HIS Geo-Enabling Toolkit

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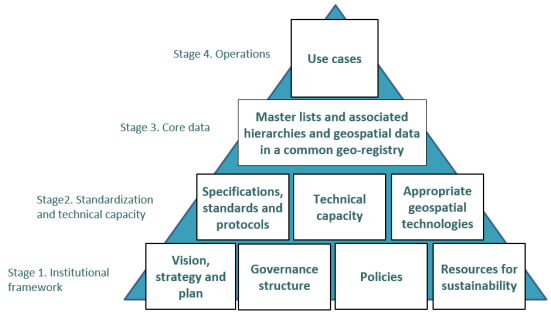

In collaboration and with the support of:

Revision history

Revision	Revision Date	Comment	By
1.1	June 20, 2018	Document created	Steeve Ebener, Izay Pantanilla
1.2	June 25, 2018	Corrections in the text and figures	Izay Pantanilla
1.3	June 28, 2018	Corrections in the text	Izay Pantanilla
1.4	October 22, 2023	Adjustments of some figures and text, improvement of the HIS geo-enabling quick assessment tool and inclusion of additional resources	Steeve Ebener
1.5	April 8, 2024	Inclusion of additional resources and improvement of Annex 5	Steeve Ebener

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The development of the HIS geo-enabling toolkit was led by Steeve Ebener and Izay Pantanilla from the Health GeoLab with the support of the Asian Development Bank.

The document also benefited from the development and implementation in Myanmar of the UNICEF Guidance on the Use of Geospatial Data and Technologies in Immunization Programs: Overview and Managerial Considerations for In-Country Strengthening[1].

Purpose and audience

The purpose of this Health GeoLab toolkit is to support the geo-enablement of the in-country Health Information System for the health sector to fully benefit from the power of geography, geospatial data and geospatial technologies.

The audience for this toolkit includes all the stakeholders contributing to the strengthening of the Health Information System (HIS) in general and the technical capacity of the health sector to manage and use geospatial data and technologies in particular.

Please note that some of the sections in this guide require basic understanding of concepts pertaining to the management and use of geospatial data and technologies. These concepts are described in the reference material generated by the Health GeoLab in collaboration with other partners[2].

Abbreviations

ADB	Asian Development Bank
GDTMU	Geospatial Data and Technologies Management Unit
GIS	Geographic Information System
HGL	Health GeoLab
HIS	Health Information System
KHP	Key Health Program
NSDI	National Spatial Data Infrastructure
SDG	Sustainable Development Goal
UHC	Universal Health Coverage
WHO	World Health Organization

[1] https://www.unicef.org/media/58181/file
[2] https://healthgeolab.net/resources/reference-materials/

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Glossary[3]

Action plan: Document describing in great detail exactly how strategies will be implemented to accomplish the objectives that have been set

Business process: A business process or business method is a collection of related, structured activities, or tasks that in a specific sequence produces a service or product (serves a particular business goal) for a particular customer or customers.

Common Geo-Registry: IT solution that allows the simultaneous hosting, management, regular update and sharing of the lists as well as associated hierarchies and geospatial data for the geographic objects core to development in general and public health in particular.

Data: Raw, unorganized facts and statistics collected for reference or analysis

Data management: All the disciplines related to managing data as a valuable resource. This covers, but is not limited to: data collection, cleaning, validation, documentation as well as the generation of data products (graphs, tables, and maps)

Geo-enable: To apply geospatial capabilities to a business process in order to establish the authoritative spatial location of business data and enable contextual spatial analysis.

Geo-enabled HIS: An Information System that fully benefits from the power of geography, geospatial data and geospatial technologies through the proper integration of the geographic and time dimensions across its business processes.

Geographic data: Information describing the location and attributes of things, including their shapes and representation. Geographic data is the composite of spatial data and attribute data.

Geographic feature: A human-made or naturally created features of the Earth (e.g., house, road, health facility, river, …)

Geographic information: Spatial and/or geographic data organized and presented to create some value and to answer questions.

Geographic Information System (GIS): An integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed.

Geographic object: Also known as a Geo-Object, a computer representation of a geographic feature (e.g., point, line, polygon)

Geography: The field of science devoted to the study of the lands, the features, the inhabitants, and the phenomena of Earth.

[3] The source of the definitions included in this glossary can be consulted here: https://bit.ly/2q27s0I

Geospatial data: Also referred to as spatial data, information about the locations and shapes of geographic features and the relationships between them, usually stored as coordinates and topology.

Geospatial technologies: Refers to equipment used in visualization, measurement, and analysis of earth's features, typically involving such systems as Global Navigation Satellite System (GNSS), Geographical Information Systems (GIS), and remote sensing (RS)

Global Navigation Satellite System (GNSS): A satellite navigation system with global coverage

Health Information Systems: A system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services. HIS is a much broader term than HMIS and includes HMIS, Patient Management Registration System (PMRS), Logistics Management Information System (LMIS), Human Resources Information System (HRIS), Financial Management System (FMS), etc.

Information: Data processed, organized, structured or presented in a given context so as to make it useful

Information System: Organized system for the collection, organization, storage, and communication of information.

Master list: Unique, authoritative, officially curated by the mandated agency, complete, up-to-date and uniquely coded list of all the active (and past active) records for a given type of geographic feature/object (e.g. health facilities, administrative divisions, villages)

Registry: IT solution that allows storing, managing, validating, updating, and sharing a master list.

Remote Sensing (RS): Collecting and interpreting information about the environment and the surface of the earth from a distance, primarily by sensing radiation that is naturally emitted or reflected by the earth's surface or from the atmosphere, or by sensing signals transmitted from a device and reflected back to it. Examples of remote-sensing methods include aerial photography, radar, and satellite imaging.

Strategy: Approaches that will be used to reach the objectives that have been defined

System: A set of detailed methods, procedures, and routines created to carry out a specific activity, perform a duty, or solve a problem.

Vision: Vivid picture of where you want to be in the future

1. Background

The Health GeoLab (HGL) is regional resource supporting low- and middle-income countries in Asia and the Pacific for them to fully benefit from the power of geography, geospatial data, and geospatial technologies to reach the health-related Sustainable Development Goal of healthy lives and well-being for all (SDG 3)[4].

The HGL uses the HIS geo-enabling framework to strengthen in-country capacity. The present document has been developed as part of this approach and with the objective to be used by the largest number of users possible.

This toolkit is a living document made to evolve based on the inputs received from the users. Please do not hesitate to contact us if you have any suggestions for improvement.

Please also contact us using the same email address should you use this document as part of your activities and would like to have your institution recognized as one of the document's users.

2. Introduction

Being able to contextualize any piece of information in both space and time is a key capacity that the Health Information System (HIS) should have in order to support all three main functions of a country's public health system: (1) assessing and monitoring the health of communities and populations at risk; (2) assuring that all populations have access to quality, timely, and cost-effective care; and (3) formulating public health policies designed to solve identified health problems and priorities.

Despite their foundational importance, these two dimensions are generally among the most poorly captured in the HIS, leading to health programs not being able to fully benefit from what geography as the science, geospatial data as the content, and geospatial technologies as the tools have to offer to address public health priorities such as Universal Health Coverage (UHC) under the umbrella of the Sustainable Development Goal of healthy lives and well-being for all (SDG 3).

The present toolkit has been designed by the HGLC as the instrument to help countries address this gap through the implementation of the HIS geo-enabling framework. It is meant to be generic enough to be used by any stakeholder willing to strengthen the level of geo-enablement of the HIS in any given country.

The content of this toolkit builds on the experience gained through the implementation of the HIS geo-enabling process in Cambodia, Myanmar, and Vietnam thanks to ADB's support. It also greatly benefited from the development and implementation in Myanmar of the joint UNICEF-Health GeoLab guidance on the use of geospatial data and technologies in immunization programs [1].

While designed to be implemented at the level of the HIS as defined in the glossary, this toolkit can be adapted to be applied to a program specific information system. The above-mentioned guidance is a good example of such an adaptation.

[4] https://www.un.org/sustainabledevelopment/health/

3. The HIS geo-enabling framework

A geo-enabled HIS is an information system that fully benefits from the power of geography, geospatial data and technologies through the proper integration of geography and time across its business processes.

The HIS geo-enabling framework is composed of nine (9) elements that need to be in place for an HIS to be considered as geo-enabled, namely (please refer to the glossary for an explanation of the concepts listed here):

1. A Clear **vision**, **strategy,** and **action plan** for the management and use of geospatial data and technologies have been defined.
2. A **governance structure** supporting the vision, strategy, and action plan has been established.
3. Sufficient **technical capacity** has been developed to support the proper management and use of geospatial data and technologies.
4. Geospatial data **specifications, standards, and protocols** have been defined and are being implemented to ensure the availability and quality (completeness, uniqueness, timeliness, validity, accuracy, and consistency) of geographic information across the whole data lifecycle.
5. The **master lists** for the core geographic objects (health facilities, administrative divisions and villages, and reporting divisions) and their associated hierarchies and geospatial data have been developed, made accessible, and an updating mechanism put in place for each of them using a **common geo-registry**.
6. The appropriate **geospatial technologies** have been identified and are being used in accordance with good geospatial **data management practices**.
7. **Use cases** (applications) supporting health programs (communicable diseases surveillance, malaria elimination, health service coverage, disaster management, etc.) towards reaching SDG 3 are being implemented and documented.
8. **Policies** supporting and enforcing all the above as well as geospatial data accessibility have been released.
9. The necessary **resources** to ensure long term sustainability have been identified and secured.

These elements are core common assets covering four key stages of the HIS geo-enabling framework (Figure 1). It is important to note here:

- How these different stages support each other towards an operational use of geography, geospatial data and technologies to support the implementation of health programs.
- The order in which the 9 elements are listed above does not follow the structure of Figure 1 but the logical order in which it is advisable to cover these elements as part of the implementation of the geo-activation process (see Section 4).

Please refer to Roth et al. [2] and Ebener et al. [3] for a detailed description of the benefits gained through the implementation of this framework.

