Singapore Geospatial Collaborative Environment

Reference Number: SG-SPACE/2012/3

Country Report - Singapore

The Singapore National Spatial Data Infrastructure

Abstract

This document reports the status of Singapore's geospatial information activities, prepared at the request of the United Nations Global Geospatial Information Management (GGIM) Secretariat. It serves the purpose of exchanging practical information among member states and supports the consideration of the agenda item on the development of a knowledge base for geospatial information at the Second Session of the UN Committee of Experts on GGIM to be held in New York, 13-15 August 2012 (E/C.20/2012/INF/1).

Drafted by: SG-SPACE Secretariat

Endorsed by: SG-SPACE Coordinating Committee

Executive Summary

Since the inception of the Singapore Geospatial Collaborative Environment (SG-SPACE) in 2008, the Whole-of-Government and its agencies have made a concerted effort to cooperate closely on implementing the National Spatial Data Infrastructure (NSDI) in Singapore. This has helped proliferate the use of geospatial information and technology (GIT) in the public, private and people sectors.

From the SG-SPACE experience, the development of sound geospatial policies; strong institutional arrangements; data availability; and capacity development, supported by funding mechanisms are essential in implementing the NSDI.

One of the key challenges facing SG-SPACE, is to identify the key drivers towards data sharing and work towards that end goal in mind. This importance is augmented by the expectation that GIT will be the engine in supporting evidence-based decision-making, public service delivery and in the realization of Smart Cities.

From this perspective, there would be much scope for SG-SPACE to learn from the international geospatial community and where possible, to contribute to the discussions and the activities of the United Nations Global Geospatial Information Management mechanism.

SG-SPACE – Vision, Objectives & Critical Building Blocks

SG-SPACE is a Whole-of-Government initiative co-driven by the Singapore Land Authority (SLA) and the Info-communications Development Authority of Singapore (IDA) to implement Singapore's NSDI. SG-SPACE's vision is "Towards a spatially enabled nation", where the nation, including its government, businesses and citizens make use and benefit from geospatial information in all activities. SG-SPACE's objective is to provide a mechanism to make available the interoperable, organized, and authoritative geospatial information for national level decision making; public security; cost effective businesses and build location awareness among citizens.

Against this backdrop, SG-SPACE identified the following six building blocks crucial in implementing Singapore's NSDI. These six prongs are broadly classified as the six "M"s:
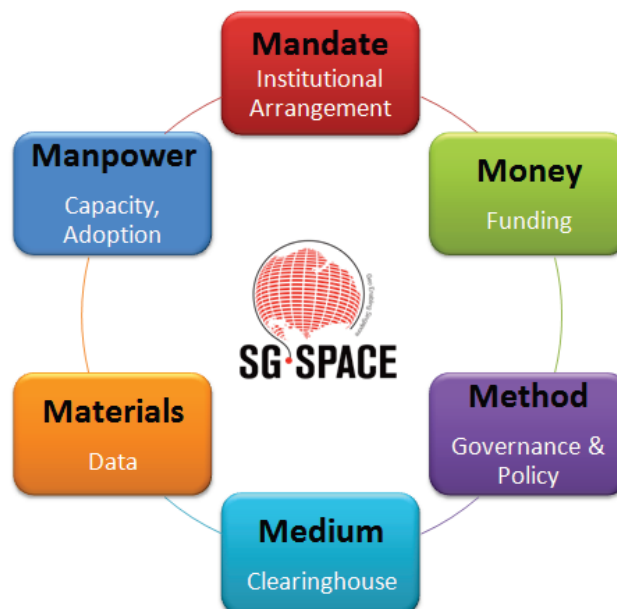

