BULETIN Geospatial SEKTOR AWAM

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Pusat Infrastruktur Data Geospatial Negara (MaCGDI)
Kementerian Sumber Asli dan Alam Sekitar (NRE)
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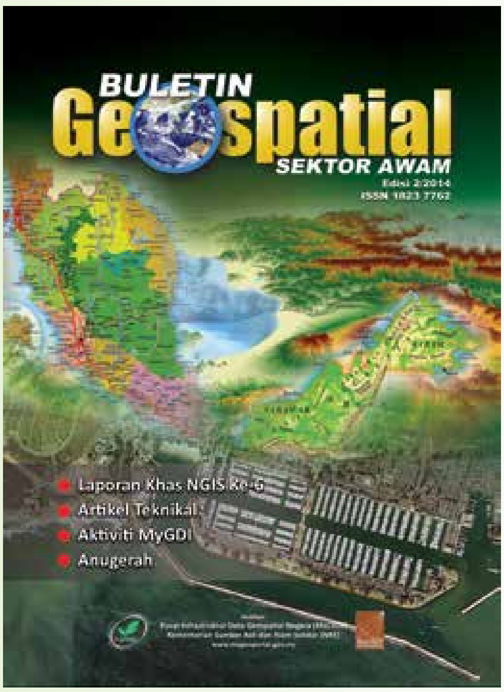
Kandungan

Laporan Khas

Artikel Teknikal

Aktiviti MyGDI

Anugerah



BULETIN Geospatial SEKTOR AWAM

Sidang Pengarang

Penerbit
Pusat Infrastruktur Data Geospatial Negara (MaCGDI)
Kementerian Sumber Asli dan Alam Sekitar (NRE)
Aras 7 & 8, Wisma Sumber Asli
No. 25, Persiaran Perdana, Presint 4
62574 Putrajaya, Malaysia
Tel: +603-88861111
Faks: +603-88894851
www.mygeoportal.gov.my

Ketua Editor

Assalamualaikum,
Salam Sejahtera dan Salam 1Malaysia

Dengan rasa bersyukur kepada yang Maha Esa pada kesempatan ini membenarkan saya mengukir sepatah dua kata buat tatapan semua.

Penerbitan Edisi 2/2014 Buletin Geospatial Sektor Awam (BGSA) oleh MaCGDI memaparkan laporan khas NGIS ke-6, artikel teknikal dan aktiviti MyGDI. Antara intipati kandungan buletin ini merangkumi pengajuran aktiviti atau program berkaitan geospatial yang merupakan platfom bagi mempromosikan pengetahuan serta aktiviti geospatial yang telah dilaksanakan oleh pelbagai pihak di Malaysia.

Kelestarian penerbitan ilmiah ini harus dilihat sebagai satu usaha murni dalam mempromosikan pengetahuan berkaitan geospatial kepada pengguna geospatial. Beberapa artikel telah didokumentasikan untuk tatapan dan dikongsi bersama secara umum. Inisiatif yang diambil oleh MaCGDI dapat mempromosikan aktiviti geospatial pada tahap yang lebih meluas dan dimanfaatkan oleh semua pihak.

Akhir kata,

Kalau ada sumur di ladang,
Boleh kita menumpang mandi,
Kalau ada umur yang panjang,
Boleh kita bersua di lain edisi.

Sekian, terima kasih.

Selamat membaca.

Fuziah binti Hj. Abu Hanifah
Pengarah MaCGDI

LAPORAN KHAS

SIMPOSIUM MAKLUMAT GEOSPATIAL KEBANGSAAN (NGIS) KE-6

PUSAT KONVENSYEN ANTARABANGSA PUTRAJAYA (PICC)
17&18 MAC 2014

Pengenalan

Persidangan dan Pameran Sistem Maklumat Geografi Kebangsaan *(National GIS Conference and Exhibition)* telah mula dianjurkan oleh NRE pada tahun 2004. Ia merupakan aktiviti dwi tahunan diadakan bagi mempromosikan penggunaan maklumat geospatial dalam perancangan pembangunan negara.

Pada tahun 2012, nama persidangan ini telah dinamakan semula kepada Simposium Maklumat Geospatial Kebangsaan *(National Geospatial Information Symposium* – NGIS) selaras dengan peluasan skop persidangan yang meliputi semua aspek pengurusan geospatial seperti penyediaan infrastruktur dan pengurusan maklumat.

Semenjak dianjurkan pada tahun 2004, sebanyak lima (5) persidangan NGIS telah berjaya menarik penyertaaan yang menggalakkan dari sektor awam, swasta dan institusi pengajian tinggi serta orang awam.

NGIS Ke-6 pada kali ini diadakan bagi memberi ruang kepada semua pihak dalam memperluaskan lagi pengetahuan dalam bidang geospatial dan mempromosikan kredibiliti setiap agensi pempamer. Pelbagai aktiviti diadakan termasuklah pembentangan kertas kerja yang telah disampaikan oleh pakar-pakar dalam bidang geospatial, sesi perbincangan panel dan pameran daripada pelbagai agensi kerajaan dan swasta.

Penganjuran NGIS Ke-6

Penganjuran NGIS Ke-6 membariskan Kementerian Sumber Asli dan Alam Sekitar (NRE), Pusat Infrastruktur Data Geospatial Negara (MaCGDI) dan Jabatan Ukur dan Pemetaan Malaysia (JUPEM) sebagai penganjur utama, manakala Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU) dan Suruhanjaya dan Multimedia Malaysia (MCMC) sebagai penganjur bersama. *International Symposium and Exhibition on Geoinformation* (ISG) yang terdiri daripada Universiti Putra Malaysia (UPM), Universiti Teknologi Malaysia (UTM), Universiti Teknologi Mara (UiTM), *Infrastructure University Kuala Lumpur* (IUKL), ATSB Sdn. Bhd. dan PETRONAS CARIGALI merupakan organisasi sokongan bagi penganjuran pada kali ini.

Manakala penaja simposium ini terdiri daripada:

1. <u>Penaja Platinum</u>
   i) Suruhanjaya Komunikasi dan Multimedia Malaysia (MCMC)
   ii) ESRI Malaysia
   iii) Dr. Nik & Associates Sdn Bhd

2. <u>Penaja Gold</u>
   Hexagon Geospatial

Tema

NGIS ke-6 ini bertemakan 'Geospatial Pemacu Wawasan Negara' *(Geospatial Drives National Vision)*. Tema ini dipilih bagi memperlihatkan kepekaan dan langkah proaktif yang diambil oleh pihak Kementerian bagi menangani dan menghadapi cabaran perkembangan yang begitu pesat dalam bidang maklumat dan teknologi geospatial.

Objektif

Objektif penganjuran NGIS ke-6 adalah seperti berikut:

1) Menyediakan *platform* untuk membincangkan isu-isu berkaitan maklumat geospatial terkini;
2) Merealisasikan misi kerajaan ke arah kecemerlangan pengurusan maklumat geospatial dalam pelbagai sektor; dan
3) Merangsang transformasi pengurusan maklumat secara geospatial ke arah wawasan negara.

Faedah Penganjuran

Di antara faedah penganjuran simposium ini adalah:

1) *Platform* bagi komuniti GIS di Malaysia untuk mendapatkan pengetahuan dan maklumat terkini berkaitan penggunaan, pengendalian dan penyelenggaraan maklumat geospatial;
2) Menyediakan forum perkongsian pengalaman dan kepakaran dengan pakar-pakar GIS dalam menggalakkan lagi perkembangan GIS di Malaysia;
3) Memberi pendedahan kepada peserta mengenai pelaksanaan dan kemajuan infrastruktur geospatial melalui program MyGDI; dan
4) Memberi pengiktirafan kepada agensi yang aktif dalam program MyGDI.

Penyertaan

Seramai 789 peserta telah hadir untuk menyertai simposium ini. Kesemua peserta simposium terdiri daripada agensi kerajaaan, swasta dan institusi-institusi pengajian tinggi serta pelajar sekolah di sekitar Putrajaya.

Sebanyak 26 agensi kerajaan dan swasta telah menyertai pameran pada simposium kali ini. Berikut adalah senarai agensi yang terlibat:

1) Pusat Infrastruktur Data Geospatial Negara (MaCGDI), NRE
2) Suruhanjaya Komunikasi dan Multimedia Malaysia (MCMC)
3) Jabatan Ukur dan Pemetaan Malaysia (JUPEM)
4) Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU)
5) ESRI Malaysia
6) Dr. Nik & Associates Sdn Bhd
7) Hexagon Geospatial
8) Selia Selenggara Sdn. Bhd.
9) Teknologi KBSE Sdn. Bhd.
10) Global-Trak System Sdn. Bhd.
11) Av Tech Resources
12) Map Info Sdn. Bhd.
13) Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia (JPBD)
14) Jabatan Pengaliran dan Saliran Malaysia (JPS)

15) Fakulti Geoinformasi dan Harta Tanah (FGHT), Universiti Teknologi Malaysia (UTM)
16) GPS Lands (M) Sdn. Bhd.
17) Jabatan Alam Sekitar Malaysia (JAS)
18) Telekom Malaysia Berhad (TM)
19) Jabatan Tanah dan Survei Sarawak (JTSS)
20) Urban Explorer Sdn Bhd
21) MapFlex Solutions
22) RS & GIS Consultancy Sdn. Bhd.
23) Jabatan Ketua Pengarah Tanah dan Galian (e-Tanah)
24) Syarikat E.J. Motiwalla
25) Institut Penyelidikan Perhutanan Malaysia (FRIM)
26) Jabatan Hutan Sarawak

Perasmian

Perasmian NGIS ke-6 telah disempurnakan oleh YB Datuk Seri G. Palanivel, Menteri Sumber Asli dan Alam Sekitar, pada 17 Mac 2014. Antara jemputan terhormat yang turut hadir sama di dalam majlis ini adalah YB Dato' Sri Dr. James Dawos Mamit, Timbalan Menteri NRE, YBhg. Dato' Sri Zoal Azhar bin Yusof, Ketua Setiausaha NRE, YBhg. Dato' Dr. Mohd Ali bin Mohamad Nor, Timbalan Ketua Setiausaha (TKSU I) NRE, YBhg. Datuk Dr. Abdul Rahim bin Hj. Nik TKSU II, ketua-ketua pengarah agensi persekutuan dan negeri serta Pihak Berkuasa Tempatan.

Anugerah Khas MyGDI

Anugerah Geospatial Kebangsaan 2014 (AGK 2014) julung kalinya telah diperkenalkan dalam penganjuran NGIS ke-6 ini. AGK 2014 terdiri daripada dua (2) kategori iaitu:

1) Anugerah MyGDI Kebangsaan (Agensi Kerajaan); dan
2) Anugerah Kecemerlangan Geospatial (Umum).

Anugerah ini merupakan satu inisiatif bagi mengiktiraf agensi-agensi yang bergiat aktif dan inovatif dalam bidang geospatial. AGK 2014 diperkenalkan bagi merangsang penggunaan teknologi geospatial yang seterusnya meningkatkan inovasi dalam bidang geospatial yang menjurus kepada pembangunan negara. Ia juga menyuntik kesedaran dan mencetuskan gelombang perubahan di kalangan organisasi/ agensi dalam memperkasa aktiviti geospatial pada masa kini dan akan datang.

Anugerah MyGDI Kebangsaan dibuka kepada agensi-agensi yang terlibat dalam pembangunan Infrastruktur Data Geospatial Negara (MyGDI) dari aspek perkongsian maklumat geospatial, penggunaan standard dan garis panduan pelaksanaan MyGDI. Sebanyak 16 pencalonan telah diterima bagi kategori ini. Penerima Anugerah MyGDI Kebangsaan terdiri daripada tiga agensi iaitu agensi Persekutuan, Negeri dan Pihak Berkuasa Tempatan. Setiap pemenang menerima sebuah trofi, wang tunai dan sijil penyertaan.

Penerima Anugerah MyGDI Kebangsaan terdiri daripada:

1) Jabatan Kerja Raya melalui projek Sistem Pengurusan Cerun Bersepadu.(Pemenang bagi kategori Agensi Persekutuan);
2) Pejabat Setiausaha Kerajaan Pulau Pinang melalui projek Pembangunan dan Perlaksanaan Program Maklumat (Pemenang Anugerah MyGDI Kebangsaan bagi kategori Agensi Negeri); dan
3) Perbadanan Putrajaya melalui projek Perbadanan Putrajaya *Geographical Information System* (PutraGeoInfo) (Pemenang bagi kategori Pihak Berkuasa Tempatan).

Manakala Anugerah Kecemerlangan Geospatial dibuka kepada semua agensi kerajaan, swasta dan Institut Pengajian Tinggi (IPT) bagi menghargai inisiatif-inisiatif pembangunan geospatial yang bersifat holistik secara umum. Sebanyak 23 pencalonan telah diterima bagi kategori ini. Pemenang anugerah terdiri daripada 3 agensi terpilih yang juga menerima sebuah trofi, wang tunai dan sijil penyertaan.

Penerima Anugerah Kecemerlangan Geospatial terdiri daripada:

1) Jabatan Meteorologi Malaysia melalui projek *Fire Danger Rating System* (FDRS);
2) Jabatan Ukur dan Pemetaan Malaysia (JUPEM) melalui projek e-Kadaster; dan
3) Telekom Malaysia Berhad melalui projek SMARTMAP.

Pembentangan Kertas Kerja

Selaras dengan tema simposium, sebanyak empat (4) sesi pembentangan kertas kerja telah disampaikan oleh pakar-pakar dalam bidang geospatial. Berikut adalah senarai kertas pembentangan NGIS ke-6 mengikut sesi:

1. Sesi I: *Geospatial For National Development*

i. *Economic Transformation and Value of Geospatial* - Dr. Fadhullah Suhaimi Abdul Malek, Unit Pengurusan Prestasi dan Pelaksanaan (PEMANDU);
ii. *GIS Implementation : Shaping Malaysia Development* - En. Mohd Nor Hassan, Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU); dan
iii. *The Importance of Geospatial Information for National Development* - Datuk Prof. Sr Dr. Abdul Kadir Taib, Jabatan Ukur dan Pemetaan Malaysia (JUPEM).

