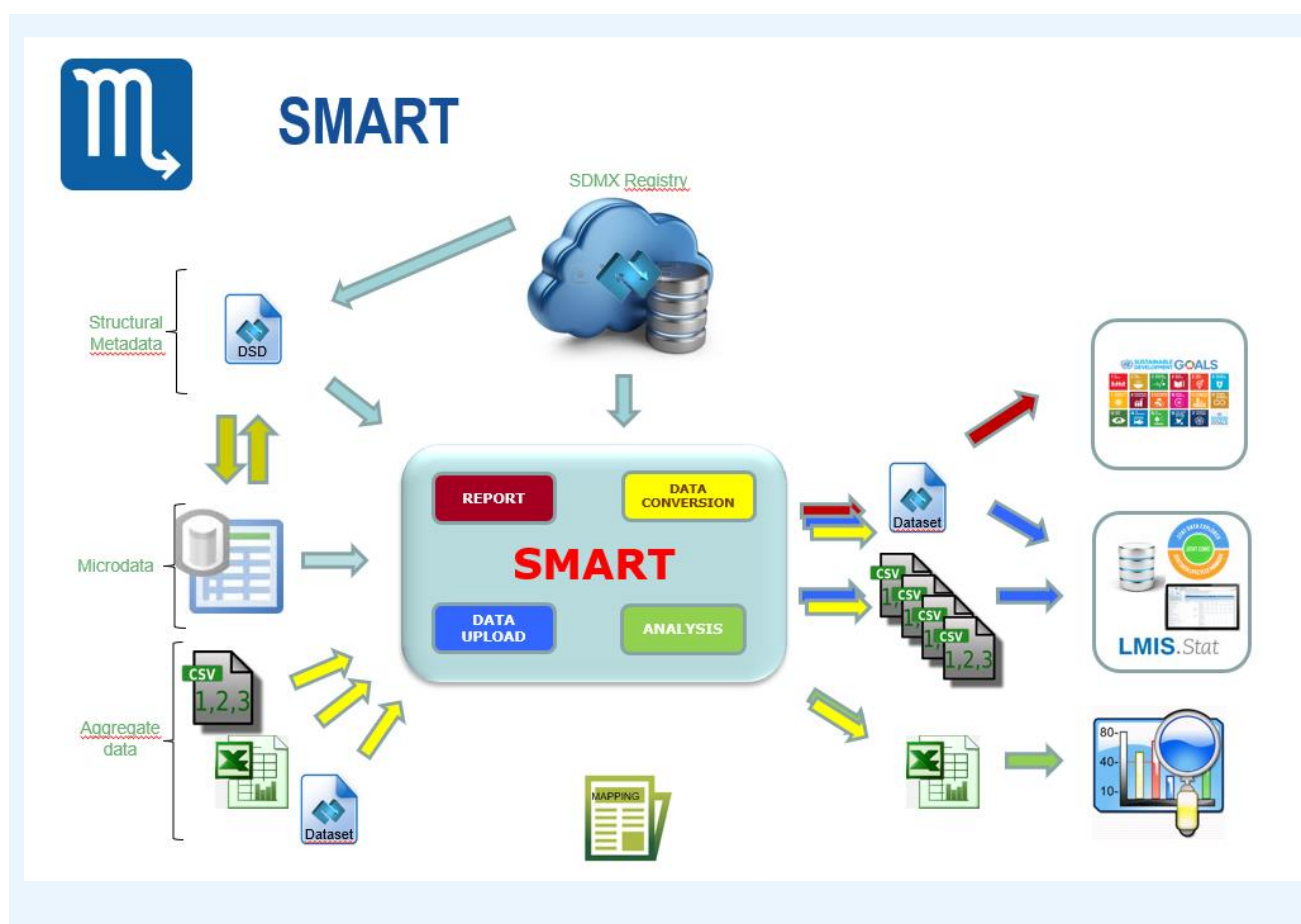


As indicated in the diagram, the conceptual design and data modeling falls predominantly on statisticians and data managers. They initiate the process in Excel Worksheets with the modeling template, preparing common concepts/code lists, defining indicators with their respective breakdowns, and assorting indicators based on thematic topics. Subsequently, system administrators or data engineers are responsible to craft the corresponding SDMX artifacts using the SDMX Constructor. This transition is streamlined: items for concepts and code lists can be transferred directly from the Excel inputs via simple copy-paste operations. The newly integrated Editor – Table Modeler further simplifies this by allowing the creation of DSD, data flow, and content constraints for tables through intuitive drag-and-drop actions. Additionally, with the CategoryScheme Editor, hierarchical categorizations can be established, mirroring the grouping principles outlined in Excel.

2.3.3. Data collection and formatting

ILOSTAT SMART, the multipurpose statistical processor and transcoder developed by ILO, is compatible with current and future versions of .Stat, serving the purpose of data and metadata preparation for uploading to .Stat.

