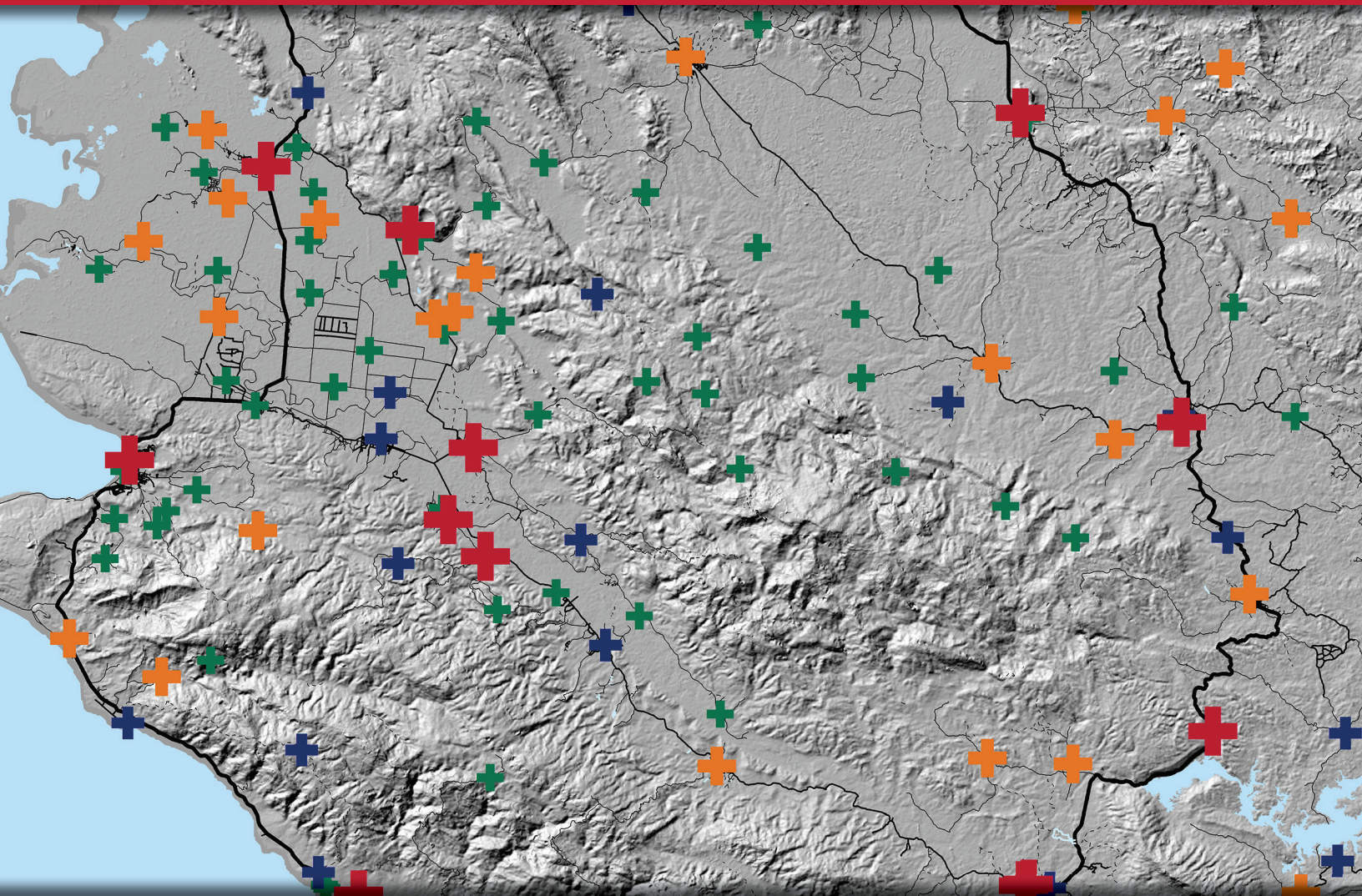# MASTER FACILITY LIST RESOURCE PACKAGE:

