



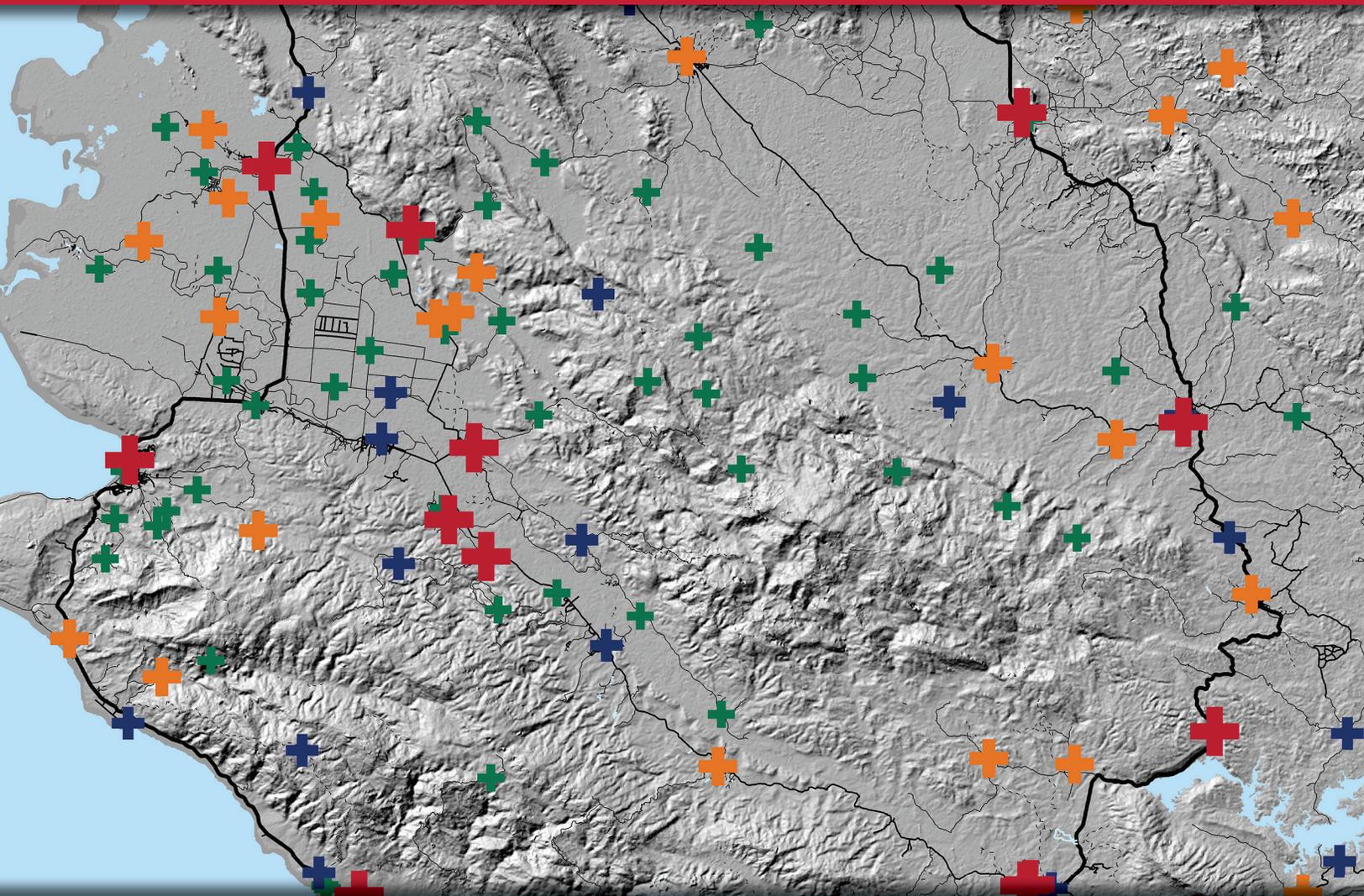
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World Health Organization

MASTER FACILITY LIST RESOURCE PACKAGE:

Guidance for countries wanting to strengthen their MFL



January 2018

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OVERVIEW OF THE MFL RESOURCE PACKAGE

The Master Facility List (MFL) Resource Package was developed to guide countries through the process of establishing or strengthening their MFL. The MFL Resource Package describes the various elements that must be in place to have a functional MFL including a governance structure; a comprehensive, up-to-date facility list; and a software platform to house and share the MFL data. It discusses key decisions that must be made during the planning and implementation phases; describes best practices for establishing, maintaining, and sharing an MFL; and summarizes resource needs. Additionally, the MFL Resource Package includes case studies from various countries, and links to tools and practical resources that will be helpful to the implementation team.

INTENDED AUDIENCE

The MFL Resource Package is targeted at individuals and organizations involved in the establishment of an MFL, whether at the planning stage or during implementation. The audience may include ministry officials, implementing partners, program managers, and donors interested in understanding the process and requirements for establishing a fully functional MFL, one that is complete, up-to-date, and capable of integration with other information systems.

HOW TO USE THE MFL RESOURCE PACKAGE

The MFL Resource Package consists of a series of 10 modules, each of which addresses a specific aspect of MFL implementation. The modules can be used together or individually, depending on the specific needs of the country and where it is on the development spectrum in achieving a fully functional MFL. Depending on a country's phase of MFL development, particular modules (or sections of modules) may be more relevant than others.

The first page of each module includes a summary of the module contents, key audiences for the module, and actions that should be completed before you implement the activities set forth in the module. The modules included in the resource package are:

1. Introduction to the MFL
2. MFL Assessment
3. Key Considerations for the MFL
4. MFL Governance
5. MFL Data Content
6. Geographic Coordinates in the MFL
7. Establishing an MFL Dataset
8. Establishing a Facility Registry Service
9. Maintaining the MFL
10. Sharing the MFL

The development of an MFL is not a linear process. Various elements may be developed simultaneously or in different phases and decisions made at one time may require revision as things develop in a given area. The resource package uses cross-referencing in the modules to relate guide the reader through various paths toward development of a MFL.

Additional resources are linked or included in the document. The resources were developed by a group of partners who agreed to share them to aid others involved in MFL implementation.

MFL RESOURCE PACKAGE DEVELOPMENT PROCESS

The MFL Resource Package was developed with input from a team of professionals who, in various capacities, have been involved in the development and management of MFLs in different countries. The content builds on previous MFL guidance developed by the World Health Organization, MEASURE Evaluation, and OpenHIE. This MFL Resource Package seeks to expand and update that guidance and to make it accessible to a global audience.

Development of the Resource Package included: (1) a literature review, (2) a series of in-depth interviews with key informants, (3) a three-day meeting attended by various experts—to discuss the content and structure of the guidance document—and, (4) a thorough review process. The content reflects the experiences of government officials involved in the establishment and daily management of MFLs, and implementing partners who have supported various MFL strengthening activities including harmonizing facility lists, conducting data quality audits, adding geographic coordinates, and creating facility registry services to render the MFL interoperable. A full list of contributors is included in the Acknowledgements section.

ACKNOWLEDGEMENTS

The MFL Resource Package was developed with input from professionals who, in various capacities, have been involved in the development and management of MFLs in different countries. The content builds on previous MFL guidance developed by the World Health Organization, and by MEASURE Evaluation, and on the Draft Facility Registry Implementation Guide developed by OpenHIE.¹ This MFL Resource Package seeks to expand and update that guidance and to make it accessible to a global audience. Development of the Resource Package included: a literature review, a series of in-depth interviews with key informants, a three-day meeting attended by various experts—to discuss the content and structure of the guidance document—and a thorough review process.

Cristina de la Torre (ICF) and Clara Burgert (ICF) led the development and drafting of this guidance document. Lwendo Moonzwe (ICF), Kirsten Zalisk (ICF), and Aubrey Casey (formerly ICF) helped to draft the MFL Resource Package, organize resources, and document discussions during the three-day meeting. Andrew Inglis (formerly MEASURE Evaluation/JSI) and Scott Teesdale (InSTEDD) helped draft sections of the MFL Resource Package.

Lynne Franco led an EnCompass team in conducting a series of in-depth interviews to inform the content of the Resource Package, and subsequently helped facilitate the three-day meeting to review the guidance proposed for the MFL Resource Package.

In addition, we are grateful to the following individuals who contributed to the MFL Resource Package in various ways that may include: attending a three-day meeting to reach consensus on the content and structure of the package, participating in in-depth interviews, contributing resources, reviewing drafts, and providing information for the case studies.

Table 1: Persons who contributed to the development of the MFL Resource Package

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¹ World Health Organization, 2013. Creating a Master Health Facility List, Draft. WHO: Geneva; MEASURE Evaluation and the World Health Organization (WHO), 2007. The Signature Domain and Geographic Coordinates: A Standardized Approach for Uniquely Identifying a Health Facility. UNC: Chapel Hill. <https://www.measureevaluation.org/resources/publications/wp-07-91>
OpenHIE, 2015. Health Facility Registry Implementation Guide, Draft.

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In addition, we would like to acknowledge the persons involved in developing the WHO guidance draft upon which this Resource Package builds. In alphabetical order, they are: Noah Bartlett, Clara Burgert, Bolaji Fapohunda, Nathan Heard, Andrew Inglis, Natasha Kanagat, Lisa

Maniscalco, Martin Osumba, Kathy O'Neil, Jason Pickering, Claire Preaud, Dag Roll-Hansen, Ashely Sheffel, John Spencer, Marina Takane, Blake Zachary, and Laurens Zwakhals.

This document was edited by Sidney Moore.

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INTRODUCTION TO THE MFL

This module describes what a Master Facility List (MFL) is and why it is important to have one. It defines basic terms, and describes the various pieces that must be in place to have a functional MFL.

Key audiences for this module

- All those interested in establishing or strengthening an MFL

Note: words in **bold** are defined in the glossary.

Figure 1: Introduction to the MFL—Module Outline

(Press Control and click on any of the boxes to be taken to that page.)

1 What Do We Mean by “Master Facility List”?	4 Elements of a Functional MFL
2 Value of an MFL	5 MFL Development Spectrum
3 Characteristics of a Functional MFL	6 Using the Resource Package

1. WHAT DO WE MEAN BY “MASTER FACILITY LIST”?

A **Master Facility List** (MFL) is the complete, up-to-date, authoritative listing of the health facilities in a particular country. It is the primary source from which other facility lists in the country are drawn and must be *validated*, *continuously updated*, and *accessible*. The MFL includes the data needed to accurately identify each facility, such as facility name, **unique facility identifier**, location, and contact information, as well as administrative data to categorize the facility, such as facility type, ownership, and operational status. The MFL may also include information about the service capacity of the facility, for example, type of services offered and number of beds. Ideally, the MFL is stored in a **facility registry service**, or software program, that makes the list accessible to stakeholders such as ministries, donors, or implementing organizations that need information about the facilities.¹

2. VALUE OF AN MFL

Many stakeholders and information systems require a comprehensive list of health facilities. Facility lists are used for health management information systems (HMIS), disease surveillance, and supply chain management. They are also needed by insurance companies, by donors planning coverage for interventions, and by researchers assessing health system performance. Often, these stakeholders create and maintain their own lists of health facilities because an MFL does not exist or is not easily accessible. Having one MFL that can be accessed throughout the national HMIS environment will lead to greater efficiency, facilitate exchange of health

¹ Sometimes the terms Master Facility List and Facility Registry are used interchangeably. However, for our purposes the MFL refers to the actual list and associated data, whereas the facility registry service is the software tool that houses the list.

information (through the adoption of common data standards for facilities), and support monitoring of infrastructure and services across the health system.

1. An MFL creates efficiencies.

- An MFL allows resources to be spent on maintaining and updating a single list rather than duplicative efforts by various stakeholders to maintain separate lists.
- Pooling or focusing resources on a single list, and having a dedicated team to maintain an MFL can lead to better quality facility data (i.e., data that are updated and validated more frequently).

2. An MFL is essential for the exchange of information across different data systems.

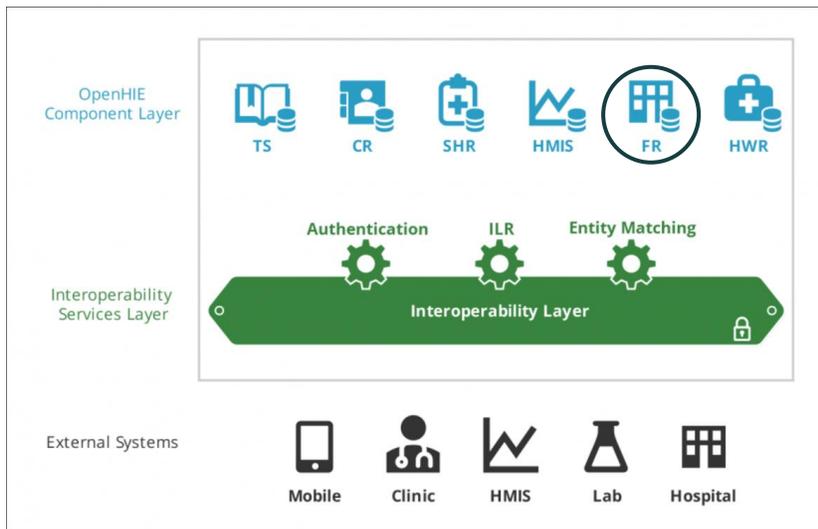
- The MFL, when widely used, ensures that all departments, ministries, and stakeholders have comparable facility data and use the same unique identifiers for facilities. These unique identifiers allow different sources of facility information to link their data.
- The MFL is the backbone for interoperability of various data systems. When the MFL is housed in a software program that allows for the exchange of information with other systems, its value and potential uses increase substantially. An MFL enables linkage of data from human resources, the HMIS, and the supply chain, for example, allowing decision-makers to obtain a comprehensive picture of the operations at each facility. Similarly, an MFL can help unify multiple parallel disease-specific reporting systems into a comprehensive HMIS by collating data around individual facilities.
- An MFL and its corresponding facility registry service are a central component of the **health information exchange** (HIE) architecture (Figure 2). Countries that are moving towards implementation of electronic health records, interoperable HMIS, and HIE architecture require standardized facility data to enable communication, linking, and merging of data across systems. The MFL is the primary source of this standardized facility data; it must be recognized as authoritative, with the expectation of regular use by the various linked systems.

A Health Information Exchange

allows for the secure transfer of data between different health information systems. HIE architecture provides a conceptual framework to understand how health data in disparate information systems can be mapped, harmonized, and exchanged. More information about OpenHIE's Architecture can be found at:

<https://wiki.ohie.org/display/documents/OpenHIE+Architecture>

Figure 2: Illustration of the Health Information Exchange Architecture



Source: www.OHIE.org

3. An MFL provides the metadata needed by other information systems.

- The MFL contains information about facilities that is needed by the HMIS and other information systems to categorize facilities within these systems. For example, facility location information (such as region, district, and ward data) is used in the HMIS to create organizational unit hierarchies. Information about facility ownership can be used in health worker registries to identify which facilities are staffed with government or private sector employees.

4. An MFL facilitates planning and management.

- An MFL that contains geographic coordinates for all health facilities in a country facilitates the planning, management, and targeting of services, through mapping and visualization of the distribution of health services and resources.
- The MFL provides the means of knowing what health services are available, whether they are distributed equitably, and where new health facilities are needed.
- In emergency situations involving natural disasters or disease outbreaks, an MFL helps responders know where health facilities are located and what services are available.
- An MFL serves as a comprehensive sampling frame for researchers or institutions that want to conduct a health facility survey or census.

5. An MFL can support case management of patients.

- For countries using electronic medical records, the MFL helps design systems that track clients across various health facilities where they receive services.
- An MFL that contains information about services can help providers identify the most appropriate health facilities for referring clients.
- If accessible to the general public, the MFL allows potential clients to identify where to seek the services they need.

3. CHARACTERISTICS OF A FUNCTIONAL MFL

For an MFL to be functional and helpful to users, it must meet the following criteria:

- The MFL is comprehensive, including all health facilities in the country.²
- The MFL has an established **minimum data content** that includes unique identifiers for each facility.³
- The MFL data are current and have been verified within the past two years.
- The MFL is updated regularly and the updating process is supported by an established set of standard operating procedures.⁴
- The MFL is visible and accessible to key stakeholders and data consumers (i.e., users of MFL data).
- The MFL is housed in a **facility registry service** that facilitates sharing, **interoperability**, and communication with other systems.⁵
- The MFL is accompanied by good governance structure that provides oversight and management of the MFL.⁶
- The MFL meets the needs of data consumers.

² The *Key Considerations Module* discusses how health facilities are defined and which types of health delivery points can be included in the MFL.

³ See the *MFL Data Content Module*

⁴ See the *Maintaining the MFL Module*

⁵ See the *Establishing a Facility Registry Service* and *Sharing the MFL* modules

⁶ See the *MFL Governance Module*

- Data consumers have confidence in the MFL data and are assured that the data are valid and complete.
- Harmonization and syncing of the MFL occurs only in one direction—from the MFL to other lists.

4. ELEMENTS OF A FUNCTIONAL MFL

For an MFL to be functional, consideration must be given to three key elements: (1) the facility listing, (2) the facility registry service that houses the data, and (3) the governance structure associated with the MFL. All three are equally important and only when they are well established will the MFL be able to serve its intended purpose and meet the needs of **data consumers**.

Facility listing: The MFL is essentially a dataset that lists and describes all the health facilities in a country. For each facility, the MFL includes data covering pre-determined facility attributes: location, ownership, facility type, and services provided. As noted earlier, for the MFL to be useful, it is important that the data are both accurate and current.

Facility registry service: The **facility registry service** is a platform for storing, managing, and sharing the MFL. It allows the MFL to be visible and accessible to data consumers, and enables them to search, sort, and download the MFL data. Ideally, the facility registry service should facilitate interoperability with other data systems so that MFL data can be more easily shared and used.

Governance structure: The MFL requires a supportive policy environment, leadership to oversee the establishment and long-term management of the MFL, standard operating procedures for the maintenance of the MFL, and measures for resource allocation to support the MFL.

5. MFL DEVELOPMENT SPECTRUM

The process of developing an MFL is different for every country. Some start at zero and must develop all three of the key elements—listing, facility registry service, and governance structure. Others may have a well-maintained listing but face challenges in sharing the MFL data because the facility registry service is inadequate. Yet others may have an MFL listing and facility registry service, but lack a sound governance structure to oversee the system long-term. Figure 3 illustrates how the three key elements of the MFL can progress either simultaneously or independently to produce an increasingly functional MFL. To achieve a fully functional MFL all three elements, the MFL listing, the facility registry service, and the governance structure,

must be well developed. Additional information on improving each element is available in the modules of this resource package.

It is important to assess the situation of your MFL to understand which elements need strengthening. The *MFL Assessment Module* provides information on how to assess the status of an MFL, and what things to look for.

Figure 3: Progression toward a fully functional MFL

Facility Listing



Facility Registry Service



Governance Structure



6. USING THE RESOURCE PACKAGE

This resource package contains several modules that can be used together or individually, depending on the specific needs of the country and where it is on the development spectrum in achieving a fully functional MFL. Depending on the phase of MFL development your country is in, particular modules (or sections of modules) may be more relevant than others.

The first page of each module includes a summary of the module contents, key audiences for the module, and actions that must be completed before you implement the activities set forth in the module.

The modules included in the resource package are:

1. Introduction to the MFL
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4. MFL Governance

5. MFL Data Content
6. Geographic Coordinates in the MFL
7. Establishing an MFL Dataset
8. Establishing a Facility Registry Service
9. Maintaining the MFL
10. Sharing the MFL



MFL ASSESSMENT

This module describes what a Master Facility List (MFL) assessment is and why conducting an assessment is important. The module focuses on assessment of seven key areas that inform recommendations and next steps in establishing or strengthening an MFL. The module also outlines potential challenges and implementation considerations that can arise when conducting an assessment of an MFL.

Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Confirm demand for better facility data among known stakeholders	Governance Module
<input type="checkbox"/> Familiarize yourself with the different elements of an MFL	Introduction to the MFL Module
<input type="checkbox"/> Familiarize yourself with key terminology in the glossary	Glossary

Key audiences for this module
<ul style="list-style-type: none"> • MFL key stakeholders • MFL Steering Committee (if present) • Persons designing the assessment • Assessment team leader

Note: words in **bold** are defined in the glossary.

Figure 1: MFL Assessment—Module Outline

(Press Control and click on any of the boxes to be taken to that page.)



1. WHAT DO WE MEAN BY “MFL ASSESSMENT”?

An MFL assessment can be:

- An evaluation of an existing Master Facility List (MFL) and its supporting environment (for example, policies, procedures, leadership, technology, infrastructure, and workforce) to determine whether it is meeting users’ needs and how it can be improved, or
- In the absence of an existing MFL, an appraisal of existing health facility lists and the policy, institutional, and technological environment to determine the best approach to establishing and maintaining an MFL.

An MFL assessment consists of:

- **Interviews:** Assessors interview a variety of stakeholders including national-level officials, information technologists (e.g., HMIS officers, developers, persons involved in health information exchange), **data consumers** (e.g., HMIS managers, supply chain managers, donors, NGO staff, development partners, and anyone else who uses or could use the MFL), and **data curators** (i.e., those who maintain the data in existing facility lists, including the MFL, if one exists). In Section 3, we describe the types of information to be gathered through these interviews.

- Review of documents: Assessors review available documents relevant to the establishment or improvement of an MFL. These documents may include national policy and strategy documents, health facility regulation guidelines, standard operating procedures related to facility lists, facility mapping information, and data specification documents.
- Review of data: Assessors examine the data included in the MFL and other facility lists (1) to identify the data elements in the lists, (2) to get a sense of the completeness and quality of the data, and (3) to identify gaps or discrepancies across lists.

2. WHY UNDERTAKE AN MFL ASSESSMENT?

The purpose of an MFL assessment is to collect information that can inform recommendations and facilitate development of an action plan to establish or strengthen an MFL. The specific objectives vary depending on whether you already have an MFL or are looking to establish one.

If no MFL exists: An MFL assessment should be undertaken early in the MFL planning stage to determine how best to create an MFL in that country, and to inform the decisions involved in establishing an MFL.

When no MFL exists, specific objectives of the MFL assessment include:

- Develop an understanding of the policy, institutional, and technological environment in which the MFL will be established, that will shape its design
- Identify the stakeholders who should be involved or consulted in establishing an MFL
- Develop an understanding of the purpose an MFL will serve in that country (how the data will be used and by whom)
- Identify data sources for building the MFL dataset
- Determine what resources are available or will be made available for establishing the MFL

If an MFL exists: An MFL assessment can be undertaken to determine how well it is functioning.

If an MFL already exists, specific objectives of an MFL assessment include the following:

- Determine whether the MFL meets the needs of data consumers (are the data suitable, accessible, and easy to use)
- Determine if the policies and procedures associated with the MFL are adequate or need to be revised
- Assess whether the human and financial resources set aside for the MFL are sufficient

The *Key Considerations Module* describes several key aspects of an MFL that must be decided early in the process. Anyone conducting an assessment should become familiar with these issues to be sure they are collecting the information needed to make decisions.

3. AREAS OF FOCUS FOR AN ASSESSMENT

The MFL assessment should cover the seven key areas described below. The methods and focus areas for the assessment will be the same regardless of whether an MFL already exists.

1. Stakeholders
2. Existing facility lists (including the MFL if one exists)
3. MFL software and supporting infrastructure
4. Policy environment
5. Governance
6. Human resources
7. Financial resources

Each of the seven focus areas is described in detail below.

3.1 Stakeholders

The first objective of the assessment is to identify stakeholders who can provide information relevant to the six other focus areas of the MFL assessment. Table 1 shows the types of stakeholders who typically provide the information needed for each focus area. More details on the types of information to be obtained are included in the following sections of this module. It is important to note that individual stakeholders can have more than one role; for example, a specific national-level health official may also be a list manager, **data consumer**, and **data curator**.

Table 1: Assessment focus areas and stakeholders who provide information

Focus area	Stakeholders who provide information
Existing facility lists	<ul style="list-style-type: none"> • Managers of existing facility lists • Data curators • Data consumers
Facility registry service (software) and supporting infrastructure	<ul style="list-style-type: none"> • Managers of the MFL and other existing facility lists • Local information technology companies • National-level HMIS staff • Persons involved in national eHealth activities • Data consumers who have used the existing software
Policy environment	<ul style="list-style-type: none"> • Persons with oversight of national eHealth efforts • HMIS managers • MOH officials • Persons in charge of developing the HIS policy and HMIS strategic plan • Persons involved with facility licensing and regulation
Governance	<ul style="list-style-type: none"> • Policy-makers • National-level health officials with authority to make decisions about the MFL • HIS technical working group if one exists • Sub-national level health officials
Human resources	<ul style="list-style-type: none"> • Managers of existing facility lists • Local information technology companies • Implementing partners
Financial resources	<ul style="list-style-type: none"> • National-level health officials • Donors and potential funders • Managers of existing lists • Developers

It is important to talk to people who use, or potentially may use, facility list data (i.e., data consumers). From data consumers, you want to gather information about their data needs, such as how they want to access the data.

Questions to ask data consumers if an MFL exists:

- Does the stakeholder use the MFL? Why or why not?
- What is the MFL used for?
- Does the stakeholder use another facility list in addition to or instead of the MFL? Why or why not?
- How could the MFL be more useful?
- What are the stakeholder's data needs?
- Does the MFL meet the users' needs?

Potential data consumers

- National and district-level HMIS staff
- Disease surveillance units
- NGO and implementing partners
- Donors
- Consultants who work with the government
- Researchers
- Supply chain managers
- Health planning and financing officials
- Emergency management staff

Questions to ask data consumers if an MFL does not exist:

- What facility list is the stakeholder currently using and why?
- How could the list be more useful?
- Does the stakeholder need or want an MFL? Why or why not?
- What are the stakeholder's data needs?
- What difficulties do users encounter with the list?

This information can be used to determine the purpose, content, and functionality of an MFL, or it can be used to determine how an existing MFL can be improved. For more about stakeholders, see the *MFL Governance Module*, Section 2: Stakeholder Engagement.

3.2 Existing Facility Lists

The MFL assessment must determine the existence, content, and quality of facility lists being used in the country. If an MFL already exists, it will be the primary focus of the assessment. However, you will also want to review other facility lists being used in the country because they can help in understanding: (1) why the MFL is not used by the stakeholders, (2) the level of duplication and discrepancies between the lists, and (3) what additional data are being collected that could be included in the MFL.

Identify Existing Facility Lists and Data

It is not unusual for a country to have several facility lists. The following are typical sources of facility lists:

- *The MOH* usually maintains information on health facilities in a county.
- *Health Management Information Systems (HMIS)* will have a facility list; however, these lists may not include private facilities.
- *Other government agencies* such as business registration offices, health worker registries, the central statistics office, disease-specific health divisions, and any regulatory body that is responsible for issuing licenses to health facilities will likely have lists of health facilities. Regional or state government offices may also maintain their own facility lists.
- *Non-government entities* that may keep lists include implementing partners, professional medical associations, and organizations involved in the distribution of medical commodities. These sources are often useful for obtaining information on private, faith-based organizations (FBO), and NGO facilities.
- *Health facility assessment surveys* conducted in a country may have collected relevant facility information. These include the Service Availability and Readiness Assessment (SARA) surveys¹, and the Service Provision Assessment (SPA) surveys.²

Assess the MFL and Other Facility Lists

Table 2 describes key criteria for assessing the facility lists. When no MFL exists, it is important to examine the data contained in the available facility lists in detail. This will help determine whether any of the existing facility lists can be used as the foundation for the MFL.