► SMART



Using SMART, the definitions of the indicators are downloaded from the Repository using SDMX or are received in a SDMX-ML file. Based on such definitions, the user creates the mapping of each concept in the tables with the variables in the input file, which can be either microdata or aggregate data.

In case of multi-dimensional Excel tables, SMART is able to “flatten” the structure and load the data just by signalling the table columns and rows headers by painting the corresponding cells.

Once the mapping has been established and the basic aggregation rules defined, SMART will generate the output in the right format required to update an LMIS.Stat system, or to report to ILOSTAT or the SDG collection agency. This mapping can be saved for future re-use.

It can also generate Excel reports for pre-analysis of the outputs, for example to decide which variant of a classification to use based on cases coverage.

SMART provides direct upload of datasets to the .Stat Suite datawarehouse to facilitate the data production of indicators, not only for the LMIS, but other reporting needs as well.

SMART takes the dataflow (and its associated DSD) to define the output data structure, and also the LMIS table directly from Excel as the data input. After applying the mappings between the input data and the output structure, it converts the data into SDMX-csv, which can then be directly pushed to DLM via transfer API.

2.4. Regular LMIS training

From 2020 to 2023, the International Training Centre of the International Labour Organization (ITC-ILO) in Turin, in collaboration with the ILO Department of Statistics, has been offering the course "Institutional Capacity Building for Effective Labour Market Information Systems (LMIS)." Over the years, this course has evolved to meet the dynamic demands of constituents in relation to labour market information systems. The course has consistently aimed to equip participants with a solid understanding of LMIS functions, components, and applications. It emphasizes that an efficiently functioning LMIS is crucial for designing, implementing, monitoring, and evaluating evidence-based employment and labour market policies.

More specifically, the course has maintained specific learning objectives:

- 1. Understanding LMIS Components:** Participants gain insights into key LMIS components, including data collection, information repositories, analytical tools, and institutional arrangements.
- 2. Understanding LMIS Functions:** The course fosters an understanding of critical LMIS functions, such as labour market analysis, policy monitoring and reporting, and coordination among actors and institutions involved in labour market information.

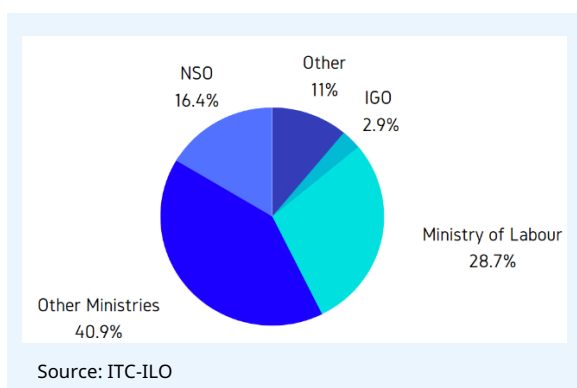
► Participant Diversity in LMIS Capacity Building

The participant diversity in LMIS capacity building can be seen across three pillars:

- **Gender Equality**
- **Multifaceted Professional Backgrounds**
- **Global Distribution**

The gender distribution of participants in the program reveals an almost equal representation of both females and males, with **186 female participants and 222 male participants, totaling 408 individuals**. This balanced participation is a testament to the program's commitment to inclusivity and diversity, fostering an environment where individuals from all backgrounds and genders can come together to enhance their understanding of Labour Market Information Systems (LMIS).

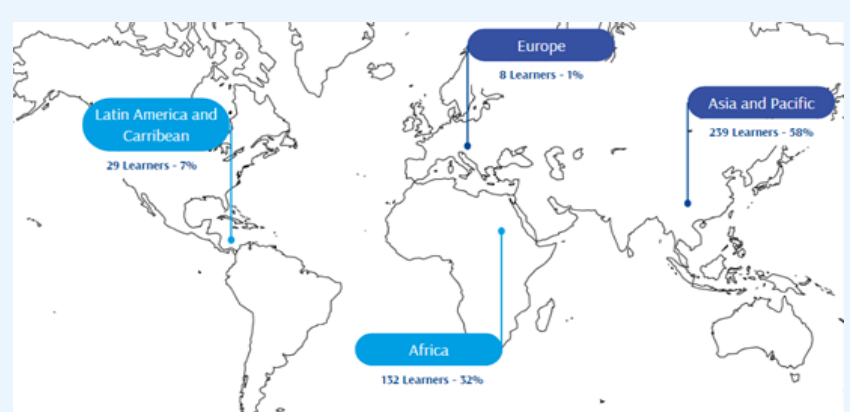
► Participants by sector



Participants in the course are a dynamic blend of professionals representing various sectors. From Ministries of Labour, National statistical offices (NSO), and other ministries to International Organizations (IGO) and beyond, this diverse group of learners forms a powerful mosaic of knowledge and expertise.

► Participants by geographic region

The course's ability to draw participants from across the world underscores its relevance and importance in enhancing labour market information systems on a global scale. It also fosters a rich and varied learning environment where participants can share insights and best practices from their respective regions.



