BULETIN GIS

JAWATANKUASA PEMETAAN DAN DATA SPATIAL NEGARA

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PENDAHULUAN

Jemaah Menteri berasaskan Kertas Kabinet No.243/385/65 bertajuk *National Mapping Malaysia* telah meluluskan jawatan dan terma-terma rujukan *"Surveyor-General Malaya and Singapore"* sebagai Pengarah Pemetaan Negara Malaysia dan mengesahkan keanggotaan serta terma-terma rujukan Jawatankuasa Pemetaan Negara pada 31 Mac 1965.

Cabutan para-para 2(b), 2(c) dan 2(d) daripada kertas kabinet tersebut mengenai keanggotaan dan terma-terma rujukannya adalah seperti berikut:

"2(b) National Mapping Committee

That a National Mapping Committee be appointed to comprise the following:

i. Director of National Mapping
ii. Director of Lands & Surveys, Sabah;
iii. Director of Lands & Surveys Sarawak;
iv. Representative of the Ministry of Defence;
v. Representative of the Ministry of Rural Development (now substituted by the Ministry of Natural Resources and Environment);
vi. Assistant Director of Survey, FARELF

2(c) The terms of reference of the National Mapping Committee to be as follows:

i. to advise the Director of National Mapping on matters relating to mapping policy;
ii. to advise the Director of National Mapping on mapping priorities.

2(d) That the Committee be empowered to appoint a Secretary and to co-opt persons who would be required to assist the Committee,"

Seterusnya pada 22 Januari 1997, Jemaah Menteri telah meluluskan pindaan terhadap nama, keanggotaan dan bidang-bidang rujukan Jawatankuasa Pemetaan Negara kepada Jawatankuasa Pemetaan dan Data Spatial Negara (JPDSN), bagi mencerminkan peranannya yang diperluaskan ke bidang data pemetaan berdigit. Keanggotaan JPDSN pada masa kini adalah terdiri daripada agensi-agensi seperti berikut:

1. Jabatan Ukur dan Pemetaan Malaysia
2. Jabatan Tanah dan Ukur Sabah
3. Jabatan Tanah dan Survei Sarawak
4. Wakil Kementerian Pertahanan
5. Jabatan Mineral dan Geosains Malaysia
6. Jabatan Perhutanan Semenanjung Malaysia
7. Jabatan Pertanian Semenanjung Malaysia
8. Jabatan Perhutanan Sabah
9. Pusat Infrastruktur Data Geospatial Negara (MaCGDI) *(co-opted)*
10. Jabatan Pertanian Sabah
11. Jabatan Pertanian Sarawak
12. Pusat Remote Sensing Negara (MACRES)
13. Universiti Teknologi Malaysia
14. Universiti Teknologi MARA *(co-opted)*
15. Universiti Sains Malaysia *(co-opted)*
16. Jabatan Laut Sarawak *(co-opted)*
17. Jabatan Perhutanan Sarawak
18. Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia *(co-opted)*

Buletin GIS ini yang diterbitkan dua kali setahun adalah merupakan salah satu aktiviti oleh Jawatankuasa Pemetaan dan Data Spatial Negara, sebagai salah satu media pendidikan dan penyebaran maklumat dalam mendidik masyarakat memanfaatkan maklumat spatial dalam pembangunan negara. Walau bagaimanapun, sebarang kandungan artikel-artikel adalah tanggungjawab penulis sepenuhnya dan bukan melambangkan pandangan penerbit.

Kandungan

DARI MEJA KETUA EDITOR

Mengimbau sejarah lalu mengenai keagungan Maharaja Napoleon Bonaparte berbangsa Perancis yang telah berjaya menakluki benua Eropah. Bagi membiayai kos peperangan yang begitu tinggi serta menjaga empayar Eropahnya yang luas, pada tahun 1808 beliau telah mengeluarkan dekri supaya ukur dan pemetaan dilaksanakan bagi setiap plot tanah untuk tujuan pungutan cukai tanah. Evolusi ukur dan pemetaan di Eropah semenjak kurun ke 19 ini telah banyak mempengaruhi ukuran serta sistem tanah moden yang diwarisi pada hari ini. Contohnya, sesuatu hakmilik tanah itu hanya akan dikeluarkan oleh pihak berkuasa setelah ukuran dan pemetaan dilakukan dan rekod dikemaskini.

JUPEM yang telah ditubuhkan semenjak 1885 di Johor telah pun mencapai usia 125 tahun dan mempunyai seramai 5,000 kakitangan yang bertugas di Ibu Pejabat Kuala Lumpur dan cawangan-cawangan JUPEM di seluruh negeri serta Topografi Negeri. Secara amnya, fungsi JUPEM melibatkan dua (2) bahagian iaitu dalam bidang Kadaster dan Pemetaan.

Pada ketika ini, JUPEM telah pun menghasilkan pangkalan data ukur kadaster yang mempunyai 7.6 juta lot tanah yang telah siap diukur. Ini bermaksud, pemilik tanah boleh mengenal pasti sempadan tanah masing-masing bagi tujuan pembangunan. Di samping itu, hakmilik tetap bagi lot tanah tersebut juga boleh dikeluarkan. Untuk makluman pembaca, Sistem Kadaster di Malaysia merupakan antara sistem yang terbaik serta diakui di dunia yang mana sempadan serta hak pemilik tanah dinyatakan dengan jelas dan aktiviti urus niaga terjamin oleh Kerajaan. Pangkalan data yang dibangunkan adalah berintegriti tinggi dan berkoordinat tepat, selaras dengan keupayaan serta tuntutan teknologi masa kini.

Dari sudut aktiviti Pemetaan pula, JUPEM telah menghasilkan banyak siri peta bagi kegunaaan pertahanan dan pembangunan. Antara peta yang dikeluarkan adalah Peta Am Malaysia, Peta Topografi, Peta Bandar serta Peta Tematik. Selain itu, JUPEM turut memenuhi kehendak pelanggan yang terdiri daripada agensi kerajaan, pihak swasta dan orang awam dengan menghasilkan produk-produk seperti model paramuka berdigit, ortofoto, fotograf udara dan eMap. Sementara itu, peta topografi digital dalam pelbagai format telah pun digunakan oleh pelbagai agensi kerajaan dan swasta bagi melaksanakan sistem GIS di tempat masing-masing. Dalam pada itu, JUPEM juga menghasilkan data geodetik yang penting untuk perancangan dan pembangunan Negara seperti data ketinggian, data graviti, parameter transformasi koordinat, MyRTKnet dan peta geoid.

JUPEM juga memainkan peranan yang begitu besar dengan menjadi penasihat teknikal kepada Kerajaan Malaysia dalam perbincangan mengenai kedudukan sempadan antarabangsa daratan dan maritim.

Adalah menjadi harapan besar JUPEM untuk menjadi pemacu bagi pembangunan negara melalui penyediaan data geospatial negara untuk kegunaan semua pihak yang berkaitan. Tema sambutan 125 tahun ini iaitu **'INOVASI MENJAMIN KESEJAHTERAAN RAKYAT DAN PEMBANGUNAN NEGARA'** meluahkan segala hasrat warga JUPEM kepada Negara.

PERLAKSANAAN METADATA YANG TERSELARAS DI MALAYSIA

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Seksyen Perkhidmatan Pemetaan, JUPEM
amazlan@jupem.gov.my

1. Pengenalan Metadata

Metadata juga dipanggil *Data directory* atau *Information directory*, menyediakan maklumat/ penerangan mengenai data di dalam pangkalan data. Metadata berfungsi untuk menyediakan maklumat secukupnya kepada pengguna agar pengguna dapat membuat penilaian ke atas sesuatu dataset tanpa perlu mengakses pangkalan data berkenaan. Setiap pengguna ingin mengetahui jenis-jenis data terkini yang disimpan di dalam pangkalan data, di mana data tersebut boleh diperolehi dan untuk tujuan apa data-data berkenaan digunakan. Dalam hubungan ini, metadata meyokong sesuatu data dengan memberi maklumat mengenai kandungan, kualiti, sumber yang digunakan, sifat-sifat, serta sejarah penyediaan data.

2. Sejarah Metadata Di Malaysia

2.1 Pembangunan metadata di Malaysia adalah berasaskan dokumen antarabangsa ISO/TC211, iaitu ISO 19115:2003 - *Geographic Information / Geomatics – Metadata*. Skop khusus dokumen ini adalah untuk mendefinisikan skema bagi menerangkan maklumat geografi dan perkhidmatannya, iaitu seperti berikut:

2.1.1 Mewujudkan skema bagi maklumat geografi untuk metadata.

2.1.2 Skema maklumat geografi yang seragam akan membenarkan maklumat geografi disuaipadankan dengan teknologi maklumat. Seterusnya, ia turut membantu meningkatkan keupayaan suatu maklumat geografi yang dibangunkan bagi tujuan kegunaan sesuatu aplikasi.

2.1.3 Metadata yang berkaitan akan dapat menerangkan perkara-perkara berkenaan data yang terkini (*currency*), ketepatan data, kandungan data dan atribut, punca data, kos data, liputan dan kesesuaian data untuk sesuatu kegunaan.

2.2 Di dalam dokumen ISO 19115:2003 - *Geographic Information/Geomatics – Metadata* terdapat 409 entiti maklumat metadata di mana ia terdiri daripada elemen-elemen bertaraf mandatori (M), *conditional* (C) dan *optional* (O).

2.3 Walau bagaimanapun, dokumen antarabangsa tersebut telah dikemas kini berasaskan keperluan di negara ini dan disesuaikan dengan kehendak garis

panduan SIRIM. Kerja-kerja pengemaskinian dan penyesuaian ini telah dimulakan oleh Jawatankuasa Teknikal Standard MyGDI (JTSM) semenjak bulan Februari 2006.

2.4 Sehubungan dengan itu, metadata yang telah dikemaskini dan disesuaikan dengan keperluan di negara ini mempunyai 138 entiti maklumat metadata di mana 21 elemen terdiri daripada elemen mandatori (M) seperti **Jadual 1** di bawah:

Entiti	Nama/*Role Name*
CI_Citation	1. *Title*
CI_Series	2. *Abstract*
CI_ResponsibleParty	3. *Organisation Name* 4. *Position Name*
CI_Telephone	5. *Voice* 6. *Facsimile*
CI_Address	7. *Delivery Point* 8. *City* 9. *Administrative Area* 10. *Postal Code* 11. *Country* 12. *Electronic Mail Address*
CI_Online Resource	13. *Lingkage*
MD_RepresentativeFraction	14. *Topic Category* 15. *Content Developer Type* 16. *Rating*
EX_GeographicBoundingBox	17. *East Bound Longitude* 18. *West Bound Longitude* 19. *South Bound Longitude* 20. *North Bound Longitude*
Additional Information	21. *Product*

Jadual 1: 21 elemen mandatori

3. Pelaksanaan Metadata

3.1 Pada ketika ini, agensi-agensi pembekal data mendokumenkan metadata produk masing-masing dengan kaedah yang tidak terselaras iaitu menggunakan format yang tersendiri dan penggunaannya khusus untuk agensi-agensi yang berkenaan

sahaja. Dalam hal sedemikian, aspek perkongsian data tidak dititikberatkan. Antara contoh-contoh Agensi Pembekal Data yang telah mempunyai metadata bagi produk masing-masing adalah seperti contoh di **Lampiran A**.

3.2 JTSM ketika ini telah dapat menghasilkan *template* bagi metadata seperti di **Lampiran B**. *Template* ini telah diedarkan kepada agensi-agensi pembekal data untuk diguna pakai. Sehubungan dengan itu, pemantauan terhadap pematuhan *template* metadata tersebut yang digunakan oleh agensi-agensi pembekal data geospatial telah dijalankan secara berterusan oleh Pusat Infrastruktur Data Geospatial Negara (MaCGDI), Kementerian Sumber Asli dan Alam Sekitar.

3.3 Sebagai langkah untuk memudahkan pengesanan serta capaian kepada data geospatial yang terdapat di pelbagai agensi pembekal data, MaCGDI telah membangunkan modul *metadata entry, updating* dan *metadata search* di dalam aplikasi MyGDI.

3.4 Penggunaan *template* metadata ini diharap dapat membantu melaksanakan perkara-perkara berikut:

3.4.1 Bagi Agensi Pembekal Data

(i) Mempromosi dan menerbitkan produk-produk agensi berkenaan.
(ii) Memaklumkan dan menyediakan maklumat berkaitan produk dan perkhidmatan yang diberikan.
(iii) Memudahkan perkongsian maklumat berkaitan produk-produk.

3.4.2 Bagi Pengguna Data

(i) Melaksanakan carian yang lebih berkesan mengikut keperluan.
(ii) Mengetahui data-data dan perkhidmatan yang diberikan.
(iii) Mengenal pasti kesesuaian data untuk digunakan.
(iv) Dapat mengakses maklumat secara atas talian.

4. Penggunaan Metadata Yang Terselaras

Penggunaan metadata yang terselaras adalah digalakkan agar perkongsian data di antara agensi dapat dilaksanakan dan seterusnya dapat memberi kemudahan ke atas perkara-perkara berikut:

4.1 Menyediakan terma yang seragam.

Terma yang seragam dapat menghindarkan daripada berlakunya sebarang kekeliruan ke atas perkara-perkara yang dibincangkan. Sehubungan dengan itu,

ia akan menggalakkan semua data-data didokumenkan menggunakan format yang terselaras dan tekal.

4.2 Memudahkan carian sesuatu lokasi.

Metadata yang terselaras dapat membenarkan aktiviti-aktiviti seperti carian, membuat penilaian, membuat suntingan dan mengguna pakai data-data di dalam rekod metadata dengan mudah, cepat dan berkesan. Dalam hal sedemikian, ia dapat membantu agensi-agensi yang mempunyai data-data geospatial berkenaan untuk mempromosikan data-data geospatial tersebut.

4.3 Membenarkan carian secara automatik.

Metadata yang terselaras membolehkan komputer diprogramkan untuk menghasilkan fungsi-fungsi bagi tujuan carian dataset untuk kegunaan yang khusus. Fungsi-fungsi tersebut akan menjadi semakin penting apabila lebih banyak data-data elektronik *clearinghouse* dibangunkan.

4.4 Dengan merujuk kepada *Executive Order No. 12906* yang dikeluarkan oleh Rumah Putih, Amerika Syarikat pada 11 April 1994 bahawa data-data geospatial hendaklah didokumenkan menggunakan format daripada *Federal Geographic Data Committee's* (FGDC) - *Content Standard for Digital Geospatial Metadata* dan dimaklumkan melalui sistem *clearinghouse*. Sehubungan dengan itu, maklumat terhadap data *custodian* dan data-data yang diterbitkan akan dapat diketahui.

5. Pembangunan Metadata Sebagai Standard

Dalam menjadikan pemakaian *template* metadata yang terselaras, JTSM perlu mengangkatnya kepada Jawatankuasa Teknikal 2 SIRIM (TC2 SIRIM) dan Jabatan Standard Malaysia sebelum diluluskan oleh Y.B Menteri Sains, Teknologi dan Inovasi (MOSTI). Sehubungan dengan itu, proses pembangunan standard ditunjukkan seperti di **Rajah 1**.

Rajah 1: Proses Pembangunan Standard

6. Perkara Yang Perlu Diberi Perhatian Dalam Perkongsian

Dalam melaksanakan metadata ini bagi tujuan perkongsian data, terdapat beberapa perkara yang perlu diberi perhatian, iaitu:

6.1 Penerbitan Metadata

Agensi Pembekal Data wajar menyediakan garis panduan atau pun prosedur mengenai tahap kepadatan dan kerahsiaan maklumat dalam menerbitkan metadata bagi tujuan perkongsian. Tahap-tahap tersebut bergantung pada peringkat-peringkat berikut:

6.1.1 Dalam Jabatan di mana maklumat mengenai produk berkaitan hendaklah lebih terperinci bagi menggalakkan penggunaannya.

