Working Group 3 on Regional SDI

Activity Report

for

The 5th UN-GGIM-AP Plenary Meeting

Kuala Lumpur, Malaysia

16-20 October, 2016

Chair
Ms. Jie Jiang, China – jjie@nsdi.gov.cn

Vice Chairs
Mr. Simon Costello, Australia, Simon.Costello@ga.gov.au
Mr. Lee Sangho, Korea, addlsh78@korea.kr
Ms. Bayarmaa Enkhtur, Mongolia, bayarmaa.e@gazar.gov.mn
Mr. Alireza Vafaee Nejad, Iran, a_vafaei@sbu.ac.ir
1. BRIEF OF WORKING GROUP

1.1 Background

Regional sustainable development must aim at a high level of taking into account the diversity of situations in the various regions of the UNGGIM-AP members. The balanced developed, interoperable and sharable Geo-spatial information in the region is essential for the regional sustainable development.

Many NSDIs have been established in the member countries. But a number of problems exist regarding the availability, quality, uniformity, accessibility and sharing of spatial information.

It is necessary to promote the common understanding of establishing a regional SDI by using unified data standards, and to share or interoperate the SDI for location-based services.

1.2 Timeline

The work began 2015 and continued through 2018.

1.3 Membership of the Working Group

Chair:

Ms. Jiang Jie
Director & Chief Engineer, Dept. of Geoinformation Service Platform
National Geomatics Center of China
E-mail: jjie@nsdi.gov.cn

Vice-Chairs:

Mr. Simon Costello
Branch Head, National Location Information
Environmental Geoscience Division, Geoscience Australia
Email: Simon.Costello@ga.gov.au

Mr. Lee Sangho
Geographic Information Department
National Geographic Information Institute
Email: addlsh78@korea.kr, addlsh940@gmail.com

Ms. Bayarmaa Enkhtur
Head of Geospatial information and technology Department, ALAGaC, Mongolia
Email: bayarmaa.e@gazar.gov.mn

Dr. Alireza Vafaee Nejad
General Manager of GIS and SDI in National Cartographic Center of Iran (NCC)
Email: a_vafaei@sbu.ac.ir

2. RESOLUTIONS ADOPTED AT THE 20th UNRCC-AP (corresponds to WG3)

The Conference:

Noting
- the increasing regional issues and location based services require the access and sharing of geo-spatial information among countries for regional sustainable development;
- the increasing demand for effective on-line location-based services from government, professional agencies and public;
- the establishment of national geospatial data infrastructures in some countries; while there are different levels of development of NSDI among the countries;
- national geospatial portals have been established in some countries to improve the accessibility and application of the data; while the interoperability among these portals may not be achieved;
- the problems regarding availability, quality, interoperability, accessibility and sharing of geospatial data among the countries;
- the need to keep the efforts technical in nature so as not to raise political concerns.

Recommends that
- Conduct a survey to investigate and assess the current status of NSDI development of the member countries, with focus on access, management,
update, web-based services and sharing of data/service;

- Identify the common data standards, including data themes, specifications and metadata catalogue for regional SDI as well as common service standards, including interfaces and specifications for the interoperability of portals; draft data and service sharing rules;

- Conduct pilot project with some countries to test the mechanisms of sharing data under pre-drafted rules and integrate web-based services/portals for the interoperation of the NSDIs;

- Refine the data/service standards and data/service sharing rules based on the results of the pilot projects; develop guidelines on the use of these standards and rules for regional SDI; disseminate these guidelines to the countries of the region;

- Develop joint action programs for the provision of educational and training for the data sharing, portal construction, and application for regional SDI.