Annex 1 provides the objectives and benchmarks expected to be reached for each of the nine (9) elements in the framework. These benchmarks represent the reference being used to conduct the assessment described in the next section of this toolkit.

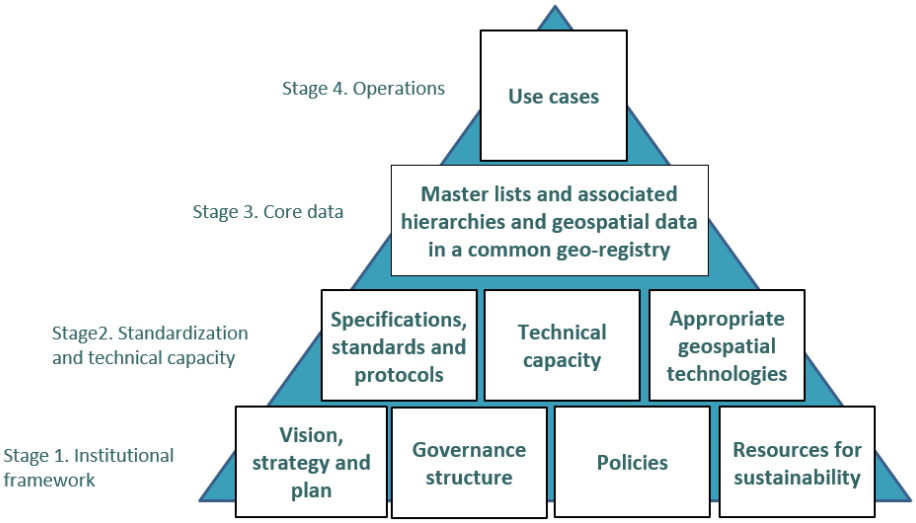


Figure 1 - Hierarchical organization of the HIS geo-enabling framework (modified from [1])

4. In-country implementation of the HIS geo-enabling framework

The implementation of the HIS geo-enabling framework takes place through a simple 6-step process (Figure 2). These steps are as follows:

- Step 1: Assess the level of geo-enablement of the health information system.
- Step 2: Define the strategy(ies) to be implemented to fill the gaps identified during the assessment.
- Step 3: Develop the action plan aiming at geo-enabling the HIS.
- Step 4: Implement the action plan.
- Step 5: Assess, document and sustain the result of the action plan implementation.
- Step 6: Restart from step 1 on a regular basis.

The following sections describe each of these steps in detail and provide tools to support their implementation in countries.

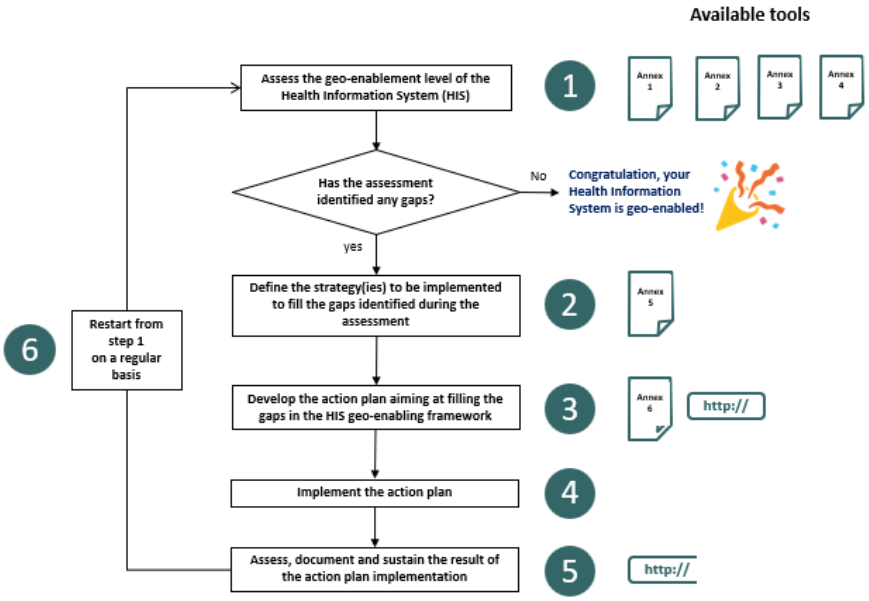
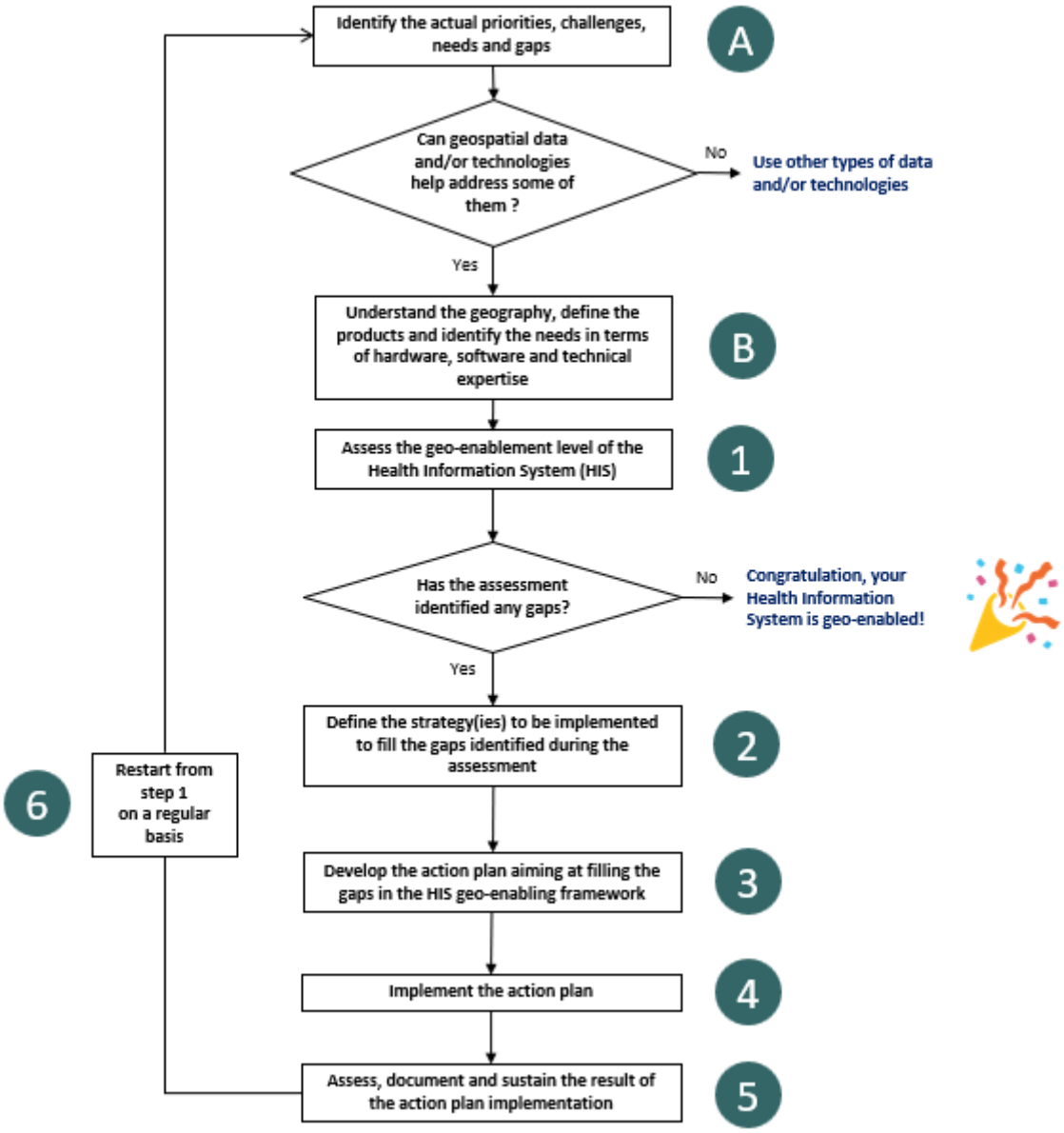


Figure 2 - In-country HIS geo-enabling framework implementation process and tools provided here to support it

When you are looking at geo-enabling a specific program or intervention, two additional steps are generally added at the beginning of the HIS geo-enabling framework implementation process (Steps A and B in Figure 3).


Identify the actual priorities, challenges, needs and gaps
A
Can geospatial data and/or technologies help address some of them ?
No
Use other types of data and/or technologies
Yes
Understand the geography, define the products and identify the needs in terms of hardware, software and technical expertise
B
Assess the geo-enablement level of the Health Information System (HIS)
1
Has the assessment identified any gaps?
No
Congratulation, your Health Information System is geo-enabled!
Yes
Define the strategy(ies) to be implemented to fill the gaps identified during the assessment
2
Develop the action plan aiming at filling the gaps in the HIS geo-enabling framework
3
Implement the action plan
4
Assess, document and sustain the result of the action plan implementation
5
6
Restart from step 1 on a regular basis