Source: ITC-ILO

3. Overview of LMIS implementation projects

3.1. Africa

3.1.1. Botswana

The LMIS project is managed by the Human Resources Development Council, with the participation of several stakeholders. The project started in April 2020 and the MoU was signed in August. The Data production workshop took place in March 2021 and the SDMX and data modelling workshop in May 2021, both in virtual mode. In May 2022, the Data preparation and ETL workshop was delivered in Gaborone in presential mode.

In the IT track, it started working with HRDC IT team in September 2020. In May 2021,.Stat Suite deployment started with source code approach; in August 2021, a .Stat system upgrade was performed.

Fast-forward to May 2023, training and knowledge transfer on IT team was conducted during a workshop in Turin, then September 2023, another round of .Stat upgrade was completed again, with the latest release at the time.

They have completed all the trainings and released the Master Plan in September 2022. They are currently finalizing the upload of data with everything ready to launch the LMIS.

3.1.2. Cape Verde

The presentation of the LMIS implementation project was delivered to the Observatório do Mercado de Trabalho (OMT) of Cape Verde in June 2020. On November 25th, 2020 the MoU was signed.

The project has been advancing very slowly. In 2022 they have made an update of an old diagnostic of data availability published in 2016, which was presented in an event hold in March 2023 where the LMIS project roadmap was also presented to all the stakeholders. This diagnostic was meant to be the input for the Data production workshop, but it has not been possible to organize it because of lack of funding.

3.1.3. Djibouti

This assistance is part of the Better Regional Migration Management (BRMM) Project. The initial presentation to stakeholders was in September 2023 and currently the preparation of the MoU and project document is in progress. There has already been a data availability and institutional situation assessment done in 2022, so the data production workshop is expected to take place in December 2023 or early 2024.

3.1.4. Ethiopia

A data availability and institutional situation assessment has been performed by a consultancy firm during the first phase of the Better Regional Migration Management (BRMM) Project. The validation workshop took place in Addis on May 2022 and the LMIS Team was invited to deliver a remote presentation on integration of Labour Migration data in LMIS. It is expected to start the implementation sometime in 2024.

3.1.5. Lesotho

Lesotho Ministry of Labour sent an official request for LMIS implementation in February 2022, but then asked to postpone it until after LFS 2023 is completed.

3.1.6. Madagascar

Instat, the national statistical institute of Madagascar, sent an official request for LMIS implementation. The Data production workshop will take place in the coming months.

3.1.7. Malawi

The Southern African Migration Management (SAMM) Project is supporting the implementation of the LMIS in Malawi; thus, Labour Migration indicators are to be included. The presentation meeting took place on March 10th, 2023. Since then the Ministry of Labour, Youth and Manpower Development is working on the Project document.

3.1.8. Morocco

The LMIS project started back in March 2020 with the ONMT (Observatoire National du Marche de Travail) and has advanced quite slowly since then due to the COVID-19 pandemic. In the beginning of 2022, the “Towards a Holistic Approach to Labour Migration Governance and Labour Mobility in North Africa-THAMM” project contacted us in order to integrate Labour Migration indicators to the LMIS. This project is developed by the HCP (Haut Commissariat au Plan). A workshop with the participation of Labour Migration stakeholders took place in May 2022 to introduce them the LMIS; on 3 – 4 November 2022, a new workshop was carried out for the validation of the Data availability assessment and introduction of the LMIS implementation project. Next steps are the preparation of the updated Project Document and the Data Production Workshop, which is planned to take place later this year or beginning of next year.

3.1.9. Mozambique

The project started in May 2020, advancing quite slowly because of the pandemic.

The Data Production Workshop was completed in June 2023. They are currently working on the Masterplan.

Communication with IT team started in July 2021, with a kickoff meeting, presentation and demonstration of .Stat Suite. In April 2022, we started installation of .Stat Suite, and completed in May 2022. The system was tested and working fine from the server.

3.1.10. Namibia

The Office engaged with NSA Namibia long ago, since 2018. The first mission allowed to deploy .Stat version 7 and provided training and knowledge transfer to the IT staffs at NSA. This version of .Stat was never released to production.

Fast-forward to 2021, we started working with NSA again to bring the team up-to-speed with the new version of .Stat Suite, which is a completely new design and architecture from the previous version. In November 2021 the Data Production Workshop was undertaken in virtual mode.

The SDMX and Data Modelling Workshop took place with 6 sessions in February 2022. Each session lasting 2 hours. Simultaneously, .Stat Suite deployment started and completed the process in March, with some technical and network challenges.

In June 2022 the Data Preparation and ETL Workshop took place during 5 days in presential mode.

Over the past 2 years, there were multiple requests from NSA for technical support related to .Stat. In May 2023, NSA participated in a workshop held in Turin, whit a fruitful knowledge transfer to the IT team with detailed explanation on the system architecture and configuration.

During the workshop in May, we also took the opportunity to upgraded the entire system to the latest version of .Stat at the time. It was tested and working well inside NSA network.