3. WORK PLAN OF WG3

<table>
<thead>
<tr>
<th>No</th>
<th>Activities/Steps</th>
<th>Period</th>
<th>Targeted goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conduct a survey to investigate and assess the current status of NSDI development of the member countries, with focus on access, management, update, web-based services and sharing of data/service</td>
<td>2015-2018</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; draft report in the middle of 2016; 2&lt;sup&gt;nd&lt;/sup&gt; draft report in the end of 2017; final report in the middle of 2018</td>
</tr>
<tr>
<td>2</td>
<td>Identify the common data standards, including data themes, specifications and metadata catalogue for regional SDI as well as common service standards, including interfaces and specifications for the interoperability of portals; draft data and service sharing rules;</td>
<td>2015-2018</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; draft in the middle of 2016; 2&lt;sup&gt;nd&lt;/sup&gt; draft in the end of 2017; final report in the middle of 2018</td>
</tr>
<tr>
<td>3</td>
<td>Conduct pilot project with some countries to test the mechanisms of sharing data under pre-drafted rules and integrate web-based services/portals for the interoperation of the NSDIs;</td>
<td>2016-2018</td>
<td>As soon as the cooperation established among countries including China, Korea, Indonesia, Mongolia, Viet Nam Pilot projects be finished by the middle of 2018</td>
</tr>
</tbody>
</table>
5. Training courses on regional SDI, portal/platform and application

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Training courses on regional SDI, portal/platform and application</td>
<td></td>
<td>Pending on the availability of the fund, should be conducted before the ending of the pilot projects</td>
</tr>
<tr>
<td>6</td>
<td>Workshops, seminars co-organized with other International organizations</td>
<td>2016-2018</td>
<td>2017, co-organized with ISPRS</td>
</tr>
</tbody>
</table>

4. ACTIONS TAKEN BY WG3 SINCE THE 20th UNRCC-AP

- Designed a questionnaire on the status of NSDI development of the member countries, with focus on access, management, update, web-based services and sharing of data/service. The questionnaire has been distributed to member countries by the Secretariat of UN-GGIM-AP in June 2016. Eight replies have been received by September 2016. And an elementary analysis has been done based on the received questionnaire (as shown in Annex A).

- Help to organize the 1st ISPRS-UNGGIM National Mapping and Cadastral Agencies Forum during the ISPRS Prague Congress on 14-15 July, 2016. National Mapping and Cadastral Agencies worldwide took part in the Forum to share the scientific, technical and application issues. (as shown in Annex B)

- A pilot portal for Regional SDI Service Interoperation has been done by National Geomatics Center of China, which can integrate on-line services released by different agencies and countries based on OGC standards. Successfully integrated the services published in Geospatial BNPB, the website developed by Indonesia and WG 2 (term 2012-2015) for disaster management. (as shown in Annex C). Further efforts will be done to provide the URLs of the on-line services so users can integrate the services into their own systems, and provide menu to let users publish map layers or services via the Portal. We would like to call participating to improve the Portal, including provide URLs that can be integrated into the Portal, and help to evaluate and validate the information published in the Portal. Comments and suggestions on improving the Portal are welcome.

- Australia has made efforts on conducting pilot project with some countries to test the mechanisms of sharing data under pre-drafted rules and integrate web-based services/portals for the interoperation of the NSDIs. (as shown in Annex D)
Annex A

Elementary Analysis to the Questionnaire on the Current Status of Spatial Data Infrastructure in AP Region

The Questionnaire was designed by UN-GGIM-AP WG 3 on “Regional SDI”, with focus on access, management, update, web-based services and sharing of data/service. The questionnaire has been distributed to member countries by the Secretariat of UN-GGIM-AP in June 2016. Eight replies have been received by September 2016, including Bangladesh, Brunei, China, HKSAR, Japan, Laos, Mongolia, Nepal.

From the limited returned questionnaires, we can see that:

- NSDIs are developed by the National Mapping Agency (NMA) in all country/region (except Hong Kong).
- About 38% of the countries have Laws and Policies related to NSDI, and about 50% have not yet (Fig.2, Green means “Yes”, Yellow means “No”).
- About 50% of the countries have standards related to NSDI, and about 38 have not yet (Fig.3).
- Control Point, Road, Water, Administration Area, Land Cover, Elevation, Place Name are the most essential themes in NSDI (Fig.1)

<table>
<thead>
<tr>
<th>Country</th>
<th>Control</th>
<th>Road</th>
<th>Rail</th>
<th>Water</th>
<th>Admin Area</th>
<th>Land Cover</th>
<th>Bld Area</th>
<th>Pipe</th>
<th>Elevation</th>
<th>Names</th>
<th>Parcel</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAOS</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>MONGOLIA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>BANGLADESH</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NEPAL</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>JAPAN</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>BRUNEI</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CHINA</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HK</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Fig.1 Themes in NSDI

