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**1st High Level Forum
on UN-GGIM**

Sistem DID1 GeoInfo
1 Pangkalan Data GIS untuk 1 JPS

**The Monitoring of Landuse
Development using Quantum GIS**

**Satellite Images Processing
Behind the Scenes**



GIS *Sana-Sini*

GIS DAY @ Sekolah Orang Asli
Daerah Kuala Langat



Lawatan GISTDA-Thailand



Terbitan:
Pusat Infrastruktur Data Geospasial Negara (MaCGDI)
Kementerian Sumber Asli dan Alam Sekitar (MRE)

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Assalamualaikum dan Salam 1Malaysia,

Pengurusan maklumat geospasial secara lestari dan secepat telah diperakui di peringkat Pertubuhan Bangsa-bangsa Bersatu (PBB). Ini terbukti dengan inisiatif penganjuran “*The First High Level Forum on United Nation Global Geospasial Information Management (UN-GGIM)*” yang telah diadakan di Seoul, Korea pada 24 – 26 Oktober 2011 yang lalu. Dalam forum yang julung kali diadakan ini, Y.B. Dato Sri Douglas Uggah Embas, Menteri Sumber Asli dan Alam Sekitar (NRE) telah mewakili Kerajaan Malaysia dan diberi penghormatan untuk memberi ucapan pada slot “*Ministerial Segment*”. Satu deklarasi iaitu “*Seoul Declaration on Global Geospasial Information on Management*” telah diisytiharkan sebagai kemuncak penganjuran forum tersebut. Komitmen NRE menerusi UN-GGIM mampu menjana impak yang positif dalam pembangunan dan pengurusan maklumat geospasial secara global, sejajar dengan fungsi Kementerian. Laporan mengenai perkara ini dipaparkan pada artikel yang pertama sebagai pembuka tirai bagi BGSA edisi 2/2011 ini.

Artikel kedua pula menyentuh mengenai usaha Jabatan Pengairan dan Saliran Malaysia (JPS) yang telah membangunkan satu pangkalan data bersepadu dikenali sebagai projek “*DID 1 GeoInfo*”. Dalam hubungan ini, setiap jabatan di bawah JPS dapat berkongsi maklumat geospasial antara satu sama lain dalam meningkatkan lagi kecekapan pemantauan pengurusan air dan saliran. Inisiatif ke arah kerjasama dalaman antara jabatan di bawah JPS ini sewajarnya diperluaskan lagi agar maklumat geospasial yang berkaitan boleh dikongsi dengan pihak-pihak yang berkenaan secara lebih lancar.

Artikel selanjutnya yang bertajuk “*The Monitoring of Landuse Development Using Quantum GIS (QGIS)*” adalah merupakan rentetan dari artikel mengenai QGIS yang telah diterbitkan pada edisi BGSA 2/2010 yang lepas. Kemampuan QGIS dalam pelaksanaan analisis pemantauan guna tanah oleh pihak JPBD turut diperjelaskan dalam artikel berkenaan.

Artikel yang terakhir dalam edisi pada kali ini mengupas berkenaan metodologi imej *remote sensing*. Artikel ini membawa kita bersama-sama menelusuri dan mendalami kerja-kerja di sebalik tabir dalam pembikinan imej *remote sensing*. Ia memuatkan penerangan secara agak terperinci dari segi pemprosesan data yang diterima daripada satelit sehinggalah kepada penghasilan imej yang dapat digunakan oleh semua pihak.

Harapan kami agar BGSA 2/2011 ini dapat memberikan suntikan idea dan memberikan manfaat yang besar dalam bidang geospasial di semua peringkat.

Selamat membaca.

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Penafian: Kesahihan dan ketepatan tulisan atau pendapat adalah tertakluk pada cetusan idea pengirim artikel



1st High Level Forum on UN-GGIM

(The First High Level Forum on United Nations Global Geospatial Information Management)
24 ~ 26 October 2011 Coex, Seoul, Korea

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ABOUT GGIM

There is general agreement by member states of an urgent need for an inter-governmental consultative mechanism that can play a leadership role in setting the agenda for the development of global geospatial information and to promote its use to address key global challenges; to liaise and coordinate among Member States, and between Member States and international organizations.

In 2009, the United Nations Statistics Division/ DESA (UNSD) convened in New York, on the side of the 9th United Nations Regional Cartographic Conference for the Americas (UNRCC-A), an informal consultative meeting with geospatial information experts from different regions of the world and discussed how to better coordinate the various regional and global activities on geospatial information and the related management issues.

Subsequently, UNSD, jointly with the UN Cartographic Section, convened two preparatory meetings on Global Geographic Information Management (GGIM) - the first in Bangkok in October 2009, prior to the 18th UNRCC-AP, and the second in New York, in May 2010.

At the 18th United Nations Regional Cartographic Conference - Asia Pacific (UNRCC-AP) and the 41st session of the UN Statistical Commission, the issue of global geospatial information



management was discussed and the UN Secretariat was requested to initiate discussion and prepare a report, for the approval of ECOSOC on global coordination of geospatial information management, including the consideration of a possible creation of a United Nations Forum on UN-GGIM.

In July 2010, Economic and Social Council (ECOSOC) decided to request the Secretary-General to submit to the Council at its 2011 substantive session a report on global geographic information management; this decision paved the way for subsequent GGIM preparatory activities.



The First High Level Forum on Global Geospatial Information Management, held in Seoul from 24 to 26 October 2011, brought together 350 participants from 90 countries, 22 United Nations representatives, and 37 representatives from international organizations and the private sector.

List of Malaysian delegates:

1. YB. Dato Sri Douglas Uggah Embas, Minister of Natural Resources and Environment
2. Y.Bhg. Datuk Prof. Sr Dr. Abdul Kadir Bin Taib, Director General of Survey and Mapping Malaysia
3. Ms. Fuziah Abu Hanifah, Director of MaCGDI Ministry of Natural Resources and Environment
4. Mr. Ahmad Shafei bin Jamal, Under Secretary of Development Division, Ministry of Natural Resources and Environment
5. Prof. Sr Dr. Alias bin Abdul Rahman, Dean Faculty of Geoinformation & Real Estate, University of Technology Malaysia (UTM)

The Forum was opened by Prime Minister Kim Hwang-Sik of the Republic of Korea, United Nations Under-Secretary-General Mr. Sha Zukang, and Prof. Cartwright, President of the Joint Board of Geospatial Information Societies.

The Prime Minister stressed that geospatial information is the most fundamental and essential tool to support the joint efforts in resolving global issues. By interconnecting information on natural disasters, poverty and the environment through location data, global issues such as sustainable development and poverty eradication can be systematically and effectively managed. He pointed out that, as a consequence of rapid technological advances, geospatial data have become increasingly important in our daily lives.



The Forum began with a Ministerial Segment with Ministers from eight countries (Korea, Chile, Finland, India, Malaysia, Mongolia, Namibia and Nigeria) exchanging views on the role of geospatial information in national development. This is followed by four thematic sessions focusing on “Challenges in Geospatial Policy Formulation and Institutional Arrangement”, “Developing Common Frameworks and Methodologies”, “International Coordination and Cooperation in Meeting Global Needs” and “Capacity Building and Knowledge Transfer”. The Forum was preceded on Sunday 23 October by an Exchange Forum attended by representatives from the geospatial industry and the government.



i. The Ministers voiced strong support for the United Nations initiative of Global Geospatial Information Management and argued for the important role of geospatial information in policy formulation and evidence-based decision making for national development. Several policy challenges were explicitly referenced: climate change, disaster management, population growth and food security, tourism, urban planning and sustainable development. Ministers pointed out that the demand for geospatial data does not only come from the political level in the context of policy formulation and decision making, but also increasingly from civil society in the context of efficient public service delivery, a process that was described as the “democratization of data”.



- ii. The Ministers stressed the importance of working together across borders. Whilst the country circumstances might differ, the ministers pointed to the benefits of cooperation, which allowed savings with respect to costly R&D investments, sharing of good practices and technology transfer, in order to meet national, regional and global demand for geospatial data. Collaboration enabled the tapping into a larger infrastructure. This was of particular importance for Member States with less capacity as it provided access to additional capabilities and capacities.
- iii. Ministers’ views were echoed by the delegates who, in turn, expressed their appreciation that the issue of geospatial management was given attention at the highest political level. This was considered an important precondition to successfully tackle the institutional and policy challenges related to geospatial information management. The need for a long term vision of development of a geospatial infrastructure, supported by the necessary investments, was stressed. The Forum recognized UN-GGIM as an important platform to advocate for such long term investment.
- iv. The Forum stressed the importance of collaboration among Member States in developing common frameworks, tools and procedures. This will assist countries to develop integrated national data infrastructures to facilitate collection, integration, sharing and dissemination of information. The Forum pointed out the need to share best practices on impact and usefulness of well implemented national spatial data infrastructures.



- v. International geospatial information societies at the Forum affirmed their commitment, and together with the academia, pledged to use their collective professional expertise, research and development capacities to help realize the vision and goal of UN-GGIM of building sustainable geospatial information infrastructure at national, regional, and global levels and of enhanced cooperation in the generation, dissemination and sharing of geospatial information.
- vi. The Forum recognized the important role of international geospatial information societies and standards setting organizations and welcomed their contributions. Countries voiced their support and desire to fully collaborate with these societies and organizations. In this context, UN-GGIM could play an important role to act as a coordinating body providing overall guidance and direction.
- vii. The Forum recognized that the geospatial industry is a key partner in global geospatial information community. The dialogue with industry partners noted the importance of continuing the dialogue between governments and industry under the umbrella of UN-GGIM. The private sector could respond faster to the market place and identify appropriate technological solutions, as we moved from a paradigm of management of geospatial information to the management of all kinds of information geospatially.
- viii. At the national level, the Forum identified the accessibility and sharing of geospatial data at minimum cost as one of the key information policy issues. Open data (and metadata) platforms were considered an important condition for effective integration of geospatial data with other thematic data. Whilst privacy and national security considerations needed to be taken seriously, there was broad support that restrictions on the release of geospatial data should be minimal. The Forum recognized the importance of monitoring the development of crowd sourcing and volunteered geographic information, which could be additional sources of geospatial information.
- ix. The Forum noted that, with respect to institutional arrangements and legal frameworks, the challenge would be to bring together all producers of geospatial information in an effective manner. Whilst it was recognized that there would not be one solution that fits all countries, the need for integration and coordination under the leadership of a national authoritative body was strongly supported. The Forum suggested UN-GGIM to develop and elaborate some guidelines for countries, describing existing models of institutional arrangements and their strengths and shortcomings. This will also help Member States in their ongoing efforts to modernize their legal frameworks.

- x. The Forum pointed out the urgent need to develop a roadmap based on international best practices to assist countries in the development of a National Spatial Data Infrastructure which would form the basis for integrating data with other sources and for data-sharing at all levels (local, national, regional and global).
- xi. The Forum acknowledged that common frameworks and methodologies are useful to increase accessibility and sharing of data and welcomed the suggestions put forward on global geodetic reference system and a global consultation mechanism on the adoption of technical standards. The UN-GGIM was asked to further explore the need for common framework through appropriate work groups.
- xii. The Forum expressed the need to develop effective strategies for building and strengthening capacity of Member States, especially developing countries, to manage geospatial information. A holistic capacity building effort was recommended, that

includes capacity assessment and capacity enhancement in all dimensions: building of knowledge and institutions, education research and outreach. In this context, the Forum recognized the need of appropriate funding mechanism, especially in developing countries, as they try to implement their National Spatial Data Infrastructure in a most timely and efficient way. The Forum suggested that UN-GGIM mechanism could play an important role in enhancing closer cooperation with international funding/aid agencies.

- xiii. The Forum noted the importance of effective regional cooperation and urged greater efforts be made in this regard. Strong regional activities coordinated through regional GGIM mechanisms would in turn help build an effective global data infrastructure.
- xiv. The Forum adopted the Seoul Declaration at the conclusion of the Forum.





Seoul Declaration



on

Global Geospatial Information Management (GGIM)

We, the participants of the First High Level Forum on Global Geospatial Information Management held in Seoul, Korea, on October 24 to 26, 2011, having met in the context of United Nations initiatives to enhance global cooperation in the field of geospatial information management in order to help overcome global challenges, hereby issue this Seoul Declaration on Global Geospatial Information Management (GGIM).

Recalling Resolution 2011/24 of the United Nations Economic and Social Council, which recognized the need to promote international cooperation in the field of global geospatial information;

Recalling further the United Nations Secretary-General's Report E/2011/89, which encouraged the strengthening of cooperation among Member States and International Organizations and emphasized the urgency in establishing concrete actions for the further development of global geospatial information in order to adequately respond to global challenges;

Recognizing the need for full interoperability of multi-dimensional geospatial information and integration with other data sources at national, regional, and global level, in order to provide an effective information base for the resolution of global and local issues, and the need for establishing national, regional and global mechanisms for effective management and utilization of such information;

Sharing a global vision and conviction that reliable and timely geospatial information is an important basis for policy decision making, especially in the context of humanitarian assistance and sustainable development;

We, therefore resolve,

- to express our support for the initiative of the United Nations to foster geospatial information management among UN Member States, international organizations, and the private sector; and in this regard:
- to take actions to foster and strengthen national, regional and global cooperation with the aim of developing an interconnected global community of practice on geospatial information under the umbrella of the United Nations;
- to devise effective processes for jointly and collaboratively promoting common frameworks and standards, as well as harmonized definitions and methods for the treatment of national geospatial data in order to enhance geospatial information management at the national, regional and global level;
- to share experiences in policy-making, supporting legislation, and funding strategies, to encourage and develop best practices in the management (i.e. collection, storage, maintenance and dissemination) of geospatial information management at all levels and its integration with other data sources, and to facilitate and promote capacity development in the developing countries.

