The Use of Geospatial Technology in Support of Census Operations

S U H A N A   T A H I R

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Overview GIS in Malaysia

Population Census

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INTRODUCTION

VISION

To be a leading statistical organization internationally by 2020

MISION

Producer of National Statistics of Integrity and Reliability
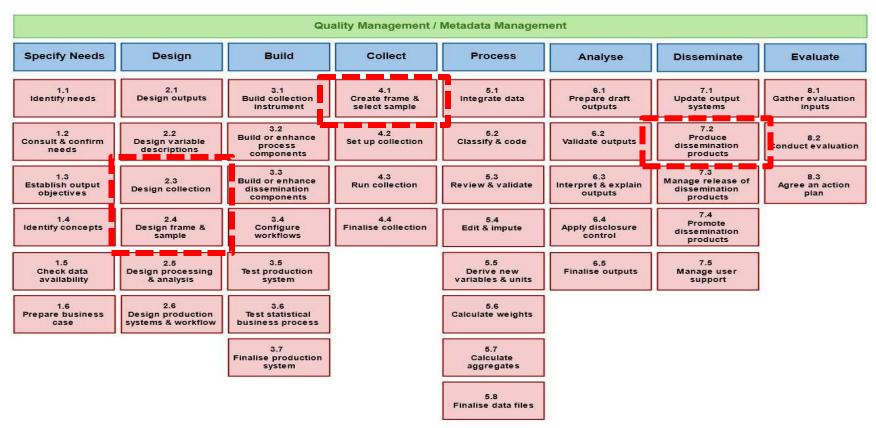
Generic Statistical Business Process Model (GSBPM) 5.0

Quality Management / Metadata Management							
Specify Needs	**Design**	**Build**	**Collect**	**Process**	**Analyse**	**Disseminate**	**Evaluate**
1.1 Identify needs	2.1 Design outputs	3.1 Build collection instrument	4.1 Create frame & select sample	5.1 Integrate data	6.1 Prepare draft outputs	7.1 Update output systems	8.1 Gather evaluation inputs
1.2 Consult & confirm needs	2.2 Design variable descriptions	3.2 Build or enhance process components	4.2 Set up collection	5.2 Classify & code	6.2 Validate outputs	7.2 Produce dissemination products	8.2 Conduct evaluation
1.3 Establish output objectives	2.3 Design collection	3.3 Build or enhance dissemination components	4.3 Run collection	5.3 Review & validate	6.3 Interpret & explain outputs	7.3 Manage release of dissemination products	8.3 Agree an action plan
1.4 Identify concepts	2.4 Design frame & sample	3.4 Configure workflows	4.4 Finalise collection	5.4 Edit & impute	6.4 Apply disclosure control	7.4 Promote dissemination products	
1.5 Check data availability	2.5 Design processing & analysis	3.5 Test production system		5.5 Derive new variables & units	6.5 Finalise outputs	7.5 Manage user support	
1.6 Prepare business case	2.6 Design production systems & workflow	3.6 Test statistical business process		5.6 Calculate weights			
		3.7 Finalise production system		5.7 Calculate aggregates			
				5.8 Finalise data files			

- UN *Principles and Recommendations for Population and Housing Censuses, Rev.2,* **recommended the use of Geospatial technologies for improving traditional methods of census mapping** (adopted by UNSC in 2007).
- Other recommendations derived from UN EGM on GIS and Census Mapping emphasized:
  - the need for countries to consider the **census geography programme as a continuous process**
  - the use of and application of geospatial technologies and information is **beneficial at all stages of population and housing census process** (GI improves the efficiency in the preparatory, enumeration, processing and dissemination phases of the census)

Linking geospatial information to statistics through geocoding.
[2nd Session of UN-GGIM, August 2012]

Stronger interoperability and integration, between geospatial and statistical authorities.
[Future trends in geospatial information management: the five to ten year vision, July 2013]

International standard for linking socio-economic information to location— an **international statistical geospatial framework.**
[UNSC Programme Review. February 2013]

