Ministry of Health and Sports of Myanmar
Department of Public Health (DoPH)

Guidelines for the Geo-enabling of the Health Information System (HIS)

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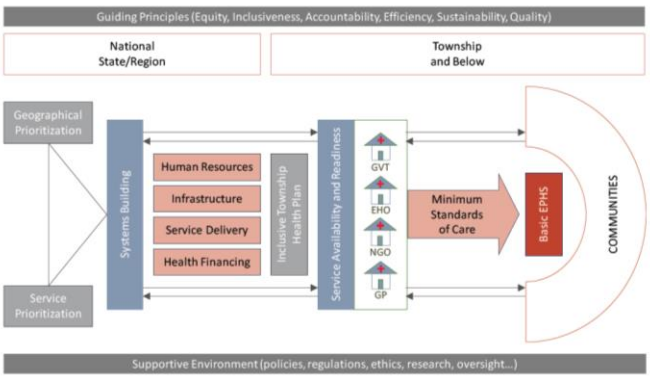

In collaboration and with the support of:

ADB AeHINGIS Lab

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Abbreviations

ADB	Asia Development Bank
AeHIN	Asia eHealth Information Network
DOPH	Department of Public Health
GIS	Geographic Information System
HIS	Health Information System
HMIS	Health Management Information System
MOHS	Ministry of Health and Sports
NHP	National Health Plan
NSDI	National Spatial Data Infrastructure
SDG	Sustainable Development Goal
UHC	Universal Health Coverage
WHO	World Health Organization

1. Introduction

The Department of Health of the Ministry of Health and Sports of Myanmar (MOHS) has embarked in a process aiming at geo-enabling its Health Information System (HIS) in order for the all Ministry to share the same geography and therefore benefit from the visualization and analytical power that geospatial technology offers.

The geo-enabling of the HIS will be reached once:

1. A clear vision, strategy and plan have been defined on the basis of an assessment;
2. A governance structure and a minimum technical capacity have been established;
3. Geospatial data specifications, standards and protocols have been defined and are being implemented to ensure the availability, quality (completeness, uniqueness, timeliness, validity, accuracy and consistency) of geospatial information across the whole data life cycle;
4. The master lists for the core geographic objects (health facilities, villages, administrative and reporting divisions) and their associated geography have been developed and an updating mechanism put in place for each of them;
5. The appropriate Geospatial technologies have been identified and are being used in accordance to good geospatial data management practices;
6. Geography, geospatial data and technologies are used to support the implementation of programs towards reaching SDG 3 and improving Universal Health Coverage in countries;
7. Policies supporting and enforcing all of the above as well as geospatial data accessibility have been released;
8. The necessary resources to ensure sustainability on the long term have been identified and secured.

The objective of the present document is to guide the Ministry of Health and Sports when it comes to all the elements that should be in place to reach the geo-enabling of its HIS.

2. Vision, strategy, needs and plan

The interaction between the Department of Public Health of the MOHS and the Asia eHealth Information Network (AeHIN) GIS Lab between June and December 2016 lead to defining the vision behind the geo-enabling of the HIS as follow:

"The necessary geospatial data and geographic information services are available, of quality and accessible in a coordinated way to support the implementation of the National Health Plan 2017-2021 towards achieving Universal Health Coverage (UHC)"

The purpose of the geo-enabling process is to equip the Department of Public Health in a first phase and then the all Ministry in a second phase with all the necessary elements to reach this vision. These elements are listed in the introduction of the present document.

The National Health Plan (NHP) 2017-2021 provides the strategy for the implementation of the above mentioned vision. More specifically, geography is going to be a key dimension when it comes to:

- Addressing health inequities by prioritizing the Townships with the greatest needs;

- Ensuring physical accessibility to quality health care to reach universal coverage.

Implementing and sustaining the vision will not only require for the availability, quality and accessibility of the necessary geospatial data but also for the necessary human and financial resources to be available and sustained on the long term.

When it comes to geospatial data, a conceptual data model (Annex 1) covering all the objects necessary for the operations of the DOPH has been designed following the process documented by the AeHIN GIS Lab [1].