2. Sesi II: *Geospatial In Social And Economy Growth*

i. *Spatially Information for Social, Environmental and Economic Development* - Sr Teo Chee Hai, *International Federation of Surveyors* (FIG);
ii. *Bridging the Gap between Academia and Policy Makers via Geospatial* - Prof. Madya Dr. Azmi Hassan, Universiti Teknologi Malaysia (UTM);
iii. *Space Technology for Socio-Economic Benefits: The Case for Geospatial Applications* - Sr Dr. Noordin Ahmad, Agensi Angkasa Negara (ANGKASA);
iv. *Sosio-Economic Impact of Geospatial Information and Technologies* - Pn. Fuziah Abu Hanifah, Pusat Infrastruktur Data Geospatial Negara (MaCGDI);
v. Aplikasi GIS dalam Pilihanraya : Isu, Cabaran dan Prospek - Dr. Rosmadi Fauzi, Universiti Malaya (UM); dan
vi. *Safeguarding The Social And Economic Importance Of Forest Resourses, Advance Technology Applications* - Dr. Affendi Suhaili, Jabatan Hutan Sarawak.

3. Sesi III: *Fostering The Potential Of Geospatial Against National Challenges*

i. Penggunaan "MAGICMAP" di dalam Pembangunan Industri Komunikasi Negara - Norsam Mohd Yusoff, Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM);
ii. *99% of Untapped Geospatial Potential - Revealing the intelligence of 'Where' using Location Analytics* - Lai Chee Siew, ESRI Malaysia;
iii. *Application of Geospatial Technology as tools for Effective Forest Management in Peninsular Malaysia* - Dato' Prof. Dr. Hj. Abd. Rahman Hj. Abd. Rahim, Jabatan Perhutanan Semenanjung Malaysia (JPSM);
iv. *Transformation of Malaysian Armed Forces Towards Spatially Enabled Forces* - Brig Jen Dato' Zaharin Din, Bahagian Geospatial Pertahanan (BGSP) JUPEM;
v. *The Integration of Geoinformation Technologies in Civil Engineering – From Cloud to Coast* Dato' Ir. Dr. Nik Mohd. Kamel Nik Hassan, Dr. Nik & Associates Sdn. Bhd; dan
vi. *Promoting Location Based Data Sharing in Malaysia* – En. Shamim Ahmad Ameer Ali Khan, Telekom Malaysia Berhad (TM).

4. <u>Sesi IV: *Geospatial For Sustainable Development*</u>
i. Isu-Isu dan Keperluan Data Geospatial dalam Pentadbiran Tanah di Peringkat Daerah - Dato' Dr. Sallehuddin Ishak, Jabatan Ketua Pengarah Tanah & Galian (JKPTG);
ii. *The Application of Geospatial in Slope Management* – En. Mohd Taufik Haron, Institut Kerja Raya Malaysia (IKRAM); dan
iii. *Mobile Field Force Automation* (MFFA) *in the Restoration of Power Supply in Malaysia* - En. Tunku Azuin Tunku Hanizar, Tenaga Nasional Berhad (TNB).

Sesi Perbincangan Panel

Sesi perbincangan panel selama satu (1) jam telah mengupas tema NGIS ke-6 iaitu 'Geospatial Pemacu Wawasan Negara'. Sesi ini melibatkan Datuk Prof. Sr Dr. Abdul Kadir Taib sebagai moderator dan lima (5) ahli panel iaitu Dato' Dr. Nor Aliah Mohd Zahri (MAMPU), Prof. Madya Dr. Azmi Hassan (UTM), Pn. Fuziah Hj Abu Hanifah (MaCGDI), Sr Teo Chee Hai (FIG) dan Sr Razali Ahmad (PETRONAS).

Penutup

Simposium ini berakhir dengan ucapan penutup daripada Timbalan Ketua Setiausaha I (TKSU I), YB Dato' Dr. Mohd Ali bin Mohamad Nor. Secara keseluruhannya penganjuran NGIS pada kali ini telah berjalan dengan lancar dengan kerjasama dan bantuan daripada pelbagai pihak. Penglibatan peserta dan pempamer pada kali ini lebih memberansangkan berbanding penganjuran NGIS Ke-5 yang lalu. Di harapkan pengisian dalam simposium ini dapat menjadi pemangkin ke arah menggalakkan penggunaan maklumat geospatial di kalangan agensi kerajaan melalui pendedahan kepada infrastruktur termasuk teknologi terkini yang boleh membantu dalam perancangan dan pelaksanaan projek. Ia juga memberi peluang kerjasama antara sektor awam dan swasta serta institusi pengajian tinggi dalam meningkatkan perkhidmatan geospatial kepada negara.

Spatial Data Infrastructure (SDI) Readiness: A Case Study for State Government Agencies in Malaysia

Hasmezam bin Jamaluddin
Advanced Informatics School (AIS)
UTM International Campus
Jalan Semarak, 54100 Kuala Lumpur
hezam2005@yahoo.com

> *"The main goal of the implementation of SDI is to overcome the problem of duplication of data collection between agencies."*

Abstract

Spatial Data Infrastructure (SDI) is a concept developed for Spatial Data adjustment between government and non-governmental agencies. It provides the infrastructure and facilities for data sharing. The main goal of the implementation of SDI is to overcome the problem of duplication of data collection between agencies. This leads to the wastage of financial funds and time. SDI is currently developed at the global, regional, national, state, as well as local levels. Malaysia Centre Geospatial Data Infrastructure (MaCGDI) is the agency responsible for the development of SDI at the national level in Malaysia. Over the past two years, Malacca has taken the initiative to develop SDI at the state level. These steps are taken to meet the needs of agencies in Malacca to retrieve data more easily and efficiently. Unit Perancang Ekonomi Negeri (UPEN) and Jabatan Perancang Bandar dan Desa (JPBD) are the agencies responsible for the development of SDI in Malacca. Even though SDI in Malacca has been developed since 2011, but the level of its readiness is not yet known. This study aims to investigate the factors involved in measuring the SDI readiness and to assess the level of Malacca SDI readiness. Theoretical framework derived from Delgado, a well known framework which is widely used by the researchers, is also utilised for this research. The end product of this research is a framework which is hoped to be able to determine the SDI readiness in Malacca. This study suggest a SDI factor to be improved. This study also benefit the implementation of SDI in Malacca and make easier to them in further improve the SDI concept developed.

Keywords - *Spatial Data Infrastructure (SDI)*

Overview

A SDI is a data infrastructure implementing a framework of geographic data, metadata, users and tools that are interactively connected in order to use spatial data in an efficient and flexible way. Another definition is the technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data. In Malaysia, Pusat Infrastruktur Data Geospatial Negara (MaCGDI) is SDI at National Level. It is an initiative by the government to develop a geospatial data infrastructure to enhance the awareness about data availability and improve access to geospatial information. This can be fulfilled by facilitating data sharing among participating agencies. SDI development is important for a number of reasons. It allows, for example, Spatial Data sharing among government and municipal agencies, thus reducing redundancy in Spatial Data collection by these various agencies. This will definitely save both time and money. Recognizing the importance of not only Spatial Data collection but also Spatial Data management, Malacca state government took the initiative in establishing an efficient SDI. It is important to note that Malacca was in fact the first state in Malaysia which develops SDI at the state level. In 2011, two Malacca state government agencies, UPEN and JPBD, established an SDI. The present study aims to examine several factors that determine the Readiness of SDI development in Malacca. As such, this study will administer a survey to both the agencies and individuals involved. A brief yet meaningful comparison of SDI developments in selected countries will also be discussed in order to shed some light on this problem. Besides that, this study will also propose a suitable SDI readiness framework for further SDI development in Malacca. This will not only help the state government to determine their SDI readiness but also to help them to manage their Spatial Data effectively.

Research Objectives

In order to have a better understanding of this problem, this research will attempt to achieve the following objectives: To investigate the factors of SDI readiness and to propose Framework to measure the Readiness of SDI in Malacca.

Literature Review

The term SDI is often used to denote the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data.

The SDI provides a basis for spatial data discovery, evaluation, and application for users and providers within all levels of government, the commercial sector, the non-profit sector, academic and by citizens in general, (SDI Cookbook, 2001). SDI is now playing a much broader role in a modern society.

The concept involves a complex digital environment including a wide range of spatial databases and is concerned with standards, institutional structures and technologies including the World Wide Web (WWW). SDI is now moving to underpin an information society and enable a society to be spatially enabled, (Rajabifard, 2006). SDI is as an "umbrella of policies, standards, and procedures under which organizations and technologies interact to and foster more efficient use,management, and production of geospatial data" (UNECA, 2000). Many countries worldwide are engaged in SDI development, which involves the development of geospatial services that support public service delivery. This development ranges from local to state/provincial, national and regional levels, to a global level. However, this research will focus on the SDI Readiness in Malacca State Government as a Case Study.

Definitions of SDI

SDI is playing a much broader role in today's information society as it evolves from just a concept to become a core infrastructure supporting economic development and environmental management across nations. A few definitions of SDI will highlight the nature of the infrastructure. The term SDI is often used to denote the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data. The SDI provides a basis for spatial data discovery, evaluation, and application for users and providers within all levels of government, the commercial sector, the non-profit sector, academia and by citizens in general, (SDI Cookbook, 2001).

The Federal Geographic Data Committee (1997) defines the United States national SDI as an umbrella of policies, standards, and procedures under which organizations and technologies interact to foster more efficient use, management, and production of geospatial data. It further explains that SDI consists of organizations and individuals that generate or use geospatial data and the technologies that facilitate use and transfer of geospatial data, (Nebert, 2006).

Coleman and McLaughlin (1998) defines the Global SDI as encompassing 'the policies, technologies, standards and human resources necessary for the effective collection, management, access, delivery and utilization of geospatial data in a global community'. Dutch Council for Real Estate Information defines the Dutch National Geographic Information Infrastructure as a collection of policy, datasets, standards, technology (hardware, software and electronic communications) and knowledge providing a user with the geographic information needed to carry out a task (Masser, 1998).

In summary, SDI is about the facilitation and coordination of the exchange and sharing of spatial data between stakeholders in the spatial data community. The principal objective of developing an SDI is to provide a proper environment in which all stakeholders, both users and producers of spatial information can cooperate with each other in a cost-efficient and cost-effective way to better achieve their targets at different political/ administrative levels.

SDI Framework

The investigation of SDI readiness factors is through the Framework that have in SDI. The definitions of SDI in 2.6 reveal a factors of SDI framework. The Australia New Zealand Land Information Council (ANZLIC, 1998) identifies institutional, technical standards, fundamental datasets, and clearing house networks as the factor of SDI Framework. The institutional defines the policy and administrative arrangements for building, maintaining, accessing and applying the standards and datasets. The technical standards define the technical characteristics of the fundamental datasets. The fundamental datasets are produced within the institutional and fully comply with the technical standards.

The clearinghouse network is the means by which the fundamental datasets are made accessible to the community, in accordance with policy determined within the institutional, and to agreed technical standards.In addition to this SDI framework, there is the people which includes the spatial data users, suppliers and any value-adding agents in between, who interact to drive the development of SDI, (Williamson et al, 2003b).

1) Data Factor

Dataset, which may be used for many different purposes and in many different applications, are often referred to as base data, core data, fundamental data or reference data. These datasets are widely needed for a variety of purposes and by many agencies. The other types of datasets are known as thematic datasets which are derived from the fundamental datasets, (SDI Africa, 2004).

2) Metadata Factor

Metadata is a summary document about the dataset, including the geographic area that the dataset covers, the custodian, who to contact to obtain a copy of the dataset and other useful information that helps people decide whether or not the dataset is useful for their particular purpose. A geospatial metadata record includes core library catalogue elements such as Title, Abstract, and Publication Data; geographic elements such as Geographic Extent and Projection Information; and database elements such as Attribute Label Definitions and Attribute Domain Values.

3) Standards Factor

Effective use and sharing of spatial information requires that it adheres to known and accepted standards. Standards facilitate the use of a wider range of data. Development of formal standards is a consultative process through national standard bodies through international standard organizations. Spatial data are standardized in terms of geographic referencing, the data content, the resolution, and metadata (SDI Africa, 2004). Some international standard organization for geographic information are ISO TC211 (de-jure) standards, and de facto specifications from organizations such as OGC (Open Geospatial Consortium), Organization for the Advancement of Structured Information Standards (OASIS) and W3C (Gould, et al, 2008). There is close relationship between OGC and ISO TC211, resulting in an effective joint development of certain standards.

4) Access Network Factor

Gould et al (2008) state that "Although SDI are primarily institutional collaboration frameworks, they also define and guide implementation of heterogeneous distributed information systems, consisting of four main software components linked via Internet. These components are: 1) metadata editors and associated catalogue services, 2) spatial data content repositories, 3) client applications for user search and access to spatial data, and 4) middleware or intermediate geoprocessing services which assist the user in finding and in transforming spatial data for use at the client side application."

5) People and Partnership Factor

People and Partnership includes the spatial data users and suppliers and any value-adding agents in between, who interact to drive the development of the SDI. For this reason the formation of cross jurisdictional partnerships has been the foundation of SDI initiatives supported to date. People are the key to transaction processing and decision-making.

All decisions require data and as data becomes more volatile human issues of data sharing, security, accuracy and access forge the need for more defined relationships between people and data. The rights, restrictions and responsibilities influencing the relationship of people to data become increasingly complex, through compelling and often competing issues of social, environmental and economic management.

Facilitating the role of people and data in governance that appropriately supports decision-making and sustainable development objectives is central to the concept of SDI.

6) Policies and Institutional Arrangements Factor

The institutional defines the policy and administrative arrangements for building, maintaining, accessing and applying the standards and datasets, (ANZLIC, 1998). Policies and Institutional Arrangements define other components of SDI such as governance, data privacy and security, data sharing, and cost recovery, (Nebert, 2006). It is the policies and organizational components that make it possible for the realization of aims and objective of SDI. Even when data and other components are in place, without enabling policies, and institutional arrangements, coordination, cooperation and sharing will not be achieved.