However, NSA is still facing technical difficulty to open its firewall and allow public access to the Data Explorer of .Stat. Pending support may be necessary in coming months to finalize and release .Stat into production. In the meantime, the NSA team is populating the platform aiming to launch the LMIS soon.

3.1.11. Nigeria

There have been several activities related to LMIS implementation in Nigeria in the last 3 years. A very successful hybrid activity called “Institutional Capacity Building for Effective Labour Market Information Systems (LMIS)” was carried out in October 2022 in Abuja with the sponsorship of the “Promotion of Employment in Nigeria – PEN” project.

This year the International Training Center of the ILO (ITC-ILO) has been approached by GIZ and Africa Foresight Group seeking for specific training in LMIS implementation to be delivered in the framework of the SKYE project. This project is implementing labour market information systems at different states in Nigeria.

After a presentation of ILO’s implementation roadmap to GIZ, they have agreed to do a presentation to the Federal Minister of Labour and Employment (FMLE) and propose them to adopt ILO’s methodology. This presentation took place on September 26th and got clearance from FMLE for ITC-ILO to prepare a proposal for the development of the capacity building activities during 2024.

3.1.12. Seychelles

Seychelles requested assistance for the implementation of the LMIS with the leadership of the Ministry of Employment and Social Affairs, the close collaboration of the National Bureau of Statistics and the Department of Information Communications Technology, and the participation of more than 10 institutions. They completed the Data Production Workshop in March 2022, and published a very well-designed Master Plan. The SDMX and Data modelling workshop took place in Victoria from 14 to 16 November 2022.

IT focal points have been identified and planned to initiate the deployment procedure by mid of October, 2023.

The Data preparation and ETL workshop, including a recap of data modelling, is scheduled for the week of 20 – 24 November 2023.

3.1.13. South Africa

The LMIS project at “Department of Employment and Labour – DEL” of South Africa started in March 2020, following an assessment mission in October 2019.

The Data production workshop took place in June 2021 in virtual mode, as well as the SDMX and data modelling workshop in November 2021.

After the COVID-19 pandemic, the project developed very well since the beginning of 2022, with the involvement of Statistics SA and a greater support from the IT area at DEL. In May 2022 a new edition of the SDMX and Data modelling workshop was delivered in Pretoria, followed by the data preparation workshop.

IT track started in September 2020, with a kick-off meeting with IT team. Deployment started and completed in March 2022, after server infrastructure became available.

A year after, in March 2023, we worked with IT team on the upgrade of .Stat. The system was successfully upgraded to the latest version at the time.

In May 2023, South Africa delegations attended LMIS workshop in Turin. With participation from IT team, we transferred all the knowledge on system architecture, configuration, and management to the participants.

In the past 2 years, numerous remote technical assistances were requested on data modelling and upload, and system troubleshooting.

Currently, with all activities completed and the platform deployed, they are populating the datawarehouse. The LMIS should be launched soon once enough data is uploaded.

3.1.14. Uganda

The LMIS project in Uganda suffered the COVID slowdown but restarted in March 2022 working on both the statistical and IT tracks. The Data production workshop took place in August 2022, covering the labour market data sources and derived indicators. While the Master Plan was being prepared, there was a complementary activity for the Data Production workshop in March 2023, in order to include Labour Migration, since Uganda is one of the countries in Better Regional Migration Management 2 (BRMM2) project. Once the master plan is completed the SDMX and Data modelling workshop has been scheduled for 4th quarter 2023.

It also planned to take this opportunity to work with the IT team onsite and deploy .Stat Suite. Currently there are communications with IT team in the preparation of server infrastructure. A mission is planned in November 2023 for the .Stat Suite deployment, as well as SDMX and Data Modeling workshop.

3.1.15. Zambia

LMIS implementation project in Zambia started in April 2023 with a virtual Knowledge Sharing Meeting with the participation of managing staff from the Ministry of Labour and Social Security (MLSS), the national statistical office ZamStat and the Zambia Qualifications Authority (ZAQA).

The Data Production Workshop, including labour migration and skills indicators was completed in September. They are currently working on preparing the Master Plan.

3.1.16. Zimbabwe

A formal request to provide assistance for the implementation of LMIS was received in May 2022. Since then, there have been several virtual meetings to guide them in the preparation of the Project document and MoU, which has been submitted for final revision by the end of October 2022. As soon as the Project Document was signed and considering that the Regional Statistician had already completed the data

availability assessment, the Data Production workshop was held in May 2023 including labour migration indicators. They are currently working on preparing the Master Plan.

3.2. Arab States

3.2.1. Jordan:

After a first assessment mission in August 2019, the project was on hold during the Pandemic. By the end on 2021 a new phase started with the participation of GIZ that is running a development project in the Ministry of Labour (MoL). GIZ team in Jordan is going to collaborate with the Office in the implementation of the LMIS. They have a direct request from the Minister.

There was no real advance during 2022, but in 2023 the Secretary General gave priority to the LMIS implementation.