Figure 1: SPACE Building Blocks

Mandate: Institutional Arrangement

SG-SPACE is guided by a number of governing committees, which comprise the Government Data Steering Committee and SG-SPACE Coordinating Committee. These committees oversee and coordinate the development work for SG-SPACE carried out by the Technical Committees (TCs), and approve SG-SPACE projects and activities. Broadly, TC1 looks at the issues concerning Data Standards and Management; TC2 supports Infrastructure and Technology Facilitation and TC3 facilitates Capacity Building. These committees comprise of members from the developmental, planning, environmental, security, statistical, healthcare and economic government agencies. The multi-agency collaborative approach is critical to the robust implementation of SG-SPACE:

Figure 2: SG-SPACE Governing Committees

Money: Sustainability

Geospatial Information needs to be constantly updated and refreshed for meaningful representation and analyses. Sustainable funding is required to support the development of geospatial projects, data content, capacity and architecture. In this regard, the Government provides financial support to public agencies in the range of SGD$40M to support Singapore's infrastructure development and promoting adoption.

Materials: Data Availability

The numbers of spatial data contributed (371 layers) and the contributing agencies (29 public agencies) have increased steadily over the years. This trend reflects the increasing importance agencies placed on the value towards data sharing. To this end, traditionally textual information such as business data and population statistics has also been geo-coded to support a wide variety of public functions. Public officers can now discover and make use of geospatial data in their planning, operations and public service delivery:
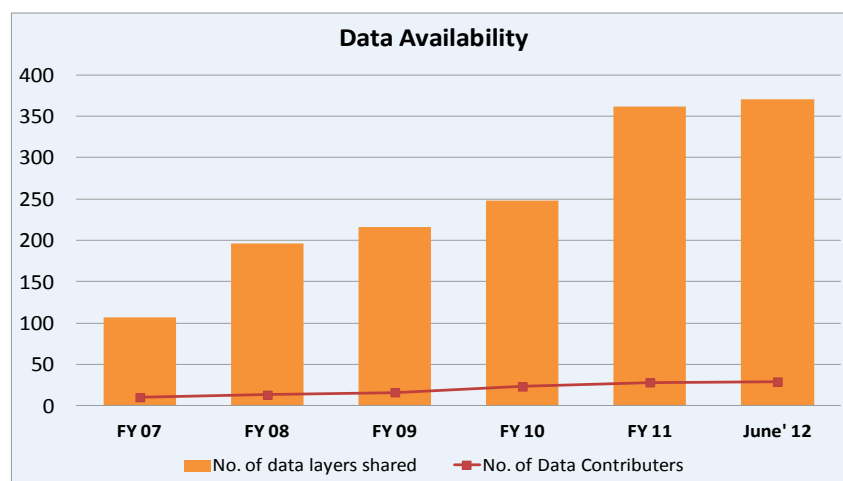

Figure 3: Available Geospatial Datasets

Materials: 3D National Topographic Map

Since early 2012, SLA is leading a whole-of-government initiative to develop and maintain a large-scale 3D National Topographic Map. Today, separate agencies produced and kept the topographic plan separately for their specific needs. Topographic plans are typically produced to serve localised development needs (e.g. for a particular development area). Given the increasing need for cross-sharing of information for better planning of public infrastructure such as roads, drains and parks; there is a strong need to coordinate the approach in integrating existing and future topographic data. This initiative will integrate the localised topographic survey plan data into a 3D GIS. The key datasets to be created in this initiative is the high resolution authoritative Digital Terrain Model (DTM). Hence, SLA will develop national DEM first to form the base for the topographic map. Height data from various sources have been adopted in producing the DTM. The primary technique adopted is the Stereo Photogrammetry Technique.

Method: Data Standards

Singapore will be adopting the international standards set out in the ISO 19100s series, with some local adaptation to help ensure data quality and interoperability. In essence, two levels of geospatial data standards will be developed and adopted by all agencies in Singapore. The first level is Common Standards which touch on general aspects of data management that are applicable to all datasets. The second level is Content Standards which will be developed by the various working groups formed under TC1. SG-SPACE is currently assisting public agencies to implement the Common Standards for Fundamental Datasets under Phase 1 of the implementation plan.