While this model still needs to be converted into a logical and then a physical data model [1] it does already provide the list of geographic objects that should be available, of quality and accessible to the DOPH.

In Annex 1, different shapes have been used to differentiate between:

- Entities/objects for which a master list[1] is needed [2]. These are represented by rectangles.
- Entities/objects for which a master list is not needed/applicable due to their continuous nature. These are represented by ovals.

Colors are themselves used to categories objects into health (in blue) and non-health (in grey) and arrows to indicate a relationship between them. This relationship can be of different types, namely:

- Geographic (for example a health facility is located within an administrative division),
- Network based (a laboratory is working with an health facility),

The technical support provided by the AeHIN GIS Lab to the DOPH also clearly demonstrated the need to strengthen and sustain a core technical capacity within the MOHS. The role and responsibility of such capacity are described in the next section of this document and the plan as well as the financial resources needed to strengthen it as well as ensure its sustainability until 2021 are detailed in Chapter 8.

3. Governance structure and minimum technical capacity

By ensuring the use of the same geography to solve public health problems, the geo-enabling of the HIS is a cross-cutting activity that supports the implementation of all the programs within the health sector. As such it should be seen as a common asset being developed and sustained through a collaborative effort involving all the key stakeholders collecting, maintaining and/or using geospatial data and GIS services and this not only within the MOHS but also among its partners.

The above requires for a proper governance structure to be established. While different models do exists, the approach recommended to the MOHS is to place the responsibility of the geo-enabling under one specific unit and to ensure the engagement of all concerned

[1] The authoritative (officially curated by the mandated governmental agency), complete, up-to-date, and uniquely coded list of all the active (and past active) records for a given geographic object (e.g. health facilities, administrative divisions, villages).

stakeholders through the creation of a Technical Working Group (TWG) on geospatial data management and GIS.

The Health Management Information System (HMIS) unit to be attached to the Minister's Office as part of the implementation of the NHP could represent the appropriate entity to be in charge of the geo-enabling. In the meantime, the activity could continue to be led by the Department of Public Health (DOPH).

Annex 2 does itself present the proposed functions, structure, membership and method of work for the TWG. The activities of the TWG should directly be connected and aligned with the development of the National Spatial Data Infrastructure (NSDI).

The geo-enabling of the HIS will also require for a central technical capacity to be established, sustained and made available to the MOHS and, to some extent, the TWG members. Such capacity will principally be in charge of:

1. Being the guardian of the guidelines, standards and protocols defined and agreed upon by the TWG;
2. Developing, maintaining, regularly updating and sharing the core master lists (see Chapter 5);
3. Supporting the implementation of the guidelines, standards, protocols and master lists in all the information systems across the MOHS;
4. Providing GIS services to the Minister's Office and DOPH.

While such capacity could be expanded depending on the needs, it should at least be composed of one geospatial data manager/GIS technician. The proposed Terms of Reference for this position is reported in Annex 3.

4. Geospatial data specifications, standards and protocols

As an active member of the Asia eHealth Information Network (AeHIN), the Ministry of Health and Sports of Myanmar aims at adopting the specifications, standards and protocols being recommended in the Region by the AeHIN GIS Lab.

The present guidelines therefore build on the guidance documents being released by the GIS Lab[2] in regards to the implementation of the geospatial data management chain [3]. More specifically, the MOHS is following the recommendations of the GIS Lab when it comes to:

- Documenting the process and defining the data needs [1];
- Defining the vocabulary, the data set specifications, and the ground reference [2];
- Compiling existing data and identifying gaps (document under preparation);
- Creating geospatial data:
    - Extracting data from other sources (document under preparation);
    - Collecting data in the field [4];
- Cleaning, validating, and documenting the data (document under preparation); and
- Distributing, using, and updating the data (document under preparation).

[2] http://aehin.org/Resources/GISLab.aspx

The use of the already available guidance documents resulted in:

1. The conceptual data model for the DOPH (Annex 1) as well as the identification of the core objects to be covered by a master list (see Chapter 5);
2. The proposed data specifications to be followed by the MOHS (Annex 4);

The adoption of the above as well as the definition of the other necessary standards and protocols should take place as part of the activities of the TWG on geospatial data management and GIS to be established under the MOHS (see Chapter 3) and could represent a direct contribution to the development of the National Spatial Data Infrastructure (NSDI).