- Digital Ortho-photo, digital elevation model and digital topographic data are the most essential data types in NSDI (Fig. 5)

<table>
<thead>
<tr>
<th>Country</th>
<th>DLG</th>
<th>DLW</th>
<th>DLG</th>
<th>DLW</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAOS</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>MONGOLIA</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>BANGLADESH</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NEPAL</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>JAPAN</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BRUNEI</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CHINA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HK</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Fig.5 Data type in NSDI

- Different Coordinate Referencing Systems are used by different countries/regions
<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Coordinate Referencing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAOS</td>
<td>Lao National Datum 1997</td>
</tr>
<tr>
<td>MONGOLIA</td>
<td></td>
</tr>
<tr>
<td>BANGLADESH</td>
<td></td>
</tr>
<tr>
<td>NEPAL</td>
<td>Modified UTM</td>
</tr>
<tr>
<td>JAPAN</td>
<td></td>
</tr>
<tr>
<td>BRUNEI</td>
<td>GDBD2009</td>
</tr>
<tr>
<td>CHINA</td>
<td>CGCS2000</td>
</tr>
<tr>
<td>HK</td>
<td>Hong Kong 1980 Grid</td>
</tr>
</tbody>
</table>

- 1:50000, 1:1000, 1:100000 are the most essential scale of the digital topographic data

<table>
<thead>
<tr>
<th></th>
<th>1:50000 or greater</th>
<th>1:10000</th>
<th>1:5000</th>
<th>1:1000</th>
<th>1:25000</th>
<th>1:50000</th>
<th>1:100000</th>
<th>1:250000</th>
<th>1:500000</th>
<th>1:1 million or smaller</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAOS</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MONGOLIA</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BANGLADESH</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NEPAL</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>JAPAN</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BRUNEI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CHINA</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HK</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Most countries/regions restrict access or limited circulation the data for public from domestic and abroad.
- One country (12.5%) proved free access to public users, and 4 countries/regions (50%) provide free access to governmental users.
- 3 countries (37.5%) provide on-line datasets order, while 50% provide on-line services.
- Only 2 countries (25%) have the national portal for geo-information service based on NSDI, while 6 countries (75%) have plan to establish one or upgrade the one.
- Most of the countries/regions are interested in sharing some of the data in NSDI and on-line services with other countries/regions, while current only 2 countries has signed agreements with foreign countries/regions or international organizations on sharing data/ service based on NSDI.

Based on this draft analysis, we can get the following draft conclusions for improving the development of NSDI and the interoperability of Regional SDI.

1. Efforts on Law/Policies and standards for NSDI should be enhanced, and the one for regional SDI should be developed;
2. Unique Coordinate Referencing System should be adopted by different NSDI;
3. Efforts on establishing National Geospatial Portal can be done by UNGGIM-AP, by
organizing technical training, seminar, workshop, and conduct pilot study and provide some demonstration/models/products;

(4) Data/service sharing among countries/regions can be promoted because most of the countries are interested in it.
Annex B

The 1st ISPRS-UNGGIM National Mapping and Cadastral Agencies Forum

WG 3 helped to organized the 1st ISPRS-UNGGIM National Mapping and Cadastral Agencies Forum during the ISPRS Prague Congress on 14-15 July, 2016. The Forum was opened by Greg Scott, Global Geospatial Information Management, United Nations Statistics Division, Department of Economic and Social Affairs. Total 4 sessions were arranged, with the topic of Imagery for National tasks, 3-dimensional geoinformation, Geospatial data infrastructures, Quality assessment of geoinformation. Officers and experts from National Mapping Agencies of Ireland, U.S., Spain, Saudi Arabia, France, the Netherlands, Czech Republic, Germany, Austria, China, Ethiopia, Finland, UK, Swiss, India, etc. made the presentations.
Annex C
Pilot on establishing the Regional SDI Portal

The pilot was developed by the team from National Geomatics Center of China (NGCC). One website (http://unggimap.tianditu.com/demo/) has been established based on the Chinese National Geoinformation Service Platform “MapWorld”, taking the reference of the data themes, data sharing rules, OGC standards defined by UN-GGIM-AP WG3. And integrated the information published in Geospatial BNPB, the website developed by Indonesia and WG 2 (term 2012-2015) for disaster management.