6.1.2 Antara agensi.

6.1.3 Antara negara.

Di dalam urusan penerbitan metadata di peringkat agensi dan negara, Agensi Pembekal Data perlu menyemak terlebih dahulu tahap kerahsiaan data-data yang berkenaan sebelum metadata dapat diterbitkan.

6.2 Penyediaan dan Pengemaskinian Metadata

Agensi Pembekal Data merupakan agensi yang bertanggungjawab untuk menyedia dan mengemaskini metadata bagi produk-produk yang dihasilkan. Aktiviti-aktiviti ini perlu dilaksanakan untuk mengawal data-data yang kutip agar dapat mematuhi tahap kualiti, spesifikasi produk dan standard yang ditetapkan. Sehubungan dengan itu, Agensi Pembekal Data hendaklah diberi kebenaran untuk mengakses dan mengemaskini terhadap data-data bagi Agensi Pembekal Data berkenaan sahaja.

6.3 Promosi dan Latihan

Agensi Pembekal Data perlu mengadakan promosi mengenai pembangunan metadata yang terselaras dan merangka latihan bagi kakitangan untuk memberi kefahaman untuk melaksanakan tugasan bagi menyedia dan mengemaskini metadata.

7. Kesimpulan

7.1 Metadata yang disediakan oleh Agensi Pembekal Data merupakan satu maklumat yang penting dalam era teknologi maklumat dan komunikasi/*information and communication technology* (ICT). Ia menjadi pemangkin kepada perkongsian data sama ada di antara *Government to Government* (G2G), *Government to Business* (G2B) dan *Government to Customer (*G2C) dengan lebih mudah, cepat dan telus.

7.2 Dalam aspek pengendalian data spatial, ia memberi kemudahan untuk aktiviti-aktiviti seperti mencari, menilai, menerbit dan seterusnya menggunakan data-data geospatial. Di samping itu, metadata yang terselaras akan menggalakkan pemakaian format dan terma yang terselaras, memberi kefahaman yang lebih terperinci serta mengalakkan penggunaan ke atas data-data yang ada di pasaran.

7.3 Walau bagaimanapun, beberapa perkara yang perlu dititikberatkan dalam perkongsian data, seperti mana yang telah dinyatakan di atas perlulah diberi perhatian. Namun demikian, ia bukan menjadi penghalang kepada kemajuan Sistem Maklumat Geografi/*Geographic Information System* (GIS) yang sedang berkembang, bukan sahaja di rantau ini bahkan di seluruh dunia.

LAMPIRAN A

1. **Contoh Metadata Agensi JUPEM (Siri L 7030, Lembar 3367, Gurun)**

MD_Metadata	
Language:	*English*
Character Set:	*8859part3*
Hierarchy Level:	*005(dataset)*
MD_Identification	
Language:	*English*
Character Set:	*8859part3*
Abstract:	*This topographic mapsheet No.3367 of L7030 Series is of 1:50 000 scale with 20 metres contour interval covering Gurun area.The topographic mapsheet was digitally produced.*
EX_GeographicBoundingBox	
Extent type	*inclusion*
East Bound Longitude:	*100.685*
West Bound Longitude:	*100.415*
South Bound Latitude:	*5.691*
North Bound Latitude:	*5.963*
Spatial Resolution:	*-*
Geographic Description:	*-*
MD_MaintenanceInformation	
Maintenance and Update Frequency:	*continual*
MD_Category	*-*
Theme Code	*Aeronautical (A), Built Environment (B), Demarcation (D), Geology (G), Hydrography (H), Hypsography (R), Transportation (T), Utility (U), Vegetation (V), General (Z)*
CI_Citation	
Title:	*Topographic Mapsheet No.3367 of L7030 Series of Gurun. (Edition 1- PPNM)*
Date:	*1987*
Edition:	*1*
CI_MandatatoryParty	
Responsible party organisation name:	*Department of Survey and Mapping, Malaysia*
Position Name:	*Director of Survey (Mapping Services)*
Responsible party role code:	*003(Owner)*
CI telephone	

Voice telephone:	*03-26170872*
Facsimile:	*03-26970140*
CI address	
Delivery Point:	*Pusat Jualan Data Geospatial, Department of Survey and Mapping, Jalan Semarak, 50578 Kuala Lumpur*
City:	*Kuala Lumpur*
Administrative area:	*Wilayah Persekutuan Kuala Lumpur*
Postal Code:	*50578*
Country:	*Malaysia*
CI Online Resource	
On-line resource linkage:	*http://www.jupem.gov.my*
RS Reference System	
RS Reference Identifier:	*-*
MD Spatial Representation	
Spatial Representation type code:	*002(Vector)*
MD_Constraints	
Use Limitation:	*Not Restricted Map*
MD_LegalConstraints	
Use Constraints:	*008*
LI Lineage	
Lineage statement:	*This map and the Digital Topographic Database was subsequently prepared from the following base materials: (a) Compiled from Aerial Photograph - 1981 (b) Base information obtained from topographical maps Series L7010 Sheets 8,16,17 & 153 (c) Additional information from Field Completion - 1984 (d) Amendments to State Administrative Boundaries - 1983 (e) Cartographic enhancement was done by digital method*
Series No:	*L7030*
Sheet No:	*3367*
DQ Completenes Value:	*-*
DQ Topological Consistency Value:	*-*
DQ Positional Accuracy Value:	*26.676 meters (planimetric), 9.026 meters (height)*
DQ Thematic Accuracy Value:	*-*
DQ Temporal Validity Value:	*-*
MD Digital Transfer Options	
Online Resource Linkage:	*www.jupem.gov.my*
MD Format	

Format name:	*DXF, CAMS ASCII*
Version:	*1*
Keyword:	*Digital Topographic Database Gurun 1:50 000 L7030*

2. Contoh Metadata Agensi Jabatan Pertanian Semenanjung Malaysia

File Identifier:*16_134102_GTS_1997*
Language: *English*
Character Set: *8859part3*
Hierarchy Level: *dataset*
Contact:
Organisation's name: *Department of Agriculture*
Role: *custodian*
Datestamp:*20080910*
Metadata Standard Name:*MS ISO 19115*
Metadata Standard Version:*MS ISO 19115:2003*
Reference System Info:
Reference System Identifier:
Code: *MRT48*
Projection identifier:
Code: *MRSO*
Ellipsoid identifier:
Code: *Modified Everest*
Datum identifier:
Code: *Kertau48*
Ellipsoid parameters:
Semi-major axis: *6 337 304.063*
Axis units: *meter*
Denominator of flattening ratio: *1/300.8017*
Identification Info:
Citation:
Title: *Present Land Use Map of Peninsular Malaysia 1997 (Digital)*
Date:
Date: *20000110*
Date type: *revision*
Abstract:*Land use 1997 is based on Landsat 7's image (30m x 30m resolution), topographic index map L7030 of scale 1:50,000 and field verification. The map consists of nine (9) main categories: 1. Settlements and associated non-agricultural areas 2. Horticultural lands 3. Tree, palm and other permanent crops 4. Cropland 5. Animal husbandry areas 6. Neglected grassland 7. Forest land 8. Swamps (mangrove, nipah, gelam etc) 9. Water body The land use map is being updated for every 2 years and related statistical data is also provided.*
Purpose:*Suitable for macro planning especially for government agencies, private sector/consultants and universities.*
Status: *completed*

Point of contact:
Organisation's name: *Department of Agriculture*
Position Name: *Director*
Contact Info:
Phone:
Voice: *603-8870 3000*
Fax: *03-88884326*
Address:
City: *Putrajaya*
Delivery point: *Soil Resource Management & Conservation Division,Level 9, Block 4G2, Wisma Tani, No, 30 Persiaran Perdana,Precint 4,*
Administrative area: *Wilayah Persekutuan Putrajaya*
Postal code: *62624*
Country: *Malaysia*
Electronic Mail Address: *asnita@doa.gov.my*
Online Resource:
Linkage: *http://www.doa.gov.my*
Hours of service: *08.00-17.00(GMT+8)*
Role: *custodian*
Maintenance:
Maintenance And Update Frequency: *asNeeded*
Resource Format:
Name: *Shape file*
Version: *ArcGIS ArcINFO 9.2*
Descriptive Keywords:
Keyword Type: *Theme keywords*
Keywords: *Land Use*
Keywords: *Department of Agriculture Peninsular Malaysia*
Keywords: *DOA*
Resource Specific Usage:
Specific Usage: *Land Use Type, Land Use Categories*
User Determined Limitations: *Medium scale map. Suitable for macro planning.*
User Contact Info:
Organisation's name: *Department of Agriculture*
Role: *custodian*
Topic Category: *Vegetation*
Resource constraints:
Use Limitation: *This map derived from satellite imagery interpretation and field verification. Areas less than 10 hectares are not updated.*
Access Constraints: *restricted*
Use Constraints: *restricted*
Spatial Representation Type: *vector*
Spatial Resolution:
Equivalent Scale:
Denominator: *50000*

Distance: *50000*
Extent:
Geographic Bounding Box:
South Bound Latitude: *1.235314*
North Bound Latitude: *6.74218*
West Bound Longitude: *99.419169*
East Bound Longitude: *104.703984*
Language: *English*
Character Set: *8859part3*
Content Info:
Compliance Code: *partly MS1759*
Language: *English*
Feature Catalogue Citation:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date:
Date: *20000110*
Edition: *1*
Edition date: *20000110*
Distribution Info:
Distribution format:
Name: *Shape file*
Version: *ArcGIS ArcINFO 9.2*
Distributor:
Distributor Contact:
Organisation's name: *Department of Agriculture*
Role: *custodian*
Distribution Order Process:
Planned Available Date Time: *30 days*
Ordering Instructions: *Application through completed forms provided by HQ DOA. Terms and conditions are applied.*
Distributor Transfer Options:
Units of distribution: *Megabyte (Mb)*
Offline:
Name: *cdRom*
Data Quality Info:
Scope:
Level: *dataset*
Report:
Result:
Completeness:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *Conformance level: Omission: Not more than 10% features are missing.*
Pass: *pass*

Logical Consistency:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *Domain consistency - Not more than 5% information wrongly keyed-in.*
Pass: *pass*
Topological Consistency:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *Not more than 10% have incorrect topology.*
Pass: *pass*
Relative Internal Positional Accuracy:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *All the features positions are relatively correct to its positions as known or accepted being true.*
Pass: *pass*
Temporal Accuracy:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *Not more than 10% from the selected evaluated temporal information that is related to the sequent of events are incorrect.*
Pass: *pass*
Temporal Validity:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *3 years of data completion.*
Pass: *pass*
Non Quantitative Attribute Accuracy:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *Less than 5% of items may have incorrect colour coding and classification.*
Pass: *pass*
Quantitative Attribute Accuracy:
Specification:
Title: *Present Land Use Map of Peninsular Malaysia 1997*
Date: *20000110*
Explanation: *Less than 5% of items may have labeling error.*
Pass: *pass*
Maintenance:
Maintenance And Update Frequency: *asNeeded*

Penyediaan Metadata MyGDI

The required fields are noted with a red asterisk (*). For more information on these elements, please refer to the MyGDI Metadata Data Dictionary and MyGDI Metadata Codelist.

MD Metadata: (*root entity which defines metadata about a resource or resources*)

File Identifier : 03_JPBD_RTJeli

Language : English (en)

Character Set : 8859part3 (008)

Parent Identifier :

Hierarchy Level : dataset (005)

CI_Responsible Party: (*identification of, means of communication with person (s) and organizations associated with the dataset*)

Organisation Name : Jabatan Perancang Bandar dan Desa Kelantan

Role : custodian (002)

DateStamp (YYYYMMDD) : 20060322

Metadata Standard Name : MS19115

Metadata Standard Version : MS

MD_ReferenceSystem: (*information about the reference system*)

Reference System : Cassini

Projection : Cassini

Ellipsoid : Modified Everest

Datum : State Cassini

MD_Ellipsoid Parameters: (*set of parameters that describes the ellipsoid*)

Semi Major Axis : 6 337 304.063

Axis Units : meter

Denominator of Flattening Ratio : 1/300.8017

MD_DataIdentificationInfo: (*information required to identify a dataset*)

CI_Citation: (*standardized resource reference*)

Title *: Proposed Local Plan for Jeli District Council

CI_Date: (*reference date and event used to describe it*)

Date (YYYYMMDD) : 20060322

Date Type : publication

CI_Series: (*information about the series, or aggregate dataset, to which a dataset belongs*)

Series Name :

Abstract * Detailed plan w hich translates policies and proposal

Purpose Suitable for identification purposed of landuse

Credit Jabatan Perancang Bandar & Desa Negeri Kelantan

Status completed (001)

CI_ResponsibleParty: (*identification of, and means of communication with, person(s) and organizations associated with the dataset*)

Organisation Name *:	Jabatan Perancang Bandar dan Desa Kelantan
Position Name *:	Director
Role	custodian (002)

CI_Telephone: (*telephone numbers for contacting the responsible individual or Organization*)

Voice *:	09-748 1957 ext 4002
Facsimile *:	09-744 4454

CI_Address: (*location of the responsible individual or organization*)

Delivery Point *:	Blok 4, Kota Darulnaim 15646 Kota Bharu
City *:	Kota Bharu
Administrative Area *:	Jeli
Postal Code *:	15646
Country *:	Malaysia
Electronic Mail Address *:	mohdnoor@macgdi.gov.my

CI_Online Resource: (*information about on-line sources from which the dataset, specification, or community profile name and extended metadata elements can be obtained*)

Linkage *:	http://w w w .mygeoportal.gov.my/
Hours Of Service :	08.00-17.00(GMT+8)

Role: custodian (002)

MD_MaintenanceInformation: (*information about the scope and frequency of updating*)

Maintenance And Update Frequency: asNeeded (009)

MD_BrowseGraphic: (*graphic that provides an illustration of the dataset (should include a legend for the graphic)*)

File Name : localplanmdjeli

File Type : Vector

URL :

MD_Format: (*description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel)*

Format Name : MapInfo (*. TAB)

Format Version : 7.8

MD_Keywords: (*keywords, their type and reference source*)

Keyword: Proposed of Landuse Local Plan, Local Plan.