5. Key master lists

The conceptual data model (Annex 1) allowed identifying the geographic objects core to the DOPH operations, meaning those presenting the highest number of relationships, as follow:

1. Health services;
2. Villages;
3. Administrative divisions;
4. Persons.

While the last object is generally not directly captured in a Geographic Information System (GIS) due to its mobile nature, the first three require a particular attention and the DOPH should therefore work with the relevant partners in order to establish, maintain and regularly update (at least yearly) a master list and the corresponding geography of these objects (point, polygon) to be stored in a GIS format.

The pilot project conducted over the Region of Magway (See Chapter 7) allowed making a first assessment towards the establishment, maintenance, update and sharing of a unique and common master list of health facilities, administrative divisions and villages covering the all country and to be used across the whole MOHS.

The volume of work to be completed is important and will require for the involvement and collaboration of several stakeholders not only from within the MOHS but also other partners such as the Ministry of Home Affairs, the Myanmar Information Management Unit (MIMU) and the World Bank in order to obtain master lists that comply with the specifications reported in Annex 4. In an ideal situation, all of these master lists should be accessible from a common geo-registry.

It is therefore suggested for this activity to take place under the umbrella of the TWG on geospatial data management and GIS.

6. Appropriate Geospatial technology

Geospatial technology refers to equipment used in visualization, measurement, and analysis of earth's features, typically involving such systems as Global Navigation Systems (GNSS), Geographic Information System (GIS), and Remote Sensing (RS).

The most appropriate technology or combination of technologies to be used is generally defined based on the needs, the context and the financial resources.

In the case of the MOHS, the implementation of the NHP in general and of the vision proposed here (see Chapter 2) will mostly require the use of GIS and GNSS technology.

Thanks to ADB's and WHO's support, different units within the Department of Public Health (DOPH) are already using Esri's desktop and online GIS technology and have received training on how to use it.

While such high-end technology should continue to be used at the central level in order to allow for the implementation of the all geospatial data management chain [3], other options could very much be deployed at the sub national level in the future.

When it comes to GNSS technology, a large number of the devices on the market contain a receiver/antenna that can be used to collect geographic coordinates.

While several factors, starting with cost, will influence the choice of the device to be used, the minimum specifications that are required to collect GNSS coordinates that comply with commonly accepted best practices are that the device [4]:

1. Allows for setting the following specifications:
    a. Position format: hddd.ddddd (decimal degrees with 5 digits)
    b. Map datum: WGS84
    c. Map Spheroid: WGS84
    d. Distance and speed: metric
2. Provides coordinate readings with at least 5 decimal digits to reach a level of precision down to the nearest meter.
3. Displays the following information together with the reading:
    a. Number of received satellite signals
    b. Accuracy measure

These specifications allow the implementation of all the SOPs recommended by the AeHIN GIS Lab for collecting data in the field [3].

7. Use of geography and GIS Services

Investing in the geo-enabling of the HIS will only be cost-effective if the geospatial data and GIS services that they generate are being used across all the health programs in Myanmar.

As mentioned in Chapter 2, geography is going to be key when it comes to addressing health inequities and ensuring physical accessibility to health care under the umbrella of the National Health Plan (NHP) 2017-2021.

These represent only two of the areas in public health that would benefit from the use of geography and geospatial technologies. Generally, the main users of the science and technology within the health sector are: planning, disease surveillance and emergency management.

The DOPH has therefore been implementing a pilot project with the support of the AeHIN GIS Lab in order to illustrate the range of potential applications in these areas. This pilot covers three case studies over the Magway Region, namely:

1. Planning: Proposition for a fully functional Emergency obstetric care delivery network (BeMOC and CeMOC) that would not only comply to the international norms [5] built also offer the best accessibility coverage possible;
2. Disease monitoring and surveillance: temporal follow up on health facility level number of examination and positive cases identification over 2015;
3. Emergency management: preliminary impact assessment after Chauk earthquake (August 14, 2016)

It is hoped that the presentation of the result of the pilot project will not only support the geo-enabling of the HIS but also encourage other divisions within the MOHS to benefit from geography and geospatial technologies to support their operations.