Issued on 26 Oct 2011

SISTEM DID1GeoInfo

1 PANGKALAN DATA GIS UNTUK 1 JPS

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ABSTRAK

Keperluan bagi mewujudkan satu pangkalan data GIS yang bersepadu menjadi elemen yang terpenting kepada pengumpulan serta penyebaran data GIS. Kewujudan satu pangkalan data akan memudahkan untuk mengurus, mengemas kini serta menyebarkan data GIS. Pengguna hanya perlu merujuk kepada satu pangkalan data sebagai sumber rujukan bagi mendapatkan maklumat GIS yang diperlukan. Di samping itu juga, pangkalan data GIS bersepadu akan menjimatkan kos dari segi pembangunan aplikasi kerana satu pangkalan data boleh digunakan oleh banyak pihak.

Artikel ini menerangkan usaha Jabatan Pengairan dan Saliran Malaysia menerusi kerjasama di antara Bahagian Pengurusan Maklumat (BPM) dan Bahagian Mekanikal dan Elektrik (BPME) dalam mewujudkan satu pangkalan data GIS yang dikenali sebagai Sistem DID1GeoInfo. Menerusi Sistem DID1GeoInfo, pengguna khususnya warga JPS dapat mencapai maklumat-maklumat GIS seperti lokasi struktur, projek atau sungai. Pada peringkat awal, sistem ini memfokuskan kepada maklumat GIS untuk BPME dan akan dikembangkan kepada bahagian-bahagian lain di JPS Malaysia secara berperingkat mengikut Pelan Strategik Teknologi Maklumat.

PENGENALAN

Jabatan Pengairan dan Saliran Malaysia (JPS Malaysia) mula menggunakan perisian Geographic Information System (GIS) sejak awal tahun 90'an lagi. Pada peringkat permulaan, GIS digunakan sebagai *tool* di dalam menjalankan *Spatial Analysis* bagi projek *Integrated Shoreline Management Plan* (ISMP) serta *River Basin Information System* (RBIS).

Walau bagaimanapun, GIS tidak dikuasai dengan sepenuhnya pada masa itu disebabkan beberapa faktor. Antaranya adalah seperti kekurangan data akses, *duplication of work*, *lack of strategic planning*, tiada penekanan untuk menggunakan GIS dalam kerja-kerja harian, program latihan GIS yang kurang berkesan dan tiada koordinasi di peringkat Jabatan bagi pelaksanaan GIS.

Disebabkan ini, dirasakan perlu ada satu (1) pangkalan data lengkap untuk maklumat GIS JPS Malaysia yang mesra pengguna selaras dengan teknologi terkini bagi meningkatkan lagi penyampaian perkhidmatan kepada orang ramai.



LATAR BELAKANG SISTEM DID1GeoInfo

Sistem DID1GeoInfo dibangunkan oleh Bahagian Pengurusan Maklumat (BPM) dan BPME. Pembangunan sistem ini bermula pada bulan Jun 2009 sehingga Ogos 2010 bagi menyimpan maklumat GIS selaras dengan salah satu inisiatif yang telah dinyatakan dalam Pelan Tindakan GIS. Sistem ini membolehkan perkongsian serta penyebaran data spatial di antara warga JPS di semua peringkat sama ada daerah, negeri serta Ibu Pejabat.

Sehingga kini, sistem ini memberi fokus kepada maklumat GIS yang diuruskan oleh BPME dan ia akan diperluaskan bagi memasukkan maklumat GIS yang diuruskan oleh bahagian-bahagian lain di JPS Malaysia secara berperingkat. Maklumat yang boleh diperoleh daripada sistem ini adalah seperti *Tidal Gate, Pump House, Irrigation Canal Structures*, nama sungai serta lokasi projek.

MODUL DALAM SISTEM DID1GeoInfo

Sistem ini mempunyai lima modul seperti berikut:

a Modul Pengurusan Pengguna (*User Management*)

Modul Pengurusan Pengguna berfungsi untuk menambah dan mengemas kini maklumat pengguna serta menjana laporan. Terdapat dua peringkat pengguna iaitu Pentadbir dan Pengguna sama ada di peringkat Ibu Pejabat atau di peringkat Negeri. Pengguna hanya boleh melihat sub modul iaitu *Reset Password* sahaja. *Screenshot* bagi skrin kemasukan maklumat pengguna seperti di Rajah 1.0.



Rajah 1.0 : Menu *User Management*

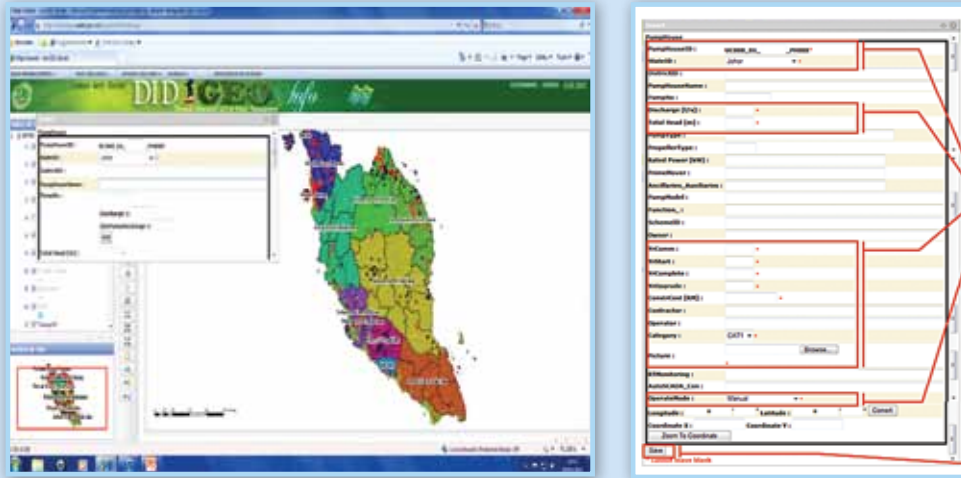
KELEBIHAN SISTEM DID1GeoInfo

- Memudahkan warga JPS untuk mendapatkan maklumat GIS dengan lebih cepat.
- Mewujudkan satu Pangkalan Data GIS Bersepadu untuk JPS Malaysia.
- DID1GeoInfo juga digunakan untuk merekodkan aset tak alih JPS Malaysia bagi tujuan pemantauan.
- Memudahkan pengemaskinian data GIS secara atas talian.

“ Sistem ini membolehkan perkongsian serta penyebaran data spatial di antara warga JPS di semua peringkat sama ada daerah, negeri serta Ibu Pejabat ”

b Modul Tambah Rekod (*Add Record*)

Modul Tambah Rekod berfungsi menambah rekod yang membolehkan pengguna mengisi maklumat *Tidal Gate*, *Pump House*, *Barrage* dan *Irrigation Canal*. Maklumat yang diisi adalah berpandukan kepada MS1759 serta Surat Pekeliling JPS 2/2005. *Screenshot* bagi skrin tambah rekod GIS seperti di Rajah 2.0.



Rajah 2.0 : Menambah Rekod

c Modul Kemas Kini (*Update*)

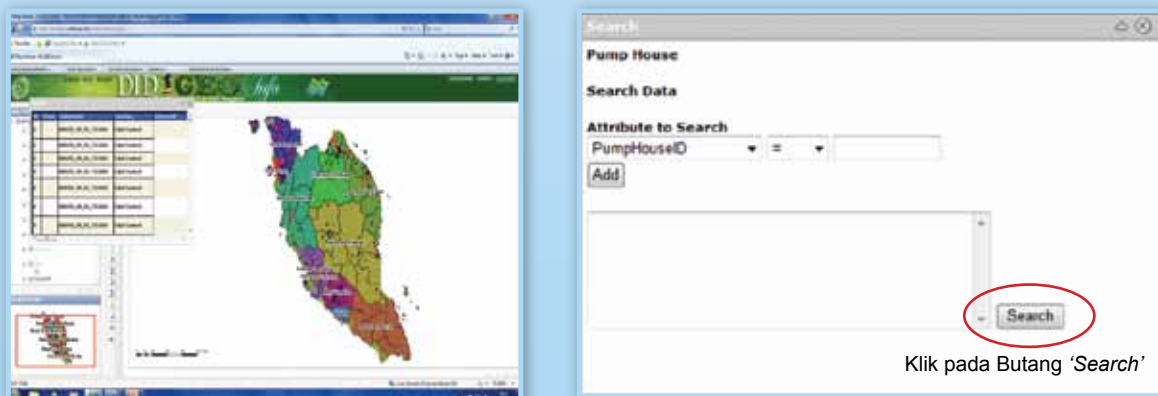
Modul Kemas kini berfungsi membenarkan pengguna mengemas kini maklumat untuk *Tidal Gate*, *Pump House*, *Barrage* dan *Irrigation Canal*. *Screenshot* bagi skrin kemas kini maklumat GIS seperti di Rajah 3.0.



Rajah 3.0 : Kemas Kini Rekod

d Modul Carian (*Search*)

Modul Carian berfungsi melaksanakan carian kepada rekod yang dikehendaki dengan klik pada menu *Search* seperti pada Rajah 4.0. Pengguna boleh melakukan carian berdasarkan kepada *attribute* seperti *PumpHouse ID*, *State ID* atau *District ID*. *Screenshot* bagi skrin carian seperti di Rajah 4.0.

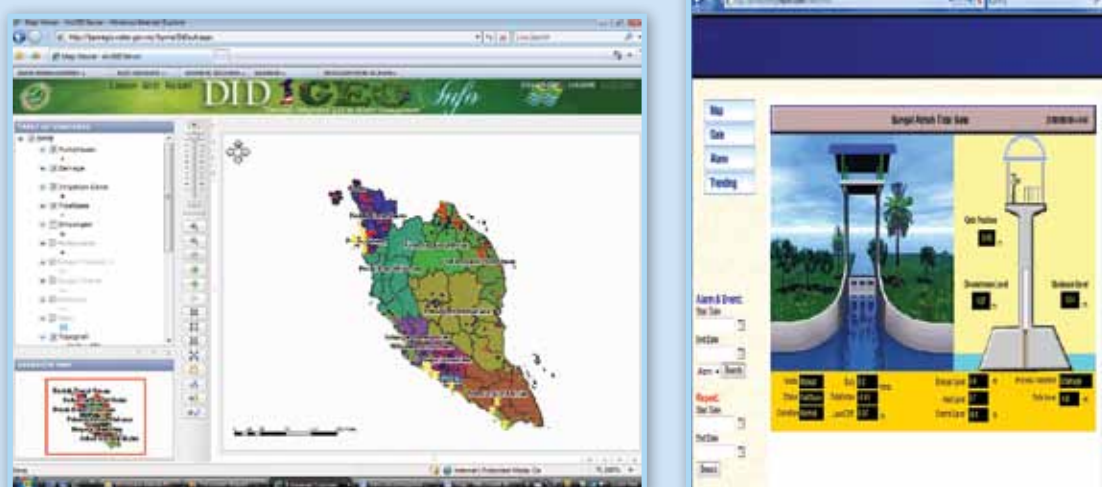


Klik pada Butang 'Search'

Rajah 4.0 : Carian Rekod

e Modul Integrasi SCADA (SCADA Integration)

Supervisory Control And Data Acquisition (SCADA) adalah Sistem Pengumpulan Data berpusat di mana data-data di lapangan akan dihantar ke Pusat Kawalan secara elektronik untuk pemantauan dan pengawalan. Menerusi SCADA, pihak BPME dapat memantau keberkesanan operasi sesebuah struktur seperti *Tidal Gate* sama ada berfungsi dengan baik atau sebaliknya. Modul Integrasi SCADA berfungsi membolehkan pengguna mendapatkan maklumat projek untuk *Tidal Gate* atau *Pump House* secara *Real-Time* dalam Sistem SCADA. *Screenshot* bagi skrin Modul Integrasi SCADA seperti di Rajah 5.0.



Rajah 5.0 : Menu Integrasi SCADA

PROGRAM KEMASUKAN DATA

Kemasukan data-data bagi Sistem DID1GeoInfo dilakukan oleh pegawai-pegawai mekanikal Ibu Pejabat dan Negeri yang terdiri daripada Jurutera, Penolong Jurutera dan Juruteknik. Pegawai-pegawai ini diberi latihan serentak dengan kerja-kerja kemasukan data. Bengkel kemasukan data yang pertama telah dilaksanakan pada bulan November 2010 di *National Water Management Institute* (NAWMI), Kelantan di bawah anjuran BPME. Bengkel kemasukan data yang kedua pula telah diadakan pada Julai 2011.