MD_Usage: (*brief description of ways in which the resource(s) is/are currently or has been used*)

Specific Usage : Suitable for identification purposed of landuse

User Determined Limitations :

MD_Constraints: (*restrictions on the access and use of a resource or metadata*)

Use Limitation : Used to supply for government, consultants and ger

MD_LegalConstraints: (*restrictions and legal prerequisites for accessing and using the resource or metadata*)

Access Constraints : Select

Use Constraints : Select

Spatial Representation Type : vector (001)

MD_RepresentativeFraction: (*derived from ISO 19103 Scale where MD_RepresentativeFraction denominator = 1/Scale. measure and Scale.targetUnit = Scale.sourceUnits*)

Denominator :

Distance :

Language : English (en)

Character Set : 8859part3 (008)

Topic Category *: Demarcation

Content Developer Type *: State

Rating *: Primary

EX_GeographicBoundingBox: (*geographic area of the dataset*)

East Bound Longitude *: 102.0603

LAUNCH MAP VIEWER TO DRAW BOX

West Bound Longitude *: 101.6345

GET BOX ALREADY DRAWN ON VIEWER

South Bound Latitude *: 5.344545

North Bound Latitude *: 5.817977

Supplemental Information :

MD_Feature CatalogueDescription: (*information identifying the feature catalogue or the conceptual schema*)

Compliance Code : 1-compliant MS1759

Language : English (en)

Title :

Date (YYYYMMDD):

Edition :

Edition Date (YYYYMMDD):

MD_Distribution: (*information about the distributor of and options for obtaining the resource*)

MD_Format: (*description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel*)

Name :

Version :

MD_Distributor: (*information about the distributor*)

CI_ResponsibleParty

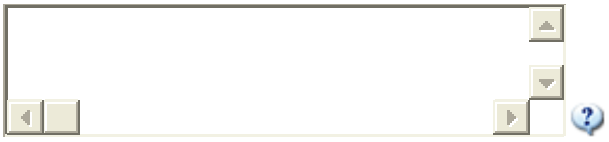
Organisation Name : Jabatan Perancang Bandar dan Desa Kelantan

Role : custodian (002)

MD_StandardOrderProcess: (*common ways in which the resource may be obtained or received, and related instructions and fee information*)

Planned Available Date Time :

Ordering Instruction :



MD_DigitalTransferOptions: (*technical means and media by which a resource is obtained from the distributor*)

Unit Of Distribution :

MD_Medium: (*information about the media on which the resource can be distributed*)

Name : Select

DQ_DataQuality: (*quality information for the data specified by a data quality scope*)

DQ_Scope: (*extent of characteristics(s) of the data for which quality information is reported*)

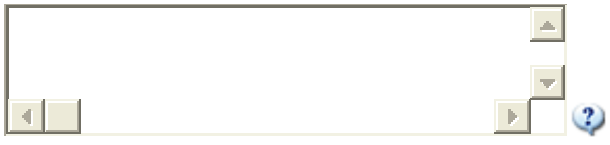
Level : dataset (005)

LI_Lineage: (*information about the events or source data used in constructing the data specified by the scope or lack of knowledge about lineage*)

Statement : Generated from cadastral map (basemap) and has b

LI_Source: (*information about the source data used in creating the data specified by the scope*)

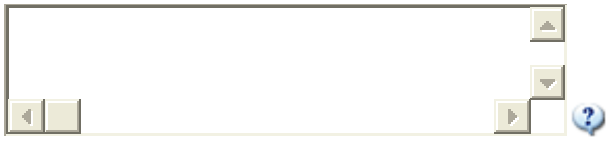
Description :



DQ_Completeness: (*presence and absence of features, their attributes and their relationships*)

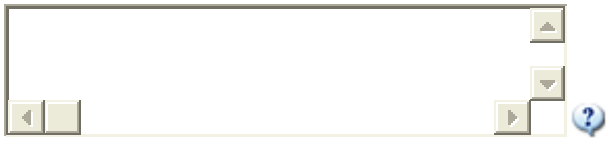
DQ_ComformanceResult: (*information about the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level*)

Title :



Date (YYYYMMDD):

Explanation :

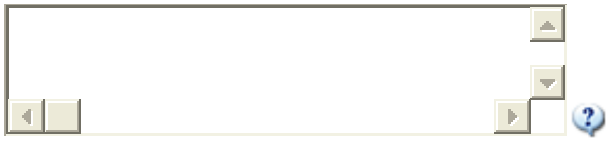


Pass : Select

DQ_LogicalConsistency: (*degree of adherence to logical rules of data structure, attribution and relationships (data structure can be conceptual, logical or physical)*)

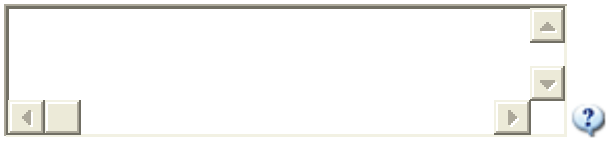
DQ_ComformanceResult:

Title :



Date (YYYYMMDD):

Explanation :

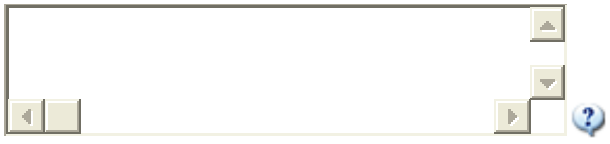


Pass : Select

DQ_TopologicalConsistency: (*correctness of the explicitly encoded topological characteristics of the dataset as described by the scope*)

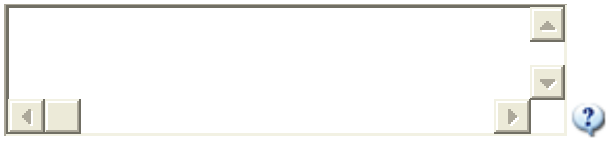
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :

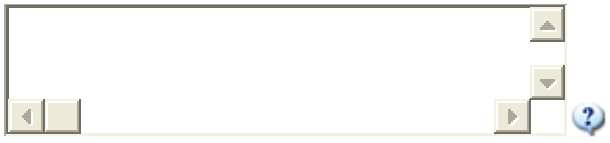


Pass : Select

DQ_PositionalAccuracy: (accuracy of the position of features)

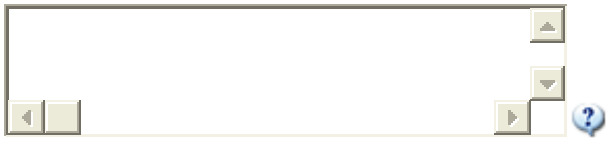
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :

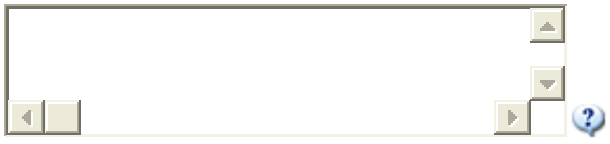


Pass : Select

DQ_AbsoluteExternalPositionalAccuracy: (*closeness of reported coordinate values accepted as or being true*)

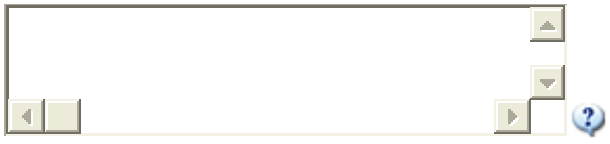
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :

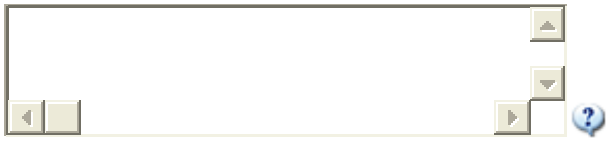


Pass : Select

DQ_GriddedDataPositionalAccuracy: (*closeness of gridded data position values to values accepted as or being true*)

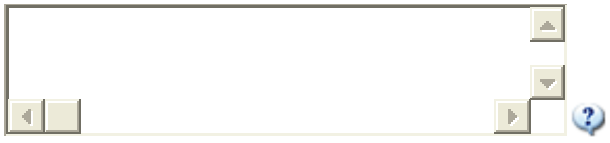
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :

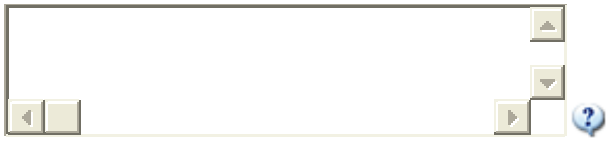


Pass : Select

DQ_RelativeInternalPositionalAccuracy: (*closeness of the relative positions of features in the scope to their respective relative positions accepted as or being true*)

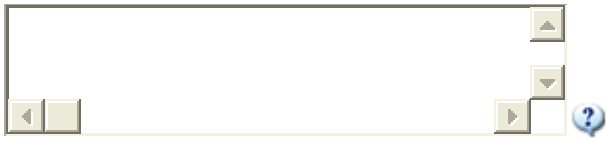
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :



Pass : Select

DQ_TemporalAccuracy: (*accuracy of the temporal attributes and temporal relationships of features*)

DQ_ComformanceResult

Title :

Date (YYYYMMDD):

Explanation :

Pass : Select

DQ_TemporalValidity: (*validity of data specified by the scope with respect to time*)

DQ_ComformanceResult

Title :

Date (YYYYMMDD):

Explanation :

Pass : Select

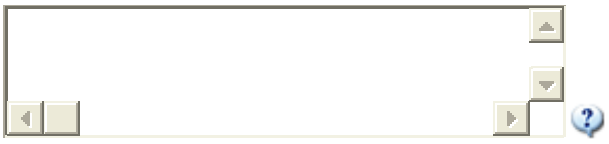
DQ_ThematicAccuracy: (*accuracy of quantitative attributes and the correctness of non-quantitative attributes and of the classifications of features and their relationships*)

DQ_ComformanceResult

Title :

Date (YYYYMMDD):

Explanation :

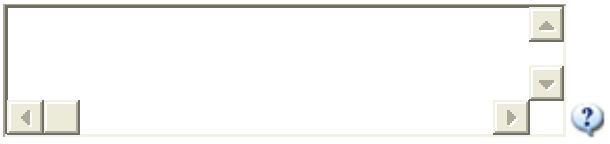


Pass : Select

DQ_NonQuantitativeAttributeAccuracy: (accuracy of non-quantitative attributes)

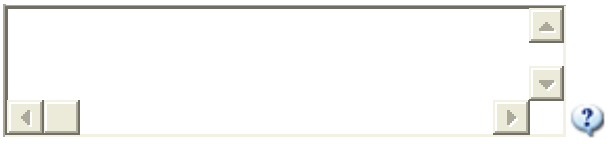
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :

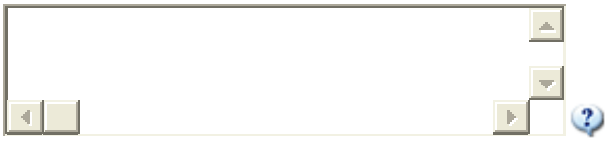


Pass : Select

DQ_QuantitativeAttibuteAccuracy: (*accuracy of quantitative attributes*)

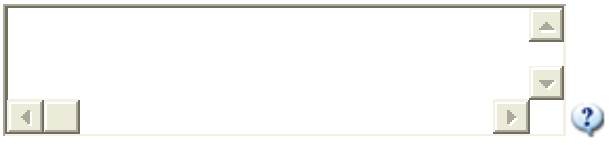
DQ_ComformanceResult

Title :



Date (YYYYMMDD):

Explanation :



Pass : Select

Metadata Maintenance:

Maintenance And Update Frequency : asNeeded (009)

Additional Information:

Product *: Localplan

Download Link*: http://mygdi.mygeoportal.gov.my/geodata/dow nload/

Map Server (URL) *: http://mygdi.mygeoportal.gov.my

Map Service *: kelantan_jpbd_localplanmdjeli

Demo Map Server (URL) *: http://mygdi.mygeoportal.gov.my

Demo Map Service *: kelantan_jpbd_localplanmdjeli

ESTABLISHING QUANTUM GIS AS THE PRINCIPAL GIS IN THE PUBLIC SECTOR

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Abstract

Quantum GIS (QGIS) is an open source Geographical Information System (GIS). It excels as a multi-platform application and runs on different operating systems including Mac OS X, GNU/ Linux, Unix and Microsoft Windows XP. It aims to be and users will agree that it is easy to install and an exceptionally easy-to-use GIS whilst providing the common GIS function and features. QGIS is contained in a small file size compared to commercial GIS and requires less RAM or processing power. This makes it an appropriate GIS tool on older hardwares or running simultaneous other applications when CPUs power may be limited. It's variety of analytical tools is growing with the development and enhancement of plugins contributed by enthusiasts as QGIS is a volunteer driven project of the Open Source Geospatial Foundation (OSGeo)[1]. QGIS has a dedicated blog, a friendly forum, an active mailing list and a good internet relay chat channel that provides ready access to help and advice from other users and developers. These strong points together plus it being available in over 30 different languages have led to a fast growing number of followers that span a wide international community. QGIS was established in 2002 and matured with the release of stable QGIS 1.0 Kore in January 2009. It was recently fine-tuned with the release of the current stable QGIS 1.0.2 Kore in May 2009.[2]

Tell us about your agency, its mission, objectives, clientéle, and number of employees

The Federal Department of Town and Country Planning, Peninsular Malaysia (JPBD) is an agency under the Ministry of Housing of Local Government (MHLG). Since town and country planning except in the federal capital[3] comes under the Concurrent List (List III) in the Ninth Schedule of the Federal Constitution, JPBD operates at both federal and state level. This is not surprising since land, being a scarce resource is an important concern to the Federal and State authorities. At the

1 Quantum GIS website, Welcome to the Quantum GIS Project

2 QGIS 1.4.0 "Enceladus" released on 10.1.2010 fixed 200 bugs and offers nearly 30 new features

3 Federal Constitution, Ninth Schedule

federal level, JPBD is responsible to the National Physical Planning Council (chaired by the Prime Minister), the Minister of Housing and Local Government while at the state level, JPBD is responsible to the State Planning Committee (chaired by the Chief Minister). In a nutshell, there are four tiers of planning which JPBD is involved:

1. At the federal level, JPBD is involved in macro programs of the national scale such as the preparation of the National Physical Plan, the National Urban Policy and the propose National Rural Policy;
2. At the regional level, JPBD is involved in schemes with cross-boundary issues such as the Northern Corridor Economic Region, Central Region, Eastern Corridor Economic Region and the Southern Johore Economic Region;
3. At the state level, JPBD is involved in the preparation of mandatory state development plans such as the preparation of structure plans and;
4. At the local level, JPBD is involved in the preparation of mandatory district development plans such as the preparation of local plans.

Since JPBD comes under the legal jurisdiction of the Federal Act 172[4], the scope of its administration does not include Sabah, Sarawak and the Federal Territory of Kuala Lumpur which have their separate legislations. JPBD's Vision is to be a leading agency in promoting excellence, glory and distinction in the public service of town and country planning. JPBD's mission is to create a quality and sustainable living environment in tandem with Vision 2020.

JPBD's objectives are:

1. To strengthen the physical, social and economic development system in urban and rural areas in an effort to upgrade the standard of living in line with the national objectives;
2. To organize, regulate and coordinate land development, usage and conservation through the implementation of the Town and Country Planning Act and other related Acts;
3. To draft and implement planning methodologies, policies, plans and guidelines as well as to ensure their effective usage by all agencies in the planning level; and
4. To ensure quality town planning and information system services for the long term planning needs.

JPBD's clientéle mainly include the MHLG, all state and local governments because land is a state matter and the local planning authority represents the principle local authority to plan, manage and maintain the built environment for its administrative area. There is currently about 730 employees under JPBD some of whom are seconded to state planning departments and relevant public agencies such as MHLG, the Economic Planning Unit (EPU), the Department of Works (JKR) and One-Stop Centre (OSC) of the local planning authorities.

4 Town and Country Planning Act, 1976

Principle Objectives of the Project

1. To find a GIS application that works in both Windows and Open Source Software (OSS) platform to help ease the transition from Windows to OSS;
2. To find a suitable open source GIS application that is user-friendly with similar functions and features to those currently used by JPBD, namely, ESRI's ArcView, ArcGIS and MapInfo;
3. To establish a de facto GIS application for use nationwide by all government agencies dealing with spatial matters especially in the field of town and country planning;
4. To reduce the spending of public funds for the investment of ICT infrastructure in the Public Sector; and
5. To boost JPBD as the pioneer agency to promote an open source GIS application for the Public Sector.

Who are the Key Partners?

There are many public agencies that would make key partners and generally they would be involved in spatial and land matters because they would require the digital aid of a GIS tool to increase their productivity in geo-processing activities. These would include the Malaysian Remote Sensing Agency (ARSM), the Department of Survey and Mapping (JUPEM), the Department of Environment (DOE), the Ministry of Agriculture and Agro-based Industry (MOA), the Department of Works (JKR), and the Department of Lands and Mines (PTG) just to name a few. The many technical departments involved in the processing of planning applications are also key users of GIS and would make key partners if they too optimized Quantum GIS (QGIS). Others would probably include the MOA, the principal agency involved with land coverage as well as ARSM and JUPEM, the key agency involved in the creation and use of raster, cadastral and topographical maps.

What are the Primary OSS technologies? Why did you choose these technologies? Please describe them briefly.