8. Policy

The sustainability of the geo-enabling will require for a policy to be released and enforced not only across the MOHS but also among all the partners who are collecting, maintaining, sharing and using geospatial data in the country.

To be effective, such policy should at least:

- Give the mandate for the development and implementation of geospatial data management and GIS guidelines, standards and protocols across the health sector as well as the development, maintenance, update and sharing of the master lists for the core geographic objects (health facilities, communities/settlements and administrative divisions) to the DOPH;
- Sustain the geospatial data management and GIS technical capacity of the DOPH (2 staff full time until the end of 2018);
- Enforce the use of the developed guidelines, standards, protocols and master lists by all the stakeholders in the health sector;
- Officialize the creation of the TWG on geospatial data management and GIS for the health sector as per the proposed TOR (Annex 2).

The above could potentially be attached to the HMIS strategy and HIS policy currently under development.

9. Sustainability

Geo-enabling the HIS is a process that takes time and requires resources especially in the case of Myanmar due to the important number of disconnected information systems already in place (7 within the DOPH only).

In addition to that, the geography and demography of the country evolve constantly, requiring for the master lists and associated geospatial data to be regularly updated.

In return, a geo-enable HIS does not only allow for a powerful use of geospatial data and technologies to support program implementation but does also contribute to improving data consistency across health programs and a more systemic approach to solving public health problems.

The current geospatial data management and GIS technical capacity of the MOHS therefore needs to be institutionalized and progressively strengthened in order to answer the expected growing needs from the health sector.

The geo-enabling of the MOHS HIS is therefore taking place as part of a plan composed of the following phases:

1. Implementation of the pilot project mentioned in Chapter 7 to strengthen the current technical capacity of the DOPH as well as demonstrate the benefits of geo-enabling the HIS;
2. Presentation of the results of the pilot project to the higher authorities within the Ministry to obtain their support for the institutionalization of the capacity and expansion of the process to the rest of the country through the release of the policy mentioned in Chapter 8;
3. Establishment of the Technical Working Group on geospatial data management and GIS to define the remaining standards and protocols needed to support the geo-enabling as well as expand the core master lists (health facilities, villages and administrative divisions) to cover the all country;
4. Support the implementation of the National Health Plan 2017-2021 and of the SDGs through the geo-enabling of the DOPH information systems;
5. Expansion and maintenance of the geo-enabling to the rest of the MOHS.

While phase 1 and 2 are financially support by ADB through the technical support provided by the AeHIN GIS Lab, the implementation of phase 3 to 5 over the 2017-2021 period will require additional financial resources to be leveraged.

10. Conclusion and recommendations

The present document has for objective to guide the Ministry of Health and Sports of Myanmar (MOHS) moving towards a more systemic approach to solving public health challenges in the country through the geo-enabling of its Health Information System (HIS).

Geo-enabling the HIS does not only allows for a powerful use of geospatial data and technologies to support geographically based decision making but does also contribute to improving data consistency across health programs and therefore a more systemic approach to solving public health problems.

In addition to that, the coordinated and standardized approach promoted through the geo-enabling will directly support the implementation of Sustainable Development Goal 3 and the possibility for the country to reach Universal Health Coverage by 2031.

While the currently existing technical capacity of the DOPH has been strengthened and the basis for the geo-enabling developed thanks to the support provided by the Asian

Development Bank (ADB) through the AeHIN GIS Lab a lot of work remains to be done in order to institutionalize and expand this capacity as well as implement the geo-enabling across all the information system within the MOHS and among external partners.

