

Article of the Month May 2014

The Development of 3D City Model for Putrajaya MPC Database ¹⁾

Chee Hua TENG, Mohd Yunus MOHD YUSOFF and Nur Zurairah ABDUL HALIM, Malaysia



Nur Zurairah, Chee Hua Teng, Mohd Yunus Mohd Yusoff

Commission No.7



Introduction



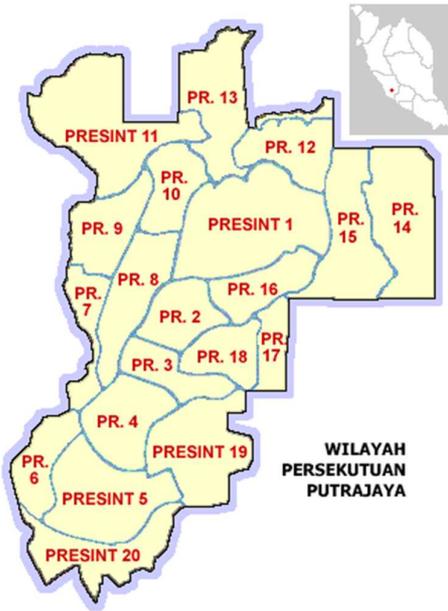
JUPEM responsible for modernization of Cadastral Survey in Malaysia

Pilot Study in FT Putrajaya on MPC concept in 2011 - 2012

Highlights MPC Database Development & 3D City Modelling

Objective : To establish a general requirement for MPC Database development

FEDERAL TERRITORY OF PUTRAJAYA



Total area of 4931 hectare

20 Precint

10,580 land parcels



Federal Territory of Putrajaya



Multipurpose Cadastre



A multipurpose cadastre is designed to record, store and provides not only land records information but also a wide variety of parcel-object related information and data from many sources. It also provides reliable services and products for many purposes and to many users.

XXV International Federation of Surveyors
Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

FIG 2014 Congress, 16 – 21 June, Kuala Lumpur



MPC PILOT PROJECT IN PUTRAJAYA



Development of Large Scale Geospatial Data for existing geospatial data with NDCDB

Data acquisition using Mobile Terrestrial Laser Scanning (MLTS)

Data fusion comprising high resolution satellite image, LIDAR and terrestrial point cloud data to generate 3D city model