Research Countries

Malacca SDI is the primary case study. However, in order to investigate SDI Readiness Factor, an SDI Framework through another countries have to be review and compared. Delhi, Tehran and Victoria are selected based on their differential location. A comparison of their respective SDI Framework is given.

SPATIAL DATA INFRASTRUCTURE (SDI)					
SDI Framework	Specific Variables	Victoria, Australia	Delhi, India	Tehran, Iran	Malacca, Malaysia
Data	Core datasets Data Format Updating Resolution	Defined Digital Yes Different	Defined Digital Yes Different	Defined Digital Yes Different	Defined Digital Yes Different
Access Network	Metadata Access Mechanism Network Architecture Clearinghouse	Yes Yes Web-based Yes	Yes Yes Web-based with several nodes Yes	Not Yet Not Yet Not Yet Not well defined	No No Centralized Yes
Standard	Data Transfer Transfer Standard	Arranged Transfer of Land Act 1958, Subdivision Act 1988	Arranged DSSDt Act, 2010	Not Yet SDt Act.	Arranged ISO, SDt Act.
Policy	Coordinating Body SDI Directive Data Access and Pricing	Yes Yes Yes	Yes Yes Yes	No Yes No	Yes Yes Yes
Institutional Arrangements	Coordinating Body Participating Agencies Working Groups	Present Yes Yes	Present Yes No	Present Yes No	Yes Yes Yes

A Review of SDI Readiness Assessment

Due to their complex, dynamic and evolutionary nature SDI assessments are difficult, (Grus, 2007). SDI have similar characteristics with Complex Adaptive Systems (CAS) in that they are open systems in which different elements interact dynamically to exchange information and where the system as a whole has emergent properties that cannot be understood by reference to the component parts, (Marion et al,2003). As SDI can be treated as a Complex Adaptive System, the assessment should include strategies for evaluating those kinds of systems. One of the SDI assessments that have been done are using assessing an SDI Readiness Index, (Delgado, 2005)

The SDI Readiness Framework

According to Delgado (2005) the SDI readiness framework integrates factors from several points of view: organizational (politicians vision-commitment-motivation, institutional leadership, national legal (umbrella) agreements); information (providers' motivation, digital cartography availability, knowledge of standards); access network (web connectivity; technological infrastructure, geospatial software availability / in-house development); people (educational level, SDI culture, individual leadership) and financial resources (government sources, private sources, national geospatial initiatives). The framework is given the quantitative nature of the majority of factors.

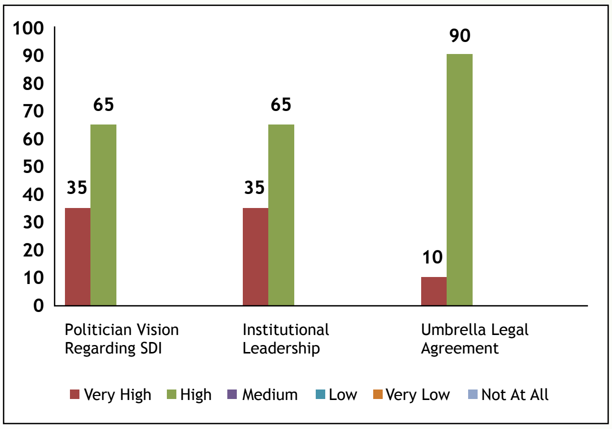
Factor of readiness	Description
Organisation	A country has an appropriate level of organisation to undertake SDI if it has an appropriate level of vision on SDI, institutional leadership and legal framework
Information	A country has an appropriate level of information to undertake SDI if there is availability of digital carthography and metadata
Human Resources	A country has an appropriate level of human resources to undertake SDI if there is an appropriate level of: national human capital, SDI-culture and individual leadership
Financial Resources	A country has an appropriate level of financial resources to undertake SDI if there is an appropriate level of funding from the Government, or from the private sector, or an high level of return on investment from the geospatial industry
Technology	A country has an appropriate level of technology to undertake SDI if there is an appropriate level of technological infrastructure, web connectivity and availability of geospatial software, or own-informatics development, or open source culture
SDI	A country is ready to undertake an SDI if, it has an appropriated level of the general factors: Organisational, Informational, People and Financial Resources and any level of Access Network

Result And Analysis

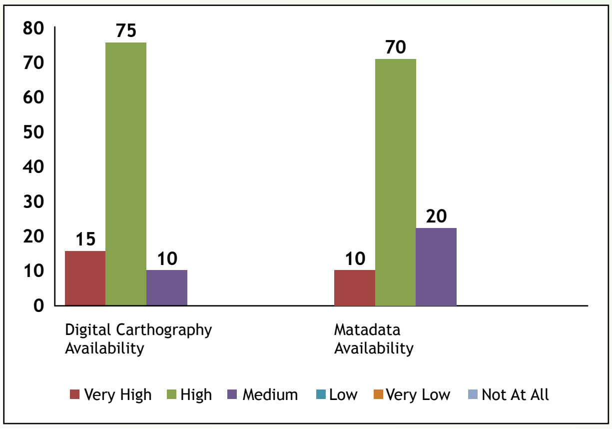
In this chapter, the results of the questionnaire collected from the respondents are presented. The questionnaire was sent to 20 respondent. Moreover, the respondents are from relevant people and are here considered as a true representative of the agencies. Results from the survey are shown. Raw result were analysis from a varies perspective (SDI Readiness) and presented in graphical form.

This graph converts the number of respondents who responded to the questionnaire in the form of a percentage. Graphs show the percentage of respondents according with SDI Readiness Factor. This percentage is the result given by the respondents and represented an analysis. Finally, SDI Readiness Framework been created for Malacca SDI.

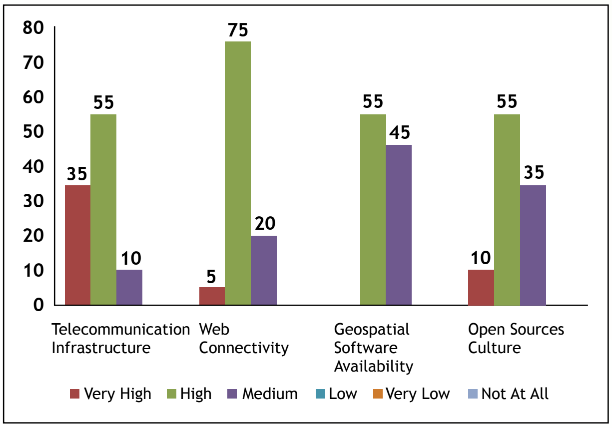
SDI READINESS FACTOR	DECISION CRITERIA (INDICATOR)	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW	NOT AT ALL	TOTAL
Organization	Politician Vision Regarding SDI	7	13					20
	Institutional Leadership	7	13					20
	Umbrella Legal Agreement	2	18					20
Informational	Digital Carthography Availability	3	15	2				20
	Metadata Availability	2	14	4				20
People	Human Capital		5	13	2			20
	SDI Culture		9	11				20
	Individual Leadership		18	2				20
Access Network	Telecommunication Infrastructure	7	11	2				20
	Web Connectivity	1	15	4				20
	Geospatial Software Availability		11	9				20
	Open Sources Culture	2	11	7				20
Financial Resources	Government Central Funding		8	12				20
	Return of Investment		8	12				20
	Private Sector Activity						20	20



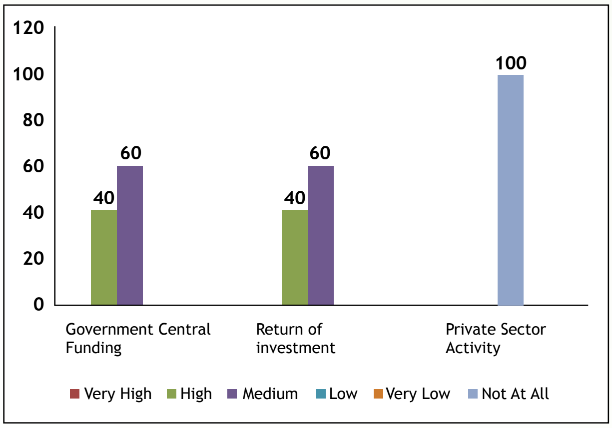
Organization by percentage (%)



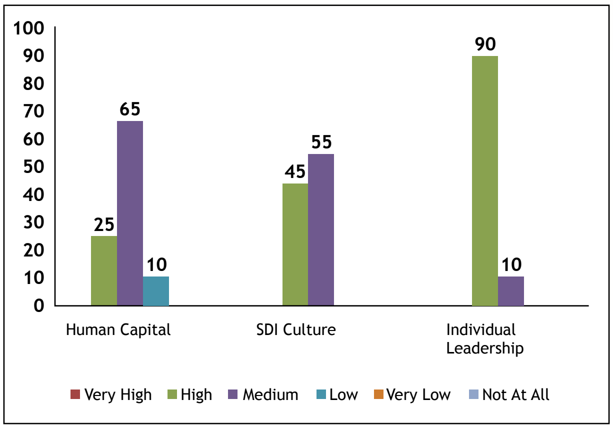
Information by percentage (%)



Access Network by percentage (%)



Funding by percentage (%)



People by percentage (%)

Result Summary of Malacca SDI Readiness Level

Level of SDI Readiness Factor

SDI Readiness Factor	Level
Organisation	High
Informational	High
People	High
Access Network	High
Financial Resources	Medium
Average	**High**

Discussion

Malacca SDI readiness is in high level. This indicates a state government is ready to manage the Spatial Data sharing through SDI implementation in the high level followed by organization, information, network access, people, and financial resources. The discussion to describe Malacca SDI Readiness Framework is above:

1) Organization

SDI Organization at Unit Perancang Ekonomi Negeri (UPEN) has committees that work together well at the state level. State government has undertaken serious initiatives in SDI development with the interest of GIS as a necessity by working towards a developed country since 2011. As a solution to further strengthen the organization, committees and agencies involved with SDI should continuing support and cooperate in helping to develop SDI.

2) Information

The agencies of spatial data providers(custodian) made a good initiative in delivering data and metadata to the UPEN. Data sharing allows the agency to get and use spatial data from different agencies. As a solution to expand the usage of Spatial Data, UPEN should have the data from category aeronautical, geology, soil, special use, and vegetation from the data provider(custodian) to complete the framework of the core dataset. As a solution to expand the usage of Spatial Data, UPEN should have the data from category aeronautical, geology, soil, special use, and vegetation from the data provider(custodian) to complete the framework of the core dataset.

3) Access Network

Jabatan Perancang Bandar dan Desa (JBPD) role are to providing IT technology for SDI development in Malacca. The use of IT at JPBD benefit to users with the GIS Unit. GIS unit in JPBD is work to handling system requirements by users in SDI development. As a solution for network access development to have more efficient, the GIS unit needs to be updated with current technologies and GIS technology can be benefit to people.

4) People

SDI in Malacca is new and developed in 2011. Understanding and SDI function requires time for been known. Although SDI was developed at the national level not everyone will understand the overall functions. UPEN Malacca also have less expertise in GIS especially technically part. Not many people can handle GIS tools.

5) Funding Resources

UPEN do not have funding to develop the GIS unit. GIS Unit was developed in JPBD, and one of the function are to handles IT Infrastructure for SDI. For the management part of SDI are conducted in UPEN. Until now, funding to create GIS unit at the EPU that function as SDI Infrastructure has not been develop. As solution the federal government should give more funding to UPEN.

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ASSESSMENT OF ORTHOMETRIC HEIGHT DERIVED FROM EGM96, EGM08 AND MyGEOID

Adzlan bin Ainee, Wan Muhammad Aizzat bin Wan Azhar, Amir Hamzah bin Othman
Faculty of Geoinformation and Real Estate, Universiti Teknologi Malaysia
adzlanainee@gmail.com, aizzatazhar@yahoo.com, amirhamzah_othman@yahoo.com

Abstract - *The ability of Global Positioning System (GPS) as a primary positioning system is undeniable for various applications. By implementing several GPS observation techniques, we are able to obtain accuracy up to millimeter (mm) level for horizontal component. However, contrary to horizontal component, GPS vertical component which is GPS heighting is not that accurate for current status. The aims of this study are to assess heighting accuracy derived from geocentric and fitted geoid and also to study GPS relative heighting methodology. In this study, two geoid models are assessed called EGM96 and EGM08 which represent geocentric geoids and a gravimetric geoid called MyGEOID which is a fitted geoid. The study was conducted around UTM campus, Jalan Skudai and Pulai by performing simultaneous GPS observation at two on GPS stations and BM involved in this study. Reference CORS selected in this study is ISKANDARnet system in which all data will be connected to ISK1. Data obtained from field survey were processed by using Trimble Total Control (TTC) 2.7 where all observation data and ISKANDARnet data were processed together in order to process GPS baselines and also to perform GPS network adjustment for this study. Height of every GPS stations and BM derived from TTC 2.7 was transformed to orthometric height which refers to EGM96, EGM08 and MyGEOID for analysis and comparison purposes. The findings of this study will give better knowledge in implementing GPS relative heighting and improve understanding in geoid concepts and geoid models.*

Keywords – *Earth Gravitational Model 96 (EGM96), EGM08, MyGEOID, ISKANDARnet*

Introduction And Study Objectives

In Geomatic surveying, position and height can be obtained by various surveying methods. One of most popular method in determining position on earth is GPS observation. A position obtains from GPS observation can be described either in geographical or Cartesian Coordinate System (CCS). A position presented in geographical coordinates system is described in three-dimension (3D) form which is Latitude (ϕ), Longitude (λ) and height (h). For a CCS, position is presented in X, Y and Z form.

Height can be defined as the elevation of a geographic location above a fixed reference surface. Reference surfaces here refer to National Geodetic Vertical Datum (NGVD) and ellipsoidal surface. NGVD is the local height reference system that determine by tidal observation and analysis. Every height derived from NGVD is called Mean Sea Level (MSL) height.

Due to earth terrain irregularities, it is impossible to model the earth. Therefore, ellipsoidal surface which is basically a mathematical model that is used to present the earth shape. It is needed for calculation purposes height derived from ellipsoidal surface called Ellipsoidal height.