In view of the above it is recommended for:

- The MOHS to:
    - Continue implementing the process aiming at geo-enabling its Health Information System;
    - Institutionalize the currently existing technical capacity, enforce the use of the defined standards, protocols and master lists as well as establish the Technical Working Group on geospatial data management and GIS through the release of the proposed policy.
- External partners to:
    - Advocate for a more coordinated approach to the management and use of geospatial data and technologies through the sharing of the present guidelines among development partners;
    - Continue the support provided to the MOHS when it comes to implementing the rest of the process aiming at geo-enabling it HIS;
    - Be part of the Technical Working Group on geospatial data management and GIS within the health sector;

References

[1] Ebener S. (2016): Guidance for the collection and use of geospatial data in health. Part 2 - Implementing the geospatial data management chain: 2.1 Documenting the process and defining the data needs. AeHIN GIS Lab documents: http://www.aehingislab.net/DOCUMENTS/Guide_GIS_Lab_Part2_1.pdf [Accessed February 20, 2017]

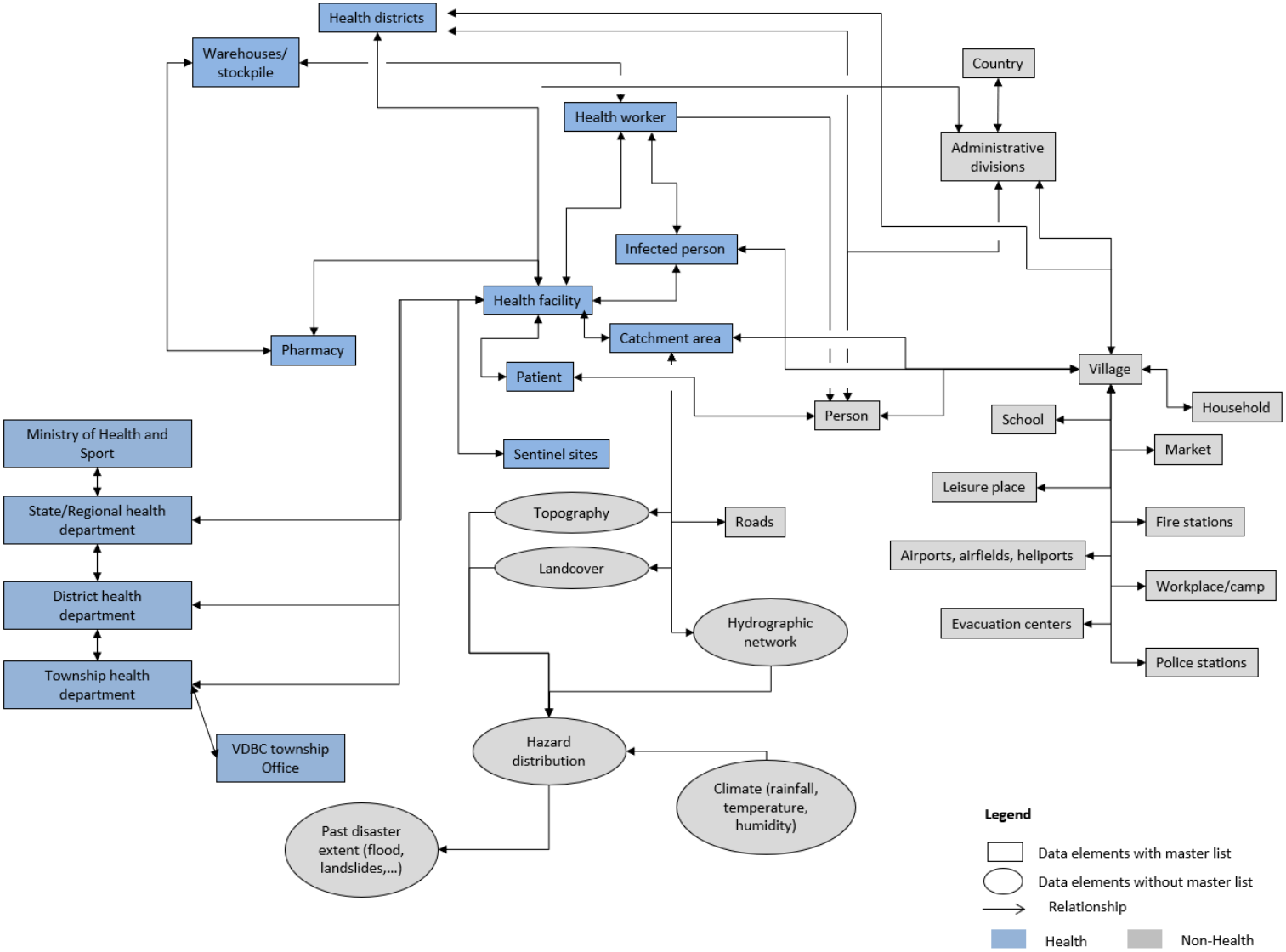
[2] Ebener S. (2016): Guidance for the collection and use of geospatial data in health. Part 2 - Implementing the geospatial data management chain: 2.2 Defining the vocabulary, the data set specifications and the ground reference; AeHIN GIS Lab documents: http://www.aehingislab.net/DOCUMENTS/Guide_GIS_Lab_Part2_2.pdf [Accessed February 20, 2017]