**The use of geospatial technology in the Census 2010 Global ratings :
58% using a digital map
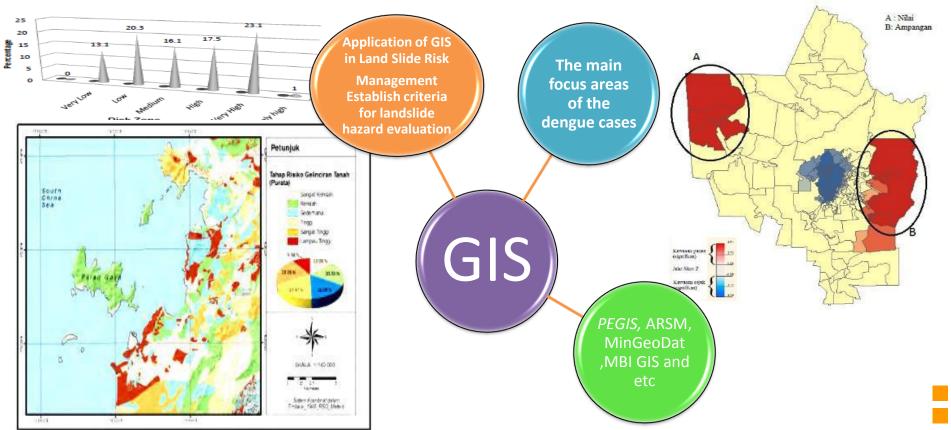74% use GIS / GPS
25% aerial photography
24% satellite image**

OVERVIEW GIS IN MALAYSIA

GIS

Application of GIS in Land Slide Risk Management Establish criteria for landslide hazard evaluation

The main focus areas of the dengue cases

PEGIS, ARSM, MinGeoDat ,MBI GIS and etc

A : Nilai
B: Ampangan

➢ **Before Formation of Malaysia**
 1911, 1921,1931, 1947, 1957

➢ **After Formation of Malaysia(every 10 years)**
 1970, 1980,1991, 2000, 2010 …

➢ **Next Census**
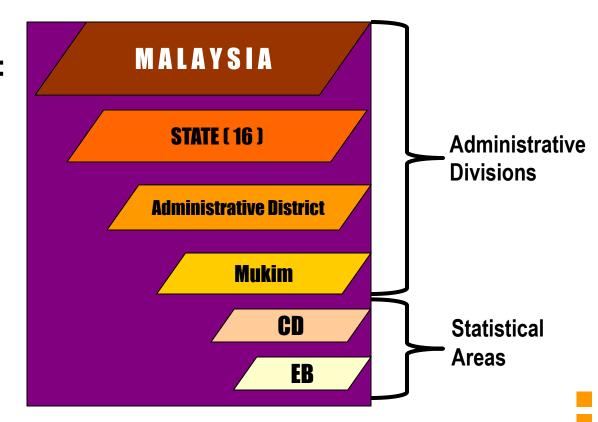 **2020**

EB is formed by :

A. Administrative divisions:

Gazetted Boundries

- State
- Administrative district
- Mukim/sub district
- Local authority area

B. Statistical Areas

Defined by DOS;

- Census Districts (CD)
- Enumeration Block (EB)

MALAYSIA

STATE (16)

Administrative District

Mukim

CD

EB

Administrative Divisions

Statistical Areas
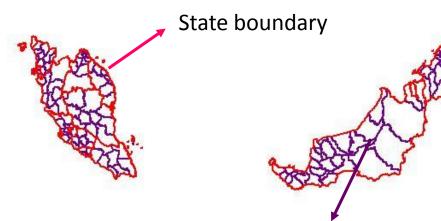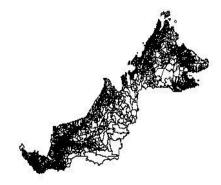
Administrative Areas

State boundary

District boundary

Statistical Areas
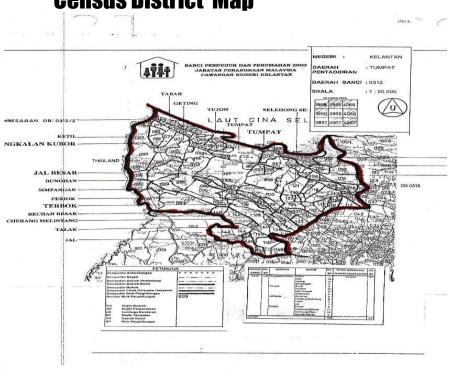
Total EBs for 2016 = 80,781
Total LQ = 7,626,201
Total Census Districts = 550