Method: Fundamental Datasets
The SG-SPACE Secretariat, in consultation with the governing committees, has identified the Fundamental Datasets which are the authoritative sets of core data that provide spatial reference, enable interoperability of geospatial data and applications for Singapore. Looking ahead, SG-SPACE seeks to improve their accessibility and ensure their continued availability and quality over time.

Medium: Clearinghouse

GeoSpace was launched in Feb 2011 as the government's clearinghouse for geospatial data and metadata. Through this intranet, public agencies are able to share data from the various data hubs, discover and use data for planning, analysis, operations, decision making and public service delivery. GeoSpace allows agencies to upload their data directly through file transfers, web uploads or web service. GeoSpace has also recently added a new function known as the "GeoCommunity". This spatial platform provides tools for inter-agency collaboration and interaction on a specific area of interest. An example is the Slope Hazard Analysis Repository System, which brings together relevant agencies to pool data and share expertise on slope management and build models to inform proactive slope protection measures.
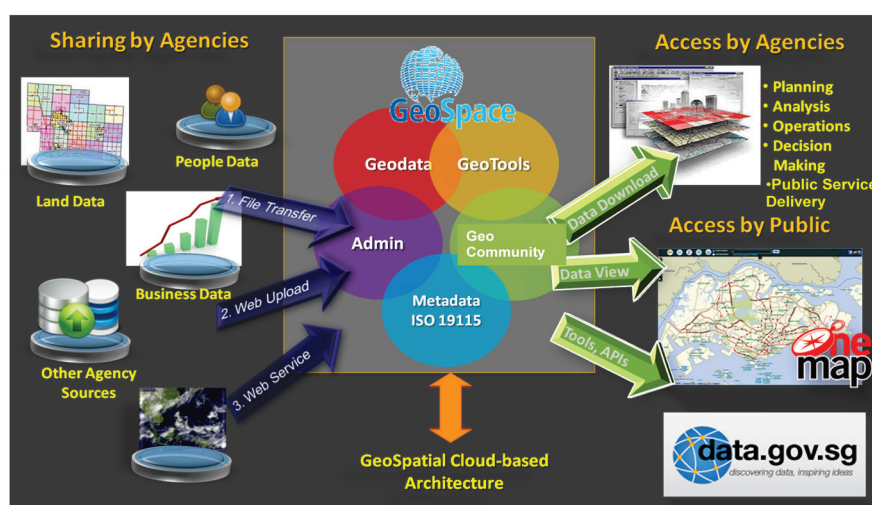