ISU DAN CABARAN

Pembangunan DID 1GeoInfo pada awalnya terdapat beberapa isu dan cabaran yang perlu dihadapi oleh BPM dan BPME. Antara isu dan cabaran tersebut adalah :-

i. Sumber peruntukan yang tidak mencukupi

Sejarah teretusnya DID 1GeoInfo bermula apabila sistem BPMEGIS telah dicerobohi oleh penggodam dan pembaikpulihan perlu dilaksanakan dengan kadar segera. BPM dan

BPME telah bersepatat untuk membangunkan Sistem BPMEGIS yang baru secara usaha sama dengan pihak pembekal. Cadangan untuk membangunkan sistem yang baru telah diputuskan memandangkan pembaikan semula sistem sedia ada akan melibatkan kos yang hampir menyamai pembangunan sistem baru.

ii. Kurangnya kemahiran pegawai dalam bidang GIS

Pembangunan DID 1GeoInfo ini memerlukan kemahiran yang mendalam dalam teknologi GIS terutamanya penggunaan perisian ESRI iaitu ArcGIS Desktop dan ArcGIS Server. Selain itu pengetahuan dalam bahasa pengaturcaraan *C sharp* (C#) juga diperlukan. Kekurangan kemahiran ini diatasi dengan mendapatkan latihan tambahan dalam bidang berkaitan dengan menggunakan peruntukan daripada BPME.

iii. Isu pemilihan nama sistem aplikasi

Di awal pembangunan sistem aplikasi ini, nama sistem masih dikekalkan kepada nama asalnya iaitu BPMEGIS. Namun selepas beberapa kali perbincangan yang diadakan dan selepas melihat dari pelbagai sudut, nama telah ditukar kepada DID 1GeoInfo.

iv. Masa/kelewatan

Masa merupakan cabaran yang paling utama kerana ia melibatkan komitmen yang tinggi daripada semua pegawai. Memandangkan setiap pegawai mempunyai komitmen yang berbeza dan pula tugas pembangunan ini tidak merupakan tugas utama, ia menyebabkan kelewatan dalam menyiapkan projek. Pembangunan projek ini bermula April 2008 dan siap pada Ogos 2009.

PERANCANGAN DID 1GeoInfo

Menjangkau 2014 nanti DID1GeoInfo akan menjadi *One Stop Center* untuk data GIS jabatan bagi kegunaan warga JPS dan orang awam. Di bawah Program Pembangunan Pusat Sumber GIS Setempat (*One-Stop Center*) dan Pelan Tindakan GIS (Pelan Strategik Teknologi Maklumat JPS) DID 1GeoInfo akan dikembangkan secara berperingkat bermula 2010 sehingga 2014. Perancangan ini akan melibatkan gabungan kesemua data-data GIS jabatan iaitu data sungai, data banjir, data empangan, data paras air dan lain-lain lagi mengikut keperluan

semasa. Selain berfungsi untuk memasukkan data, mengemas kini data, mencari data dan integrasi SCADA, sistem ini juga akan berupaya membuat analisis yang dapat membantu pihak pengurusan tertinggi.

Harapan yang tinggi diletakkan kepada DID1GeoInfo untuk menjadi pangkalan data GIS bersepadu yang dapat membantu pengurusan tertinggi semasa membuat keputusan.

PENUTUP

Pembangunan DID 1GeoInfo adalah berdasarkan kepada Pelan Tindakan GIS JPS yang menggariskan keperluan mewujudkan satu pangkalan data GIS berpusat bagi JPS Malaysia. Ia membolehkan perkongsian maklumat Spatial di kalangan warga JPS, agensi kerajaan serta orang awam lebih meluas kerana maklumat GIS boleh dicapai secara atas talian. Penambahbaikan dan perluasan sistem akan dilaksanakan supaya sistem ini mampu untuk memenuhi keperluan pengendalian maklumat GIS untuk setiap Bahagian di JPS Malaysia.

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The Monitoring of Landuse Development using Quantum GIS

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ABSTRACT

This paper is desirous to prove that it is currently possible not to rely on proprietary GIS but to optimize open source GIS exemplified by Quantum GIS (QGIS) to monitor landuse development. GIS analysis was a process of filtering conforming landuses from a study area until the non-allowable non-conforming landuses stood out. The exercise highlighted a few areas that warrant further attention: topology error, UNIX rules, non-uniform field names and a cautionary use of blanket SQL query statement. The exercise concluded that whilst QGIS managed to sieve the non-allowable non-confirming landuse, there are still limitations in current GIS to effectively monitor landuse development. Beyond this, site surveys must be carried out to confirm the actual situation on the ground pertaining to those non-allowable non-conforming landuses. Here, human judgement has to make the final decision.

INTRODUCTION

Those involved in physical planning and land administration know well that land is a state matter as clearly spelt out in the Federal Constitution. To the state authorities, this is a very important formal statement because they are not as wealthy compared to the Federal Government. Land is their principal source of revenue so it is understandable that they constantly want to know whether their socio-economic and physical planning policies are implemented as planned. Even so, with respect to physical planning, there is a professional need to constantly monitor landuse development so that existing and propose landuse are in line with mandatory development plans and that relevant authorities walk the talk. At the micro lot-base level, the local planning authority (LPA) is responsible to ensure that happens. Since judge should not be jury, the task of monitoring landuse development approved by the LPAs is the role of the State Town and Country Planning Department (JPBD). Thus, it would be great if all parties involved have at their disposal a common tool to compare notes.

QUANTUM GIS TO THE RESCUE

Quantum GIS (QGIS) is a popular multi-platform open source GIS that LPAs where public agencies or anyone for that matter should exploit as it does not incur cost. This is good news for the poorer District Councils who may prefer instead to invest their limited budget on IT infrastructure. QGIS hallmark is its use-friendliness; JPBD gave an intermediate level training on QGIS to BOMBA officers whom had no GIS experience but by the end of the day, they completed a 10 minutes response time catchment area for fire

stations. Some state agencies such as K-Perak Implementation & Coordination Corporation prefer Open Source while others prefer Windows. QGIS is an ideal GIS tool because it can operate in both environments. The user does not need to use any special module to run the GIS analysis as the stock QGIS is adequate but should it be required later, there are more than 400 GRASS (Geographic Resources Analysis Support System) modules to choose from since both are compatible open source tools.

HOW TO GO ABOUT IT?

Task 1 Activate the Zoning and Existing Landuse Plans

The first task was the simplest as exemplified by the output below:

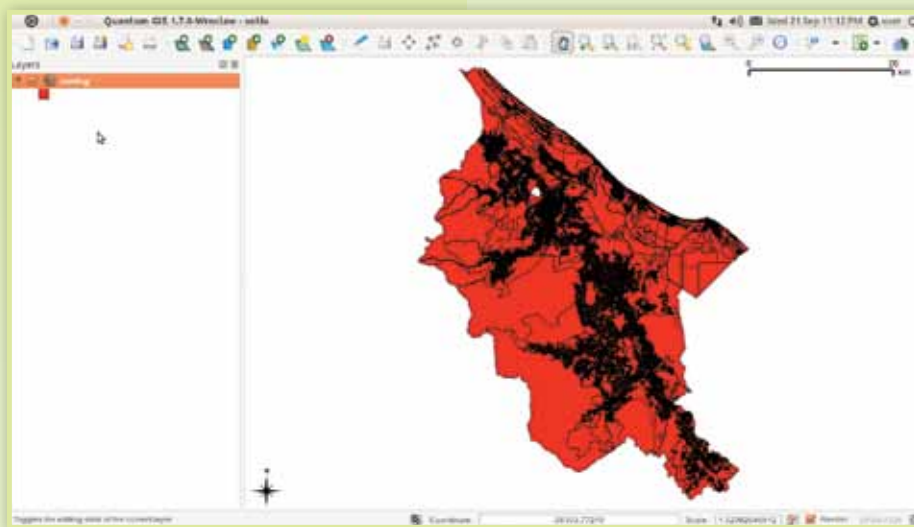


Figure 1 : Zoning plan activated

Task 2 Merge the Zoning and Existing Landuse Plans

The use of the Intersect module intended to merge the existing landuse and zoning plan but the first run was not successfully. It was suspected the cause was topology error. To play safe, both

files were imported into GRASS to spatially index them, v.build command applied to topology build them later exported as .shp files. The various steps are exemplified below:

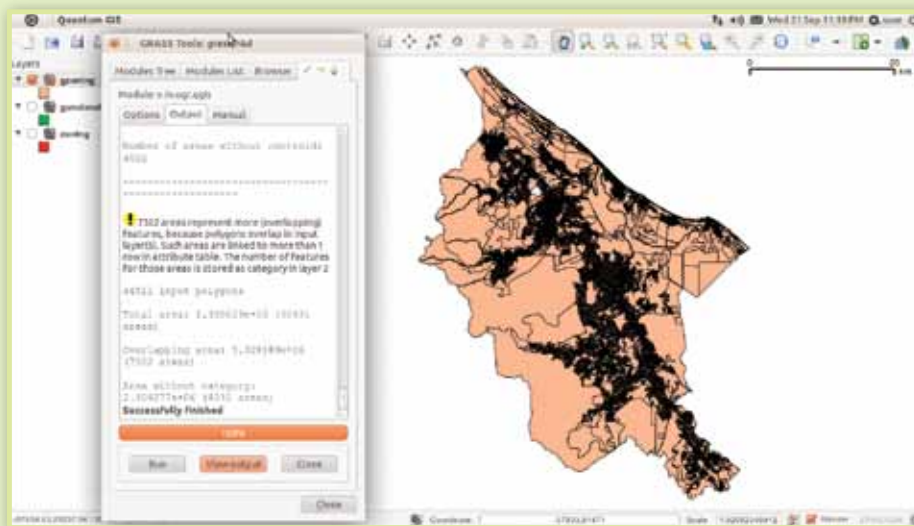


Figure 2 : Zoning plan after spatially indexed



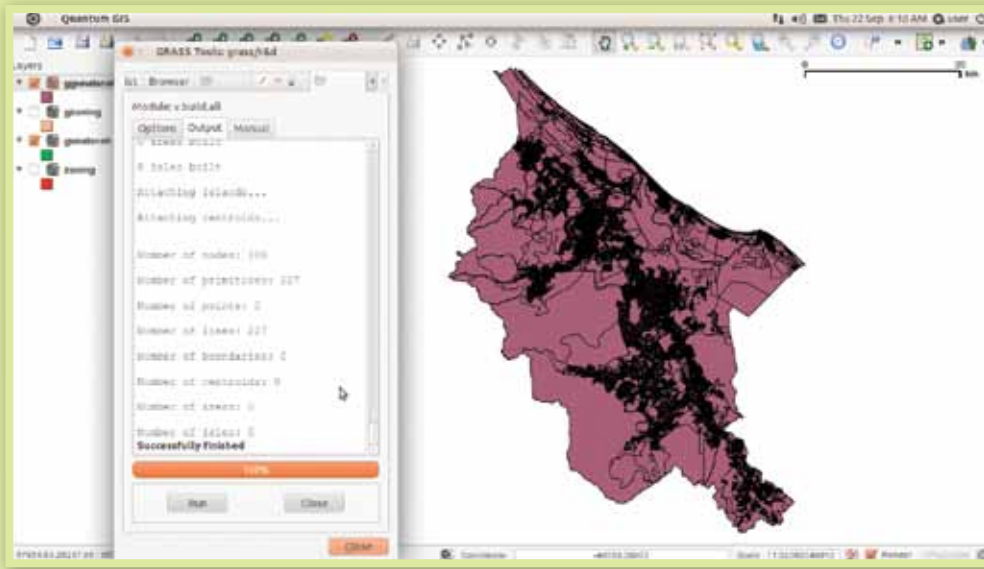


Figure 3 : Existing landuse plan after topology built

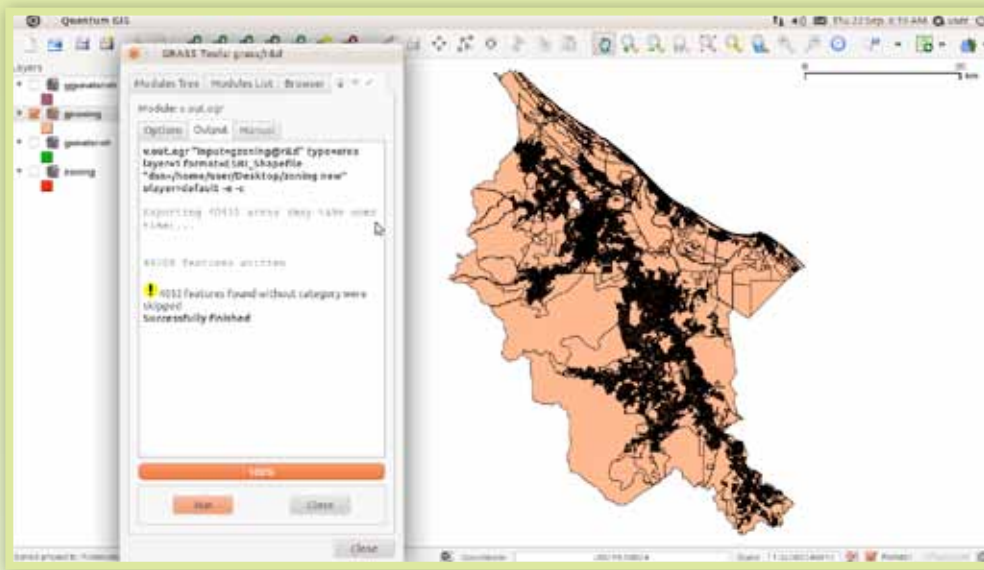


Figure 4 : Zoning plan successfully exported to .shp file

After the Intersect module was properly configured and run again, everything went smoothly as planned.

