

## TOWARD SPATIALLY ENABLED COUNTRY AND SOCIETY : THE CASE OF THAILAND

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**Abstract:** In the year 2000 the Geo-Informatics and Space Technology Development Agency (GISTDA) was officially established by combining two separate but inter-dependent offices, namely Remote Sensing Division and the National GIS Office into one public organization. The two main functions of GISTDA, namely Remote Sensing and GIS have been set in motion alongside harmoniously. The function dealing with geo-informatics has been moving forward to cover GI standardization, NSDI development and implementation. Activities under the NSDI efforts, under the guidance of the National GIS Commission have been in progressing stages covering the development of 13 fundamental geographic datasets and the identification of the respective custodians; the development of geospatial data clearinghouse/portal for accessing, assessing, enquiring and transaction of spatial data between users and producers of spatial data that meet their needs.

The ThaiSDI has been established to be a forum for communication of activities dealing with all components of NSDI in order to promote activities leading to interoperability in all sectors and all levels of operation. This ThaiSDI, representing Thailand geospatial data clearinghouse/portal has been officially launched at the inauguration chaired by the Minister of Science and Technology on 9<sup>th</sup> February 2012. At this occasion, representatives of all the custodians of the already identified 13 FGDS layers were enthusiastically present to assure the cooperation and meaningful contribution into the Thailand SDI that has been under the development for some time now.

Meanwhile the conditions for spatially enabled society are being followed to keep up with the conditions for spatially enabled country and society in order for the continued development aiming for spatially enabled Thailand.

### INTRODUCTION

Geographic Information Systems (GIS) have become an indispensable tool for managing and using spatial information at the local, regional, national and global levels. Many organizations need the same information, but in many countries including Thailand, there is no effective structure for the effective coordination and sharing of these data. The concept of National Spatial Data Infrastructure (NSDI) has been implemented in many parts of the world and provides a framework of standards, policies, data, procedures, and technology to support the effective coordination and dissemination of spatial information across many sectors of government and society.

While the Spatial Data Infrastructure (SDI) initiatives are being conceived, considered, developed and implemented around the world with varying stages of advancement, Thailand has put the NSDI development in motion not long ago. Its implementation has not only been driven from within but also from the outside world as well, especially by way of “learning from experience of others”. The idea of NSDI has been around for a few decades already and accordingly, there have been many documents and literatures generated that one can refer to as starting point to learn more or to follow in the case of adopting SDI development, in view of “learning from experience of others”.

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## NSDI CONCEPTS, COMPONENTS, DEVELOPMENT AND IMPLEMENTATION

According to the SDI Cookbook (<http://www.gsdi.org>), Spatial Data Infrastructure (SDI) was taken to mean “The SDI provides a basis for spatial data *discovery, evaluation, and application* for users and providers within all levels of government, the commercial sector, non-profit sector, and academia and by citizens in general”.

The Federal Geographic Data Committee (FGDC) gave the definition of NSDI as: “National Spatial Data Infrastructure” (“NSDI”) means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.”

Chan et al, 2001 described the nature of SDI in the following way “SDI is understood differently by stakeholders from different disciplines. It is commonly recognized that an SDI can include core components of policy, fundamental datasets, technical standards, access networks and people, and adopt different design and implementation processes. In this regard, researchers and various national government agencies have attempted to capture the nature of SDI in definitions produced in various contexts. The varieties of definitions have resulted in a fragmentation of the identities and nature of SDI. Lack of a more holistic representation and understanding of SDI has limited the ability to describe its evolution in response to the technical and user environment”.

From the beginning of SDI initiatives, it can be seen that three levels of SDIs have been identified, namely national, regional and global levels. National SDI is seen as more natural than any other levels of the SDIs because of the sense of identity. Additionally, there are more list to show at the national level, based on Masser (1998a) and Onsrud (1998), cited by Rajabifard and Williamso, 2001 at the outset, for example Australia, Canada, China, Colombia, Denmark, Finland, France, Germany, Hungary, Italy, Indonesia, Japan, Malaysia, Netherlands, Portugal, Spain, Switzerland, UK and USA. Fortunately, there have been researchers/practitioners who contributed into the documentation pool to serve those who may be seeking for information and experience in formulating and implementing national SDI, including future strategic plans, especially the cases of Australia and the United States. For regional SDIs, there are two regional SDI initiatives that include the Asia-Pacific SDI (APSDI) coordinated by the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) and the European Geographic Information Infrastructure (EGII) coordinated by the European Umbrella Organization for Geographic Information (EUROGI). The regional SDI is made possible because of the existing supporting organizations, such as the PCGIAP for the APSDI and the EUROGI for the EGII. The other two anticipated regional SDI from Americas and Africa have to be in existent under the coordination of respective agencies from the Americas and Africa respectively. At the global level, there is an ongoing initiative called Global Spatial Data Infrastructure (GSDI) under which two regional organizations, namely EUROGI and PCGIAP are playing supporting roles. Additionally, there is a GSDI Association to provide some technical advice, etc.