Figure 4: GeoSpace Framework

<u>Medium: OneMap</u>

Geospatial data from the government is also shared with the public through the internet portal, OneMap (www.onemap.sg). OneMap an integrated map system which government agencies use to deliver thematic data and location based services. The private sector also utilizes OneMap and the wealth of government geospatial information to develop value-added map-based services for the public:
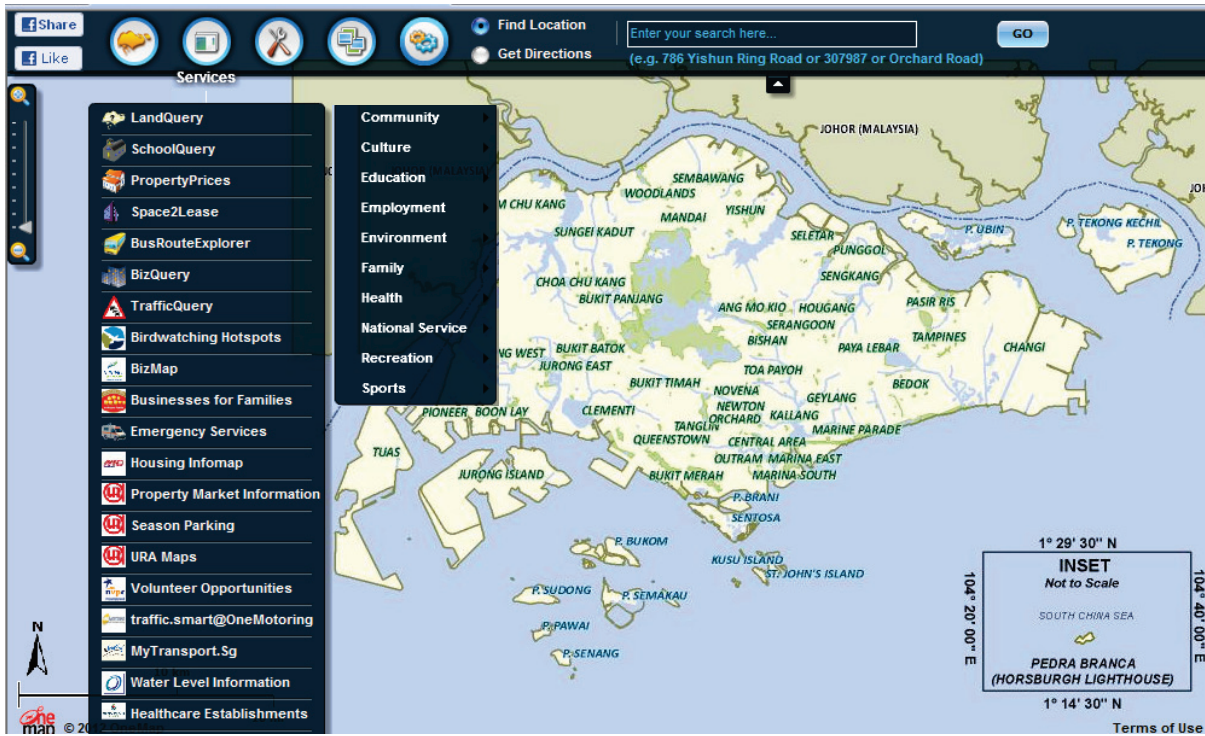

Figure 5: Services & Themes on OneMap (www.onemap.sg)

Since the launch of OneMap on 31 March 2010, the number of participating government agencies has been steadily increasing with more than 30 public agencies contributing information and more than 50 agencies using OneMap to develop public services. To date, there are 50 map themes and 30 services made available for free to the public through web portals and access via OneMap APIs:
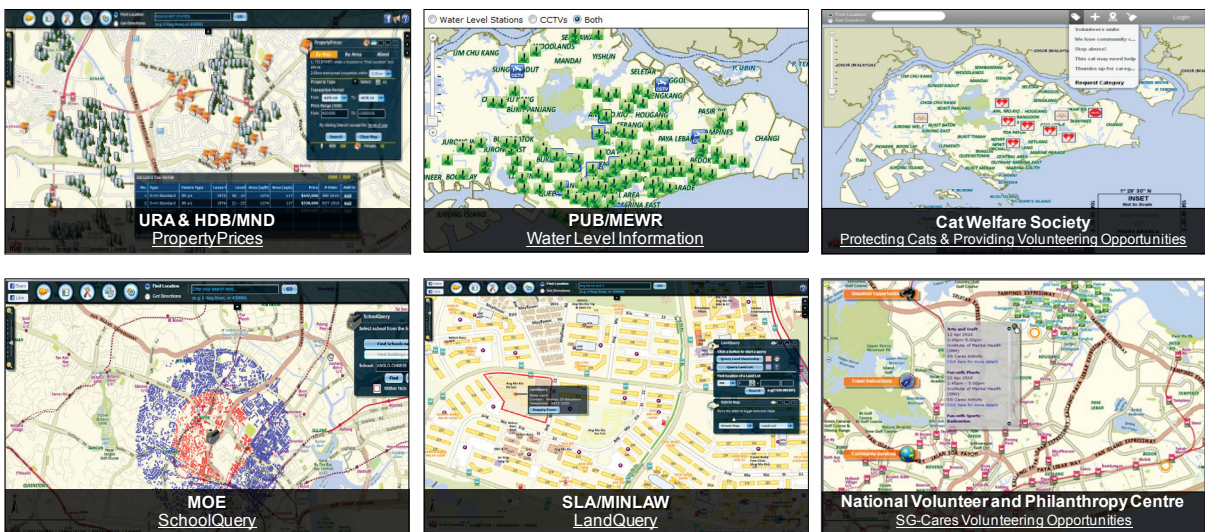