JPBD spearheaded the use of OSS in 2002 after MAMPU's started to encourage public agencies to invest in OSS. At about that time, GITN mail server housed JPBD's email-boxes but was ineffective at protecting emails from the Nimda virus. Thus, a decision was made to develop and maintain an in-house mail server that had it's own anti-virus solution. However, a mail server is a favourite among hackers so that made it necessary to establish a server farm to intensify protection against hacking. As the development of the server farm was on the drawing board, it was felt the web-hosting of JPBD's homepage at GITN could also be terminated and be maintained in-house. Stability, reliability, scalability and expandability of the server operating system became the key criteria in deciding which technology to choose. Taking into account long term cost considerations, a decision was made to go Open Source as this was also supported by MAMPU. Subsequently, all new servers at JPBD headquarters were developed using Red Hat Linux Enterprise, a popular Open Source choice. However, when Red Hat Linux Enterprise began to impose a RM10,000 annual fee for patch updates in 2004, a decision was made to migrate from Red Hat Linux Enterprise to

Unix Free BSD because Free BSD was developed and maintained by the University of Berkley, an academic and non-commercial institution. Furthermore, established Yahoo web portal servers internationally were developed on Free BSD. JPBD ICT officers who were later trained in MySQL and PhP eventually developed a GIS metadata system and the Firdausnet file monitoring system. Over the years, these OSS applications and operating system proved to be reliable. The release of OpenOffice.org's comprehensive Version 2.0 and the rapid development of the Ubuntu operating system gave further confidence to venture OSS at the desktop level. In the meanwhile, there was no directive from JPBD Management to utilize OSS at the desktop level.

What are the design specifications?

JPBD Headquarters server farm was developed on the concept of a De-Militarized Zone (DMZ). The server farm consists of an external firewall and internal firewall server where the storage server, DHCP server, library server, homepage server, mail-cum-antivirus server are located in the DMZ. Mirror servers were linked to key servers, namely, the firewall, internal firewall, homepage and mail servers. At the desktop level, specific applications like GIS are still designated at desktop computers because the financial investment for a desktop GIS is still expensive. Further to that, JPBD storage server was too slow to process GIS data over the intranet. As the financial investment for Windows GIS applications on a large scale was exhorbitant, the provision of desktop GIS applications was prioritized at project offices.

What is the end client usage model?

As the majority of GIS applications in the market at the desktop level run on Microsoft Windows, JPBD had traditionally used ESRI's ArcInfo, ArcView, ArcGIS or MapInfo. To compliment that, digital information sourced from key agencies such as local planning agencies, state planning departments and JUPEM often came in the form of ESRI shape files or MapInfo tab files. Thus, as a matter of convenience, JPBD joined the band wagon. JPBD also did not set any policy when choosing a GIS but users usually to preferred MapInfo when mapping was emphasized and ESRI products when GIS data analysis was a priority though from a cost point-of-view, MapInfo was more popular.

Overview of hardware/software of system

Desktop computers and notebooks at JPBD run on Pentium CPUs. As mentioned earlier, the operating system for desktop computers is Microsoft Windows and the GIS are either ArcInfo, ArcView, ArcGIS or MapInfo. The standard office application is Microsoft Office Professional Suite and the anti-virus solution is Kaspersky.

Why did you choose OSS/Linux?

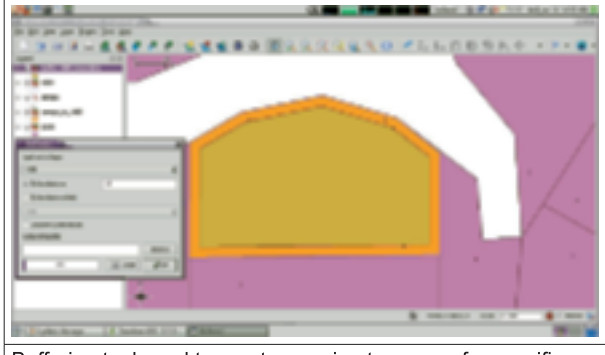
1. The key reason in the choice for QGIS was because it is one of the few GIS available in both Windows and OSS platform, thus, makes it an excellent choice to encourage a gradual

transition from Windows to OSS.

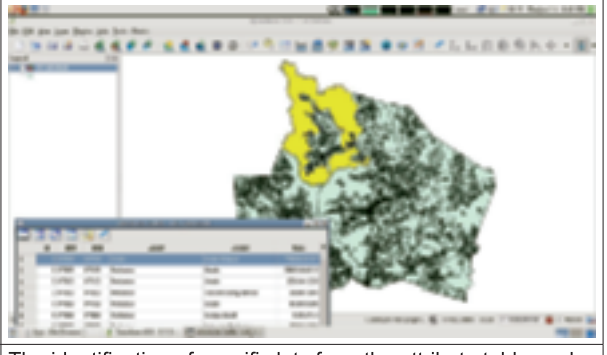
2. QGIS in both Windows and OSS versions look alike and operate in the same manner, thus, no re-learning is required except for Linux installation. QGIS can be downloaded and installed in the Windows and Linux desktop computers at no cost.
3. QGIS is available for the Ubuntu operating system and offer a greater chance of integration between the two.

How and why did OSS solve the perceived need/problem?

1. QGIS is a multi-platform application, available in both Windows and Linux platform. In that sense, it gives users more confidence and ease when migrating from Windows to OSS.
2. QIS is very user-friendly and can simultaneously view ESRI's shape files and MapInfo tab files. There is no hassle of file conversion, thus, saving a tremendous amount of time that can be put to better use.
3. No GIS application has yet been established as the de facto GIS application for JPBD offices. This means sometimes one has to be familiar in two types of GIS application, namely, ESRI and Mapinfo. This can be taxing since GIS is a complex application to master.
4. Installation of QGIS in Windows desktop computers can already help overcome budget problems in acquiring GIS.



Buffering tool used to create a perimeter zone of a specific width as in this case, within a lot.



The identification of specific lots from the attribute table works wonderfully.

What innovation took place, if any?

1. A serious look into open source GIS only began in early 2009 after word got out that the MHLG intended to migrate all desktop computers under its wings to OSS but delayed action towards JPBD to give time for research on this matter. The stable QGIS version which was coincidentally released in early 2009 made things easier. QGIS, also available on the Windows platform made it convenient to get a feel of the application as well encourage a gradual migration from Windows to OSS platform.
2. The Ubuntu QGIS version was successfully installed in early 2009 inclusive of plugins from external repositories. However, although the Windows version was successful installed, the

QGIS Python Package Installer could not be installed and made it impossible to download plugins.

3. QGIS 1.0.2, released on 13.5.2009 solved that problem now both Ubuntu and Windows version were successfully installed. The additional installation of Microsoft C++ Runtime Libraries SP1 2005 and 2008 were required to run QGIS on the Windows platform.
4. MIMOS Prisma computers and MIMOS CL-51 notebooks were tested upon to determine if QGIS could run on them. It was found and confirmed later by a programmer at JPBD who had also done similar tests that the MIMOS Prisma computer was incompatible with both Ubuntu 8.0.4 and Ubuntu 9.0.4. Nevertheless, QGIS ran smoothly on the MIMOS CL-51 notebook.

What impact did deployment have on agency, public etc.?

QGIS had never been deployed in JPBD any earlier. In a way, that was good since the period before 2009 was a teething period. Other open source GIS such as GRASS is available but was heavy on script commands and that made it not user-friendly. The search for a stable open source GIS in both OSS and Windows came with the release of QGIS 1.0.0 Kore in January 2009.

1. Savings on Government Expenditure

   Based on the cost of an desktop ArcGIS that retails for RM10,000/pax, any department that requires ArcGIS installed in 100 desktop computers requires RM1,000,000. This does not include the annual support fee per license to obtain patch-up files or after-sales support. There will be savings of at least RM1,000,000 if QGIS were chosen instead. This translates into much saving of public money which the government could then divert to other areas of need e.g. education, medical.

2. Standardization in adoption of GIS application

   A standard QGIS for the public sector would help enrich GIS knowledge because technical advise will be on the same frequency. This makes the dissemination of GIS technique easier as users only need to be familiar in one make. Installation issues, mapping, data processing and data analysis will be better when different agencies use the same GIS and common knowledge-sharing will foster closer inter-departments friendship.

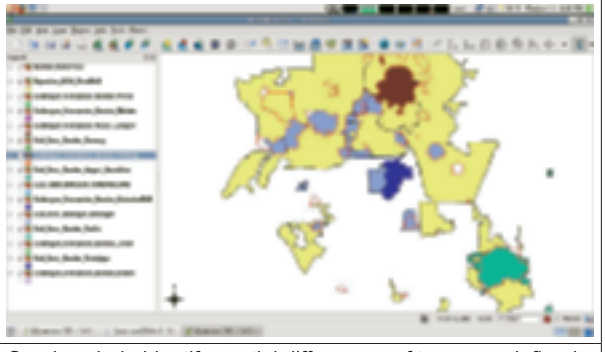
3. Ease of use

   QGIS does not require file conversion when different file format are used. This saves much time because error results are known only after the process completed. The process may need to be repeated before satisfactory results are achieved. During that time, the use of that computer for other work is impossible because it will certainly hang due to excessive tasks. This means GIS data analysis using QGIS could be made available faster.

Any key experiences learned that you share as result of experience?

1. QGIS installation is fast, easy and does not require up much hard disk space.
2. QGIS is user-friendly and simple to use as claimed.
3. Previous complaints of the plugin installer being difficult to install is now a non-issue since it became a default package under QGIS Ver 1.0.2.
4. The QGIS manual is comprehensive and easy to understand.
5. The Department of Survey and Mapping's (JUPEM) Kertau RSO Coordinate Reference System for topographical maps and all state Cassini references for cadastral maps have been incorporated into QGIS.
6. No file conversion is required to simultaneously view shape files or tab files. This prevents loss of data accuracy and saves much time as this task is time-consuming.
7. Plugins for town planning analytical needs are available but there is still room for improvement. Plugins are constantly being upgraded on the initiative of the developers who also seek feedbacks from users.
8. The community at QGIS Forum is helpful in giving advice. Master developers actively give advice and take pains to reply private messages.
9. The mailing list appears to be more responsive than QGIS Forum for obtaining replies.
10. QGIS runs faster on the Ubuntu operating system than on Windows platform.

Measuring tool helps to measure road width.



Overlays help identify spatial differences of towns as defined by JPBD and Dept. of Statistic (DOS).

What is the current status of the Project?

1. This project is the initiative of the author.
2. Ubuntu QGIS 1.0.2 ran on a Pentium IV computer. Plugins were successfully installed.
3. QGIS could not run on a MIMOS Prisma computer due to hardware incompatibility with Ubuntu.
4. Ubuntu QGIS 1.0.2 ran on a MIMOS CL-51 notebook. Plugins were successfully installed.
5. Linux QGIS is an excellent alternative against Window GIS since it can deliver similar GIS features for free.

Who can provide testimonials of the subject?

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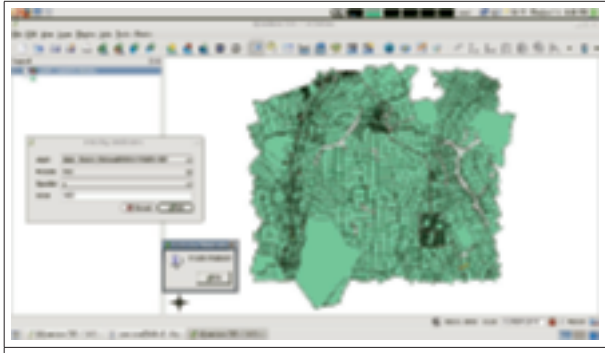	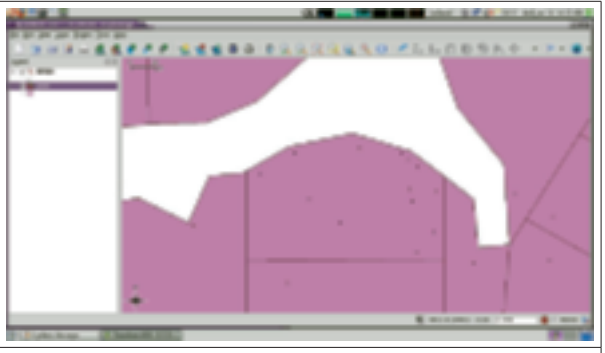
Finding a lot polygon by attribute may pop up interesting results, here, a district has 2 lots with same lot numbers which represents lots from different Mukims.	Calculation of the number of points in a polygon is possible in QGIS.

Please share any other relevant information.

Eva Dodsworths[5] in her review on the usability of QGIS 0.11.0, July 2008 concluded that "The features of QGIS are easy to work with and a simple map can be generated quickly. Some of the more complex features such as thematic mapping and querying take more time to understand, and learn to successfully apply it. Some of the more basic features that GIS users would expect are surprisingly not available, such as text or graphic insertion, custom labeling and any image-related manipulation (clipping) or high resolution image export. However, for a free program it is remarkably sophisticated with some very valuable GIS tools. What stands out the most about this program is its editing tools – the ability to easily create, edit and delete shape files and files within it. The raster geo-referencing plugin is also a remarkable feature. QGIS would satisfy any GIS user who is in need of viewing and manipulating geo-spatial files in a variety of formats, and is interested in creating simple maps with these datasets." Much of the shortcomings mentioned have been addressed with the release of QGIS 1.0.2.

Other than that, an article entitled "Towards Open Source at the Desktop" by the author to promote the use of the Ubuntu operating system, Open Office.org and QGIS at the desktop level was published in the June edition of OSCC Newsletter[6]. QGIS was promoted by the author at the JPBD ICT Steering Committee on 10.7.2009 where the Committee[7] acknowledged and supported QGIS.

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5 The GeoCommunity:Quantum GIS Software-Application User Review

6 OSCC Newsletter, June 1/2009

7 *Mesyuarat Jawatankuasa Pemandu ICT JPBD Bil. 2/2009, 7.7.2009*

Can you share any knowledge products as a result of this experience?

A utopic QGIS where the compromises to code style, code quality, user experience, code manageability, build efficiency and so on, have been minimized making QGIS the best possible GIS environment for both users and developers alike obviously does not exist. However, QGIS developers will focus their minds[8] towards a common goal and set of values.

Please cite any relevant URLs

Free GIS, http://www.freegis.org/database/viewobj?obj=1211

Open Source GIS, http://opensourcegis.org

Quantum GIS web site, http://www.qgis.org

Source Forge: Quantum GIS, http://sourceforge.net/projects/qgis

Wikipedia: Quantum GIS, http://en.wikipedia.org/wiki/qgis

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Quantum GIS website , http://www.qgis.org, Welcome to the Quantum GIS Project

Federal Constitution, Ninth Schedule

Town and Country Planning Act, 1976

The GeoCommunity:Quantum GIS Software-Application User Review, http://spatialnews.geocomm.com/articles/qgisreview

OSCC Newsletter, June 1/2009, http://www.oscc.org.my/content/view/242/267

Mesyuarat Jawatankuasa Pemandu ICT JPBD Bil. 2/2009, 7.7.2009

QGIS Architetcure Roadmap, http://www.qgis.org/wiki/QGIS_Architecture_Roadmap

The template was provided by MAMPU.

8 http://www.qgis.org/wiki/QGIS_Architecture_Roadmap

THE UTILIZATION OF THALES PROMARK3 GPS FOR MAP UPDATING IN SOFT-PHOTOGRAMMETRIC MAPPING

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ABSTRACT

Nowadays, the use of GPS in the surveying community is widely in many purposes. GPS survey required less field time and more time used only to analyze, manage and manipulate the large volume of data. The problem behind this project is the details of new features do not exist during the aerial photography exposure. Selection of the study area is UiTM Shah Alam. This project study involves two phases which are Soft-Photogrammetric mapping and detailing using THALES Promark3 GPS survey. Soft-Photogrammetric mapping is carried out based on a pair of existing aerial photographs. While, detailing survey by THALES Promark3 GPS is carried out to survey and observe new features at certain aerial photograph's hidden area. After data processing, the final product is an integration map of the Soft-Photogrammetric mapping and detailing survey. The aim of this project study, that is to explore the capabilities of THALES ProMark3 in Soft-Photogrammetric mapping's updating (new development of certain aerial photograph's hidden area). It is also to update the current map with carrying out THALES ProMark3 detailing survey (stop & go) for new features at the study area. It is found that the result of detailing survey by THALES ProMark3 is successful and capable for the Soft-Photogrammetric mapping updating.