## A BRIEF REVIEW OF NEW INITIATIVES FOR SPATIAL ENABLEMENT OF A COUNTRY AND SOCIETY

The concept of spatially enabled government and society may take similar trail. It is believed that many individuals/organizations who may have entered into the NSDI development already and yet not well informed about what it means by ‘Spatially Enabled Government and society’.

Spatially Enabled Government (SEG) manages its information and process using spatial concepts and technologies. The vision gained traction in the mid 2000s and has been the focus of international forums including GSDI and PCGIAP (Bennet and Rajabifard, 2009).

Spatially enabled government is achieved when governments use place as the key means of organizing their activities in addition to information, and when location and spatial information are available to citizens and business to encourage creativity (Enemark, 2007).

A Spatially Enabled Society (SES) – including its government – is one that makes use and benefits from a wide array of spatial data, information, and services as a mean to organize its land related activities. Spatial enablement is a concept that adds location to existing information and thereby unlocks the wealth of existing knowledge about the land, its legal and economical situation, its resources, potential use and hazards. Information on landownership is thereby a basic and crucial component to allow for correct decision-making. Such data and information must be available in a free, efficient, and comprehensive way in order to support the sustainable development of society. It

therefore needs to be organized in such a way that it can easily be shared, integrated, and analyzed to provide the basis for value-added services (Stuedler and Rajabifard, ed., 2012). This same document covers other information such as challenges that led to the concept of ‘spatially enabled government and society’ and a set of six fundamental elements that are required to realize the vision of ‘spatially enabled government and society: SEG - SES’.

## NSDI DEVELOPMENT IN THAILAND

Geographic information as a technology has propagated into Thailand after remote sensing has been settled and in place. The promotion of geographic information system was done similar to that of a business activity resulted in a large number of hardware and software for GIS acquired by both public and private organizations. This situation occurred at the time when people were not well prepared to take up the technology that was still new, complicated and unproven at the time. This had led to the lack of policies, uncoordinated and no direction, duplication of activities in data acquisitions and application, no sharing or exchanging of data, etc.

In order for the policies on geospatial information development, cartography and remote sensing to proceed systematically, minimizing duplication, promoting integration and sharing and coordinating effectively, the Government decided to establish the “National GIS Commission” or some time called “National Geographic Information Committee (NGIC)” by the Order of the Prime Minister’s Office, dated 16 June B.E. 2546 (2003) which went into effect on 9 July B.E. 2546 (2003) with GISTDA being appointed as Secretariat to the Committee.

The establishment of the National GIS Committee marked the important policy decision made by the government in the hope for the realization of the e-government plan that has not been fulfilled thus far to that point. By action of the National GIS Committee, the issue of NSDI was brought up for serious consideration again in 2000.

### Policy on Institutional Framework

The current institutional infrastructure that is in place includes GISTDA, a public organization charged with the responsibility in geospatial information development and geospatial information standards and standardization for the country. The Office of Thai Industrial Standard Institute (TISI) is official representative of the Thai government in the ISO/TC211 meeting along with representative from GISTDA. TISI is an official organization to publicize the developed and accepted standard(s). The National GIS Committee, appointed by the cabinet is a strong geospatial information infrastructure to the Thai SDI in a similar way the FGDC is to the United States’ NSDI.

### Geospatial Information Standards and standardization

In 1997 Thailand joined ISO/TC211 as Participating-member: P-member to participate in the development process of the ISO/TC211 191XX series of geospatial information standards. In this endeavor the TISI established a technical committee (TC 904) to liaise with ISO/TC211 in the development of the ISO 191XX series. Being P-member of ISO/TC211 Thailand has access to the developed and published ISO/TC211 standards via TISI. As a result of this approach, TISI has publicized (publicly announced) metadata standard ISO 19115:2005 as Thai Industrial Standard 19115:2548. Some other standards (23) have been publicized by the National GIS Committee to support the urgent need of user community and to assure them of the direction of Thailand standardization.