Figure 6: OneMap Applications

On 24 May 2012, "OneMap Crowd Sourcing Tools" was launched to help organizations tap on volunteered geographic information from the crowd. The first adopter is the Cat Welfare Society who used crowd-sourcing to better manage stray cats or any other relevant cat issues.

Figure 7: Crowd Sourcing API used by the Cat Welfare Society. The tool was also mentioned in UNSPIDER

The OneMap platform serves to catalyze the use of spatial data and collaboration in the 3P (Public, Private People) sectors. In this regard, OneMap has picked up a number of awards including the ESRI Special Achievement in GIS (2010); Map Asia Geospatial Excellence Award (2010); URISA Exemplary Systems in Government (2010); Stockholm Challenge Finalist in Public Administration (2010); and e27 Asia Top 50 Apps Best Design of the Year for Pocket OneMap (2011).

Manpower: Capabilities

Beyond putting in place geospatial policies and provision of infrastructure, SG-SPACE plays a more fundamental role in developing SG-SPACE long term capabilities in GIT. This involves investment in capacity development in areas such as education, outreach and adoption, so as to lay the basis for sustainable development in the future.

First, SG-SPACE collaborates with three local tertiary institutions to run GIS 101 courses from late 2010 to equip public officers with basic GIS knowledge and its applications. GeoSpace trainings are also conducted to familiarize officers with the use of the clearinghouse. SG-SPACE is currently working with the Ministry of Education and education institutions to introduce geospatial topics into the curricula and certification programs.

Second, to facilitate outreach, SG-SPACE organizes annual competitions, namely the OneMap Challenge and the Spatial Challenge. The OneMap Challenge aims to increase the awareness on the use of spatial data among the general public through the development of desktop and mobile applications. To provide the geospatial foundation for successive generations of Singaporeans, SG-SPACE, supported by the Ministry of Education, organizes the Spatial Challenge for tertiary students. It aims to encourage the use of GIT in schools and entrench the innovative use of GIT in Singapore.
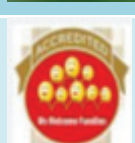
Third, the government has also set aside SGD$15.5 million through GeoFund to encourage public agencies to adopt GIT. For example, the National Parks Board uses GeoFund to develop a GIS-based system for tree management and trend analysis. Other projects include the development of an information system to study climate change and to prototype the use of open-source remote sensors to collect real-time geospatial information. In addition, SG-SPACE carries out pilot projects with public agencies and NGOs to help spur further development of GIT within these organizations.

Fourth, SG-SPACE recognizes the private sector as a key partner in driving the use of GIT in Singapore SG-SPACE aims to create an overall environment where a vibrant private sector can support the growth of GIT with their ideas, innovations, expertise and experience. In this regard, the i-Singapore@work Call-for-Collaboration Initiative is to encourage enterprises to adopt geospatial applications to create new business opportunities, improve workforce productivity and enable better decision making. The awarded projects include applications on live traffic mashups, location analytics, live surrounding information and personal navigation in areas of retail, real estate and logistics.