¹ http://www.who.int/healthinfo/systems/sara_introduction/en/

² <http://dhsprogram.com/What-We-Do/Survey-Types/SPA.cfm>

Table 2: Criteria for assessing the facility lists and factors to consider

Criteria for assessing facility lists	Factors to consider
How is the list used and shared?	<ul style="list-style-type: none"> • Who owns the list? • Who uses the list? • What is the list used for? • Is the list shareable and accessible? • What are the challenges associated with using and maintaining the list? • Does the list pull data from the MFL? If yes, what data?
What data about facilities are included?	<ul style="list-style-type: none"> • Does the list contain all the data elements needed for the MFL?³ • If not, what data are missing? • Does the list include unique identifiers, and are these consistent across lists? • Are the data elements defined according to data specifications for the MFL?⁴
Is the list comprehensive?	<ul style="list-style-type: none"> • What types of facilities are included in the list? • What definition of a “health facility” is used for the list? • What is the geographic coverage of the list?
Are the data up-to-date?	<ul style="list-style-type: none"> • When was the list updated last? • Was it updated in its entirety (for all facilities and all data elements)? • What methods were used for updating the list?
Do the data appear to be of good quality?	<ul style="list-style-type: none"> • Do the list managers and users trust the data? • How many facilities have missing data? • What data sources were used to update the list? • Were the data validated following the update? • How were they validated and by whom? • Are there obvious errors in the data? • Using an online map (e.g., google map), do the locations appear correct? Do the locations correspond to built areas? • If resources are available, do some data quality checks by selecting a few facilities and verifying directly that the data in the list are accurate.

³ See the *MFL Data Content Module*.

⁴ Data specifications should be pre-defined, prior to establishing the MFL. See the *MFL Data Content Module* for more information.

It is likely that you can obtain most of the criteria for assessing the facility lists from the persons charged with managing the lists, but data consumers can provide valuable information about accessibility and data quality. Additionally, review any available list-specific documentation on content, governance, maintenance, and use of the facility list.

3.3 Facility Registry Service: Software and Supporting Infrastructure

The assessment determines how data for the MFL are stored and shared, and what software and supporting infrastructure are needed for the MFL.⁵

If an MFL exists, determine what type of software or **facility registry service** is used to house the MFL, what it does, and whether it meets the needs of data consumers.

- What software or facility registry service is used to store the MFL?
- Where is the MFL being hosted (i.e., cloud-based or local)?
- Who developed the facility registry service?
- Who can use the facility registry service, and for what purposes?
- Which data elements are available to the user?
- Does the facility registry service allow for:
 - MFL data to be shared (downloaded, exported)?
 - Data consumers to search and sort the data?
 - Persons to suggest changes to the data?
- Interoperability with other information systems?
- What workflows exist to use and update the facility registry service?
- What challenges have users (**data curators** and **data consumers**) encountered when using the service?

If an MFL or facility registry service does not exist, gather information to understand which software and supporting infrastructure can be used to house, support, and share the MFL once

⁵ See the *Establishing a Facility Registry Service Module*

established. You will want to ask what software is used for existing facility lists and how well it works.

In all cases, you will want to gather information about the technological infrastructure to determine:

- Whether barriers to technology exist (i.e., electricity, servers, band width, and computers) at different levels of the system, and the implications for the facility registry service
- Whether other information systems need to interact with the facility registry service
- What data standards are being used by these systems
- Whether any infrastructure updates are planned

Review any available data specifications and e-Health strategy documents (see Policy section below).

This information can be obtained from national officials, HMIS staff, local information technology firms, and consultants. It can be used to inform how the facility registry service is developed, or improved to meet the needs of data consumers, given any infrastructure constraints.⁶

3.4 Policy Environment

Another goal of the assessment is to understand the policy environment and regulatory framework surrounding the MFL. Policy generally sets the parameters for how facility data are collected and shared or disseminated. It is important to identify any policy gaps that must be addressed. The following are questions to consider:

- Is there a mandate for MFL implementation?
- Is the MFL part of the country's broader health information system strategic plan?
- What existing policies are applicable to the establishment and maintenance of an MFL?

Examples of such policies include the following:

- Policies on the regulation and accreditation of health facilities
- Policies about data sharing and where data are to be hosted
- eHealth policies
- Policies about data use
- National open data policy

It is likely that you can obtain this policy information from the MFL **steering committee**, if one exists. If not, the information can be obtained from various government officials. Review any

⁶ See the *Establishing a Facility Registry Service Module* for more information.

documents available on classification and regulation of health facilities, e-Health or m-Health strategies, and MOH strategies and policies. This information can be used to determine whether additional policies need to be developed, or stakeholders need to advocate for policy changes, to reach the goal of an MFL strategy and implementation plan that can be aligned with existing policies.⁷

3.5 Governance

The assessment aims to understand how the MFL is governed if an MFL already exists, or to obtain input to set up a governance structure if there is no MFL. An assessment can help inform the following questions:

- Is there a national authority responsible for the MFL?
- Is there an institutional home for the MFL?
- Who makes decisions regarding content and implementation for the MFL?
- What stakeholders are consulted about these decisions?
- Is there a technical working group that meets regularly to discuss how the MFL is functioning and what improvements are needed?
- Does the governing body regularly consider how the MFL interfaces with other health information systems in the country?
- Is there a costed strategic plan for the MFL?
- Do data consumers feel they have a voice in shaping how the MFL is implemented?
- What challenges exist, or do respondents foresee, related to governance of the MFL?
- Are there terms of references or standard operating procedures that describe the processes to be followed in establishing and maintaining the MFL?

This information, typically gathered from the MFL manager, the steering committee, other list managers, and national-level officials, can be used to improve or develop a governance structure for the MFL.⁸

⁷ See the *MFL Governance Module*, Section 3.3: Policy Environment, for more information on policies relevant to the MFL.

⁸ See the *MFL Governance Module* for more information on establishing a governance structure for the MFL.

3.6 Human Resources

Another goal of the assessment is to identify the human resources needed to establish and maintain an MFL.

If an MFL exists, you want to gather information about the number of staff involved in MFL support by level, responsibilities, level of effort, organization, and phase (that is, establishment and maintenance). Additionally:

- Is there staff dedicated solely to the MFL?
- Are staffing levels sufficient to support the MFL?
- What additional support or training does staff need?
- Have roles and responsibilities been clearly defined?
- Are any positions unfilled? If so, why?
- Does the MFL primarily rely on local staff or on international consultants?
- Is staff turnover high?
- Is there sufficient recurring funding for staffing?

Human resources needs

- Data curators to maintain, update, and validate the MFL regularly or continuously
- Data collectors to gather new data for the MFL
- Data sources to provide updates when there are changes in facility data
- MFL manager(s) to oversee implementation of the MFL
- Software developers to create and maintain the facility registry service, and to make adjustments to it as required to meet changing data consumer needs
- Steering committee to facilitate high-level oversight and funding
- Trainers and supervisors

If an MFL does not exist, you want to gather information to inform how human resources could be organized based on existing structures and capacity.

- Who will provide staff to manage the establishment and maintenance of the MFL?
- Is there capacity within the MOH or with other local partners to fill the necessary positions?
- What types of training will be required?

You will also want to gather information about human resources associated with establishing and maintaining any facility lists that are in use, other than the MFL, to determine the level of duplication of effort. This information can be collected from MFL managers, national officials, and managers of other facility lists. Review any existing job descriptions, standard operating procedures, and job aids available.

This information can be used to determine if human resources are adequate for MFL establishment and maintenance, and if not, to develop plans to ensure that human resources needs are met.⁹

3.7 Financial Resources

The final goal of the assessment is to identify both the financial resources available and those that are needed to establish and maintain an MFL.

- Who is funding the establishment of the MFL?
- Has a costed action plan been developed?
- Is there a budget line in the national budget for MFL maintenance, including support for any information technology components?
- What are other potential funding sources?
- What are the costs of maintaining other facility lists, and how are these currently covered?
- Are there opportunities for cost sharing with other entities that use the MFL?
- Do the stakeholders understand what establishing and maintaining an MFL costs?

Common tasks that require financial commitments

- Data collection to fill gaps in the MFL
- Staffing to oversee processes to establish the MFL
- Harmonize and clean data from facility lists
- Develop a facility registry service
- On-going technical support for the facility registry service
- Staff to manage and curate the MFL over the long-term
- Training sub-national staff to collect data, validate MFL data, and use the facility registry service
- Develop SOP, policies and job aids in support of MFL
- Meetings of MFL Steering Committee or technical working groups
- Communication

This information, typically obtained from facility list owners, HMIS staff members, MOH budget planners, and donors, can be used to advocate for adequate funding from the government, to target potential funders, and to better understand the level of project activity that is possible – taking into consideration funding constraints.

⁹ See the sub-section, *Maintenance Workforce*, under Section 3.3 of the *Maintaining the MFL Module* for more information on human resources needed during the maintenance phase of the MFL.

4. IMPLEMENTING THE ASSESSMENT

4.1 Who Should be Involved

An MFL assessment can be undertaken by any organization; it does not need to be carried out by the MFL managers or **steering committee**. However, the steering committee (if present) and other key stakeholders (e.g., health facility list owners) should be involved in the assessment design. They are the primary audience for the assessment findings, and recommendations and next steps require consensus from this audience. It is important to include someone who understands information technology so they can assess issues related to the facility registry service.

4.2 Resources and Timelines

The assessment fieldwork, including interviews and document and data reviews, can be implemented by a small team of two or three people over a two to four week period, depending on the number of facility lists and stakeholders involved. Additional time will be needed for design and analysis. During the assessment design phase, it is advisable to hold one or more meetings with key stakeholders to determine the purpose and scope of the assessment and to begin identifying persons who need to be interviewed. After the fieldwork is conducted, it will take another week or two to analyze the results, write a report, and disseminate the results to key stakeholders.

Ultimately, the scope of the assessment will depend on the funding available to carry it out. It is important to keep this constraint in mind as you plan for and design the assessment. Below is a timeline and checklist to guide assessment preparation, fieldwork, analysis, and dissemination of results; it can be adapted to fit your needs.

- Assessment preparation (2 weeks)
 - Convene a stakeholders' meeting to determine if an assessment is needed and, if so, to identify: (1) the purpose of the assessment, (2) the potential implementers, and (3) the financial resources needed and available.
 - Determine who will implement the assessment and what training they may require to conduct the fieldwork.
 - Define the purpose, scope, and timeline of the assessment.
 - Identify the respondents and existing facility lists. Decide which lists to include in the assessment.
 - Develop the tool that will be used to guide the assessment.

- Train the persons who will be carrying out the fieldwork. It is important for the fieldwork team to have a thorough understanding of the MFL. The interviewers will need to have read all the modules in the Resource Package and be familiar with the data collection tools that have been prepared.
- Reconvene the stakeholders to review the assessment tool, finalize logistics, and ensure buy-in.
- Assessment fieldwork (2-4 weeks)
 - Interview key stakeholders and informants for the seven focus areas described above
 - Review key documents (e.g., policies, standard operating procedures)
 - Review facility lists as described in Section 3.2 above.
- Assessment analysis and dissemination (2 weeks)
 - Review information collected during the fieldwork.
 - Present preliminary findings to key stakeholders and solicit feedback from them.
 - Draft an assessment report that includes findings and recommendations.
 - Disseminate the findings and recommendations via a stakeholder meeting.

When the findings become available, stakeholders—particularly those charged with leading the establishment or strengthening of the MFL—must determine how best to use the findings. The results can serve as a roadmap for addressing gaps that exist between the data that are available and the data that are needed. A detailed action plan should be developed, prioritized, and costed. In some cases, discussing the assessment results with people external to the project, who are experienced in establishing and strengthening an MFL, can provide guidance in moving the MFL forward.

4.3 Data Collection Tool

To standardize data collection across various types of respondents and to ensure that the interviewers collect all the information needed to inform recommendations and next steps, a tool should be used to implement the assessment. Ideally, the assessment will cover all seven focus areas described in this module, but the content of the final adapted tool will depend on the purpose of the assessment and the types of information key stakeholders need to inform next steps.

5. CHALLENGES

Various challenges may arise during implementation of an MFL assessment. Common problems are too many facility lists and insufficient funds. These assessment-related challenges are shown in Table 3 along with potential solutions. Like them, most challenges can be overcome if appropriate resources are available; however, larger challenges may require coordination between the MFL managers, the steering committee (if present), and key stakeholders.

Table 3: MFL assessment challenges and potential solutions

Challenge	Potential solution
Too many facility lists	<ul style="list-style-type: none">• Gather information about the lists from the list managers and users to ascertain their purpose, when they were last updated, and which facilities are covered.• Discard lists that are obviously outdated or have critical data quality issues.• Narrow the number of facility lists to those you want to examine in greater detail regarding content and data quality.
Insufficient funds	<ul style="list-style-type: none">• The MFL assessment is a critical step in the process of developing interest and support among stakeholders. Efforts should be made to cover all focus areas to get a complete picture of the MFL situation in the country. If this is not possible, select the most relevant focus areas and prioritize the questions that need to be answered. Set clear objectives on what the assessment is intended to achieve.



KEY CONSIDERATIONS FOR THE MFL

This module discusses critical issues and decisions regarding the Master Facility List (MFL) that must be resolved early in the planning process. They include decisions on leadership of the MFL, purpose of the MFL, institutional home for the MFL, types of facilities to include in the MFL, type of software used to store and share MFL information, and overall workflows of the MFL. The module provides guidance on key factors to consider when making these decisions.

Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Establish a steering committee	MFL Governance Module
<input type="checkbox"/> Engage stakeholders to participate in the decision-making process	MFL Governance Module
<input type="checkbox"/> Completed an assessment of the MFL status (if possible)	MFL Assessment Module

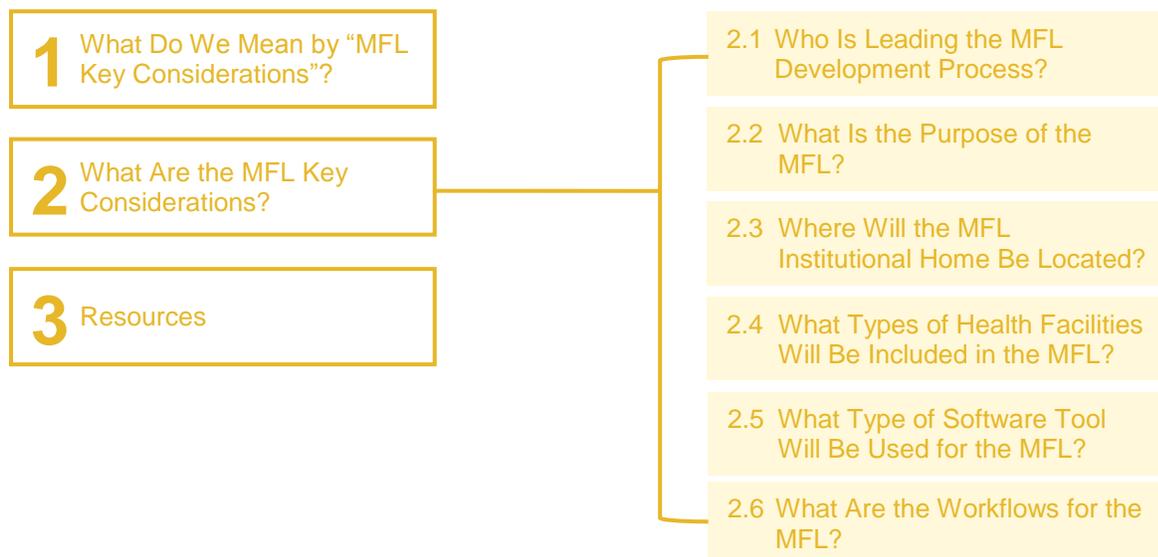
Key audiences for this module

- MFL steering committee
- Managers who will directly oversee the MFL development process
- Implementers who will assist in establishing the MFL

Note: words in **bold** are defined in the glossary.

Figure 1: MFL Key Considerations—Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT DO WE MEAN BY “MFL KEY CONSIDERATIONS?”

Key considerations regarding an MFL are the critical issues and decisions that need to be resolved early in the development process. They include decisions about who will lead the MFL development process; what is the purpose of the MFL; where will the MFL institutional home be located; what types of facilities will be included in the MFL; what type of software solution will be used to house and share the MFL; and what are the general workflows associated with data management? All these decisions are important because they directly influence the development process. Without resolving these key considerations up front, successful implementation of the MFL will be challenging.

2. WHAT ARE THE MFL KEY CONSIDERATIONS?

2.1 Who is Leading the MFL Development Process?

The first key decision to be made is who will be leading the process of establishing or strengthening the MFL. It is recommended that a **steering committee** be formed to oversee the planning and implementation of the MFL. Careful consideration should be given to the selection of persons who will make up the committee. Ideally, the steering committee will include:

- Ministry officers who have the authority or connections needed to push the MFL agenda forward, make important decisions, secure funding, and delegate tasks;

- Individuals who can advise on data requirements, data sources, and mechanisms for data collection;
- Individuals who can advise on the technological solutions for the **facility registry service** that will store and share the MFL data;
- At least one representative from the technical working groups (TWG) set up to implement key MFL activities.¹

The steering committee can be an existing body tasked with new responsibility for the MFL or a newly formed committee.

The steering committee will be responsible for bringing together key stakeholders and getting consensus on the other key decisions outlined in this module. The primary responsibilities of the steering committee in the early stages of establishing the MFL include:

- Promoting the wider engagement of stakeholders
- Fostering decision-making through consultation and consensus
- Ensuring commitment and buy-in for the MFL
- Planning for establishment of the MFL, including securing resources and setting up technical working groups to carry out specific activities in support of the MFL

The *MFL Governance Module* provides more details about the steering committee, including specific roles and responsibilities regarding the MFL development process.

2.2 What is the Purpose of the MFL?

Prior to establishing the MFL, it is important to clarify what role the MFL will play in the overall health system, whether it will be part of a broader eHealth strategy, and how it is expected to contribute to the generation of strategic information.

It is also important to understand how stakeholders will want to use the MFL and what they hope the MFL can do for them. Defining **requirements** (and expectations) for the MFL is an important first step because it establishes the foundation for subsequent decisions regarding the MFL. The process helps determine the specific data the MFL will contain and what functionalities the **facility registry service** (the software platform that stores and shares the

¹ See the *MFL Governance Module* for a description of the TWG. Also, refer to the *Establishing the MFL Dataset Module*, the *Establishing the Facility Registry Service Module*, and the *Maintaining the MFL Module* for more on what the TWGs are tasked with.

MFL data) should have. The steering committee will help to define the MFL requirements through consultation with stakeholders and MFL **data consumers**.

Current and potential MFL data consumers should also be asked what they want facility data for and how they need to interact with it.² Gathering this information can be done through collecting “**user stories**” that describe the type of user, what they want, and why they want it.

The needs of potential MFL users vary substantially, as illustrated in the box to the right. It is useful therefore to list all the requirements presented, and then prioritize them according to those the MFL can accommodate and those beyond the scope of the MFL. For example, it may not be realistic for the MFL to include all community distribution sites. If resources are limited, it is important to determine which requirements can be addressed immediately (e.g., obtaining a full list of public facilities) and which can be addressed at a later date (e.g., adding information about services offered).

While it is important to understand the full range of user requirements, it is also important that expectations for the MFL (what it can and cannot do) are set early in the process, and that expectations are realistic and attainable. It is likely that the MFL will not be able to meet all data consumer needs so transparency in the decision-making process is important.

Examples of possible user requirements

- The HMIS needs a list of all public facilities with unique IDs so it can pull data from different health programs (e.g., malaria and HIV/AIDS) to get a full picture of service provision at the facility level.
- A donor needs the MFL to include service data so the donor knows which facilities in specific districts offer HIV/AIDS services.
- Disaster response teams need to know the exact location and number of beds in tertiary care hospitals to refer patients in an emergency.
- Supply chain managers need a list of all sites (including pharmacies and community distribution points) that dispense drugs.
- A researcher needs to sort facilities by type and location, and then download the list to a spreadsheet.

2.3 Where Will the MFL Institutional Home be Located?

The institutional home is where the MFL is established and maintained. The institutional home typically provides the following: oversight and management of the MFL, coordination and leadership, and dedicated staff support for the MFL. An institutional home should be accountable, transparent, and have the capacity needed to ensure the effective long-term maintenance of the MFL.

² See the *MFL Assessment Module* for more information on interviewing stakeholders.

When deciding on the institutional home for the MFL, there are several factors to consider:

- Who has oversight and authority over health facilities (including private health facilities)?
- Is the institution best suited to manage and maintain the MFL?
- Are the necessary financial and human resources available?
- Does the institution have the ability to mobilize resources to support the MFL?
- Can the institution ensure the independence of the MFL as a standalone list?
- Does the institution have the ability to coordinate across stakeholders?
- What specific office or team within the institution will lead the MFL process?
- Does the team have the necessary skills (including data management, GIS, and information technology) to maintain the MFL?³

The institutional home of an MFL is often a sub-division of the Ministry of Health. Typically, countries have one primary owner or institutional home for the MFL but this is not always the case; in Tanzania, three groups share ownership of the MFL.

It is important to identify any limitations associated with the institutional home and to propose solutions that will mitigate these limitations. It is also important to clearly state the relationship between the institutional home and the steering committee. The *MFL Governance Module* discusses the roles and responsibilities of the institutional home in more detail.

CASE STUDIES: INSTITUTIONAL HOMES

Haiti: In Haiti, the unit of Planning and Evaluation was a natural fit to house the MFL and it is now central to the MFL governance process in the country. Establishing the MFL within this unit has proven successful because the unit now uses data from the MFL in its routine health information system.

Tanzania: In Tanzania, three groups have ownership of the MFL: the Directorate of Curative Services, the Information and Communication Technology Unit, and the M&E and HMIS division. All were instrumental in moving the MFL forward and had an important stake in its implementation. Having multiple owners requires additional coordination, but can be successful if carefully managed.

³ See the *Maintaining the MFL Module* for a description of human resources needed.

2.4 What Types of Health Facilities Will be Included in the MFL?

An important decision is determining the types of health facilities that will be included in the MFL. Typically, health services are offered through a variety of service delivery points. It is important to give careful consideration to deciding which of these should be included in the MFL and to be aware of the implications of adding different types. In deciding which facilities to include you will need to answer the following questions:

What Constitutes a Health Facility?

It is unrealistic to include all the locations where health providers offer services (for example, if they do so out of their own home). Therefore, it is recommended to develop minimum standards to define what a health facility is and to determine eligibility for inclusion in the MFL. If national standards exist for licensing health facilities, those can be used. Also, decide whether laboratories or pharmacies are to be considered health facilities for purposes of the MFL.

What Types of Health Facilities to Include in the MFL?

Once you have defined what a health facility is, you need to decide which types of health facilities to include in the MFL. The box to the right gives examples of different types of health facilities that may exist in a country and need to be considered. The decision regarding which facilities to include in the MFL will depend on:

Types of health facilities to consider

- Laboratories
- Pharmacies
- Community health post
- Mobile clinics
- School clinics
- Jail clinics

- How much demand there is for information about these types of facilities and how critical the information about these facilities is to stakeholders
- The feasibility of collecting and validating data about these facilities on an ongoing basis
- What data sources exist for acquiring information about these facilities
- The additional budget and human resources needed to maintain the list (the greater the number of facilities the greater the resources needed)

Will Both Public and Private Health Facilities Be Included in the MFL?

When making the decision whether to include private facilities along with public facilities in the MFL, it is important to understand the limits to feasibility of identifying all private facilities, and gathering the necessary information from those facilities on an ongoing basis.⁴ The same

⁴ The *MFL Data Content Module* lists the minimum information about each facility that should be included in the MFL.

criteria for deciding what types of facilities to include in the MFL (described above) can be applied here; in addition, there are the following considerations:

- What data sources exist in the country that can be accessed to gather information about private facilities?
- Is there high turnover among private facilities or frequent changes in the types of services provided? If so, this may be a challenge for maintenance of the MFL.

The types of facilities included in the MFL vary from country to country. For example, Kenya wanted the MFL to have an inventory of every facility that was available to see patients, whether public or private. The decision-making process for the Philippines and Haiti is illustrated in the case studies below.

CASE STUDIES: SELECTING THE TYPES OF FACILITIES TO INCLUDE IN THE MFL

Philippines: In the Philippines, the National Health Facility Registry (NHFR) limits the types of health facilities covered to Barangay (village) Health Stations, Rural Health Units, and public and private hospitals. Public and private hospitals are licensed and therefore easily monitored; this is not the case with other types of private health facilities. The vast number of unlicensed private facilities poses a challenge for health facility profiling, validation, and updating. For this reason, they were purposefully omitted from the original NHFR. Future plans for the NHFR include working to add other licensed private facilities such as infirmaries, medical out-patient clinics, psychiatric care facilities, drug abuse treatment and rehabilitation centers, and birthing homes.

Haiti: The 2010 Haiti earthquake highlighted the need for a comprehensive and accurate list of health facilities in the country and prompted the creation of an MFL. At the time, private health facilities provided 75% of the country's health care services. It was essential therefore to include private facilities in the proposed MFL. The Ministry of Health (MOH) and multinational partners realized there was no system in place to register the private health facilities into the MOH facility registry. Thus, the establishment of the MFL corresponded to the development of an online facility registry service. This online facility registry service included a system that required the private health facilities to register with the Ministry of Health to be able to provide health services in Haiti. This requirement spurred the private health facilities to work with the MFL stakeholders to supply their facility information.

2.5 What Type of Software Tool Will be Used for the MFL?

The MFL needs to be made accessible to stakeholders and **data consumers**. It is therefore important to determine how MFL data will be stored and shared. This requires determining what type of software solution, or **facility registry service**, will be used for this purpose. The simplest solution is to store the MFL information in a spreadsheet that can be emailed or

downloaded. However, this greatly limits its functionality and the potential to use the MFL for more complex purposes such as data exchange and managing change requests.

The *Establishing a Facility Registry Service Module* provides detailed guidance on selecting a software solution for the MFL and the steps needed to set it up. Here we highlight some key issues to consider early in the MFL development process:

- Develop comprehensive knowledge of the ways in which **data consumers** need or want to interact with the MFL data. Collecting **user stories** helps to document the requirements for the facility registry service, ensuring that it meets the needs of multiple stakeholders and data consumers.
- Develop a vision of the activities and functions the facility registry service should carry out.
 - What types of data requests need to be accommodated?
 - Is the purpose of the facility registry service simply to share data files? Or, do you want it to act as a **curation tool** for the MFL as well?
 - Does the facility registry service need to integrate with other information systems?
 - Who will have access to the MFL data? Do you need different permission levels?
- Determine what can be achieved both short-term and long-term with available resources. This may affect whether you need to develop a new facility registry service immediately, or you can wait until a later phase of the project.
- Ascertain the infrastructure requirements for your vision of the facility registry service (e.g., internet connectivity, servers, reliable electrical power, etc.) and whether it exists.

2.6 What are the workflows for the MFL?

Another key consideration is determining the overall workflows for the MFL. These workflows relate to data collection, data management, and data sharing processes. These issues are described in greater detail in the *Maintaining the MFL Module* and the *Sharing the MFL Module*. Because workflow will affect various subsequent MFL design issues, it is important to get clarity on the following questions:

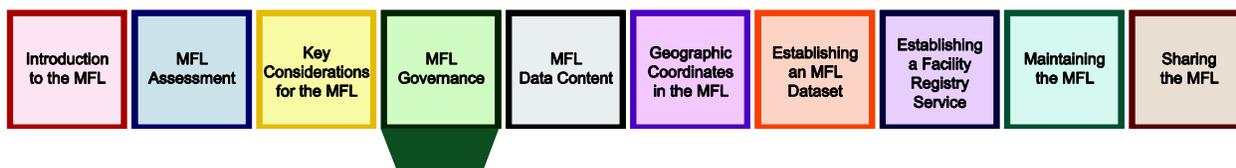
- Is the MFL data management centralized or decentralized?
- How are new data or change requests submitted to the MFL?
- Who can submit data or change requests to the MFL?
- At what stage are the data validated and who is responsible for carrying out this task?

- Will the MFL data approval processes be centralized or decentralized?
- How does the facility registry service interact with and push or pull data to other information systems?
- What is the frequency and timing with which these activities are carried out?

The processes outlined above depend in large part on the type of facility registry service used for the MFL and the functions it is designed to carry out. Therefore, decisions about the overall workflows need to be made jointly with decisions about the facility registry service.

3. RESOURCES

- [Tanzania Data Management and Maintenance Workflows](#)
- [Examples of user requirements for MFL \(OHIE\)](#)



MFL GOVERNANCE

This module discusses the importance of establishing a governance structure for the Master Facility List (MFL) and describes four key elements of governance that are necessary to successfully establish an MFL. The key elements are leadership, stakeholder engagement, policy environment, and institutionalization and sustainability. The module concludes with a list of common challenges and potential solutions related to MFL governance.