MPC PILOT PROJECT IN PUTRAJAYA



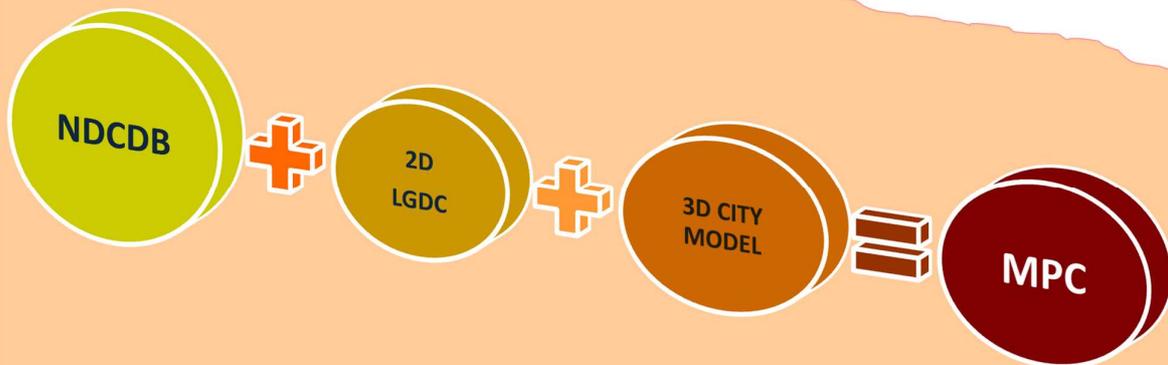
Development of MPC Application Modules

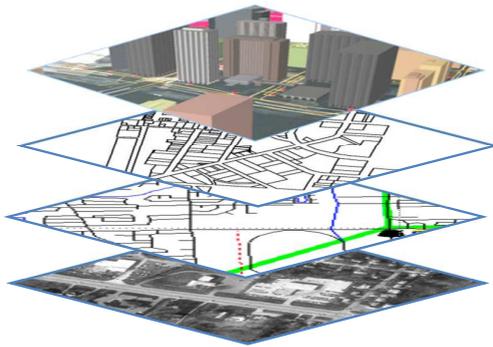
Integration with Street Addresses

Development of Online Web Access



Development of Survey Accurate MPC of Putrajaya





3-Dimensional City Models

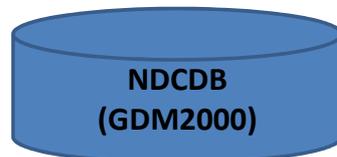
Street Addresses

Building/Facilities

Satellite Images



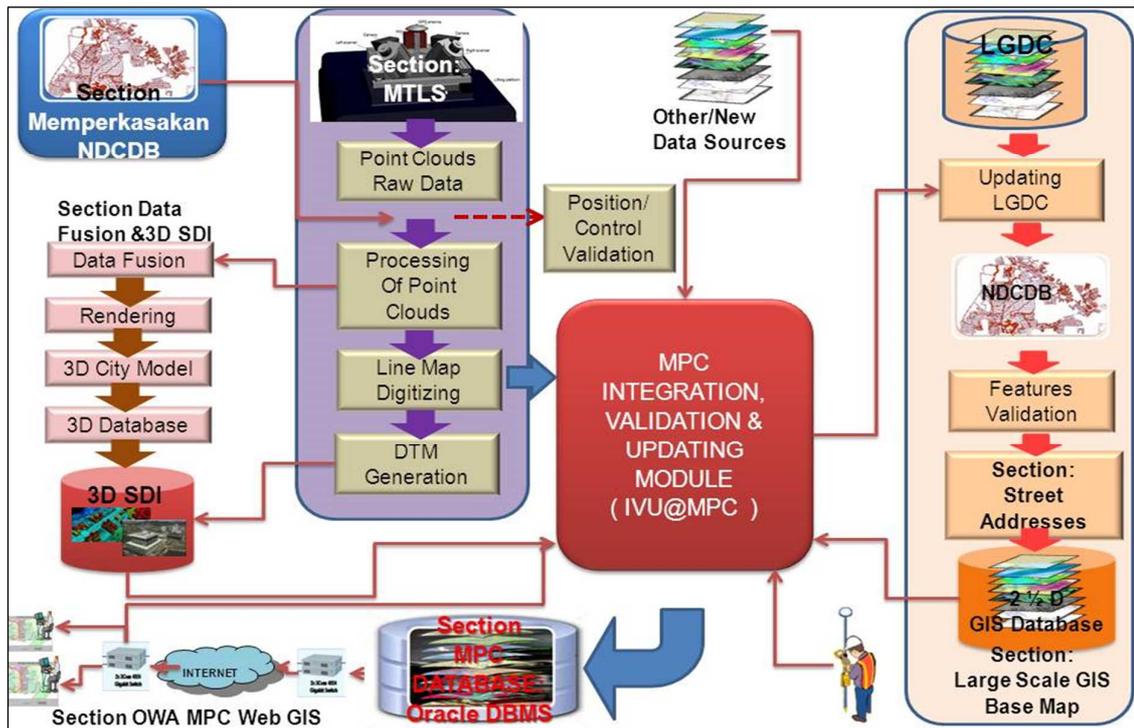
GIS Base Map: SGDC Negeri
(1:10,000) - MaCGDI
(Server MyGDI Negeri)



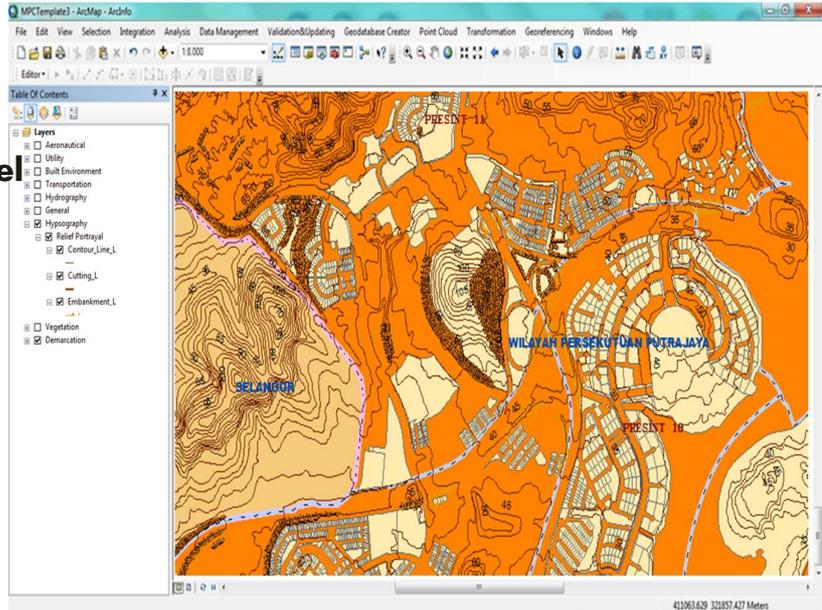
NDCDB Negeri
(JUPEM Negeri)