Uses of Geospatial information

The public agencies and NGOs in Singapore use GIT for their operations, planning, decision-making and public service delivery. A number of applications and services have also sprung up across the developmental, economic, healthcare and social sectors. Some examples are as follows:

Services/Apps	Agencies	Brief description of application	
iPlan	Urban Redevelopment Authority (URA)	iPLAN or the Integrated Planning and Land Use System is the GIS platform using over 100 map layers to support land use planning in Singapore.	
Property Market Information	Urban Redevelopment Authority (URA)	This app provides basic information on prices, rentals, vacancy, supply and stock of private residential, commercial and industrial properties.	
Housing Infomap	Ministry of National Development (MND)	This app provides users the location of Town Council and HDB Branch Offices. It also allows a search for properties that have been bought and sold in the vicinity of a location.	
Mobile@HDB	Housing and Development Board (HDB)	This app allows users to check on flat sales application results; availability of flats for public viewing; expected completion dates for new flats; recent transacted prices for resale flats; and directions.	
Parks "Live"@SG	National Parks Board (NPARKS)	An augmented reality app to identify locations and provide navigation to facilities, places of interests in Pasir Ris Park.	
MyTransport.SG	Land Transport Authority (LTA)	A portal and app providing information and eServices such as accident locations and live traffic conditions for all land transport users, including commuters, motorists and cyclists.	
BusMesh@SG	Nanyang Polytechnic (NYP)	This app provides locals and tourists travelling in and around Singapore with information on bus routes and arrival timings. It taps on transport data from Public Transport @ SG, SMRT Buses and SBS Transit.	
NEA Weather@SG	National Environment Agency (NEA)	This app shows the weather forecast, temperature and PSI readings at different locations in Singapore.	
MyWaters	Public Utilities Board (PUB)	This app provides water level information of drains and canals collected from over 150 water sensors. This also enhances forecasting capabilities and response time. Also features an augmented reality function.	
BizMap	SPRING Singapore	This app allows you to find HDB and SLA industrial properties available for lease. You can search by property type: Office Commercial Industrial Warehouse Mixed-use or search by location.	
Your Singapore Guide	Singapore Tourism Board (STB)	This app contains over a 1,000 things to see and do in Singapore. It provides directions to the sight using built in maps.	

MOH iHealth Sg	Ministry of Health (MOH)	This app allows users to search and locate Healthcare Establishments and doctors nearby. Users can search by name, location, establishment type etc.	
iDAT	Health Promotion Board (HPB)	This app helps you track calories consumed, calories burned and maps the running routes.	
Police@SG	Singapore Police Force (SPF)	Inform the public on information surrounding safety related issues in their neighbourhood (crime incidents, police appeals, missing people) and allows users to search for and locate police stations.	
Find My MP	Singapore Parliament	This app allows user to find the elected Member of Parliament representing the area the users are living in.	
PocketOneMap	Nanyang Polytechnic (NYP)	Pocket OneMap is the mobile version of SLA's OneMap. This app gives you immediate access to concise and accurate location-based information.	
Birdwatching Hotspots	Nature Society of Singapore	This app allows members of the public to view on a Singapore map the location of hotspots to observe different species of birds based on 7 distinct habitats - Forest, Woodland, Parkland, Scrubland, Grassland, Freshwater Marshland, and Mangrove.	
Family Friendly Businesses	Business for Families Council	This web based app helps locate family-friendly businesses in Singapore.	
Rapid Rescue	The Singapore Red Cross	This app connects first-aiders to those in a medical emergency. When an SOS is activated, nearby first-aiders can respond using the shortest route mapped to the first aid seeker, before the ambulance arrives.	

Challenges

One of the constant challenges facing SG-SPACE, is to identify the key drivers towards data sharing and work towards that end goal in mind. The increase in data availability and accessibility will unlock the full potential of geospatial information. This would require a collective and sustained effort from public agencies to allocate resources towards improving data sharing.

Nevertheless, GIT is a growth area and the pace of development can only intensify. It is a critical component to Smart Cities and is becoming increasingly ubiquitous in daily lives. To this end, the development of sound geospatial policies, quality infrastructures, strong coordination within the government, investment in capacity development and support from the public, private and people sectors become not only useful, but essential to the implementation of a NSDI.

SG-SPACE is at the initial phase of developing our NSDI and is gearing up to further strengthen Singapore's geospatial capabilities. In this regard, SG-SPACE hopes to learn from the international experiences and where possible, contributes to the discussions and activities concerning global geospatial development.