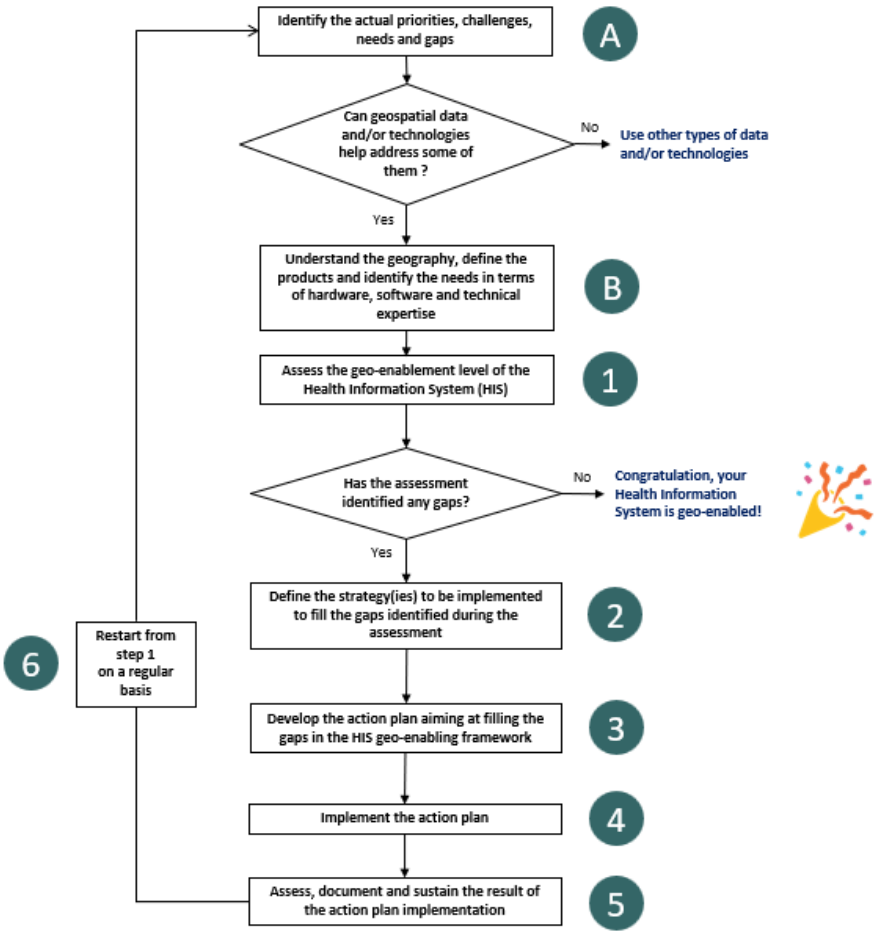


Figure 3 -Geo-enablement process when applied to a specific program or intervention

These steps consist in:

- Step A: identifying the actual priorities, challenges, needs and therefore gaps of the program or intervention and using the results to define if geospatial data and/or technologies can help address some of them
- Step B: Understand the geography, define the products and identify the needs in terms of hardware, software and technical expertise needed to generate these products.

Please also note that, in this case, step 1 of the HIS geo-enabling framework is expended to assess the availability, quality and accessibility of the data needed to generate the above-mentioned products.

Please refer to UNICEF. Guidance on the Use of Geospatial Data and Technologies in Immunization Programs [1] and the geo-enabled microplanning handbook [4] for examples of implementation of these additional steps.

4.1 Step 1 - Assess the level of geo-enablement of your Health Information System (HIS)

- Objective: Identify and document the current situation and indirectly potential gaps across the nine (9) elements of the HIS geo-enabling framework
- Expected deliverable: A report documenting the current situation.
- Estimated duration of implementation: 1-2 week.
- Volume of resources needed: Limited.
- Person to be involved: Head of the geospatial data management and technology unit if any, representatives from key health programs (health information system, communicable diseases, planning, emergency management, and immunization), development partners, external facilitator.
- Supporting tool:
  a. HIS geo-enabling benchmarks (Annex 1)
  b. Quick HIS geo-enablement level assessment questionnaire (Annex 2)
  c. Additional information and documents to be collected in complement to the quick assessment questionnaire (Annex 3)
  d. Resources illustrating the first 7 elements of the HIS geo-enabling framework (Annex 4)
  e. HIS geo-enablement assessment matrix template (mentioned in the text)

Assessing the level of geo-enablement of the HIS is the foundation of the overall HIS geo-enabling process. It is therefore critical to conduct such assessment with the utmost care and level of details, especially if it is being conducted for the first time. Not conducting such an assessment might result in wrong assumptions and therefore loss of time and resources.

At the end of this first step, the entity or person conducting the assessment should have a clear picture of the current situation in terms of public health priorities and challenges as well as gaps against the benchmarks to be reached for the HIS to be considered as geo-enabled (Annex 1). The absence of any gap would signify that your health information system is geo-enabled!

The assessment can be conducted in different ways depending on the context and resources at disposal, among which we can mention:

1. By the Ministry of Health (self-assessment). It is recommended to then organize a workshop grouping all the concerned programs/units to validate the result of the assessment.
2. Facilitated on site by an external party through separated one on one interviews with each program/unit. This approach might require a cross-validation exercise to take place depending on the answers provided for the cross-cutting elements of the framework.
3. Facilitated on site during a workshop grouping all the programs/units. This approach presents the advantage of allowing to directly clarify and cross-validate information during the workshop.

While other programs can of course be involved, the assessment should ideally cover the following Key Health Programs (KHPs) as they are the main potential providers and users of geospatial data and technologies [1, 2, 3, 5, 6]:

- Health Information System (HIS): Natural guardian of the national level geospatial data management and technologies unit.
- Planning: Physical accessibility to health care is an important component of UHC which depends on the spatial distribution of the population in need, the spatial distribution of

services that are being provided, and the environment that the patients have to cross to reach them.

- Communicable diseases: Being able to contextualize cases in both time and space is key to surveillance, monitoring, and elimination of communicable diseases.
- Immunization: Base microplanning maps are essential to ensure that all the targeted population is covered during an immunization campaign.
- Emergency management: Geospatial data and technologies are critical instruments across the whole emergency management cycle (mitigation/preparedness, response, recovery).

The assessment also represents an opportunity to inform the Ministry of Health and its partners about recent developments in the field of geospatial data and technologies and to illustrate how they are being used to support public health programs.

The quick geo-enablement level assessment questionnaire reported in Annex 2 (MS Excel version: https://bit.ly/3xdXnEI) is organized according to the nine (9) elements of the HIS geo-enabling framework and has been developed to serve as the starting point for this exercise. The questionnaire also allows to capture the current priorities and challenges of each program/unit filling it. Implementing this questionnaire before any on site workshop does also provide an opportunity to introduce the HIS geo-enabling specific terminology.

To have a complete picture of the situation, it is also important to collect the information and documents listed in Annex 3 as well as conduct a desktop review to compile as much information as possible regarding the situation observed in the country across the 9 elements of the framework (Annex 4 provides examples of the kind of document to search for). Doing so might provide some important additional background information including identifying some potential MOH programs/units to be involved in the exercise.

The product resulting from the assessment will be a report describing where each program/unit, and the MOH for cross-cutting elements, are currently finding themselves across the nine (9) elements of the HIS geo-enabling framework.

In this report, the answers to the questionnaire can be presented in a tabular form like the examples provided in Figure 4 (template accessible from: https://bit.ly/3V8KHqk). In these tables, the current situation along the continuum of options provided in the questionnaire is represented by the cells highlighted in blue. The gap does itself correspond to what needs to be done to reach the end of the continuum on the right of each table.

		The programme/unit does not have technical capacity for the management and use of geospatial data and technologies	The programme/unit has technical capacity but it is not sufficient to implement its activities	The programme/unit is currently strengthening its technical capacity to be able to implement its activities	The programme/unit has such technical capacity and it is sufficient to implement its activities
Technical capacity	HIS				
	Malaria				
	TB				
	HIV				

	No governance structure has been established	A governance structure is in the process of being established	A governance structure exists but is not operational at this time	A governance structure exists and is operational but not all health stakeholders are involved	The governance structure is fully operational and participates in the National Spatial Data Infrastructure
Governance structure					

Figure 4 – Examples of tabular representation of the current situation observed in a country for a programme/unit specific element (technical capacity) and a cross-cutting one (governance structure)

4.2 Step 2 - Define the strategy(ies) to be implemented to fill the gaps identified during the assessment

- Objective: Define the strategy(ies) to be implemented to fill each of the gaps identified during the assessment
- Expected deliverable: A document documenting the strategy(ies) to be implemented to address the gaps identified during the assessment.
- Estimated duration of implementation: up to 1 week
- Volume of resources needed: Limited.
- Person to be involved: Head of the geospatial data management and technology unit if any, representatives from key health programs (health information system, communicable diseases, planning, emergency management, and immunization), development partners, external facilitator.
- Supporting tool:
    a. Non exhaustive list of strategy(ies), recommended stakeholders to be involved, and implementation level aiming at filling the identified gaps (Annex 5)

This next step in the process consists of identifying the strategy(ies) to fill each of the gaps identified during the assessment conducted in the previous step.

This step is separated from the development of the action plan because such action plan might not be in the position to cover all the gaps that have been identified during the assessment. It is therefore useful to document these strategies for a potential future iteration.

At the end of this second step, the Ministry of Health should have clear strategies to be included in the action plan for each element of the HIS geo-enabling framework (see Section 4.3).

Annex 5 has been designed to support this exercise and is organized to provide:

- A list of potential gaps identified during the assessment are provided for each of the framework elements.
- Possible strategies to fill each of the identified gap.
- The minimum list of stakeholders to be involved as well as the level of implementation for the strategies to be conducted are then recommended.

It is first important to indicate that the content of this table is certainly not exhaustive and that additional gaps and strategies be identified during the implementation of the HIS geo-enabling process. It should nevertheless contain the major gaps that could be expected.

The present toolkit considers two levels of implementation:

1. National: Implemented national wide, starting with the central before the sub-national level for the former to serve as trainers for the latter
2. Pilot: Implemented on a limited part of the country's territory

While some of the strategies listed in Annex 5 are recommended for implementation at the national or pilot level only, most of them are offering both options and this is because the final choice will greatly depend on the country-specific context and on the size of the gap versus the

availability of resources (financial, human, and physical) including organizational and external support to fill such gap (Figure 5).

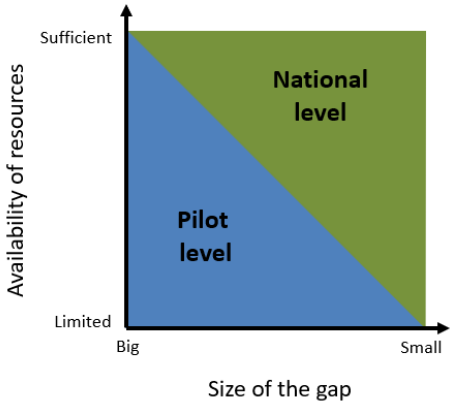


Figure 5 - Recommended activity implementation level based on the size of the gap and the availability of resources to fill it

The product resulting from this step will be a report or a table providing a strategy, or set of strategies, to be implemented together with the list of involved stakeholders and level of implementation to fill the gaps across all the element of the HIS geo-enabling framework.