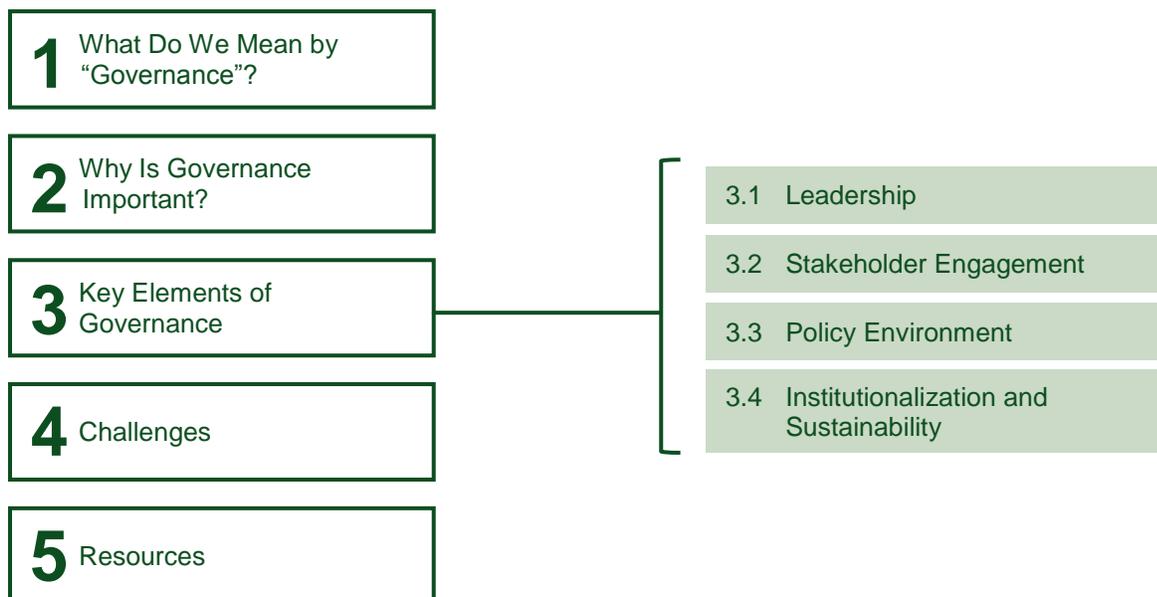
Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Become familiar with the existing governance structures and procedures for health systems governance	MFL Assessment Module
<input type="checkbox"/> Prepare a list of potential MFL stakeholders	MFL Assessment Module

Key audiences for this module
<ul style="list-style-type: none"> • Key stakeholders wanting to establish or strengthen an MFL • Leadership in MOH or other involved ministries • The MFL Steering Committee (once it is established)

Note: words in **bold** are defined in the glossary.

Figure 1: MFL Governance—Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT DO WE MEAN BY “GOVERNANCE”?

Governance can be defined as the process through which rules and decisions are made, authority is granted, and institutions and stakeholders are managed. We outline four key elements of governance that are necessary for the success of an MFL: (1) leadership, (2) stakeholder engagement, (3) policy environment, and (4) institutionalization and sustainability. The overall goal of good governance is to generate quality results (i.e., an MFL that meets the needs of **data consumers**), accountability, and sustainability.

2. WHY IS GOVERNANCE IMPORTANT?

Among experts involved in establishing MFLs in various countries, sound governance is cited as the most important factor for MFL success.¹ A strong governance structure around the MFL is critical because it facilitates:

- A common vision and local ownership of the process of establishing an MFL
- Collaboration and the inclusion of stakeholders in the establishment and maintenance of the MFL
- Coordination and the pooling of resources that reduces duplication and increases efficiency

¹ The DHS Program conducted interviews with 24 MFL experts during research for this guidance document.

- Establishment of procedures, roles and responsibilities
- Transparency and accountability
- A means of establishing and setting standards
- Integration across other systems and structures
- Continued commitment and the sustainability of the MFL
- A reduced burden on health system personnel, particularly during times of crises or high demand for health facility information

3. KEY ELEMENTS OF GOVERNANCE

3.1 Leadership

Strong, well-coordinated leadership is essential to the successful implementation of the MFL. Leadership is needed to: (1) advocate for the MFL, (2) provide oversight and direction for the establishment and maintenance of the MFL, (3) ensure a favorable policy and regulatory environment, (4) secure funding, and (5) facilitate planning to guide future investments.

Steering Committee

It is recommended that a **steering committee** be established to serve as the leadership body for the MFL. This should be done early in the planning phase so the steering committee can help guide the process of establishing or strengthening the MFL.

Primary responsibilities of the steering committee:

- Promote stakeholder engagement (see Section 3.2 Stakeholder Engagement)
- Make critical decisions about the MFL through consultation and consensus
- Develop an overall vision and strategic plan for the implementation or improvement of the MFL
- Delegate responsibilities
- Push through the MFL agenda when roadblocks are encountered

Other responsibilities of the steering committee:

- Provide oversight to technical working groups engaged in activities concerned with the MFL
- Mobilize resources (human and financial) for the MFL through advocacy

- Ensure that legal and policy frameworks are in place to support the MFL (see Section 3.3 Policy Environment)
- Ensure that key management, operational, and financial structures are in place²
- Help determine the requirements for the MFL³
- Ensure that government leaders are briefed as needed
- Ensure open communication with stakeholders
- Develop a costed plan and prioritize activities
- Resolve conflict when necessary. Discord over ownership of the MFL, reluctance to share data, and opposition to changing current systems and practices are common tensions that a leader or leadership body must resolve.

The composition of the steering committee must be given careful consideration; a steering committee should include:

- Ministry officers who have the authority or connections needed to push the MFL agenda forward, make important decisions, and delegate tasks
- Individuals who can advise on data requirements, data sources, and mechanisms for data collection
- Individuals who can advise on technological solutions for the **facility registry service** that will store and share the MFL data
- At least one representative from the technical working groups (TWG) set up to implement key MFL activities⁴

The steering committee can be an existing body that is tasked with the additional responsibilities of establishing an MFL (e.g., an existing Health Management Information System (HMIS) or E-health committee), or it can be newly formed for this purpose.

A clear vision of the proposed MFL and the roadmap to be used in establishing the MFL must be articulated by the steering committee. The role of the steering committee will vary according to country but will be driven by the specific needs of the country. It is important that the steering committee:

² See the *Maintaining the MFL Module* for more on inputs required to sustain an MFL.

³ See the *Key Considerations Module*.

⁴ See next section, Technical Working Group

- Have a clear vision of what it will be doing and how the decision-making process will operate
- Establish clear roles and responsibilities for all members

Develop clear, documented rules/guidelines that facilitate addressing procedural issues such as changes in leadership and how leaders are selected or elected.

CASE STUDY: TANZANIA MFL CORE TEAM

In Tanzania, a core team from the Ministry of Health and Social Welfare (MoHSW) played a central role in establishing the MFL in that country. As part of the Monitoring and Evaluation Strengthening Initiative, emphasis was placed on integrated eHealth infrastructure and two priority activities for the MFL were identified: (1) arranging a stakeholder meeting to plan for and define requirements for the MFL, and (2) implementing the MFL. The core team met periodically and worked with the University Computing Centre to develop an electronic MFL based on the existing HMIS health facility list. In 2012, more stakeholders joined the MFL core team and in September 2012 a stakeholders' workshop was held to define the prioritized requirements for the Tanzania MFL. The MFL core team identified three key owners of the MFL within the MoHSW—the Directorate of Curative Services, the Information and Communication Technology Unit, and the M&E/HMIS section.

Technical Working Group

In addition to a steering committee, it is necessary to create one or more technical working groups (TWG) to implement the procedures for establishing and maintaining the MFL and the **facility registry service**. The TWGs will develop detailed work plans for achieving predefined goals and will coordinate and manage the technical staff to carry out the work.

TWGs can include both local and international members:

- Implementing partners
- Government staff assigned to the MFL by their respective institutions
- Local research institutions and technology firms
- Consultants

In populating the membership of a TWG, it is important to include **data consumers** as well as technical staff, to be sure the needs of data consumers are considered in the overall design and structure of the MFL.

During the establishment phase, the work of the TWG will be more intense and will require a greater level of effort, staffing, and support than in the maintenance phase.⁵ After establishment of the MFL and the facility registry service, the TWGs should rely more heavily on local staff to ensure continued support and sustainability of the MFL.

CASE STUDY: KENYA TECHNICAL WORKING GROUP

In Kenya, the National Health Information System (HIS) Coordinating Committee oversees and provides guidance for the MFL. In addition, the Ministry of Health (MOH) has a Technical Working Group (TWG) that oversees the day-to-day workings and maintenance of the MFL. Because all members of the TWG are in the same office they are able to meet on an as-needed basis to discuss the MFL. Additionally, they have a standing meeting twice a month dedicated to discussing the status of the MFL.

MFL Champion

Often an MFL champion plays a crucial role in (1) obtaining buy-ins and (2) bringing the appropriate stakeholders to the table. A “champion” is someone who advocates for the MFL, convinces stakeholders of the benefits of having the MFL, and secures commitments and the political will to establish or strengthen the MFL.

A champion is central to creating a common vision of what the MFL can be and what it can do. Depending on the context, “selling points” or “incentives” for having an MFL may differ. Some common benefits (selling points) include: avoidance of duplication, cost savings, increased access to data, and the ability to exchange data across information systems.⁶ The champion will advocate for resources and see to it that progress and momentum are maintained for the MFL.

In many countries, the government, usually the Ministry of Health, is the key stakeholder for the MFL. It is important, therefore, that key personnel within the MOH understand the value of a well-structured, accurate MFL. Funders and potential partners also need to be enlisted. Finally, key stakeholders and governments may regard their current systems as “sufficient,” and be reluctant to take action on the MFL. Then, the task of proving the benefits of the MFL, or of justifying why the existing MFL needs to be improved, typically falls to the MFL champion.

⁵ For additional information on these topics, see the following modules: *Establishing an MFL Dataset Module*, *Establishing a Facility Registry Service Module*, and *Maintaining the MFL Module*.

⁶ See *Introduction to the MFL Module*: Section 2. Value of an MFL

CASE STUDY: NIGERIA CHAMPIONS

Through the dedicated efforts of MFL champions in Nigeria, the government now sees the importance and utility of having an MFL that is accurate and continuously updated. The government is discussing with partners how to achieve this goal.

3.2 Stakeholder Engagement

Engagement of stakeholders early in the process of establishing an MFL is essential to guide the planning and decision-making associated with the MFL. Engaging stakeholders also encourages accountability and transparency through the open sharing of information on decisions and progress. A stakeholders' meeting at the onset is advisable to reach consensus on key issues including steering committee membership, ownership of the MFL, and purpose of the MFL.

Stakeholder engagement should also occur at critical points in the decision-making process such as:

- Deciding the **minimum data content of the MFL** (see *MFL Data Content Module*)
- Determining where the MFL will be housed (see *Key Considerations for the MFL Module*)
- Establishing the **requirements** of the facility registry service (see *Key Considerations for the MFL Module* and *Establishing a Facility Registry Service Module*)
- Defining standard operating procedures for updating and maintaining the MFL (see *Maintaining the MFL Module*).

In addition to participating in the governance structure and decision-making process, stakeholders can play a critical role in providing information to shape MFL policy and can contribute to implementation of specific activities. They should continue to be engaged and consulted throughout the implementation and maintenance phases of the MFL. There are various types of stakeholders and their roles in supporting the MFL differ. Table 1 lists some of the key stakeholders to consider for inclusion in the MFL process, their potential roles and responsibilities, and their reasons for engaging in the MFL process. Conducting a stakeholder analysis and implementing a stakeholder engagement plan is often helpful. Workshops, meetings, and conferences are common avenues through which stakeholders can be engaged.

In the process of engaging stakeholders, it is important to consider the following:

- Cost of facilitating and maintaining stakeholder engagement
- Coordination mechanisms used by key stakeholders
- Competing donor initiatives

- Differing stakeholder agendas
- Ministries (likely major stakeholders) have their own missions and agendas

Table 1: Key MFL stakeholders, roles and responsibilities, and reasons for engagement in the MFL process

Stakeholder	Roles and responsibilities	Reasons for engagement
Government ministries/local government agencies	<ul style="list-style-type: none"> • Provide leadership and governance • Create mandates and grant authority for decision-making • Advise on policy development • Provide financial resources • Facilitate networking and information sharing • Assign human resources to implement and manage the MFL • Grant authority for mobilizing sub-national staff for MFL data collection and verification • Provide existing lists • Provide maps • Agree on data sharing procedures • House the MFL 	<ul style="list-style-type: none"> • Efficient use and distribution of resources • Limit duplication • Improved access to facility data • Interoperable systems and data sharing • Improved data quality
Policy-makers	<ul style="list-style-type: none"> • Create policies to support the MFL • Align needed leadership • Mitigate resistance • Create mandates 	<ul style="list-style-type: none"> • Efficiencies across government agencies • Time saving • Establishing good governance

(continued)

Stakeholder	Roles and responsibilities	Reasons for engagement
Donors	<ul style="list-style-type: none"> • Contribute financial resources • Facilitate Coordination • Identify partners • Define MFL requirements • Use MFL data • 	<ul style="list-style-type: none"> • Need quality facility data • Improved M&E • Improved ability to target programs and to track program efforts • Eliminate the need to develop and maintain own facility lists • Interoperable systems and data sharing
Local NGOs	<ul style="list-style-type: none"> • Assist with MFL data collection and verification • Provide facility lists • Use MFL data 	<ul style="list-style-type: none"> • Need quality facility data • Improved ability to target program efforts • Use MFL for M&E
International NGOs	<ul style="list-style-type: none"> • Advocate for the MFL • Build capacity • Provide technical assistance to establish the MFL and facility registry service • Define MFL requirements • Contribute resources • Provide facility lists • Advise on policy development • Use the MFL data • (e.g., eHealth policies) 	<ul style="list-style-type: none"> • Support government initiatives • Need quality facility data • Improved ability to target program efforts • Use MFL for M&E
CBOs/FBOs	<ul style="list-style-type: none"> • Assist with MFL data collection and verification • Provide facility lists • May own facilities: provide data for MFL • Advocate for the MFL 	<ul style="list-style-type: none"> • Support government initiatives • Need quality facility data • Use MFL for M&E

(continued)

Stakeholder	Roles and responsibilities	Reasons for engagement
Private institutions and professional networks	<ul style="list-style-type: none"> • Provide data about facilities • Contribute staff with subject matter expertise • Provide technical assistance • Define MFL requirements • Contribute financial or other resources 	<ul style="list-style-type: none"> • Access to facility data facilitates business processes • Potential expansion of business based on MFL information • Interoperable information systems • Use for planning purposes • Enhancement of product offerings • Increased visibility • Improved data quality
National health programs (malaria, TB, HIV)	<ul style="list-style-type: none"> • Provide existing facility lists • Provide data about facilities • Define MFL requirements • Use MFL data 	<ul style="list-style-type: none"> • Eliminate need to maintain own facility list • Interoperability with national HMIS and other information systems • Improved ability to target resources and program efforts • Use of MFL for M&E
Data consumers (i.e., all those who use MFL data, regardless of institution)	<ul style="list-style-type: none"> • Define MFL minimum data content • Define MFL requirements 	<ul style="list-style-type: none"> • Access to facility data • MFL meets their data needs • Interoperable systems can share information • User-friendly facility registry service facilitates access and sharing of MFL data • Improved data quality
Technical users	<ul style="list-style-type: none"> • Define requirements for the facility registry service • Determine data standards • Inform policy decisions 	<ul style="list-style-type: none"> • Increased access to the MFL • Mobile portal • Analytical capabilities • Data linkages • Improved data quality
MFL and technical staff	<ul style="list-style-type: none"> • Maintain database • Maintain the facility registry service • Provide technical assistance • Seek ways to improve the MFL (add content, add functions to the facility registry service) 	<ul style="list-style-type: none"> • Support government initiatives • Salaries • Performance reviews

(continued)

Stakeholder	Roles and responsibilities	Reasons for engagement
Medical or clinical staff	<ul style="list-style-type: none"> • Contribute to data (identify information to be updated) • Use MFL data 	<ul style="list-style-type: none"> • Identify services available locally • Use MFL to identify facilities for referrals

3.3. Policy Environment

It is important to understand and shape the policy environment in which the MFL will exist. Policies are important because they provide guidance and regulation, establish compliance measures, and set limits on what can and cannot be done regarding MFL data. Policies also help align other stakeholders and development partners around a government-led MFL strategy.

The MFL will likely be regulated by national policies associated with health information systems, eHealth, and data sharing. The *MFL Assessment Module* discusses the need to evaluate these policies to understand how they may affect decisions about the MFL. During the course of the MFL assessment you may identify opportunities for revising policies or for developing new policies if none exist. For example, if a country does not have a policy on open data and data sharing, this may be a good opportunity to initiate a dialogue on how to structure such a policy in the context of that country.

Establishing policy specifically for the MFL contributes to the legitimization and sustainability of the MFL. The design and documentation of governance policy should be developed in conjunction with decisions and solutions implemented for other aspects of the MFL. Prior to creating a policy, several issues must be resolved⁷:

- Who leads the decision-making process and which key stakeholders should be involved?
- Whether and how will the MFL be institutionalized; and, what requirements will be set for the institutional home?
- To what degree will public sharing of MFL data be allowed and promoted?

If the MFL is being implemented in stages and not all issues have been resolved upfront, a policy may be modified or expanded at a later time.

Generally, a MFL policy should define:

- Who is responsible for implementation, oversight, revisions, and updates to the MFL policy
- Who is accountable for the MFL and for the **facility registry service** that houses it

⁷ The *Key Considerations Module* provides additional information on these decisions.

- How access to and sharing of the data will be granted
- Which funding mechanism will be used for the recurring costs of maintaining the MFL, and what if any constraints or parameters are associated with the funding mechanism
- The required level of coordination between stakeholders to enable establishment, maintenance, and sustainability of the MFL
- Who is responsible for defining required MFL data and elements

MFL policy should enforce use of the MFL across the HIS, especially use of a facility’s unique identifier/code, for purposes of consistency and improved communication.

CASE STUDY: MANDATE FOR THE MFL

In the Philippines, an administrative order is being drafted which describes the role and responsibilities of each stakeholder and establishes the MFL (or “facility registry” as it is called there) as the unique official list of health facilities in the country. It will also mandate municipalities to provide the information necessary for the MFL.

3.4 Institutionalization and Sustainability

Institutionalization

Institutionalization of an MFL involves embedding the entire structure within an institution and setting up standardized management procedures to maintain the MFL over the long-term. Institutionalization enables planning and the allocation of resources to implement activities in support of the MFL. It also makes the home institution accountable for how resources are spent and for continuing to deliver an MFL that meets the needs of data consumers. Not having an institutional home presents many problems for an MFL, as seen in the quote below from a key informant.

The institutional home typically provides the following: oversight and management of the MFL, coordination and leadership, and dedicated staff support for the MFL. It also assigns roles and responsibilities to other institutions that need to be engaged. Some best practices for institutionalization of the MFL include:

“A MFL, if it exists, is often a standalone activity, not institutionalized. There is a lack of funding and support for this type of long-term activity, and resource availability can restrict what might be needed to create, validate, and maintain an authoritative updated list” – Key informant interview

- Having a mandate

- Having clear roles and responsibilities, management processes, and lines of authority
- Having well-defined standard operating procedures describing the various tasks and timelines for maintaining the MFL and the facility registry service
- Having a permanent line item in the budget to support the work

When deciding how to institutionalize the MFL and what management processes are most appropriate, it is important to align these with the overall governance structure in the country.

Governance structures are usually **centralized**, **decentralized**, or **federated**. The governance structure in which the MFL is situated will determine how decision-making processes and responsibilities are distributed. Regardless of the governance structure, coordination across the various levels of government and among key stakeholders is critical to successful governance of the MFL.

Types of governance structures

Centralized: One central authority is responsible for decision-making

Decentralized: Responsibilities are distributed from a central authority to other entities that also contribute to decision-making

Federated: Responsibilities and decisions are shared among multiple self-governing organizations

Sustainability

A critical governance consideration is how to “keep things going.” Institutionalization of the MFL helps to foster sustainability by making the institution and team accountable and by establishing management procedures. However, these activities alone are not sufficient over the long-term. Sustainability requires additional inputs, and consideration should be given to the following issues:

- How will the MFL be funded beyond the initial seed money?
- Is there a dedicated workforce to maintain the MFL and the facility registry service, and is the workforce adequately trained?
- Is there oversight to ensure that people are carrying out their roles and responsibilities?
- Is there a mechanism in place to get feedback from **data consumers** on how to improve the MFL?
- Are there systems in place to address the issues associated with high staff turnover (e.g., training more than one person to do a specific job, providing incentives to stay in a current position)?

Funding is a critical first step and an important consideration both in the MFL development process and in the sustainability of the MFL. Funding sources vary but international organizations often fund the establishment of MFLs in countries where none exist. In such

cases, thinking through what will be needed to maintain the MFL in the future, when these resources are no longer available, is critical. In-country funding for the MFL is usually best because it allows the MFL to be country-directed, which generates ongoing interest at all levels and facilitates sustainability.

CASE STUDY: FUNDING THE MFL

In the Philippines, the World Health Organization (WHO) provided financial support during the initial stage of the health facility registry development. Subsequently, for the full establishment and sustainable maintenance of the facility registry, funding is through government budget support of the Knowledge Management and Information Technology Service unit.

4. CHALLENGES

Establishing a governance structure for the MFL poses several challenges. Table 2 lists the MFL governance-related challenges that can occur and potential solutions to these challenges.

Table 2: Governance challenges to establishing an MFL and potential solutions

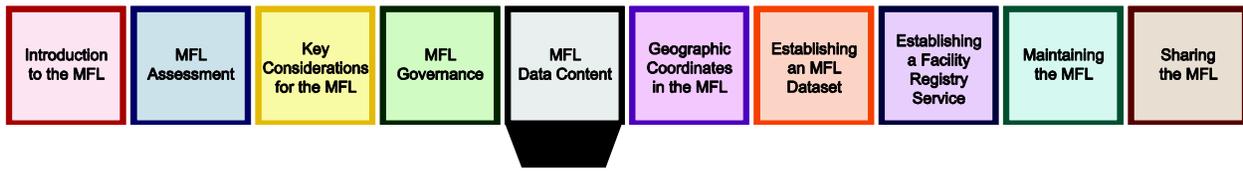
Challenge	Potential solution
Tensions between various stakeholders (ministries, donors, stakeholders)	<ul style="list-style-type: none"> Steering committee and strong leadership mitigate challenges Stakeholder meetings and workshops establish common grounds for cooperation and collaboration Adopt democratic approach of consensus building; promote openness to sharing data
Various authorities involved but lacking in power	<ul style="list-style-type: none"> Use existing systems and power structures Have policies with clear directives
Limited funding	<ul style="list-style-type: none"> Develop a detailed cost model early in the process Prioritize activities and build the MFL in phases
High staff turnover	<ul style="list-style-type: none"> Have clearly written guidelines and standard operating procedures to aid new staff Include detailed MFL-related duties in job descriptions Train more than one staff person to fill a specific role (e.g., curating the database or validating data at the district level)
No champion	<ul style="list-style-type: none"> Implement stakeholder analysis to understand and share how each would benefit from an MFL Have the TWG use findings from the MFL assessment to build a business case for the MFL Hold a dissemination workshop following the assessment to engage stakeholders and get buy-in

(continued)

Challenge	Potential solution
Lack of procedures	<ul style="list-style-type: none"> Steering committee establishes a guidance document or manual that outlines processes and procedures for establishing and maintaining the MFL
Lack of buy-in from some stakeholders	<ul style="list-style-type: none"> Expand advocacy on the benefits of the MFL Hold a dissemination workshop following the assessment to engage stakeholders and get buy-in

5. RESOURCES

- [Ghana eHealth Strategy](#)
- [WHO National eHealth Strategy Toolkit](#)



MFL DATA CONTENT

This module describes the data that should be included in the Master Facility List (MFL). It covers both the minimum data elements required for inclusion in the MFL and other data elements commonly included. The module is useful both when setting up an MFL and when considering modifications to the content of an existing MFL. Additionally, the module will help guide those involved in the assessment of data in an MFL.

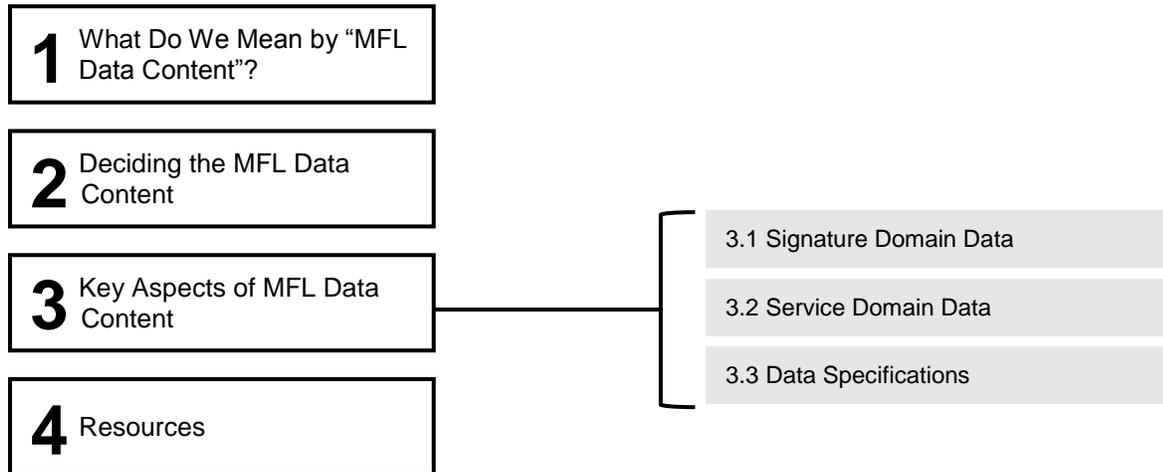
Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Determine key requirements of the MFL	Key Considerations Module
<input type="checkbox"/> Identify available resources	MFL Assessment Module

Key audiences for this module
<ul style="list-style-type: none"> • MFL Steering Committee • MFL managers • Technical Working Group assigned to establish the MFL dataset

Note: words in **bold** are defined in the glossary.

Figure 1: MFL Data Content – Module Outline

(Press Control and click on any of the boxes to be taken to that page.)



1. WHAT DO WE MEAN BY “MFL DATA CONTENT”?

The MFL data content refers to the information, or **data elements**, that relate to each facility included in the MFL. Typically, an MFL includes both administrative information that can be used to identify and contact the facility (**signature domain data**) and information on the service capacity of the facility (**service domain data**). Both signature domain data and service domain data are described in this module.

2. DECIDING THE MFL DATA CONTENT

It is important to carefully select and define the data elements to be included in the MFL. Data elements for the signature domain (see Section 3.1) are required while others, including service domain data, are desirable but optional. The inclusion in an MFL of additional or optional data may be useful to MFL **data consumers** but, ultimately, the more data included in the MFL, the greater the cost and the effort required to update and maintain the MFL. Therefore, the decision regarding which data to include in the MFL must necessarily balance the basic needs of data consumers with the potential costs and resources required to collect additional data on all facilities, and to regularly update and verify that data.¹

The following are recommended best practices for deciding which data to include in an MFL:

- *Consult potential MFL data consumers prior to deciding on the facility data to include in the MFL. It is useful to have a formal process for identifying the types of facility data that stakeholders*

¹ For additional information about the process required to keep an MFL up-to-date, see the *Maintaining the MFL Module*.

want or need from the MFL, and the ways in which they plan to use it. MFL data requirements can be captured through **user stories**.²

- *Review the data being collected by existing facility lists* and determine how the data are being used, how important these data are to users of the list, and what difficulties are encountered in collecting these data.
- *Identify the sources available for obtaining the data you want to include in the MFL.* Once the data requirements are determined, it is important to identify the potential data sources and the procedures that will be used to collect and validate the data.³
- *Start with the **minimum data content** in the MFL.* To adequately manage the data collection and maintenance process, limit the initial number of data elements to those that are absolutely necessary. Add others as additional financial and human resources become available.
- *As much as possible, include facility data that changes little over time.* Information that changes frequently, such as the name of the chief medical officer, requires the MFL data to be checked and updated more often.
- *Work through the MFL Steering Committee* to engage stakeholders in decisions about the MFL data content. The Steering Committee should revisit the data content periodically to reassess new data requirements and to review the resources available for collecting and validating facility data.⁴

² See the *Key Considerations Module* for additional information on collecting user stories.