In March 2023 a new mission allowed to hold meetings with MoL authorities and stakeholders, assess stakeholders' capacities, and agree on timeline and activities (formalization of the work between ILO and MoL Jordan). After that, the LMIS task force was put in place, the Data coordinator and System administrator were nominated, and data providers identified.

The Data production workshop has been completed in May 2023, and after a first draft of Master Plan has been submitted and reviewed, now continuing with its update.

The MoU has been agreed but still waiting for counter signature of MoL. Nevertheless, there are ongoing preparations for the Data modelling and SDMX workshop in the coming months.

On the IT track, there were few contacts from MoL Jordan since early 2022. Finally in July 2023, we had a coordination meeting with technical participants from MoL and the Ministry of Digital Economy and Entrepreneurship – MoDEE, IT service provider for all governmental institutions. In September 2023, it started .Stat Suite deployment through remote assistance and access. One dedicated SQL server and one Windows application server were prepared by MoDEE. Currently working on the installation of .Stat components with Kamal from MoL.

Expected completion of installation in the beginning of October 2023.

3.2.2. Kingdom of Saudi Arabia:

In February 2019 a mission was conducted to assess the current status of data sources and satellite systems for the implementation of an LMIS in Saudi Arabia. The project started with a new mission in February 2020 to provide training on SDMX and agree on the steps for the implementation of an LMIS in Saudi Arabia in the Ministry of Human Resources and Social Development (MHRSD). The outbreak of the COVID-19 pandemic in March made it very difficult to advance.

In October 2020 there was a webinar on "Introduction to data modelling and coding good practices", followed by a session with participants from MHRSD and the General Authority in Statistics – GASTAT - to demonstrate the modelling of a statistical table in SDMX and upload to .Stat Suite.

From June to December 2021, an Arabic-speaking consultant with extensive experience in SDMX data modelling was hired in order to overcome the language barrier in working with MHRSD team to develop capacities in data modelling. That allowed to prepare some structural metadata and upload some data to the LMIS.Stat platform.

However, strict rules established by the IT security policies have been a big obstacle for the development of the LMIS. The installation of the platform has been very cumbersome as it is explained below, and after the deployment, it has not been easy to access even for MHRSD staff.

In May 2023 a new LMIS project manager was appointed at the MHRSD, starting what has been designated as phase 2. A mission to Riyadh was conducted in August 2023 in order to meet with managers and technicians at MHRSD to address the challenges they have in the IT and data modelling areas of the LMIS project implementation. The issues related to IT and networking security policies were confirmed and some agreements have been done aiming to mitigate their effects.

From the IT point of view, interaction with MHRSD IT team started in February 2020, with a mission to Riyadh. During the mission, .Stat Suite system architecture and requirements to the IT team were presented, and it was agreed that the deployment could start once they prepared all necessary infrastructure.

In September 2020, we started working with IT team remotely to install .Stat Suite on the server provided. However, we faced numerous challenges due to a very strict network security policy, therefore, we spent significantly much more resources and time on the deployment comparing to system installation in other cases. Finally, a working system was created in December 2020.

Through 2021, multiple remote technical support sessions were requested by MHRSD and IT, and we also took the opportunity to upgrade the initial installation to a newer version at that time.

Currently, the system is pending for another round of upgrade, and we started working with MHRSD and IT team again aiming to resolve the technical challenges related to phase 1.

3.3. Asia-Pacific

3.3.1. Brunei Darussalam

Brunei Darussalam LMIS was among the earliest projects initiated by ILO in the Region, since about 2010, prior to our current methodology, with an ILO project funded by the country itself. The project ended in 2019 with a system not very close to what we would call an LMIS today, but there is an LMIS design, and a project implementation report. A web application comprising the “KILM” indicators is currently available and is regularly updated by the country since then.

3.3.2. Cook Islands

ILO supported LMIS design in Cook Islands thanks to a project that ended in 2020. Those draft designs are available, and countries in the region are hoping that ILO will continue this process (further funding on this has been the issue).

3.3.3. Indonesia

Assessment reports on LMIS were recently done in Indonesia in the framework of an ILO skills project. These reports can be a starting point for ILO support on LMIS. Currently, discussions on the LMIS process are ongoing.

3.3.4. Malaysia

There were several consultations about LMIS implementations during 2021, including an introductory course in April 2021 organized jointly with ITC-ILO and the Skills for Prosperity (SfP) project in Malaysia, with the participation of the staff of the Economic Planning Unit (EPU) & the Department of Statistics Malaysia (DOSM).

The country is continuing with its “LMIAP”, although they did not follow the ILO methodology, but count on ILO technical support on substantive matters.

3.3.5. Papua New Guinea

Papua New Guinea initiated an LMIS design process in 2021 as part of their “LMI Policy 2021 – 2030”, to which the ILO provided technical inputs. While the country has basically no data to populate the LMIS (this being ILO’s main concern), the design is still there and will eventually/hopefully be implemented in the future.

3.3.6. Philippines

Assessment reports on LMIS were recently done in Philippines in the framework of an ILO skills project. These reports can be a starting point for ILO support on LMIS.