JUPEM MPC Data Infrastructure

Overall MPC Methodology Workflow



- **GLMS Layers**
- **Large Scale Mapping Data**
- **Digital Elevation Model**
- **High Resolution Satellite Image**
- **Airborne LiDAR Data**
- **Orthophoto**
- **Utility Data**
- **Street Addresses**
- **Textual Data**
- **MyGeoid Putrajaya**
- **MyRTKnet Station Coordinates**
- **Levelling Benchmark Values**



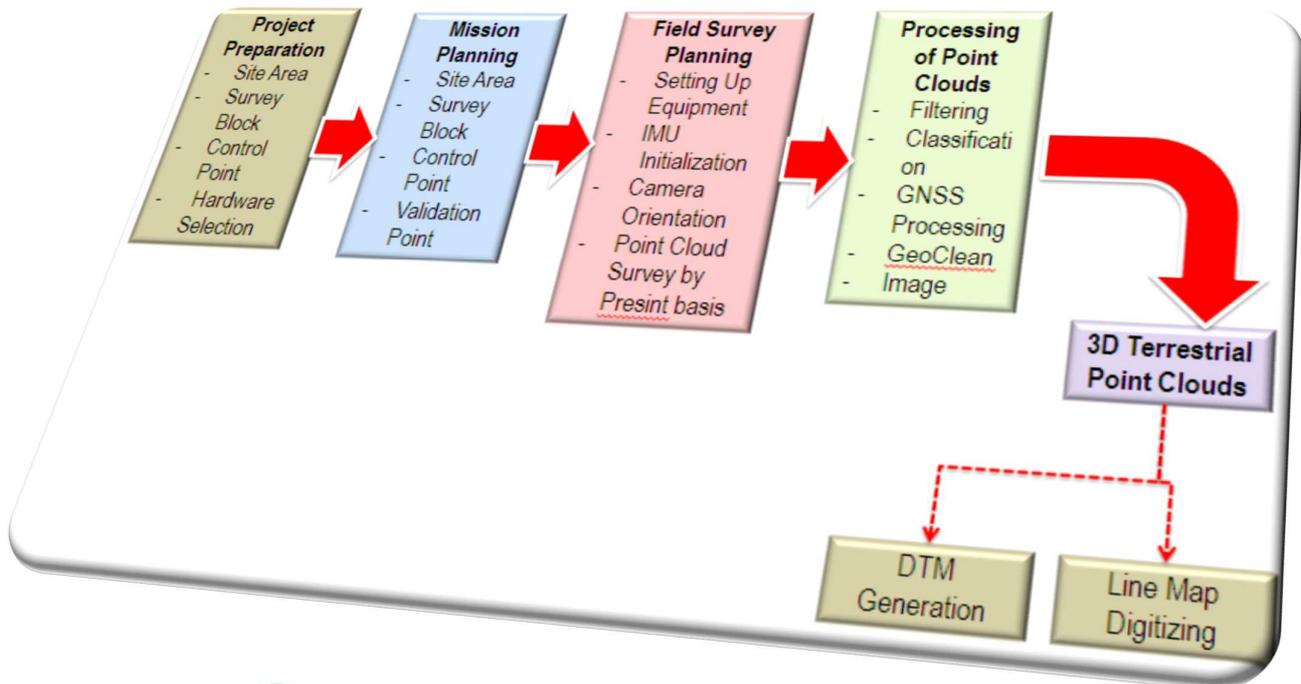
2D LGDC For Putrajaya



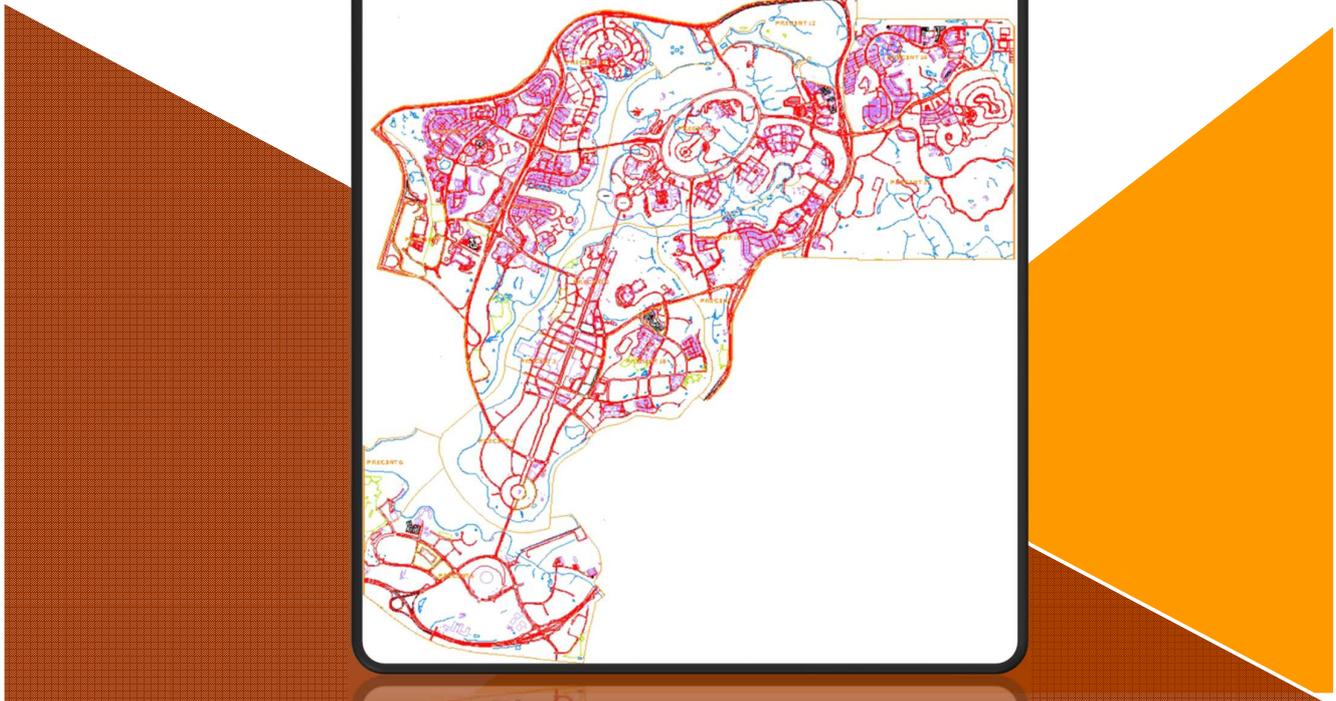
MTLS Dual Laser DynaScan 3 system

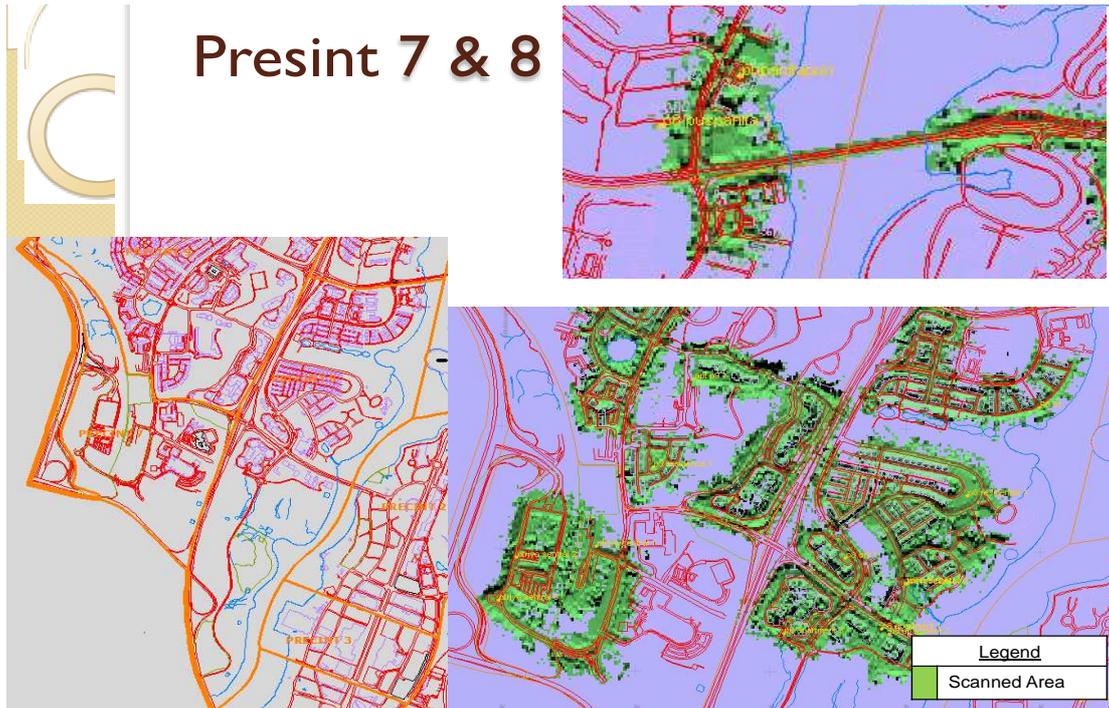


Methodology for MTLs Data Collection