[3] Ebener S. (2016): Guidance for the collection and use of geospatial data in health. Part 1 - Introduction to the data-information-knowledge-decision continuum and the geospatial data management chain. AeHIN GIS Lab documents: http://www.aehingislab.net/DOCUMENTS/Guide_GIS_Lab_Part1.pdf [Accessed February 20, 2017]

[4] Ebener S., Maude J.R., Gault P. (2016): Guidance for the collection and use of geospatial data in health. Part 2 - Implementing the geospatial data management chain: 2.4 Creating geospatial data - 2.4.1 Collecting data in the field. AeHIN GIS Lab documents: http://www.aehingislab.net/DOCUMENTS/Guide_GIS_Lab_Part2_4_2.pdf [Accessed February 20, 2017]

[5] WHO, UNFPA, UNICEF and Mailman School of Public Health. Averting Maternal Death and Disability (AMDD) (2009): Monitoring emergency obstetric care: A Handbook http://apps.who.int/iris/bitstream/10665/44121/1/9789241547734_eng.pdf [Accessed February 20, 2017]

Annex 1 - DoPH conceptual data model



Annex 2 - Proposed functions, structure, membership and method of Work for the Technical Working Group on geospatial data management and GIS

1. Functions

The function of the TWG is to work in partnership with all concerned stakeholders to:

1. Support the geo-enabling of the Health Information System (HIS) by:
    a. Contributing to the development, maintenance and update of the identified core master lists and associated geographies;
    b. Defining, agreeing upon and enforcing the use of guidelines, standards and protocols;
    c. Coordinating data collection efforts and projects (including the harmonization of data and information collection tools) to avoid unnecessary duplication and ensure data consistency;
    d. Coming up with the necessary policies; and
    e. Proposing measures to leverage the necessary resources to sustain the geo-enabling on the long term

2. Assess geospatial data and GIS services needs and gaps;

3. Share knowledge, experiences, expertise, best practices and project information related to the management and use of geospatial data and technologies

2. Structure and membership

1. The TWG is placed under the umbrella of the Ministry of Health and Sports (MOHS);

2. The HMIS unit shall serve as the Chair of the TWG;

3. The roles and functions of the Chair are to:
    a. Provide leadership to the TWG;
    b. Provide the provisional agenda to all Members and facilitates the meetings; and
    c. Ensure that executive summary of the meetings and other materials are shared with the TWG members.
    d. Communicate/report coordination and policy gaps and issues that cannot be resolved within the TWG to appropriate MOHS officials for resolution

4. The TWG comprise focal points from:
    a. The MOHS divisions involved in the collection, management and use of geospatial data and technologies;
    b. Key partners and stakeholders from the health sector and beyond invited by the TWG Chair

5. The roles and functions of the focal persons are to:

a. Represent her or his agency and report on its activities during IM-TWG meetings;
b. Serve as contact person and subject matter expert on issues covered by the IM-TWG and provision of data and information needed for disaster risk reduction and management;
c. Report back to her or his agency on discussions and decisions taken during the IM-TWG meetings;
d. Perform other tasks as requested.

3. Method of work

1. Technical advisory function:
    a. The TWG has the power to create task groups, sub-committees or launch projects;
    b. The task group or project report directly to the TWG during its meetings;
    c. The results of the work conducted by the TWG together with its recommendations are presented to Minister's Office for approval and implementation

2. Meetings:
    a. The frequency of meetings will be determined based on the needs and progress of the TWG's activities;
    b. One week before each meeting, the Chair will ask Members for items to be included in the agenda and will share a final draft with all Members at least the day before the meeting;
    c. Focal points and subject matter experts will be convened based on the items on the agenda;
    d. When appropriate, virtual meetings will be organized.