³ See the *Establishing the MFL Dataset Module* for additional information on identifying sources and collecting data for the MFL.

⁴ For more information on stakeholder engagement and the MFL Steering Committee, see the *Governance Module*.

CASE STUDY: DEFINING MFL DATA CONTENT

Kenya: Held a stakeholder meeting to determine which data elements to include in the MFL. They came up with a minimum standard of what you need to know about the facilities and how often the data need to be updated.

Rwanda: Did a formal information gathering to determine which facility data were already available and, among these, which elements they wanted to include in the MFL. Because of funding constraints, they decided to wait on introducing new data elements, adding them to the MFL in steps. They decided on a small initial list of data elements and are working on adding more data elements to the MFL as funds become available.

Philippines: Began with a large list of data elements; however, when they tried to operationalize the large amount of data content, they encountered problems and decided to reduce the list. At this point, the stakeholders met and determined the key minimum data elements that would be included in the MFL going forward.

Tanzania: Gained consensus on data content from a broad group of stakeholders through the use of key informant interviewers and implementation of a three-day workshop.

3. KEY ASPECTS OF MFL DATA CONTENT

3.1 Signature Domain Data

The signature domain contains data elements that are used to establish a “fingerprint” for a facility.⁵ It includes all the information necessary to uniquely identify, locate, and contact a specific facility. These data elements should not change substantially over time. The data elements in the signature domain constitute the **minimum data content** for your MFL.

⁵ MEASURE Evaluation and the World Health Organization (WHO), 2007. The Signature Domain and Geographic Coordinates: A Standardized Approach for Uniquely Identifying a Health Facility. <https://www.measureevaluation.org/resources/publications/wp-07-91>

Table 1: Data elements in the signature domain of an MFL

Signature domain data element	Definition of data element	Description of data element	Example
Facility Unique Identifier	A unique code that identifies a specific facility and distinguishes it from all others	Numbers are often used as unique identifiers for facilities. They are simple, compact, and can be stored in any system. Ideally, they are automatically generated by the system. (Note: Additional information about unique identifiers follows this table.)	Number: 125656443
Facility Name	Official name of the facility	The implementation team will need to agree on naming standards and use a consistent format for all facilities. The facility name should be the official name of the health facility and consist of a single text field. It is recommended that the name be free of abbreviations. Facilities may go by several names, for example if different languages are spoken. In such cases, stick to one language in the main facility name field. Other data elements can be added that include additional names the facility goes by. It is important not to include the administrative unit's name or level in the name of the facility, unless it is part of the official name. The location or the type of facility should be included in the facility name only if it is included in the official name.	Louis Pasteur Hospital Nairobi Women's Hospital Lema Dispensary

(Continued...)

Signature domain data element	Definition of data element	Description of data element	Example
Facility Type	Classification of the facility	Facility types should be determined by a central authority. The MOH may already have a list of standard facility types, with criteria defining each type.	Hospital Primary Health Care Center Dispensary Mobile Health Care Facility
Ownership or Managing Authority	Entity that owns or manages the health facility	Ownership and managing authority should be determined by a central authority. Each facility should have just one type of ownership designation. If a facility can be classified under more than one ownership category, the <i>more specific</i> designation should be used. For example, a “military” facility can be classified under “government” and “military,” but because “military is more specific, this option should be used.	Government MOH Government Military Private Nongovernmental organization Faith-based organization
Postal Address	Physical location or address of the facility	This data element will often require various separate fields that may include: <ul style="list-style-type: none"> • Street Name and number • City/ Neighborhood • Postal Code However, given the variability between countries in how addresses are listed, this data element will need to be defined at the country level.	380 Francis Road Pretoria 0001
Contact Information	Information necessary to get in contact with the facility	Separate fields are required for each type of contact information. The most important data elements are the facility’s telephone number and email address.	+ 223 12 976 5555 xyzdispensary@gmail.com

(Continued...)

Signature domain data element	Definition of data element	Description of data element	Example
Administrative Areas	District, province, or other administrative level in which the facility is located	<p>There will usually be several data elements to cover the various administrative levels in a country. To assure that linkages with other data sources are possible, a standardized list of administrative units should be used.</p> <p>The MOH may maintain health districts or zones (i.e., administrative areas that are specific to the function of the health sector), distinct from the geographic units used in other aspects of the country's governance. In such cases, both should be captured in separate fields.</p> <p>Each administrative unit should be assigned a numerical designation to clarify the hierarchy of levels. For example, province is level 1, district is level 2, and ward is level 3.</p>	Southern District
Geographic Coordinates ⁶	Physical location of the facility, typically represented as latitude and longitude	Both latitude and longitude should be specific in decimal degrees (with positive and negative numbers). For latitude, north is considered positive and south is considered negative. For longitude, east is considered positive and west is considered negative.	The latitude and longitude (in decimal degrees) of Lusaka, Zambia are: Latitude: -15.41667 Longitude: 28.28333
Operational Status	Legal status of a facility intended to provide health services. At any given time, a facility will have a single operational status.	<p>The following are suggested operational status categories:</p> <ul style="list-style-type: none"> • Operational: Facility is open • Pending: A facility that has been approved and licensed but is not yet operational • Closed: A facility that was operational but is now permanently closed • Does not exist: A facility whose physical existence cannot be verified. Facilities that can be classified as "Pending" are not included in this category. • Duplicate: The facility exists and is properly licensed but is effectively a duplicate of another facility. 	

(Continued...)

⁶ For detailed information on collecting geographic coordinates, see the *Geocoding the MFL Module*.

Signature domain data element	Definition of data element	Description of data element	Example
Record date	The date in which the data were collected or validated	When possible, include the date which the signature domain data were collected or validated. This information should be specified for each facility entry. In case of duplicate entries, the latest (most recent) year is considered the valid date. If no data year is available, the field should be left blank. Consider whether individual elements in this domain are likely to change at different frequencies and therefore if a date field should be attached to each data element rather than the full record.	May 2015

Further Discussion of Facility Unique Identifiers

Unique identifiers are one of the most important components of an MFL.⁷ They should consist of numbers, preferably randomly or sequentially assigned. A unique identifier should not include any information about the facility—for example it should not include a part of the facility name or reference the administrative unit—because these characteristics can change over time. Once assigned, the unique identifier for a facility should not be changed, particularly when multiple systems rely on these codes for data linkage.

Numbers are simple, compact, and can be stored in any system. Manual generation of unique identifiers should be avoided because the process is prone to error and duplication. For example, in decentralized systems where unique identifiers are generated at the province level, it is important to assign a range of codes to each province to avoid duplication—province A is assigned codes 1000–4000, and province B is assigned codes 4001–8000. Coding schemes that including “0” at the front must be avoided because in certain software applications the “0” falls off, making integration of databases difficult.

⁷ See the *Introduction to the MFL Module*

CASE STUDY: FACILITY CODES

Philippines: The MFL assigns a sequential unique identifier to each facility; the code is generated by the facility registry. There is no geographic association within the number. Initially, they tried to include administrative characteristics (administrative location of facility) in the unique identifier, but the administrative units changed frequently and the facility codes proved too difficult to maintain.

Tanzania: The MFL assigns a random unique identifier to each facility.

Kenya: The system assigns a random unique identifier to each facility registered in the MFL. Therefore, when the administrative divisions in Kenya were redrawn the facility codes (unique identifiers) were not affected.

3.2 Service Domain Data

The **service domain** contains data elements that describe the basic services, infrastructure, and human resources at a facility; therefore, service domain data are critical for planning and resource allocation. Compared with signature domain data, these data tend to change more frequently, so greater effort is required to keep information current. Careful consideration should be given to identifying the minimum service domain data elements to be included in the MFL. Which data elements are included and which are excluded will depend on: (1) the budget requirements for collecting and maintaining these data; (2) the ability to capture the information for all facilities; (3) MOH priorities; and (4) how the MFL will be used in the country. You will need to work with key stakeholders and the MFL Steering Committee to decide which service domain data elements need to be included in the MFL.⁸

Data sources for the service domain can include surveys such as the Service Availability and Readiness Assessment (SARA) surveys⁹, or the Service Provision Assessment (SPA) surveys.¹⁰ Alternatively, the information can be collected more routinely through the use of dedicated forms completed by health facility staff.¹¹

⁸ See the *MFL Governance Module* for more information on stakeholder engagement and the MFL Steering Committee.

⁹ http://www.who.int/healthinfo/systems/sara_introduction/en/

¹⁰ <http://dhsprogram.com/What-We-Do/Survey-Types/SPA.cfm>

¹¹ See the *Establishing an MFL Module* for more of data sources for the MFL.

Table 2: Data elements in the service domain of an MFL

Service domain data element	Definition of data element	Description of data element	Example
Services Offered	Types of services offered by facility	A series of data elements listing key health services is included in the MFL; facilities are categorized as “Yes” providing the service or “No” not providing the service. Information must be adapted at a country level to include the package of services offered through the country’s health system, and that are of interest to data consumers.	Family Planning Antiretroviral Therapy (ART) Labor and Delivery
Human Resources	Number of medical personnel by type	The categorization of health personnel is specific to the country. Types include, but are not limited to: physicians, non-physician clinicians, registered nurses, and registered midwives. For each type of health personnel, the facility reports the number available.	Number of Midwives: 4
Infrastructure	Number of inpatient and maternity beds and cots in facility	For the MFL, it is suggested that only information on inpatient beds/cots (including maternity beds) be collected. Other equipment and infrastructure details should be collected through a separate health facility assessment (SAM, SARA, SPA, HFA, etc.). However, additional equipment and infrastructure data may be added to the MFL, if desired.	Number of Inpatient Beds: 15

3.3 Data Specifications

Data specifications are guidelines describing how each data element must be defined and formatted for data entry. Data specifications are important for ensuring that information about facilities is collected in a standardized and consistent manner. Each facility record will comprise

a series of data elements that describe the details about each facility. For each data element, it is important to clearly define the following attributes:

- **Definition:** A simple description of the data element
- **Data Rules:** A description of the format for the data element along with a list of constraints or conditions that should be applied to a data element. For example:
 - Number of characters
 - Use of letters, numbers, and symbols (including accents)
 - Capitalization rules
 - Use of abbreviations (if allowed), and which are permitted (e.g., use only Ave. to abbreviate Avenue)
 - Language (including when to use symbols and accents)
- **Data Source:** Where the information comes from (an individual, survey, organization, or other information system).
- **Required, Important or Optional:** Some data elements are absolutely required to create a new facility record (*required*); some are fundamental to stakeholder needs but may be difficult to acquire (*important*); and some are simply good to have (*optional*).
- **Missing Values:** In all types of data collection there will be missing values; information may be hard to get, and some respondents may not have the information. It is, however, important to *distinguish missing information from the value zero*. If the respondent does not know the number of beds in a facility, that information (“Don’t know”) is substantially different from there being no beds in the facility. It is necessary then to assign a code for the missing data. It should always be possible to distinguish the missing data codes from the codes for valid answers. Depending on the range of valid answers, the codes 9, 99, 999... are recommended for use in the case of missing data. Be careful that missing data are not confused with real data; for example, if data are missing for the number of beds in a facility, using the numbers 9 or 99 for “missing data” may be confusing. It is best to use a number such as 99,999, which is unlikely to reflect the actual number of beds.

These data specifications should be clearly detailed in a data specification document that is easily accessible to anyone who needs to submit or use MFL data. When adding a new facility to the MFL, or appending new data to a facility record, it is important to make sure all data conform to these specifications.

When setting up data fields in the **facility registry solution**, it is important to define the field types accurately, and to set restrictions so that only the appropriate format can be entered. This will help reduce errors.

International data standards can be used to define data specifications. Data standards are agreed upon rules for how data should be formatted, defined, structured, managed and used. The use of international data standards is important for sharing data, especially for integrating the MFL with other information systems; it allows both systems to share a common language and understand what the data mean.¹² For example, dates can be entered in various ways as shown in the text box. Data standards will dictate which format to use consistently to avoid problems when sharing data. For example, data standards may require that all dates be formatted as DD/MM/YYYY.

When selecting data standards, it is important to consult the managers of the information systems with which the MFL will be sharing data, to determine which data standards are already in use and which make the most sense in the context of the particular country.

Date formats. The format of dates varies depending on the system used in a country. To enable communication between the MFL and data consumers, one consistent date format must be used. For example, 05/07/17 would be interpreted as the 7th of May 2017 in the United States, and the 5th of July 2017 in Europe; and countries such as Ethiopia and Eritrea use the Ethiopian calendar rather than the Gregorian calendar. Delimiters used between the month, day, and year provide additional complication because some systems may not be able to read them. The forward slash (/) and the hyphen (-) are most common, with some systems using no delimiters.

The mostly widely used date standard is the International Standards Organization (ISO) date format, ISO 8601. ISO 8601 specifies the date format as YYYY-MM-DD, where *Y* is the four-digit year, *M* is the month, and *D* is the date so that the 7th of May 2017 would be represented as 2017-05-07. ISO 8601 further specifies standards to represent the time of day, the coordinated universal time (UTC), the local time with offset to UTC, date and time, time intervals, and recurring time intervals.

Examples of different date formats

- June 2, 2002
- 2 June, 2002
- 06-02-2002
- 02/06/2002
- 2/6/02

Further resources on date and time formats can be found in the links below:

- <https://www.iso.org/iso-8601-date-and-time-format.html>
- <https://www.iso.org/standard/40874.html>
- <https://www.w3.org/TR/NOTE-datetime>
- https://en.wikipedia.org/wiki/UTC_offset

¹² See the *Sharing the MFL Module* for more information on integration.

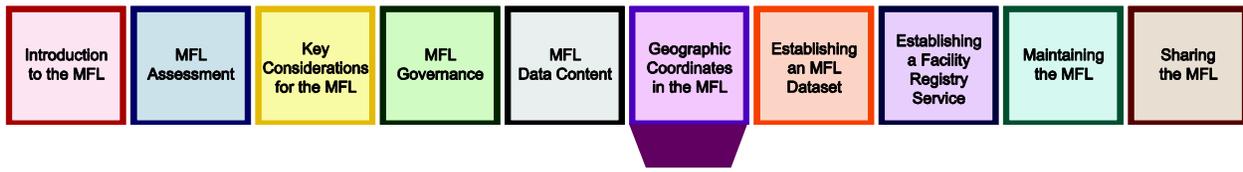
Address considerations. International standards exist that facilitate specifying addresses in different countries and sharing information about addresses—for example, the OASIS Customer Information Quality (CIQ) family of specifications, and specifically the eXtensible Address Language (xAL). The Universal Postal Union (UPU) also gives international standards for addresses.

Multilingual considerations. In some cases, your MFL may need to support multiple languages. The UTF-8 encoding system is recommended. Detailed instructions on how to support Unicode and multilingual databases are available at the web sites below:

- Oracle: https://docs.oracle.com/cd/A97630_01/server.920/a96529/ch5.htm
- MySQL: <https://dev.mysql.com/doc/refman/5.5/en/charset-unicode.html>

4. RESOURCES

- [Haiti MFL Codebook](#)
- [Tanzania Health Facility List Data Specification](#)
- [Rwanda Registry Specifications \(See Page 17\)](#)
- [Establishing and Using Data Standards in Health Workforce Information Systems](#)



GEOGRAPHIC COORDINATES IN THE MFL

This module provides guidance on the procedures for assigning geographic coordinates in the Master Facility List (MFL). The module provides guidance for selecting a schema for the coordinates, and for obtaining, validating and sharing geographic coordinates for the MFL.

Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Identify the main users of MFL data and document their requirements	Key Considerations Module
<input type="checkbox"/> Decide the minimum data content of the MFL	MFL Data Content Module
<input type="checkbox"/> Assess content of existing facility lists	MFL Assessment Module
<input type="checkbox"/> Established a Steering Committee for the MFL	Governance Module

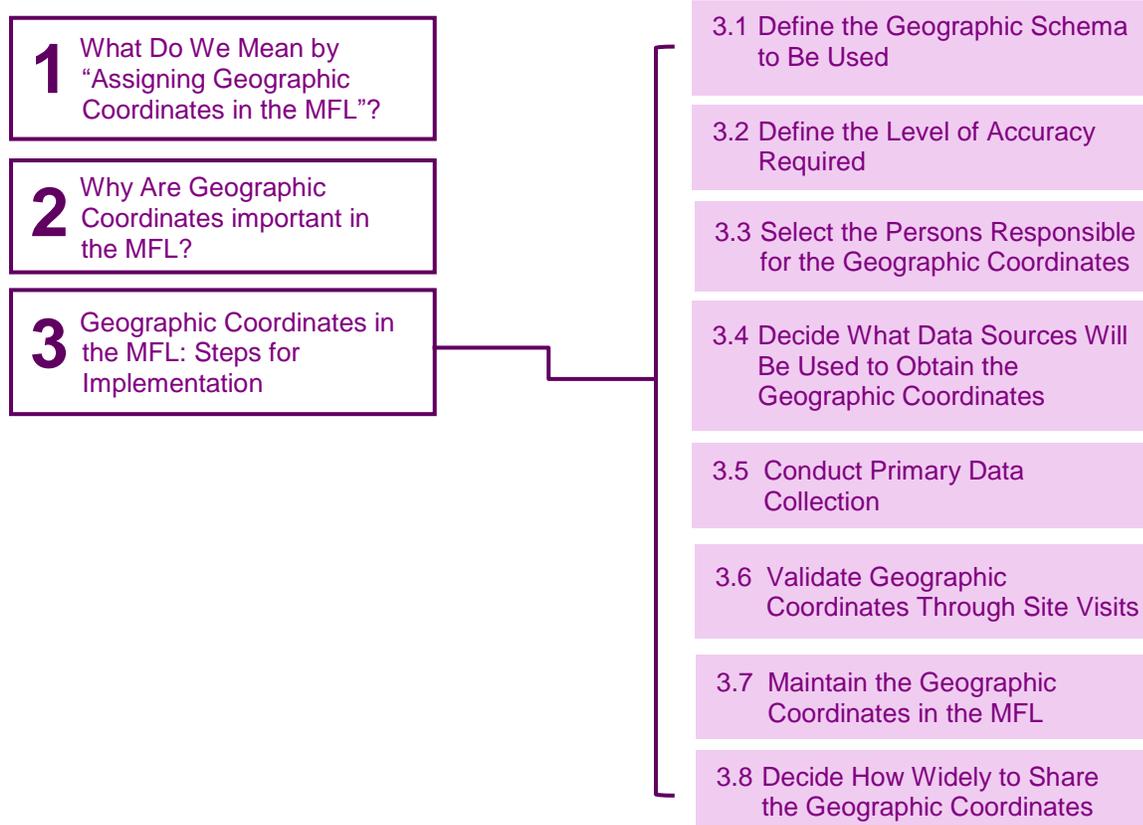
Key audiences for this module

- Technical staff responsible for collecting or validating geographic coordinates for the MFL
- Managers who oversee the MFL

Note: words in **bold** are defined in the glossary.

Figure 1: Assigning Geographic Coordinates in the MFL – Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT DO WE MEAN BY “ASSIGNING GEOGRAPHIC COORDINATES TO THE MFL”?

Assigning geographic coordinates to the MFL entails gathering and assigning physical location data (typically using geographic coordinates for latitude and longitude) to each health facility included in the MFL. While an MFL usually includes different types of geographic identifiers, such as the administrative unit (e.g., province or district) in which the facility is found, geographic coordinates provide a more accurate location for the facility and can be visualized as a point on a map. Conceptually, assigning geographic coordinates is a simple process but implementation can be complex.

The complication comes from ensuring that all geographic coordinates within the MFL can be proven to be reliable. If even a few geographic coordinates are found to be incorrect, the whole list of geographic coordinates can come into question and trust may be lost in the reliability of the MFL. Establishing sound procedures for obtaining and validating geographic coordinates is critical. Of equal importance is ensuring proper documentation of processes used and

documentation of the source for every geographic coordinate so that data consumers can access it and judge the reliability for themselves.

The module outlines the most common approaches to assigning geographic coordinates, and discusses key considerations to be reviewed when determining the methods to be used.

2. WHY ARE GEOGRAPHIC COORDINATES IMPORTANT IN THE MFL?

Having geographic coordinates in the MFL allows one to benefit from all the data visualization and analytical capabilities offered by Geographic Information System (GIS). This brings many advantages including the following:

- It facilitates management of health programs.

Knowing where health facilities are located and where specific services are offered is critical to managing national health programs and targeting interventions efficiently. With geographic coordinates it becomes possible to easily visualize and query the data using a mapping program such as Google Earth or by using a Geographic Information System (GIS). This mapping can help in identifying areas of high or low concentration of activities and then making adjustments to service locations to improve service availability.

Facility location data can help examine questions related to access, equity, and gaps in service provision. Accurate location information about health allows health planners to target interventions, review and assess the impact of programs, and plan future activities.

Location information can also help with budgeting and planning for activities that involve the transport of goods and human resources, such as supervisory visits or the delivery of commodities.

- It makes it possible to link the MFL to other spatially distributed datasets.

Linking the MFL data to other spatially distributed datasets allows for greater insight into health programs and their interaction with factors that can influence their effectiveness. From a geographic perspective, it can be of value to understand the location of facilities and services relative to factors such as population distribution (overall population or key populations), transportation networks, markets, climate, or agricultural patterns. The key to this process is having the other dataset in question also stored as geographic data to allow linkage with the MFL within a GIS software.

- It assists with management of the MFL itself

Knowing the exact location of facilities can help flag potential duplicate listings in the MFL (for example, if two facility entries with different names are found to have the same

geographic coordinates). If duplication is suspected, the team should investigate whether there is an error or whether there really are two different facilities located in the same building.

To be most effective, the MFL should include the location of every health facility in the system; however, even partially complete spatial data in an MFL can be beneficial. It is better to have some geographic coordinates in an MFL than none at all because of the benefits these data provide.

3. GEOGRAPHIC COORDINATES IN THE MFL: STEPS FOR IMPLEMENTATION

Assigning geographic coordinates to facilities in an MFL requires a number of steps and decisions as described below. The eight main steps are:

1. Define the geographic schema to be used
2. Define the level of accuracy required
3. Select the persons responsible for obtaining and maintaining the geographic coordinates
4. Decide what data sources will be used
5. Conduct primary data collection
6. Validate the geographic coordinates
7. Maintain the geographic coordinates
8. Decide how widely to share the geographic coordinates

3.1 Define the Geographic Schema to Be Used

Geographic coordinates system is a reference system for pinpointing locations in relation to each other. They have three main elements, reference point (0,0), units of measure (meters, degrees, etc.), and mathematical algorithm (datum) representing the curvature of the earth.

The schema of the geographic coordinates is the primary data format used to store the geographic coordinates. Various types of schema formats exist. However, we recommend using *latitude and longitude in decimal degrees, with WGS84 as the datum* in an MFL. The reasons for this are: (1) latitude and longitude is widely understood and commonly used in computer systems, (2) decimal degrees are easy to review and to identify data issues, and (3) WGS84 is a common datum. This is the default schema used in many mapping applications and in geographically enabled devices such as smartphones and tablets. Using a well-known schema such as the one noted above, facilitates sharing the geographic coordinates and facilitates integration of the MFL with other geographical data.

Definitions

The schema needs to be clearly defined and documented so that users of the MFL can access this information and understand the data they are using.¹ If the data format, whether Decimal Degrees (DD), Degrees, Decimal Minutes (DDM), or Degree, Minutes, Seconds (DMS), is not clearly stated or known, the ability to determine the true location is limited.

In some cases, you may want to include more than one schema in your MFL. For instance, if a particular schema is commonly employed in other databases accessed by MFL users, it may be helpful to include it in the MFL as well. When more than one schema is included, it will be necessary to define one as the primary schema.

Some countries or regions of the world have their own coordinate system, defined to better match the curvature of the earth across a smaller area such as a country, as opposed to the entire planet. This schema is usually based on historical mapping units. If the local coordinate system is widely used at the local level, integrating the MFL data with local GIS datasets will not require conversion. However, conversion to other common data formats and data sources outside the country can be complicated. For example, gridded populations and road networks (open street maps) are in global common coordinate systems; for them to be used with a local coordinate system requires conversion. For this reason we recommend using a local coordinate system as a secondary schema along with a primary global schema in the MFL

3.2 Define the Level of Accuracy Required

The required level of accuracy of the geographic coordinates depends on how the MFL will be used.² Accuracy refers to how well (or how close) the data corresponds to the true facility location in the “real-world.” In contrast, precision refers to the level of measurement and exactness of the data values themselves. If the MFL is primarily used to map locations of facilities for planning purposes, then having the location of the village or town where the facility is located is likely sufficient (that is low accuracy). If the MFL must be used for navigating to facilities for supervisory visits or for the provision of commodities, then highly accurate location for each facility is needed. Some types of analytics may require more accurate locations, for example if one wants to study how distance to facilities affects uptake of services and health outcomes.

Latitude measures north/south location. North of equator values range from 0 to 90 degrees with 0 being the equator. South of the equator values range from 0 to -90 degrees;
Longitude measures east/west location. East of the prime meridian (which runs through Greenwich, UK) values range from 0 to 180 degrees, and west of the prime meridian values range from 0 to -180 degrees.
A degree is approximately 111 km at the equator, which reduces as you move further from the equator.

¹ The *MFL Data Content Module* has information on defining and documenting data specifications for the MFL.

² For more on understanding user requirements for the MFL see the *Key Considerations Module* and the *Establishing a Facility Registry Service Module*.

The level of accuracy affects the level of effort required to obtain the geographic coordinates. Accurate locations require visiting the facility to collect the exact geographic coordinates, whereas less accurate locations (such as assigning a facility to a particular town) may be done remotely using software such as Google Maps. Depending on the resolution of the satellite images in Google Maps it can be highly accurate in assigning geographic coordinates especially in urban areas.

The decision on the level of accuracy should be reviewed at least every few years to maintain viable geographic coordinates that continue to meet the needs of the MFL users. If the MFL **user requirements** shift, or the cost of obtaining geographic coordinates changes, then the required level of accuracy can be altered. It is important to note that such changes will likely have consequences on the methods used to collect and validate geographic coordinates.

3.3 Select the Persons Responsible for the Geographic Coordinates

When deciding who to charge with maintaining the geographic coordinates it is important to understand the roles and responsibilities this job entails, and how they will interact with the other roles and responsibilities associated with the MFL.³ The responsibilities of the team charged with managing the MFL geographic coordinates are described below:

1. Establishing and implementing the procedures for collecting geographic coordinates
2. Identifying processes for validation of geographic coordinates
3. Assessing and validating geographic coordinates
4. Maintaining and sharing the MFL geographic coordinates
5. Responding to inquiries regarding the geographic coordinates assigned to facilities
6. Documenting the procedures for assigning geographic coordinates in the MFL and making them accessible to users

These responsibilities can be divided up or assigned to one person, depending on the size of the MFL. They can be managed centrally or regionally if there are standardized procedures. These tasks can be contracted out as long as there is close oversight and coordination to ensure alignment with other MFL maintenance processes. Typically, the person(s) tasked with managing the geographic coordinates should be within the same institution and unit as others managing the overall MFL, to facilitate management and coordination. It is recommended that more than one MFL team member be involved in the process of assigning geographic coordinates so that with the departure of key staff, these skills are not lost.⁴

³ See the *Maintaining the MFL Module* for a description of the responsibilities associated with maintaining and managing the MFL long-term.

⁴ See the *Maintaining the MFL Module* for more information on MFL roles and responsibilities.

3.4 Decide What Data Sources Will be Used to Obtain the Geographic Coordinates

A key decision with regard to geographic coordinates is whether you will collect new data or use existing geographic coordinates from other facility lists. The decision will depend on what data are available, how trustworthy they are, whether they meet the schema and accuracy criteria you have established, and whether the method of collection is well documented. This requires a careful review of the existing lists, which can be done as part of the initial MFL assessment.⁵ Lists that contain geographic coordinates meeting these criteria can then be reviewed more closely to classify the data for geographic coordinates facility by facility. If no trustworthy data exist, then new data collection will be required (see Section 3.5)

It is important to look at the overall completeness of the geographic coordinates from the available list(s), the level of accuracy and precision, the date of the last update, and the method of data collection. This information provides the foundation for determining whether the data can be used and whether facilities need to have geographic coordinates collected.