![Fig.1 Pilot Regional SDI Portal](image)

1. **Map Layers in the Portal:**
   - Image Map, including 250 meter (global area), 30 meter (AP area), 2 meter (China and some country), 0.5 meter (more than 500 Chinese Cities);
   - Terrain shading map, based on 90 meter SRTM (global area), 25 meter DEM (China area), 10 meter DSM (some countries);
   - Place names (in English, Chinese), including global area administrative place names, natural place names and POIs, especial detail in China area.
   - Place names (in Mongolian, Uighur), including administrative place names, natural place names and POIs in part of China, and Mongolia.
   - Global Land cover 30: Global land cover data at 30 meter resolution with 10 different classes for years 2000 and 2010. It is developed by China and distributed
by UN.

- Peta Ancaman Bencana, Peta Risiko Bencana: Disaster management information developed by Indonesia.

Fig.2 0.5 meter image in China

Fig.3 30 meter image in Bangladesh

Fig.3 2 meter image in Laos

Fig.4 1 meter image in Pakistan

Fig.5 Shade map based on 90 m DEM

Fig.6 Shade Map based on 10 m DSM
2. Standards used in the Portal:
OGC WMS and WMTS are used for releasing the services.

3. Functions provided by the Portal:
- Map browse
- Place name searching and positioning (in English and Chinese)
4. **Further works:**
   - Provide URLs of the on-line services, so everyone can integrate the services into their own systems
   - Provide menu to let users can upload map layers or services into the Portal so to let others to use.

5. **Call for participating:**
   UN-GGIM-AP members, WG 3 co-chairs, to work together to improve the Portal:
   - Provide URLs that can be integrated into the Portal;
   - Help to evaluate and validate the information published in the Portal;
   - Provide comments and suggestions to improve the Portal.

Fig 9  Searching and positioning “Colombo”
Annex D
Pilot done by Australia

Australia has made efforts on conducting pilot project with some countries to test the mechanisms of sharing data under pre-drafted rules and integrate web-based services/portals for the interoperation of the NSDIs.

Australia is a federation of states, territories and the Commonwealth (national) government. Management of fundamental geospatial information is the responsibility of various agencies across these levels of government.

Australia’s Foundation Spatial Data Framework program is wrapping up its investigation of identifying the approximately 900 datasets and data products which form the basis of our national spatial data infrastructure. The delivery policies and mechanisms for each dataset are being identified, as well as its mandate, funding, quality, location in the supply chain, and uses.

The delivery mechanisms for Australia’s fundamental geospatial datasets are many and varied. Based on investigations through the FSDF program, there are at least 52 ways in which users can find fundamental geospatial datasets, but only 27 of these allow a user to consume the datasets. There is no single way in which a user can access all fundamental geospatial information in one location. The investigation has also highlighted potential duplication in back-end infrastructure, which is leading to opportunities for custodians to collaborate on sharing infrastructure and dataset management overheads.

One of the means by which national fundamental geospatial datasets are able to be viewed is through the NationalMap (www.nationalmap.gov.au). NationalMap has been developed in Australia using the Cesium mapping platform, which is open source, as a basis for the development of a mapping and analytical software platform called TerriaJS. NationalMap is set up such that any dataset with any type of spatial reference – such as coordinates, addresses, localities, administrative boundaries, postcodes etc – can be automatically turned into a geospatial dataset as a web service and published into NationalMap within a day. Datasets with restrictions – in Australia, this includes the cadastre and some transport datasets – can be published under agreement as WMS services.

Demand for use of fundamental geospatial data off-line is still very strong in
Australia. Geoscience Australia released a new cloud-based delivery platform called ELVIS – the ELeVation Information System - in January. ELVIS has saved Geoscience Australia significant operating costs and reduced the delivery times of large unrestricted elevation datasets from days to a matter of minutes. Users can customise the data to suit their needs. ELVIS is being trialled to delivery elevation and imagery datasets for our partner agencies in our states and territories, and is also being looked at by commercial and international agencies. ELVIS’ three components – the “warehouse”, the processing engine, and the front-end discovery and delivery portals – have been designed to be technology-agnostic; any component could be replaced by open-source or proprietary technology when required.