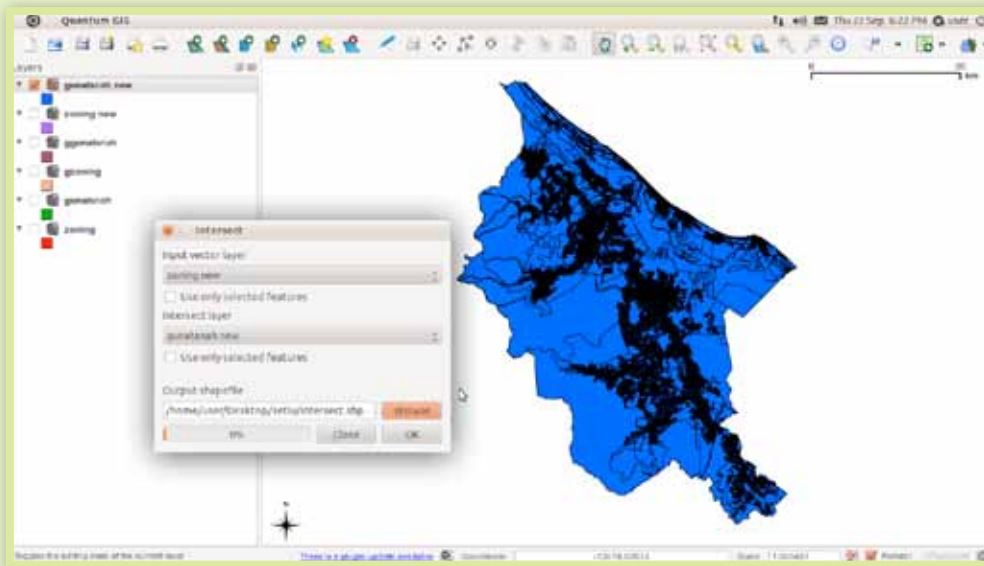


Figure 5 : Intersect module configured to produce the Intersect output

Task 3 Identify Inconformity

The Query Builder was used to determine where lies inconformity between the two plans. The SQL clause was “*Semasa != Zoning*” as illustrated below:

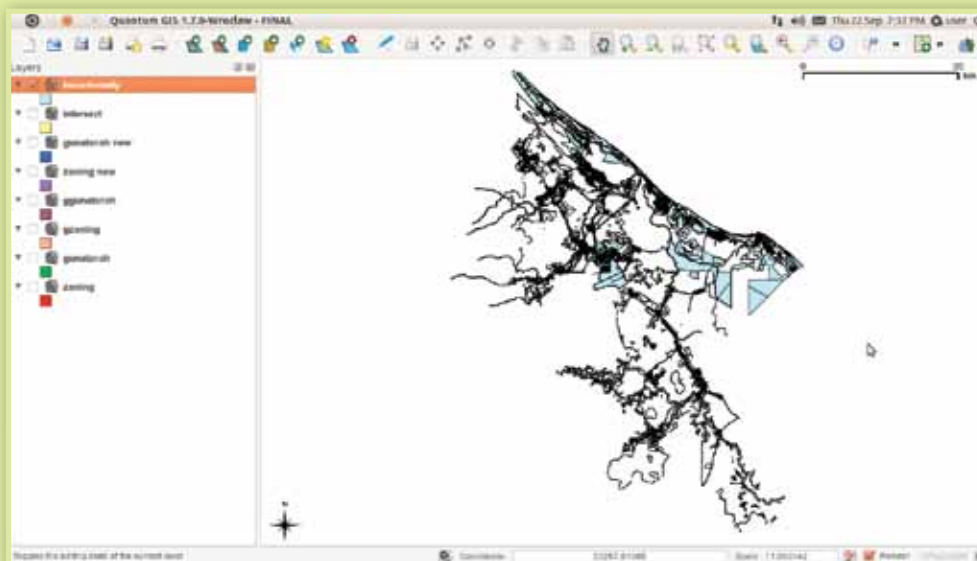


Figure 6 : Inconformity output

Task 4 Identify Questionable Data

As a result of not being thoroughly verified, the data used unfortunately contained some questionable features in the zoning plan. The features “*Pengekalan Bukit, Setiu Wetlands and Taba*” did not tally with requirements of JPBD’s GIS Manual. This made it impossible to do a comparative assessment between them with any feature in the existing landuse plan. Firstly, they had to be verified but since verification requires knowledge of current local conditions and to prevent it from being an obstacle to the exercise, that questionable data was identified then kept aside for the relevant authorities to verify later during site surveys. This time, the Query Builder was used to consolidate the three features into one group.

The SQL clause was “*Zoning='Pengekalan Bukit' OR Zoning='Setiu Wetlands' OR Zoning='Taba'*”. The output is shown as below:

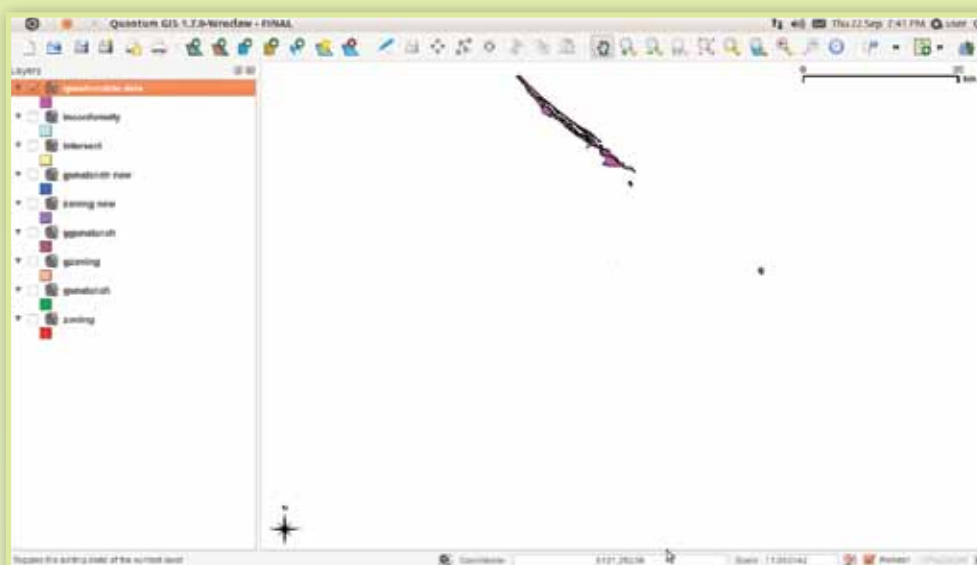
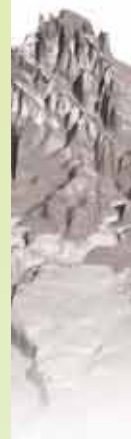


Figure 7 : Questionable data output



Task 5 Identify Inconformity Less Questionable Data

The Difference module was used again to create a new set of inconformity by separating the area of the questionable data output from the area of the Inconformity output.

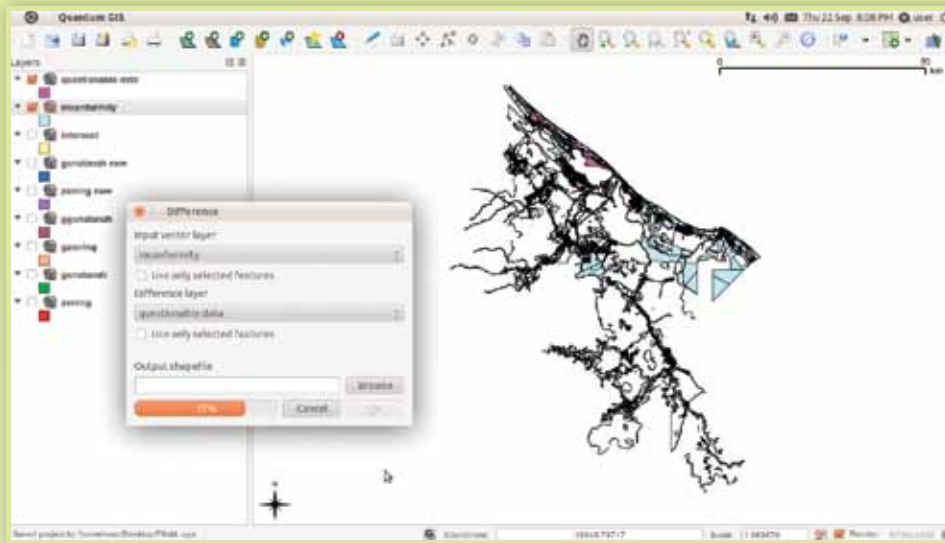


Figure 8 : Difference module run to produce the inconformity less questionable data output

Task 6 Develop Allowable and Non Allowable Non-Conforming Landuse Matrix

The purpose of this task was to identify for each matrix cell the features between in the two plans where development can be allowed or not. Although in reality, 3 possibilities may occur, for the purpose of this exercise, the value judgement per cell was limited to 'YES' or 'NO' but not 'MAYBE' as shown below:

Table1 : Allowable and Non Allowable Non-Conforming Landuse Matrix

No.	Zoning	Existing Landuse									
		Badan Air	Hutan	Industri	Infrastruktur & Utiliti	Institusi & K.Masyarakat	Kediaman	Pengangkutan	Peniagaan & Perkhidmatan	Pertanian	Tanah Lapang & Rekreasi
1	Badan Air (Water Bodies)	O	A	X	X	X	X	X	X	X	X
2	Hutan (Forest)	A	O	X	X	X	X	X	X	X	X
3	Industri (Industry)	X	X	O	X	X	X	X	A	A	
4	Infrastruktur & Utiliti (Infrastructure & Utility)	X	X	X	O	X	X	X	A	A	
5	Institusi & K.Masyarakat (Institution & Community Facilities)	X	X	X	X	O	X	X	A	A	
6	Kediaman (Housing)	X	X	X	X	X	O	X	A	A	
7	Pengangkutan (Transportation)	X	X	X	X	X	X	O	X	A	A
8	Peniagaan & Perkhidmatan (Commerce & Services)	X	X	X	X	X	X	X	O	A	A
9	Pertanian (Agriculture)	X	A	X	X	X	X	X	X	O	A
10	Tanah Lapang & Rekreasi (Open Space & Recreation)	A	A	X	X	X	X	X	X	A	O
11	Pengekalan Bukit # (Preservation of Hills)	R	R	R	R	R	R	R	R	R	R
12	Setiu Wetlands # (Setiu Wetlands)	R	R	R	R	R	R	R	R	R	R
13	Taba # (Taba)	R	R	R	R	R	R	R	R	R	R

O Common case
A Allowable case

X Non-allowable case
R Keep-in-view case

Task 7 Identify Allowable Non-Conforming Landuse

Less the “R” cases which have been put aside as keep-in-view cases, the matrix shows more “X” than “A” cases. A SQL clause to identify Non-Allowable Non-Conforming landuse could be done but would be tediously lengthy so a simpler, shrewder method was opt: identify the Allowable Non-Conforming landuse then separate the area of that output from the area of the Inconformity less questionable data output to obtain the desired result.