Guidance for countries wanting to strengthen their MFL

Module 8: Establishing a Facility Registry Service

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DRAFT

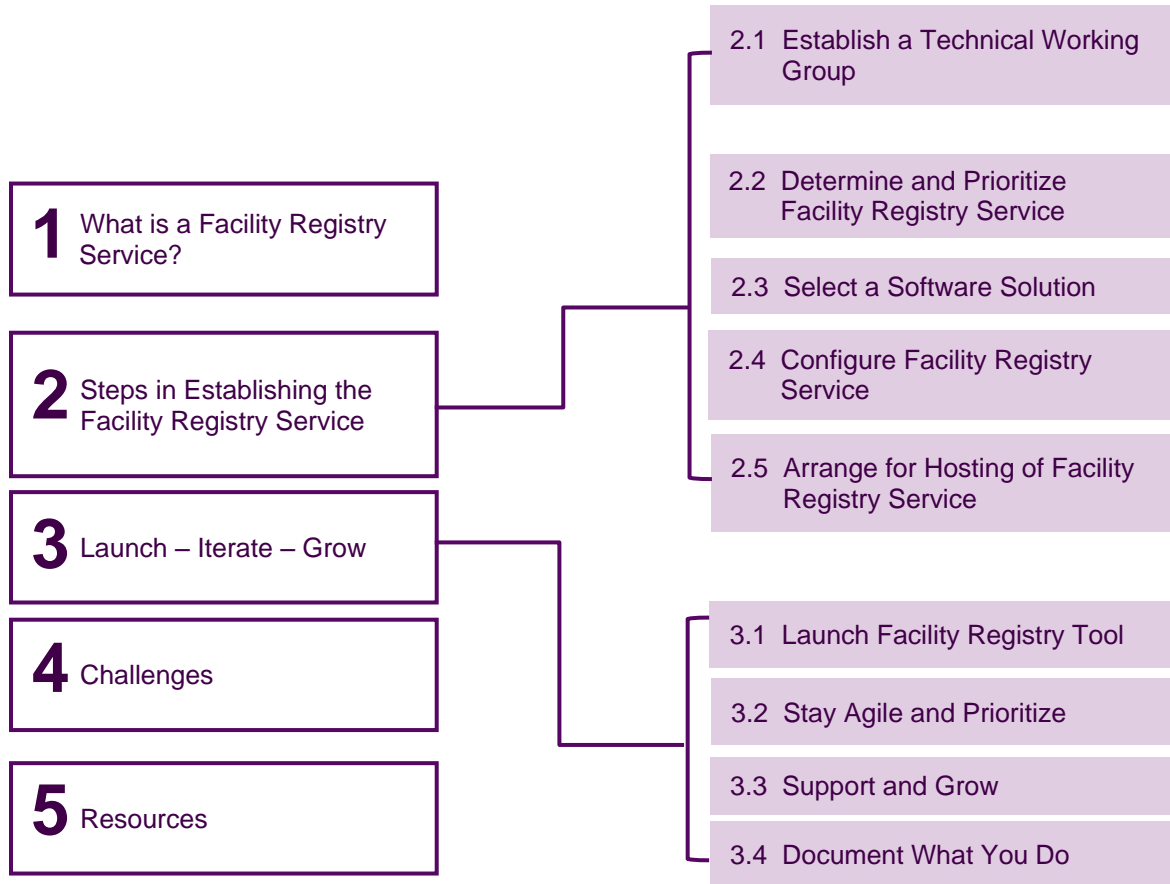# ESTABLISHING A FACILITY REGISTRY SERVICE

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
☐ Gather user requirements and goals for the MFL	**Key Considerations Module**
☐ Determine processes and workflow for updating and curating the MFL data	**Maintain the MFL Module**
☐ Review existing data sharing policies	**MFL Governance Module**
☐ Decide the MFL data content and define 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 directly to that section)