4.3 Step 3 - Develop the action plan aiming at filling the gaps in the HIS geo-enabling framework

- Objective: Obtain a budgeted action plan to implement the strategies defined during step 2 and, as such, fill the gaps identified during the assessment.
- Expected deliverable: HIS geo-enabling action plan.
- Estimated duration of implementation: 1 month
- Volume of resources needed: Limited.
- Person to be involved: Head of the geospatial data management and technology unit if any, representatives from key health programs (health information system, communicable diseases, planning, emergency management and immunization), development partners, external facilitator.
- Supporting tool:
    a. Non-exhaustive list of activities to be considered for implementation across the 9 elements of the HIS geo-enabling framework (mentioned in the text)
    b. Action plan template
    c. Example of action plan (Annex 6)
    d. Cost and timeline drivers for activities aimed at strengthening the geo-enabling environment [7]

The information collected during the previous steps needs to be organized into an action plan. Such action plan should at least contain:

- The vision (short and/or long term
- The objectives to be achieved through the implementation of the plan
- The implementation period covered by the plan
- The full name of the implementation manager
- The date of last update of the plan

- For each element of the HIS geo-enabling framework:
    - The current situation/gaps as identified during the assessment (a comments field to provide additional information can also added)
    - The strategy(ies) to fill the identified gaps.
    - The level of implementation of the strategy(ies)
    - The activities associated to each strategy with the mention of the following for each of them:
        - Anticipated deliverable(s)
        - Person/entity to lead the activity (lead)
        - Entity, individuals to be involved in the activity (target group)
        - Timeline (start and end date)
        - Budget
        - M&E Indicator

The action plan can also contain additional columns to monitor the current implementation status as well as notes specific to each activity.

To facilitate the process, a non-exhaustive list of activities to be considered for implementation across the 9 elements of the HIS geo-enabling framework is maintained by the Health GeoLab and accessible from the following Google spreadsheet: https://bit.ly/3taPQ7d

At the end of this third step, the Ministry of Health should have a clear action plan containing all the information it needs for a successful implementation.

Experience shows that it is important to take the following into account when developing the action plan and this to ensure not only a successful implementation but also long-term sustainability:

- Be as inclusive as possible from the start of the process by engaging in the process not only the key health programs identified during the assessment but also development partners who might currently be supporting projects with a geo-enabling component or interested in doing so.
- Have at least one focal point officially nominated for each MOH entity and the partners involved in the implementation of the action plan.
- Make sure that the action plan in general and the use cases (applications) in particular address public health priorities included in the National Health Plan.
- Build on already existing action plan(s), taking the results of the HIS geo-enabling assessment into account.
- Leverage local MOH champions who have understood the value of the geo-enablement and have a clear view on their needs for geospatial data and technologies.
- Use local capacities (national consultant, universities, private companies, etc.) as much as possible, not only because this reduces costs but also allows a closer follow-up on the implementation as well as helps in addressing potential language issues.
- Prefer long term coaching to one-off training sessions.
- Start by strengthening the central level before the subnational level for the central level to then serve as trainers and point of contact for the sub-national level.
- Use the implementation of the use cases (applications) as the driver to strengthen the technical capacity of the MOH.
- Get the MOH staff to do as much of the work as possible with the support of the national and international consultants. This will contribute to the strengthening of their technical capacity and to experience firsthand potential data and process related issues.

- Even if the resources are available for a full-scale implementation, it might be better to implement the action plan in phases and to only go for a full-scale implementation only once sufficient capacity has been established at the central level. The implementation of a pilot project also presents the advantage of giving a clearer picture of the activities, resources, time, etc. needed to expand the implementation to the whole country.
- Do not implement an action plan spanning further than 12 months (8 to 9 for a pilot project) to have the opportunity to regularly assess and adjust the plan if needed.
- Anticipate unexpected delays in the implementation of the activities and try to come up with a timeline that would be flexible enough to absorb these delays as much as possible.
- Anticipate the need to sustain the technical capacity and other common assets established during the implementation of the action plan.

While the final action plan can be prepared in the form of a narrative report, presenting it in a tabular form might make it easier to digest. The fictive action plan reported in Annex 6 has been developed using the latter format and taking the above bullet points into account. A blank template for the development of such a plan can be downloaded from here: https://bit.ly/3vHhOIA.

The context considered at the origin of the action plan presented in Annex 6 is a country that would find itself at the earliest stage of its HIS geo-enabling journey, meaning that important gaps have been identified during the assessment and the need to demonstrate the benefits of the geo-enablement remains. As such, the action plan focuses on three (3) main objectives (technical capacity strengthening, demonstration of the benefits, and making the case for its extension) and six (6) of the nine (9) elements of the HIS geo-enabling framework. Please nevertheless note that developing such an action plan allows addressing the elements part of stage 1 of this framework (Figure 1).

The budget for the implementation of the action plan should not only cover the cost of the activities included for each element of the HIS geo-enabling framework but also items such as (other recommendations relating to costing can be found in [1] and [7]):

- Salary for the national and/or international consultant(s) as well as field data collectors when it applies.
- Travel for the international, and in some cases, national consultant(s).
- Allowance for the MOH staff attending the meeting, workshops and training if not located in the same city as well as for field data collectors when it applies.
- A good internet bandwidth at the MOH.
- Online common drive (Dropbox for example) for the sharing of data among the members of the technical working group.

4.4 Step 4 - Implement the action plan

- Objective: Complete the activities defined in the action plan
- Expected deliverable: Those listed in the action plan.
- Estimated duration of implementation: 9-12 months.
- Volume of resources needed: Limited to significant, depending on the activities included in the action plan.
- Person to be involved: All the parties involved in the implementation of the action plan.
- Supporting tool: None for this step.

The activities included in the action plan are being implemented in this step of the process if the necessary resources are available. If this is not the case, this step will first have to leverage the resources in question.

Once this is the case, the same implementation guidelines that would be followed for other projects apply here are well. The following should nevertheless be emphasized as important issues to be addressed before the implementation of the HIS geo-enabling action plan:

- Make sure that all parties involved have a clear understanding of the action plan in general and of each of the activities it contains in particular.
- Get a focal point to be officially nominated for each of the parties involved in the action plan implementation.
- Develop and give access to a shared contact database for the focal and other key person from the ministry to facilitate communication.
- Clearly define the roles and responsibilities of each involved party (focal points, consultants, development partners, etc.). Develop terms of reference when necessary and ensure that someone oversees the specific activities to take place during the action plan implementation (see next set of bullet points).
- Define the mode of communication between parties taking potential language issues into account. This is particularly important when parties are in different locations during the implementation (international consultant for example).
- Establish an online common working space (using Dropbox for example) to facilitate the sharing of files among the MOH staff and the consultants.

Then during implementation, it is important to:

- Keep track of the action plan implementation: This is to ensure that the implementation remains on track based on the establish timeline and that the activities do not go outside the approved scope of the action plan.
- Manage the financial resources: Independently from specific actions required by the development agencies funding the implementation of the action plan, it is crucial for someone to keep track of the overall flow of financial resources.
- Manage potential risks: Internal or external events may occur during the implementation of the action plan and could threaten its success. It is therefore important to be able to identify risks as early as possible. Once identified, the risks need to be qualified according to their probability of occurrence and their impact on action plan objectives and action being taken to mitigate them.
- Ensure proper flow of communication among the involved parties. Regular on-site visits and teleconferences in between these visits are important to keep all parties informed and address the previous items listed here.

4.5 Step 5 – Assess, document and sustain the result of the action plan implementation

- Objective: Evaluate, document, showcase and sustain the result of the action plan implementation.
- Expected deliverable: After action review, implementation report, marketing material and sustainability plan.
- Estimated duration of implementation: 1 month.
- Volume of resources needed: Moderate.
- Person to be involved: All the parties involved in the implementation of the action plan.
- Supporting tool:
    a. After Action Review guides (URLs in the HIS geo-enabling toolkit)
    b. Section 6.8.4 of the geo-enabled microplanning handbook
    c. Example of story maps (URLs in the HIS geo-enabling toolkit)

Conducting an after-action review is an activity that should take place after the implementation of the action plan. An after-action review (AAR) is a knowledge management tool that is being applied during or after the implementation of a project to assess what happened and learn from this. During this kind of exercise, all the parties involved in the implementation meet to answer a set of questions that allows discussing successes and failures in an open way. Here is a non-exhaustive selection of short documents describing what an ARR is and how to conduct one:

- https://www.adb.org/sites/default/files/publication/27570/conducting-after-action-reviews.pdf
- https://www.unicef.org/knowledge-exchange/files/After_Action_Review_production.pdf
- https://www.cebma.org/wp-content/uploads/Guide-to-the-after_action_review.pdf

Documenting processes and lessons learned during the geo-enablement as well as its impact is a crucial step towards either scaling it up (pilot implementation) and/or institutionalizing it.

It is recommended to develop the following set of documents:

1. Overall process that led to the development of the geo-enabling workplan, starting from identification of the priorities and challenges to be addressed through the geo-enablement. This kind of report is important for those who invested in the geo-enablement.
2. Details of technical processes followed including challenges and lessons learned when addressing data availability and quality issues; identification of the geographic dimension of the program or intervention and definition of the conceptual data model; and generating the products resulting from the operationalization of the applications of geospatial data and technologies. If data specifications and/or standards have been defined as part of the geo-enablement, these should be documented at the same time.
3. Processes, feedback, challenges, and lessons learned during the integration and use of the products by the program or intervention.

These reports will also be useful from a reporting and auditing perspective and serve as reference material to be used by other countries.

It is also important to document the work that has been accomplished under the form of marketing material to:

- Demonstrate the benefit of the geo-enablement, especially in the context where the organization was not convinced in the first place.
- Leverage resources to either ensure the sustainability of what has been established, support the extension of the pilot project to the whole country, or finance the next round of HIS geo-enabling activities.