MSL height is a height derived from NGVD that is widely used as heighting reference. MSL height presents in discrete manner which is presented by benchmarks (BM). Each height transferred by leveling method refers to MSL height. Contrary to MSL height, ellipsoidal height is derived from an ellipsoidal surface for instance WGS84.

Currently, surveying society tends to use GPS technique rather than precise leveling since GPS technique is easier to perform. Despite GPS heighting brings more benefits to users, there is an issue related to height derived from this technique. This is due to the difference in reference surface adopted by GPS heighting and NGVD and so called vertical datum bias. Therefore, height derived from GPS observation cannot be applied directly for surveying purposes, it needs to be transformed into orthometric height.

The accuracy of orthometric height is depending on the GPS observation techniques applied such as static and RTK and also depending on the geoid model adopted to obtain the height. The study is conducted to understand GPS relative heighting methodology and to analyze achievable orthometric height accuracy derived from EGM96 and EGM08 and MyGEOID.

Methodology

Research methodology in this study is including making some literature review on the related topics, doing observation planning which is important for GPS observation sessions and baselines processing, collecting all relevant information which related to this study by implementing static technique, data processing for GPS network and the result obtain will be analyzed by applying different geoid models.

Project Planning

In this study, project planning covers selection of GPS observation techniques, benchmark data collection, site reconnaissance and GPS network design. For GPS observation techniques, static technique had been selected. Equipments involved in performing static technique are Leica System 500 and Trimble 4800. Meanwhile, benchmarks information was obtained from Department of Surveying and Mapping Malaysia (DSMM).

Based on benchmark information, we had performed site reconnaissance in order to ensure benchmarks availability and still in good condition.

This also enables us to prevent bad measurement due to bad satellite geometry, obstacles around the benchmarks and also multipath. Finally, based on benchmark selected, the network will be designed for GPS observation sessions. The network design plays a vital role in GPS observation planning since GPS data will be processed according to observation sessions. By having strong GPS network, we can obtain more reliable data with higher positioning and heighting accuracy.

Data Acquisition

In this study, there are two GPS stations and two benchmarks were selected to established GPS network. From those four points, there are six baselines which connect those four points. This means there were six GPS static observation sessions must be made. For each of observation sessions, a simultaneous observation was made at two GPS stations and benchmarks. The duration of each observation was 60 minutes and the observation parameters such as elevation mask was set as 15° and data recording was set 1 second for an epoch of observation. The procedures were repeated for every observation session.

Data Processing

Data processing began with data downloading by using Leica Ski Pro. GPS static data processing was done by using Trimble Total Control (TTC) 2.7. GPS baseline basically is the position of a point relative to another point. In GPS surveying, this is the position of one receiver relative to another. When the data from these two receivers is combined, the result is a baseline comprising a three-dimensional vector between the two stations. Internally, a baseline is built, if it has one common epoch between the observations of two stations. That is why we need to perform GPS observation simultaneously between two stations. Before starting data processing, the project must be configured in term of coordinate system and geoid model applied. To perform data processing, the sequence must follow observation session planning. Observation session planning for this study is shown in **Table 1**.

By referring to **Table 1**, those dependent baselines must undergo processing process so that they turn to independent baselines. In TTC 2.7, formerly those independent baselines were dependent baselines and presented by white baselines. After the baselines had been processed, the white line will turn to green line indicating the baseline was an independent baseline.

SESSION	TIME		OCCUPIED STATION	INDEPENDENT BASELINE	DEPENDENT BASELINE
	DATE	DURATION			
1	21.4.2012	10:23-11:25	STN2-STN1	ISK1-STN2-STN1	ISK1-STN1
2	21.4.2012	12:10-13:13	STN1-J3300	ISK1-J3300-STN1	ISK1-STN1
3	21.4.2012	13:39-14:40	STN1-J3299	ISK1-STN1-J3299	ISK1-J3299
4	16.5.2012	11:39-1240	STN2-J3300	ISK1-STN2-J3300	ISK1-J3300
5	16.5.2012	13:49-14:51	STN2-J3299	ISK1-J3299-STN2	ISK1-STN2
6	21.5.2012	15:01-16:03	J3299-J3300	ISK1-J3300-J3299	ISK1-J3299

Table 1 : Observation Session

The followings figure show an example of a complete network processing done by TTC 2.7,

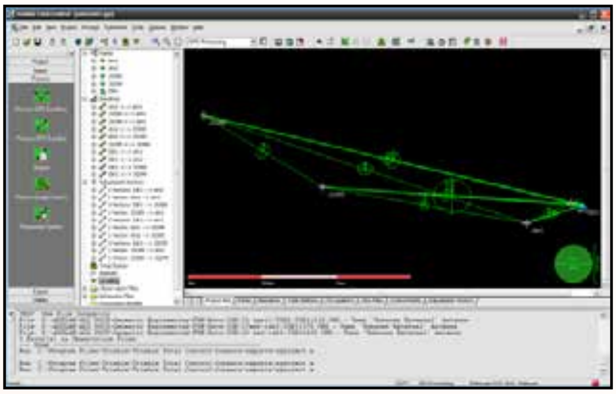

Figure 2 : Baseline network processing by TTC 2.7

The final step was to run network adjustment and view the statistical report. The result of baselines data post processing gave root mean square (RMS), ratio, standard error, coordinate of station and ellipsoidal height of each station for further analysis.

Transformation of Orthometric Height

Transformation of orthometric height was calculated based on EGM96, EGM08 and MyGEOID. Orthometric height derived from both EGM96 and EGM08 can be obtained after performing network adjustment by using TTC 2.7. For orthometric height derived from MyGEOID, GEOID.exe program is used to interpolate geoid height which is developed by Malaysian DSMM.

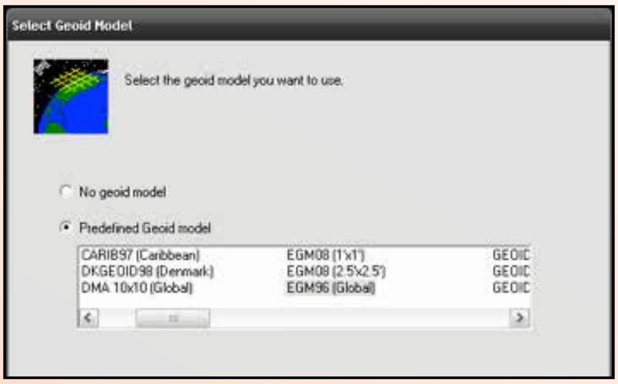

Figure 3 : Defining geoid model by using TTC 2.7

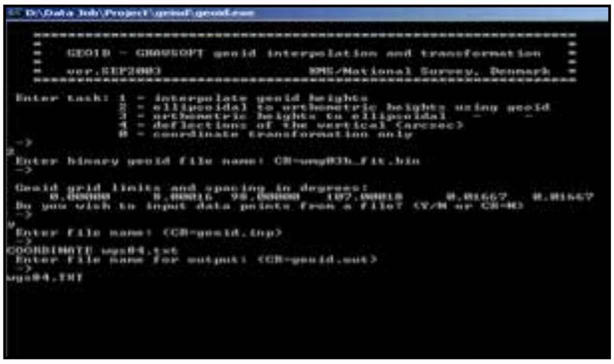

Figure 4 : Height transformation by using GEOID.exe.

Results And Analysis

In this section, results and analysis for this study were assemble and organized. The analysis for this study can be divided into three categories which are GPS baselines analysis, benchmark reliability analysis and assessment of orthometric height derived from static technique by adopting different geoid models which are EGM96 and EGM08 and a gravimetric geoid, MyGEOID.

Analysis of Baselines Quality

Baselines analysis is made based on ratio, RMS, PDOP and distance between two stations. Therefore, in this study baselines network quality will be assess by adopting static GPS observation technique. For a fine solution, RMS value must not exceed 15mm. On the other hand, the higher the ratio value the better the solution. The following table shows the summary of baselines quality analysis.

By referring to **Table 2**, the best RMS value is at baseline STN2-J3300 which is 5.7 and the highest RMS value is 10.8 at baseline J3300-J3299. Meanwhile, the higher the ratio value the better the solution.

BASELINES	RMS (mm)	RATIO	PDOP	SOLUTION	DISTANCE (m)
ISK1-STN1	6.8	5.4	1.3 - 2.2	Fixed	395
ISK1-STN2	8.1	4.5	1.4 - 1.9	Fixed	76
ISK1-J3300	9.7	3.8	1.5 - 5.4	Fixed	1762
ISK1-J3299	8.7	4.8	1.2 - 2.4	Fixed	2632
STN1-STN2	8.4	8.7	1.3 - 2.4	Fixed	332
STN1-J3300	7.6	4.9	2.4 - 8.8	Fixed	1403
STN1-J3299	8.2	3.1	1.4 - 2.6	Fixed	2304
STN2-J3300	5.7	10.1	2.4 - 9.3	Fixed	1690
STN2-J3299	8.4	8.4	1.4 - 6.5	Fixed	2560
J3300-J3299	10.8	6.4	1.3 - 3.5	Fixed	939

Table 2 : Baselines Processing Summary

Baseline STN2-J3300 shows highest ratio value which is 10.1 and baseline STN1-J3299 shows lowest ratio value which is 3.1. Theoretically, all baselines solution is acceptable since RMS must not exceed 15mm.

Besides **Table 2**, the following table also defines the quality of baselines solution. The following **Table 3** was summarized from baselines loop closure report which was generated by TTC 2.7.

MISCLOSURE VECTOR LENGTH	1.08cm
PRECISION	3.023 ppm
RATIO	1 / 330746
TOTAL LENGTH	3560.2448m

Table 3 :
Baselines Loop Closure

Based on **Table 3**, we can conclude that the misclosure vector length for baselines loop is quite small which is 1.08cm in magnitude. The precision value is quite small which 3.023 mm per each kilometer. The ratio for these baselines loop closure is 1/330746 and the precision value is derived from this value.

Benchmarks Reliability Analysis

Benchmarks reliability analysis plays a vital role in this study. This is so because in order to assess GPS heighting, we must ensure that all benchmarks involved are in good condition. Good condition here refers to benchmarks which are located at actual planimetric position and the height of the benchmarks is correct.

Hence, an analysis is done regarding to the benchmarks reliability.

By making some comparisons on height differences between benchmarks involved, we can declare which benchmark is in good condition and which is not.

The following figure shows the height difference derived from benchmarks height and orthometric height derived from GPS static observations based on different geoid models which are EGM96, EGM08 and MyGEOID.

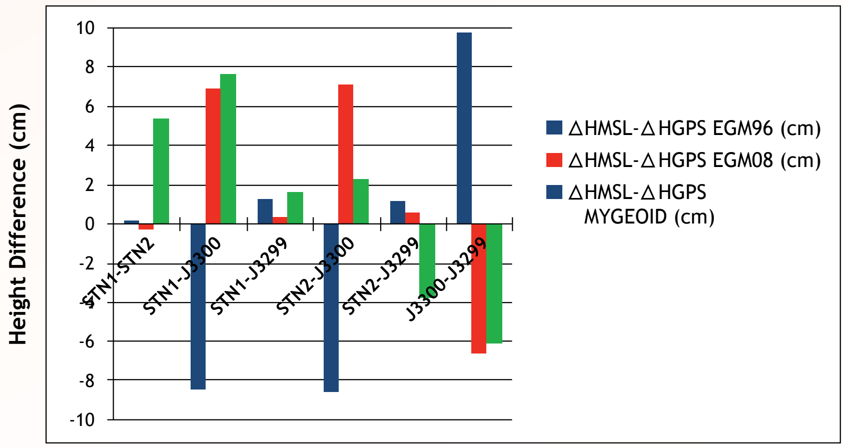

Figure 5 : The difference between benchmarks height and GPS orthometric height.

From **Figure 5**, we can conclude that all height difference does not exceed 10 cm. Maximum height difference between two GPS points is between J3300-J3299 which is 9.8 cm. the least difference is between STN1-STN2 which is 0.1 cm. By making comparison, every stations compared to benchmark J3300 will show large difference which the difference value mostly exceed 6.0cm. Hence, there are two possibilities that may cause large height differences related to J3300. Firstly is this is might due to bad observation at J3300 and the other one is J3300 might had been shifted by some distance. But, by referring to **Table 2**, we can conclude that large height difference related to J3300 is due to bad observation environment. This is so because Position Dilution of Precision (PDOP) of J3300 is quite large compare to other GPS points which the difference achieved 9.3 cm.

Station	HMSL (m)	Geoid Model	HGPS (m)	HGPS-HMSL (m)
STN1	23.624	EGM96	24.62	0.996
		EGM08	24.302	0.678
		MyGEOID	23.587	-0.037
STN2	31.162	EGM96	32.159	0.997
		EGM08	31.838	0.676
		MyGEOID	31.179	0.017
J3300	30.898	EGM96	31.809	0.911
		EGM08	31.645	0.747
		MyGEOID	30.938	0.04
J3299	25.387	EGM96	26.396	1.009
		EGM08	26.068	0.681
		MyGEOID	25.366	-0.021

Table 4 : Orthometric height derived from static technique based on EGM96, EGM08 and MyGEOID

Analysis on Orthometric Height Derived From Static Technique by Adopting Different Geoid Models

This part of analysis is the main part findings for this study. In this orthometric height analysis, heights derived from static observation are assessed in term of accuracy. For each GPS stations and benchmarks involved, different geoid models are applied in order to analyze the orthometric height derived. The following **Table 4** shows list of orthometric height for every stations and benchmarks derived from different geoid models and their respective differences compare to benchmark actual value.

Based from **Table 4**, we can graphically present the data for further analysis. By extracting information from **Table 4**, we can see the variation of orthometric height value for each station in the following **Figure 6**.

