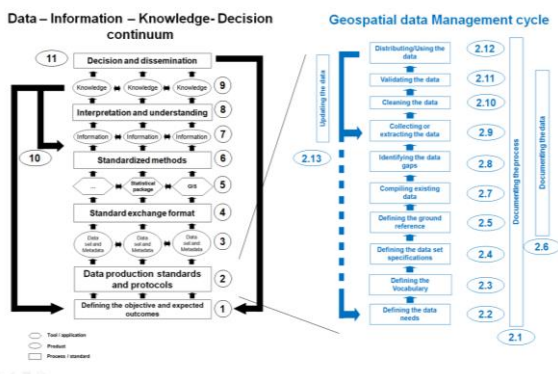Ministry of Health and Sports, Myanmar
Department of Public Health (DOPH)

HIS geo-enabling -
Geospatial data management guideline

Version 1.0 (27.06.2018)

In collaboration and with the support of:

Revision history

Version	Release date	Comment	By
1.0	June 27, 2018	Document created	Steeve Ebener

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Abbreviations

ADB	Asia Development Bank
DOPH	Department of Public Health
GAD	General Administration Departement
GIS	Geographic Information System
HGLC	Health GeoLab Collaborative
HIS	Health Information System
MIMU	Myanmar Information Management Unit
MOHS	Ministry of Health and Sports
SDG	Sustainable Development Goal
UNICEF	United Nations Children's Fund

1. Introduction

Under the umbrella of the Myanmar National Health Plan 2017-2021 and thanks to the support of ADB, the Department of Public Health (DOPH) from the Ministry of Health and Sports of Myanmar (MOHS) embarked in a process aiming at geo-enabling its Health Information System (HIS) and this in order for the all health sector in Myanmar to fully benefit from the power of geography, geospatial data, and technologies to reach the health-related Sustainable Development Goal of healthy lives and well-being for all (SDG 3)[1].

Generating and maintaining good quality geospatial data as well as generating data products (tables, graphs and maps) out of it requires for proper data management standards, practices and protocols to be defined and implemented as part of the geospatial data management cycle (Figure 1).
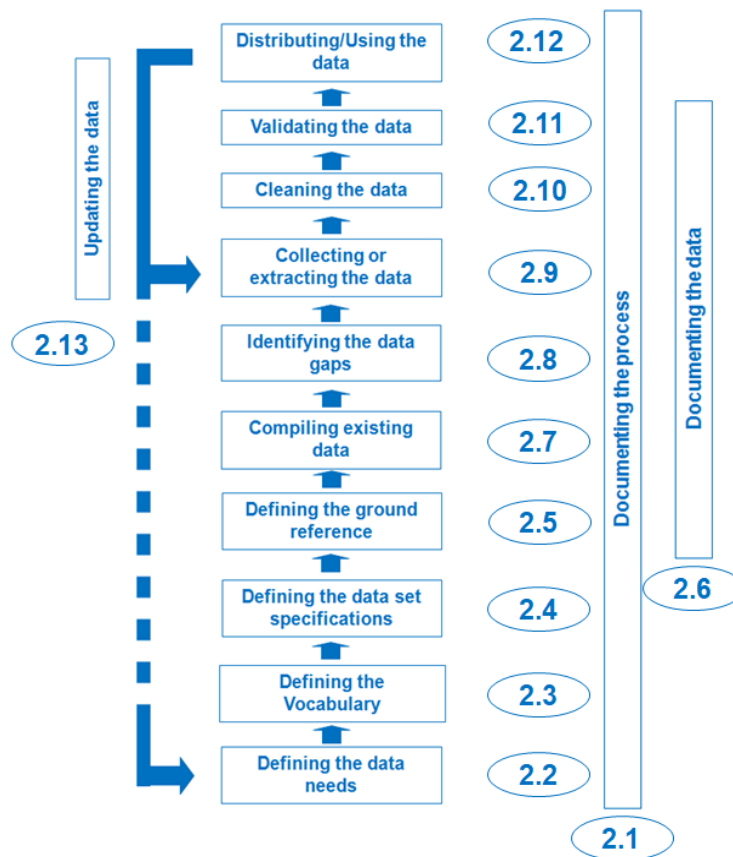

Figure 1 - Geospatial data management cycle (extracted from [1])

The objective of the present document is to guide the Ministry of Health and Sports of Myanmar on the standards, practices and protocols to be implemented as part of the geospatial data management cycle and this to ensure for the availability, quality and accessibility of geospatial data for the health sector in the country.