1. INTRODUCTION

Photogrammetry can be defined as the method of determining the shapes, sizes and positions of objects using photographs; therefore it is an indirect method of measurement because photographic images are under scrutiny rather than the objects themselves (Bannister et. al., 1998). It is the art, science and technology of obtaining reliable information through processes of recording, measuring, and interpreting photographic images (Wolf and Dewitt, 2000).

The most common application of photogrammetry is the preparation of topographic maps from the aerial photographs. These maps vary in scale from large to small and used in vary applications with special purpose. A huge quantity of topographic maps is prepared for use in providing spatial data for geographic information systems (GIS) (Wolf and Dewitt, 2000).

Photogrammetrists and photo interpreters can obtain aerial photographs whether to purchase and use existing photographs or obtain new photographs (Wolf and Dewitt, 2000). However, to obtain a new one for small project is uneconomical and impracticable. Thus, before the decision can be

made whether to use existing photography or obtain new, it is necessary to ascertain exactly what coverage exists in a particular area to meet the purpose of project.

The conventional methods to survey and observe detailing on the field are tape and offset, plane table and transit-stadia or theodolite-stadia. The modern and most common methods nowadays are total stations, photogrammetry and global positioning system (GPS). The new technique that has been introduced is terrestrial laser scanning. There are various methods of 'supplying' or picking up detail in surveys, assuming that survey control has been provided. However, the important thing is to obtain the location (X,Y,Z coordinates) of details because positioning is everything in surveying.

This study presents and discusses the exploration of the capabilities of THALES ProMark3 in Soft-Photogrammetric mapping (new development for specific area). The THALES ProMark3 is a global positioning system (GPS) instrument and this is one of the methods that hopefully can fulfill this manner. Otherwise, plane table and radiation of total station are the other techniques to solve it. The good accuracy achievable with GPS has made it very attractive to use in Soft-Photogrammetric mapping and navigation applications, thus are suitable for control and detail surveying (Bannister et. al., 1998).

1.1 BACKGROUND OF THE STUDY

Photogrammetry forms the baseline of many Geographic Information Systems (GIS) and Land Information System (LIS) studies and activities. Aerial photogrammetry applies to the measurement of photographs that are taken from the air. As the science of aerial photogrammetry, it has included all operations, processes, and products involving the use of the aerial photographs such as topographic maps, orthophotos and other.

The vast majority of topographic surveys are now performed using aerial surveying techniques, with the plans and digital elevation models (DEM) constructed using modern computerized photogrammetric techniques (Kavanagh, 2003). Huge amounts of data can be captured using aerial photography. For the small area, it often carried out survey using electronic equipment such as total stations and GPS where are more cost-effective. Softcopy or digital photogrammetry is the recent advances in the photogrammetric process to be accomplished mostly using automated techniques.

As the advantage of the softcopy photogrammetry, data of measurement is locate in specific types of information or layers in digital form. Topographic maps, DEMs and digital orthophotos are examples of photogrammetric product which are now commonly employed in developing these spatial layers of information. The other information can be added up to the maps that have produced by softcopy photogrammetry.

Furthermore, other information that collected by other technique such as total station and GPS survey can be compiled together directly in digital format, and thus are compatible for direct entry to be used in GIS.

Nowadays, GPS survey technique is one of the most common methods to be used in detailing survey. Surveyors use GPS for increasing portion of their work because it offers the cost saving by the reducing time at the site survey and provide capable accuracy. The use of GPS is as

an extension, not a replacement, to the surveyors range of equipment which, when combined with a total station, level and even a steel tape, enable the surveyor to use the most efficient positioning tool.

GPS receivers have the capability of giving coordinated at any point on the earth's surface to an accuracy of approach centimeter level. While more sophisticated survey units can give relative position to within a few millimeters and thus are suitable for control and detail surveying (Bannister et. al., 1998).

A kinematic GPS survey can be carried out to survey and observe details on the site and then post processed, but it is common to use real time kinematic (RTK) GPS survey where the results are obtained in real time. As with conventional methods for detail surveys, control points must be established on site when doing detail surveying by GPS (Uren and Price, 2006).

1.2 PROBLEM STATEMENT

1.2.1 Details not exist (hidden) during the aerial photography exposure

Data acquisition for photogrammetry is done through the aerial photographs. The existing aerial photographs are to be used maybe a few years ago and not updated photographs. Then, there are new developments at the certain area in the same area with the existing aerial photographs. It is needed to complete and update the detailing that not exists in aerial photographs to prepare an updated detail map. So, the detailing survey needs to be carried out using the THALES ProMark3 (GPS instrument) for the new detail.

1.2.2 An aerial photographic mission is an expensive

In this situation, the existing aerial photographs at the selected area are to be used. An aerial photographic mission is an expensive operation involving two or more crewpersons and high-priced aircraft and equipment. Sometimes, photogrammetric mission is impracticable, uneconomical and impossible for the project especially if the current map of the same area is existed. An execution of ground site survey is needed to complete and update the detailing for the specific area on the coverage area that has new development.

1.3 OBJECTIVES

The objectives of this study consist of:

- To explore the capabilities of the THALES ProMark3 in Soft-Photogrammetric mapping (new development of specific area).
- To update the current map with carrying out THALES ProMark3 detailing survey (stop & go) for new features at the study area.

1.4 SCOPE OF THE STUDY

1.4.1 Area of the case study

The area of the study case is within UiTM Shah Alam **(Figure 1)** that based on a pair of aerial photographs that taken by Department of Surveying and Mapping Malaysia (JUPEM).

Figure 1: Aerial photograph of study area (UiTM Shah Alam) (source: JUPEM, 2001)

1.4.2 Data sources

There are two sources of data collection. First, data collection for the current map based on aerial photographs of study area. The scale of aerial photographs is 1:10000. Soft-Photogrammetric mapping technique is applied to obtain this current map through softcopy photogrammetry.

Secondly, data collection for the new features at the study area is obtained through GPS survey that carried out using THALES ProMark3. Stop & go GPS surveys are carried out to survey and observe the new details at the field site.

1.5 LIMITATION

The detailing survey for this project study will be carried out at the open space area apart from where it is impossible to receive the GPS signal such as under canopy, inside building, parking garages, and other subterranean locations. The accuracy of the detailing survey will be accepted and not be compared to other accuracy from the different methods of survey.

2. LITERATURE REVIEW

Detail can be variously defined as the shape, configuration, relief, roughness or three-dimensional quality of the earth's surface. Detail maps are made to show this information, together with the location of man-made and natural features of the earth, including buildings, roadways, streams, forests and others. The detail maps are important to be prepared before locating and planning, for example a building on a land.

The ability to use maps is very important to people in many professions other than surveying, for examples are engineering, agriculture, geology and military. There are various methods of 'supplying' or picking up detail in surveys, assuming that survey control has been provided. In a linear survey, where the control is provided by a triangle-based framework of lines measured by steel tape, the detail will be picked up by tape and offset methods. However, tape and offset methods may be used to survey and observe detail from any measured survey line, not merely from lines in linear surveys.

2.1 DETAIL SURVEY

The expression of detail surveying and mapping is used to describe the process of locating or picking up detail on site from the control network. The most common methods for doing this nowadays are either by using global positioning system (GPS) receivers or by using a radiation method involving total station or EDM. In addition, the recent development of laser scanners has added another powerful tool to the surveyor's detail surveying kit (Uren and Price, 2006).

2.2 DETAILING SURVEY BY PHOTOGRAMMETRY

Photogrammetry has been defined by the American Society for Photogrammetry and Remote Sensing as the art, science and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring, and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena (Wolf and Dewitt, 2000).

There are two areas in photogrammetry which are metric photogrammetry and interpretative photogrammetry. Metric photogrammetry involves in making precise measurements from the aerial photographs and other information sources to determine the relative locations of points or details. This includes sizes, shape, elevations and areas of objects (Wolf and Dewitt, 2000).

The most common applications of metric photogrammetry are the preparation of planimetric and topographic map from photographs, and the production of digital orthophotos (Wolf and Dewitt, 2000). These maps vary in scale from large to small and used in vary applications with special purpose. Topographic mapping is produced according to detailed specification.

Aerial photography provides an extremely flexible and detailed data source from which a wide range of highly accurate datasets can be generated. The use of aerial photography can drastically reduce the requirement for field survey and provide information in a timely manner.

Soft-Photogrammetric mapping products using aerial photographs are extensive and cover the whole area. However, these products are not suitable for some project even at various scales. The main reasons for this are their positional accuracy and lack of sufficient height information at large scales (Uren and Price, 2006).

A survey can then be carried out to meet the exact requirements and specifications for a project. This is one of the preferred methods for obtaining height information and other information. At large scales, ground surveys by total station and especially GPS become economic (Uren and Price, 2006).

2.3 GLOBAL POSITIONING SYSTEM (GPS)

The NAVSTAR (**Nav**igation **S**atellite **T**iming **A**nd **R**anging) Global Positioning System (GPS) was developed by United State Department of Defense (DoD) as a worldwide, satellite-based radio-navigation and positioning system. As a universal positioning system, GPS provides unique characteristics such as extremely accurate (3-dimensional) position, velocity and time (PVT) determination, a worldwide common grid easily converted to other local datums, passive all weather operation, real-time and continuous information, and survivability in a hostile environment (Mensah, 1999).

The development of the NAVSTAR GPS began in 1973. The first GPS satellite was launched on 22 February 1978 and became operational on 29 March, almost one month later. More than twenty years since the first satellite launch, GPS has become one of the most widely used systems for marine navigation, aviation, vehicle tracking and management, recreational activities and surveying.

The use of GPS is seen as an extension, not a replacement, to the surveyors range of equipment which, when combined with a total station, level and even a steel tape, enable the surveyor to use the most efficient positioning tool available for their client. In the modern business environment, it is often difficult to keep up to date with changing technology. In the surveying industry, changes in microchip technology have seen electromagnetic distance measuring equipment (EDM), electronic total stations (ETS), digital levels, and computer aided drafting and design (CADD) software, computer based engineering and mapping software and now GPS, and all become a reality in the surveying profession.

Use of the global positioning system requires specialized equipment, data collection techniques and data processing algorithms. The advantage of GPS is that a clear line of sight is not required between observation points, and the equipment can work day or night, in all weathers, being unaffected by rain, fog or snow. GPS can be used everywhere except where it is impossible to receive the signal such as inside building, parking garages, and other subterranean locations and underwater. It offers incredible cost saving by drastically reducing set up time at the survey site.

2.4 GPS FIELD METHODS

As practical, field procedures employed on GPS surveys depend on the capability of receivers used and the type of survey. Specific field procedures are being used in carried survey include the static, rapid static, pseudokinematic, kinematic, and real-time kinematic (RTK) methods. Except RTK method, all of methods are based on carrier phase-shift measurements and employ relative positioning techniques. It is means two or more receivers occupying at different stations and simultaneously making observations to several satellites. The vector (distance) between receivers is called baseline and its ΔX, ΔY and ΔZ coordinate difference components are computed as a result of observations. RTK method is based on the computational (Paul R. Wolf and Charles D. Ghilani, 2002).

2.5 PERFORMING STOP-AND-GO GPS SURVEYS

In detail survey for this project study, stop & go GPS survey is used to survey and observe the details at the study area. This technique gives in centimeter accuracy positioning during very short observation periods (less than 1 minute) which receiver moves carefully from point to point. This is a true kinematic technique because the receiver continues to track satellites while it is in motion. It is known as the “stop & go” (or semi-kinematic) technique because the coordinates of the receiver are only of interest when it is stationary (the “stop” part), but the receiver continues to function while it is being moved (the “go” part) from one stationary setup to the next. (http://www.gmat.unsw.edu.au/snap/gps/about_gps.htm).

The stop & go technique is well suited when many points close together have to be surveyed, and the terrain poses no significant problems in terms of signal disruption (usually an audible signal is emitted by the receiver when it has lost lock on the satellites) (http://www.gmat.unsw.edu.au/snap/gps/about_gps.htm).

Requirement of this technique is two units needed which are one stationary (the base) and the other (the rover) moved successively on the points to be surveyed. There can be several rovers logging data at the same time. Survey must start with an initialization phase. Once initialization is achieved, be careful not to mask the rover’s GPS antenna throughout the survey. In case of satellite signal loss, user will have to resume the initialization phase. Data must be collected simultaneously by the two units. (Manual THALES ProMark3, Copyright 2005-2006)

3. METHODOLOGY

Following are the general workflow of the methodology (Refer to **Figure 2**.):

Stage 1: Literature review

Stage 2: Selection of study area

Stage 3: Data collection

Stage 4: Data processing

Stage 5: Producing updated map

Stage 6: Result and analysis

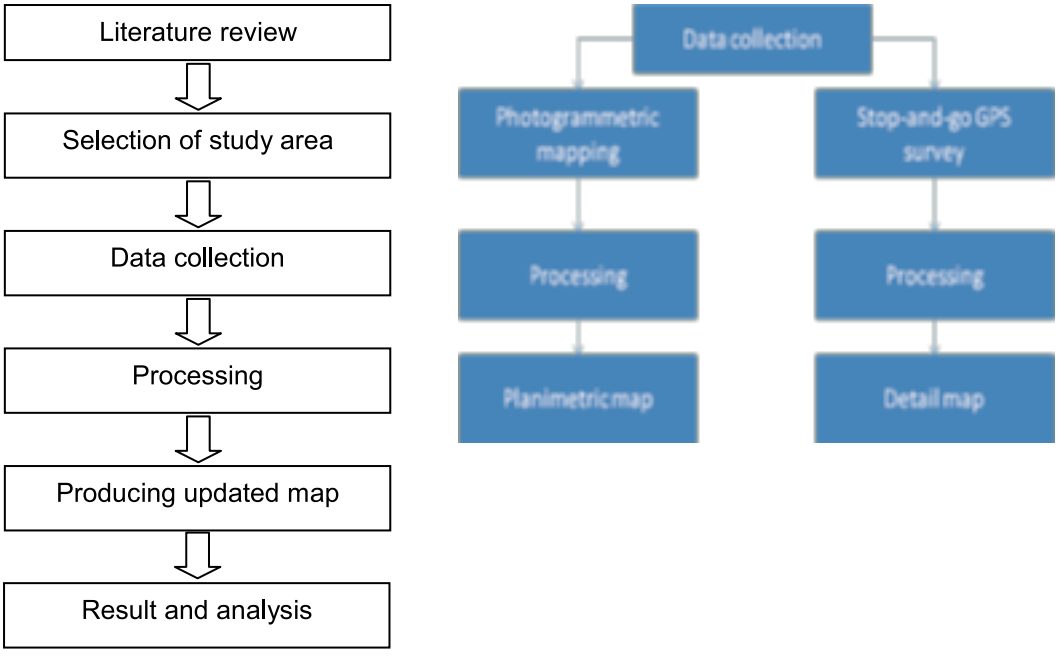

Figure 2: General work flow of methodology

3.1 SELECTION OF STUDY AREA

The selection of study area is UiTM Shah Alam Campus. This area is selected base on the existed of the aerial photos. The aerial photos are provided by the Department of Survey and Mapping, Malaysia (JUPEM) at a scale of 1:10000.

3.2 DATA COLLECTION

There are two phases of data collection. First, data collection for the current map based on aerial photographs (**Figure 1**) of study area. Soft-Photogrammetric mapping technique is applied to obtain this current map. There is a pair of aerial photographs that being used to achieve the map. The study area is UiTM Shah Alam and the scale of aerial photographs is 1: 10000. Secondly, data collection for the new features for the study area is obtained through stop-and-go GPS survey that carried out at the study area by using THALES ProMark3 GPS **(Figure 3)**.

Figure 3: THALES ProMark3 GPS. (Source: Magellan Professional, 2007)

i. Soft-Photogrammetric mapping

The Soft-Photogrammetric mapping works includes getting the aerial photograph, producing photo control points, aerial triangulation, digitizing using stereo viewing, and data editing and plotting. The PCI Geomatica software is used in this task to produce detail map. The result of the map is in DXF format.

ii. Stop-and-go GPS survey

The objectives are to execute stop-and-go GPS survey for detailing and to prepare detailing map. This survey is carried out using THALES ProMark3.