While each donor or development agency will have its own requirement in terms of reporting, it can be useful to complement such type of document with visually appealing presentations. Among existing options, story maps happened to have a high impact during the implementation of the HIS geo-enabling process in Myanmar, Cambodia, Viet Nam and Mongolia due to the possibility it offers to not only present dynamic maps but also being accessible from any device through the internet. Here are the links to the story maps in question:

- Myanmar: https://arcg.is/OCHOz
- Cambodia: https://arcg.is/0uviGj
- Viet Nam: https://arcg.is/1XmLjy
- Mongolia: https://arcg.is/1O0u4r

Finally, it is during this step that you want to sustain what has been established during the implementation of the action plan, including:

1. Storing, maintaining, improving, and updating the data and products generated during the geo-enablement
2. Scaling up the geo-enablement process if the implementation has only been at the pilot project level until now
3. Ensuring the long-term sustainability of what has been established during the geo-enablement, , especially the governance structure and the technical capacity as these will help sustain the other components of the HIS geo-enabling framework
4. Planning for the next iteration of the HIS, program, or intervention geo-enabling process

4.6 Step 6 - Restart from step 1 or A on a regular basis

- Objective: Ensure for the process to be implemented on a regular basis until the HIS has been geo-enabled and/or the program/intervention geo-enabled.
- Expected deliverable: Start of a new cycle of the HIS geo-enabling process.
- Estimated duration of implementation: 1 day.
- Volume of resources needed: Limited.
- Person to be involved: Head of the geospatial data management and technology unit if any, representatives from key health programs (health information system, communicable diseases, planning, emergency management, and immunization), development partners.
- Supporting tool: None for this step.

This step consists of repeatedly conducting the activities from step 1 to step 5 until the Health Information System is geo-enabled in a sustainable manner or from step A to 5 when it comes to a program or intervention.

Several rounds of the process might have to be conducted before reaching the point where the Health Information System and/or programs/interventions is/are geo-enabled in a sustainable manner.

In addition to that, several elements are meant to change over time, including public health priorities, geospatial technologies, or even the strategy that the government follows regarding information management.

In view of the above, it is important to regularly update the previous version of the assessment to have an updated picture of the geo-enablement level of the HIS, identify remaining gaps and aim at filling them.

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[9] WHO (2018): Master Facility List Resource Package: guidance for countries wanting to strengthen their Master Facility List. Disponible depuis : https://www.who.int/publications/i/item/-9789241513302 [Accessed 22.10.2023]

Annex 1 - HIS geo-enabling elements objectives and benchmarks

Element of the framework	Objective	Benchmarks
1. Vision, strategy, and action plan	A vision, a strategy and an action plan have been defined and are implemented to support the geo-enablement of the HIS	1.1 The MOH has a documented vision, strategy, and plans regarding the management and use of geospatial data and technologies. 1.2 Each key program has a documented vision, strategy and action plan regarding the management and use of geospatial data and technologies
2. Governance structure	A governance structure supporting the vision, strategy and action plan has been established and is operational	2.1. The MOH has established a governance structure to handle issues pertaining to the management and use of geospatial data and technologies. 2.2. All the health program and the stakeholders involved in the management and use of geospatial data and technologies in health are part of the governance structure. 2.3 The MOH is on board of the National Spatial Data Infrastructure (NSDI).
3. Technical capacity	The central unit of the Ministry of Health as well as the main health programs have sufficient technical capacity to manage and use geospatial data and technologies	3.1. The MOH has a central level geospatial data and technologies management unit (GDTMU) with enough technical capacity to: a) ensure guardianship over the defined guidelines, standards and protocols; b) support the development, maintenance, regular update and sharing of the master lists for the geographic objects core to public health; c) support the implementation of the guidelines, standards, protocols, and master lists across all health programs and information systems; and d) providing services to the HIS unit and beyond if needed. 3.2 The key health programs have enough technical capacity to support the implementation of their activities with the support of the central level unit
4. Specifications, standards and protocols	All programs use the same data specifications, standards and protocols to ensure geospatial data quality	4.1. The NSDI has defined the geospatial data and technologies related specifications, standards and protocols that should be used by all governmental agencies. 4.2. The MOH is using the geospatial data and technologies related specifications, standards and protocols across all key health programs.

Element of the framework	Objective	Benchmarks
5. Master lists, hierarchies and associated geospatial data in a common geo-registry	The Ministry of Health has quality master lists, hierarchies and associated geospatial data for the geographic objects key to public health	5.1. The MOH has a complete, up-to-date, uniquely coded, and geo-referenced (for point type objects) master list for each geographic object key to public health (health facilities, administrative divisions and villages, reporting divisions. 5.2. The government maintains, regularly updates, and shares geospatial data containing the boundaries of the administrative and health reporting divisions. 5.3 These master lists and associated hierarchies and geospatial data are simultaneously hosted, maintained, regularly updated, and shared using a Common Geo-Registry (CGR) or individual registries fulfilling the function of a CGR. 5.4. All the master lists, and especially their officially recognized codes, are being integrated in all the information systems and used for data collection, reporting, and monitoring across all health programs.
6. Appropriate geospatial technologies	The central unit of the Ministry of Health as well as the main health programs have access to the necessary and appropriate geospatial technologies	6.1. The central level geospatial data management and technologies unit has access to the necessary and appropriate geospatial technologies (GNSS, GIS) to support its mandate. 6.2 The key health programs have access to the necessary and appropriate geospatial technologies (GNSS, GIS) to support the implementation of their activities
7. Use cases	The benefits of managing and using geospatial data and technologies are recognized by all programs and use cases demonstrating this are documented	7.1. Geospatial data and technologies are recognized as important and their full potential is being used to support the implementation of key health programs towards reaching SDG 3. 7.2 Use cases supporting decision making and/or planning are documented and available.
8. Policies	The necessary policies to support the geo-enablement of the Health Information System have been defined and are being applied	8.1. A policy/Policies enforcing the following has/have been released: a) The mandate over the guardianship on geospatial data specifications, standards, and protocols as well as over the development, maintenance, update, and sharing of master lists for the geographic objects core to public health using a common geo-registry. b) The use of the developed specifications, standards, protocols, and master lists by all the stakeholders in the health sector.
9. Resource for sustainability	The financial resources necessary to ensure the sustainability of geo-enablement exist in the long term	9.1. The central level geospatial data management and technologies unit has the necessary financial resources to ensure the long-term sustainability of its activities linked to the geo-enablement of the HIS. 9.2 The key health programs have the necessary financial resources to ensure the long-term sustainability of their activities

Annex 2 - HIS geo-enablement level quick assessment questionnaire

Introduction

The aim of this questionnaire is to obtain a picture of the situation in your department/unit regarding its geo-enablement level.

This information will be used as baseline for the development of the action plan.

Please take the time to browse the glossary before completing the questionnaire: https://tinyurl.com/tavfcdjx

Respondent contact information

Full Name of the respondent: _____

Function/position of the respondent: _____

Full name of the institution: _____

Full name of the department/unit: _____

Address: _____

City/Town: _____

State/Province: _____

Country: _____

Email address: _____

Phone number: _____

Priorities and challenges

This section aims at capturing the current priorities and challenges of your department/unit/programme

Question 1: What are the 3 main priorities, objectives, targets or goals that drive the current agenda of your programme/unit (example: eliminating malaria by 2030)?

Priority 1: _____

Priority 2: _____

Priority 3: _____

Question 2: What are the current main challenges encountered by your programme/unit when it comes to supporting its operations? Please select all that applies

- ☐ Lack of population denominator
- ☐ Delayed reporting of events
- ☐ Lack of quality/reliable data
- ☐ Lack of access to information or data
- ☐ Insufficient utilization of data and information
- ☐ Lack of unique identifier
- ☐ Insufficient supply of commodity
- ☐ Insufficient supply of services
- ☐ Insufficient supply of equipment
- ☐ Insufficient supply of qualified health workers
- ☐ Inadequate supportive supervision
- ☐ Low demand for services
- ☐ Geographic inaccessibility
- ☐ Lack of or inappropriate referrals
- ☐ Poor planning and coordination
- ☐ Lack of effective resource allocation
- ☐ Delayed provision of care
- ☐ Inadequate access to transportation
- ☐ Absence of community feedback mechanisms
- ☐ Poor accountability between the levels of the health sector
- ☐ Inadequate understanding of beneficiary population
- ☐ Other (please specify):

Current level of geo-enablement of your programme/unit

This section aims at capturing the current geo-enablement level in your programme/unit and this across specific elements of the HIS geo-enabling framework

Question 3 - Vision, strategy, plan: What is the current situation in your programme/unit when it comes to vision, strategy and plan for the management and use of geospatial data and technologies? Choose the option that applies

- ☐ The programme/unit has not developed/documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies
- ☐ The programme/unit is in the process of developing/documenting its vision, strategy and action plan concerning the management and use of geospatial data and technologies
- ☐ The programme/unit has developed and documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies but they have not been approved yet
- ☐ The programme/unit has developed and documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies, they have been approved but they have not yet been implemented
- ☐ The programme/unit has developed and documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies and they are implemented
- ☐ I don't know

Question 4 - Use cases: What is the current situation in your programme/unit when it comes to the implementation and documentation of use cases related to the management and use of geospatial data and technologies (e.g. accessibility to health care analysis, geo-enabled microplan,...)? Choose the option that applies

- ☐ The programme/unit does not recognize the importance of geospatial data and technologies
- ☐ The programme/unit recognizes the importance of geospatial data and technologies but is not using them
- ☐ The programme/unit recognizes the importance of geospatial data and technologies and use them but do not have documented use cases
- ☐ The programme/unit recognizes the importance of geospatial data and technologies, utilize them, and have documented use cases
- ☐ I don't know

Question 5 - Technical capacity: What is the current situation when it comes to the technical capacity needed for your programme/unit to manage and use geospatial data and technologies? Choose the option that applies

- ☐ The programme/unit does not have technical capacity for the management and use of geospatial data and technologies
- ☐ The programme/unit has technical capacity but it is not sufficient to implement its activities
- ☐ The programme/unit is currently strengthening its technical capacity to be able to implement its activities
- ☐ The programme/unit has such technical capacity and it is sufficient to implement its activities
- ☐ I don't know