3.3.7. Tonga

ILO supported LMIS design in Tonga thanks to a project that ended in 2020. Those draft designs are available, and countries in the region are hoping that ILO will continue this process (further funding on this has been the issue).

3.3.8. Vanuatu

ILO supported LMIS design in Vanuatu thanks to a project that ended in 2020. Those draft designs are available, and countries in the region, in particular Vanuatu, are hoping that ILO will continue this process (further funding on this has been the issue).

3.3.9. Viet Nam

Assessment reports on LMIS were recently done in Viet Nam in the framework of an ILO skills project. These reports can be a starting point for ILO support on LMIS.

3.4. Latin America and the Caribbean

3.4.1. Chile

In March 2019, the National Statistical Institute (INE) launched the first LMIS (known as “SIMEL” in Spanish) after almost 2 years of joint work with ILO for the deployment of a system based in .Stat ver.7.

The system had only indicators produced by the INE, without participation of any other institution in the provision of data, neither the governance of the system.

By the end of 2021, after the COVID-19 pandemic, some conversations started aiming to upgrade the platform to the new .Stat Suite application.

In May 2022 a mission to Santiago was conducted in order to hold meetings with INE (Labour statistics and IT departments) to organize the migration of the current platform to the new version (.Stat Suite) and to introduce the basis of data modelling and SDMX. The mission also met the Ministry of Labour with the aim of establishing data provision agreements for the SIMEL and, eventually, install a federated platform with a node at the MoL. By this time, a Labour Statistics Coordination Board with all the most relevant data producers (Sub secretariat of Labour, INE, Superintendencies of Pensions and Social Security, DT, Sub secretariat of Social Security, SENCE, Labour Observatory, etc.) had started to meet regularly, and became the Governance body for the SIMEL.

In October 2022 a second mission was conducted to deliver SDMX and data modelling training, and build capacities for the migration of data and metadata from the current .Stat v7 to .Stat Suite, including the use of data preparation tools.

During a face-to-face workshop held in ITC Turin in May 2023, the participant from Chile was able to work with ILO technical team on refining the data model and migrating the reference metadata.

On the IT side, in 2022 Chile started preparing for a full system upgrade and data migration to the new .Stat Suite. After a few months of preparation, IT team has made the infrastructure ready for deployment. This round of implementation is on Linux server with docker containers. After working very closely with the IT team, successfully deployed and configured a new environment by May 2023.

Currently, the LMIS Team is assisting INE IT team and providing necessary training on system upgrade and maintenance, as well as evacuating last minute queries on data and metadata preparation. The installation is being finalized for a production release of the SIMEL scheduled for 25 October 2023.

3.4.2. Costa Rica

Authorities has expressed their interest in the project and sent an official request for assistance on September 27th, 2023. It is expected to be able to start working on the implementation from 2024 onwards.

3.4.3. El Salvador

LMIS project with El Salvador was initiated with an kick-off meeting and presentation delivered in June 2020 to the Ministry of Labour and Social Security (MTPS). The Data production workshop was held in virtual mode in February 2021, followed by the SDMX and Data modelling workshop in April. Lastly, in June 2021 the Data preparation and ETL workshop was realized. All these activities were developed in virtual mode due to the travel limitations because of the COVID-19 pandemic.

In parallel, between April and May, an assessment of the quality of administrative registers to be used as statistical data sources was conducted by an ILO consultant.

On the IT track, the focal point was nominated in August 2020, and a kick-off presentation was delivered with IT team in September 2020.

Deployment of .Stat Suite started at the end of October 2020 after IT prepared all necessary infrastructure. El Salvador has their own Keycloak authentication server, so we re-used this existing service.

In November 2020, successfully deployed .Stat Suite from source code, with one application server and a dedicated SQL database server. knowledge transfer and training was done during the deployment process. By end of November 2020, users were able to access the system within their network.

In September 2021, After about 1 year of data preparation and customization of the system, SIMEL is ready for an upgrade before launching the platform to public. The upgrade process started in August 2021 and completed in September 2021. Data was successfully persisted after the upgrade. knowledge transfer and training was again performed during the system upgrade process. Both front-end components and database backend were upgraded to the latest version at that time. SIMEL has implemented customization and branded with new design. The launch of the SIMEL was on December 1st, 2021.

Staff rotation affected the SIMEL operation by the end of 2022, posing some difficulties to maintain both the platform and the data and metadata in it. The MTPS requested an extension of the project for a second phase which formally started with a mission conducted in August 2023 to train new members of the data modelling team and advice on several aspects related to the new SIMEL Phase 2 (Reference metadata, new modelling methodology and tools, .Stat Suite upgrade, etc).

A new IT focal point has been nominated and is now working closely with ILO technical specialist for another round of system upgrade. This time .Stat will be upgraded to docker containers on a Linux server (Ubuntu). Initial knowledge was transferred to the IT team about containerized architecture and configuration. SIMEL is working on creating the containers and configuring them. Assistance and support will be provided as needed. We are expecting technical support in the coming weeks, and to finalize the upgrade to docker environment by end of 2023.