*Note: Untill Jun 2016
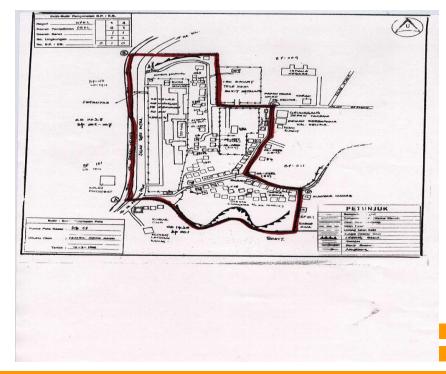
Census District Map

Enumeration Block (Sketch Map)

POPULATION CENSUS

Stages of Development

2017 – 2019
Pre-enumeration

2020
Enumeration

2021 - 2022
Post enumeration

Periods beginning in
June 2017-December 2019

- Updating Frame
- Preparation of map
- e-Dokumen 1
- Housecode for e-census

- The use of web map for the Census operation

- Map for analysis and dissemination of data in the form of web-based.

Preparing and updating map statistics (CD, CC and EB) at the UB and the LQ for the metro area (stratum 1)

Pre-enumeration

Mobile mapping

Maps in hardcopy and softcopy (format that can be opened using a mobile / tablet)

- Determine the position of UB
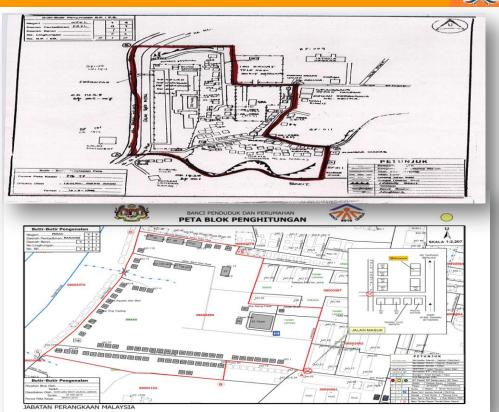- Creating a statistical boundary
- Share / transfer data to a geodatabase

Sketch map

Before Census 2010

Digital map

Census 2010

CHECKING FROM GOOGLE EARTH - THE ALTERNATIVE

Address geocoding

- Information in the form of point LQ.
- LQ contains complete address information, Housecode
- Analysis / visualize in detail