Question 6 - Geospatial technologies: What is the current situation in your programme/unit when it comes to the geospatial technologies (e.g.: GNSS enabled devices, GIS software,...) needed by your programme/unit to support its activities? Choose the option that applies

- ☐ The programme/unit does not have the geospatial technologies necessary to support the implementation of its activities
- ☐ The programme/unit has some geospatial technologies but they are not sufficient to implement its activities
- ☐ The programme/unit is in the process of acquiring the geospatial technologies needed to implement its activities
- ☐ The programme/unit has the geospatial technologies necessary to implement its activities
- ☐ I don't know

Question 7 - Financial resources: What is the current situation in your programme/unit when it comes to financial resources to support the management and use of geospatial data and technologies? Choose the option that applies

- [ ] The programme/unit has no financial resources to support the management of the use of geospatial data and technologies and no requests for funds have been made
- [ ] The programme/unit has no financial resources to support the management of the use of geospatial data and technologies but a request for funds has been made (internal and/or external)
- [ ] The programme/unit has some financial resources but these are not sufficient to ensure the long-term sustainability of its activities related to the management and use of geospatial data and technologies and
- [ ] A request for internal or external funds has been made to ensure the long-term sustainability of activities related to the management and use of geospatial data and technologies but has not yet been approved
- [ ] An internal or external funding request has been made to ensure the long-term sustainability of activities related to the management and use of geospatial data and technologies, it has been approved and it covers all the needs of the program/unit
- [ ] The management and use of geospatial data and technologies is part of the regular programme/unit budget
- [ ] I don't know

Other important elements of the HIS geo-enabling framework

This section aims at capturing the current situation regarding other important cross-programmes elements of the HIS geo-enabling framework

Question 8 - Vision, strategy, plan: What is the current situation in the MOH when it comes to vision, strategy and plan for the management and use of geospatial data and technologies? Choose the option that applies

- [ ] The MOH has not developed/documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies
- [ ] The MOH is in the process of developing/documenting its vision, strategy and action plan concerning the management and use of geospatial data and technologies
- [ ] The MOH has developed and documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies but they have not been approved yet
- [ ] The MOH has developed and documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies, they have been approved but they have not yet been
- [ ] The MOH has developed and documented its vision, strategy and action plan regarding the management and use of geospatial data and technologies and they are implemented
- [ ] I don't know

Question 9 - Governance: What is the current situation in the MOH when it comes to the establishment of a governance structure to manage matters relating to the management and use of geospatial data and technologies? Choose the option that applies

- ☐ No governance structure has been established
- ☐ A governance structure is in the process of being established
- ☐ A governance structure exists but is not operational at this time
- ☐ A governance structure exists and is operational but not all health stakeholders are involved
- ☐ A governance structure exists, is operational and all health stakeholders are involved
- ☐ The governance structure is fully operational and participates in the National Spatial Data Infrastructure
- ☐ I don't know

Question 10 - Master lists and associated spatial data: What is the current situation when it comes to the availability, quality and accessibility of the master lists of health facilities, settlements (e.g. villages) and administrative units (e.g. Districts)? Choose the option that applies for each of them (one per column)

	health facilities	Settlements	Administrative units
No list exists	☐	☐	☐
Different programs/units within the MOH maintain their own separated list (no master list)	☐	☐	☐
The elements characterizing the master list (definition, data dictionary, classification tables, coding system, etc.) have been defined	☐	☐	☐
The existing lists were merged to form the first version of the master list based on the characterizing elements	☐	☐	☐
The first version of the master list has been created, and the associated geospatial data compiled, but gaps need to be filled to improve their quality	☐	☐	☐
Existing gaps in the master list, and associated geospatial data, have been filled but there is no updating mechanism in place	☐	☐	☐
A mechanism for updating the master list, and associated geospatial data, has been defined, documented and operationalized	☐	☐	☐
I don't know	☐	☐	☐

Question 11 - Common Geo-registry (CGR): What is the current situation in the country when it comes to availability and use of a Common Geo-Registry (CGR) to manage master lists and associated spatial data? Choose the option that applies

- ☐ The Ministry of Health does not have access to a CGR or a set of individual registries fulfilling the functions of an CGR
- ☐ Use cases, business requirements and functional requirements for the CGR or individual registries have been defined, documented and approved but not yet used to identify appropriate IT solution(s)
- ☐ Possible IT solution(s) matching the business and functional requirements have been identified but no decision has yet been taken regarding which one to deploy/develop
- ☐ The most appropriate IT solution(s) has/have been selected but has not yet been deployed/developed
- ☐ The IT solution(s) selected to serve as CGR or individual registries has/have been deployed/developed but modifications must be made to meet business and functional requirements
- ☐ The Ministry of Health has access to a CGR or a set of individual registries complying with all the business and functional requirement but it/they is/are not yet operational
- ☐ The CGR or individual registries is/are operational (existing data uploaded, manager and users trained, operational support established, updating mechanism and synchronisation with key information systems operationalised)
- ☐ I don't know

Question 12 - Specifications, standards, Standard Operating Procedures (SOP): What is the current situation when it comes to the development and implementation of specifications, standards and SOP to ensure data quality? Choose the option that applies

- ☐ No data specifications, standards and protocols have been defined
- ☐ Specifications, standards and protocols are in the process of being defined by certain programs or the entity in charge of the HIS
- ☐ Certain programs have defined specifications, standards and protocols but they have not yet been documented and/or approved by all programs
- ☐ Specifications, standards and protocols have been defined, documented and approved by all programs but they have not yet been implemented
- ☐ Specifications, standards and protocols have been defined, documented, approved and are implemented by all programs
- ☐ The specifications, standards and protocols defined by the Ministry of Health are aligned with those of the National Spatial Data Infrastructure (NSDI)
- ☐ I don't know

Question 13 - Policies: What is the current situation when it comes to the development and implementation of policies to support the geo-enablement of the Health Information System (e.g. mandate on the maintenance of data specifications, standards and protocols for geospatial data as well as the development, maintenance, updating, sharing and use of masters lists; use by all stakeholders in the health sector of the developed specifications, standards, protocols and master lists)? Choose the option that applies

- ☐ No policy exists
- ☐ The policy(ies) required to support the geo-enablement of the HIS is/are under development
- ☐ The policy(ies) required to support the geo-enablement of the HIS have been developed but are not yet approved.
- ☐ The policy(ies) required to support the geo-enablement of the HIS have been developed and approved but are not yet implemented.
- ☐ The policy(ies) necessary to support the geo-enablement of the HIS is/are applied
- ☐ I don't know

Annex 3 - Additional information and documents to be collected in complement to the HIS geo-enablement level quick assessment questionnaire

Framework element	Information and documents to be collected
1. Vision, strategy(ies), and action plan	• A copy of the existing MOH vision, strategy(ies), and/or action plan pertaining HIS geo-enabling and/or the management and use of geospatial data and technologies • A copy of the current national health plan/strategy with a clear definition of the current public priorities • A copy of the current key health programs specific plan/strategy
2. Governance structure	• Document describing the structure, role, members, and mode of operation of the established governance structure • Existence of a National Spatial Data Infrastructure (NSDI) in the country and information about it (governmental entity in charge, members, objectives, activities, etc.)
3. Technical capacity	• Information about the central level Geospatial Data and Technologies Unit (location in the MOH organogram, composition, etc.) • Information about the latest training received by MOH staffs (date, venue, content, name of the institution who conducted the training, etc.)
4. Data specifications, standards and protocols	• A copy of the existing document(s) containing the specifications, standards, and protocols used by the MOH
5. Master list and common geo-registry	• Structure of different coding schemes used in the MOH and in the master lists • Description of the updating mechanism for each master list • Availability of a shapefiles for the administrative divisions and this across time • Availability of a shapefiles for the reporting divisions and this across time • Information about the platform used as common geo-registry for the simultaneous storage, management, validation, updating, and sharing of the different master lists if any (software used, entity in charge, etc.)
6. Geospatial technologies	• Date of purchase of the GNSS enabled device. Are they functional?
7. Use cases (applications)	• The already documented use case (pager, report, etc.) • Description of ongoing projects containing a geospatial data and technologies component
8. Policy	• A copy of the existing policy(ies)
9. Resource for sustainability	• A copy of existing workplan, proposal submitted to donor, budget, etc. • List of development partners interested in or already contributing to strengthening the management and use of geospatial data and technologies in the country

Annex 4 – Example of documents to be identified for the first seven (7) elements of the HIS geo-enabling framework

Framework element	Information and documents to be collected
1. Vision, strategy(ies), and action plan	• Myanmar National Health Plan 2017-2021[5] • Cambodia Health Information System master plan 2016-2020[6]
2. Governance structure	• Example of TOR for the establishment of a TWG on the management and use of geospatial data and technologies in the health sector[7]
3. Technical capacity	• Generic TOR for the position of geospatial data manager/GIS technician (Annex J in [1])
4. Data specifications, standards, and protocols	• Geospatial data management guideline for the Ministry of Health of Cambodia[8] • Health GeoLab guidance documents[9]
5. Master list and common geo-registry	• Guidance on the establishment of a common geo-registry for the simultaneous hosting, maintenance, update, and sharing of master lists core to public health [8] • Master Facility List Resource Package: guidance for countries wanting to strengthen their MFL [9]
6. Geospatial technologies	• Health GeoLab starter kit for ArcMap, ArcGIS Online, and Survey123[7]
7. Use cases (applications)	• Health GeoLab knowledge repository[10]

[5] https://healthgeolab.net/KNOW_REP/Myanmar_National_Health_Plan_fourpager_eng_15Dec.pdf
[6] https://www.healthgeolab.net/KNOW_REP/myanmar_national_health_plan_2017-2021_eng_.pdf
[7] https://www.healthgeolab.net/DOCUMENTS/Example_TWG_TOR.pdf
[8] http://www.healthgeolab.net/KNOW_REP/KHM_MOH_Guidelines_2018.pdf
[9] https://healthgeolab.net/resources/reference-materials/
[10] https://healthgeolab.net/resources/knowledge-repository/