1 What is a Facility Registry Service?	**2.1** Establish a Technical Working Group
	2.2 Determine and Prioritize Facility Registry Service
2 Steps in Establishing the Facility Registry Service	**2.3** Select a Software Solution
	2.4 Configure Facility Registry Service
3 Launch – Iterate – Grow	**2.5** Arrange for Hosting of Facility Registry Service
4 Challenges	**3.1** Launch Facility Registry Tool
	3.2 Stay Agile and Prioritize
5 Resources	**3.3** Support and Grow
	3.4 Document What You Do

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 serve 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 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 user requirements for the facility registry service. Give particular attention to the needs of the following groups which 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
- **Data curators** – persons responsible for managing, updating, and validating the MFL content

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[1] See Open HIE (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 suppliers** – persons or information systems that submit facility data or updates to the MFL

When considering the requirements, it is important to note 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.

- What processes and workflows used to update and maintain the MFL data need to be supported by the service?[3] Specifically, it will be necessary to know beforehand (1) what the data sources for the MFL will be, (2) how data are submitted and by whom, (3) what is the data validation and approval process, and (4) the guidelines for documenting and archiving changes to the MFL data.

- What types or access permissions and restrictions need to be built-in?[4]

Prioritize Requirements

The requirements for the facility registry service should to 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 need to 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 to provide a plan designed to meet the requirements. We recommend consideration of the following questions that can highlight gaps between what currently exists and what you want to achieve:

- Is new software needed to support the MFL? Consider whether existing solutions can be improved to meet most requirements, or whether a new software solution is needed. The MFL assessment[5] will have helped identify whether software solutions exist to house facility lists, and to what extent they meet the needs of data consumers.

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[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*

- 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 what the facility registry service needs to be able to do, you can consider the different software solutions available; it is likely that several solutions will meet your needs. To facilitate the decision-making process, the following suggestions should be considered:

- Decide whether you will use open source 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 will be needed to set up the facility registry service using this software solution, and (2) whether the technical skillset is available in-country to support the specific software long-term.

Open Source Versus Custom Solutions

Recently, open source software solutions have been developed that meet many of the common requirements for a facility registry. 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 solution, consider the following:

Open Source Facility Registry Service Solutions

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

- Resource Map
- DHIS2

1. Using an open source, facility registry service solution can result in a quicker and cheaper path to implementation and scalability. However, ongoing support of the facility registry service is still needed over the long term. Support may be available through the various developers and technical staff who have worked to design these facility registry solutions.

2. Some facility registry 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 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 very specific requirements.

4. Existing facility registry service solutions provide out-of-the-box support for commonly used and accepted **application programming interfaces (APIs)** and interoperability workflows.

5. A custom-developed solution allows you to have total control over the facility registry service design and development and can therefore better meet very specific requirements. However, the costs can be higher than using open source solutions.

The OpenHIE Community or 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 solutions to common challenges.

See:
OHIE Facility Registry Community

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 exist embedded within another information system. It may be tempting to house the MFL within an HMIS solution, for example, but this is not recommended as this could lead to unnecessary complications when modifications to the MFL need to be made. Having an independent (though integratable) solution allows changes to be made to the MFL content or structure without impacting the operations of other information systems.

CASE STUDY: SELECTION OF FACILITY REGISTRY TOOLS

Bangladesh, Kenya, and *the Philippines* opted for custom-based 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 solution with customized portals. (See Tanzania.)

2.4   Configure Facility Registry Service

After a software solution has been selected, you will need to configure the registry with the appropriate details driven by the data specifications and requirements that 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 either 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 solution 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) serve as a means for users to 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 and related solutions, compared with a portal designed to be used by the MFL management team. In this case, it is likely preferable to set up two distinct interfaces – using the same data source – that respond to the particular needs of each group.

If using an existing open source facility registry 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.

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

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

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 solutions

Some open source facility registry solutions mentioned earlier are available online and typically 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 the cloud hosting, is that users can begin using 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, connectivity) is weak or unreliable. Additionally, cloud hosting often comes accompanied by 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 to maintain a locally hosted system that meet an equivalent level of security, and technical quality is typically higher than 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.