Regardless of how many standards have or have not been publicized the only thing that count is how many people are adopting or using the standards in their every day undertaking. This has been taken as a serious matter as GISTDA has been carrying out the Outreach Program to build awareness and capacity in geospatial information area as well as all about NSDI itself.

### Fundamental Geographic Data Set: FGDS

Survey by GISTDA in 2010 on data was made in view of upcoming NSDI development and found that activities regarding FGDS have been put into two areas, namely: development of base data, and development of FGDS themselves.

The base data includes orthophotos (aerial photos), orthoimages (satellite images), geodetic base stations and network (geodetic control), and digital elevation model (DEM). These activities have been conducted by certain organizations which can be identified as one or more organizations doing the same or similar activities. As for the FGDS there were 9 activities being carried out by different organizations and some time the same situation occurred the similar way as that of the base data. The 9 activities include administrative boundary, transportation,

water resources/waterways/rivers, urban/built-up areas, land use, forest area, topographic map data, land parcel, and marine/oceanographic data. These were known to exist in the survey but all these are now readjusted to take a better form in going into the NSDI development and implementation.

Plan to drive Thai SDI Implementation (National Spatial Data Infrastructure: NSDI) (B.E. 2554-2558)

For the efficient and effective mobilization of the Thailand SDI to take place the implementation plan has been devised to take two consecutive periods, i.e. a 5-year period (B.E. 2554-2558) and a 2-year period (B.E. 2558-2560) respectively. The brief account of activities in each period can be presented as follows.

The first period (phase) (B.E. 2554-2558)

Under the first period all the assigned FGDS custodians will collect, collate and integrate all FGDS under their responsibilities based on standardized approaches guided by the National GIS Committee. Part of FGDS can be put to service at the start and finally by B.E. 2558 all the FGDS service will be available to all sectors of the society. At the beginning of this period development and establishment of complete NSDI Portal/Clearinghouse will commence by connecting the existing ThaiSDI clearinghouse to the FGDS custodian nodes (Web-GIS service) based on standardized protocols accepted and accessible by all stakeholders in the community. Additionally, capacity building for all stakeholders including data producers, data distributors and end users will be in effect for the benefit of all concerned and the country as a whole.

The second period (phase) (B.E. 2558-2560)

This period has been set up to accommodate all necessary activities to ensure a fully functional Thai SDI as a result of taking all the necessary steps identified in the cookbook of the pilot project. At the end of this period it is expected that all the FGDS developed will have been integrated among them and with other relevant datasets to be instituted in the Thai SDI system, NSDI portal/clearinghouse including all FGDS nodes will be up and functional to serve the next plan to accommodate business, as well as high level government administration activities.

## DISCUSSION AND CONCLUSION

This paper serves to convey information on three related subjects, namely “Spatial Data Infrastructure: SDI” in general, “Thai SDI”, and “Spatially Enabled Government and Society: SES/SEG”. Geospatial information society/community have come to existence as a result of the evolution of spatial technologies, based on the 3-S technologies plus other related ones such as surveying & mapping, computer sciences, geography, cartography, spatial digital analysis, etc. Spatial data/information has been accepted and used as a basis for sound decision making for a long time.

The development of national spatial data infrastructure in Thailand witnessed the two periods, one before GISTDA was established and the other after the establishment of GISTDA. The remote sensing and GIS activities that were located separately were brought together under one roof to create a public organization called “Geo-Informatics and Space Technology Development Agency (GISTDA). The two functions, namely RS and GIS continued to be carried out by two different but interdependent groups. The GIS group whose background are carried over from the previous group has the responsibility to look after the NSDI development and implementation. In fact this group is going into the NSDI journey with relatively well prepared condition. The ThaiSDI portal setup to accommodate the metadata editor software to assist in developing metadata was already in place. More than 20 general geospatial information standards were developed and ready to be publicized.

In all, the Thai SDI development and implementation is to start with 5 activities to be carried out, namely, development of NSDI Portal, development of geospatial information standards, development and integration of base data, development and integration of FGDS, and capacity building. The implementation to drive the Thai SDI consists of two periods, i.e. the first period is for 5 years (B.E. 2554-2558) and the second period is for 2 years (B.E. 2558-2560) to improve and refine the 5 activities. In addition to the plans mentioned, there are plans for budgetary, plan for follow-up and evaluation, and direction/measures for the implementation as well. It is hoped that the plan to drive the Thai SDI will be successful.

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