3.4.4. Guatemala

Guatemala requested assistance for the implementation of a SIMEL in August 2022, there was an initial meeting on September 26th, 2022 with the Ministry of Labour and Social Security (MTPS). According to the Director of Labour Statistics of the MTPS, the implementation of a SIMEL in the MTPS is a priority for public policy since 2016, but for different reasons has not been possible. There is now a priority to strengthen the Labour Statistics Division, having been unified by the end of 2021 with the Labour Market Observatory, thus avoiding the pre-existing duplication of functions. They have good communication with the Instituto de Estadística, which produces the ENEI (Enc. Nacional de Empleo e Ingreso). There is a coordination table for labour statistics (OCSE) which is not working regularly but SIMEL should reactivate it. There are technicians from each relevant institution, like INE, MTPS (head of the OCSE for Employment), Min. of Economy, Banco de Guatemala, etc.

Although there has been no advance after this meeting, the project is expected to start in 2024.

3.4.5. Panamá

The project started with a presentation of the project in June 2020, but it was until September 2021 that a team was designated at MITRADEL (Ministry of Labour) to carry on the project. No activities took place until August 2022 the ILO appointed a consultant to aid MITRADEL in finalizing the MoU and Project Document, perform the institutional situation and data availability assessment, and conduct the Data Production workshop, which took place in October.

A draft Master Plan was prepared by the consultant but has not been completed yet. MITRADEL has serious difficulties in appointing people in charge of the project on a permanent basis; no Data Manager has been appointed yet, which prevents any activity to be carried out.

On August 28th, in a meeting in Panama with MITRADEL and several data providers, the director of the Labour Market Observatory and the Secretary General of the Ministry confirmed their interest in the project, despite their difficulties to hire qualified staff.

3.4.6. Paraguay

New government authorities took over from August 2023 and Minister of Labour has strong interest in the project. They expect to sign an MoU with ILO by the end of this year to start technical stages of the project in early 2024.

3.4.7. Uruguay

LMIS project with Uruguay was initiated in March 2022, initial kick-off meeting and presentation was delivered in April 2022, with participation from IT team. The Data production workshop took place between 09 and 20 May 2022, with 6 in-person sessions. In the following two weeks both the SDMX and Data modelling workshop and the Data preparation and ETL workshops were delivered during a mission.

Several follow-up virtual sessions took place between June and October 2022 working mainly on data modelling. In the last week of October the technical teams of the Ministry of Labour and Social Security (MTSS), the social security institution (Banco de Previsión Social - BPS) and the National Statistical Institute (INE) worked during the 24th, 25th, 27th and 28th of October in the revision of the data model and preparation of the structural metadata and data.

In January 2023, successfully deployed .Stat Suite in hybrid mode, with components and core services running in docker containers and database created on a dedicated SQL server. A complete knowledge transfer and final assessment of the .Stat Suite deployment was performed in May 2023. During a face-to-face workshop held in ITC Turin, participants from Uruguay were able to work with ILO technical team on fine tuning and configuration adjustment, as well as refining the data model.

On September 6th, 2023 the SIMEL was launched. It is a first phase with the basic set of indicators.

3.4.8. Perú

The first presentation of LMIS assistance project was delivered to authorities and staff of the Ministry of Labour and Promotion of Employment (MTPE) in November 2018. A change of authorities put the project on hold until October 2020 when a new presentation was done. That was the start of a project developed fully under the particular conditions of the COVID-19 pandemic, with all the trainings and assistance delivered in virtual mode.

The Data Production workshop took place in April 2021, and an SDMX, Data modelling and ETL workshop was conducted in several virtual sessions during November. These training activities were complemented with multiple remote assistance sessions for data modelling and data preparation.

Unfortunately, in the moment that the team had started uploading the data, there was a change of authorities, and they changed of the people in charge of the project, which is on-hold until today.

On the IT track, communication with IT team started as early as December, 2020. After the server and infrastructure were prepared, the actual deployment of .Stat Suite started in May 2021, and completed in June. A working system with 2 servers was tested at the end of installation.

Through 2022, interactions with IT team continued with technical support activities. In August 2022 and January 2023, ILO assisted the IT team on two rounds of system upgrade to bring the system and environment to the latest versions at the time.

3.4.9. República Dominicana

In the framework of the FORMITRA project, ILO has recently engaged a team of consultants to develop a system of performance indicators for the Ministry of Labour. This work included an exhaustive review of the administrative registries in the MoL to extract the indicators, as well as the conceptual and technical design of a system to produce a dashboard to display them.

On the other hand, the MoL has expressed their interest in implementing a SIMEL since May 2021, although it has not been part of their priorities, and in parallel, the Labour Observatory and the Employment Directorate in the MoL have also plans to implement a dashboard with some LMI.