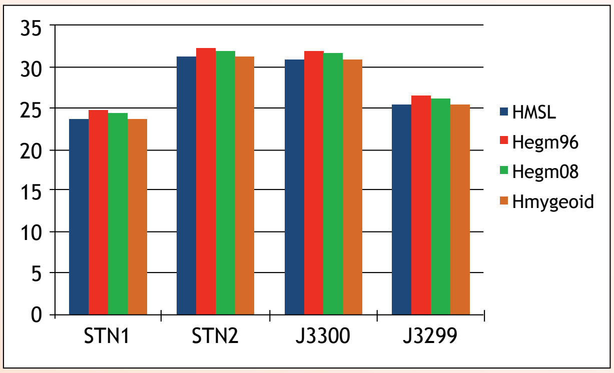

Figure 6 : Orthometric height derived from different geoid models compare to actual orthometric height value (HMSL)

By collecting information from **Table 4** and **Figure 6**, we can produce another graphical chart which aids analysis for this study. The following **Figure 7** and **Table 5** show the difference between orthometric heights of each station compare to their actual value (HMSL).

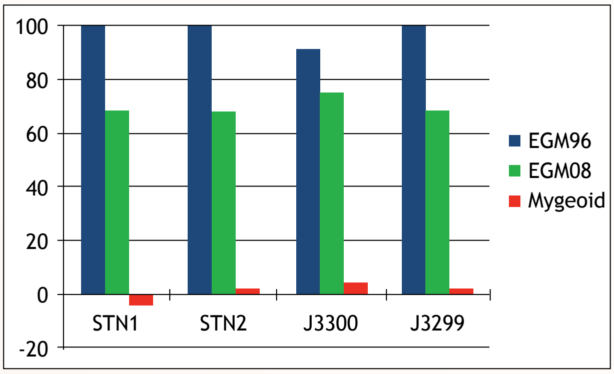

Figure 7 : Orthometric heights of each station.

Station	EGM96 (cm)	EGM08 (cm)	Mygeoid (cm)
STN1	99.6	67.8	3.7
STN2	99.7	67.6	1.7
J3300	91.1	74.7	4.0
J3299	100.9	68.1	2.1
max	100.9	74.7	4.0
min	91.1	67.6	1.7
average	96.0	71.2	2.9

Table 5 : Differences between orthometric heights of each station compare to their actual value (HMSL).

Based from **Figure 7** and **Table 5**, orthometric heights for each station are varies according to the geoid model applied to them. All orthometric heights derived from geoid model EGM96, EGM08 and MyGEOID are assessed by comparing the derived values to the actual height values, HMSL. Theoretically, the smaller the height differences, the more accurate the height value. By referring to **Table 5**, the maximum height difference derived from EGM96 is 100.9cm and the least height difference is 91.1cm. Therefore, the average EGM96 height difference is 96.0cm. Next, for EGM08, the maximum height difference is 74.7cm and the minimum difference is 67.7cm which quite smaller compare to EGM96 height difference. Hence, the average height difference for EGM08 is 71.2cm. For height derived from MyGEOID, the maximum difference in height is 4.0 cm and the minimum difference is 1.7 cm. In average, height difference for orthometric height derived from MyGEOID is 2.9 cm.

In conclusion, orthometric height derived from MyGEOID is the most accurate compare to orthometric height derived from EGM96 and EGM08. MyGEOID is capable to provide orthometric height with accuracy up to 5 cm. From this current study, MyGEOID can obtain orthometric height with accuracy as good as 2.9 cm in average. This is so because MyGEOID is a local geoid which had been fitted to local NGVD. Height derived from EGM96 is the least accurate amongst all since the height difference is the greatest. Both EGM96 and EGM08 are global geoid models and also called geocentric geoid models. Therefore, they fit the whole world but poor in fitting local NGVD.

That is why orthometric heights derived from these two geocentric geoid models are unable to satisfy surveying needs.

Concluding Remarks

As a conclusion for this study, we can divide the findings into two parts which are high quality baselines network establishment and processing and next is the accuracy of orthometric height derived from different geoid models. For the establishment of baselines network, we must follow the appropriate method in order to ensure the quality and reliability of the products. Observation sessions planning play an important role since both observation and processing part need to be done according to it. For orthometric height assessment, firstly we must validate that all benchmarks involved are in good condition in order to preserve the reliability of those benchmarks for further analysis. Height derived from geocentric geoid models such as EGM96 and EGM08 cannot fulfill surveying requirements since they are lack of accuracy.

For current status, local gravimetric geoid which is MyGEOID is capable to determine orthometric height with accuracy below 5 cm. As from result and analysis of this study, the range of heighting accuracy provided by MyGEOID is from 1.7 cm to 4.0 cm. this value is good enough and has prove that MyGEOID is ready to fulfill surveying accuracy requirement.

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DEVELOPING BOUNDARY DEMARCATION GUIDELINE FOR MARINE CADASTRE SURVEY

Nazirah Mohamad Abdullah &
Abdullah Hisam Omar
Department of Geomatic Engineering
Faculty of Geoinformation Science and Engineering
Universiti Teknologi Malaysia (UTM) Skudai Malaysia
my_nazirah@yahoo.com

> *"Due to the sea condition and surrounding environment, the difference in area between pre-computation and survey area is less than 2%."*

Abstract

In Malaysia, the introduction of Marine Cadastre is still in preliminary stage compared to other foreign countries like Australia, Netherlands and Canada. The importance in governing the ocean territory is due to the realization that coastal and marine areas provide social, economic and natural function in which contribute to the quality of life. The objective of this study is to study the procedure of demarcation of marine area, to develop boundary demarcation guideline for marine cadastre survey. In this study, surveying method will be fully indulges with the survey regulation and the data acquisition will be gathered from Global Positioning System observation. Analysis will cover few related aspects or instances accuracy of the survey, monumentation issues and marine demarcation guideline. Based on the result, it showed that the use of GPS Real Time Kinematic method is capable to be implemented for demarcation of marine boundary. Due to the sea condition and surrounding environment, the difference in area between pre-computation and survey area is less than 2%. This difference is still within the tolerance specified by DSMM which is 10% for a new survey. Essentially, this research will provide a guideline and procedure for demarcation of marine to survey authority and private sector that based on certified survey regulations and practices.

Keywords: *Marine Cadastre, Monumentation issues, Marine Demarcation Guideline*

Introduction

Since time immemorial, the Malays have always regarded the seas that bordering their country as natural appurtenances and therefore under its absolute sovereignty. This concept which emphasizes the unity of the country's land and water is reflected in the Malay term for "native-land" i.e. "tanah-air" which literally translated, means 'land-water' (Ahmad Fauzi, 2004). Furthermore with the geographical shape of Malaysia which is surrounded by ocean. Approximately, 515,000 square kilometers covered by maritime realm and 4,576 km in length by coastline. As show in figure 1 (Fauzi,2005). Given the diversity of this area, there is an economic, social and environmental need to effectively manage it.

- 13 States & 3 Faderal Territories
- Population - 25 million
- Total Land Area - 329,000 sq. km
- Maritime Area - 574,000 sq. km
- Coastline Length - 4,300 km

Figure 1: Malaysia represent in a picture and word

According to Section 40 National Land Code 1965, in Peninsular Malaysia, all government lands, minerals and stones that are found in the district of a state are the properties of the state. The government lands in question are including all the lands in the state, the bottom of rivers, beaches and the bottom of the ocean that are found inside the state or inside the state marine except for self- owned lands, reserved lands, mine lands and reserved forests.

In Peninsular Malaysia, there is not yet an existing development in terms of complete administration and marine management that is using the current law enforcement and rules. The exploration, exploitation, conservation and management of resources within Peninsular Malaysia maritime jurisdiction fall into state government and stakeholders.

The regulation and administration of these activities are shared in various ways amongst the state government, stakeholders and United Nations Convention on the Law of the Sea (UNCLOS), which is the overarching law governing use of the ocean. Furthermore there is several value of marine space, such as sources of food from animals, plants and fishes, means of transportation, means of communication (subsea cables), areas for development (mineral extraction), areas for recreation, areas for dumping of waste and areas for scientific research. In a point of view, the issue of marine activities is answered by the introduction of marine cadastre system.

Factors And Issues Driving The Development Of Marine Cadastre

It is accepted that the interests of a nation do not stop at the land sea interface. The economic, environmental and social impacts that this realization is having on the marine environment are just beginning to be felt, with competition for the vast array of natural resources ever increasing. Added to this is the implementation of the United Nations Convention on the Law of the Sea, which came into force in 1994. This has given rise to the need for more efficient and effective maritime boundary management techniques to be put in place within maritime jurisdictions.

One of the main drivers in implementing a marine cadastre comes from the awareness of the need to recognize the rights that indigenous people have both land and sea, with international initiatives and domestic court rulings giving increased focus to the indigenous people movement (Robinson and Mercer, 2000). For instance, Malaysia, a country surrounded by international waters and vice versa. The problem of quarrelling over the rights for the waterways often occurs among the countries that share the same boundary such as Singapore, Brunei and Indonesia. According to Article 76, UNCLOS 1982, the country's boundary can be claimed until 200 nautical miles and 350 nautical miles at the maximum. However, the related scientific data must be sent to the Commission for the continued platform limit. The existence of marine cadastre system enables the spatial data management to be done orderly and systematically.

An environmental movement and the effect it has had on politics and society are also becoming the important issues in implementing a marine cadastre. According to Widodo, 2003, marine environment is subject to as many pressures as the terrestrial environment and potential value as an economic resource is rapidly developing.

Issues of pollution, depleted marine resources and increased threat by man to the health of the marine environment are forcing government such as Malaysia to implement sustainable development measures.

Industries such as oil and natural gas exploration are two examples of major sources of revenue for both government and private industry, with competition increasing for control over marine areas with vast arrays of natural resources. This makes the effective management and delimitation of costal areas increasingly important.

Conceptual Model Of Marine Cadastre System

Conceptual model need to be develops in order to implement marine cadastre exclusively. This model consisted matters on how to commence the structure of marine cadastre system up to the execution been reality formed. Therefore, concept developmental as follows at least would give a clear picture on contents within the marine cadastre development as showed in **Figure 2** (Ashraf,2004).

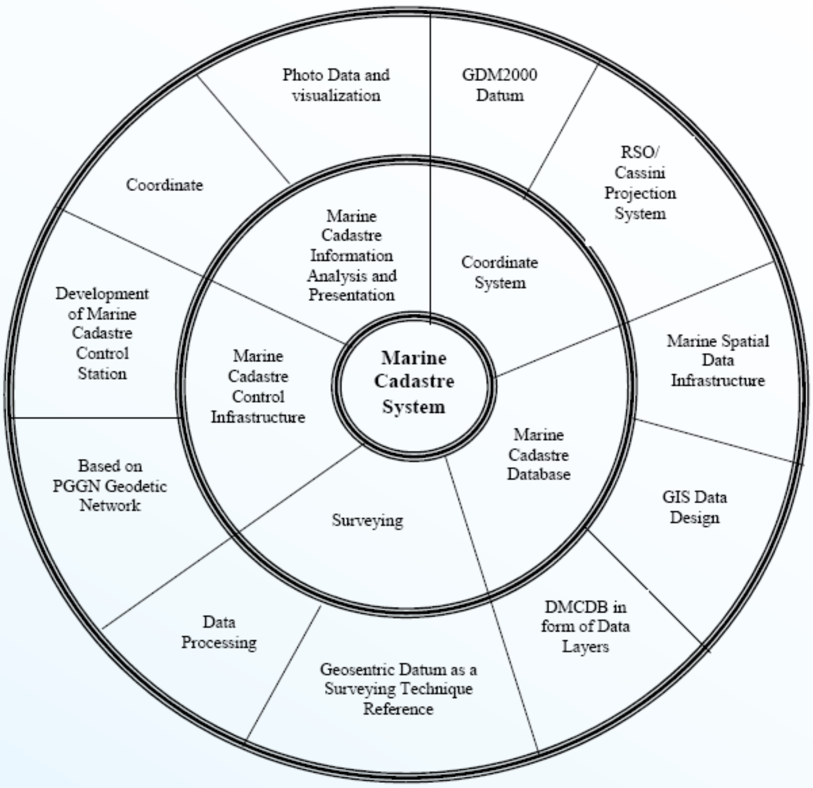

Figure 2: Marine Cadastre Conceptual Model In Peninsular Malaysia (Ashraf, 2004)

Ashraf 2004 is the first local researcher that discusses on the marine cadastre in Peninsular Malaysia. In his research entitled 'The Conceptualization of Marine Cadastre System in Peninsular Malaysia' has stated out some problems that may arise in the application of marine cadastre system in Peninsular Malaysia. They are:

(i) The concept of sea ownership is never existed

In accordance to this matter, it touches on the ownership rights that have not been legally registered from any parties due to the non existence of infrastructure and organization that specifically administrate with a complete system for sea compound. The rights that can be gained are the rights to use, rent, and collaborate and any other partial rights that are still explicably bounded by the government. Thus, this situation has made many parties to claim ownership on the sea although the sea compound has been settled or vacated.

(ii) An impossible matter to realize in terms of deciding rights of pointing on the demarcation of deep sea.

In this problem, the question of 'Is the development of the marine cadastre system can determine its physical demarcation and still relate actively in the sea compound?' arises. It is clear that this issue is difficult to be realized in determining its indication of which land and demarcation stone can be buried.

This is so obvious to be seen in the deep sea that underlies a lot of environment and natural surrounding problems such as tides, the low and high tides and deep sea emission.

(iii) In the sea compound there are four dimension that can be implemented in spatial data

(a) Rights
(b) Limitation/ Demarcation
(c) Responsibilities
(d) Time (The addition that is being noted)

Marine Cadastre Survey Regulations

In the implementation of the marine cadastre survey regulations, the measurement procedure for land cadastre (GPS Cadastral Survey Guideline) is the primary reference. Below are the steps that should be put into consideration:

4.4.1 Site identification/preparation
4.4.2 Criteria for station selection
4.4.3 Field observation
4.4.4 GPS survey method
4.4.5 Network Design

4.4.1 Site identification/ preparation

Usually, before doing the survey observation, the reconnaissance of the area must be done. It is important to know the location of the observation so that planning can be made. Beside that, it is also important to identify the location of the old boundary marks that have been planted. Site identification is based from pre-computation plan that has been given. This part is important so that the survey work can be planned properly that is depending on the site's environments.