Annex 5 - Non exhaustive list of strategies, stakeholders to be involved, and recommended level of implementation to fill the gaps

Framework element	Potential gap	Proposed strategies to fill the gap	Stakeholders to be involved	Recommended level of implementation	
				National	Pilot
1. Vision, strategy(ies) and action plan	The MOH has not yet defined/finalized its vision, strategy(ies) and/or action plan regarding the management and use of geospatial data and technologies in health	Define MOH's vision, strategy and action plan for geospatial data and technologies in concordance with the NSDI if in place	MOH (GDTMU, KHPs), development partners	X	
	The MOH has defined its vision, strategy and action plan but they have not yet been captured in official documents	Document MOH's vision, strategy and action plan for geospatial data and technologies	MOH (GDTMU, KHPs)	X	
	The MOH vision, strategy and action plan have been documented but they are not yet implemented	Promote, support and monitor the implementation of MOH's vision, strategy and action plan for geospatial data and technologies	MOH (GDTMU, KHPs), development partners	X	
2. Governance structure	The MOH has not yet established a governance structure to handle issues pertaining to the management of geospatial data and technologies	Establish such governance structure at the MOH level	MOH (GDTMU, KHPs)	X	
	The MOH has established a governance structure but not all the key health programs and development partners are on board	Advocate for all the key health programs to be on board of the established governance structure	MOH (GDTMU, KHPs), development partners	X	
	The country does not yet have a NSDI	Use public health as an example that could support the establishment of a NSDI in the country	MOH (GDTMU, KHPs), National Mapping Agency, National Statistical Agency, development partners	X	X
	A NSDI is in place but the MOH is not yet involved	Advocate for the MOH to be on board of the NSDI	MOH (GDTMU), governmental entity in charge of the NSDI	X	X
3. Technical capacity	There is no central level Geospatial Data and Technologies Management Unit (GDTMU) within the MOH	Support the development of such entity within the MOH with the objective to also support key programs	MOH (GDTMU), governmental entity in charge of the NSDI, development partners	X	X
	The technical capacity of the central unit is not sufficient to support its mandate				
	Key programs do not have sufficient technical capacity to support the implementation of their activities	Engage local (universities for example), regional or global partners in the strengthening of the MOH technical capacity (training)	MOH (GDTMU, KHPs), development partners, private sector and academe	X	X
	Technical capacity exists in both the central unit and key health programs but they are disconnected	Promote for the different entities to collaborate in order to avoid duplication of efforts and ensure for the same geography to be used across programs	MOH (GDTMU, KHPs)	X	X

Framework element	Potential gap	Proposed strategies to fill the gap	Stakeholders to be involved	Recommended level of implementation	
				National	Pilot
4. Data specifications, standards and protocols	Data specifications, standards and protocols have been defined as part of the NSDI but they are not implemented within the health sector	Support the transfer of the defined data specifications, standards and protocols from the NSDI to the health sector	MOH (GDTMU), Governmental entity in charge of the NSDI	X	
	The MOH's data specifications, standards and/or protocols are not aligned with those defined by the NSDI	Collaborate with the governmental entity in charge of the NSDI to reach an alignment and support the implementation of the changes among MOH key programs	MOH (GDTMU), Governmental entity in charge of the NSDI	X	
	There is no NSDI in place and the MOH has not yet defined any data specifications, standards nor protocols	Define and document the data specifications, standards and protocols pertaining to the management and use of geospatial data and technologies	MOH (GDTMU, KHPs), development partners, academic sector	X	X
	Data specifications, standards and protocols have been defined by the MOH but are not yet captured in an official guideline	Review the specifications, standards and protocols and document them under the form of a guideline	MOH (GDTMU, KHPs), development partners	X	X
	Data specifications, standards and protocols have been defined at the MOH level (HIS) but these are not yet being used by key health programs	Support the use of data specifications, standards and protocols defined at the MOH level across key health programs	MOH (GDTMU, KHPs), development partners	X	X
5. Master lists and common geo-registry	No list exist	Promote and implement the concept of master list within the MOH	MOH (GDTMU, KHPs), development partners	X	X
	Different programs/units within the MOH maintain their own separated list (no master list)				
	The elements characterizing the master list (definition, data dictionary, classification tables, coding system, etc.) have been defined but not applied to the master list	Apply the elements that have been defined to the corresponding master list	MOH (GDTMU, KHPs), development partners	X	X
	The first version of the master list has been created, and the associated geospatial data compiled, but gaps need to be filled to improve their quality	Define an implement a data collection/extraction exercise to address the gaps that have been identified	MOH (GDTMU, KHPs), governmental entity having the curation mandate over the list and/or associated geospatial data, development partners	X	X
	Existing gaps in the master list, and associated geospatial data, have been filled but there is no updating mechanism in place	Define, document and test the updating mechanism	MOH (GDTMU, KHPs), governmental entity having the curation mandate over the list and/or associated geospatial data, development partners	X	X
	The Ministry of Health does not have access to a CGR or a set of individual registries fulfilling the functions of an CGR	Promote and implement the concept of Common Geo-Registry within the MOH	MOH (GDTMU, KHPs), development partners	X	X

Framework element	Potential gap	Proposed strategies to fill the gap	Stakeholders to be involved	Recommended level of implementation	
				National	Pilot
5. Master lists and common geo-registry (continued)	Use cases, business requirements and functional requirements for the CGR or individual registries have been defined, documented and approved but not yet used to identify appropriate IT solution(s)	Finalize the process aiming at identifying the appropriate IT solution(s) to be deployed or developed as CGR	MOH (GDTMU), MOH programs and other governmental entities having the curation mandates over the CGR content, entity to manage the CGR once deployed/developed	X	
	Possible IT solution(s) matching the business and functional requirements have been identified but no decision has yet been taken regarding which one to deploy/develop				
	The most appropriate IT solution(s) has/have been selected but has not yet been deployed/developed	Deploy/develop, test and if necessary adjust the appropriate IT solution(s) to serve as CGR	MOH (GDTMU), MOH programs and other governmental entities having the curation mandates over the CGR, entity to manage the CGR once deployed/developed, IT solution(s) vendor(s), development partners	X	X
	The IT solution(s) selected to serve as CGR or individual registries has/have been deployed/developed but modifications must be made to meet business and functional requirements				
	The Ministry of Health has access to a CGR or a set of individual registries complying with all the business and functional requirement but it/they is/are not yet operational	Operationalize the fully compliant deployed/developed IT solution(s)	MOH (GDTMU), MOH programs and other governmental entities having the curation mandates over the CGR, entity to manage the CGR once deployed/developed, development partners	X	X
6. Availability of geospatial technologies	The MOH central Geospatial Data and Technologies Management Unit (GDTMU) does not have access to the necessary geospatial technologies to support its mandate	Equip the central level unit with the appropriate geospatial technologies taking advantage of existing public-private partnership when applicable	MOH (GDTMU), development partners, private sector, open community and academe	X	X
	The key programs do not have access to the necessary geospatial technology to support their activities	Equip the key programs with the appropriate geospatial technologies taking advantage of existing public-private partnership when applicable	MOH (GDTMU, KHPs), development partners, private sector, open community and academe	X	X
7. Use cases	The MOH does not recognize the importance of geospatial data and technologies	Promote and demonstrate the benefits of using geospatial data and technologies in the health sector (consultative meetings/capacity building workshops, national stakeholder summits etc.)	Development partners, private sector, academe		X
		Implement a use case based pilot project to demonstrate the benefits of geo-enabling the HIS	MOH (GDTMU, KHPs), development partners, private sector, open community and academe		X
	The importance of geospatial data and technologies is recognized but their potential is not fully used across health programs (no or limited number of use cases)	Demonstrate the potential of geospatial data and technologies that is currently not being used by the key health programs through the implementation of use cases	Development partners, private sector, academe		X

Framework element	Potential gap	Proposed strategies to fill the gap	Stakeholders to be involved	Recommended level of implementation	
				National	Pilot
7. Use cases (continued)	Geospatial data and technologies have successfully been used by key health programs but these use cases have not yet been documented or shared	Support the documentation of the use cases (two-pagers documents for example)	MOH (GDTMU, KHPs), development partners, private sector, academe	X	X
8. Policy	The MOH does not have such policy/policies in place	Encourage the development and enforcement of such policy/policies	MOH (GDTMU, KHPs), development partners	X	X
		Promote sharing of experiences and lessons from countries with more developed geospatial data and technologies related policy framework	MOH (GDTMU), National Mapping Agency, Ministry of Interior/Home Affairs, National Statistical Agency, development partners, open data community, private sector, academe	X	X
9. Resource for sustainability	The MOH does not have the necessary resources to sustain its activities	Demonstrate the benefit of geo-enabling the HIS for the MOH to sustain resources on the long term	MOH (GDTMU, KHPs), development partners, private sector, academe	X	X
		Encourage the MOH to include resources for geospatial data and technologies in their regular budget	MOH (GDTMU, KHPs), development partners	X	
		Support resource mobilization based on a clear action plan with timeline and budget	MOH (GDTMU, KHPs), development partners	X	

Annex 6 - Fictive HIS geo-enabling action plan

Long term vision

By 20.., the necessary geospatial data, technologies and services are available, of quality and accessible in a coordinated way to support the implementation of the National Health Plan 20..-20..towards achieving Universal Health Coverage

Action plan objectives

1. Strengthen the technical capacity of the MOH at the central level when it comes to the management and use of geospatial data and technologies
2. Demonstrate the benefits of geo-enabling the HIS through a pilot project covering two uses cases
3. Make the case to extend the pilot project to the rest of the country and institutionalize the capacity that has been developed down to the sub-national level

Implementation period January 20.. - August 20.. **Project Manager** Anthony G.

Action plan last update: December 20...