Reconnaissance

Reconnaissance is needed before doing survey to familiarize with the study area and to collect information about the topography. This stage is important in determine the location of ground control points.

Baseline test

To ensure the instrument in good condition and can be used for the next task. Rapid static survey was carried out for the baseline test where is taken 10 minutes of observation.

Planimetric and Heighting Control

This control is selected to be as referenced station. It is desirable for the GPS surveys to be referenced to an established JUPEM datum as reference. The selection of coordinate system must be done whether refer to Malaysia Rectified Skewed Orthomophic (MRSO) or Cassini projection. However, in Malaysia, most of the maps are used MRSO projection as local datum.

Establish ground control points (GCP's)

From the TBM, I have established three ground control points at the GPS site survey using static mode. These GCP's is used as tie points for stop and go survey where we need to initialize bar between the master and rover instruments before doing observation. The objective is to transfer the control point coordinates to the ground control points that established at the study area.

Performing stop-and-go GPS survey

Stop-&-go GPS survey is carried out to collect the data detailing for new features of the study area. Stop-&-go mode survey is used during the observations of details. The observation is carried out about 15 seconds for each detail. Initializing bar is done before carrying out detail survey and it takes 5 minutes. Details data that have picked up during GPS observations are:

- Road
- Building
- Street light
- Drainage
- Parking lot
- Fence
- Spot height
- Sump

All of GPS data is processed and adjusted using GNSS Solutions software. The results of the process are coordinates of all points in WGS 84 coordinate system.

3.3 DATA PROCESSING

Processing involves Soft-Photogrammetric mapping and GPS data. PCI Geomatica version 8.2 is be used to produce map in Soft-Photogrammetric mapping. While GPS data processing will be carried out using GNSS Solutions software that provided with THALES ProMark3.

3.5 PREPARING UPDATING DETAIL MAP

The step involve in this stage is preparing updating detail map. This map is integration of planimetric map of Soft-Photogrammetric mapping and detail map of stop-and-go GPS survey using THALES ProMark3.

4. RESULTS AND ANALYSIS

4.1 CAPABILITIES OF THE THALES PROMARK3

The capabilities of THALES ProMark3 in Soft-Photogrammetric mapping through the stop-&-go GPS survey technique delivers accuracy at centimeter level where at open space, has good geometry satellite and high number of visible satellites. As single frequency instrument, the THALES ProMark3 used C/A code and carrier phase as channels. It is used for post-processed positioning surveys.

Before the stop-&-go can be performed, it is required proper GCP's establishment at the site survey. The GCP's are being used as tie point of details. During the stop-&-go GPS survey, it is required minimum of five satellites. These satellites are tracked to the master and rover(s) receivers, simultaneously. Initialization period is required before carry out stop-&-go survey and loss of satellite lock is not tolerated. If loss of satellite lock occurs, it is required to reinitialize. It is recommended about five minutes for initialization period. For the stop-&-go GPS survey, it is recommended about 15 seconds observing at each point.

With THALES ProMark3, it is required less time observation at the fieldwork. Operator needs more time to analyze, manage and manipulate the large volume of data. Coordinates of the points cannot be known in real time. However, we can check or revise the points or details that have been picked up through the screen interfaced. Therefore, we cannot detect the data error during the site survey, except we do data processing at site survey.

The lesser the number of observation, the probability of the data cannot be accepted is high. Therefore, it is needed to survey and observe the details as more as we can. Revisit the points is the best way to check the accuracy of that points.

The THALES ProMark3 has no capability to detect blunders. The GNSS Solutions software that provided with THALES ProMark3 has capability of blunders detection and quality analysis tools. It is be able to detect the blunders and showed up during the data processing. This is to ensure accurate and reliable output.

The THALES ProMark3 also has warning system to inform to the user. This warning system is informed about loss of satellite lock and no satellite view during the site survey.

4.2 RESULT AND ANALYSIS OF SOFT-PHOTOGRAMMETRIC MAPPING

In Soft-Photogrammetric mapping, maximum of acceptable accuracy is within 2m to 2.5m for contours. While building details is required less than 1m accuracy. Accuracy of the map is depends on the instrument and software that have been used. Preparation of Soft-Photogrammetric mapping is depends on the purpose of the map and the scale of the map.

In this project study, PCI Geomatica version 8.2 has been used to prepare the planimetric map. The result of the Soft-Photogrammetric mapping is the planimetric map of UiTM Shah Alam. The planimetric map that has been produced is at sub-meter level. This map is fulfilled the requirement of Soft-Photogrammetric mapping.

4.3 RESULT AND ANALYSIS OF THALES PROMARK3 DETAIL MAPPING

Result of the GPS survey is performed in detail map showing the new features situated at certain area. There can be determined the types of suitable features which can be surveyed by using THALES ProMark3, through stop-and-go GPS technique. Following are the types of suitable features to be surveyed by using THALES ProMark3:

i. Most suitable

- Parking area at bare land
- Road
- Spot height at bare land
- Drainage and culvert
- Street light

ii. Fairly suitable
- Low density tree
- Offset to single storey building

iii. Not suitable
- Heavy dense trees
- Buildings especially tall building except doing offset as far as we can. This is to avoid multi-path error and loss of satellite lock/signal.
- Any details under enclosed area

4.4 MAP UPDATING

Updated map (as shown in **Figure 4** and **Figure 5**) is an integration of the maps that have been produced (the planimetric map by Soft-Photogrammetric mapping) and the detail map (at specific updated area) by stop-&-go THALES ProMark3 GPS survey.

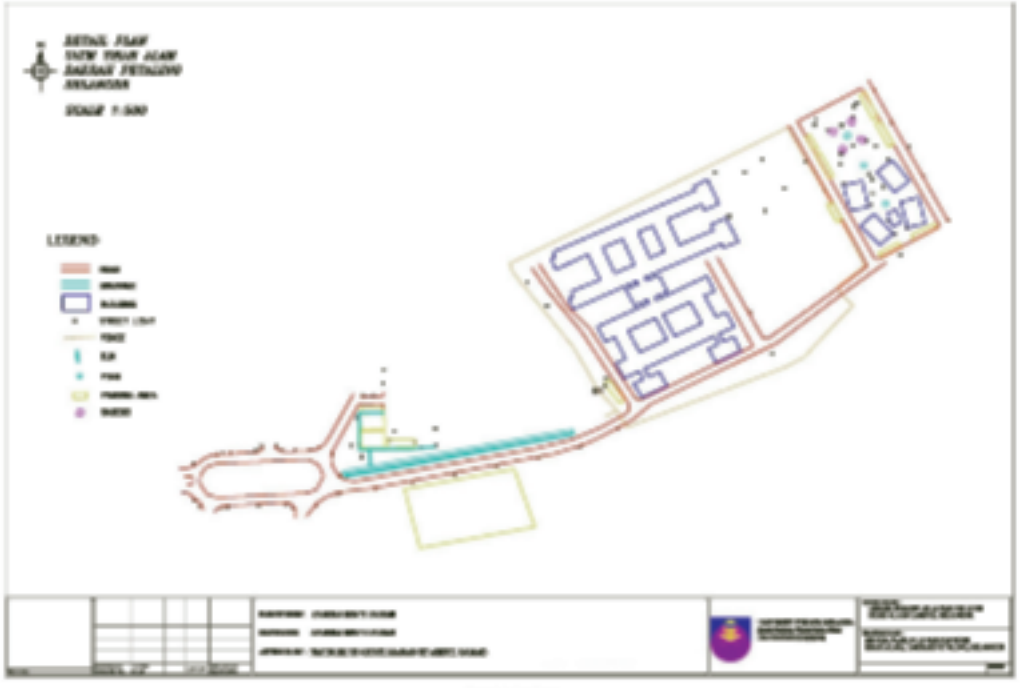

Figure 4: Detail (Updated) Mapping Using THALES ProMark3 GPS.

The updated map has been produced to meet the second objective of this study. Cost of producing updated map through stop-&-go THALES ProMark3 GPS survey is more economical. By using stop-&-go THALES ProMark3 GPS survey, it is less time to survey and observe the details of new features. However, it is depending on the area cover of survey. For the small area, it is more economical and practical to carry out conventional ground survey.

Figure 5: Updated Map (Using THALES ProMark3 and PCI-Geomatica).

Capability of the map updating can be used for the future is depend whether both of maps are fitted each other and the maps accuracy. After producing updated map, the detail map (by THALES ProMark3 GPS survey) is fitted to the planimetric map (by Soft-Photogrammetric mapping). In term of accuracy, the planimetric map (by Soft-Photogrammetric mapping) is produced at sub-meter level of accuracy. The detail map (by THALES ProMark3 GPS survey) is also at sub-meter level. Thus, the integration of those maps is at the same level/rate of accuracy.

This updated map is suitable to be used for any project or mapping that not requires high accuracy data. Examples are to prepare medium accuracy mapping, GIS projects, planning for the future development or management, and so on.

Based on the updated map that has been produced, there can be determined suitable features for the Soft-Photogrammetric mapping. There are certain features that can be represented in Soft-Photogrammetric mapping because of digital mapping limitation. The suitable features that can be represented for Soft-Photogrammetric mapping are:

- Structures like buildings, walls, water towers and fence lines
- Roads and highways
- Other transportation likes railroad, port and airport runways.
- Spot height and contours
- General land use like agriculture area, vegetation area, forest area and bare land.
- Natural features like lakes, rivers, bushes, and wetland.
- Project specifications

5. CONCLUSION AND RECOMMENDATIONS

The main objective of this project study, is to explore the capabilities of the THALES ProMark3 in map updating of the Soft-Photogrammetric mapping, has been successfully achieved. THALES ProMark3 as GPS instrument has capability to survey and observe details through stop-and-go technique. By using THALES ProMark3 GPS, it required less fieldwork time and more time is needed to be used to analyze, manage and manipulate the large volume of data.

The THALES ProMark3 GPS that has been used in this project study is small, portable and is screen interfaced with a keyboard for system control and entry of codes to identify features surveyed. This equipment is suitable for detail survey and makes data collection simpler and very fast one-person operation. The THALES ProMark3 GPS capable to deliver accuracy at sub-meter accuracy. It is believes this instrument suit for updating Soft-Photogrammetric mapping.

The use of THALES ProMark3 GPS is as an extension or option, not a replacement, to the surveyor's range of equipment that enables the surveyor to use the most efficient positioning tool. The used of THALES ProMark3 GPS is not only in the surveying but in many other areas of activity. An example is in transportation or car navigation.

The second objective is to update the current map with carrying out ProMark3 detailing survey (stop & go) for new features at the study area, has been successfully achieved. The map updating is an integration of planimetric map and detail map that have been produced before. These two maps are in sub-meter level accuracy. Thus, these maps are fitted each other. The map updating can be used for the future depends on the project requirements.

Based on this project study, it can be conclude that all of objectives are successfully achieved. There are some recommendations to improve the project study in future which are;

1. Using two different unit of THALES ProMark3, through stop-and-go GPS survey to observe the same details to check the capabilities and the data observation for the both THALES ProMark3 instruments.
2. Doing comparison between THALES ProMark3 with other discipline method such as total station to check the accuracy of the observation.
3. The exploration of THALES ProMark3 through kinematic GPS survey.
4. There are also some recommendations of field procedure that to be carried out by THALES ProMark3 GPS (stop-and-go technique):

i. Before carried out stop-and-go GPS survey, it is required to occupy initialization bar about 300 seconds or 5 minutes.
ii. It is recommended about 15 seconds observation to survey and observe each detail through stop-and-go GPS survey using THALES ProMark3.
iii. To survey and observe detail of building, it is required offset to the building. Length of the offset is depending on the PDOP reading and visibility of satellites.
iv. Once loss of satellite lock/signal occur, it is required to reinitialize bar.

6. ACKNOWLEDGEMENT

The Pixelgrammetry and Al-Idrisi Research Group (***Pi_ALiRG***), The Department of Survey and Mapping, Malaysia (JUPEM), and The Department of Surveying Science and Geomatics, Faculty of Architecture, Planning and Surveying of Universiti Teknologi MARA (UiTM) Malaysia are greatly acknowledged.

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CARTOGRAHIC GENERALISATION: NEW SOLUTION FOR SPgD

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1. Introduction

As part of the ongoing modernisation programme, *Seksyen Pangkalan Data* (SPgD) is now procuring an automated generalisation solution to generate 1:50,000 hardcopy topographic maps from a base scale of 1:25,000. This will replace the existing manual procedures and establish seamless topographic and cartographic databases for the on-demand mapping.

The proposed solution will deliver leading-edge software components that will complement and enhance the current SPgD's technology infrastructure. These operational components will be provided to address each of the major stages of a generalisation workflow:

a) Data Preparation,
b) Model Generalisation,
c) Cartographic Generalisation, and
d) Text Placement.

2. The Proposed Solution

The proposed solution to meet SPgD's requirements is based on these two new softwares:

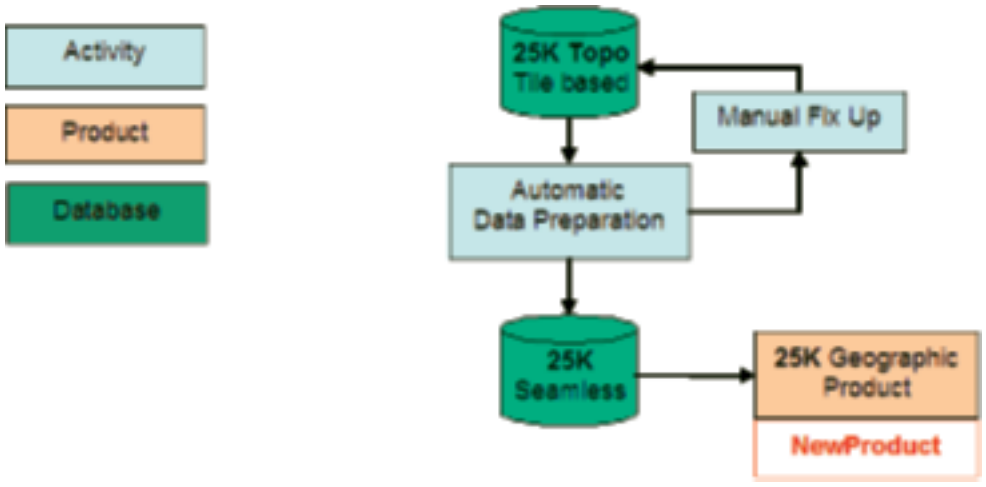
a) Radius Studio – to support Data Preparation through data migration and creation of the seamless 1:50,000 scale topographic data, and
b) Radius Clarity – to provide automated model and cartographic generalisation tools in producing cartographic datasets at both 1:25,000 and 1:50,000 scales with Text Placement capability.

2.1 Data Preparation

In order for the generalisation workflow to perform at optimum level, it is important that the data entering process is fit-for-purpose and any inconsistencies are resolved. This will require the creation of a seamless database, topological data structure, appropriate object hierarchy and clustered objects. All these will be the basis for efficient data processing.