Site preparation is also comprised of the equipment that is used during the field observation. The most important is the buoy for the demarcation process. PVC cylinder shape buoy is painted with red colour and tied to an anchor that is used. There are three receivers that are used in the demarcation process that includes a Trimble 4800 and a pair of Leica 500. One of the Leica products that is used as a roving unit and has been set the coordinates for the marine demarcation before undergo for the field observation. Other equipment such as tripod, pole and hand held GPS are used to assist the navigation.

4.4.2 Criteria for station selection

The exploration of the GPS survey project area has been carried out to minimize delays in observing schedules. The reconnaissance survey provides information on the recoverability of the existing Jabatan Ukur dan Pemetaan Malaysia (JUPEM) GPS Geodetic Control Stations and benchmarks.

In selecting stations for the GPS Control Station, the following criteria are as follows:-

- Cut-off angle of 15° is applied during the observation. The stations must be further away from tall trees. This condition may not be achievable especially in the densely forested area.
- No nearby objects that could cause multi-path of the GPS signals such buildings and metallic objects that may cause significant problems to signal reception.
- The location of the station mark must be suitable for direct occupation with a survey tripod.
- The GPS observation is carried-out on a station with at least 60% sky visibility.

4.4.3 Field observation

The field campaign adopted in this study includes:

- Network design to develop interlocking multi-figure network
- Network planning such that each baseline should be independently
- Observe and each station should be observed twice
- Preparation of a daily projected work schedule for each field party
- Deployment of four parties with observational schedule of 3-4 hours per day
- Used four GPS equipment (Two Leica system 500 and Two Trimble 4800)
  - Primary network: Trimble
  - Secondary network: Leica
- Buoy as a boundary mark

The following are the work methodologies:

a) Two base stations are setup
b) Before the field observation, the Leica equipment that will be employed as the roving unit has all the coordinates set.
c) Navigated to pre-computation coordinates using hand held and the rover.

4.4.5 Network design

Network design is carried out to ensure that relative accuracy of better than 1: 50,000 (20ppm) is achieve for the entire network. Redundant observations are taken to minimize the possibility of systematic errors. In planning a GPS survey it is very important that to ensure good geometry of satellite constellation is tracked during the field campaign. Furthermore, sources of errors such as multi-path and signal obstructions should be minimized in order to achieve a higher accuracy. The GPS field operation was commenced on the 25th of January to 28th of January 2008. During this period a total of 22 fully operational satellites were available. This provided the luxury of about 10 hours of observation window per day (8:00-18:00), offering a minimum of five satellites and good geometry (Geometry Dilution of Position (GDOP) value less than 5).

The GPS campaign is carried out in two phases, as shown below (**Table1.0**):

	PHASE	
	Phase 1 Base Station	**Phase 2 Demarcation Boundary**
Number Of Station	2 Bases station	11
Reference Station	2VirtualStation (Virtual_60&Virtual_59)	2BASEs (Continuous observation)
Observation Technique	Static	Real Time Kinematics
Observation Time	3-4hours	1second
GPS Data Processing Software	TG Office	SKIPROv2.1
Adjustment Software	TG Office	SKIPROv2.1

Table 1.0 : GPS Survey Implementation Procedures

4.4.4 GPS survey method

The method of static GPS surveying is utilized in the establishment of the control network. Static GPS surveying has proven to be the most accurate technique compared to rapid static or kinematic techniques. This technique allows for the best determination of the integer ambiguity from the carrier phase measurements. A total of one Trimble 4800 and two Leica System 500 GPS receivers are used in the survey campaign. The network is planned in such a way to constitute several looping networks so that possible error propagation can be eliminated.

Demarcation Procedure

There are two kinds of demarcation that are done in this study; on the land and sea. Boundary demarcation uses types of boundary mark that is legal as fixed in rule 67, Peraturan Ukur Kadaster (PUK) 2002:

i) All boundary marks have been done neatly on the ground and top of the boundary mark were not more than 8 cm on the ground.
ii) Demarcating on other surface should be done permanently and clearly.

iii) Mark on -line :
   a) For old boundary marks are moved from the first part, reification must be done base on government rules; and
   b) The new boundary mark should be proven on the boundary line with calculation or observation.

iv) No mark:
   If the boundary marks on the location that cannot be marked, no mark method should be used as:
   a) Permanent reference mark should be placed on the ground so that boundary mark position can be determined; and
   b) Permanent reference mark must be placed on the border line as close as the blocking detail.

v) Distance between marks
   a) Marks on the straight boundary must be placed in intermittent of 300 m if the mark can be seen from each other or in intermittent of 200 m if the mark cannot be seen; and
   b) They also were proved on the ground by calculation and observation. Offset for distance measurement to boundary point taken as nearest as can from traverse point and not more than 20 m.

Referring to the research area of 74297.883 m2 (square) in width at Nusajaya, Johor, there are 11 demarcation points which are 9 at the marine area and 2 on land. The distances between points are in range of 50 - 60 m. The demarcation procedures are carried out on by referring to the pre-computation plan that has been prepared before the field observation. The pre-comp plan and the list of coordinates for each boundary are shown at **Table 2.0** and **Figure 4.0.**

STATION	NORTHING	EASTING
1	-69121.663	11352.393
2	-69200.580	11375.378
3	-69256.696	11340.201
4	-69286.906	11305.563
5	-69352.635	11230.199
6	-69427.524	11163.930
7	-69502.413	11097.661
8	-69577.302	11031.391
9	-69536.619	10962.508

Table 2.0 : List of Pre-computation Coordinates

Rela Time Kinematics (RTK) technique has been used to execute the demarcation process for marine boundary. RTK is a technique used in land surveying which utilizes short observation times and enable to move between stations. Radio communication link between the base receiver and the rover is maintained in this method and the rover receives the pseudo-range and carrier phase measurement which in turn computes its position and display the coordinates.

Although this limits the usefulness of the RTK technique in terms of general navigation, it is perfectly suited to roles like surveying. In this case, the base station is located at a known surveyed location, often a benchmark, and the mobile units can then produce a highly accurate map by taking fixes relative to that point. RTK has also found uses in auto drive/ autopilot systems, precision farming and similar roles.

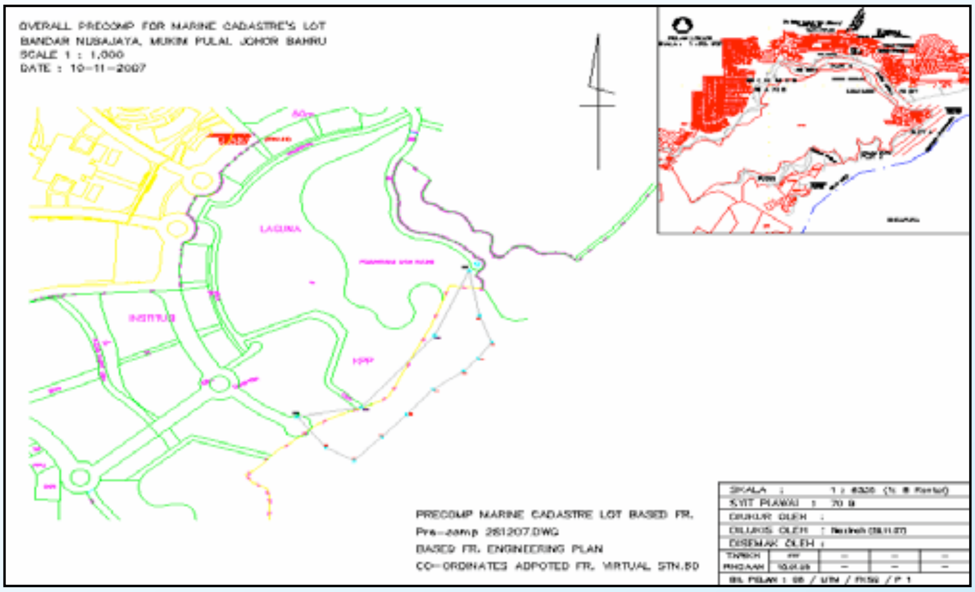

Figure 4.0 : Pre-computation Plan

5.1 Sea Demarcation

In Ketua Pengarah Ukur Pemetaan (KPUP) circular, it has stated that for the boundary demarcation that not on the ground, the mark must be done clearly and perpetually. Therefore, buoys are chosen as the best thing to use for boundary mark. The buoy has been tied using rope with anchor it is shown in **Figure 5.0** Buoy demarcation locations are based on the pre-computation plan provided. RTK GPS technique is used to determine the buoys locations. **Figure 6.0** shows the buoys locations for this study.

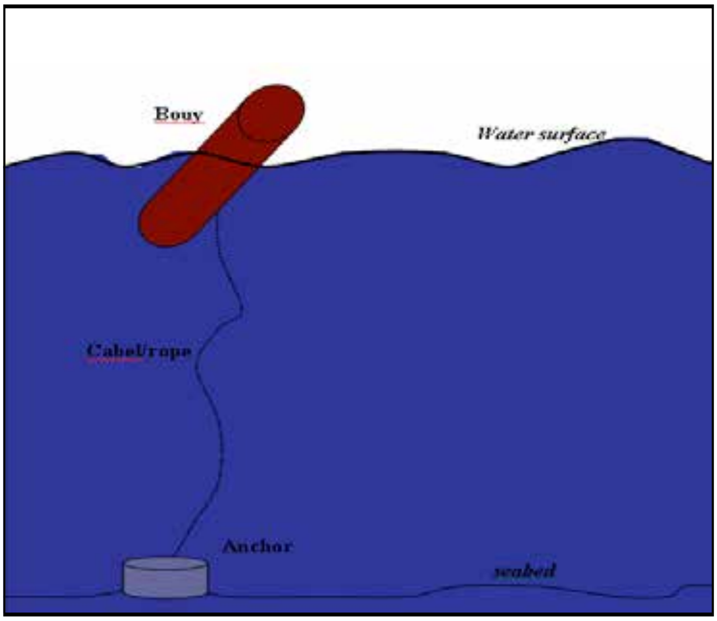

Figure 5.0 : Diagram of the Buoy

5.2 Data Processing

The recorded data in the GPS receivers will be downloaded into Notebook computers on a daily basis for post processing. The collected data will be processed using the GPS receiver manufacturers supplied software (SKIPRO). SKIPRO is capable of determining baselines using L1/L2 carrier frequencies and C/A & P-codes. Quality control on the baseline vectors computed will be based on the root mean square (RMS) residual of the double difference observations as well as on the residual plots.

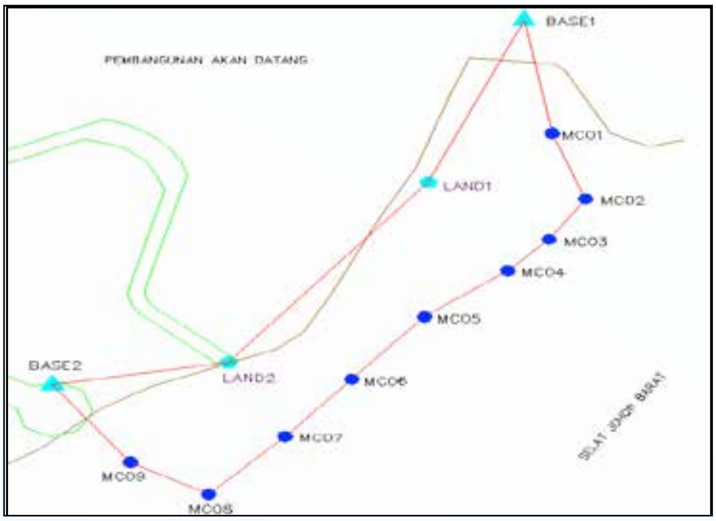

Figure 6.0 : Buoy Locations

5.2.1 Base Station Processing

The following processing parameters are used in the processing of the carrier phase data to generate the baseline vectors between stations using TGO software as shown in **Figure 7.0** and **Table 3.0**

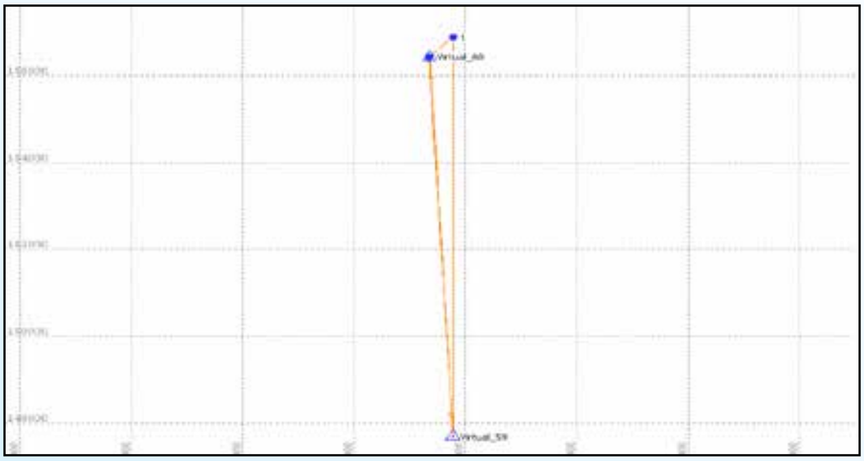

Figure 7.0 : Base Station Establishment

Elevation Mask	Ephemeris	Solution Type	Ambiguity Resolution	Frequency Type	Tropospheric Model
13˚	Broadcast	Fixed	Yes	L1	Hopfield

Table 3.0 : Base Station Processing Parameters

Minimal network adjustment is performed by fixing Virtual 59 station in order to check the geometry strength of the network. Over constraint network adjustment is executed by fixing Virtual_60 and Virtual_59 in order to determine the final coordinates. **Table 4.0** shows the adjusted geodetic coordinate of the fixed station and Virtual Reference Station (VRS) established by the JUPEM.