Completeness: you will need to determine how many of the facilities in the list(s) have geographic coordinates, and how many are missing these data.

Accuracy: You will need to determine if the accuracy of the geographic coordinates in the existing list(s) meets the accuracy requirements defined for the new MFL. For example, if the data are used for navigation, aiming to arrive within 10 meters of the site, and accuracy of the data only identifies the geographic location of the village and not the facility itself the existing data need to be more accurate.

Precision: You will need to determine if the precision of the data recorded for the geographic coordinates meets the precision requirements defined for the new MFL. For example, if the data are used for navigation, aiming to arrive within 10 meters of the site, and the schema is geographic (using decimal degrees), then the precision of the geographic coordinates would need to be at least the fourth decimal place recorded in the database.

Validity: When reviewing existing geographic coordinates, it is important to examine how they were collected to determine how reliable the data are. You will also need to determine whether the location data are correct and correspond to the right facility. To do this, you can map the location to see if the geographic coordinates fall within the recorded administrative area and whether they are plausible (e.g., they don't fall in the middle of a body of water or other uninhabited areas).

Once the useable geographic coordinates have been identified in existing lists, the next step is to compare geographic coordinates from different lists with each other. The aim is to use the

⁵ For more information on review of existing facility lists, see the *MFL Assessment Module*.

existing lists to determine the validity of each geographic coordinate. Codes that match lend assurance to their validity. Matches do not need to be exact, but the locations should be within a reasonable range of each other, for example within 50 meters (the exact range you set will depend on the level of accuracy you have determined needing in the MFL). Where large discrepancies exist, further verification is necessary. The outcome of the review process will be a list of facilities, categorized according to the status of their geographic coordinates: validated (ready to use), provisional (needs to be validated), or to be collected (missing or unusable geographic coordinates). Facilities that have a geographic coordinates that meets the required accuracy from two independent sources can be classified as *validated*; facilities that have geographic coordinates that meet required accuracy from only one source can be classified as *provisional*; facilities that do not have geographic coordinates that meet the required accuracy should be classified as *to be collected*. This classification helps determine which, if any, existing data can be used and determines the level and type of action required to complete the MFL with corresponding geographic coordinates for each health facility.

Keep in mind that pulling geographic coordinates data from other lists to the MFL requires matching facilities across lists, which can sometimes be a time-consuming and cumbersome process.⁶ Following this process, you still need to further validate the geographic coordinates, as described in Section 3.5.

3.5 Conduct Primary Data Collection

Developing an Action Plan

Following the review of geographic coordinates in existing facility lists, you need to develop an action plan for collecting new data to fill the gaps. This action plan will depend on a variety of factors such as (1) type, size, and distribution of data gaps, (2) resources available for data collection (people, equipment, and funds), (3) level of effort required to carry out the data collection, and (4) the urgency with which geographic coordinates are needed in the MFL. The action plan should be documented to assist with securing funds and for coordination with other activities.

There are two main strategies for collecting geographic coordinates using a GPS receiver or a GPS-enabled device:

1. Targeted visits to facilities solely to collect geographic coordinates
2. Adding GPS data collection to routine or planned visits to facilities

⁶ For more information on harmonizing lists, see the *Establishing an MFL Dataset Module*.

The main differences between the two approaches are: level of control associated with the data collection process, timing of data collection, need for coordination with other activities, and overall cost.

Targeted visits to facilities to collect geographic coordinates are a focused effort to collect site coordinates and can provide high quality data in a timely fashion. However, cost can be a factor in using targeted visits so this approach is rarely used.

Including GPS data collection with other activities that bring people to facilities (e.g., supervisory visits, commodity delivery) is one option for collecting new data or for validating existing data. It is important to keep in mind that “pairing” with another activity requires coordination and can result in additional time being needed to complete the geocoding process. Added effort and oversight may be needed to ensure that personnel are trained and proper data collection methods are used.

The action plan for addressing data gaps can be a combination of approaches: targeted visits and opportunistic collaboration with other routine visits. As the MFL becomes more mature, the recommendation is that an increasing proportion of GPS data collection be done through collaboration with other routine data collection. It is also recommended that when finalizing the plan for filling in the gaps in geographic coordinates, a phased approach to long-term processes for data collection (for new sites) should be specified.

Regardless of the approach, it is imperative to have clear written protocols and training materials on how GPS data are collected in the field, stored, and transmitted.

Finally, for both primary data collection and validation of geographic coordinates, implementation of a feedback mechanism to identify and report issues with geographic coordinates should be considered.

Primary Data Collection of Geographic Coordinates

When visiting a health facility, geographic coordinates can be collected using a *GPS receiver* or a *GPS-enabled device* (e.g., smartphone or tablet). Each device has advantages and disadvantages, although the process has a number of similarities. Below are key points for weighing the benefits of the two devices.

GPS Receivers

A stand-alone GPS receiver is primarily designed for personal navigation but it can be a useful tool for capturing geographic coordinates. Many GPS receivers are ruggedized so they can function well in remote locations. Each receiver has its own process for capturing geographic coordinates but in general the receiver will display the location and store it on the GPS receiver for download later. Because they vary, it is important to refer to the receiver’s instruction

manual for specific information about how to capture and download geographic coordinates. The primary advantage of GPS receivers is that they are specifically designed to handle geographic coordinates. At the same time, this characteristic is also a limitation because the GPS receiver is a single-task device that cannot easily collect any other attribute information.

Smartphones or Tablets

There has been a rapid growth in the use of smartphones for data collection. Most tablets, smartphones, and even some basic phones come with a built-in GPS chip and therefore can capture location information. The quality of GPS chips has improved to the point where these devices can have the same accuracy as a GPS receiver. A key advantage of using a smartphone or tablet for collection of facility geographic coordinates is the ability to capture other health facility information as well, through specially designed data collection forms. This functionality enables the pairing of geographic coordinates with other data, such as facility name and services offered, ensuring that the geographic coordinates are correctly linked to the right facility. It is also possible to sync directly with the MFL database, if connectivity and the facility registry service solution permit. Typically, data collection on these devices requires an app specially designed to capture data and geographic coordinates. These apps can be found in the device's relevant app store or custom apps can be created using tools such as ODK or iFormbuilder.

When collecting geographic coordinates at a facility site it is important to record the method used (GPS device, smartphone, map) and the date and time of the data collection. This information is useful for documenting the source of the geographic coordinates and for checking data quality. With the advent of electronic data collection and near real-time data transfer, there is opportunity for rapid data transfer and feedback. The value is that electronic data collection can allow feedback while data collectors are still in the field. However, expectations and understandings about roles and responsibilities need to be well established to ensure that the feedback mechanism is used effectively.

Cartographically Determining Location

When there are limited opportunities to physically visit a site, then locating the site using cartographic methods an option until the location can be visited. For example, some web maps allow users to extract latitude and longitude by clicking on the map. It's possible for people with local knowledge to identify the structure of a health facility using web based satellite imagery and collect latitude and longitude this way. The main disadvantage of using cartographical methods is lack of confirmation that the right geographic coordinates have been assigned to a particular facility. If this method is employed, using multiple sources such as Google Earth, topographical maps, and people with local knowledge, can minimize the likelihood of the geographic coordinates being incorrect. When a cartographic method is used,

it should be documented in the MFL and viewed as an interim source of information until geographic coordinates from the location can be obtained.

Potential Data Issues during Data Collection

In the process of data collection of geographic coordinates, issues regarding the list of facilities may come to light. A common type of data problem is duplication—the same location has two names. For example, Alpha District Hospital may also be known as St. Paul Hospital. In this case, the duplication needs to be documented and eventually resolved with the MFL maintenance team. As part of the data collection process, there needs to be a procedure in place for documenting discrepancies in the facility list and resolving them according to the MFL structure.

Documenting Data Collection Procedures

It is important to have well documented procedures for the collection of geographic coordinates to ensure they are obtained in a standardized manner. In addition, the process for physical data collection and recording requires training materials to provide the data collectors with clear instructions on how to collect geographic coordinates. The storage of data and the process of transferring the data collected will also need to be agreed upon and documented.

Data Quality Checks

After collection of new geographic coordinates, the data must be reviewed to ensure data quality before the geographic coordinates are added to the MFL. There are multiple ways of checking whether geographic coordinates correctly represents the specified facility at the specified location. However, the best way to validate geographic coordinates is for someone to physically visit the site and confirm that the geographic coordinates there match the recorded geographic coordinates.⁷ Below are ways of checking the validity of geographic coordinates that do not require going into the field. The shared principle behind these methods is assessing the validity of geographic coordinates by comparing them with other known geographic information.

1. Do the coordinates conform to the MFL schema?
2. When mapping geographic coordinates, compare them against other known locations or landmarks (e.g., other health facilities in the MFL).
3. Do the geographic coordinates appear in or near the border of their associated administrative unit? If a location is near or on the border of its administrative area it may be correct, but other data are needed to confirm it is in the right location.

⁷ It is considered a match when both coordinates are within 10 meters.

4. If the focus is a large health facility, is the location on or near a road? Is it in the center of a town? Larger health facilities are always located on or near a road and usually in a town center. If it is not, then other data are needed to confirm it is in the right location.
5. When mapped over imagery, is the location an improbable site (e.g., in a river, in a dense forest, or in the middle of an open plain)?

After the geographic coordinates are reviewed and identified as having a viable location—by checking the geographic coordinates against other known geographic data—then it becomes available for provisional use. The geographic coordinates must still be validated but it may be some time before the opportunity for validation comes with another visit to the site.

3.6 Validate Geographic Coordinates through Site Visits

Validation of geographic coordinates is required regardless of the data source (e.g., a pre-existing list or new data collection). Validation serves to verify the accuracy of the geographic coordinates and its assignment to the appropriate facility in the MFL. Validation of location data can be done when a site is being visited for other purposes (e.g., commodity delivery or supervisory visits). The process entails re-collecting location data and comparing it to the data in the MFL. A specified margin of error (i.e., acceptable deviance between the two location readings) should have been predefined early in the MFL process. If there are discrepancies, it is important to review the methods used to collect the geographic coordinates and to re-verify until two separate readings provide the same information.

The opportunity for validation through revisiting a site usually requires both a willingness to coordinate with all parties involved, and that all parties involved see the value of validating geographic coordinates during the site visit. It also requires careful training of the team going into the field and written instructions on how to collect, store, and transmit the data.

As with other changes and updates to the MFL, the geographic coordinates should include the data collection date and the data verification date, to show that the geographic coordinates MFL are being well-maintained.

3.7 Maintain the Geographic Coordinates in the MFL

As with all information stored in the MFL, geographic coordinates must be maintained to ensure that reliability and trust in the MFL are maintained. Effective maintenance recognizes that the MFL will have to accommodate regular changes to the list, and resources will have to be set aside specifically to collect and maintain geographic coordinates.

Together, the increased use of electronic data and the integration of GPS sensors into smartphones provide an opportunity to decrease the burden of physical data collection and management of geographical data through the use of IT innovation. Regardless of the technology used, four main factors are suggested to ensure sound maintenance of geocoding:

- Create processes to identify changes in the MFL and whether they are likely to trigger a change in the geographic coordinates. If the change in the MFL does trigger a change in the geographic coordinates, then the site must be added to a tracking sheet of geographic coordinates to be checked and either replaced or validated.
- Set up and document the standard methods for checking the geographic data.
- Update documentation of the geographic data elements, generally known as “metadata.” The metadata is descriptive documentation that contains information on the schema, datum, method of data collection, and format of the data elements in a geographic dataset. The metadata will need to meet national geospatial metadata standards.
- Schedule regular mapping and review, for tracking changes in the geographic coordinates. This activity should be done in coordination with a review of the entire MFL. The aim is to measure how well the MFL has been maintained, to improve the maintenance process, to increase reliability, and to reduce the cost of maintaining the MFL.

3.8 Decide How Widely to Share the Geographic Coordinates

The decision on whether and how to share the MFL geographic coordinates should be done in accordance with the policies developed around governance of the MFL. The *Sharing the MFL Module* discusses the importance of a MFL sharing policy and describes various factors to consider in developing such a policy. That information is also relevant to the sharing of geographic coordinates.

Among the factors to consider regarding the sharing of geographic coordinates is the trade-off in value between the utility of the data to MFL stakeholders and the sensitivities associated with the data. For instance, the location of military clinics could be considered sensitive. The MFL Steering Committee and MFL Managers need to carefully consider what data to make available and to whom, and to develop written policies around this.

Data Access

When sharing an MFL with geographic coordinates, the sensitivity of the location data needs to be taken into account. It may be necessary for some data to be restricted. The following will need to be carefully defined prior to sharing the data:

1. Who has access to the geographic coordinates?
2. What procedures are required to receive access to the geographic coordinates?
3. Are separate steps necessary to access the geographic coordinates (compared with other MFL data)?
4. Do specific types of sites require separate access policies (e.g., health facilities located at military establishments)?

Data Formats and Metadata

In addition to sharing the geographic coordinates it is important to share the metadata, or information about the following, for each facility:

- How the geographic coordinates were collected
- When the geographic coordinates were collected
- What exact schema was used
- The level of accuracy used

It is necessary for data users to have this information (1) to manipulate the geographic data elements in the MFL, and (2) to integrate MFL data with other geographic data.

Feedback on Geographic Coordinates

Receiving and incorporating feedback from MFL data users on the accuracy and utility of the geographic coordinates in the MFL is important. It is likely that MFL data users will eventually become reviewers of the quality of the lists of geographic coordinates and can help in identifying errors and improving data quality. Establishing a mechanism whereby errors can be flagged and suggested changes submitted for review is important. For more on this topic, see the *Maintaining the MFL Module*.



ESTABLISHING AN MFL DATASET

This module describes the process of establishing an MFL dataset. Some sections of the module apply to countries where no MFL exists, others are applicable to countries that already have an MFL but need to fill gaps in the data or to validate the data content. Using the flow chart in Figure 1, you can quickly determine which sections of the module are most appropriate for your situation.

Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Consult stakeholders to understand how the MFL data will be used	MFL Governance Module Key Considerations Module
<input type="checkbox"/> Determine what data should be included in the MFL	MFL Data Content Module
<input type="checkbox"/> Conduct an assessment of the MFL and available facility data in your country	MFL Assessment Module
<input type="checkbox"/> Set up a steering committee to lead the process of strengthening the MFL	MFL Governance Module

Key audiences for this module

- Steering committee for MFL strategic planning
- Managers of the MFL
- Implementing organizations who will assist in establishing the MFL dataset

Note: words in **bold** are defined in the glossary.

Figure 1: Establishing an MFL Dataset—Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT DO WE MEAN BY “ESTABLISHING AN MFL DATASET”?

Establishing an MFL dataset involves compiling the facility data you need from different sources and validating the information obtained. There are various approaches to establishing an MFL dataset. The preferred approach depends on which data are already available, the quality of those data, and how well they align with the previously established MFL requirements.¹ Depending on the country, you may need to build a new MFL dataset from scratch, harmonize existing facility lists into a MFL, collect and add additional data to complete the MFL, or simply **validate** an existing MFL.

This module outlines the various steps and decisions that must be made in the process of establishing an MFL dataset. Some steps may be skipped for countries that are further along in the process.

¹ For additional information see the *Key Considerations Module* and the *MFL Data Content Module*.

2. KEY STEPS IN ESTABLISHING THE MFL DATASET

2.1 Determine What Data the MFL Will Contain

Before you begin the process of establishing an MFL, you need to have determined what facility data you want included in your MFL dataset and what format the data should be in. See the *MFL Data Content Module* for detailed information on these issues.

2.2 Identify Available Facility Lists and Assess Their Content

You will also need to have identified and assessed the existing facility lists in the country, including the MFL, if there is one. The *MFL Assessment Module* contains detailed guidance for assessing facility lists. The assessment will help you identify what facility lists exist, how complete and up to date the data are, and whether the data contained in these lists can help build or supplement your MFL.

After assessing individual lists, consider the group of lists as a whole to determine:

- How complete are the data available?
 - Do you have data for all or most data elements of the MFL?
 - Do you have data for all or most health facilities?
- What data are missing?
- Will you need to collect new data to fill gaps?
- Are there important discrepancies across lists (for example, facility names or addresses are not the same)? Is it possible to determine where the error lies?
- Are the data in the lists defined according to the data specifications and standards you have set for the MFL?²

2.3 Identify a Good List to Serve as a Starting Point

If an MFL already exists in a country and you have determined that the data are reasonably complete and of good quality—even if there are some gaps—you can skip this section.

If a country does not yet have an MFL, the information you have gathered about existing lists will help determine if there is a facility list of sufficient completeness and quality that it can be used as the basis for establishing your MFL. To serve as a solid foundation for the MFL, this list

² See the *MFL Data Content Module*

must meet most of the MFL criteria for data content and quality. The list does not need to be complete, but it should:

- Be credible—you trust the data sources and methods used to update and validate the list;
- Have enough information about facilities to populate a substantial proportion of the MFL data needed;
- Contain data that was collected or verified within the past five years.

If some data elements or facility types are missing, those can be collected separately. The more important aspect of this step in the process of establishing an MFL is determining whether you have confidence in the validity of the data in the list you have selected. If there are too many errors, incomplete information, or other data quality concerns, it may be best to start from scratch with an entire census of health facilities. If you are unsure about data quality, you may want to do spot checks and data validation for some data elements. See Section 2.7 below, “Validate Data for Each Facility,” for more information.

If none of the lists meet sufficient assessment criteria—for example, the lists are too outdated or the data are fragmented and incomplete—then you will need to consider starting from scratch and collect new facility data. For more information, see Section 2.6 below, “Collect New Data.”

CASE STUDIES: STRATEGIES FOR ESTABLISHING AN MFL DATASET

Kenya: New data collection was used to create the MFL because no existing list had sufficient information to serve as a starting point. The MOH conducted the new data collection by sending each district a template that outlined the requested data fields. The districts collected the information and reported it to the MOH, which then compiled the data and used it to create the initial MFL.

Nigeria: Each state had a different process for registering and identifying facilities. The Federal Ministry of Health harmonized data from multiple lists, assigned new unique identifiers, and began a process to remove duplicates.

Tanzania: The MFL was created by implementing both new data collection and harmonization of existing lists. The existing lists came from various sources such as government ministries, multi-national organizations, and other agencies.

Haiti: After the 2010 earthquake, Haiti realized the importance of having a list of all the health care facilities in the country. A preliminary MFL was developed by merging information from various lists and consulting knowledgeable persons. This preliminary MFL was then posted to a public website where anyone could recommend corrections or additions to the list.

Philippines: The facility directory was maintained by the National Health Facility Registry (NHFR) Team at the Department of Health (DOH), with the sub-national health offices and the licensing bureau both having upload rights. This arrangement led to the creation of duplicate records and, from an initial roster of 17,000 facilities, the list expanded to 40,000. Input into the directory was not efficient, resulting in the facilities list being both overly large and incomplete—i.e., duplicate facilities and missing and incorrect data. The NHFR Team spent a substantial amount of time cleaning the directory and flagging potential duplicate facilities, which was a challenging and time consuming process. Duplicates were matched by health facility name and location (administrative unit, geographic coordinates). The team devised a set of rules for identifying potential duplicates. For example, they flagged all districts that had more than two hospitals.

2.4 Address Gaps in Data

If you have identified a facility list that will serve as the basis of the MFL, you need to clearly document any gaps that exist in this list. Gaps can be: (1) missing data (for example, there are no geographic coordinates), (2) incomplete data (for example, a sub-set of facilities such as military hospitals are missing), or (3) data that appear to be erroneous. You are likely to have already noted these gaps during the course your MFL assessment. However, it is important to examine the gaps in data carefully to know exactly what additional information needs to be gathered to supplement the existing data in the facility list, thereby creating a comprehensive MFL.

The next step is to determine where to obtain the data needed to complete the facility list. Generally, there are two options: you can pull data from another facility list, or you can collect data directly from the facilities. In some cases, you will need to do both. For example, you may find a list that has the necessary data for facilities in one region of the country, but need to collect that data for other regions.

When choosing whether to pull from other lists or to collect new data, give careful consideration to the level of effort required and the associated costs. Pulling from different lists can be complicated if facility names and unique identifiers do not match. If you think the gaps in your list can be addressed using data from other available lists, see Section 2.6 “Harmonize Lists into a Single List.”

If the missing data are not available in current lists, or if harmonization is not a practical solution, you will have to fill the gaps by collecting new data. See Section 2.5 “Collecting New Data” for information on how to do this.

2.5 Collect New Data

During the process of establishing an MFL you may need to collect new data. This is the case if you do not have all the information for your MFL **minimum data content**, and you cannot fill the gaps using information available on other lists. Be clear about the types of new data you need to collect; specify the following:

- Types of facilities you are including³
- Geographic areas where data collection will occur
- Data elements you need to collect, along with clear definitions for each
- Data collection tools or measurement approaches you will use
- Data sources you will use

Approaches to new data collection include the following:

Health facility assessment surveys—can provide new data for the MFL using a standardized methodology for collecting information about a health facility, such as services offered and infrastructure. Examples of such surveys are the World Health Organization’s Service Availability and Readiness Assessment (SARA) and the DHS Program’s Service Provision Assessment (SPA). These surveys can be administered as a census, or in selected regions, or targeted to a specific type of facility, depending on the information to be collected. You can coordinate with the facility assessment surveys to make sure they are collecting the data needed

³ See the *Key Considerations Module* for more information on determining what facilities to include in the MFL.

for the MFL, per the data specifications you have decided on. For planning purposes, you will need an estimate of the number of facilities in each geographic area and their approximate locations. A facility assessment survey will provide information beyond what is needed for the MFL and may be coordinated with other initiatives. However, this is an expensive option to carry out.

Targeted facility census—an alternative to a full facility assessment survey is to send teams into the field to collect the data directly from facilities only on the data elements needed for the MFL. Sending trained data collectors improves the quality of the data you collect.

District Health Information Officers—can be enlisted to collect information about facilities in their districts. They tend to be familiar with the various facilities and can coordinate with local MOH staff to help gather the specific data needed. These efforts can either be coordinated with scheduled supervisory visits to facilities or be carried out as standalone activities. A simple questionnaire specifically designed for the MFL is helpful in aiding the data collection process.

Crowd sourcing—soliciting contributions from a large group of people in a community or from data consumers can generate new data. In remote areas particularly, the community itself is often a necessary source of data. However, this method poses data quality issues because the persons collecting and sending in the information have not been trained to collect the data, and may not understand the exact definitions and measurement approaches specified for the MFL.

Collecting data on facility locations requires a meticulous approach. For more information, see the *Geographic Coordinates in the MFL Module*.

New data collection can be costly, depending on the approach that is used. Therefore, it is important to consider carefully the available budget before planning for new data collection. If the budget is limited, data collection can be done in stages, such as targeting one sub-group of districts at a time. It is important to prioritize which data are needed most urgently. Usually, data pertaining to the signature domain is critical to a MFL and should take precedence over data describing services offered at the facility.⁴

Once the data have been collected and entered into your list, you will need to begin the process of validating the data for each facility. See Section 2.7, “Validate Data for Each Facility.”

⁴ See the *Key Considerations Module* for more information.

CASE STUDY: NEW DATA COLLECTION

Tanzania: In addition to the harmonization of lists, a data collection tool was used to collect additional information and to verify or validate the information in the existing lists. The tool was about 4 pages and collected information on a wide range of information including: name, location, administration level, unique facility identifier, contact information, facility type (which included a better categorization of facilities than that used in the existing lists), ownership, infrastructure (number of beds, rooms, transport, waste, etc.), services offered, physical location, and service area population.

2.6 Harmonize Lists into a Single List

When the plan calls for harmonizing lists, keep in mind the costs and resources necessary to carry out this procedure. The time and effort required for matching facilities across lists and for data cleaning is often underestimated, which can result in substantial delays in establishing an MFL. Ideally, you establish a technical working group or committee of experts that oversees the harmonization process.

Harmonization generally has two purposes. First, it can be carried out to add additional facilities, along with their complete records, to the MFL. Second, harmonization can be carried out to add supplementary data about facilities already included in the MFL.

To harmonize the lists, you will first need to:

- Identify the data to be kept from each list;
- Compare data element definitions (**data specifications**) across lists that will be used to populate the MFL, to assure consistency;
- Estimate what proportion of facilities can be matched electronically across lists. To match electronically, the facilities need to have identical data in one or more key data elements (e.g., same unique identifier or geographic coordinates, or the same name plus administrative unit). The inconsistent use of accents or abbreviations, and misspellings will impede electronic matching. If the proportion of non-matching facilities is high (over 25%), determine how long it will take to verify and individually cross-reference each facility between lists.

Then you will need to carry out the following steps:

- Match facility records to create one record per facility in the MFL.
 - Organize the facility data—you will want to organize the facilities by lowest appropriate administrative level (often, this will be district level). It is also helpful to sort them alphabetically if the matching will be done by hand.
 - Electronic matching works best when there are a large number of facilities. The simplest approach is to try to match facility data per district based on facility name. However, small differences in spelling can fail to electronically match the same facility across lists. Geographic coordinates and unique identifiers are usually not consistent across lists and are not recommended to be used for matching.
 - For matched facilities, do a quick check of the other data fields for the **signature domain** to verify that the facility is in fact the same across both lists.
 - For facilities that were not matched electronically, you will have to match them manually on an individual basis. For facilities to be considered a match, the following data should be the same for both records
 - Facility name—a slight difference in spelling, naming, or abbreviations may have prevented the electronic match from recognizing these facilities as a match
 - Facility type (hospital, clinic, rural health center, etc.)
 - Managing authority (public, private)
 - Location within administrative units
- Combine the information in matching records to yield one record per facility. If entries cannot be matched, flag the multiple entries for reconciliation during the validation process.
- You may also want to import data for new facilities (not included in your MFL). In this case, you do not need to merge records, but you do want to verify that the facility is not already listed under another name.

A common challenge that arises during data harmonization is discrepancies in facility-level data—spelling differences, address or location differences, and differences in the naming of facilities. If you are not sure whether some facilities are in fact matches, you will need to consult district or facility personnel for clarification.

Once you have harmonized the data into a single list, the next step is to create the unique facility identifier codes for facilities that do not already have them.⁵

⁵ See the *MFL Data Content Module* for more information on facility codes.

When harmonization is complete, you should assess the new list for possible gaps.

CASE STUDIES: PROCESS OF HARMONIZATION

Tanzania: Harmonizing the existing lists included matching for geographic administration level, facility name, geographic coordinates, multiple IDs, ownership, and facility type. A data collection tool was used to obtain additional information about the facilities and to verify and validate the information in the existing lists.

Nigeria: To establish Nigeria's MFL, the Federal Ministry of Health (FMOH) had to harmonize data from multiple facility lists. The goal of the process was to allocate new unique identifiers and eliminate duplication of facilities. An intelligent unique identification system was used to create new unique identifiers. Following this allocation, matching of independent identifiers across different information systems (those previously deployed in the country) was attempted. A manual matching process was employed—any facility records that were a 100% match were considered similar records and the data in the other system was used to improve the information from the primary MFL that the FMOH had compiled. Any facility records that were a partial match were reviewed further by the FMOH. The FMOH was responsible for verifying whether the data were associated with one or more than one facility, and entering the verified facility information into the MFL.

2.7 Validate Data for Each Facility

After the necessary data have been input into the MFL, you will need to **validate** the data for each facility. Validating the list involves determining if you have data quality issues that must be resolved. This is an ongoing process that continues throughout the life of the MFL. All data in the MFL must be validated, but accuracy of the signature domain is considered most important.

It is recommended that, when possible, individuals familiar with the health facilities in their own localities (for example district health information officers) be responsible for validating the data. Data validation can be carried out through supervisory visits or through dedicated visits to the facility to determine the validity of the MFL data. If visits are not possible, telephone or email contact with the managing authority may be sufficient to obtain the required data (with the exception of validating coordinates).⁶

Once you have validated the data for each facility and assigned unique identifiers, you have a validated MFL that is ready to share.