The SQL clause was “*Semasa='Badan Air' OR Semasa='Hutan' OR Semasa='Pertanian' OR Semasa='Tanah Lapang dan Rekreasi' AND Zoning !='Pertanian' OR Zoning !='Tanah Lapang dan Rekreasi'*”. The output for the Allowable Non-Conforming landuse is shown below:

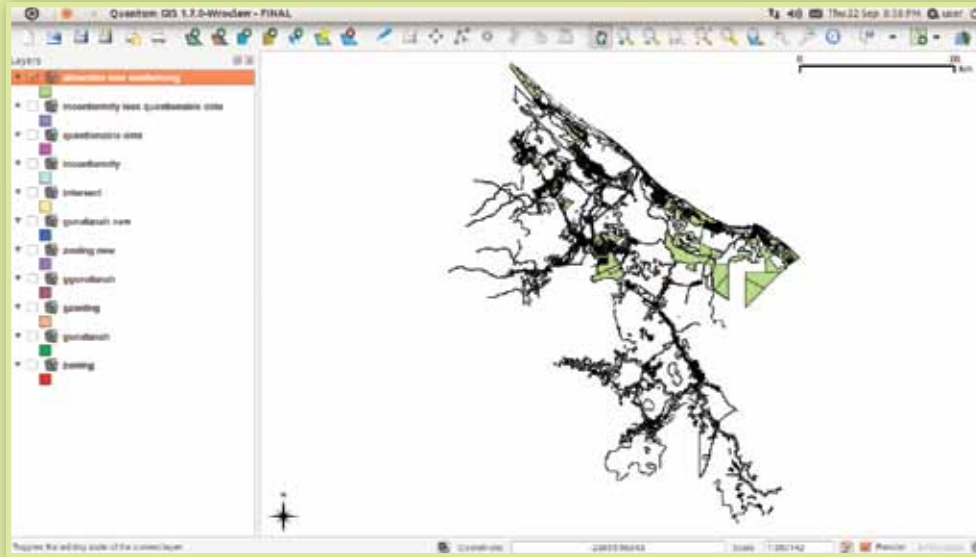


Figure 9 : Allowable Non-Conforming landuse

Task 8 Identify Non-Allowable Non-Conforming Landuse

Finally, with the difference module again, area of the Allowable Non-Conforming landuse output was separated from the area of the Inconformity less questionable data output to help identify the area of the Non-Allowable Non-Conforming landuse. The output is shown below:

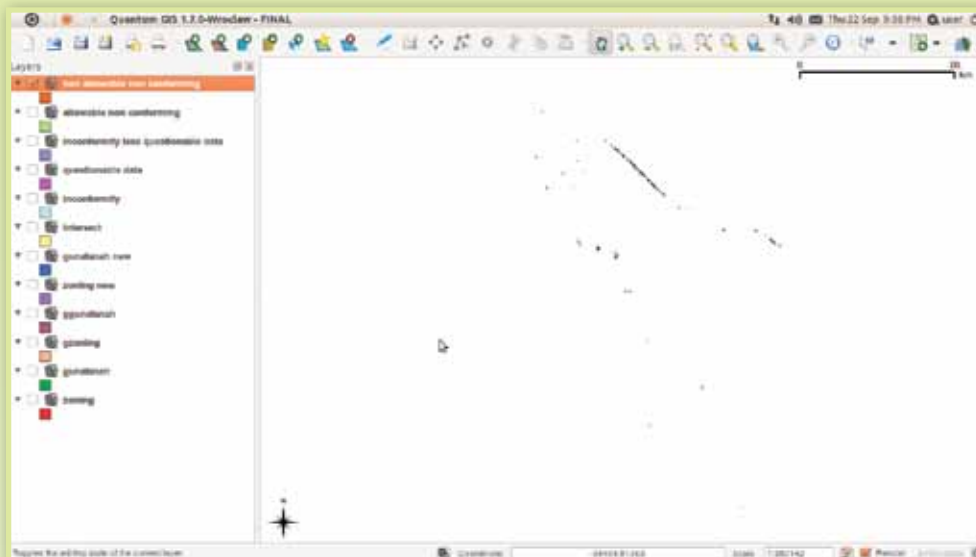


Figure 10 : Non-allowable non-conforming landuse



THE RESULT

- i. GIS analysis involved use of the Intersect, Difference and Query Builder modules while the GRASS v.Build command was used to build the data topology. GRASS v.in.ogr, qgis and v.out.ogr commands were used for import-export purposes. However, the GRASS modules would not have been needed had the data topology been cleaned in the first place.
- ii. The exercise had used a random selection of geospatial data and it was found later, that data still needed further verification. However, its use did not have any negative effect on the exercise and even helped identify loose strings in data collection that need further attention by the relevant authorities. The exercise found that the percentage of Non-Allowable Non-Conforming landuse from the RTD Setiu study was minimal (0.24%) and

even had the questionable data proved to be non-allowable non-conforming landuse, that composite percentage would also be small (1.36%) shown as in Table 2. From this result it would be acceptable to set a very small target for Non-allowable non-conforming landuse to occur in other development plans.

- iii. This is the limit of current GIS. Quantum GIS is not different from other GIS on this matter. With the help of JPBD's custom QGIS planning colour template, the landuse colour classification was added to both the Non-Allowable Non-Conforming landuse and zoning plan where the former was laid over the latter. Manual comparison between the landuses from the two plans will have to be done to verify whether certain non-conforming sites are allowable development back later by ground surveys.

Table 2 : Breakdown of outputs

ITEM	Features	Total	%	
Non-Allowable Non-Conforming Landuse	474		0.24	
Allowable Non-Conforming Landuse	81,476		41.68	
Topology Error	153		0.08	
Questionable Data	2,183		1.12	
Inconformity		84,286		43.12
Conformity		111,151		56.88
Intersect		195,437		100.00

ISSUES

Topology Error

The first trial run to merge the attribute table from separate layers proved unsuccessful with the Intersect module. QGIS reported data topology in the zoning plan was not proper. As a precautionary step, it was decided to convert file format from .tab to .shp since QGIS default file format is .shp. A second precautionary step was to import both .shp files into GRASS since this migration catalogues attributes by 'spatial indexing'. The use of v.Build command helped strengthen the data topology before being exported as .shp. No error message appeared after that.

UNIX Rules

The existing landuse attribute table could not merge with the zoning attribute table because one of its fields contained more than 10 characters as GRASS uses UNIX rules. The solution was to rename that field names only did the two attribute tables merged. No error message appeared after that. A golden rule of the thumb is to maintain such legacy because in future data-sharing may occur between different agencies that still use such legacy.

Non-Uniform Field Names and Attribute Names Cautionary Use of Blanket SQL Query Statement

When the SQL query was initiated, it could not produce any result. This was because the field name differed between the existing landuse and zoning attribute table. Again, adjustments had to be made to rectify this error before the SQL query could produce proper results. No error message appeared after that. Similarly, when attribute names between the existing landuse and zoning attribute table differed, no results appeared until spelling error and non-uniformed attribute names were rectified.

Cautionary Use of Blanket SQL Query Statement

Blanket SQL query statements must be carefully used when monitoring landuse. This is because different LPAs employ spatial policies differently throughout their administrative areas. For example, specific stretches of road in Petaling Jaya such as Jalan Utara and in Kuala Lumpur such as Jalan Maarof now allow commercial activities on residential plots of land where the onus is on the landowner to develop in conformity to the development plan, if he wishes to. Thus, GIS analysis for monitoring landuse should be on a case-by-case merit.

Site Survey

This exercise managed to reduce the area to be surveyed to 0.24% of the Intersect area and a more accurate result could have been obtained if the questionable data did not occur in the first place. Thus, data verification during the early stage of data collection needs to be stringent to help reduce unnecessary burden of site surveys.

CONCLUSION

1. Preinspection to the quality of the data is critical for successful GIS analysis.
2. UNIX rules should be adhered to because inaccurate data topology and inconsistent data structure are not accepted by QGIS.
3. GIS analysis for monitoring landuse development needs to be on a case-by case merit because different LPAs set different spatial landuse policies for their administrative area.
4. Site surveys are obligatory once the non-allowable non-conforming landuses have been identified since there are limitations in GIS.
5. A target of 1% for non-allowable non-conforming landuse to occur is acceptable.
6. QGIS sieves well the non-conforming landuse in monitoring landuse development.
7. QGIS should be capitalize because it offers a free, simple and straight forward tool to monitor landuse development.
8. Users must have a strong grasp in SQL logic and good understanding of SQL operators to appreciate QGIS as an analytical tool because sieving and SQL query are important in GIS analysis especially in the field of town and country planning.

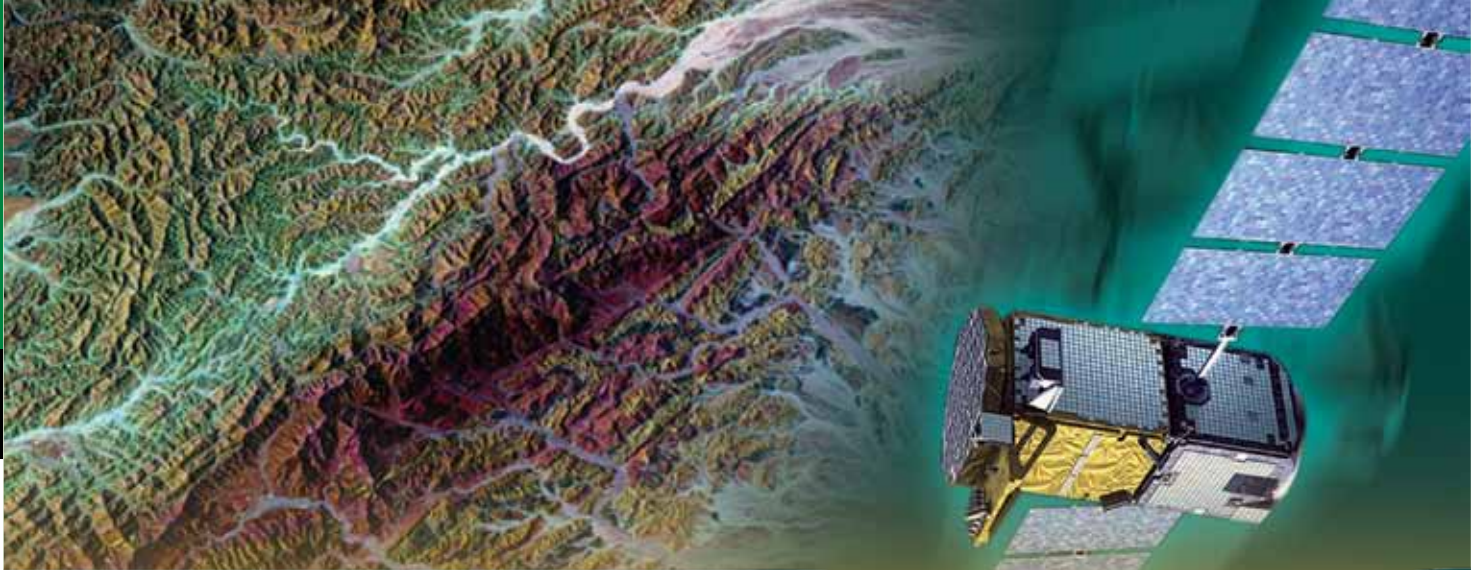
ACKNOWLEDGEMENT

This paper acknowledges and appreciates the contributions made by Mohd. Fadzlan Mohd. Sa'ad, Federal Department of Town and Country Planning, Peninsular Malaysia in joint efforts to use QGIS analysis for monitoring landuse development.

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2. Geospatial Data from Kajian RTD Setiu.





SATELLITE IMAGES PROCESSING BEHIND THE SCENES

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KEY WORDS: Geometric Correction, Radiometric Correction, Image Processing, Satellite Ground Receiving Station.

OVERVIEW

Remote sensing platform and sensor technologies develop quickly; the resolution of remotely sensed images becomes much higher. However, the data processing technologies have been following behind, especially in computing speed and efficiency. In this paper, outlines the overview remote sensing data processing system technologies which consist of traditional workflow and an existing technology and customization services to provide an automatic production system for orthorectification, pansharpener, colour balancing and mosaicking of image data products. Fully automatic production oriented workflow for orthorectification, pansharpener and mosaic creation as well as other modules, resulting in faster, repeatable, less expensive and more accurate results. Satellite sensor performance was also discussed.

SENSOR AND IMAGES

Today, there are many types of satellite sensor with different performance for different types of application. A sensor is a device that measures and records electromagnetic energy transmitted from the sun and reflected as well as emitted by the Earth surface. Sensor can be divided into two groups. Passive sensor depend on the external source of energy, usually the Sun and sometimes the Earth itself. Active sensors have their own source of energy. Measurements by active sensors are more controlled because they do not depend upon the illumination condition. Figure 1 illustrate types of remote sensing sensor which measured reflected sunlight, detect energy emitted by the Earth or provide their own energy.



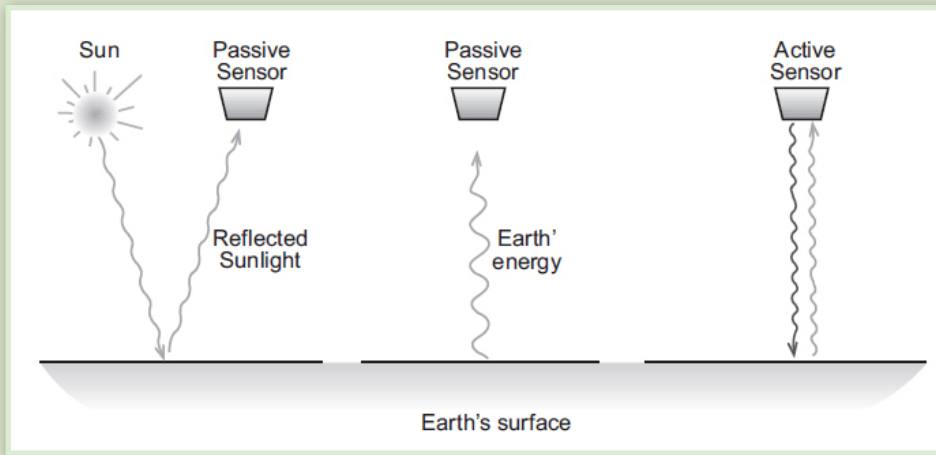


Figure 1 : Passive sensor and active sensor

The quality of image data is primarily determined by characteristics of the sensor-platform system. These sensor-platform system characteristics are usually referred to spectral and radiometric resolution, spatial resolution and temporal resolution. Spectral resolution and radiometric resolution, referring respectively to the part of the Electromagnetic spectrum measured and the differences in energy that can be observed. Spatial resolution, referring to the smallest unit area indicates the minimum size of object that can be detected. Revisit time is the time between

two image acquisitions over same location on Earth surface. All these sensor-platform characteristics contribute to the characteristics of image data. Image data are stored in a grid format (rows and columns). Characteristics of image data are image size (the number of rows and columns in image scene), number of bands (the number of wavelength band stored, for example 5 band for RazakSAT®), and quantization (the data format used to stored the energy measurements, 8 bits which represents the value 0-255).