3. Reporting:
    a. Written executive summary of the meetings shall be issued and distributed to all TWG Members one week before the next meeting at the latest.

Annex 3 - Proposed TOR for the position of geospatial data manager/GIS technician

1. Background

The Department of Health of the Ministry of Health and Sports of Myanmar (MOHS) has embarked in a process aiming at geo-enabling its Health Information System (HIS) in order for the all Ministry to share the same geography and therefore benefit from the visualization and analytical power that geospatial technologies offers.

In this context, the Department of Public Health is looking for a data manager/GIS technician in order to be in the position to provide technical support in the areas of geospatial data management and GIS services during the geo-enabling process.

2. Main responsibilities

The main responsibilities of the incumbent will be to provide technical support in the areas of geospatial data management and GIS services in line with the guidelines, standards, and protocols identified/defined as part of the activities of the TWG on geospatial data management and GIS services.

3. Description of duties

Working under the supervision of head of the MOHS HMIS unit and in close collaboration with the TWG Members, the incumbent will be in charge of:

- Providing geospatial data management and GIS technical support to the Department of Public Health in a first phase and then to the entire MOHS;
- Developing, maintaining, updating and sharing the core master lists (health facilities, villages and administrative divisions);
- Supporting the definition of guidelines, standards and protocols aiming at improving the availability, quality (completeness, uniqueness, timeliness, validity, accuracy and consistency) and accessibility of geospatial data;
- Supporting the implementation of the guidelines, standards, protocols and master lists in all the information systems across the MOHS;
- Generating GIS based data products to support decision making.

4. Expected deliverables

- Authoritative, standardized, complete, up-to-date and uniquely coded master lists of health facilities, villages and administrative divisions in the country;
- Guidelines, standards and protocols endorsed by the TWG on geospatial data management and GIS;
- Geo-enable Health Information System (HIS);
- Data products (table, graphs and maps) as per the established SOPs

5. Required qualifications

a. Education:

- University degree with a background in data management and/or GIS or enough professional experience in data management and/or the use of GIS to be considered as equivalent;
- Background in public health

b. Skills:

- Good knowledge in the use of ArcView, ArcGIS or other GIS software as well as MS Office suite,
- Demonstrable skills in relation to data standardization and data management;
- Ability to work harmoniously as part of a team.

c. Experience:

- At least one experience working in a GIS related project;
- Experience in the area of Public Health would be seen as an advantage;

d. Languages:

- Myanmar: Proficient
- English would be seen as an advantage

Annex 4 - Proposed geospatial data specifications for the MOHS of Myanmar

Validity:

Geographic coordinate system

- Geographic Coordinate System: GCS_WGS_1984
  - Angular Unit: Degree (0.0174532925199433)
  - Prime Meridian: Greenwich (0.0)
  - Datum: D_WGS_1984
  - Spheroid: WGS_1984
    - Semimajor Axis: 6378137.0
    - Semiminor Axis: 6356752.314245179
    - Inverse Flattening: 298.257223563

Geographic extent (Decimal degrees)

- West Boundary: 92.1° E
- East Boundary: 101.2° E
- South Boundary: 9.6° N
- North Boundary: 28.6° N

Language:

- English and Myanmar language (unicode)

File format:

- Vector: shape file
- Raster: Esri GRID

Metadata standard:

- ISO 19115: Geographic information - Metadata

Accuracy:

- Scale (vector/raster layers): 1:100,000
- Spatial resolution (raster layers): 90 m
- Positional accuracy (vector/raster layers): 50 meters
- Positional accuracy (GPS reading): 15 meters
- Precision: meter (5 digits)

Timeliness:

- The most recent available data should be used
- Data older than 5 years should be avoided

Completeness, uniqueness and consistency:

- Priority should be given to geospatial data generated and maintained by official governmental entities;
- When applicable, the content of the layer should match the official registries in terms of completeness, uniqueness and consistency (spelling, codes).