These standards, practices and protocols are presented in the following sections of this document and have been defined as part of the HIS geo-enabling process supported by the Asian Development Bank through the activities of the AeHIN GIS Lab and the Health GeoLab Collaborative over the June 2016 and March 2018 period and then by UNICEF as part of the Yangon pilot project aiming at improving immunization coverage through the use of geospatial data and technologies

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[1] www.healthgeolab.net

started in June 2018. The DOPH staffs at both the central and State/Region levels have been trained based on the use of these standards, practices and protocols over that same period.

This document builds on the geospatial data management guideline developed for the Department of Planning and Health Information of the Ministry of Health of Cambodia.

2. Process documentation

Implementing a process based on geospatial data and technologies might not only take a long time but might also need to be repeated several times by different person. The only way to ensure that the process can be replicated in the same way is to document each of the steps that has been followed and this as precisely as possible.

There is no specific template to be followed to perform such documentation and the length of document will depend on the process that is being implemented. In some cases, the resulting document might just cover the standards and protocols that have been used while, in other cases, a more lengthy description might be required [2].

3. Data needs

Defining the data needs consists of making a list of all the data, geospatial or statistical, that are needed to address the objectives of the project, activity, program,... [1]. While doing this, it is also useful to look at how these different data are meant to relate to another in the final database.

These two objectives can be reached through the development of a data model. A data model is an abstract model that organizes elements of data and standardizes how they relate to one another and to properties of the real world.[2]

A first conceptual data model covering all the objects necessary for the operations of the MOHS has been designed following the process documented by the HGLC [2]. While quite simple, this data model (Annex 1) already allows identifying the geographic objects core to public health (health facilities, administrative divisions and villages) as well as the relationships that exists between them.

Such conceptual data model should slowly be expanded to cover the needs of all the health programs being implemented in the country and then converted into a logical and then physical data model [2].

In Annex 1, different shapes have been used to differentiate between:
- Entities/objects for which a master list[3] 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.

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[2] https://en.wikipedia.org/wiki/Data_model
[3] 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).

Colors are themselves used to categories objects into health (in blue) and non-health ones (in grey) and arrows to indicate a relationship between them. This relationship can be of different type, namely:
- Geographic (for example a health facility is located within an administrative division),
- Network based (a laboratory is working with an health facility),

4. Common vocabulary

Like in any other domains, it is key to ensure for all the stakeholders dealing with geospatial data and technologies in the health sector to share the same understanding over the terms that are being used in this field. The use of common dictionaries helps in this regards.

While different GIS dictionaries do exist, the one included in the GIS.com wiki [4] remains the most comprehensive online resource and therefore the one being recommended here. Another option is the GIS dictionary maintained by Esri and which is accessible either online[5] or in print.

5. Data specifications

The data specifications contain the list of requirements the geospatial or geographic data should adhere to in order to be considered of quality and fulfil its original purpose [1].

In the case of Myanmar, such specifications have been defined right at the beginning of the HIS geo-enabling process (Annex2) and cover all the 6 dimensions of data quality (validity, accuracy, timeliness, completeness, uniqueness and consistency [3]).

6. Ground reference

Ground reference, or ground truth, refers to two different concepts:
1. The actual location of a given feature on the surface of the Earth. High resolution satellite or orthophotos represent the best options in this regards as checking all these locations in the field is a too expensive exercise.
2. Master lists which can be defined as 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) [2].

The above is necessary to evaluate the completeness, uniqueness, timeliness, accuracy, and consistency of geospatial and geographic data [3].

The following source of satellite images are accessible to the MOHS of Myanmar and should therefore be used as ground reference (by order of preference):
1. Those accessible from within ArcGIS desktop as Web Map Services (requires for an ArcGIS Online account)

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[4] http://wiki.gis.com/wiki/index.php/GIS_Glossary
[5] http://support.esri.com/other-resources/gis-dictionary

2. Those hosted in google map
3. The 50 meter resolution Landsat images that can be downloaded from here: http://glcfapp.glcf.umd.edu:8080/esdi/index.jsp

The development, maintenance, regular update and sharing of the master lists for the geographic objects core to public health as well as the enforcement of their use, especially of their official coding scheme, and this across all the stakeholders are key to HIS geo-enabling.

The data model described in Chapter 3 of the present document allowed identifying the following objects as being core to public health in Myanmar: Health facilities, Administrative divisions and villages.

While the master lists for the last two objects are under the responsibility of General Administration Department (GAD) under the Ministry of Interior (MOI), the first one is under the responsibility of the MOHS. In an ideal situation, all of these master lists should be accessible from a common geo-registry [4].

The Master Facility List resource package released in 2018 [5] shall be used by the DOPH as the guide describing the key components of the health facilities master list to support its establishment, maintenance and regular update.