⁶ See the *Maintaining the MFL Module* for more information on validating MFL data.

CASE STUDY: PHILIPPINES VALIDATION WORKSHOPS

The Philippines organized subnational validation workshops during which the MFL team and Department of Health (DOH) representatives worked together to clean and complete the existing MFL. They reviewed the list facility by facility to verify the data and correct them as needed. This process took about one year to cover 16 of the regions in the country. These validation workshops were useful whereas previous attempts to correct and fill gaps in the data by sending lists to subnational representatives were unsuccessful due to low response and poor internet connectivity. At the same time, the workshops provided a forum for (1) training DOH representatives on the process of updating the MFL, and (2) improving their skills in the collection of data on geographic coordinates of facilities using Google Map or GPS devices.

3. GOVERNANCE ISSUES TO CONSIDER

When you have determined the best process to follow in establishing your MFL dataset, you will need to set up a technical working group tasked with implementing the work. It will help with developing a work plan, creating a budget, and establishing a timeline to aid in managing the process.

Stakeholder engagement is critical at every step in the process of establishing an MFL dataset. Stakeholder buy-in and support is especially important if you want to harmonize lists owned by different groups, and reach consensus on a single authoritative list for the country.⁷

4. CHALLENGES

Establishing an MFL involves compiling a dataset of facility information from various sources and validating the information obtained. Table 1 lists some of the challenges that can occur during this process and their potential solutions.

⁷ For additional information on stakeholder engagement, see the *MFL Governance Module*.

Table 1: Dataset challenges to establishing an MFL, and potential solutions

Challenge	Potential solution
Too many facility lists exist	<ul style="list-style-type: none"> • Work with the MFL Steering Committee or Technical Working Group to determine what lists should be assessed and considered for building the MFL • Eliminate lists that are old or contain few relevant data elements or are duplicative of data available elsewhere. • Determine whether harmonizing many lists is more cost-effective than collecting new data.
Too many data elements included in the MFL	<ul style="list-style-type: none"> • Work with the MFL Steering Committee or Technical Working Group to determine what the minimum content should be and prioritize the need for additional data • Fully understand the implications and costs of adding more data elements to the list, what issues might arise, and how those issues will be resolved • Consider the costs and data collection burden required to keep the list up-to-date in the long-term
Non-standard facilities (i.e., not “brick and mortar”) or mobile facilities	<ul style="list-style-type: none"> • Determine what sources of data will be used for these types of facilities • Determine what value their inclusion in the MFL will bring against the added cost of doing so • Location data will need to be general (for example, just naming the district where they operate) • Anticipate needing to validate data for these types of facilities more frequently because they tend to change more often
Addressing discrepancies between MFL and externally managed facility lists (donors or civil society)	<ul style="list-style-type: none"> • Work with the MFL Steering Committee, Technical Working Group and list owners to determine how data discrepancies will be addressed • Validate data in the MFL to make sure it is accurate

5. RESOURCES

- [Development of a Master Health Facility List in Nigeria](#)
- [Development of a Master Health Facility List: Haiti’s Experience](#)
- [Tanzania MFL data collection form](#)
- [Rwanda MFL data collection form](#)



ESTABLISHING A FACILITY REGISTRY SERVICE

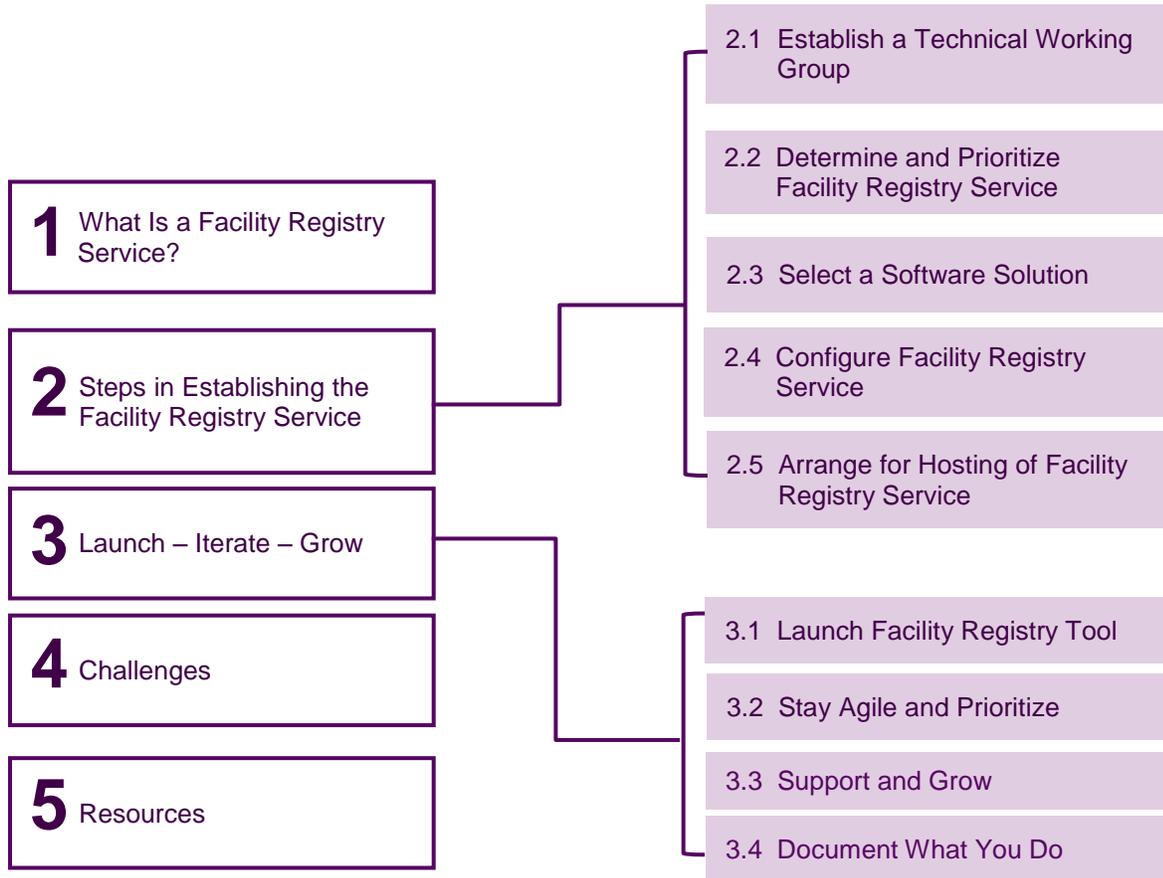
A **facility registry service** is a software solution that houses and shares the Master Facility List (MFL). This module describes the steps required to develop and launch a facility registry service. It also provides information about the various decision points and approaches encountered in the process of establishing a facility registry service.

Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Gather user requirements and goals for the MFL	Key Considerations Module
<input type="checkbox"/> Determine processes and workflow for updating and curating the MFL data	Maintaining the MFL Module
<input type="checkbox"/> Review existing data sharing policies	MFL Governance Module
<input type="checkbox"/> Decide the MFL data content and define the data specifications	MFL Data Content Module

Note: words in **bold** are defined in the glossary.

Figure 1: Establishing a Facility Registry Service – Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT IS A FACILITY REGISTRY SERVICE?

A **Facility Registry Service** is a software solution that stores and shares the Master Facility List (MFL) data. Depending on its design, a facility registry service can have a number of additional purposes. A facility registry service can:

- Enable data consumers to read, search, sort, download, and use facility data.
- Facilitate data curation by (1) allowing users to submit suggested data updates, (2) recording changes made to MFL data, and (3) archiving data that is no longer valid.

- Act as a common component of a health information exchange (HIE) and enable more complex interoperability use cases.¹
- Serve as a portal for data consumers to ask questions or to suggest improvements regarding the facility registry service itself or the data contained in the MFL.

2. STEPS IN ESTABLISHING THE FACILITY REGISTRY SERVICE

2.1 Establish a Technical Working Group

The first step in the process of establishing the facility registry service is creating a technical working group (TWG) tasked with development and implementation of the facility registry service. At a minimum the group should include developers, government representatives, and the primary MFL data consumers as well as those who will be responsible for the long-term management and maintenance of the MFL. It may be necessary to establish subcontracts with local or international information technology (IT) firms to support the development phase.

The working group will need to coordinate closely with the MFL Steering Committee to assure that the development process aligns with the broader MFL goals, that national eHealth and data policies are taken into account, and that the necessary resources are available.² Stakeholders should also be consulted regarding key decisions about the facility registry service to avoid difficulties that might otherwise arise. It is also important that the TWG establish a plan for measuring the success of the facility registry service in meeting MFL goals.

2.2 Determine and Prioritize Facility Registry Service Requirements

Gather Requirements

To successfully implement a facility registry service, begin by identifying the persons, agencies, institutions, and organizations that are likely to use it. Second, determine how the different types of users want to access and interact with the MFL data. As discussed in the *Key Considerations Module*, it is helpful to gather user stories to understand and document user requirements for the facility registry service. Give particular attention to the needs of the following groups that are most likely to use the facility registry service:

- **Data consumers** – persons who access and use the MFL data
- **MFL administrators** – persons responsible for overseeing all processes related to the MFL

¹ See OpenHIE (Open Health Information Exchange) for more information on health information exchanges and the role of the MFL and the facility registry service within this system: www.ohie.org

² See the *MFL Governance Module*.

- **Data curators** – persons responsible for managing, updating, and validating the MFL content
- **Data suppliers** – persons or information systems that submit facility data or updates to the MFL

When considering facility registry service requirements, it is important to know the following:

- Whether the MFL will exchange data with other information systems. For example, the MFL may need to pull data from a facility licensing database or push data to a health management information system (HMIS).
- Whether international standards will be used to facilitate data integration.
- Which processes and workflows used to update and maintain the MFL data will need to be supported by the facility registry service.³ Specifically, it will be necessary to know: (1) the data sources for the MFL, (2) how the data will be submitted and by whom, (3) the data validation and approval process, and (4) the guidelines for documenting and archiving changes to the MFL data.
- What types of access permissions and restrictions need to be built-in to the MFL?⁴

Prioritize Requirements

The requirements for the facility registry service must be prioritized and decisions made regarding what can be accomplished with the available resources. You can create a phased implementation plan to address immediate needs while putting off other functions until additional resources become available. To facilitate prioritization, collaborating organizations must have a common set of goals for how facility data are to be managed and shared.

Assess Gaps

Once the facility registry service requirements have been identified and prioritized, you need a plan to implement those requirements. We recommend using the following questions to assess gaps in the MFL, that is, gaps between what currently exists and what you want to achieve with a fully functional MFL:

- Is new software needed to support the MFL? Consider whether existing software solutions can be improved to meet most facility registry service requirements; if not, new software solutions will be needed. The MFL assessment⁵ will help in identifying what software

³ See the *Maintaining the MFL Module* for more information on these processes.

⁴ See the *Sharing the MFL Module*

⁵ See the *MFL Assessment Module*

solutions are already used to house facility lists, and determine the extent to which these software solutions meet the needs of data consumers.

- Can the existing infrastructure (e.g., Internet connectivity, servers, electrical power, etc.) adequately support the facility registry service? Consider whether enhancements to the infrastructure are needed and whether they can feasibly be implemented.

2.3 Select a Software Solution

After you have determined the software needs of the facility registry service, that are required to provide full functionality to the MFL, you can consider the different software solutions available. It is likely that several software solutions will meet your needs. To facilitate the decision-making process, the following suggestions should be considered:

- Decide whether you will use open source software or proprietary software. This decision depends on the financial and personnel resources available to support development of the facility registry service. It will also depend on the user requirements and which software can best meet those requirements.
- Determine what the software can do “out of the box” and how much additional programming will be needed to meet the facility registry service requirements.
- Consider which software solutions are most familiar to local information technology (IT) partners. This will affect (1) how much external technical assistance is needed to set up the facility registry service using this software solution, and (2) whether the technical skillset is available in-country to support this software long-term.

Open Source Versus Custom Software Solutions

Recently, open source software solutions have been developed that meet many of the common requirements for a facility registry service. These facility registry service solutions have been developed through in-country implementations and likely have many of the features you will need (see box at right). When deciding whether to use an existing facility registry service solution or to create a custom software solution, consider the following:

1. Using an open source, facility registry service solution has the benefits of quicker, cheaper implementation, plus the option of scalability. However, ongoing technical support for the facility registry service will need to be long-term. Support is typically available through the various developers and technical staff who designed these facility registry solutions.

Open source facility registry service solutions

Two open source software solutions that can easily be configured to function as facility registry services are:

- [Resource Map](#)
- [DHIS2](#)

2. Some facility registry service solutions are available for use in the cloud, and nontechnical users can get started immediately configuring the facility registry service and uploading available data.
3. These open source software solutions can serve as the foundation of the facility registry service, and then be adapted or built upon as needed. For example, it is possible to add custom interfaces and portals to meet local or specific requirements.
4. Existing facility registry software solutions provide out-of-the-box support for commonly used and accepted **application programming interfaces (APIs)** and interoperability workflows.
5. A custom software solution allows you to have total control over the facility registry service design and development, and can better meet very specific requirements. However, the costs are typically higher than using open source software solutions.

Keep the Facility Registry Service Independent

The facility registry service should primarily seek to fulfill the requirements identified for the MFL. Preferably, it should not be embedded in another information system. It may be tempting to house the MFL within an HMIS software solution, for example, but this is not recommended. Such an arrangement can lead to unnecessary complications when modifications to the MFL need to be made. Having an independent (but integratable) facility registry service allows changes to be made to the MFL content or structure without impacting the operations of other information systems.

OpenHIE community of practice

The global OpenHIE community maintains a community of practice dedicated to the development and implementation of facility registry services. This community provides a forum where members can seek support, share experiences, and participate in the development of software solutions to common challenges.

See: [OHIE Facility Registry Community](#)

CASE STUDY: SELECTION OF FACILITY REGISTRY TOOLS

Bangladesh, Kenya, and the Philippines opted for custom-based software solutions for their facility registry tools. (See [Bangladesh](#), [Kenya](#), [the Philippines](#).)

South Africa elected to use the open source DHIS2 platform to house their MFL. However, they are using a different DHIS2 instance than the one used for the HMIS, thus keeping the two databases independent.

Tanzania and **Rwanda** are using an open source reference tool built on Resource Map software with customized portals. (See [Tanzania](#).)

2.4 Configure Facility Registry Service

After a software solution has been selected, you will need to configure the facility registry service with the appropriate details, according to the data specifications and requirements you have identified and prioritized.⁶ Configuration should be approached in an iterative fashion, meaning that it is done in a phased manner with each phase involving user testing and the resulting feedback being incorporated into the next iteration. Configuring the facility registry service includes the following activities:

- Define fields and metadata. Take the MFL data specifications and set up the fields in the registry.
- Institute permissions. Define the appropriate access for those who will read, edit, or curate the facility registry. Permissions may vary by role, by fields, or even by geographic location of the facility.⁷
- Implement integrations. Ensure that the facility registry service connects with and shares data effectively with partner systems that need to use or contribute data. Begin by prioritizing the integrations; ensure you have collected the related requirements; and decide if international standards will be used. Then, carry out the integration using standard-based, reusable transactions and interfaces that make it easy for technologies to share data with each other.
- Develop applications. If the software solution cannot be configured to meet all requirements, it is possible to develop external applications. This approach facilitates greater levels of customization and functionality by connecting the facility registry service over APIs to other applications that serve either custom or specific roles that are neither intrinsic nor exist within the scope of the facility registry. Examples of such applications include programs that implement a particular curation process or help to identify duplicate records.
- Design user interfaces. User interfaces (or portals) are a means by which users interact with a program. They can be used to present data with a particular branding or to customize the presentation of data for specific types of users. For example, a facility “look-up” for the general public has a substantially different set of requirements compared with a portal designed to be used by the MFL management team. In this case, it is likely preferable to set up two interfaces—using the same data source—each designed to meet the needs of one of the two groups.

⁶ See the *MFL Data Content Module* for more on data specifications.

⁷ See the *Sharing the MFL Module* for more on providing access to the MFL.

If you are using an existing open source facility registry software solution it may be possible to work with the software provider to enhance or add features to this reference solution. This is the preferred approach if the enhancements are likely to be beneficial to other implementations.

2.5 Arrange for Hosting of Facility Registry Service

A question that often arises regarding a facility registry service is whether it should be hosted locally on a Ministry of Health or organizational server, or it should be cloud hosted. The answer depends on existing national policies, data security concerns, and available resources. Many countries have laws that regulate where national data can be stored and who owns those data. The legal framework around these issues must be carefully examined. Data localization laws in particular must be consulted prior to deciding where to host the MFL data.

Hosting options for open source facility registry software solutions

Some open source facility registry software solutions are available online and are usually hosted via a cloud service. The implementation can be achieved by (1) leveraging a cloud hosted instance, or (2) downloading an instance to a local server. The main benefit of choosing cloud hosting is that users can begin accessing the facility registry service immediately, while minimizing associated costs and logistics.

Data security is another consideration when selecting where to host the MFL. Many cloud-based servers provide data security measures as part of their services, and it is important to ascertain the details of those security measures. When a local server is being evaluated, it is necessary to consider whether similar security measures are in place and if they are continually supported and updated.

If there are no legal constraints, the choice of host centers on what is most practical in a given setting. It is common practice to begin with a cloud hosted instance and, over time, to migrate the service to a locally hosted instance.

- **Cloud Hosted** – Cloud-based hosting is advantageous when the local infrastructure environment (including physical servers, electricity, and Internet connectivity) is weak or unreliable. Additionally, cloud hosting often comes with support services related to data security, backups, server maintenance, and troubleshooting, thus eliminating the need to find local teams to manage these tasks.
- **Locally Hosted** – Facility registry services can be installed locally on a server under the direct ownership of implementers such as the Ministry of Health. The full spectrum of operations and infrastructure support for a locally installed instance are then shifted to the implementers. The cost and level of effort required to maintain a locally hosted system that meets an equivalent level of security and technical quality is typically higher than that of cloud hosting. The cost of implementing a facility registry locally can increase substantially

during the process of establishing the necessary physical infrastructure and technical support. The main benefit of hosting locally is that implementers have greater control and autonomy regarding management of the infrastructure supporting the system.

3. LAUNCH – ITERATE – GROW

3.1 Launch Facility Registry Service

Planning for and executing the launch of a facility registry service is an important step, particularly when a public interface is being used. To be successful, you need to: (1) consider the appropriate communication channels for announcing the launch, (2) involve the partners who were identified early in the process when the facility registry service requirements were determined, (3) encourage participation and engagement with the facility registry service, allowing for self-service and easy channels of support, and (4) be welcoming to those who want to collaborate with the facility registry or provide support.

3.2 Stay Agile and Prioritize

Ensure that an agile and iterative development process continues after the launch of the facility registry service. This involves considering new and yet-to-be-resolved priorities, and developing and testing enhancements in short cycles. This process means that user testing and iteration of the features and configurations of a registry take place simultaneously, repeatedly, and as often as possible, rather than just at the end of a project lifecycle. This iterative process maximizes user input into the facility registry service software solution. Testing a software solution only at the end of the project adds substantial risk and should be avoided.

Additional requirements and user stories will be generated throughout the life of the facility registry service implementation; these should be prioritized and similarly addressed when resources are available. Additional development can take place and be informed through routine testing and re-prioritization, as new requirements arise. A software code repository (e.g., GitHub) can transparently document and track issues and updates for a facility registry service, keeping both technical and nontechnical users engaged and up-to-date on progress.

3.3 Support and Grow

Ongoing technical support is needed for the facility registry service. The team tasked with managing the MFL over the long-term will need to coordinate this technical support with the assistance of one or more developers. Their job will be to triage, document, and resolve requests for system enhancements and integrations, as well as troubleshooting user problems. Common types of ongoing support for facility registry services are the following:

- Developer and operations support. Ongoing support is needed for the configuration, enhancements, infrastructure, and logistics of the facility registry service. For instance, it

may be desirable to improve the curation workflow or develop other applications that operate in coordination with the facility registry service. These activities are usually handled by developer and operations support. When the facility registry service is hosted locally there is a need for operations support to include: monitoring error logs, maintaining a server, ensuring security protocols, and conducting backups and software updates.

- Integration support. Over time, additional data consumers may want to integrate with the MFL, or may have changing requirements regarding data integration. These partners will likely need technical assistance to add the appropriate codes into their application to facilitate integration.

3.4 Document What You Do

Documentation of decisions, processes, challenges, and resolutions related to the facility registry service is important for adequate management and support of these systems long-term.

4. CHALLENGES

Establishing a facility registry service for the MFL poses several challenges. Table 1 below lists some of the common challenges and potential solutions.

Table 1: Facility registry service challenges and potential solutions

Challenge	Potential solution
Insufficient funds to meet all user requirements	<ul style="list-style-type: none"> • Prioritize user requirements, the involvement of the various stakeholders, and the MFL Steering Committee • Cost out the different options and determine if other agencies or organizations are willing to invest in the facility registry service • Choose open source software that provides cost savings
Facility registry service is too complex	<ul style="list-style-type: none"> • The facility registry service should focus primarily on housing and sharing MFL data • Extra functionalities should be given careful consideration before inclusion in the facility registry service • Determine if the requirements can best be met by a separate application rather than the facility registry service
Insufficient consideration of the long-term cost of the facility registry service (as opposed to the initial setup cost)	<ul style="list-style-type: none"> • Identify the long-term maintenance, technical, and support requirements associated with the facility registry service and establish a budget for them.
Insufficient training and support for users of the facility registry service	<ul style="list-style-type: none"> • Have a small IT team continuously available locally to provide support, answer questions, and trouble shoot when issues arise

5. RESOURCES

- [Tanzania Resource Map User Guide](#)
- [DHIS2 Documentation](#)
- [Tanzania MFL User Requirements](#)
- [Potential Use Cases for the Development of an Electronic Health Facility Registry in Nigeria](#)
- [OHIE Facility Registry Service User Testing Guide](#)
- [Planning an Information Systems Project - PATH](#)



MAINTAINING THE MFL

This module describes the procedures that must be implemented to maintain the Master Facility List (MFL) and keep it up to date. The module provides guidance on updating and verifying existing facility data in the MFL and making adjustments to the types of data collected. The module also covers aspects of maintenance related to the facility registry service that houses the MFL. It discusses issues that require attention during the planning phase, and describes the management and staffing resources necessary for proper maintenance.

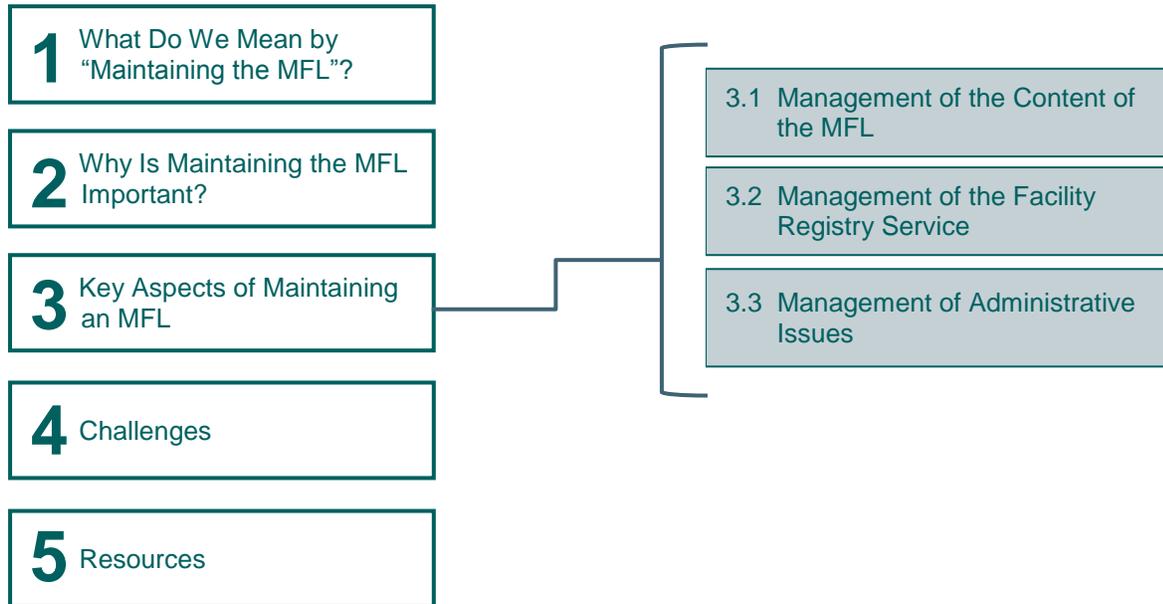
Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Understand the purpose and value of an MFL	Introduction to the MFL Module Key Considerations Module
<input type="checkbox"/> Establish a Steering Committee to oversee the MFL development process	MFL Governance Module
<input type="checkbox"/> Understand the context within which the MFL will be implemented	MFL Assessment Module

Key audiences for this module
<ul style="list-style-type: none"> • MFL Steering Committee • MFL Technical Working Group (TWG) tasked with developing MFL maintenance procedures • Managers who oversee implementation of MFL processes

Note: words in **bold** are defined in the glossary.

Figure 1: Maintaining the MFL – Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT DO WE MEAN BY “MAINTAINING THE MFL”?

After the MFL is established—meaning a dataset exists, has been validated, and is housed on an appropriate software solution—it must be maintained over the long-term. Maintaining the MFL involves implementing procedures that ensure that the data are updated, accurate and complete, and that the data continue to meet the needs of stakeholders. It is important that well-defined, feasible processes, standard operating procedures, funding, and human resources are in place to maintain the MFL and enable sustainability.

Maintaining the MFL involves the following components:

1. Management of MFL content to ensure that the data are current, reliable, and useful to data users:
 - Updating (i.e., adding or changing) the data for individual facilities
 - Auditing existing MFL data regularly to verify its continued accuracy
 - Reviewing the data elements included in the MFL and making adjustments as needed
2. Management of the MFL **facility registry service** (i.e., the software that houses the MFL data):
 - Troubleshooting problems that arise
 - Responding to new user requirements

- Supporting integration with additional information systems
3. Management of administrative activities related to the MFL:
- Ensuring that adequate leadership is available to oversee the maintenance process, resolve conflicts, manage expectations, and handle queries that arise
 - Establishing and implementing maintenance standard operating procedures (SOPs)
 - Ensuring that there is sufficient staff to maintain the MFL
 - Ensuring that there is adequate funding for maintenance

2. WHY IS MAINTAINING THE MFL IMPORTANT?

Maintaining the MFL is important because facility data can quickly become outdated. New facilities open while others close, some may be upgraded, and facility services change periodically. Ultimately, maintaining the MFL is important because if the data are not of high quality (i.e., accurate, current, complete, and relevant) the information will not be useful to data consumers. If an MFL is perceived to be outdated, incomplete, or inaccessible, it ceases to be a valuable tool and stakeholders will go back to developing their own facility lists.¹

3. KEY ASPECTS OF MAINTAINING AN MFL

3.1 Management of the Content of the MFL

Maintaining the MFL requires implementing procedures that ensure that the data are accurate and current, and that the data continue to meet the needs of stakeholders. Three procedures are fundamental to maintaining the content of an MFL.

- Updating the MFL data—MFL data sources or users propose changes to the MFL (such as adding or deleting facilities, or editing data about a facility) and **data curators** verify and approve the changes that are submitted. This procedure can be thought of as a “push system” whereby data updates are pushed by data sources or users to the MFL.
- Auditing the MFL—Persons in charge of the MFL periodically conduct checks of the MFL data to verify continued accuracy. This procedure can be thought of as a “pull system” whereby data are pulled from the MFL for verification.
- Reviewing the data elements included in the MFL—A consultative mechanism is in place to determine whether the data elements included in the MFL continue to meet the needs of data consumers; adjustments are made to the data elements as needed.

¹ See the *Introduction to the MFL Module*.

Updating MFL Facility Data

Updating the MFL content entails adding or changing MFL data. The process of updating the MFL has three possible outcomes: (1) data for a new facility are added, (2) data for a listed (but no longer active) facility are archived, and (3) data for a listed facility are changed or updated.