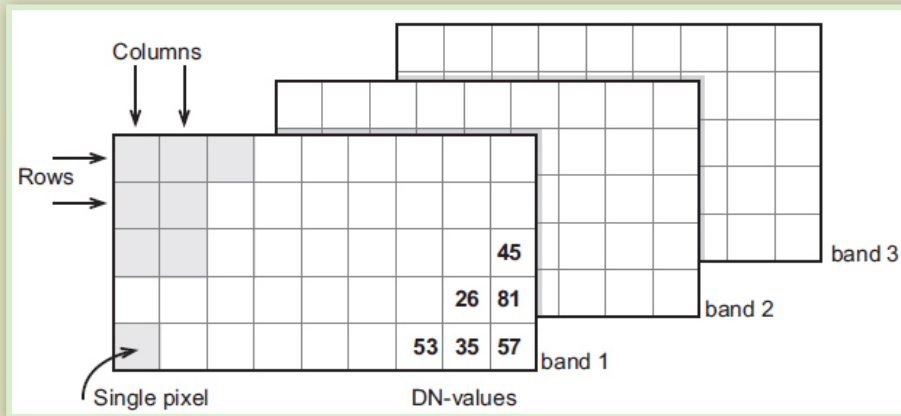


Figure 2: An image file comprises number spectral bands

PROCESSING SYSTEM TECHNOLOGIES

Processing system for satellite imagery normally took place at the Satellite Ground Receiving Station (SGRS) for specific satellite. In general, the SGRS will receive the real-time satellite imagery and ingest into its system during satellite pass. Upon data ingestion, further processing will take place, i.e. the pre-processing and

post-processing which is called satellite image production before the final satellites imagery are send to the users. The processing system for satellite imagery can also perform the image processing using the archiving imagery which is stored in the system based on user's request.





Figure 3: Multi-mission Satellite Ground Receiving Station

Figure 3 shows the example of multi-mission SGRS that is able to receive remote sensing images from various satellites. In this case, there are two main processing systems that perform the satellite imagery production which categorized into high resolution and meteorological data processing system. There are many processing steps involved in SGRS processing system prior to producing the final satellite imagery and will be discussed in this paper.

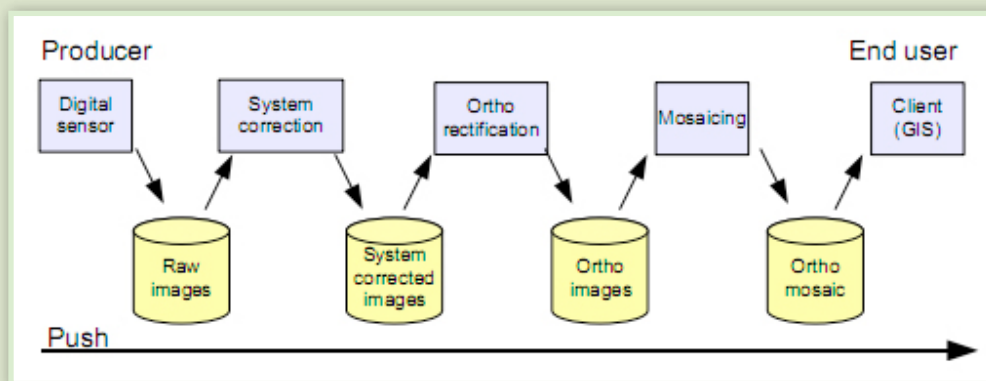


Figure 4: Traditional workflow for SGRS processing system

Traditional Workflow

In traditional workflow for SGRS processing system involves all the processing steps that are done in hierarchical level workflow, from satellite imagery (digital sensor) up to final satellite imagery as describe in Figure 4. In this workflow, each level of processing will produce their own sub-product like system corrected images, ortho-images, ortho-mosaic and etc. In this case, the system requires bigger storage and database system which is not required by the end users except for researchers. Researchers normally like to explore the processing level for each sub-product.

New Paradigm Workflow

The new paradigm workflow for SGRS processing system allow the images to be processed on-the-fly whereby it would require less storage and database but increase the processing speed performance. In Figure 5, the processing workflow will only require all data storage for system corrected images and also storage for final imagery product.

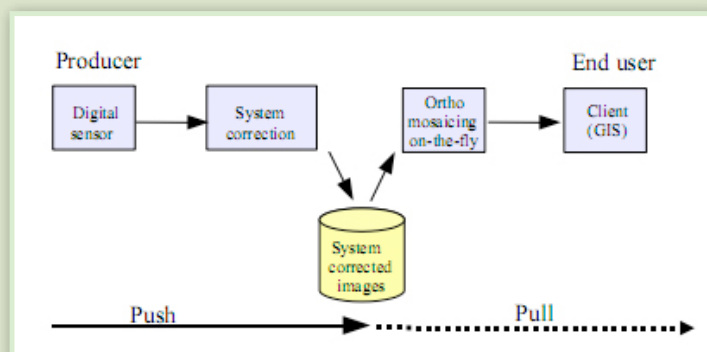


Figure 5: New paradigm workflow for SGRS processing system



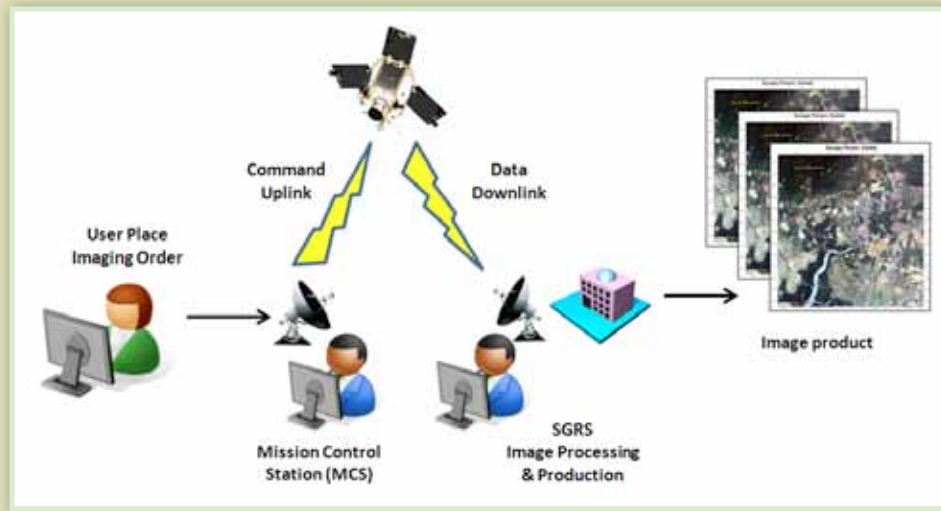


Figure 6 : Image Production Workflow

IMAGES PRODUCTION

Production of remote sensing image is beginning with the new imaging order from the user to the satellite operating agency. Users will place imaging order if the image is not available in the data archive. Satellite operating agency officer will create an imaging plan based on the criteria such location, time specified by users. Then created imaging plan will be released to Mission Control Station officer which in turn will command the satellite based on the imaging plan.

Once the satellite captured the images, remote sensing satellite will sent data to SGRS through data downloading/downlink. The recorded data will be transferred to the archive system and indexed to the catalogues system. The cataloguing process sorts the data according to user request. The data will process into several processing module and produced in various format and media for distribution to the users. Overall process of image production was illustrates in Figure 6.

Image processing can be broadly divided into 3 stages i.e. pre-processing, post-processing: enhancements and transformations, and features extraction. In SGRS, received satellite image will through the pre-processing and post-processing module. Pre-processing module consist of radiometric and geometric correction, while post-processing module consists of image enhancement such image mosaicking, colour balance and cloud, haze replacement.

Pre-Processing

Pre-processing consists of radiometric and geometric correction. Radiometric correction involved the removal of sensor or atmospheric noise, to accurately represent ground conditions; to correct data loss, remove haze and cloud effect and enables mosaicking. Geometric correction involved of conversion of remote sensing data to ground coordinates by removal distortions from sensor geometry.

Radiometric Correction


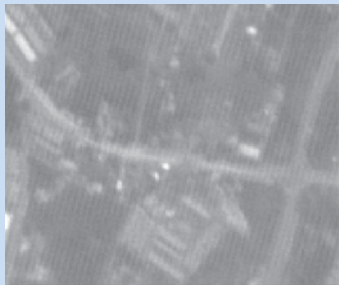

Digital sensor on satellite called as payload record the intensity of Electromagnetic Radiation (EMR) from Earth surface as Digital Number (DN) for each spectral band. The exact range of DN that a sensor utilizes depends on its radiometric resolution. For example, a sensor such RazakSAT® Medium Aperture Camera (MAC) measures radiation on a 0-255 DN scale whilst Quickbird measures it on 0-2047 scale.

The majority of image processing has been based on raw DN values in which actual spectral radiances are not of interest (e.g. classifying a single satellite image). However, there are problems to study spectral signature of features such vegetation. Spectral signature is not transferable if measured in DN. Spectral signature value are dependent on the viewing geometry of the satellite at the moment the image was capture, the location of sun and weather conditions. All of this function contributes to the noise and radiometric correction is used to modify the DN values for the following reason to eliminate noise within the image such speckle or striping, noise between adjacent/overlapping images for mosaicking, noise between band for multispectral technique and noise between temporal image data and sensors.

Noise in remote sensing imagery degrades the interpretability of the data. Noise is produced by numerous factors including thermal effects, sensor saturation, quantization errors and transmission errors. Common noise appears in raw remote sensing data are tabulated in Table 1 below. This noise need to be corrected in early stage of image processing workflow which done by SGRS processing module.



Table 1 : Common noise in raw remote sensing data

Radiometric Error	Striping Line	Periodic Noise	Point Spread Function
Example of noise in satellite image			
Description	Missing data (appear black line) due to sensor failure result in a line DN values = 0.	Periodic noise occurs at regular interval and appears with same orientation.	Point Spread Function (PSF) noise due to optical sensor behaviour. Image looks blurring.

Geometric Correction

Remotely sensed data usually contain both systematic and unsystematic geometric error. Some of the more important sources of geometric error are summarized in Table 2 (Jensen, 1996).

These errors may be divided into two classes:

- 1) Those that can be corrected using data from satellite ephemeris and knowledge of internal sensor distortion and;
- 2) Those that cannot be corrected with acceptable accuracy without a sufficient number of ground control points (GCPs).

A Ground Control Point (GCP) is a point on the surface of Earth where both image coordinates (measured in rows and column) and map coordinates (measured in latitude and longitude, meters) can be identified. Those geometric distortions that can be corrected through analysis of sensor characteristic and satellite/platform ephemeris include scan skew, mirror scan velocity, spacecraft velocity and earth's curvature. Those that can only be corrected through the use of GCPs are sensor system altitude (roll, pitch and yaw) and altitude.

Table 2 : Sources of Geometric Error in Remote Sensing Scanning Systems

SYSTEMATIC DISTORTIONS
<p>Scan Skew:</p> <p>Caused by the forward motion of the platform during the time required for each mirror sweep. The ground swatch is not normal to the ground track but is slightly skewed, producing cross-scan geometric distortion.</p>
<p>Mirror Scan Velocity :</p> <p>The mirror scanning rate is usually not constant across a given scan, producing along scan geometric distortion.</p>
<p>Panoramic Distortion:</p> <p>The ground imaged is proportional to the tangent of the scan angle rather than to the angle itself. Because data are sampled at regular intervals, this produces along-scan distortions.</p>
<p>Earth Rotation:</p> <p>Earth rotates as the sensor scans the terrain. This results in a shift of the ground swatch being scanned, causing along scan distortion.</p>
<p>Platform Velocity:</p> <p>If the speed of the platform changes, the ground track covered by successive mirror scans changes, producing along track scale distortion.</p>
NON SYSTEMATIC DISTORTIONS
<p>Altitude:</p> <p>If the sensor platform departs from its normal altitude or increases in terrain elevation, this produces change in scale.</p>





Figure 7: Systematic Corrected versus Orthorectification product

At the SGRS processing centre, satellite images will go through several phases of processing for correcting the effects of geometry distortion. There are three (3) level of processing to eliminate the geometric distortion:

- 1) Systematic correction;
- 2) Precision correction; and
- 3) Orthorectification.

Processing for systematic correction is based on satellite ancillary data while precision correction and orthorectification is based on Ground Control Points (GCP) and Digital Elevation Model (DEM). Summary of these three levels of processing is tabulated in Table 3.