The coding schemes that should be enforced for the collection, management, reporting and sharing of any health data/information should be as follow:
- Health facilities: new coding scheme defined as part of the HIS geo-enabling process (Structure: HF000001)
- Administrative divisions and villages: MIMU PCode while waiting for the new official coding system to be in place.

7. Data documentation (Metadata)

Documenting the data is an important and integral part of the data management cycle [1] and should be applied to geospatial and statistical data, the two elements that compose geographic data.

The documentation of each dataset is being captured in what we call a metadata profile, profile which is generally based on a specific metadata standard. Such profile should at least allow answering the following questions [6]:
1. What is the data about?
2. Who created the data?
3. When was the data created/collected/last updated?
4. How was the data created?
5. What are the data specifications (geographic coordinate system/projection system, scale, accuracy, language..)?
6. Are there any use or redistribution restrictions attached to the data?
7. Who can I contact if I have questions about the data?

While different metadata profiles to exist it is recommended to use the ones promoted by the Health GeoLab Collaborative as they do not only comply with the above but are also based on a well established metadata standard [6].

8. Compiling data and identifying gaps

Geospatial and statistical data can be obtained from different sources and it is therefore important to follow some specific rules to ensure not only the use of the most appropriate one but also the identification of potential gaps that would have to be filled through field data collection.

These rules are included in a guidance released by the Health GeoLab Collaborative [7] and recommended for implementation by the MOHS.

9. Collecting or extracting data

Filling the data gaps identified after having collected all the existing data [7] can be done in two ways, depending on the data in question and the availability of resources:
1. Extracting data from other sources (e.g. remote sensing images, paper maps);
2. Collecting the data in the field.

For the moment, the DOPH has been trained to perform the later and the different methods to be used in this regards have been captured in a specific guidance [8] that is compatible with the data specifications promoted here.

10. Conclusion and recommendation

The present guidance is documenting the standards, practices and protocols that have been defined and used during the implementation of the HIS geo-enabling process supported by ADB over the June 2016-March 2018 period.

Continuing to implement them will ensure for the health sector to slowly improve the quality of the geospatial and geographic data that the health sector in general and the Ministry of Health and Sports in particular needs to support the implementation of its health program under the umbrella of the Myanmar National Health Plan 2017-2021.

As such, it is recommended for the Department of Public Health to promote and support the use of the standards, practices and protocols presented here across the health sector in the country.

References

[1]   Ebener S. (2016): Guidance for the management and use of geospatial data and technologies in health. Part 1 - Introduction to the data-information-knowledge-decision continuum and the geospatial data management chain. Health GeoLab Collaborative document: http://www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part1.pdf [Accessed June 2018]

[2]   Ebener S. (2016): Guidance for the management and use of geospatial data and technologies in health. Part 2 - Implementing the geospatial data management cycle: 2.1 Documenting the process and defining the data needs. Health GeoLab Collaborative document: http://www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part2_1.pdf [Accessed June 2018]

[3]   Ebener S. (2016): Guidance for the management and use of geospatial data and technologies in health. Part 2 - Implementing the geospatial data management cycle: 2.2 Defining the vocabulary, the data set specifications and the ground reference. Health GeoLab Collaborative document: https://www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part2_2.pdf [Accessed June 2018]

[4]   AeHIN GIS Lab and InSTEDD (2017): Guidance on the establishment of a common geo-registry for the simultaneous hosting, maintenance, update and sharing of master lists core to public health: https://drive.google.com/drive/folders/0B6enNobOP9SZU0I3WHZ3a1pUenM [Accessed June 2018]

[5]   Demographic and Health Surveys (2018): Master facility list resource package: Guidance for countries wanting to strengthen their MFL. USAID document: https://www.who.int/healthinfo/MFL_Resource_Package_Jan2018.pdf?ua=1 [Accessed June, 2018]

[6]   Ebener S., Pantanilla I. (2018): Guidance for the management and use of geospatial data and technologies in health. Part 2 - Implementing the geospatial data management cycle: 2.5 Cleaning, validating, and documenting the data - 2.5.1 Documenting the data using a metadata profile. Health GeoLab Collaborative document: www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part_2_5_1.pdf [Accessed June, 2018]

[7]   Pantanilla I., Ebener s. (2018): Guidance for the management and use of geospatial data and technologies in health. Part 2 - Implementing the geospatial data management cycle: 2.3 Compiling existing data and identifying gaps. Health GeoLab Collaborative document: https://www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part2_3.pdf [Accessed June 2018]

[8]   Ebener S., Maude R.J., Gault P. (2018): Guidance for the management and use of geospatial data and technologies in health. Part 2 - Implementing the geospatial data management cycle: 2.4 Creating geospatial data - 2.4.2 Collecting data in the field. Health GeoLab Collaborative document: www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part2_4_2.pdf [Accessed June, 2018]