During this stage, the data will be migrated to new data models that will complement the Model Generalisation stage's requirements. These data models will provide the necessary relationships to support the generalisation process and allows the creation of partitions and clusters necessary for further automated generalisation. This stage will also provide the facilities to validate the quality of the source data and facilitate any necessary improvements by

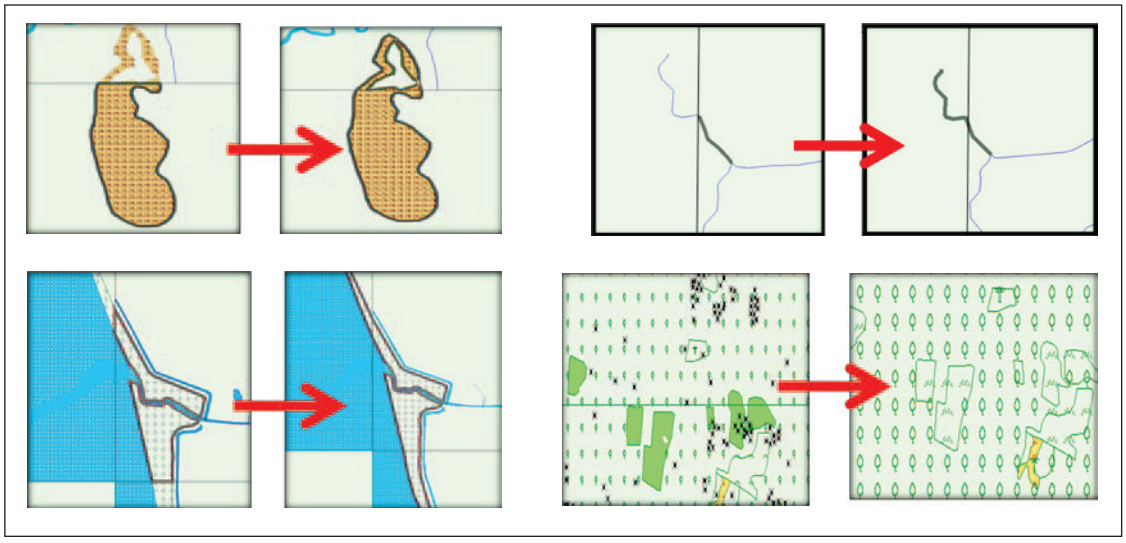
supporting manual interaction using mark-up facilities to lead the operator directly to the data that needs correction.



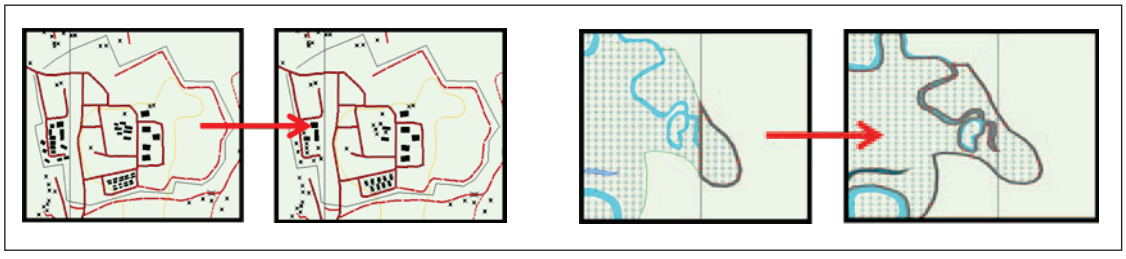
Data Preparation Stage

Radius Studio is introduced to perform the Data Preparation role. It has been specifically designed to meet the requirements of organisations that have the need to reuse legacy data for other activities. In this case, it is taking the tile based primary data and ensuring it fits the automated generalisation's purpose. Radius Studio is also designed to be flexible and allow customers to tune and develop their own rules and actions for specific data examples and requirements. This is particularly important for SPgD in order to ensure that future flow lines can be developed and data quality continues to be assured in line with the demands of the Malaysian geographic community.

The implementation of Radius Studio in this Data Preparation stage will create a 'Unified Rules Repository', which is made up of a comprehensive set of business rules. The solution includes the key features of data validation and data transformation of the existing SPgD data against a comprehensive agreed set of business rules, delivering a consistent seamless and quality assured dataset as a result. Any data quality issues detected in the data will be highlighted as inconsistencies and if errors, can be automatically cleansed in the Radius Studio environment. If due to the subjective nature of a non-conforming feature to a business rule, it is not possible to automate a correction, then the report identifying the feature(s) is passed to the operators, via mark-ups, to inspect and manually correct in a SPgD data maintenance environment. This use of mark-ups is aided by the common use of the Gothic environment by the proposed workflow and the existing systems within SPgD.



Edge-merged - large features crossing sheet boundaries stored as single Objects

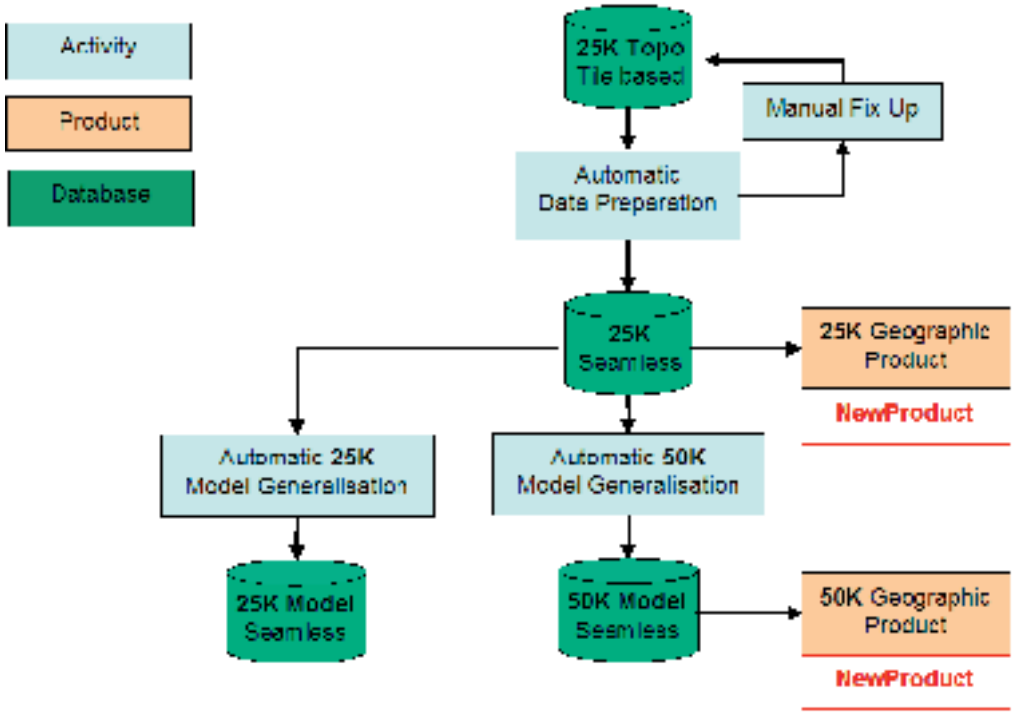


Edge-matched - no misalignment at map sheet boundaries or other data capture boundaries

2.2 Model Generalisation

The second stage of the workflow requires the transformation of the data to include changes to the data model and geometric elements to reflect the target rather than source data. This phase has always been necessary and recognised as a separate and identifiable step in the workflow enabling data auditing and providing a qualified data set for purposes other than cartographic generalisation.

Model generalisation, including model transformation, tends to be rule-based and our approach is that the rules are implemented using process methods and process sequences. These are implemented within Gothic and managed within Radius Clarity.



Model Generalisation Stage

Model Generalisation is the reduction of the amount of source data to a level suitable for the target scale. This is achieved by:

a) Removing feature classes that are not visualised at the target scale,
b) Amalgamating or removing small features while retaining topological connectivity, and
c) Filtering unwanted detail from features.

2.3 Cartographic Generalisation

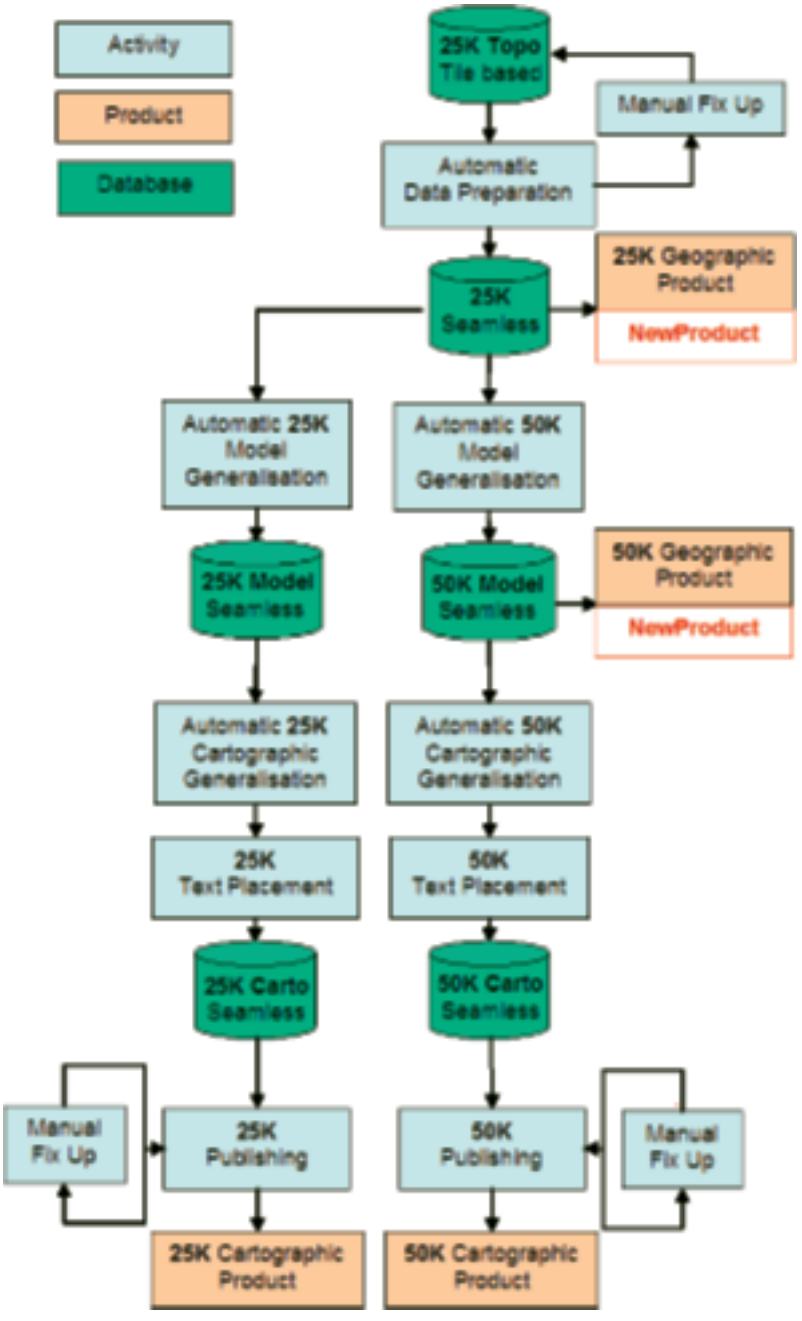
Cartographic Generalisation is all about the detection and resolution of conflicts between map objects for representation at the target scale. The Cartographic Generalisation stage provides the highest level of possible automation. This is achieved by utilising the world leading cartographic generalisation tool, the Radius Clarity.

It allows the maintenance of consistently high quality standards for mapping, whilst reducing the typically high levels of expertise that are normally required. It provides a parameterised, rules-based process that is repeatable, consistent, measurable, flexible and adaptable to user's requirements. For a manually generalised product, the chosen solution is dependant on the cartographer's art skill. However, the automated system will consistently replicate the same solution, again making a significant contribution to the consistency between products.

The automated Cartographic Generalisation is performed by the combination of these methods:

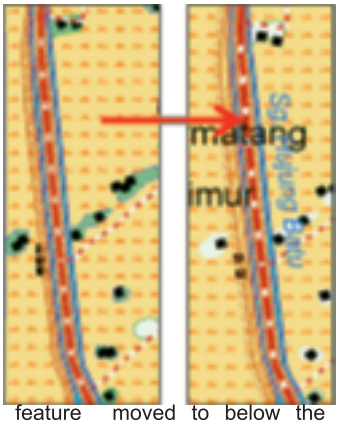
a) Simplification,
b) Typification,
c) Displacement,
d) Enlargement,
e) Diffusion, and
f) Exaggeration.

This is a complex operation and is extremely difficult to implement solely with process methods and sequences. Much better results can be achieved using the AGENT system provided by Radius Clarity. This allows the definition of the goal rather than paths to achieve the goal, providing a flexible, context sensitive generalisation approach that is proven to automate a higher proportion of generalisation tasks than any other currently available. As result, fewer conflicts need to be dealt with interactively, therefore saving costs, time and providing a consistent and repeatable solution.



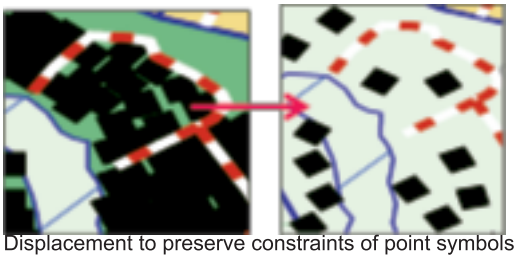
Cartographic Generalisation Stage

Whilst this is a crucial stage of the workflow, the necessary displacement carried out to avoid representation conflicts introduces an element of inaccuracy within the data, thus making the data perfect for maps but less suitable for analysis purposes.

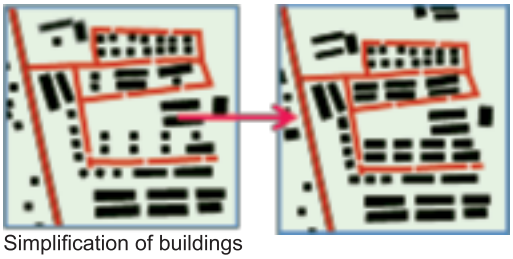


The text feature moved to below the line and associated with (the river)

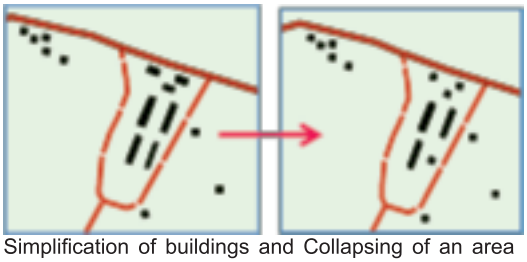
Label with a candidate text location for a point 'kampung'



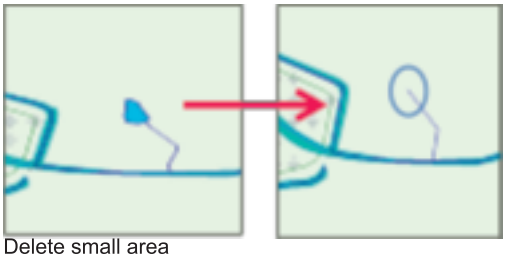
Displacement to preserve constraints of point symbols depending on line



Simplification of buildings



Simplification of buildings and Collapsing of an area to a point



Delete small area

Cartographic Generalisation Output

2.4 Text Placement

The last stage of the workflow involves the placement of text and labels. This involves an intelligent approach to text and feature clash detection and provides information to support the interactive manipulation of detected clashes. This stage will follow the cartographic generalisation and will utilise facilities within Radius Clarity. By adopting this approach, the existing text and label placements, within the data, will be retained and only those clash/conflict with other features with new texts will require modification. This recognises the considerable investment of time and afford made by SPgD staff in applying text positions and ensures that texts are not eliminated unnecessary.

The implementation of the workflow will include an intelligent clash detection capability which will be provided as an addition to LAMPS2. The implemented addition employs techniques to identify conflicts between text features and the symbolised map features at the target scale. It then provides supporting information to operators to allow the interactive solution to overcome these clashes. The module will identify conflicts between text features and map features and at the same time identify conflicts between text labels.

All text/feature or text/text conflicts are marked-up for manual inspection and correction in LAMPS2. The proposed workflow is designed so that the text placement is undertaken after the cartographic generalisation as the last stage of the automatic generalisation workflow. The text placement module employs rules to identify conflicts between text features and the map features and creates mark-ups to allow the operators to resolve those identified conflicts

The approach initially renders the data via representation into a second, temporary dataset. It then runs actions, using similar methodology to Radius Studio on this second, temporary dataset with an action to create markups in the original dataset. These markups are then used within LAMPS2 to allow the operator to interactively resolve the detected clash. Finally, it runs another action to suppress the markups when the user has accepted the clash. This requirement is taken into consideration by the selection process described above.