Point Name	Latitude (N)	N error	Longitude (E)	E error	Height	h error	Fix
Virtual_ 60	1°24'52.8"	0.000m	103°39'32.8"	0.000m	9.000m	0.000m	Lat Long h
Virtual _59	1°20'07.6"	0.000m	103°39'46.2"	0.000m	19.000m	0.000m	Lat Long h
Base 2	1°24'52.7"	0.002m	103°39'32.0"	0.003m	13.801m	0.006m	
1	1°25'07.6"	0.003m	103°39'46.1"	0.004m	13.177m	0.008m	

Table 4.0 : Adjusted WGS84 Coordinate for Control Stations

5.2.2 Demarcation Processing

The following processing parameters are used in the demarcation processing (using SKI PRO). **Table 5.0** shows the Demarcation Processing Parameters whereas **Table 6.0** shows the Coordinates of Buoys and **Figure 8.0** which is the display of SKI PRO Processing Window.

Cut-off Angle	Ephemeris	Solution Type	Ambiguity Resolution	Frequency Type	Tropospheric Model
15°	Broadcast	Standard	Yes	L2	Hopfield

Table 5.0 : Demarcation Processing Parameters

STATION	SURVEYED	
	NORTHING	EASTING
Mc01	-69120.220	11347.315
Mc02	-69202.243	11378.084
Mc03	-69253.403	11344.251
Mc04	-69292.074	11306.490
Mc05	-69353.529	11232.252
Mc06	-69428.296	11163.009
Mc07	-69500.112	11101.195
Mc08	-69572.411	11031.442
Mc09	-69532.123	10959.269

Table 6.0 : Coordinates of Buoys

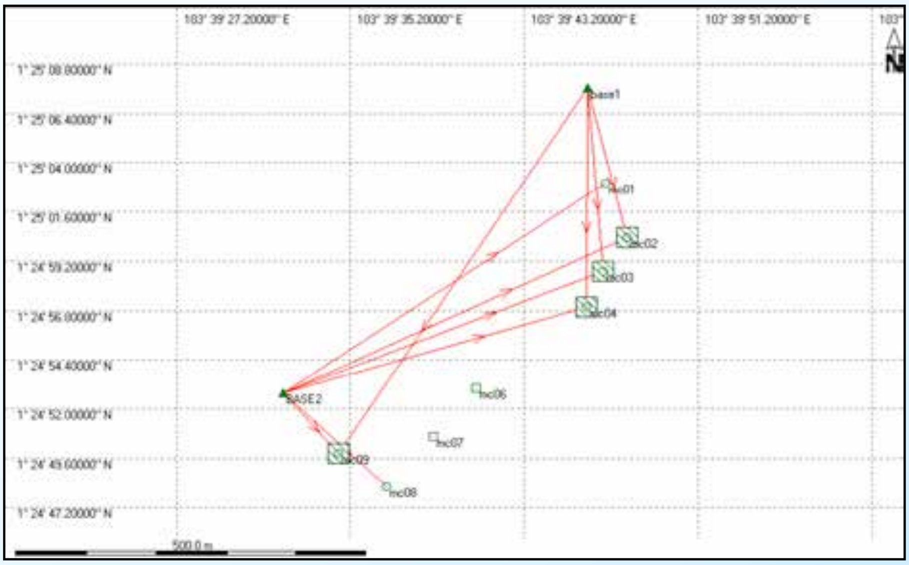

Figure 8.0 : SKI PRO Processing Window

According to JUPEM GPS Cadastral Survey Guidelines 1999, GPS Cadastral Survey requires the coordinates to be determined of the land parcel, in relation to a near by GPS mark (established by the Control Survey). This maybe done using the 'Rapid Static' GPS surveying technique. However, there will be a restriction on the length of the baseline, and recommendations are made concerning the length of the observation session.

Conclusion

It is a well known fact that marine cadastre is a new system that has a big potential. Thus, this system should be discussed in full details in which it should also be relate to some of the worldwide issues. Based on the views of researchers from the Department of Geomantic in University of Melbourne, cadastre can be define as a system to enable the boundaries of maritime rights and interests to be recorded, spatially managed and physically defined in relationship to the boundaries of other neighboring or underlying rights and interests and it is a marine information system, encompassing both the nature and spatial extent of the interests and property rights, with respect to ownership, various rights and responsibilities in the marine jurisdiction. The needs for research in Marine Cadastre should be executed to manage our resources so that it will maximize benefit to our country and to protect delicate environment.

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Aktiviti MyGDI

LAWATAN TEKNIKAL

LAWATAN TEKNIKAL SYARIKAT BEKALAN AIR MELAKA BERHAD

TARIKH: **23 JANUARI 2014**
TEMPAT: **BILIK MESYUARAT PERMATA, ARAS 7, NRE**

Lawatan teknikal Syarikat Bekalan Air Melaka Berhad (SAMB) telah dipengerusikan oleh Puan Fuziah binti Hj. Abu Hanifah, Pengarah MaCGDI. Lawatan seramai 11 pegawai GIS ini diketuai oleh Encik Zainal Abidin bin Ab. Rahman, Pengurus Kanan Pembangunan Bisnes, SAMB. Lawatan ini bertujuan untuk berkongsi pengalaman berkaitan pengurusan data aset geospatial dari segi pengurusan utiliti bawah tanah dan perkongsian data.

Antara aktiviti yang dijalankan adalah sesi taklimat berkaitan MaCGDI dan MyGDI yang disampaikan oleh pegawai MaCGDI dan taklimat pemetaan utiliti telah disampaikan oleh Encik Mohd Riza bin Halim dari Seksyen Pemetaan Utiliti, JUPEM. Delegasi SAMB juga berminat untuk mengetahui dengan lebih lanjut mengenai pengurusan data aset geospatial.

LAWATAN YB EXCO JAWATANKUASA TETAP SAINS, INOVASI DAN TEKNOLOGI MAKLUMAT, KOMUNIKASI DAN TEKNOLOGI TINGGI NEGERI KEDAH DARUL AMAN

TARIKH: **10 APRIL 2014**
TEMPAT: **BILIK MESYUARAT PERMATA, ARAS 7, NRE**

MaCGDI telah menerima kunjungan delegasi dari negeri Kedah seramai 14 pegawai diketuai oleh YB Norsabrina binti Mohd Noor (EXCO Jawatankuasa Tetap Sains, Inovasi dan Teknologi Maklumat, Komunikasi dan Teknologi Tinggi Negeri Kedah Darul Aman). Lawatan teknikal ini bertujuan untuk meningkatkan kerjasama di antara kedua belah pihak dan mengenali MaCGDI dengan lebih dekat lagi.

Delegasi YB EXCO telah diberi penerangan berkaitan kerjasama yang telah dijalankan antara MaCGDI dengan kerajaan negeri Kedah melalui aktiviti kumpulan kerja negeri Kedah, latar belakang MaCGDI & MyGDI, aplikasi seperti MyGDI Explorer, MyGOS, 1Malaysia Map, G4NRE dan MyGeoName. MaCGDI juga memberi taklimat *One Stop Centre* Geospatial meliputi konsep, peranan dan pelaksanaan.

YB EXCO sangat menghargai pembentangan dan sesi demo yang telah disampaikan. Beliau jelas tentang aktiviti-aktiviti serta peranan MaCGDI. YB EXCO kagum dengan inisiatif MaCGDI mewujudkan aplikasi sedia ada termasuk MyGeoName yang turut memasukkan sebutan dan dialek tempatan.

Antara perkara lain yang disentuh semasa sesi perbincangan meliputi cabaran yang dihadapi dalam setiap pelaksanaan serta saranan membina dalam menyokong usaha YB EXCO untuk diguna pakai di negeri Kedah. MaCGDI berharap kerjasama antara kedua-dua pihak dapat dipertingkatkan lagi untuk masa akan datang melalui program-program berkaitan geospatial, perkongsian pengalaman dan sebagainya.

LAWATAN TEKNIKAL DELEGASI *XXV INTERNATIONAL FEDERATION OF SURVEYORS CONGRESS* (FIG CONGRESS 2014)

TARIKH: 19 JUN 2014
TEMPAT: BILIK MESYUARAT PERMATA, ARAS 7, NRE

Sempena FIG 2014, yang berlangsung di Kuala Lumpur Convention Centre (KLCC) pada 16 - 21 Jun 2014, Persatuan Juruukur Tanah Bertauliah Malaysia (PEJUTA) selaku penganjur telah mengambil peluang untuk mengadakan lawatan teknikal ke beberapa agensi kerajaan termasuk MaCGDI kepada peserta persidangan. Delegasi lawatan ini terdiri dari beberapa buah negara iaitu Finland, Rusia, Negeria, Singapura, Hong Kong, Jepun dan Algeria.

Lawatan ini dipengerusikan oleh Puan Hajah Norizam binti Che Noh, Timbalan Pengarah, MaCGDI. Taklimat berkaitan MaCGDI dan MyGDI telah disampaikan oleh pegawai MaCGDI bagi menerangkan kepada delegasi peranan dan fungsi yang dimainkan oleh MaCGDI. Selain itu, sesi demo dan soal jawab berkaitan aplikasi GIS turut diadakan. Kedua-dua pihak saling bertukar-tukar pendapat dan maklumat berkaitan perkembangan teknologi geospatial di negara masing-masing.

BENGKEL *SPATIALLY ENABLED* NRE 2014

TARIKH: 17 - 20 NOVEMBER 2014
TEMPAT: SKUDAI, JOHOR

MaCGDI telah mengadakan satu bengkel yang bertujuan memberi maklumat perkembangan terkini di bawah program "Spatially Enabled NRE". Bengkel ini turut membincangkan dan mencadangkan penyelesaian berkenaan perkongsian maklumat geospatial dalam membantu NRE menangani isu-isu semasa. Objektif bengkel ini adalah:

i. Membincangkan fokus isu semasa NRE melalui perbincangan kumpulan;
ii. Mendapatkan status ketersediaan maklumat geospatial yang terdapat di agensi di bawah NRE;
iii. Mendapatkan keperluan maklumat geospatial berdasarkan isu-isu semasa NRE; dan
iv. Menyediakan pelan tindakan "Spatially Enabled NRE" 2015 berdasarkan isu semasa NRE.

Bengkel tersebut dibahagikan kepada dua (2) sesi iaitu Sesi Perbincangan Fokus Isu, Ketersediaan Data dan Pelan Tindakan Geospatial NRE tahun 2015 yang dibincangkan secara berkumpulan dan sesi kedua aktiviti luar iaitu lawatan ke Taman Negara Johor Tanjung Piai.

Aktiviti lawatan dijalankan di Taman Negara Johor Tanjung Piai yang dibantu oleh pegawai dari Perbadanan Taman Negara Johor. Aktiviti ini dibahagikan kepada dua (2) kumpulan dan setiap kumpulan diberi penerangan yang lengkap mengenai keistimewaan taman negara ini yang kaya dengan flora dan faunanya.

Taman Negara Johor Tanjung Piai, terletak di selatan Pulau Kukup diisytiharkan sebagai Tapak Ramsar pada 31 Januari 2003. Kawasan ini mempunyai pantai pesisir hutan bakau dan dataran lumpur *intertidal*.

BENGKEL PENGEMASKINIAN DATA GEOSPATIAL BAGI SUNGAI SEROM, SUNGAI PAGOH DAN SUNGAI SEPANG LOI

TARIKH: 30 NOVEMBER - 2 DISEMBER 2014
TEMPAT: MUAR, JOHOR

Bahagian Sumber Air, Saliran & Hidrologi (BSASH), NRE telah mengadakan satu bengkel yang bertujuan untuk mengemaskini data geospatial bagi Sungai Serom, Sungai Pagoh dan Sungai Sepang Loi. Objektif bagi bengkel ini adalah:

i. Memberi pendedahan mengenai kemudahan aplikasi yang dibangunkan oleh MaCGDI bagi membantu agensi-agensi negeri dan persekutuan mengemaskini maklumat yang diperlukan di dalam menyempurnakan Projek *Integrated River Basin Management* (IRBM) Sungai Muar; dan

ii. IRBM Sungai Muar dipilih sebagai *pilot area* untuk mendapatkan maklum balas daripada peserta mengenai aplikasi yang telah dibangunkan bagi tujuan penambahbaikan dan memastikan aplikasi yang dibangunkan dapat diguna pakai oleh semua agensi terlibat.

Seramai 25 pegawai dari Pihak Berkuasa Tempatan (PBT), agensi di bawah NRE telah menyertai bengkel ini. Bengkel ini telah dibahagi kepada tiga (3) sesi iaitu:

i. Taklimat Bengkel Pengemaskinian Data Geospatial bagi Sungai Serom, Sungai Pagoh dan Sungai Sepang Loi telah disampaikan oleh Ketua Penolong Setiausaha BSASH, yang menerangkan secara ringkas mengenai aktiviti-aktiviti yang dilaksanakan sepanjang bengkel berlangsung;

ii. Taklimat pengemaskinian secara dalam talian oleh MaCGDI pula telah disampaikan oleh Timbalan Pengarah MaCGDI. Beliau menerangkan mengenai hala tuju dan pelaksanaan aplikasi IRBM Editor di jabatan dan agensi yang terlibat. Pembentangan seterusnya telah disampaikan oleh Pengurus Projek IRBM Editor yang memberikan penerangan lebih jelas berkaitan penggunaan aplikasi IRBM Editor kepada para peserta; dan

iii. Aktiviti pengemaskinian data diketuai oleh Ketua Projek IRBM Editor dengan dibantu oleh fasilitator-fasilitator MaCGDI di mana peserta diberikan peluang menggunakan aplikasi IRBM Editor secara *hands-on* untuk memplotkan fitur baru bagi punca pencemaran dan mengemaskini maklumat yang sedia ada di dalam aplikasi berdasarkan kawasan sekitar mereka.

PROGRAM EXPLORASI MINDA SEMPENA NGIS KE-6

TARIKH: 17 -18 MAC 2014
TEMPAT: PUSAT KONVENSYEN ANTARABANGSA PUTRAJAYA (PICC)

MaCGDI telah menganjurkan Simposium Maklumat Geospatial Kebangsaan Ke-6 telah diadakan pada 17 dan 18 Mac 2014 bertempat di PICC. Simposium ini merupakan program dwi tahunan MaCGDI, NRE. Program ini bertemakan 'Geospatial Pemacu Wawasan Negara' (*Geospatial Drives National Vision*). Tema ini dipilih bagi memperlihatkan kepekaan dan langkah proaktif yang diambil oleh pihak Kementerian ini dalam menangani dan menghadapi cabaran perkembangan yang begitu pesat dalam bidang maklumat dan teknologi geospatial.