1. *New facility added*—If a facility not already included in the MFL is determined to exist, it should be added to the MFL. If a regulatory authority is responsible for issuing health facility licenses, this authority should be included in the updating process. New facilities should be communicated to the appropriate MFL data curator by the regulatory authority, for addition to the MFL. However, if such an authority does not exist or if the MFL includes health facilities that fall outside of the authority’s control (e.g., private facilities operated by NGOs or FBOs), other methods, such as a periodic facility census, or obtaining data from local data sources may need to be used to collect accurate and complete information about new facilities.
2. *Facility data archived*—If it is determined that a facility does not exist, has shut down, or was a duplicate record, the data for that facility is archived within the MFL. It is important to archive the facility record rather than delete it so a record can be maintained. If the facility never existed, its operational status should be set to “Invalid” or “Does not exist.” If the facility did exist but is closed or no longer operational, its operational status should be set to “Closed.” If the facility consists of a duplicate record, select one record to keep and one to archive. The archived record should set its operational status to “Duplicate” and a note should be included referencing the facility record being kept and its facility identification number.
3. *Facility data changed*—Information for a facility may change over time (e.g., name change, change in services provided, and change in contact details). Such changes require updating the facility’s entry in the MFL. A record should be kept of the changes made (we discuss this process in greater detail in sections below).

The updating process can be *centralized, decentralized, or federated*.

- *Centralized updating process*—Data are collected and submitted to a central body for review, validation, and approval. The central body is the “data curator.” Local bodies such as district health offices are data sources.
- *Decentralized updating process*—Data are collected and submitted to a local or regional body (e.g., to district health office) for review, validation, and approval. The local body is the “data curator.”

- *Federated updating process*—In a federated system, various separate databases contribute facility data to the MFL (e.g., a facility licensing authority and pharmacy registries). Updates are submitted to and validated by the owners of those databases prior to submitting the data to the MFL. It may be necessary for the MFL data curators to validate the data again at the central level if there are concerns over data quality. In such cases, newly proposed facilities can exist with a status of “pending” until approved at the central level. This would allow pending sites to still be visible, shared, and referenced with discretion.

Data Sources for MFL Content Updates

There are two important questions for consideration regarding data sources for maintaining the MFL. First, what are the sources of the data updates, and second, who can submit change requests to the MFL?

A variety of sources can provide information for updating the MFL, including the following:

- *Individuals who are familiar with facilities and are typically the “first to know” about changes in data or circumstances.* These persons can include (1) district- or county-level health officials who have oversight for a number of facilities, (2) implementing partners who collaborate with facilities, (3) institutions coordinating commodities and logistics systems, and (4) employees of the facilities themselves.
- *A broad group of data consumers who become aware of the need for data updates through their interactions with facilities.* Typically, this group includes researchers and the general public. Opening data submission to a wider audience may increase submission of detailed data but will likely require additional work verifying all data submissions, especially if the persons submitting have not been trained in how to collect accurate data on facilities.
- *Facility licensing authorities that provide information on licensed facilities.* This direct source of information about facilities covers newly licensed facilities, those that have been upgraded (or downgraded), and those that have closed.
- *Facility censuses or surveys (e.g., SPA, SARA) that identify new information about facilities.* This source requires an individual who is skilled in comparing data reported in a national survey/census with data in the MFL. The person notes where discrepancies in facility data exist and determines what information needs to be updated. This process, which requires comparison of large datasets, is time consuming, particularly when a large number of facilities are involved.

Regardless of the sources of data used to update the MFL it is advisable that the persons collecting the data have adequate training to understand the format and specifications for the different MFL data elements.

CASE STUDY: TRAINING DATA SOURCES

Philippines. Data validation workshops provided a forum to train sub-national DOH officers on the process of updating the MFL. The workshops included the opportunity for attendees to improve their skills in collecting geographic coordinates of facilities using Google Maps and GPS devices.

Submitting Data for MFL Content Updates

Depending on the technology available and the type of data source used, the submission process can be carried out in different ways.

- *Web interface.* The facility registry service can be set up to receive and process change requests through a web interface.
- *Online*—If the facility registry service is connected to the Internet the data source can submit data online directly through the registry service, for the data curator to review and verify. If the curators are decentralized, online updates they make can immediately be visible in the MFL. Online web interfaces work well in areas where Internet connectivity is reliable and regular.
- *Offline*—It is possible to set up programs that allow data sources to submit change requests offline when their device is not connected to the Internet. In this case, the information can be entered but the update cannot be sent for validation and approval until an Internet connection is established. Offline web interfaces work well in areas where Internet connectivity exists but is intermittent.
- *Mobile data collection form.* The facility registry service can be set up to receive and process change requests submitted via mobile technology. A special program and mobile data collection form is set up on a mobile device such as a basic cell phone, a smart phone, or a tablet. The data source enters and sends the MFL data update from the mobile device. The program can be designed to work online or offline. In places where network coverage is not reliable or is nonexistent, data can be entered offline and sent at a later time when the data source travels to a place where network coverage is re-established.
- *Email*—Data can be entered by data sources on a pre-formatted form and sent via email to a specially designated email address. This approach requires the data curator to monitor email and extract and upload or enter data into the MFL when it is received.
- *Paper form*—Technology-wise, paper forms are the simplest way to submit updates for review and validation, and are best suited for areas where network coverage is poor or

nonexistent. They are also a good choice if setting up an electronic submission system is not feasible (e.g., because of time, funds, human capacity). While paper forms are “simple,” they do pose a number of challenges: (1) they have to be printed and distributed, (2) they have to be physically transported from point A to point B, (3) the information on them has to be entered into a computer, and (4) they can get lost or damaged. However, as funds, technology, and human capacity become available, paper forms can be transitioned to mobile or web-based submission systems.

CASE STUDIES: UPDATING DATA CONTENT

Philippines. After being tested using Google Drive spreadsheets, the updating mechanism of the National Health Facility Registry (NHFR) is now directly integrated into its web-based platform (<http://nhfr.doh.gov.ph>) and users can submit requests for updates online. In the NHFR, there are four request categories for updating the Facility Registry: (1) new facility, (2) potential duplicate(s), (3) update of information in a particular field, and (4) closed facility. Once a request for update has been submitted the NHFR team at the national level validates the request through document review. At this point, the name of the user who submitted the request is captured by the system, providing for user accountability and allowing the NHFR team to follow up should there be questions or clarifications.

Tanzania. District-level health staffs update the data in the facility registry in real time and implement changes directly into the system. Each district has two persons who have been formally trained to update the facility registry. If the district staff has any questions or concerns when they are proposing the updates, the Ministry of Health staff is available to assist them.

Kenya. Kenya used the structure of their existing health reporting system to design a maintenance system for the MFL. The MFL data can be updated on an ongoing basis, with updates made in real time, as needed. The Sub-County Health Records and Information Officers are responsible for entering updates into the MFL system, using a standardized form. For tracking purposes, the system keeps a record of who makes the updates.

Reviewing, Validating, and Revising Changes to Facility Data

All MFL data change requests must be reviewed and validated by a data curator to ensure they are accurate, valid, and complete. Communication between data sources and data curators—if different people—is important for carrying out this step in the MFL maintenance process. Communication can take place inside the facility registry service software (through chat features) or by other means (e.g., via phone or email). If necessary, the reviewer can contact a facility directly to ensure the information submitted is correct. Validation may take place at the national or sub-national level, depending on the structure of the updating process (centralized or decentralized).

Verification of the facility geographic coordinates should include looking up the geographic coordinates on a map to determine whether the coordinates are *consistent* with other facility data. For example, are the facility's geographic coordinates a match for the reported administrative area? Also, determine whether the geographic coordinates are *feasible*. For example, the coordinates do not place the facility in a body of water or outside the country. Having up-to-date shapefiles of administrative areas is helpful in this process.²

If the change request is to add a new facility, the data curator should check that the facility is not already in the MFL and assigned a unique identifier. Due diligence is important to ensure that a new site request is not an existing site with a different name, perhaps a name known locally or one in a different language.

If the data curator uncovers issues during the process of reviewing and validating the data, he or she should ensure that the issues are resolved before the data are approved. In most cases, the data curator should contact the person who submitted the data, alerting the submitter to the issue, and asking the person to clarify or correct the issue and resubmit the data.

CASE STUDIES: REVIEW AND VALIDATION PROCESSES IN KENYA AND TANZANIA

Kenya. National-level Ministry of Health (MOH) staff charged with the management of the MFL are responsible for validation and approval of the updates to the MFL. When data validation questions arise, the MOH calls the responsible Sub-County Health Records and Information Officers to confirm the data and resolve any discrepancies. Additionally, when necessary, the MOH conducts site visits to validate data. Although the validation process takes place at different levels, only Sub-County-level personnel are allowed to make definitive changes and updates to the MFL database. This limitation of access prevents confusion regarding change authorization, and prevents national-level personnel from being able to make changes without the knowledge of Sub-County personnel.

Tanzania. The Department of Curative Services (DCS) reviews the proposed updates, validates the information, and either accepts or rejects the updates. While the DCS has the lead in validation, it receives assistance from the Information and Communication Technology (ICT) Unit and the Department of Policy and Planning (DPP) Health Management Information System (HMIS) Section. If there are any questions about the proposed updates, the DCS will follow up with the district staff member who proposed the updates because the district-level staff members have more up-to-date facility information from the facility data collection form.

² See the *Geographic Coordinates in the MFL Module*.

Approval

Once validated, the MFL updates must be approved. Approval usually occurs at the central level, but it may occur at a lower level (e.g., district health office) in a decentralized system. Standard operating procedures need to be clear on the matter of who has the authority to approve changes. Once the changes are approved, they can be entered in the MFL database.

Documentation of Changes Made

All additions and changes to the MFL database must be appropriately documented. For new facilities, a “date added” field can be used to track when a facility entry is added to the MFL. Changes made to existing entries should be tracked to ensure that information is not permanently lost, and a history of MFL content is available for reference.

Ideally, a tracking mechanism is built into the MFL facility registry service to automatically record changes and the date on which they were made.³ However, if no such tracking mechanism exists, changes can be tracked separately—either on paper or electronically. A log file should contain the following minimum information to permit changes to existing entries:

1. Facility ID
2. Facility name
3. Facility location
4. Data element that was changed
5. New value
6. Old value
7. Date of change
8. Name and position of person who submitted the change
9. Name of person who approved the change
10. Type of change, i.e., “correction” or “real-life change.”

A correction means the old value was incorrect and was never valid. A “real-life” change means that the old value was valid in the past but is now being updated because of a change in the actual facility status.

Frequency of Updates

Updating MFL content is a continuous process. Change requests should be allowed at any time, and validation should be ongoing to avoid backlogs. It is advisable to send data sources periodic reminders, urging them to submit known changes and updates. Experience from various countries suggests that data sources may not always be submitting updates to MFL.

³ See the *Establishing a Facility Registry Service Module*.

If continuous updating is not feasible, the verification and updating process can be linked to another regular activity (e.g., delivery of medical supplies, supervision visits) to ensure that it does happen and that the frequency is standardized.

In general, facility surveys or censuses are not good sources for regular MFL updates because of their high cost and infrequent implementation. However, a large scale survey or census may be necessary to update the MFL if: (1) there are substantial data gaps, (2) you want to add new data fields for which no current data exist, or (3) substantial time has passed since the last validation and you doubt the accuracy of the data in the MFL.

Geographic coordinates—A Special Case

Collecting geographic coordinates and updating the data requires special consideration because there are specific methods associated with the collection of this data. Using new methods or equipment to collect geographic coordinates may produce results that differ from the original data. If conflicting data emerge, you will need to consider the source before making any determination on the accuracy of the data. How well trained were the data collectors, and what were the specific methods and equipment used to collect the geographic coordinates? The *Geographic Coordinates in the MFL Module* provides detailed information on collecting and verifying location data for the MFL.

Audit the MFL Content (Also Referred to as “Pull Verification”)

It is important to note that the verification of changes submitted by data sources (or “pushed” data) is different from data verification done through an audit. Verification of “pushed” changes means that data sources have identified and reported data that need to be updated or added, and the data curators are verifying that the suggested changes are accurate. This process focuses on “known” changes and relies on data sources to be proactive in reporting changes.

An audit, or “pull verification,” is the process of periodically checking all, or a sample of, existing MFL content to ensure that the data are valid and entries are not missing. Pull verification should be done periodically (e.g., the entire database is checked annually), or on a rolling basis, in which case a subset of facilities are selected each month for verification. This type of audit process is an opportunity to uncover data that are outdated, incorrect, incomplete, or missing.

The audit process can result in changes similar to those in the updating process (i.e., a facility entry is added, a facility entry is archived, a facility entry is edited). There is also a fourth possible outcome: a facility entry is current, complete, and valid (i.e., it requires no change). If this last outcome is the case, any such entries should be indicated as such (i.e., “no-change”) with the date of verification during the verification process. The verification date is important because it provides a record of when the entry was last reviewed and assessed to be valid.

One approach to the data verification process is to provide data sources (e.g., district health officers or facility staff) with forms prepopulated with facility information currently in the MFL. For example, every quarter, the district health management team members can be asked to review all of the MFL entries for the health facilities in their district to identify missing facilities, gaps in data, or incorrect information. The data sources can then make any necessary corrections to the forms and send them back.

As with the content updating process, the audit process can be linked to another regular activity, such as supervision visits. One challenge to keep in mind with such a linkage, however, is that while supervision visits may occur regularly according to policy, in actuality they may be far more variable. Furthermore, supervision visits may not occur at all in private facilities. If special site visits are required to verify data, the visits must be included in the budget.

Reviewing the MFL Data Elements

In addition to keeping data for individual facilities current, it is important to make sure that the types of data collected on facilities continue to be relevant to users. It is therefore important to have a regular review of the status of data elements in the MFL. The following questions are examples of the issues considered in the discussions:

- Are all of the data elements currently being collected useful to data consumers?
- Are any data elements missing that are important to data consumers?
- Are all of the data element definitions still relevant?
- Have there been changes in the classification of facilities or the administrative units that need to be incorporated into the MFL?

An inclusive way to answer these questions is through a technical working group (TWG) comprised of key MFL stakeholders, including leadership, facility registry service developers, data curators, and data consumers. TWG meetings can be informed by interviews or surveys of stakeholders not in the TWG. The TWG should meet regularly (e.g., annually) to develop, discuss, and reach consensus on propositions for new MFL data requirements, such as (1) the addition of a new data element, (2) changing the characteristics of a data element (e.g., definition, attributes), and (3) archiving data elements that are not needed or are no longer relevant. Propositions that are supported by the TWG can then be proposed to the MFL steering committee for final approval.

When deciding whether to change the structure of the MFL, it is important to consider the implications of change for data consumers and data curators. The following are questions that address some of the major concerns.

- Will the change require revision of the content updating and validating processes (e.g., data collection and submission forms or facility registry service interfaces)?
- Will the change require additional data curator training?
- Will the change affect data that are already in the MFL?
- How much time will a developer require to make the change?
- Are there adequate funds to cover implementation of structural changes and any associated needs (e.g., training, updates to job aids, guidelines and SOPs)?
- Is there a data encoding standard that can be used (e.g., ISO)? Can custom encoding be avoided?
- How will the change affect integration with other systems?
- Is it possible and appropriate to store the new data elements in other systems that are interoperable with the MFL, rather than having to change the structure of the MFL database?

3.2 Maintaining the Facility Registry Service

The facility registry service that houses and shares the MFL data requires ongoing support and maintenance. Here we provide an overview of the long-term maintenance issues related to the facility registry service that need to be considered. More detail is provided in the *Establishing a Facility Registry Service Module* and the *Sharing the MFL Module*.

Routine Management and Troubleshooting

MFL managers need to plan on having a small team of information technology (IT) specialists available to manage and troubleshoot issues around the use of the facility registry service. The following are examples of the kinds of activities for which these teams will be responsible.

- Managing updates used for the facility registry service and handling any compatibility issues that arise during these updates
- Ensuring data security
- Backing-up the MFL data periodically, if this is not an automated function
- Ensuring that the server is fully operational, if the facility registry service is hosted locally

- Assisting users (whether data curators or data consumers) with troubleshooting issues such as inability to log in, difficulties downloading data, etc.
- Troubleshooting issues related to integration and interoperability with other systems

Responding to New User Requirements

It is inevitable that new user requirements will emerge that need to be addressed. The MFL must have a mechanism to collect, prioritize, and respond to these new requirements on a regular basis. New requirements can range from needing to sort data in a different way, to more complex matters such as creating a new program to enable mobile data entry and submission. In addition, there are likely to be new requirements linked to the integration and interoperability of the MFL with other systems, especially in a context of rapidly evolving technology. *While the cost of such changes may be difficult to predict, it is important to plan for a future in which human and financial resources need to be mobilized to meet new requirements.* It is helpful to know which local and international partners can be called on for support in these efforts.

Thorough Assessment of the Facility Registry Service

Periodically, a thorough assessment of the facility registry service should be conducted to determine whether it continues to meet user needs and what changes, if any, should be considered. Some questions to ask are listed below. The *MFL Assessment Module* contains additional information useful for this purpose.

- Is the MFL facility registry service easy to use?
- Is the technology reliable?
- Are there new software solutions that may be more appropriate?
- What are the key challenges users face with the facility registry service?

3.3 Management of Administrative Issues

It is a good idea to start planning for MFL maintenance early in the conceptualization process. And, even when the MFL already exists, it is not too late to establish and implement standardized maintenance processes and procedures. The following are key issues of administrative management that relate to maintenance of the MFL.

- Ensuring that adequate *leadership* is available to oversee the MFL maintenance process
- Establishing and implementing *standard operating procedures* for maintenance of the MFL
- Ensuring that there is sufficient *trained staff* to maintain the MFL
- Ensuring that there is adequate *funding* for maintenance of the MFL

Leadership

Leadership is a key factor throughout the process of establishing an MFL but, on the issue of MFL maintenance, it is of particular importance during two stages in the process:

1. *During the planning stage*—Leadership is needed to facilitate development of a comprehensive approach, including detailed procedures for carrying out MFL maintenance. It is important to do this as early as possible in the planning stage so that after the MFL is established, the necessary pieces—processes, guidelines, staff, and funding—are in place to ensure that the MFL can be adequately maintained. Leadership during this stage requires close consultation with stakeholders, staff at different levels of the health system, and software developers, to reach consensus on what maintenance processes are feasible and can be implemented in the particular context.

“Champions” who understand the importance of ongoing MFL maintenance and are in a position to advocate for it are important stakeholders to involve in planning for MFL maintenance. Their efforts will help ensure that different agencies support the process and that the MFL remains relevant and up-to-date for data consumers.

2. *After the MFL is established*—It is important to designate an MFL manager or administrator who provides overall leadership for the MFL and oversees implementation of day-to-day MFL maintenance processes. The MFL maintenance responsibilities of this person are the following:
 - MFL standard operating procedures (SOPs) are adhered to and updated as necessary
 - Maintenance processes in place are implemented appropriately
 - Staff tasked with updating or validating MFL data are adequately trained and perform their assigned tasks correctly
 - Adequate MFL funding is in place for implementation of maintenance procedures
 - New user requirements are collected, prioritized, and addressed
 - Issues and problems that arise are quickly identified and resolved
 - Stakeholder meetings are held regularly to discuss aspects of MFL content and the continued relevance of the MFL in a context of changing information needs

MFL leadership responsibility should be in the hands of a person who has a managerial position within the institution housing the MFL. This person should have sufficient authority to

- (1) ensure proper implementation of the maintenance tasks associated with the MFL, and
- (2) make decisions about resources and staff changes as needed, if results are not acceptable.

The MFL steering committee (described in the *MFL Governance Module*) will continue to have oversight of the MFL. The committee should receive periodic reports on the performance of the MFL and be alerted to any problems that arise or new developments that are needed. Members of the steering committee can be helpful in identifying technical support and finances for new developments for the MFL.

Maintenance Guidelines (Standard Operating Procedures)

To ensure that managing the MFL is standardized and transparent, a set of procedures should be developed outlining how the institution charged with the MFL will handle ongoing maintenance of the MFL. Guidelines, standard operating procedures, and job aids should all be developed so that maintenance processes are well-defined and easily implemented. In the process of developing these guidance materials, a number of important questions will have to be considered. (The answers to some of these questions will depend to a large extent on the type of software used for the facility registry service and how it is configured.⁴ The most common questions that must be dealt with are the following:

- Which unit within the implementing agency or organization is responsible for maintenance of the MFL?
- How often will the MFL be updated (e.g., quarterly, on an ongoing basis)?
- What processes will be used to update the MFL content and who will implement them (e.g., is the process centralized or decentralized; at each level, who is responsible for the specified tasks)?
- What are the mechanisms for submitting MFL content updates (e.g., web-based interfaces, mobile applications, paper forms)?
- Where will the data for updating the content come from (e.g., national health facility regulatory body, sub-national MOH staff, private organizations, other data consumers)?
- How often will the content of the MFL be audited?
- What processes will be used to verify the MFL content and who will implement them (e.g., is the process centralized or decentralized; at each level, who is responsible for the specified tasks)?

⁴ See the *Establishing the Facility Registry Service Module*.

- Who will be responsible for the technical maintenance and ongoing development of the facility registry service (e.g., how will changes to the data elements be handled; how can the facility registry service be further developed to make maintenance processes easier; how will issues encountered when updating the MFL be handled)?
- Who will conduct trainings for data sources and **data curators**, and how often will the trainings be held?
- What sort of supervision and data curator support processes will be implemented?
- Will reminders be sent to data sources and data curators to ensure that they submit updates and perform data validation? If so, how and when?
- Who has authority to make decisions about sharing the MFL data?
- How are questions, data requests, and conflicts handled, reported, and resolved?
- Who will provide the training, technical assistance, and supervision required to properly maintain the MFL?

Maintenance Workforce

Throughout this module we have described the roles and responsibilities of the persons involved in maintaining the MFL. The following list describes the roles related to MFL maintenance that require permanent staffing:

MFL manager or administrator—Person responsible for overall leadership of the MFL (see leadership section above).

Data curators—Persons involved in managing the MFL data. They have the authority to verify and validate changes to health facility data.

Data sources—Persons who provide information on facility data updates or changes. They can include employees of the Ministry of Health, but can also include staff from other government agencies and NGOs, as well as the general public.

Information technology specialists—Persons who maintain the facility registry service and aid in its ongoing development.

Trainers—Persons in charge of training the data sources and data curators to perform their MFL maintenance tasks.

Supervisors—Persons who provide supervision for data sources and data curators.

Other staff—MFL maintenance requires persons who perform a range of tasks such as answering questions about the MFL, responding to data sharing requests, collecting new user requirements, and helping to track finances. These tasks may be assigned to the MFL manager, to data curators, or to other staff, depending on the resources available.

Key MFL maintenance personnel are usually situated within the institution and unit that has overall responsibility for the MFL. Persons supporting the MFL maintenance process may be located in other central offices, administrative units (e.g., province, region, district, and health zone), and facilities, as well as in NGOs, CBOs, and other local partner organizations.

The exact composition of this workforce will depend on whether the updating and verifying processes are centralized or decentralized and, perhaps, how many MFL entries there are to keep up-to-date. When defining the MFL maintenance processes, consideration should be given to the following issues:

- What MFL maintenance tasks must be completed and at what levels?
- What skills are required to perform the MFL maintenance tasks?
- How many people are needed to accomplish the MFL maintenance tasks?
- What trainings do data curators need to be effective in performing their roles?
- What are the needs of the information technology (IT) staff that will ensure that the software and data platform are reliable and secure?

Thinking through these considerations will help in planning for an adequate number of appropriately trained staff to maintain the MFL.

Among those who have had the experience of implementing an MFL, it is the opinion that, particularly at higher levels, permanent staff with 100% level of effort (LOE) should be involved in MFL maintenance; however, this ideal situation is not always feasible. At a minimum, MFL-related maintenance tasks should be included in staff members' official job descriptions and, during recruitment for MFL-related positions, minimum qualifications that acknowledge MFL maintenance activities should be clearly laid out. Additionally, at least two people should be trained for each position at every level, to ensure continuity if someone changes positions, leaves the organization, or is simply out of the office.

In some places, MFL-related maintenance responsibilities are incentivized (e.g., tied to funds or commodities) to increase the likelihood that they are performed. This may be especially effective for data sources, encouraging them to submit known updates in a timely fashion. However, incentives may not be needed if maintenance tasks are included in a person's job

description. In such cases, failure to perform these vital tasks will be noted on the person’s employment record and may be grounds for termination.

Funding for Ongoing Maintenance

MFL funding must be a recurring line item in the national budget; MFL maintenance cannot be dependent on external resources. If the establishment of the MFL is funded by donors, funding will likely be reduced after the establishment phase is completed. Therefore, MFL maintenance must be recognized as an essential part of the government’s strategic plan, even if that plan requires simplified maintenance processes and minimal costs to achieve sustainability.

The availability of long-term funding for maintenance of the MFL should be taken into account during the selection of the facility registry service, and again during the development of the operating procedures specified for updates, which can affect maintenance costs.

4. CHALLENGES

Maintaining the MFL poses several challenges. Table 1 below lists some of the common challenges and potential solutions.

Table 1: Challenges to maintaining an MFL, and potential solutions

Challenge	Potential solution
Staff turnover and training needs	<ul style="list-style-type: none"> • Train multiple persons on all tasks required to maintain the MFL • Staff agree to remain in their position for minimum amount of time
Addition of new data elements to the MFL	<ul style="list-style-type: none"> • Understand the implications of adding data elements to MFL (e.g., where the data come from, whether new data collection is required, how new data elements affect the facility registry service, and integration of the MFL with other systems). Determine what issues are likely to arise and plan how to deal with them • Work with a developer to make the changes to the facility registry service • Develop a feasible and realistic budget and timeline
Lack of infrastructure	<ul style="list-style-type: none"> • Know what infrastructure is available before developing maintenance processes and guidelines • Determine whether infrastructure updates are feasible and when they are likely to happen • Consider implementing various maintenance processes (e.g., different mechanisms for submitting data) to accommodate a range of situations
Changes to political or administrative areas (e.g., district boundaries)	<ul style="list-style-type: none"> • Create new data elements for the new administrative units. Archive the old administrative units so users can compare the

Challenge	Potential solution
	<p>location of facilities in the old administrative areas with the location in the new administrative areas.</p> <ul style="list-style-type: none"> Do not use unique identifiers that are tied to administrative units
<p>Cost of maintenance/sustainability</p>	<ul style="list-style-type: none"> Consider the costs of maintenance and sustainability in the planning phase (e.g., conduct an MFL assessment to determine estimated costs) Consider the cost of NOT maintaining the MFL; this likely means that many institutions and organizations will maintain their own facility lists, resulting in cost duplication and inefficient use of resources Ensure that there is high level buy-in for maintenance of the MFL Ensure that funds for the MFL are specified as a line item in the national budget
<p>Lack of compliance in reporting</p>	<ul style="list-style-type: none"> Have guidelines or policies in place—such as an administrative order—that mandate timely and accurate updates of facility data

5. RESOURCES

- [Kenya Master Facility List Administrative Documents](#) (includes maintenance procedures, roles, and responsibilities of different actors and user guides)
- [Tanzania Health Facility Registry Curation Tool User Guide](#)



SHARING THE MFL

This module describes the processes and considerations necessary for sharing the Master Facility List (MFL). It presents information on (1) the importance of a data sharing policy, (2) decisions regarding what to share and with whom, and (3) what additional documentation should be shared along with the data. Finally, the module examines considerations around integration of the MFL with other information systems.