Map of UB Census 2010

Address geocode LQ level : Census 2020

NEGERI	DAERAH PENTADBIRAN	VERSI DAERAH BANCI	DAERAH BANCI	VERSI BP	PD	DESKRIPSI (LOKALITI STATISTIC KAW.KECIL)	LOKALITI UNTUK INDEK
0	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. SERI KINTA	JLN. 5, KG. SERI KINTA
1	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. SERI KINTA	JLN. 7, KG. SERI KINTA
2	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. SERI KINTA	JLN. 11, KG. SERI KINTA
3	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. SERI KINTA	KG. SERI KINTA
4	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. SERI KINTA	JLN. 2, KG. SERI KINTA
5	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. TEMIANG	RUM. JPR, KG. TEMIANG
6	PERAK	03	BANCI 2010	013	BANCI 2010	002	KG. TEMIANG	RUM. JKR, KG. TEMIANG
7	PERAK	03	BANCI 2010	013	BANCI 2010	002	TMN. DESA TEMIANG JAYA	TMN. DESA TEMIANG JAYA
8	PERAK	03	BANCI 2010	013	BANCI 2010	002		TEMIANG JAYA 3
9	PERAK	03	BANCI 2010	013	BANCI 2010	002		TEMIANG JAYA 4
0	PERAK	03	BANCI 2010	013	BANCI 2010	002		TEMIANG JAYA 5
1	PERAK	03	BANCI 2010	013	BANCI 2010	003		JLN. SULTAN ISKANDAR SHAH
2	PERAK	03	BANCI 2010	013	BANCI 2010	003		JLN. CHE TAK
3	PERAK	03	BANCI 2010	013	BANCI 2010	003		JLN. ALI PITCHAY
4	PERAK	03	BANCI 2010	013	BANCI 2010	003		JLN. YANG KALSOM
5	PERAK	03	BANCI 2010	013	BANCI 2010	003	KG. BANGALEE OFF	JLN. CHE WAN, KG. BANGALEE OFF
6	PERAK	03	BANCI 2010	013	BANCI 2010	003		JLN. ALI PITCHAY, DIAMOND HTL.
7	PERAK	03	BANCI 2010	013	BANCI 2010	003		JLN. CHUNG THYE PHIN
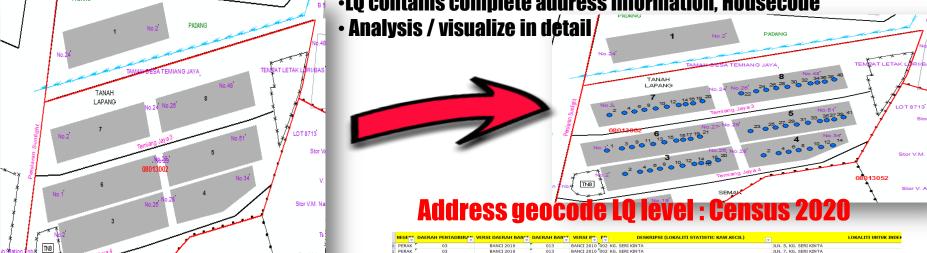
Web based Geo-eRKL;
- Control and monitoring purposes
- Census data prefix count information
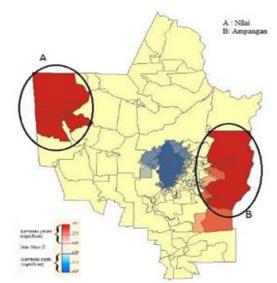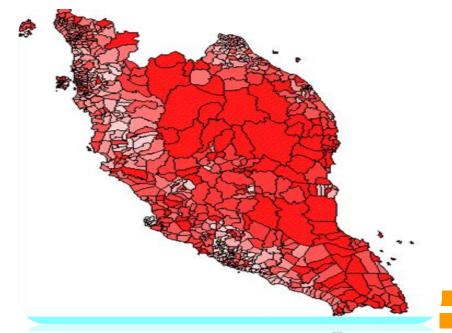- Analysis of spatial data by EB, CC, CD, AD and country

Map for analysis and dissemination of data in the form of web-based, census geoportal & GeoMedia
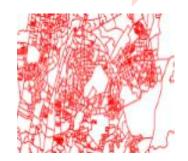
Development of GIS in DOSM

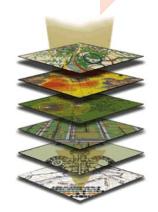**1991** — Layer:- Enumeration Block

2000 — Layer:- Enumeration Block

2010
- Layer;
- Enumeration Block
- - Point
- - Polygon
- - Road
- - River

2020
- Layer;
- Enumeration Block
- - Point
- - Polygon
- - Road
- - River

Address geocode/ Mobile map/ Web map

Current Product

Statistic Map

(NEWSS) - GIS

Product Of GIS

Census geodatabase

e-Atlas

Platform

Database

Desktop 10.3.1

- Design spatial data
- Share to web map
- Connect to DB
- Spatial editing

Server

ArcGIS Online

Design web map
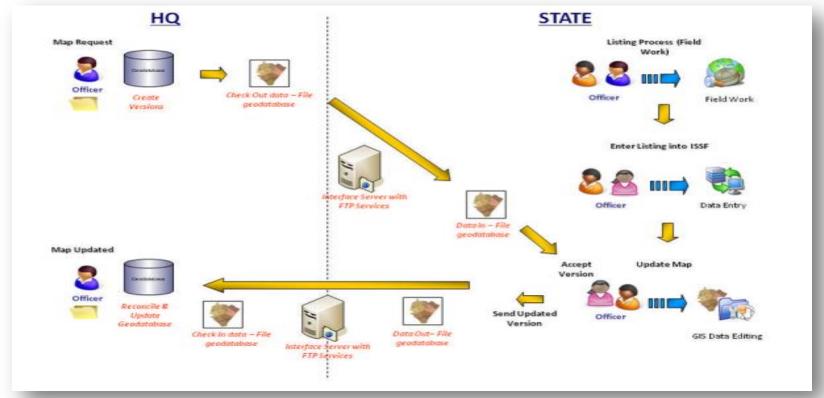Configure attribute
Share to public/group