Bersempena dengan NGIS ke-6 ini, empat (4) buah sekolah sekitar Putrajaya terlibat sepanjang dua (2) hari simposium ini berlangsung.

Aktiviti-aktiviti di ruang pameran tersebut dimanfaatkan oleh generasi muda terutamanya para pelajar mengenai geospatial dan subjek Geografi.

Sekolah-sekolah yang terlibat adalah:
1. Sekolah Menengah Alam Shah, Putrajaya
2. Sekolah Menengah Seri Puteri, Cyberjaya
3. Sekolah Menengah Kebangsaan Putrajaya Presint 18
4. Sekolah Menengah Kebangsaan Putrajaya Presint 11(1)

Program bersama pelajar ini dikenali sebagai Program Explorasi Minda. Pelbagai aktiviti telah diaturkan, antaranya *cross-word puzzle*, *jigsaw-puzzle*, Kuiz Geografi dan Ceramah Alam Sekitar oleh Rakan Alam Sekitar (RAS). Ceramah oleh pihak RAS ini dapat memberikan pendedahan berkaitan alam sekitar kepada para pelajar, peserta pameran dan peserta persidangan khususnya.

Pihak RAS juga turut membuka kaunter pendaftaran Rakan Alam Sekitar di booth Jabatan Alam Sekitar (JAS) bagi menggalakkan pelajar dan peserta menjadi ahli Rakan Alam Sekitar.

Bilangan pendaftaran ahli RAS sempena NGIS ke-6:
1. Peserta persidangan – 30 keahlian
2. Pelajar sekolah – 97 keahlian

KARNIVAL JALUR LEBAR 1MALAYSIA 2014 PERINGKAT NEGERI KEDAH DARUL AMAN

TARIKH: 14 - 15 SEPTEMBER 2014
TEMPAT: MAHSURI INTERNATIONAL EXHIBITION CENTRE (MIEC) HALL, PULAU LANGKAWI, KEDAH DARUL AMAN

Karnival Jalur Lebar 1Malaysia 2014 peringkat Negeri Kedah Darul Aman telah diadakan di Pulau Langkawi untuk mempromosikan penggunaan jalur lebar di kalangan rakyat negeri Kedah. Karnival ini dianjurkan oleh Suruhanjaya Komunikasi dan Multimedia Malaysia (MCMC) dan Pejabat Parlimen Langkawi dengan kerjasama Lembaga Pembangunan Langkawi (LADA). Program ini dirasmikan oleh Perdana Menteri Malaysia, YAB Datuk Seri Mohd Najib Tun Abdul Razak.

Objektif utama program ini adalah bagi meningkatkan kesedaran dan menggalakkan penggunaan jalur lebar di kalangan masyarakat. Ia selari dengan tujuan program dalam mempromosikan penggunaan jalur lebar untuk mencapai kadar penembusan sebanyak 75 peratus isi rumah sasaran menjelang tahun 2015. Selain itu, infrastruktur telekomunikasi yang baik juga dapat mencetuskan transfomasi, meningkatkan kebolehan rakyat, menjana inovasi, melancarkan urusan dan memperluaskan kerjasama.

Kepentingan teknologi ICT dan penggunaan jalur lebar sekali gus bertindak sebagai pencetus kepada minat orang ramai untuk mengetahui, mengguna dan melanggan perkhidmatan ini. Selain itu, kesedaran kepentingan penggunaan perkhidmatan ini dapat mengurangkan jurang antara masyarakat bandar, pinggir bandar dan luar bandar. Peningkatan pelancong setiap tahun juga adalah faktor utama sistem telekomunikasi Langkawi perlu dinaik taraf seiring dengan keperluan pengguna yang kian meningkat selaras dengan *Blueprint* Pelancongan Langkawi bagi tempoh 2011 - 2015.

Karnival yang berlangsung dua (2) hari ini disertai oleh agensi kerajaan, agensi berkaitan kerajaan (GLC), serta promosi oleh penyedia jalur lebar syarikat-syarikat telekomunikasi. Antara lain, acara menarik seperti pertandingan melukis dan mewarna, *mascot/co-player, broadband promotion, ice bucket challenge, street magic* serta konsert mini oleh artis tempatan juga diadakan pada kali ini.

23 pempamer daripada pelbagai agensi mengambil bahagian antaranya ialah MaCGDI, Kementerian Komunikasi dan Multimedia Malaysia (KKMM), MCMC, Perbadanan Pembangunan Multimedia, Telekom Malaysia, Maxis, Celcom, Digi, Pos Malaysia, PR1MA dan Jabatan Penerangan Malaysia.

PAMERAN SEMPENA *XXV INTERNATIONAL FEDERATION OF SURVEYORS CONGRESS* (FIG CONGRESS 2014)

TARIKH: 17-19 JUN 2014
TEMPAT: KUALA LUMPUR CONVENTION CENTRE (KLCC)

MaCGDI telah mengambil bahagian dalam *XXV International Federation of Surveyors Congress* (FIG Congress 2014) yang julung kalinya telah diadakan di Malaysia. FIG 2014 ini berlangsung selama enam (6) hari di KLCC. FIG Congress 2014 ini diadakan setiap empat (4) tahun sekali dan Malaysia merupakan negara pertama yang menjadi tuan rumah bagi penganjuran di rantau Asia Tenggara. Persidangan yang bertemakan "Enganging the Challenges Enhancing the Relevance" ini telah dirasmikan oleh Perdana Menteri Malaysia, YAB Datuk Seri Mohd Najib bin Tun Abdul Razak. Persidangan ini telah dihadiri oleh 2500 peserta dari 99 buah negara.

Pameran FIG Congress 2014 ini turut disertai oleh pelbagai agensi dari dalam dan luar negara. MaCGDI dan JUPEM merupakan agensi kerajaan yang mengambil bahagian dalam pameran ini. Peluang ini dilihat sebagai satu usaha MaCGDI dalam mempromosikan peranan yang telah dimainkan oleh MaCGDI dalam membantu pembangunan maklumat geospatial di Malaysia. Selain itu, pameran ini juga turut disertai oleh syarikat-syarikat pembekal peralatan ukur dan perisian geospatial seperti Trimble, ESRI, Leica dan Topcon.

Peluang menyertai pameran ini diambil oleh MaCGDI dalam meluaskan hubungan dengan agensi-agensi lain. Aktiviti dan program geospatial yang dibangunkan oleh agensi dikongsi bersama pelawat-pelawat *booth*.

CERAMAH ALAM SEKITAR SEMPENA MINGGU GEOGRAFI SEK. MEN. KEB. PUTRAJAYA PRESINT 11(1)

TARIKH: 14 OGOS 2014
TEMPAT: SEK. MEN. KEB. PUTRAJAYA PRESINT 11 (1), PUTRAJAYA

MaCGDI telah dijemput untuk menyampaikan Ceramah Alam Sekitar kepada pelajar-pelajar sekolah sempena Minggu Geografi 2014. Dalam sesi tersebut, penceramah telah mengupas beberapa isu alam sekitar serta peranan dan tanggungjawab para pelajar dan pihak sekolah dalam menangani isu ini. Para pelajar dan pihak sekolah telah didedahkan tentang kepentingan kitar semula yang merupakan salah satu inisiatif terbaik dalam membendung permasalahan ini. Para pelajar juga telah diberi sedikit penerangan berkaitan isu pencemaran udara. Selain itu, pelajar turut dimaklumkan berkaitan Indeks Pencemaran Udara (IPU) serta langkah-langkah yang wajar diambil sekiranya IPU ini menunjukkan kadar yang tidak sihat.

Ceramah alam sekitar ini adalah penting sebagai salah satu inisiatif di peringkat kementerian terutamanya untuk memberi kesedaran kepada orang ramai akan tanggungjawab memelihara dan memulihara alam sekitar serta usaha ini perlu dilakukan bermula di peringkat pelajar sekolah.

Perkongsian ilmu ini diharap dapat memberi manfaat serta pendedahan awal kepada pelajar tentang kepentingan alam sekitar dalam menangani masalah pencemaran yang semakin serius. Sebelum mengakhiri sesi ini, soalan kuiz berkaitan alam sekitar turut diajukan kepada para pelajar dan guru bagi menguji tahap kefahaman mereka.

LAWATAN AKADEMIK PELAJAR TAHUN 2 SARJANA MUDA SAINS (GEOINFORMATIK), UNIVERSITI TEKNOLOGI MALAYSIA (UTM) SKUDAI, JOHOR

TARIKH: 16 JUN 2014
TEMPAT: BILIK MESYUARAT PERMATA, ARAS 7, NRE

LAWATAN AKADEMIK PELAJAR UNIVERSITY OF STUTTGART, GERMANY

TARIKH: 3 SEPTEMBER 2014
TEMPAT: BILIK MESYUARAT PERMATA, ARAS 7, NRE

LAWATAN AKADEMIK PELAJAR DIPLOMA SAINS GEOMATIK, UNIVERSITI TEKNOLOGI MARA (UiTM) ARAU, PERLIS

TARIKH: 11 SEPTEMBER 2014
TEMPAT: BILIK MESYUARAT MUTIARA, ARAS 13, NRE

LAWATAN AKADEMIK UNIVERSITI MALAYSIA KELANTAN (UMK) KAMPUS JELI, KELANTAN

TARIKH: 5 MEI 2014
TEMPAT: BILIK MESYUARAT PERMATA, ARAS 7, NRE

Anugerah FutureGov Malaysia 2014 bagi kategori *Government Geospatial*

MaCGDI telah menerima Anugerah FutureGov Malaysia 2014 bagi kategori *Government Geospatial* melalui aplikasi *Geoinformation For Natural Resources* and Environment (G4NRE). G4NRE merupakan salah satu daripada lima (5) projek yang telah disenarai pendek bagi kategori *Government Geospatial*. G4NRE merupakan aplikasi berasaskan *web* yang dibangunkan khusus untuk memenuhi keperluan pengurusan profesional NRE dalam membuat keputusan, perancangan pembangunan dan pemantauan mengenai sumber asli dan alam sekitar. Aplikasi ini merupakan satu perkongsian pintar antara pihak jabatan dan bahagian di bawah NRE dalam bekerjasama mengurus, memacu dan melaksanakan data geospatial negara secara lestari sekaligus merealisasikan "Spatially Enabled Goverment" di Malaysia.

Anugerah Skim Pensijilan Sistem Pengurusan Keselamatan Maklumat (ISMS) ISO/IEC 27001:2005 di Majlis SIRIM Industri

Mesyuarat Jemaah Menteri telah bersetuju Sektor Awam yang merupakan sebahagian daripada Prasarana Maklumat Kritikal Negara (*Critical National Information Infrastructure* - CNII) perlu mendapatkan pensijilan ISO/IEC 27001:2005 Sistem Pengurusan Keselamatan Maklumat. MaCGDI telah dianugerahkan Pensijilan Sistem Pengurusan Keselamatan Maklumat (ISMS) ISO/IEC 27001:2005 pada 3 Julai 2014. Pensijilan ini diluluskan oleh SIRIM Sdn. Bhd. dengan nombor sijil AR6143. Skop Pensijilan ISMS MaCGDI ialah Sistem Pengurusan Keselamatan Maklumat (ISMS) bagi Pengoperasian Pusat Data MaCGDI di Aras 4, Wisma Sumber Asli, NRE.

BULETIN GEOSPATIAL SEKTOR AWAM

Format Dan Garis Panduan Sumbangan Artikel

Buletin Geospatial Sektor Awam diterbitkan dua (2) kali setahun oleh Pusat Infrastruktur Data Geospatial Negara (MaCGDI). Sidang Pengarang amat mengalu-alukan sumbangan sama ada berbentuk artikel atau laporan bergambar mengenai perkembangan Sistem Maklumat Geografi (GIS) di Agensi Kerajaan, Badan Berkanun dan Institusi Pengajian Tinggi.

Garis Panduan Untuk Penulis

1. **Manuskrip boleh ditulis dalam Bahasa Melayu atau Bahasa Inggeris.**
2. **Setiap artikel perlu mempunyai abstrak dan perlu ditulis dengan huruf condong (*italic*).**
3. **Format manuskrip adalah seperti berikut:**

Jenis huruf (*font*)	:	Arial
Saiz huruf bagi tajuk	:	12
Saiz huruf	:	10
Langkau (*spacing*)	:	*single*
Margin	:	Atas, bawah, kiri dan kanan = 2.5 cm
Justifikasi teks	:	Kiri
Lajur (*column*)	:	Satu lajur setiap muka surat

4. **Sumbangan hendaklah dikemukakan dalam bentuk *softcopy* dalam format *Microsoft Word*.**
5. **Semua imej grafik hendaklah dibekalkan dalam format .tif atau .jpg dengan resolusi tidak kurang daripada 150 d.p.i.**
6. **Segala pertanyaan dan sumbangan hendaklah dikemukakan kepada :**

Ketua Editor
Buletin Geospatial Sektor Awam
Pusat Infrastruktur Data Geospatial Negara (MaCGDI)
Kementerian Sumber Asli dan Alam Sekitar
Aras 7 & 8, Wisma Sumber Asli
No. 25, Persiaran Perdana, Presint 4
62574 Putrajaya

Tel : +603-88861252

Faks : +603-88894851

Email : or.macgdi@1govuc.gov.my

Kementerian Sumber Asli dan Alam Sekitar (NRE)

Pusat Infrastruktur Data Geospatial Negara (MaCGDI)
Kementerian Sumber Asli dan Alam Sekitar (NRE)
Aras 7 & 8, Wisma Sumber Asli
No. 25, Persiaran Perdana, Presint 4,
Pusat Pentadbiran Kerajaan Persekutuan
62574 PUTRAJAYA
Tel : +603-88861111 Faks : +603-88894851

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