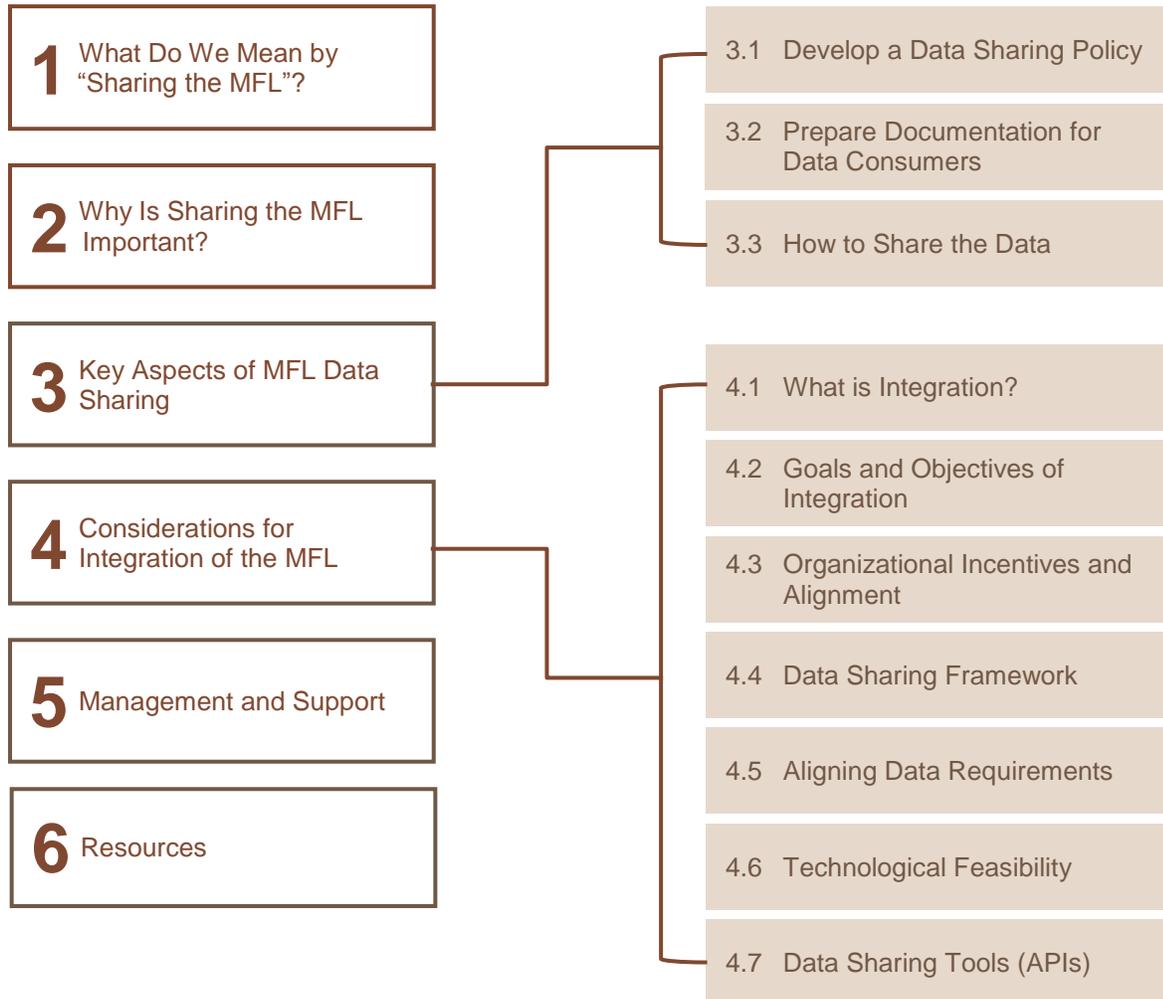
Checklist of things to do before using this module	Module where information is located
<input type="checkbox"/> Set up a steering committee to lead the process of developing and strengthening the MFL	MFL Governance Module
<input type="checkbox"/> Determine the requirements for sharing the MFL data	Key Considerations Module Establishing a Facility Registry Service Module

Key audiences for this module
<ul style="list-style-type: none"> • Steering committee for MFL strategic planning • Managers of the MFL • Technical Working Group responsible for establishing the facility registry service • Developers

Note: words in **bold** are defined in the glossary.

Figure 1: Sharing the MFL – Module Outline

(Press Control and click on any of the boxes to be taken to that section.)



1. WHAT DO WE MEAN BY “SHARING THE MFL”?

Sharing the MFL entails making MFL data accessible to **data consumers**. There are a number of ways to share the MFL, some more effective than others. The following are ways that MFL data can be shared:

- The dataset is shared using a spreadsheet that can be downloaded or emailed.
- A public portal is established through which users can access and manipulate the data.
- The MFL is integrated with other information systems.

While data sharing itself can be fairly straightforward, a number of issues must be considered before implementation. This module discusses the various aspects of data sharing that need to be taken into account.

2. WHY IS SHARING THE MFL IMPORTANT?

The primary value of an MFL lies in people's ability to access and use the facility data it contains. Many types of stakeholders can benefit from accessing a comprehensive and up-to-date list of health facilities, including government ministries, donors, and development partners. It is advisable to share the MFL as broadly as possible. The following are additional advantages that typically come with sharing MFL data.

- The greater the number of data consumers able to access and benefit from using the MFL, the more valuable the MFL becomes. With accruing value, the MFL is more likely to become a government priority and more likely to receive the resources needed to remain current and to function optimally.
- Sharing tends to improve the quality of the MFL data because, with a wider set of "eyes," there is increased likelihood that someone catches outdated or erroneous data. Further, data consumers who value the MFL may be more likely to scrutinize the quality of the data they are using.
- A widely shared MFL ensures consistency of facility data across systems. Stakeholders who use the MFL as their primary facility list will have the benefit of standardized information and the same set of unique facility identifiers across organizations and information systems. They can then more readily link up the data and exchange information.
- Sharing the MFL can potentially be a source of revenue if an access fee is applied to selected private sector users (e.g., health insurance organizations).

3. KEY ASPECTS OF MFL DATA SHARING

3.1 Develop a Data Sharing Policy

A key aspect of the planning process for MFL data sharing is development of a data sharing policy. Having a comprehensive data sharing policy is important to assure that the following activities and requirements are given adequate consideration.

- Sharing procedures and decisions are transparent and known to current and potential users of the MFL.
- Sharing of MFL data complies with existing policies governing national data.

- Management of the MFL is more efficient because of clear processes and procedures.
- Requests for MFL data are addressed and handled consistently.

A data sharing policy should specify the types of MFL data that will be shared and who has access to the data. In addition, the policy should describe in detail the decision-making and approval processes associated with MFL sharing. A number of factors must be considered in deciding these issues; these are explored in detail below. (Considerations specific to integration are discussed in Section 4.3.)

What MFL data are shared?

The data sharing policy must specify what MFL data can be shared. The types of MFL data shared and how broadly the data are shared depend on a number of factors including (1) national and institutional data policies, (2) the needs of data consumers, and (3) the presence of sensitive data in the MFL that may require protection.

National and institutional policies

Countries may have existing policies that govern how data are to be stored and shared. In some cases, there may be open data mandates that require all data to be accessible; in other cases, countries may be more protective of their information and have strict rules about who can access data, what types of data can be shared, and the procedures to follow to obtain permission to access the data. Having a thorough understanding of the policy context is important when making decisions about MFL sharing.

Consider not only national policies but also policies specific to the government institutions affiliated with the MFL. Further, if the MFL is pulling data from other sources (e.g., a national health facility licensing board), it is important to determine whether the data sources have restrictions on sharing or redistributing those data.

Needs of consumers

Deciding what data to share should take into account the needs of the MFL data consumers. If the data are too restricted the MFL ceases to be useful to stakeholders. However, the MFL may have data that only a limited number of consumers require; then it may not be necessary to make these data publicly available. Data consumers can be assigned to different levels of access; the process is described below in the section on access to data.

Presence of sensitive data

Some data contained in the MFL may be highly sensitive. For example, the location data of facilities that serve highly vulnerable populations can, if misused, pose a threat to clients of

these facilities. Types of information in the MFL that may be regarded as sensitive include the following:

- Certain categories of services provided at facilities (e.g., prevention services for sex workers; rehabilitation services for people who inject drugs)
- Geographic coordinates of certain types of facilities (e.g., HIV outreach centers or military facilities)
- Personally identifiable information (e.g., name and contact information for facility director)

Sensitive information should be restricted to trusted users. The types of data that are accessible to different groups of users should be clearly stated in the MFL data sharing policy.

Who has access to the data?

Different types of data consumers should have differential access to MFL data. In general, data consumers can be classified into four domains of access:

- *Trusted domain users:* These are government officials who work directly with the MFL or need the MFL to populate government information systems. They have broad access to the MFL data and therefore require additional security and logins to access the data.
- *Mid-level domain users:* These include development partners and insurance companies, both of whom need fairly comprehensive facility data to carry out their work, but may not need all the details in the MFL. Security measures should be in place for this group too.
- *Public domain users:* Public access to non-sensitive MFL data is recommended so as many data consumers as possible can use the data. In addition to the general public, this group typically includes researchers, survey industries, and marketing companies. Such public access need not require credentials; users can simply access the MFL data via a public portal.
- *Administrative domain users:* A small group of individuals consisting of data curators and others directly involved in the establishment and maintenance of the MFL are granted complete access to the database, including editing rights.

The MFL data sharing policy must define these user domains within the country-specific context. It should also describe processes for entering into data use agreements, if these are required. Data use agreements may be established with data consumers to clarify how the MFL data can and cannot be used. The agreements typically specify rules for attribution (e.g., acknowledging the MFL and the institution that manages it) and any restrictions on

redistribution of MFL data to third parties. Usually, these agreements are not required for the public user domain.

Approval process

The MFL data sharing policy should outline the processes for evaluating and approving requests for access to the MFL data. The approval process may vary depending on the user domain and type of access requested. For example, no approval may be needed for accessing basic data from a public portal, whereas a careful vetting process is required for approving a request for system integration with the MFL.

The policy should indicate the persons responsible for approving share requests, the criteria used in making these decisions, and the expected timeframe for reviewing the requests.

3.2 Prepare Documentation for Data Consumers

Data consumers will need additional information about the MFL database to become familiar with how the data are structured and how they can be used. This background information on the MFL data is often referred to as **metadata**. The following documents should be readily accessible to data consumers, preferably through online document repositories.

- Data specifications document¹—Describes how each data element in the MFL is defined and the parameters associated with the data.
- Summary of the process for updating the MFL and the frequency of updates—This document is important first because it informs data users how current (up-to-date) the data are; second, it alerts data users to possible changes to the dataset resulting from the update process.
- Log of recent changes to MFL data—The log includes the dates of changes to MFL data.

3.3 How to Share the Data

A number of approaches can be used to share the MFL data. The decision on which approach to use should be based on user requirements that specify the format in which the data are needed. It also depends on the type of facility registry service that is established to house and share the MFL.²

- The MFL dataset can be *sent electronically* (e.g., by email). If resources are not available to develop other means of data sharing this sharing approach will work. However, it is not generally recommended because it is difficult to control who gets access to the data, and

¹ See the *MFL Data Content Module* for more information on data specifications.

² See the *Key Considerations for the MFL Module* and the *Establishing a Facility Registry Service Module*.

unrestricted distribution of the dataset can lead to problems of version control if people continue circulating an outdated MFL file.

- The MFL can be made available as a *read-only document on a website* where users can view or download it as needed.
- The MFL can be shared through an *online interface* that allows users to query, filter, and download the data. Examples include: Kenya, the Philippines, and Tanzania.
- The MFL data can be shared through integration with other information systems.

Because data consumers are increasingly interested in integration of the MFL, this option is discussed in detail in Section 4.

4. CONSIDERATIONS FOR INTEGRATION OF THE MFL

4.1 What is Integration?

Integration is the process of physically or functionally linking multiple information systems to create a combined system or unified solution. **Data Integration** refers to the combination or exchange of data from one or multiple sources into a tool or platform that uses the acquired data for transactional or analytical purposes. Integration with the MFL is necessary to enable other systems that require the facility list to access the most recent (updated) information.

Most often, integration of the MFL aims to share the MFL facility data with other systems that need a comprehensive list of facilities. However, integration can work in the other direction, with information systems sending updates to the MFL.

Two common approaches to data integration involve the following:

- *Data synchronization*: This is an automated process through which one system (e.g., the HMIS) updates its facility list by checking for discrepancies, and then harmonizing with the content of another system (i.e., the MFL).
- *Data warehouses*: These are repositories that store data from multiple sources. The data can then be combined for analytical purposes.

Integration vs interoperability

Integration is the process of linking multiple systems, whereas *interoperability* is an intrinsic property of the systems themselves which describes their ability to exchange and interpret data.

Interoperability is defined as the extent to which systems and devices (in this case the facility registry service) can exchange data and interpret that shared data. For two systems to be interoperable they must first be able to exchange data and second understand that data so that they can be used by data consumers without changing the data's semantics.

Note: Definition adapted from the Healthcare Information and Management Systems Society (HIMSS)

To successfully integrate a facility registry with other systems requires both technical and program management activities. Good management and governance are essential to ensuring that the interested parties are in agreement and that the technical solution for integrating the MFL is acceptable to all those involved. The process of integration follows the five steps outlined below.

- Goals and Objectives of Integration
- Organizational Incentives and Alignment
- Data Sharing Framework for Integration
- Aligning Data Requirements
- Technical Feasibility

4.2 Goals and Objectives of Integration

After one or more systems have been identified for integration with the MFL, the first step is to define and agree with collaborators on the goals and objectives of integration. Simply put, what will be achieved through working together that cannot be achieved through the current status in which each system is independent? The reasons for integration vary among stakeholders because each group has different interests and requirements. Goals may be dictated by implementers, programs, funders, governments, policies, caregivers, and individuals such as analysts who interact with each system. Creating a common vision of what is to be achieved is critical in the early stages of the process. It may be useful to organize an integration workshop to help implementers identify cross-cutting problems and goals.

4.3 Organizational Incentives and Alignment

With the goals and objectives of integration defined, the next step is to ensure that organizational incentives are present and that all parties are aligned regarding achieving those goals. Affected organizations need to consider the following factors:

- Whether the integration aligns with institutional mandates and policies
- The benefits to be gained individually and collectively from integration
- The real and perceived risks of integration
- Whether staff have the capacity to manage an integrated system
- How the upfront (capital) costs and ongoing (operational) costs will be funded

Maintaining integrated systems requires ongoing effort. Sometimes, the ongoing cost of the integration falls on the organization that has the technical capacity to keep things running, not the organization that has the mandate and resources, or derives the most value from the integration. This scenario highlights the potential divergence in incentives and alignment in successfully achieving and maintaining integration.

Trust plays an important role when the various teams and organizations are in the process of integrating systems. At the outset, transparency in sharing incentives and disincentives to integration is important to help groups resolve concerns related to data.

4.4 Data Sharing Framework for Integration

When the collaborating organizations have (each) determined that there are sufficient incentives and alignment to pursue integration, the next step is to make sure there is a data sharing framework in place that adequately details the governance and contractual requirements for integration. Ambiguity in the data sharing framework is a major deterrent to integration.

In addition to the considerations discussed in the section on developing an MFL data sharing policy, a data sharing framework for integration must clearly define the following issues.

- What data are shared through integration? In which direction? How often?
- What are the assumptions about read/write/administrative access?
- How will data be curated and kept up-to-date?³
- Are there data sharing policies that affect each organization? Which ones are they? Who imposes them? Are the policies compatible?
- What are the constraints with respect to access rights and physical placement of data? Does it matter when and where data are stored? Who has access to the data, how, and for how long?
- Are there different guidelines for different types of data?

³ The *Maintaining the MFL Module* has a detailed discussion on curating and maintaining the MFL.

4.5 Aligning Data Requirements

A major step in the integration process is determining whether integration is possible in terms of data compatibility. There are two aspects to this issue that need to be considered.

- How are the data formatted?—This aspect of data compatibility is referred to as “syntactic interoperability.” Given the current widely used syntactic markup languages and schema standards such as XML, RDF, and JSON, differences in formatting are surmountable and syntactic interoperability is relatively easy to achieve.
- How are the data defined?—This aspect of data compatibility is referred to as “semantic interoperability.” In a scenario in which two systems are to be integrated, it is vital to determine any differences in how data elements are defined and managed, and be aware of any resulting limitations. The goal is to align the definitions and constraints that are inherent to the data elements that are defined in the MFL and in other systems. Having access to appropriate documentation about the data is vital for completion of this step (see Section 3.2 *Preparing Documentation for Data Consumers*).

Standardized terminologies

Standardized terminologies provide common definitions for data from different sources. A standardized terminology is essential for interoperability between different health information systems. Some examples of standardized terminologies used for health data are:

- ICD-10 (<http://apps.who.int/classifications/icd10/browse/2016/en>)
- LOINC (<https://loinc.org/>)
- SNOMED (<http://www.snomed.org/snomed-ct>)

There are a number of important checks that must be carried out before integration of the MFL data can be implemented.

- Check that facility identifiers match and that legacy identifiers are preserved.
- Check that geographic and/or administrative hierarchies match. For example, are the same administrative boundaries, names, organizations, and levels of specificity being used?
- Check that the facility types and categories of services are defined in the same way.
- Check whether some information (e.g., facility ownership) is included in a single data element with multiple response categories, or kept in several data elements with yes/no responses for each.
- Check that there is agreement on the meaning of *empty*, *NA*, and *null*.
- Check that there are records of when data were last updated and by whom (for quality control purposes).

- Check that there is maintenance of ontology mappings between terminology standards and project datasets.

4.6 Technological Feasibility

The last step in the integration process is to consider whether integration is feasible at the existing technological level.

For almost every scenario imaginable there are numerous proven solutions that resolve technical interoperability needs within even the most exceptional constraints. Common challenges that must be overcome with regards to integration are the following:

- System deployment and connectivity—Which systems are installed where, with access to what, and under whose control? For example, a computer running in an office of a non-governmental organization may access the Internet but may not itself be addressable as a web service. This creates practical constraints such as “who calls whom” and “push vs pull” notifications in a given integration scenario. Also, inconsistent connectivity from mobile devices, facilities, and general Internet availability in low and middle income countries make it necessary to cache data and queue messages for reliability. It may be necessary to put in place processes to resolve conflicting updates or lost messages.
- Accessing data securely—Typically, secure data access implies authentication (securely identifying users and systems), authorization (limiting who can see certain data or perform a particular function), and auditing (tracing what was done). Sometimes an organizational obstacle to integration emerges, due to lack of consensus about who manages these overall permissions and how, resulting in access that has to be maintained point-to-point. While the technological considerations all need to be specifically addressed, they are generally the easiest challenges to resolve in the process of integration. For health care and other fields, technological obstacles and resulting solutions have been well documented, and can be applied to future integrations.

Programmatically, core details for successfully carrying out the technical aspects of an integration include the following:

- Obtain agreement on the direction of data integration; that is, who is the source of data and who is the consumer?
- Agree on push or pull, who triggers these events, and when. This might be a manual, scheduled, or triggered process.
- Agree on where the trigger and script will be hosted or run. For example, is it in the facility registry server, a HMIS server, or a third party service?

- If the integration is done via a bridge script or point-to-point make sure to have ad hoc service credentials available, or use single-sign-on OpenID tokens, to avoid having credentials lying around in other servers.
- Plan to run the scripts against staging or replica datasets before production.
- Use interoperability profiles of standards and interoperability specifications to reduce the surface area, cost, and complexity of implementing standards.
- Integrate first and standardize later; this will increase efficiency and ensure that the standardization process is well informed.

4.7 Data Sharing Tools

Application programming interfaces (APIs) are tools that enable integration and the exchange of data. Multiple APIs are available to facilitate the automated transmission of data across systems. These are technical tools used by developers, but it is good to be aware of them as reusable options to connect systems and address interoperability with standards-based tools. The following are examples of APIs that have been used for MFLs.

- Facility Registry API—Is a RESTful style API that was developed within the OpenHIE community to support integrations for facility data (see Section 6: Resources).
- Care Services Discovery API—Is a method used to share facility data along with health worker data, through the use of an interlinked registry (see Section 6: Resources).
- Other APIs and data exchange formats—It may be desirable to use or implement other API standards, depending on the use case, technical staff experience, or limitations of the methods above. These include native APIs for specific facility registry service solutions, such as the DHIS2 API or Resource Map API. Additionally, facility registries may support data exchange via file transfers in formats such as GeoJSON, RSS, and CSV. These are data formats that some users may want to take advantage of, particularly if datasets are available but resources to develop an API for an automated process are lacking.

5. MANAGEMENT AND SUPPORT

Ongoing management and support of a facility registry's integration and data sharing needs is important for its long-term success. Together, the lead implementing group, supported by the steering committee and technical partners, constitute a proven combination for success, while also supporting local ownership and sustainability. Ongoing support for MFL sharing should include the following:

- *Designated person to respond to support requests as they come in from users.* The response may be that there is no way to fix an issue at this time, but having a point of contact to work with users and seek work-arounds in these instances is extremely valuable.
- *Technical staff that can handle technical issues and fix bugs when they come up.* A time and materials agreement can be a cost-effective approach so technical staff are engaged only as needed.
- *Routine meetings of the steering committee to plan and maintain a strategic vision for the MFL and the associated integrations.* This may include additional fundraising or petitioning for resources if substantial enhancements are required.

Funding for technical support activities can be combined with routine support for the home institution's systems. While most facility registry service efforts and related integrations have, to date, been driven by MOH and funder-related grants, other cost-sharing options may be possible, including the following:

Tiered approach to cost sharing—Access to some data is free while access to other data requires payment of fees.

Cost recovery model—Some partners or data users pay fees depending on how much they use the data. Similar models also depend on use or access rights to cover costs.

No fee for use of MFL data—Access to MFL data and services is provided by the government or owner of the registry, and no fees are charged.

6. RESOURCES

- [Facility Registry API](#)
- [CSD: IHE Documentation](#)
- [OpenHIE Workflow: Query health worker and/or facility records](#)
- [Health Information Systems Interoperability Maturity Toolkit](#)

MFL RESOURCE PACKAGE

GLOSSARY

Application Programming Interface (API): Are sets of rules, specifications, and tools that software programs follow to communicate with each other. An API serves as an interface between software programs, facilitating interaction and allowing programs to exchange information.

Centralized: Functions, powers, management and responsibilities for the MFL are concentrated at the national level within a particular agency or unit. All of the important decision-making is kept at this central level.

Codebook: A document that describes the layout of the data in the MFL and details what the values associated with the data elements mean.

Completeness (of a list): The extent to which (1) all information is available for all facility entries in a list, and (2) there is an entry for each relevant facility in a list. A list is only complete if all relevant facilities have an entry in the list, and all data elements are available for each entry in the list.

Data consumers: Individuals who use (or could potentially use) the data in a facility list.

Data curators: Individuals responsible for maintaining, updating and validating the data in a facility list.

Data element: A unit of data to be included in the MFL and for which each facility will have a value. Examples of data elements included in the MFL are: Facility name, Facility address, Facility phone number.

Data integration: Refers to the combination or exchange of data from one or multiple sources into a tool or platform that uses the acquired data for transactional or analytical purposes.

Data specifications: A guideline to ensure comprehensive and consistent data definition. For each data element, the following must be clearly defined in the data definition specifications:

Name: Short name or database code used to describe the data element.

Definition: Simple description of the data element.

Type: Classification that identifies the data element (e.g., text, numeric, yes/no, select one, select many, hierarchy, date, site, user, identifier, email, phone).

Data rules: Description of constraints or conditions that should be applied to a data element to improve accuracy and clarity.

Data source: Where the data element comes from.

Data standards: Documented agreements on representation, format, definition, structuring, tagging, transmission, manipulation, use, and management of data.

Data suppliers: Persons or information systems that submit facility data or updates to the MFL. Data suppliers may be electronic information systems (such as a facility licensing database) that push data to the MFL.

Decentralization: Functions, powers, management and responsibilities for the MFL are distributed or dispersed at the sub-national level.

Facility Registry Service: The software solution that is used to store, manage and share the MFL data.

Federated: Functions and powers are shared by multiple self-governing organizations according to an agreement among the member organizations.

Geographic coordinates: Precise geographic coordinates that identify the location of something, in this case a health facility. Typically, they specify location in terms of latitude and longitude.

Harmonize: The process of combining data from various facility lists into a single list. The process of harmonization includes a data cleaning component—identifying gaps and eliminating duplicate data.

Health Information Exchange (HIE): A network of information systems that are interlinked and share and exchange data to facilitate the functionality, analytics, and monitoring of the health system.

Institutionalization: The process whereby an initiative is embedded and routinized within an organization, society, or country. Institutionalization requires adequate funding, sufficient staffing, governance, standardized processes, support from stakeholders, and acceptance by users. Institutionalization is one component of sustainability.

Interoperability: A property of a product or system whose interfaces are understood to work with other products or systems without restriction to access or implementation.

Maintenance: The process of maintaining the functionality of an MFL after it has been established, to ensure that the MFL contents are valid and complete and the facility registry service is relevant and working without issues.

Master Facility List (MFL): A complete, updated, authoritative listing of health facilities in a country. The MFL database includes the information (data elements) needed to identify each facility—such as facility name, **unique identifier**, location, and contact information—as well as the administrative data to categorize the facility—such as facility type, ownership, and operational status. The MFL may also include information about facility services and service capacity, for example, type of services offered and number of beds.

MFL managers: The persons responsible for overseeing all processes, staffing, and budgets related to the MFL.

MFL owner: The organization or agency that has control over the MFL and is responsible for housing and overseeing implementation of the list.

Minimum data content: The minimum set of data elements describing facilities that must be included in the MFL. Other data elements can be added as resources allow, but the minimum content is required for all facilities from the onset.

Requirement: A documented physical and/or functional prerequisite that the MFL must have to be operational. It is a statement that identifies an attribute, capability, characteristic, or quality of a system that is necessary for it to have value and utility for a data consumer.

Service domain: Basic information on the service capacity of a facility. It provides a listing of available services and facility capacity (e.g., number of beds) that is essential for health systems planning and management.

Sharing: Process by which MFL data are made accessible to third parties.

Signature domain: A set of identification items for each facility that serves to uniquely identify the facility, thereby preventing duplication or omission of facilities from the MFL.

Steering committee: A leadership body that is responsible for overseeing the establishment of the MFL, making strategic decisions about the MFL, and is responsible for ensuring and monitoring its long-term implementation.

Sustainability: The endurance of a system or process, or the ability to continue a defined system or process indefinitely, or for an extended time beyond the initial life of the project. Sustainability enables stakeholders to maintain the MFL beyond the establishment phase which, if external resources (e.g., institutional, technical, financial) are involved, may require reduced dependency on declining resources.

Technical working group (TWG): A group of subject matter experts (SMEs) who work together to achieve a specified goal. In relation to an MFL, a TWG is an interdisciplinary group that is responsible for designing the structure and content of the MFL and the facility registry service,

as these entities are being planned and established. During the maintenance phase, the TWG is responsible for determining whether the structure of the MFL and the facility registry service is still relevant and whether any changes should be made to them.

Technological infrastructure: The composite hardware (e.g., servers, computers, data centers, switches, hubs, routers), software (e.g., operating systems, Internet browser, device drivers, other programs that run on a computer), network resources (e.g., network enablement, Internet connectivity, firewall, security), and human resources (e.g., network administrators, developers, designers, and data consumers) involved in developing and supporting the facility registry service.

Unique Facility Identifier: A unique code used to reference a health facility in the MFL. Its use should be standardized in other systems and surveys. There are many types of unique identifiers that can be used, each for a different situation, including sequential integer codes, user-friendly alphanumeric codes, and automatically-generated universally unique identifiers.

Updating content: The process, during the MFL maintenance phase, by which MFL entries are reviewed to reflect new or corrected information. The MFL content updating process includes four main steps: data collection, data submission, data validation and revision, and data approval. During the process, MFL entries can be added, edited, or archived. The goal of the process is to ensure that MFL content is valid and complete.

User stories: Brief statements that describe what a MFL data user wants and why. They are usually phrased as follows: “As a [type of user] I want to [insert need] so that I can [insert why].”

Validation of content: The process, during the MFL maintenance phase, by which the content of the MFL is periodically validated to ensure that *all* entries in the MFL are valid and complete. This process differs from MFL content updating in that during the updating process only “known” additions or changes are made. However, in some instances, the content updating and validation processes may be the same; it depends on the maintenance processes established. During the content validation process, all records are reviewed; if an entry is found to be valid and complete, it is marked as such, and if an entry needs to be added or corrected, the change is made. This process tries to ensure that all entries are reviewed at least once every 1-2 years.

Validation of structure: The process, during the MFL maintenance phase, by which the structure and functionality of the MFL and facility registry service are reviewed to determine if (1) all data elements are needed, (2) any data elements are missing, (3) data definitions are appropriate and relevant, and (4) the facility registry service is functioning properly and without issues. The goal of the process is to ensure that the MFL structure and the facility registry service functionality are relevant to data consumers’ needs.