Framework element 2: Governance structure
Current situation/gap: The MOH has not yet established a governance structure to handle issues pertaining to the management of geospatial data and technologies
Strategy(ies): Create a technical working group to support the implementation of the use case pilot project as the starting point to establish a sustained governance structure
Implementation level: National (Central level)

Act. #	Activity description	Target group	Responsible	Start Date	End Date	Budget (USD)	Deliverable	M&E Indicator	Status	Notes
2.1	Hold a half day meeting to present the results of the HIS geo-enabling assessment, discuss and finalize the plan of action and establish the technical working group for the use case pilot project	MOH Key health programs	International consultant	14 Jan 20..	14 Jan 20..	$500	Meeting executive summary	The meeting executive summary has been released by 20 Jan 20..	Not started	A translator will be needed during the meeting. The travel cost of the international consultant is not included in the budget. The executive summary might need to be translated.
2.2	Develop the terms of reference for the technical working group	MOH Key health programs members of the technical working group	National consultant	14 Jan 20..	25 Jan 20...	$0	TOR	The final TOR for the technical working group has been released by Jan 31 20...	Not started	The cost for developing the document is covered under the national consultant salary

Framework element 3: Technical capacity
Current situation/gap: The geospatial data management technical capacity of the MOH is very limited
Strategy(ies): a) Use the implementation of the use case pilot project as the context to strengthen the MOH technical capacity; b) Leverage the existence of a GIS capacity at the faculty of Medicine of the State University to transfer knowledge to the MOH
Implementation level: National (Central level)

Act. #	Activity description	Target group	Responsible	Start Date	End Date	Budget (USD)	Deliverable	M&E Indicator	Status	Notes
3.1	Identify the MOH staff to be trained on geospatial data management and technologies	MOH Key health programs members of the Technical working group	National consultant	15 Jan 20..	15 Feb 20..	$0	5 MOH staffs officially nominated	The MOH Staffs have been nominated by 15 Feb 20..	Not started	The MOH staffs to be nominated need to have a good level in computer skills and applied knowledge of data management
3.2	Hold the first onsite training (3 days) to introduce the concept behind HIS geo-enabling, the geospatial data management chain and the technical process that will be followed during the use case pilot project	Nominated MOH staffs from the Key health programs members of the Technical working group	International consultant	1 Mar 20..	3 Mar 20..	$3,000	Training material	The training has been conducted by 3 mar 20..	Not started	A translator will be needed during the training.
3.3	Hold the second on site training (3 days) to install the GIS licenses that have been purchased and teach the MOH staff on how to use them	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	25 May 20..	27 May 20..	$3,000	Training material	The training has been conducted by 27 May 20..	Not started	The national consultant will ensure the translation during the training
3.4	Hold the third onsite training (5 days) to practice the geospatial data management process on the data collected for the use case pilot project	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	10 Jul 20..	15 Jul 20..	$5,000	Training material	The training has been conducted by 15 Jul 20..	Not started	The national consultant will ensure the translation during the training
3.5	Hold the fourth and last onsite training (5 days) to conduct the different analysis for the use case pilot project and create the story map	Nominated staffs from the Key health programs members of the Technical working group	National consultant	20 Aug 20..	25 Aug 20..	$5,000	Training material	The training has been conducted by 25 Aug 20..	Not started	The national consultant will ensure the translation during the training

Framework element 4: Data specifications, standards and protocols

Current situation/gap: The MOH has not yet defined any data specifications, standards nor protocols

Strategy(ies): Use the Technical working group established for the pilot project as the venue to define these specifications, standards and protocols

Implementation level: National (Central level)

Act. #	Activity description	Target group	Responsible	Start Date	End Date	Budget (USD)	Deliverable	M&E Indicator	Status	Notes
4.1	Hold a one day workshop to develop the geospatial data specifications and identify the standards and protocols needed to support the geo-enablement of the HIS	MOH Key health programs members of the Technical working group	International consultant	15 Jan 20..	15 Jan 20..	$1,000	Workshop executive summary	The workshop executive summary has been released by 20 Jan 20..	Not started	A translator will be needed during the workshop. The travel cost of the international consultant is not included in the budget. The executive summary might need to be translated.
4.2	Develop a draft guideline that will contain the data specifications developed during the workshop as well as the proposed standards and protocols to be followed by the MOH	MOH Key health programs members of the Technical working group	International consultant	15 Jan 20..	15 Feb 20..	$0	Draft version of the guideline	The first version of the guideline has been released by 15 Feb 20..	Not started	The cost for developing the document is covered under the international consultant salary. The guideline might need to be translated.
4.3	Hold a half day meeting to present and finalize the first version of the guideline with the members of the technical working group	MOH Key health programs members of the Technical working group	National consultant	20 Feb 20..	20 Feb 20..	$500	Final version of the guideline	The final version of the guideline has been released by 25 Feb 20..	Not started	The national consultant will ensure the translation during the workshop

Framework element 5: Master lists and common geo-registry

Current situation/gap: The MOH have neither a master list for the geographic objects core to public health (health facilities, administrative divisions and villages) nor a common geo-registry to manage them

Strategy(ies): a) Develop the health facilities master list for the Regions covered by the use case pilot project; b) assess if the HMIS platform could serve as common geo-registry

Implementation level: Pilot (1 Region)

Act. #	Activity description	Target group	Responsible	Start Date	End Date	Budget (USD)	Deliverable	M&E Indicator	Status	Notes
5.1	Hold a one day workshop to develop the geospatial data specifications and identify the standards and protocols needed to support the geo-enablement of the HIS	MOH Key health programs members of the Technical working group	International consultant	14 Jan 20..	14 Jan 20..	$500	Workshop executive summary	The meeting executive summary has been released by 20 Jan 20..	Not started	A translator will be needed during the workshop. The travel cost of the international consultant is not included in the budget
5.2	Hold a half day workshop to define the data dictionary and associated classification tables for the health facilities master list	MOH Key health programs members of the Technical working group	National consultant	15 May 20..	15 May 20..	$500	Data dictionary and classification tables	Data dictionary and classification tables released by 20 Jun 20..	Not started	The national consultant will ensure the translation during the workshop
5.3	Collect all the available health facility database (MOH and partners) for the Region selected for the use case pilot	MOH Key health programs members of the Technical working group	National consultant	15 May 20..	15 Jun 20..	$0	Health facility databases	Database collected by 15 Jun 20..	Not started	
5.4	Combine the available health facilities databases according to the defined data dictionary and classification tables	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	15 Jun 20..	15 Jul 20..	$0	First version of the health facilities master list for the selected Region	Master list available by 15 Jul 20..	Not started	
5.5	Apply the assessment matrix to the HMIS platform to see if it could be used as common geo-registry	HMIS Unit	Head of the HMIS unit	1 Jun 20..	15 Jun 20..	$0	Resulting assessment matrix	Assessment matrix delivered by 20 Jun 20..	Not started	

Framework element 6: Availability of geospatial technologies

Current situation/gap: The MOH unit has some ArcView 3.2 licenses that needs to be upgraded and does not have any GNSS-enabled devices to allow for field data collection

Strategy(ies): Equip the central level unit with the appropriate geospatial technologies taking advantage of existing public-private partnership

Implementation level: National (Central level)

Act. #	Activity description	Target group	Responsible	Start Date	End Date	Budget (USD)	Deliverable	M&E Indicator	Status	Notes
6.1	Purchase an Esri bundle for each of the MOH nominated staff	Nominated MOH staffs from the Key health programs members of the Technical working group	International consultant	15 Jan 20..	20 May 20..	$3,750	Esri bundles	The equipment and tutorials have been delivered to the MOH by 20 May 20..	Not started	The purchase of the Esri bundles is sponsored by WHO
6.2	Purchase 30 GNSS-tablets to support field data collection	HMS unit	International consultant	15 Jan 20..	20 May 20..	$6,000	GNSS-enabled tablets		Not started	The purchase of the tablets is sponsored by ADB
6.3	Purchase a laptop for each of the MOH nominated staff	Nominated MOH staffs from the Key health programs members of the Technical working group	International consultant	15 Jan 20..	20 May 20..	$7,500	Laptop computers		Not started	The purchase of the laptops is sponsored by ADB
6.4	Get Esri to send copies of the GIS tutorial for Health	Nominated MOH staffs from the Key health programs members of the Technical working group	International consultant	15 Jan 20..	20 May 20..	$0	Esri GIS tutorial;		Not started	
6.5	Activate the ArcGIS desktop and online licenses	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	25 May 20..	27 May 20..	$0	Operational licenses	Licenses activated by 27 may 20..	Not started	

Framework element 7: Use cases

Current situation/gap: The importance of geospatial data and technologies is recognized but their potential is not fully used across health programs

Strategy(ies): Implement a use case based pilot project to demonstrate the benefits of geo-enabling the HIS in general and geospatial data and technologies in particular

Implementation level: Pilot

Act. #	Activity description	Target group	Responsible	Start Date	End Date	Budget (USD)	Deliverable	M&E Indicator	Status	Notes
7.1	Define the public health priorities/questions/outcomes that the pilot project will aim at answering through its implementation.	Key health programs members of the Technical working group	International consultant	14 Jan 20..	31 Jan 20..	$0	Defined use cases	Uses cases defined by 14 Jan 20..	Not started	Will be done during the half day meeting planed for 14 Jan 20..
7.2	Define the technical process that will be followed (from data collection to analysis and interpretation)	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	1 Feb 20..	3 Mar 20..	$0	Documented technical process	Technical process documented by 3 Mar 20..	Not started	
7.3	Compile the geospatial and statistical data necessary to implement the different use cases	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	15 May 20..	15 Jun 20..	$0	Compiled data	Data compiled by 15 Jun 20..	Not started	Compiling data might require to interact with other Ministries
7.4	Clean and organize the data that has been collected	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	15 Jun 20..	15 Jul 20..	$0	Cleaned dataset	Dataset ready by 15 Jul 20..	Not started	
7.5	Conduct the different GIS analyses	Nominated MOH staffs from the Key health programs members of the Technical working group	National consultant	20 Aug 20..	25 Aug 20..	$0	Maps presenting the results of the GIS analyses	Maps delivered by 25 Aug 20..	Not started	
7.6	Present the results to the MOH	Key health programs members of the Technical working group	National consultant	30 Aug 20..	30 Aug 20..	$0	Presentation	Presentation done by 30 Aug 20..	Not started	The presentation might have to be available in the local language