Table 3: Geometric correction processing level

Level of Correction	Geometric Correction
Systematic Correction	Removes geometric distortion based on satellite ancillary data. Geometric error < 1 km Root Mean Square (RMS) equal to geo-location error of the satellite at nadir viewing condition.
Precision Correction	Removes geometric distortion based on Ground Control Points (GCP). Geometric error < 2 pixels RMS at nadir viewing condition.
Orthorectification	Removes geometric distortion based on Ground Control Points (GCP) & Digital Elevation Model (DEM).

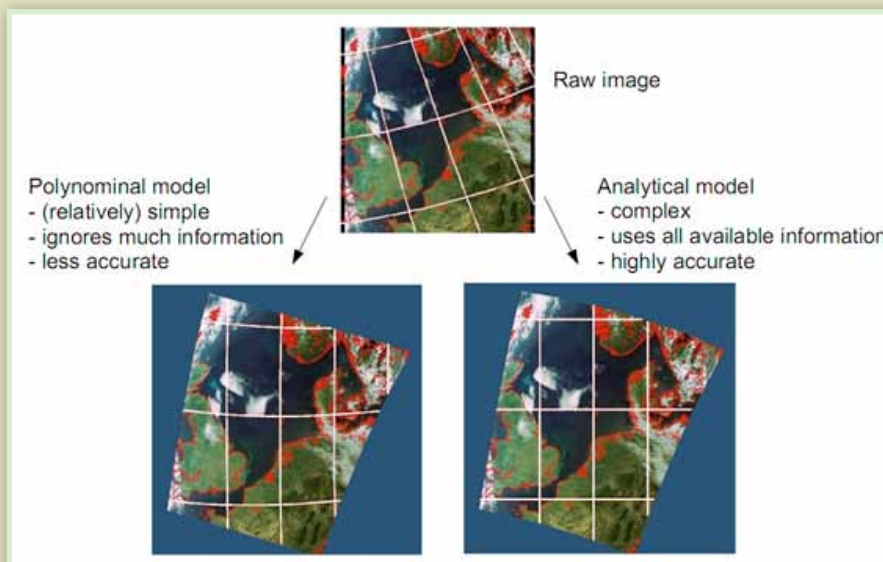


Figure 8: Geometric correction



Post-processing

Post-processing of satellite imagery is more focusing on enhancement of satellite imagery. This consist of pan-sharpening, natural colour generation, image mosaicking and cloud or haze replacement module. (As illustrated at Figure 9-12)

Pan-sharpening

Pan-sharpening module/process in SGRS can be describes as a process of transforming a set of low (coarse) spatial resolution multispectral (colour) image into high (fine) spatial resolution

images, by fusing a co-georegistered high spatial resolution panchromatic (black/white) image. Three low resolution bands- blue, green and red are used as main inputs in the process to produce a high resolution colour image.

Natural colour image with a spatial resolution of 2.4m (middle) and a panchromatic image with a spatial resolution of 0.6m (left), by combining these two inputs, a high resolution colour image is produced. The best attributes such as spectral signature and spatial features from both inputs are retained in the fused image.



Figure 9: Pan-sharpening process by fusing panchromatic and multispectral image

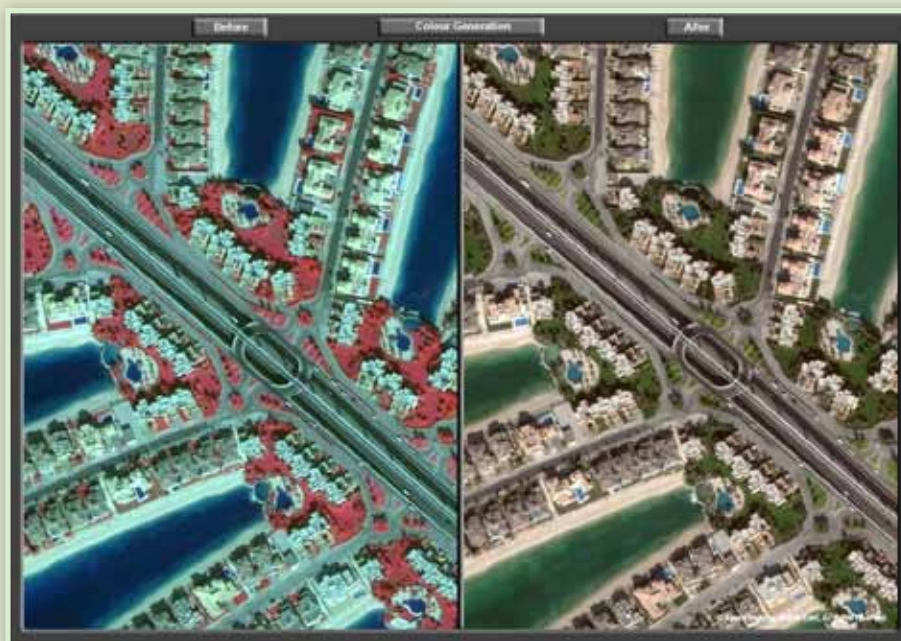


Figure 10: Natural colour composite image from visible (red, green, blue) band combination





Natural Colour Generation

Colour is widely used in many remote sensing works, and each of the colour bands conveys additional information both visually and scientifically. In a conventional multispectral imaging system Earth is represented in different spectral bands, Near Infrared (NIR), red, green, and blue bands.

An image that consists of NIR, red, and green bands which is known as a False Color Composite (FCC) image does not look natural, due to the absence of Blue Band. However, when the intended use is a 3D fly-through of draped terrain models, visual interpretation, or a display, meant for the non-remote sensing professional, this becomes a handicap. To subdue such handicaps, one has to generate natural color images from the given false color composite, which combines the blue band with green and red bands. The final output is the Natural Color Composite image.

Mosaicking

The Mosaic Generation module in SGRS will automatically create a mosaic from orthorectified panchromatic, multispectral or pansharpened images in conjunction with the information obtained through the Colour Balancing module. This module also includes the automatic detection and removal of brightness value variations, automatic radiometric colour balancing between images, automatic cutline determination to minimize visibility of seams in the mosaic as well as mosaic preview for checking colour balancing and cutline seams.

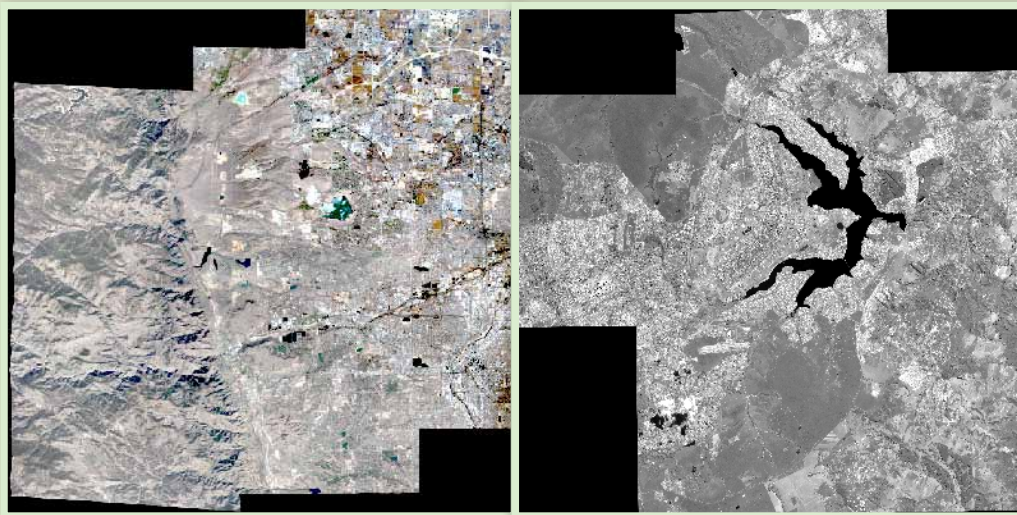


Figure 11: Mosaic image from different temporal image acquisitions



Figure 12: Haze reduction module

APPLICATION AND VALUE ADDED PRODUCT

Satellite images can be utilized for various remote sensing applications ranging from land cover to disaster monitoring. Among the strategic application suitable for Malaysia are cartography, land use/cover mapping, agriculture and forestry, oceanography as well as maritime applications. With the accurate result and faster time of image production from SGRS, user can use the resulting image to a number of applications as mentioned above. In the Table 4, show the temporal resolutions requirement for some remote sensing applications in Malaysia.

Table 4 : Temporal resolution requirement for remote sensing application. (Ibrahim et al, 2004)

Applications	Temporal Resolution		
	Real-Time	Near Real Time	Non Real Time
Forestry	Forest Fire	Logging Activity	Forest Types and Boundary Forest Species Biomass Logging track Biodiversity
Agriculture	Nutrient contents	Soil Moisture Precision Agriculture Crop vigor Pest and disease control	Landuse Crop type Yield estimation
Environment	Oil spills Turbidity Haze		
Disaster	Landslides Flood		
Oceanography/ Fisheries	Chlorophyll & Phytoplankton Fish forecasting	Wave height	Bathymetry Sea bottom features
Meteorology	Cloud formation Cloud types Water vapour Hot spots Volcanic ash Rainfall estimation		

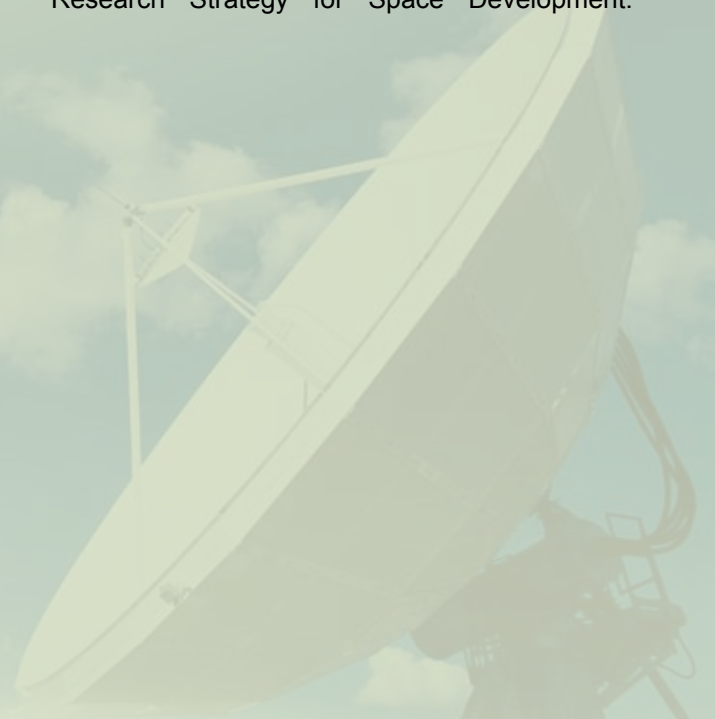
CONCLUSION

The automated production image processing workflow provides any agencies that related to satellites image processing in their daily activities, with the capability for the rapid and accurate processing of a lot of pre existing archive imagery and new imagery being acquired ongoing basis into a range of image-map and mosaic product.

Remote sensing application in Malaysia that requires real-time temporal resolution is required to have faster processing system. The main goal is to provide as much information as soon as possible to the responsible agency for further action.

REFERENCE

Mohd Ibrahim Seeni Mohd, Mazlan Hashim and Samsudin Ahmad. (2004). Research Strategies for Remote Sensing Development in Malaysia. National Workshop on Research Strategy for Space Development.





GIS DAY

@ SEKOLAH ORANG ASLI DAERAH KUALA LANGAT



Hari GIS atau lebih dikenali sebagai *GIS Day* disambut pada setiap hari Rabu minggu ketiga dalam bulan November tiap-tiap tahun. Pada 16 & 17 November 2011 yang lepas merupakan tarikh yang penuh bermakna, kerana MaCGDI telah berjaya menganjurkan *GIS Day* di Sekolah Kebangsaan Orang Asli, Daerah Kuala Langat.



Sambutan *GIS Day* bermula pada tahun 1987 oleh *National Geographic Society* untuk mempromosikan pembelajaran Geografi bagi kanak-kanak di sekolah, komuniti setempat dan organisasi yang berkaitan. Sambutan ini telah menjadi titik tolak kepada sambutan *GIS Day* di seluruh dunia.



Sejak tahun 2009, *GIS Day* merupakan salah satu aktiviti tahunan Pusat Infrastruktur Data Geospasial Negara (MaCGDI) di bawah Kementerian Sumber Asli dan Alam Sekitar (NRE) dalam usaha menggalakkan lagi perkembangan GIS di Malaysia. Memandangkan MaCGDI bertindak sebagai agensi utama dalam pembangunan GIS negara, program ini menjadi salah satu platform MaCGDI untuk menerangkan kepada masyarakat umum mengenai kepentingan pengetahuan Geografi dan keperihatinan terhadap alam sekitar.

Pihak MaCGDI telah mendapat kerjasama dari sebuah syarikat GIS bertaraf dunia iaitu *Environmental Systems Research Institute (ESRI)* untuk berganding bahu dalam penganjuran pada kali ini. Pada tahun ini program ini telah berjaya dianjurkan dengan sedikit kelainan.