3. Conclusion

A trial run has already been carried out in SPgD in order to test the stability and feasibility of the system. The result manifested that the mapping speed has been greatly accelerated and the mapping time has been shortened by using this system. At the same time, as relationship processing among features has been sufficiently considered, editing process is allowed to be done by users automatically or manually. As such, interactive relations among features can be ensured to meet the requirements of normal cartography.

SPgD beliefs that this procurement creates the opportunity to undertake further enhancement to the existing tile-based national topographic and cartographic databases. It is necessary to further enhance data quality to comply with the requirements of an automated generalisation system.

LAPORAN BERGAMBAR

MESYUARAT KE-61
JAWATANKUASA PEMETAAN DAN DATA SPATIAL NEGARA (JPDSN)

Nornisha binti Ishak
Seksyen Perkhidmatan Pemetaan
Jabatan Ukur dan Pemetaan Malaysia
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Jawatankuasa Pemetaan Dan Data Spatial Negara (JPDSN) telah mengadakan mesyuarat tahunan kali ke-61 bertempat di Hotel Le Meridien Kota Kinabalu, Sabah pada 29 - 30 Mac 2010. Mesyuarat yang dipengerusikan oleh Y. Bhg. Dato' Prof. Sr Dr. Abdul Kadir bin Taib, Ketua Pengarah Ukur dan Pemetaan Malaysia telah dihadiri oleh ahli-ahli JPDSN dari seluruh negara yang terdiri daripada 40 orang wakil dari pelbagai Jabatan/Agensi Kerajaan serta Institusi Pengajian Tinggi Awam (IPTA).

Y. Bhg. Dato' Prof. Sr Dr.Abdul Kadir bin Taib sedang mempengerusikan Mesyuarat Ke-61 JPDSN yang diadakan di Hotel Le Meridien, Kota Kinabalu, Sabah.

Dalam ucapan pembukaan, Y. Bhg. Dato' Prof. Sr Dr. Abdul Kadir bin Taib turut merakamkan ucapan terima kasih kepada mantan Pengerusi JPDSN yang lalu iaitu Y. Bhg. Datuk Hamid bin Ali yang telah bersara pada 6 Jun 2009. Selanjutnya, Y. Bhg. Dato' Pengerusi menjelaskan bahawa antara lain tujuan mesyuarat ini diadakan adalah untuk menyelaras aktiviti-aktiviti, mengkaji serta merangka program yang berkaitan dengan pemetaan dan data spatial di seluruh negara. Di samping itu, Y. Bhg. Dato' Pengerusi turut berbangga dan berterima kasih di atas kerjasama yang telah diberikan terutamanya peranan yang dimainkan oleh Jawatankuasa-jawatankuasa Teknikal yang telah ditubuhkan pada 7 Jun 1994 semasa Mesyuarat Jawatankuasa Pemetaan Negara Ke-45 di Miri, Sarawak bagi memastikan JPDSN ini bergerak dengan lancar dan jayanya.

Seterusnya, Y. Bhg. Dato' Pengerusi mengimbau kembali beberapa kejayaan dan program berkaitan pemetaan dan data spatial yang telah dilaksanakan oleh JUPEM dalam tahun 2009 yang merupakan tahun akhir di bawah Rancangan Malaysia Ke-9 (RMK9). Antaranya ialah Sistem Generalisasi Pangkalan Data, Sistem Penyediaan Data Cetak, *Map Publishing*, Projek Makmal Kalibrasi Ukur Aras, Projek Tolok Air Pasang Surut Telemetri Negara dan Projek Penyenggaraan Stesen Penyegitigaan Timbalai, Labuan. Kesemua projek tersebut telah disiapkan sepenuhnya dalam tahun 2009 kecuali Projek Sistem Generalisasi Pangkalan Data yang telah disiapkan pada awal tahun 2010.

Selain daripada itu, Y. Bhg. Dato' Pengerusi turut menyentuh beberapa perkara yang difikirkan wajar diambil maklum oleh semua ahli mesyuarat iaitu mengenai Kes Kedaulatan Batu Puteh, Tubir Selatan dan Batuan Tengah, tuntutan terhadap Pelantar Benua Malaysia serta *Exchange of Letters Malaysia – Brunei.* Dalam pada itu, Y. Bhg. Dato' Pengerusi turut memaklumkan beberapa projek utama di bawah Rancangan Malaysia Ke-10 (RMK10) yang telah dipohon oleh JUPEM dalam memantapkan lagi program pemetaan negara iaitu *Marine Geodetic Infrastructure in Malaysia Waters*, Projek ePemetaan, Sistem Pangkalan Data Geodetik dan Peningkatan Sistem Pemetaan Utiliti.

Y. Bhg. Dato' Pengerusi selanjutnya mengingatkan akan cabaran-cabaran yang akan dihadapi dalam merencanakan projek-projek pemetaan seperti memenuhi kepuasan pelanggan terhadap produk dan perkhidmatan yang diberikan. Cabaran daripada pihak swasta yang mengeluarkan peta yang lebih terkini serta menjalankan aktiviti pengutipan data tanpa mendapat kebenaran juga perlu diambil serius. Sehubungan dengan itu, beliau menyeru agar Jabatan/Agensi Kerajaan peka dengan pekeliling-pekeliling yang berkaitan dengan orang awam seperti Pengurusan Penambahbaikan Proses Pengurusan Aduan Awam (PKPA Bil. 1/2009).

Melalui mesyuarat ini juga, ahli-ahli mesyuarat berpeluang untuk berbincang, mengkaji, menyelesaikan isu-isu atau masalah yang berkaitan serta merangka aktiviti dan program bagi menjana ke arah pembangunan sosio-ekonomi dan pengurusan sumber negara dengan lebih terancang. Di samping itu, Y. Bhg. Dato' Pengerusi juga berharap agar platform yang disediakan melalui mesyuarat ini dapat memberi ruang kepada semua ahli mesyuarat untuk berbincang bagi menyelaras dan menyelesaikan sebarang isu atau masalah yang berkaitan dengan urusan pemetaan dan penyediaan data spatial ke arah memenuhi mandat yang telah diberikan oleh kerajaan.

Antara agenda mesyuarat ini adalah seperti pembentangan laporan daripada Jawatankuasa-jawatankuasa Teknikal dan Kumpulan Kerja Geodetik, pembentangan laporan aktiviti jabatan-jabatan/agensi-agensi dan juga pembentangan kertas kerja. Manakala satu kertas kerja yang bertajuk "Cadangan Penubuhan Jawatankuasa Teknikal Atlas Kebangsaan" telah dibentangkan oleh Tn. Hj. Ali bin Ahmad, Pengarah Ukur Seksyen Kartografi, JUPEM. Jawatankuasa ini akan bertanggungjawab untuk mendapatkan data dan maklumat deskriptif daripada pelbagai agensi serta memantau pembangunan atlas kebangsaan. Objektif penerbitan Atlas Kebangsaan adalah untuk memastikan data spatial dan pelbagai maklumat penting dan menarik mengenai Malaysia dapat

disampaikan kepada golongan pelajar, pentadbir serta orang awam. Sementara itu, mesyuarat JPDSN pada kali ini juga turut menjemput Agensi Angkasa Negara (ANGKASA) iaitu Dr. Noordin bin Ahmad, Timbalan Ketua Pengarah ANGKASA untuk memaklumkan mengenai perkembangan terkini satelit negara, RazakSAT.

Y. Bhg. Dato' Prof. Sr Dr. Abdul Kadir bin Taib sedang mempengerusikan Mesyuarat Ke-61 JPDSN yang diadakan di Hotel Le Meridien, Kota Kinabalu, Sabah.

Ahli-ahli mesyuarat yang terdiri daripada pelbagai Jabatan/Agensi Kerajaan serta Institusi Pengajian Tinggi Awam (IPTA).

Lawatan Ke Markas Angkatan Kapal Selam Tentera Laut DiRaja Malaysia, Teluk Sepanggar, Kota Kinabalu, Sabah

Ahli-ahli Mesyuarat JPDSN Ke-61 pada kali ini berpeluang untuk melawat Pangkalan Tentera Laut DiRaja Malaysia (TLDM) yang terletak di Teluk Sepanggar, Kota Kinabalu, Sabah pada 30 Mac 2010. Lawatan ini diketuai oleh Y. Bhg. Dato' Prof. Sr. Dr. Abdul Kadir bin Taib, Ketua Pengarah Ukur dan Pemetaan selaku Pengerusi JPDSN.

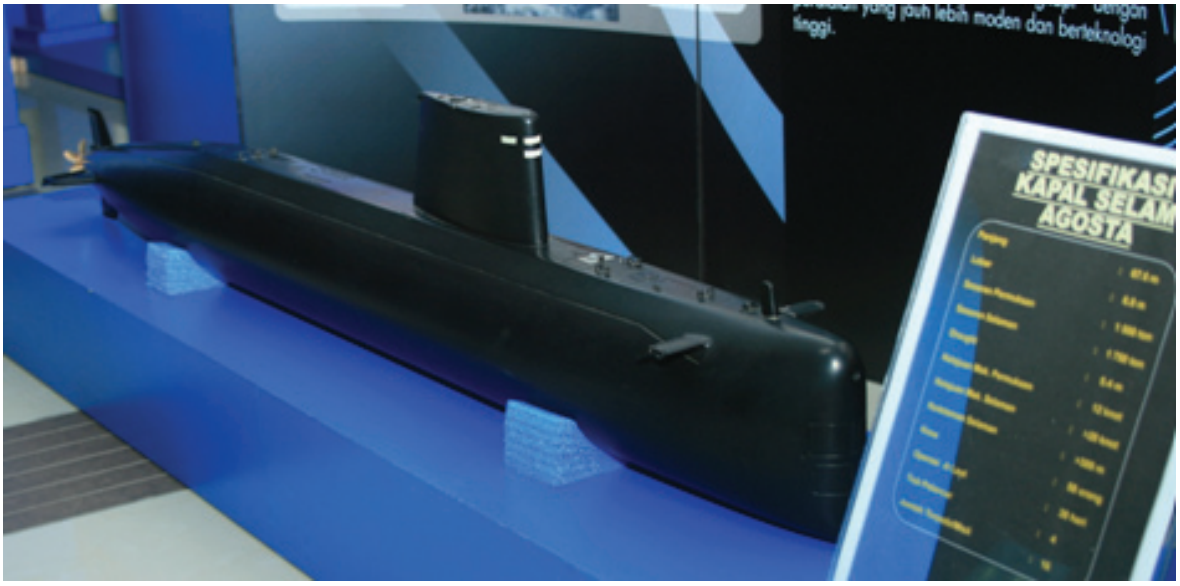
Sepanjang lawatan tersebut, ahli-ahli mesyuarat dibawa mengelilingi Pangkalan TLDM, Kota Kinabalu yang dilengkapi dengan pelbagai kemudahan untuk kakitangan serta keluarga mereka. Taklimat turut disampaikan oleh pihak TLDM mengenai Markas Angkatan Kapal Selam. Selanjutnya, ahli-ahli mesyuarat dibawa ke Galeri Kapal Selam, Pusat Latihan Kapal Selam serta KD Tuanku Abdul Rahman.

Ahli-ahli mesyuarat tidak melepaskan peluang untuk melihat sendiri aset negara yang menjadi kebanggaan dalam mempertahankan kedaulatan negara kita. Banyak informasi baru diperoleh oleh ahli-ahli mesyuarat dan ini merupakan pengalaman yang menarik untuk dikongsi bersama.

Sesi kunjungan hormat serta pertukaran cendera kenangan di antara Y. Bhg. Dato' Prof Sr Dr. Abdul Kadir bin Taib dengan Laksamana Pertama Mohamad Rosland bin Omar

Sekitar lawatan ke Markas Angkatan Kapal Selam, TLDM, Teluk Sepanggar, Kota Kinabalu, Sabah

Sekitar lawatan ke Markas Angkatan Kapal Selam, TLDM, Teluk Sepanggar, Kota Kinabalu, Sabah



Hasil daripada mesyuarat JPDSN Ke-61 ini dapat dirumuskan bahawa JPDSN berfungsi sebagai satu platform yang efektif dalam merancang dan menjalankan aktiviti pemetaan dan data spatial negara agar kerja-kerja pemetaan yang produktif dan berkualiti dapat dihasilkan. Kesempatan yang diberikan melalui lawatan teknikal ke Markas Angkatan Kapal Selam TLDM telah digunakan sepenuhnya oleh ahli-ahli mesyuarat untuk berkongsi pengetahuan dan pengalaman menarik yang mungkin tidak dapat dilupakan.

KALENDAR GIS 2010

TARIKH	TAJUK	LOKASI	PENGANJUR	TALIAN PERTANYAAN
29 - 30 Mac 2010	Mesyuarat Jawatankuasa Pemetaan dan Data Spatial Negara (JPDSN) ke 61	Kota Kinabalu, Sabah	Bahagian Pemetaan, JUPEM	Encik Ng Eng Guan Tel : +603 26170831 Fax : + 603 26970140 e-mail : ng@jupem.gov.my
28 - 29 April 2010	MRSS 6th International Remote Sensing GIS Conference and Exhibition	Kuala Lumpur	UPM & MACRES	Assoc. Prof. Dr. Abdul Rashid Mohames Shariff Tel : +6017 3543505 Fax : +603 89466425 e-mail : mrss2010@gmail.com Website : http://www.mrss.com.my/mrss2010/
17 - 18 Jun 2010	12th International Surveyors Congres	Hotel Istana, Kuala Lumpur	ISM & RICS	The Institution of Surveyors Malaysia (ISM) Tel : +603 79551772 / 7956728 Fax : +603 79550253 e-mail : secretariat@ism.org.my
28 - 29 Jun 2010	4th National GIS Conference and Exhibition [NGIS] 2010	PICC, Putrajaya	MaCGDI JUPEM MAMPU	Puan Nor Zuraini Abdul Rahim Tel : +603 88861228 Fax : +603 88894851 e-mail : ngis_jemputan@macgdi.gov.my
26 - 28 Julai 2010	9th Annual Asian Conference & Exhibition on Geospatial Information, Technology and Applications	Belum ditentukan	ISM	The Institution of Surveyors Malaysia (ISM) Tel : +603 79551772 / 7956728 Fax : +603 79550253 e-mail : secretariat@ism.org.my
November 2010	Jawatankuasa Kebangsaan Nama Geografi (JKNG)	Belum ditentukan	Bahagian Pemetaan, JUPEM	Encik Ng Eng Guan Tel : +603 26170831 Fax : +603 26970140 e-mail : ng@jupem.gov.my

SUMBANGAN ARTIKEL / CALL FOR PAPER

Buletin GIS diterbitkan dua (2) kali setahun oleh Jawatankuasa Pemetaan dan Data Spatial Negara. 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.

Panduan Untuk Penulis

1. Manuskrip boleh ditulis dalam Bahasa Malaysia atau Bahasa Inggeris

2. Setiap artikel yang mempunyai abstrak mestilah condong *(italic).*

3. Format manuskrip adalah seperti berikut:

Jenis huruf	: Arial
Saiz huruf bagi tajuk	: 12 (Huruf Besar)
Saiz huruf artikel	: 10
Saiz huruf rujukan/*references*	: 8
Langkau (isi kandungan)	: 1.5
Margin	: Atas, bawah, kiri dan kanan = 2.5cm
Justifikasi teks	: *Justify allignment*
Maklumat penulis	: Nama penuh, alamat lengkap jabatan/ institusi dan emel.

Satu *'column'* setiap muka surat

4. Sumbangan hendaklah dikemukakan dalam bentuk *softcopy* dalam format Microsoft Word. Semua imej grafik hendaklah dibekalkan secara berasingan dalam format .tif atau .jpg dengan resolusi 150 dpi dan ke atas.

5. Segala pertanyaan dan sumbangan bolehlah dikemukakan kepada:

Ketua Editor
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