Annex 1 - Data Model for the MOHS, Myanmar
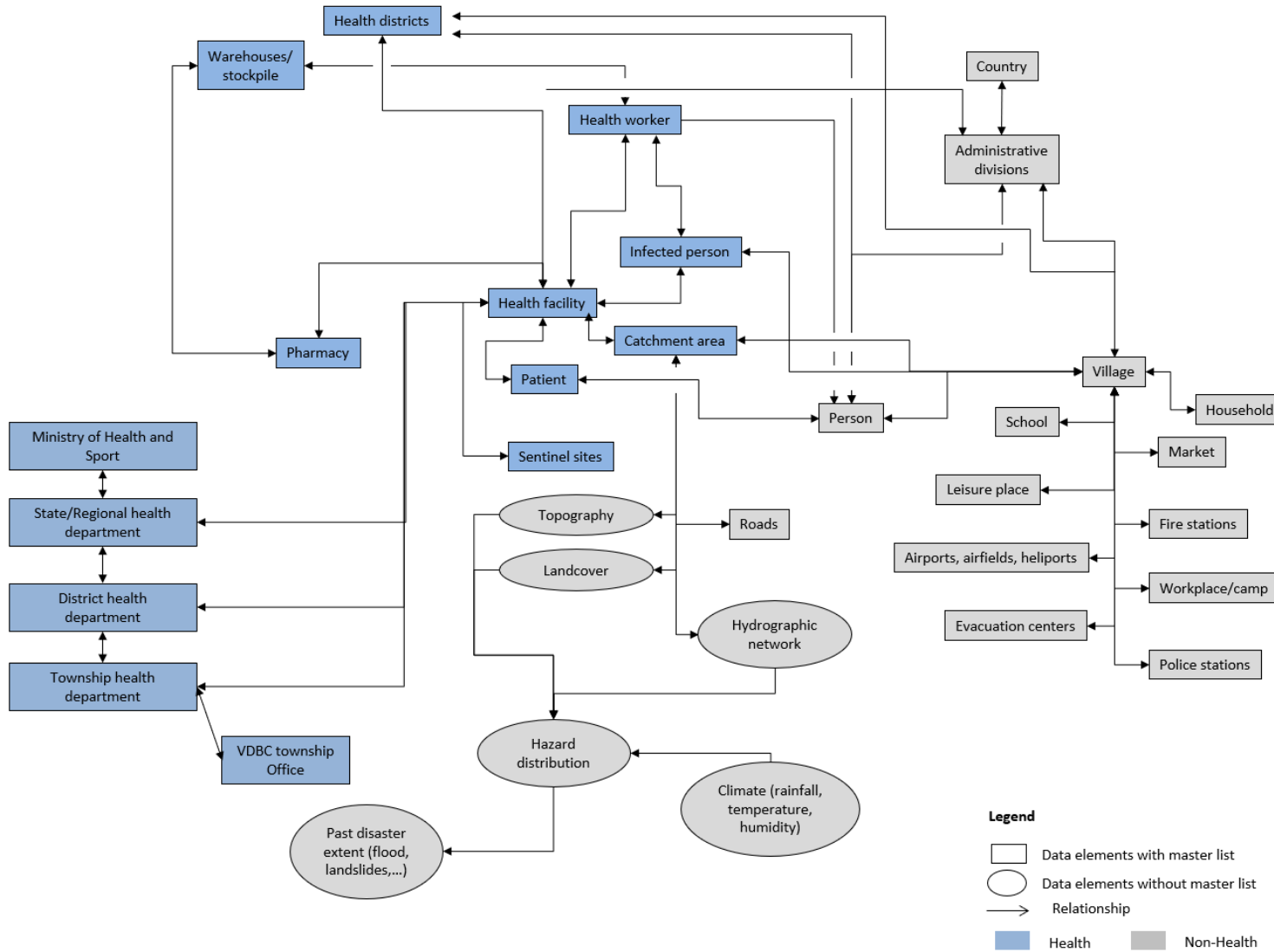
Annex 2 - Data specifications for the MOHS, Myanmar

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
- Tabular: MsExcel

Metadata standard:
- ISO 19115: Geographic information - Metadata
- Metadata profile: the one recommended by the HGLC

Accuracy:
- Scale (vector/raster layers): 1:100,000
- Spatial resolution (raster layers): 90 m
- Positional accuracy (vector/raster layers): 50 meters
- Positional accuracy (GNSS reading): 15 meters
- Precision (GNSS reading): 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 corresponding master list in terms of completeness, uniqueness and consistency (spelling, codes).