Operational Dashboard

Configure widget

Platform for updating and check-in– check-out map from state to HQ

Use and application of geospatial technologies are very beneficial to improve quality of census activities at all stages of Census : (Pre-Enumeration, During Enumeration and Post Enumeration)

- Satellite images
- Aerial photography
- GPS
- Georeferenced address registry
- GIS for enumeration maps and for dissemination and analysis

- ➢ More common-infrastructure and shared GIS
- ➢ Increase professionalism in IT/GIS planning and delivery
- ➢ Unlocking of currently legacy systems to fund new technology
- ➢ The development of a National GIS Strategy
- ➢ Create an GIS Coordinator position
- ➢ Work with all relevant parties
- ➢ Capacity building on using geospatial data for operator, administrator, and manager
- ➢ Sharing knowledge between countries

Use of Smart Mobile Technologies to Achieve Efficiencies & Cost Savings in Census 2020

➢ Development of new Census Enterprise Data Collection, Processing & Analysis capabilities.

➢ Information technology architecture & infrastructure must be agile, flexible and scalable and be able to accommodate innovations and advances in technology.

➢ Use of 4G LTE network and IoT services for field survey activities (e.g. tracking of workers and enumerators)

➢ Such technologies holds the promise of making decennial enumeration less arduous, and likely to be less costly.

Areas of Expertise Required for Successful Implementation of New GIS Technology

Sophistication

Core Census Geography Expertise	Desktop GIS	Web GIS	Application Development
- Research and development of geographic classification criteria - Statistical geography operations - Fieldwork - Map reading	- Imagery analysis and classification - Automation with scripting languages (e.g., Python) - Model building and algorithm development - Workflow and analytical analysis - Digitization	- Ability to build and customize interactive Web maps (using HTML, CSS, and JavaScript) - Knowledge of services allowing for basic feature/attribute display (e.g., ArcGIS Online, MapBox, Google Maps)	- Ability to build, integrate, and connect to census and survey subsystems and databases - Knowledge of common application development languages (e.g., Java, C++)

Geography Subject Matter Expertise

Computer Science Expertise

- Increase efficiency in disseminating small area statistics to various user

- Reduce time during data compilation and data analysis

JABATAN PENGAIRAN DAN SALIRAN MALAYSIA

MAJLIS KESELAMATAN NEGARA

SPR

JABATAN PERANCANGAN BANDAR DAN DESA SEMENANJUNG MALAYSIA

KEMENTERIAN KESIHATAN MALAYSIA

Ministry of Health

AGENSI ANTIDADAH KEBANGSAAN NATIONAL ANTI-DRUGS AGENCY NADA MALAYSIA

KEMENTERIAN PENDIDIKAN MALAYSIA

Ministry of Education

ISSUES AND CHALLENGES

GIS CHALLENGES

> What's the address here?

- What's the address here ?
- "Integrate" all the efforts by many agencies to a national goal of a National GIS
- The need for strong foundation of a Decision Support System – how it is presented/served to the prospective users - always updated and establish a mechanism for this to happen regularly
- How to make GIS data/information and applications easily available and comfortable – service ready and customer centric focus
- How to support real time situation – if there is a fire in a city, then the GIS should be able to provide the insights of a city area, road, building structure etc

WAY FORWARD

Providing the most efficient platform for data dissemination through GIS Portal and StatsDW

Use of mobile application during census mapping activies

Develop address geocode and integrate with multiple data sources

Enhancing web map for monitoring and data quality checking during enumeration

" Success will be largely dependent on the management and deployment of technology "