Pada kali ini *GIS Day* telah disambut di luar kawasan bandar iaitu di dua (2) buah sekolah orang asli iaitu di Sekolah Kebangsaan Bukit Tadom (A), Daerah Kuala Langat pada 16 November 2011 dan di Sekolah Kebangsaan Bukit Cheding (A), Daerah Kuala Langat pada 17 November 2011.

Sekolah Orang Asli telah dipilih untuk bersama-sama menyambut *GIS Day* sebagai pendedahan kepada perkembangan arus perdana terutama dalam bidang Sistem Maklumat Geografi (GIS) selain menerapkan kesedaran tentang kepentingan Geografi terhadap persekitaran kehidupan mereka.

Aktiviti dimulakan dengan ucapan dari En. Ya'cob bin Abas mewakili pihak MaCGDI yang menerangkan serba sedikit tujuan dan aktiviti yang akan dijalankan dan disusuli oleh ucapan balas dari Guru Besar sekolah terbabit. Sesi penerangan pengenalan mengenai GIS dan kepentingannya turut diadakan kepada para pelajar.

Para pelajar telah dipecahkan kepada kumpulan-kumpulan mengikut tahap masing-masing iaitu pra-sekolah, Tahap 1 iaitu dari darjah 1-3, Tahap 2 dari darjah 4-6 dan Kelas Dewasa Asli/ Penan (KEDAP). Setiap kumpulan telah disediakan aktiviti yang bersesuaian bagi mereka. Antara aktiviti yang telah dijalankan adalah pertandingan mewarna, kuiz, *Map Puzzle*, *Crossword*, *Map & Match* dan pelbagai acara yang berkaitan dengan Geografi.

Acara yang diadakan kali ini cukup meriah dan diakhiri dengan penyampaian hadiah dan cenderamata kepada pemenang dan pelajar terbaik UPSR di kedua-dua buah sekolah tersebut.



Lawatan Pelajar Jabatan Geografi

Universiti Malaya

ke MaCGDI



19 Mei 2011; Seramai 34 orang Pelajar Geografi, Universiti Malaya (UM) telah menyertai program lawatan sambil belajar ke MaCGDI. Tujuan lawatan diadakan untuk memberi pendedahan para pelajar kepada pelbagai teknik cerapan data dan analisa data geospasial yang merupakan sebahagian daripada kerangka kursus kajian lapangan. Para pelajar juga didedahkan dengan cara perolehan data geospasial yang ada di MaCGDI bagi tujuan kajian dan penulisan tesis mereka. Sehubungan dengan itu, penerangan yang jelas telah diberikan berkaitan pemerolehan data geospasial serta prosedur permohonan data oleh pelajar telah diterangkan oleh pegawai dari Seksyen Pengurusan Pangkalan Geodata, MaCGDI.





Visit from President of

Global Spatial Data Infrastructure Association (GSDI)

Dr. Abbas Rajabifard is President of the GSDI Association, Associate Professor and Director of the Centre for Spatial Data Infrastructures and Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP). The President of the GSDI Association had a visit at MaCGDI on the 21st June 2011. This opportunity give MaCGDI the chance to make a discussion on how to improve SDI in Malaysia. Many brilliant ideas from the honourable GSDI President to develop and inspiring new innovation on SDI had been proposed.



“ The purpose of GSDI is to promote international cooperation and collaboration in support of local, national and international spatial data infrastructure developments that will allow nations to better address social, economic, and environmental issues of pressing importance. ”



Lawatan Pelajar Diploma Ukur Tanah

Universiti Teknologi Malaysia
UTM International Campus,
 Jalan Semarak

9 Ogos 2011; Seramai 40 orang Pelajar Tahun 1 Diploma Ukur Tanah yang mengikuti mata pelajaran (DDPL 1122 – Pengenalan Geomatik) pada semester satu sesi 2011/2012 UTM, International Campus, Jalan Semarak telah mengadakan satu lawatan sambil belajar ke MaCGDI. Lawatan ini bertujuan untuk mengetahui teknologi pembangunan maklumat geospasial negara yang dikendalikan oleh MaCGDI. Berdasarkan sesi soal jawab, lawatan ini telah berjaya memberi rangsangan kepada para pelajar untuk menerokai teknologi geospasial dengan lebih mendalam lagi.



Lawatan Teknikal

'GEO-INFORMATICS AND SPACE TECHNOLOGY DEVELOPMENT AGENCY'
 (GISTDA) THAI MINISTRY OF SCIENCE AND TECHNOLOGY SPACE AGENCY

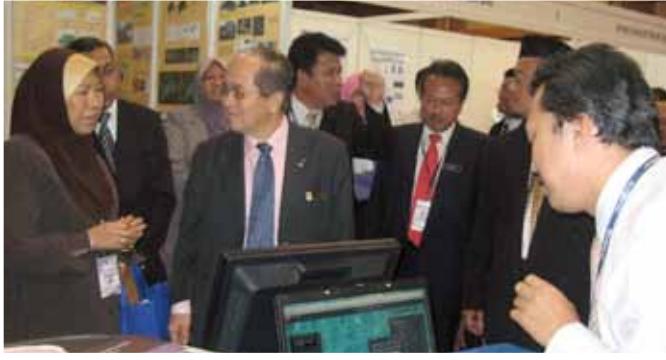


20 September 2011; Seramai 15 pegawai dari Geo-Informatics and Space Technology Development Agency (GISTDA) di bawah Thai Ministry of Science and Technology, telah mengadakan lawatan teknikal ke MaCGDI. Lawatan ini telah dipengerusikan sendiri oleh Puan Fuziah bt. Haji Abu Hanifah, Pengarah MaCGDI. Tujuan lawatan ini adalah untuk mengetahui berkenaan dengan pelaksanaan *National Spatial Data Infrastructure* (NSDI) dan pengalaman yang dilalui oleh MaCGDI dalam pembangunan dan pelaksanaan NSDI di Malaysia. Lawatan daripada delegasi Thailand ini membuktikan kejayaan MaCGDI dalam pembangunan NSDI, telah diiktiraf oleh pelbagai agensi dari dalam dan luar negara.



Joint ISG 2011 & ISPRS 2011 Conference

10th International Symposium and Exhibition on Geoinformation ISPRS
Commission II/5 on Multidimensional GIS & Mobile Data Models
ISPRS Commission II/7 on Decision Support Systems and LBS



ISG 2011 & ISPRS 2011 CONFERENCE telah diadakan pada 27-29 September 2011 di Shah Alam Convention Centre (SACC). Program ini telah dirasmikan oleh Y.B Dato Sri Douglas Uggah Embas, Menteri Sumber Asli dan Alam Sekitar (NRE). Tema penganjuran pada kali ini iaitu “*Seamless Innovative Geospatial Solutions*” menggambarkan betapa pentingnya akses yang secepat ke arah dataset geospasial yang harmoni.

Pada program kali ini Pengarah MaCGDI telah dijemput untuk mempengerusikan sesi pembentangan kertas kerja. MaCGDI juga telah menghantar beberapa orang peserta dan menyertai aktiviti pameran untuk mempromosikan aplikasi-aplikasi MyGDI kepada para peserta program tersebut.



Bengkel Keperluan Pengguna Integrated Road Information System (I-RIS) Kementerian Kerja Raya (KKR)

17-19 November 2011: Pihak Bahagian Pengurusan Maklumat (BPM), Kementerian Kerja Raya (KKR), telah mengadakan satu Bengkel Keperluan Pengguna *Integrated Road Information System (I-RIS)* bertempat di Hotel Renaissance, Melaka. Bengkel ini telah dihadiri oleh 20 orang peserta dari pelbagai bahagian dan agensi di bawah KKR. Ia bertujuan untuk menentukan senarai dan sumber lapisan data GIS berpandukan standard yang digunakan oleh MaCGDI dalam pembangunan *National Geospatial Data Center (NGDC)* bagi keperluan pembangunan pangkalan data I-RIS.



Beberapa pegawai MaCGDI telah dijemput untuk memberi penerangan dan mengendalikan bengkel ini. Taklimat dan penerangan dari aspek MyGDI, MS1759, Metadata dan pembangunan tema *Transportation* NGDC telah diberikan kepada para peserta yang hadir pada bengkel tersebut.

Hasil taklimat dan bengkel yang diadakan ini, telah memberi maklumat yang sangat berguna bagi membantu pihak KKR ke arah merancang dan melaksanakan pembangunan pangkalan data I-RIS dengan lebih baik. Pihak MaCGDI menyokong penuh terhadap usaha yang dijalankan oleh KKR dalam menyeragamkan data geospasial terutama data-data jalan dan lebuhraya negara.

Lawatan Editorial Penerbitan MaCGDI ke IRDA



Projek Pembangunan Wilayah Iskandar telah dilancarkan oleh Kerajaan Persekutuan sebagai pemangkin pembangunan ke arah negara maju menjelang 2020. Iskandar *Regional Development Authority* (IRDA) telah ditubuhkan bagi merealisasikan hasrat mega ini.

Pembangunan Wilayah Iskandar ini meliputi lima (5) agensi tempatan iaitu Majlis Bandaraya Johor Bahru (MBJB), Majlis Perbadanan Johor Bahru Tengah (MBJBT), Majlis Perbandaran Pasir Gudang (MPPG), Majlis Perbandaran Kulai (MPK) dan Majlis Daerah Pontian (MDP).

Dengan moto "*Plan, Promote and Facilitate*", IRDA bertindak sebagai pihak yang bertanggungjawab dalam menyediakan polisi dan *master planning* dengan menggunakan teknologi geospasial bagi merealisasikan impian IRDA untuk menjadi sebuah organisasi yang berdaya saing dan mendapat pengiktirafan di peringkat antarabangsa.

IRDA juga merupakan salah sebuah agensi yang menyelaras maklumat geospasial dan menyediakan infrastruktur kepada agensi-agensi bagi menggalakkan dan memudahkan perkongsian serta penyebaran maklumat.

Sehubungan itu, Pasukan Editorial Penerbitan MaCGDI telah mengadakan satu lawatan ke ibu pejabat IRDA sempena Kursus Pengukuhan Penulisan, Suntingan, Rekabentuk dan Teknik Fotografi Digital di Johor Bahru yang bermula pada 5 Disember 2011. Antara tujuan lawatan ini adalah untuk berkongsi pengalaman dalam bidang geospasial antara IRDA dengan MaCGDI.



Seminar on Utilizations of Satellite Technologies Enhancing Malaysia – Japan Collaborations



Seminar on Utilization of Satellite Technologies Enhancing Malaysia - Japan Collaborations telah diadakan pada 16 dan 17 November 2011 bertempat di Hotel Seri Pacific Kuala Lumpur. Seminar ini telah dirasmikan oleh Timbalan Menteri Sains, Teknologi dan Inovasi iaitu Y.B. Datuk Haji Fadillah bin Haji Yusof. Seminar yang dianjurkan bersama pihak JAXA (*Japan Aerospace Exploration Agency*) ini juga turut disertai oleh beberapa pegawai kehormat dari Malaysia dan Jepun, termasuklah Duta Jepun ke Malaysia iaitu Mr. Shigeru Nakamura.

Seminar ini telah dihadiri seramai lebih 65 orang peserta, yang terdiri daripada peserta-peserta tempatan seperti dari Agensi Angkasa Negara, ATSB, Jabatan Pertanian, Jabatan Alam Sekitar, MaCGDI, Jabatan Perhutanan, MARDI, JUPEM dan Jabatan Meteorologi. Ia juga dihadiri oleh pakar-pakar serta jurutera-jurutera berpengalaman dari pelbagai agensi di bawah kendalian JAXA. Seminar ini merupakan sebahagian daripada usaha ANKASA dalam mempromosikan teknologi satelit kepada pengguna dalaman.

Tujuan seminar ini diadakan untuk membuka peluang serta ruang kepada para peneraju teknologi satelit serta pakar dari kedua-dua negara berkumpul untuk membincangkan pelbagai isu yang penting berkaitan industri angkasa di samping bertukar-tukar fikiran dan kepakaran. Selain daripada itu, seminar ini juga merupakan platform kepada ANKASA amnya dan Malaysia khususnya bagi meneroka dengan lebih jauh lagi hal-hal berkaitan dengan teknologi angkasa dengan bantuan serta kerjasama dari pihak JAXA.



Dr. Mustafa Din Subari, Ketua Pengarah ANKASA menerima cendermata dari Mr Toshiro Doura (Pengarah Eksekutif Bersekutu JAXA).



YBTM Datuk Haji Fadillah bin Haji Yusof menerima cendermata dari Mr Shigeru Nakamura, Duta Jepun ke Malaysia.



Dr Mustafa Din Subari dan Mr Jun Gomi (Pengarah Space Application and Promotion Center (SAPC) mengesahkan minit mesyuarat pada penghujung seminar.

BULETIN GEOSPATIAL SEKTOR AWAM

FORMAT DAN GARIS PANDUAN SUMBANGAN ARTIKEL

Buletin Geospasial Sektor Awam diterbitkan dua (2) kali setahun oleh Pusat Infrastruktur Data Geospasial Negara (MaCGDI). Sidang Pengarang amat mengalu-alukan sumbangan sama ada berbentuk artikel atau laporan bergambar mengenai perkembangan Sistem Maklumat Geografi 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 mukasurat

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 :

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