Some open source facility registry solutions mentioned earlier are available online and typically 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 the cloud hosting, is that users can begin using the facility registry service immediately, while minimizing associated costs and logistics.

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. You need (1) to consider the appropriate communication channels for announcing the launch and (2) to involve the partners who were identified early on when the facility registry service requirements were gathered. Further, it is important (3) to encourage participation and engagement with the facility registry service, allowing for self-service and easy channels of support. Finally, (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 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 solution. Testing a solution only at the end of the project adds significant risk.

Additional requirements and user stories will be generated throughout the lifetime 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 help to transparently document and track issues and updates to a facility registry service, keeping both technical and nontechnical users engaged and up to date with 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 in 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 over time.

4.   CHALLENGES

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

Facility Registry Service Challenges	
Challenge	**Potential solution**
Insufficient funds to meet all the user requirements	• 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	• 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 long term cost of the facility registry service (as opposed to cost of initial setup)	• 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 facility registry service	• 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

ACKNOWLEDGEMENTS

The MFL Resource Package was developed with extensive input from a team of persons who have been involved in various capacities in the development or management of MFLs in different countries. The content builds off of previous MFL guidance developed by the World Health Organization, MEASURE Evaluation and Open HIE. This MFL Resource Package seeks to expand and update the guidance and make it accessible to a wide audience. Development of this Resource Package included a literature review, a series of in-depth interviews with key informants, a three-day meeting attended by various experts in this area to discuss in detail the content and structure of the guidance document, and a thorough review process.

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

Lynne Franco led a team at EnCompass to conduct 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.

The following tables list persons who contributed to the MFL Resource Package by attending a three-day meeting, participating in in-depth interviews, contributing resources, reviewing drafts or providing information for the case studies.

Table 1: Persons who participated in the three-day meeting to review the content and structure of the Resource Package.

Meeting Participants	Affiliation
Tariq Azim	MEASURE Evaluation/JSI
Noah Bartlett	USAID, Bureau for Global Health
Clara Burgert	The DHS Program/ICF
Aubrey Casey	The DHS Program/ICF
Niamh Darcy	RTI
Anita Datar	Health Policy Project/Futures Group
Cristina de la Torre	The DHS Program/ICF
Mark DeZalia	PEPFAR/CDC
Lynne Franco	The DHS Program/EnCompass
Erick Gaju	MOH Rwanda
Nate Heard	US Department of State

Meeting Participants	Affiliation
Andrew Inglis	Deliver Project/JSI
Denise Johnson	MEASURE Evaluation/ICF
James Kariuki	PEPFAR/CDC
Esther Kathini	MOH Kenya
Carl Leitner	iHRIS/Capacity Plus/IntraHealth
Lwendo Moonzwe	The DHS Program/ICF
Annah Ngaruro	MEASURE Evaluation/ICF
Kola Oyediran	MEASURE Evaluation/JSI
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John Spencer	MEASURE Evaluation/UNC
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Scott Teesdale	Open HIE/InSTEDD
Kavitha Viswanathan	WHO
Sam Wambugu	MEASURE Evaluation/ICF
Kirsten Zalisk	The DHS Program/ICF

Table 2: Persons who contributed through interviews or review of the MFL Resource Package Modules.

Name	Affiliation at time of participation
Ian Wanyeki	Health Policy Project/Futures Group
Elaine Baker	Health Policy Project/Futures Group
Bernard Mitto	Health Policy Project/Futures Group
Vanessa Brown	PEPFAR/Department of State
Robert Colombo	WHO
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Marty Gross	Bill & Melinda Gates Foundation
Jason Knueppel	BAO Systems
Rachel Lucas	USAID
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Martin Osumba	AFYAinfo, Kenya
Alyson Rose-Wood	Office of Global Affairs/HHS
Dykki Settle	iHRIS/IntraHealth
Jim Setzer	Abt Associates, Inc
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Ola Titlestad	DHIS2/University of Oslo