In this context, the LMIS Team has worked together with the consultants in order to leverage their review of the administrative registries to evaluate the possibility of calculating LMI. Besides, a mission to Santo Domingo at the time the final report was handed over to the authorities allowed to have meetings with different groups interested in similar information systems (the performance indicators dashboard, the Employment dashboard by the Observatory and the future SIMEL) as well as with the responsible of IT, highlighting the benefits of hosting all these systems in a repository based in .Stat Suite. The implementation of the SIMEL will be conditioned by the results of the upcoming presidential elections in May 2024.

3.4.10. CARICOM

Data preparation and ETL workshop has completed, transitioning into the phase of data collection and uploading. CARICOM aimed to first acquire LMIS indicators from member states in Excel or CSV formats. Subsequently, the consolidation and centralized uploading will be managed by the CARICOM Single Market and Economy Secretariat (CSME).

Interaction with CARICOM started as early as 2015, the first round of LMIS implementation took place in 2016, with the assistance from ILO Caribbean office. During this time period, .Stat version 7 was deployed on premises and training was provided in a technical workshop in Bridgetown, Barbados.

Fast-forward to January 2022, CARICOM requested another round of review and upgrade of their current system to .Stat Suite. This time, we assisted IT team on the deployment using docker containers in Amazon cloud environment. Technical support is currently in progress with a production release foresee in 2024.

4. Concluding remarks

The growth in the number of countries requesting assistance from the Office for the implementation of Labour Market Information Systems has been sustained over the last 5 years, even in times of the COVID-19 pandemic. This confirms that governments consider timely and accurate labour market information as a necessity for the formulation and monitoring of public policies.

The implementation roadmap has been structured to focus on capacity building to ensure the sustainability of the project, rather than on obtaining short-term results through processes that fail to be replicated locally once the assistance project comes to an end.

Likewise, the tools provided, in particular .Stat Suite, are open source and supported by a community of official statistics producing institutions (SIS-CC) that is growing in number and importance of its members. This also ensures sustainability, as there is no risk of the LMIS being threatened by lack of support for the application that provides the information storage and dissemination services, something that could happen if it relies on its own budget or even worse, on a service provided by commercial for-profit companies.

It is also worth highlighting the data modelling methodology developed in the Knowledge Management Solutions Unit with the objective of taking advantage of SDMX features to facilitate data harmonization. The elaboration of a Master Plan that consolidates all the necessary information for the definition of the structural metadata; the shared work on the modelling templates that allows to define in a very simple way a unique "ConceptScheme", unified codelists and the detail of the statistical tables that the system will contain; and the functionalities of the SDMX Constructor that use this information, constitute a very straightforward path from the conceptualization of the LMIS content in the Master Plan to the structural artefacts loaded in the .Stat Suite repository.

However, some steps in the implementation process are still perfectible. The Master Plan, a fundamental input for the data modelling workshop, is not always delivered on time with required information. More time should be planned towards Data Production Workshop so that participants could fully understand the relevance of this document.

In the structural metadata preparation, the rigid SDMX information model, a feature from which the methodology benefits, generates setbacks due to integrity rules that prevent modifying artefacts referenced by other artefacts. Very often a small error in the data model, for example the attachment level of an attribute in a DSD, is extremely difficult to correct as it implies changing the version of the DSD and therefore the references in all the dataflows that use it, which can be dozens; these in turn are referenced by the ContentConstraints, which must also be modified. The upgrade of the tools to SDMX 3.0 will allow the application of semantic versioning, which includes wildcarded references, making this type of minor changes possible without affecting the reference chain.

The compilation and preparation of referential metadata needs also to be improved. More time will be allocated to this topic in the workshops, and the SDMX Constructor is going to incorporate new feature to facilitate the production of this important information. Besides, a new metadata authoring tool is planned to be integrated to the toolkit.

The possibility of automating data updates is also a common need once the LMIS is in production. The new "action" codes for data maintenance in SDMX 3.0, combined with some of the features of SMARTcmd, the batch utility for data transformation and upload, will provide such capabilities in the near future.

It is also quite obvious that LMIS requires the implementation of a portal to present the information in a more user-friendly way than those default visualizations offered by the Data Explorer. Dashboards and infographics allow information to be conveyed in a much clearer and understandable way for non-technical users. While using Power BI to produce graphs and dashboards is an alternative thanks to the existence of an SDMX connector, it is sometimes complicated to use for beginners, and the publication of the graphs in a controlled environment (not public access) requires licensing. It is the intention of the Office to incorporate into the LMIS toolkit a dynamic dashboard generator based on SDMX to produce graphs easy to embed in any web portal.

Last but not least, a closed-loop follow-up and review exercise would be very welcome and valuable not only for our constituents, but also for ILO teams to continuously improve the LMIS project implementation and methodology. Therefore, making LMIS a strong and sustainable platform to benefit all of us.

In summary, it is envisaged that LMIS implementation projects will continue to grow in the coming years, while the Office will continue working to improve the methodology and tools with the aim of making it easier for the constituents implementing the systems, as well as improving their end-users' experience, and ultimately enable evidence-based labour policies to be defined and favour transparency.

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