Putrajaya MTLs Project Area





Coordinate Transformation for Point Cloud Data

Processed Point Cloud Data

- Latitude, Longitude and Ellipsoidal Height

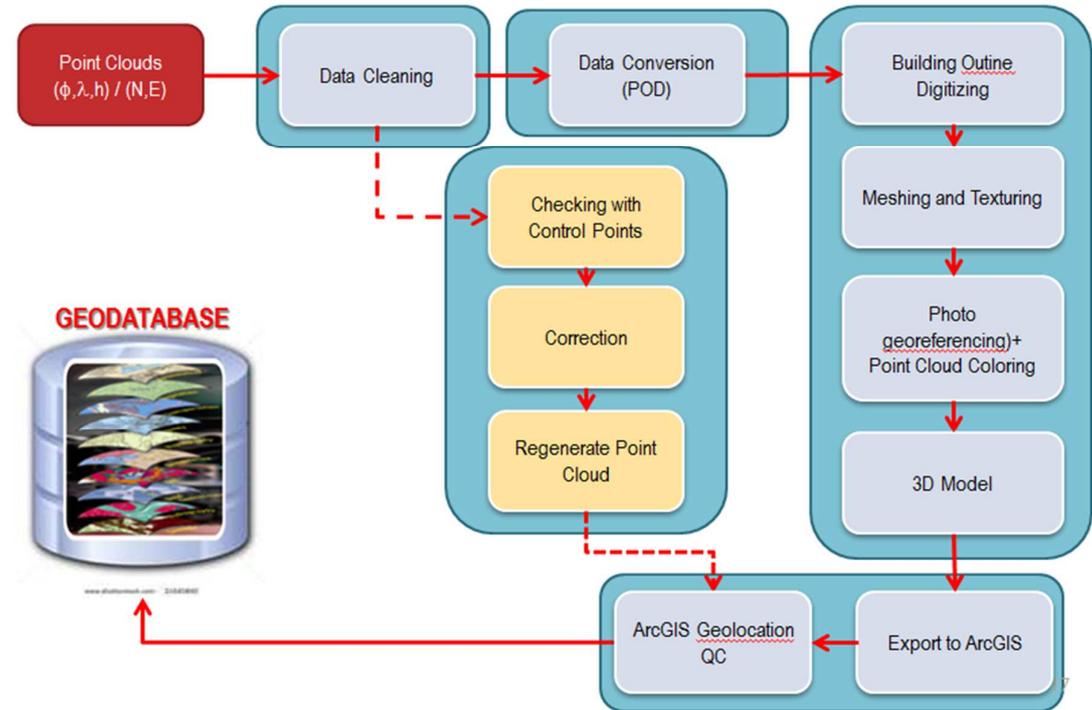
Transformation

- Coordinate Transformation (MTRANS)
- Height Transformation using MyGeoid

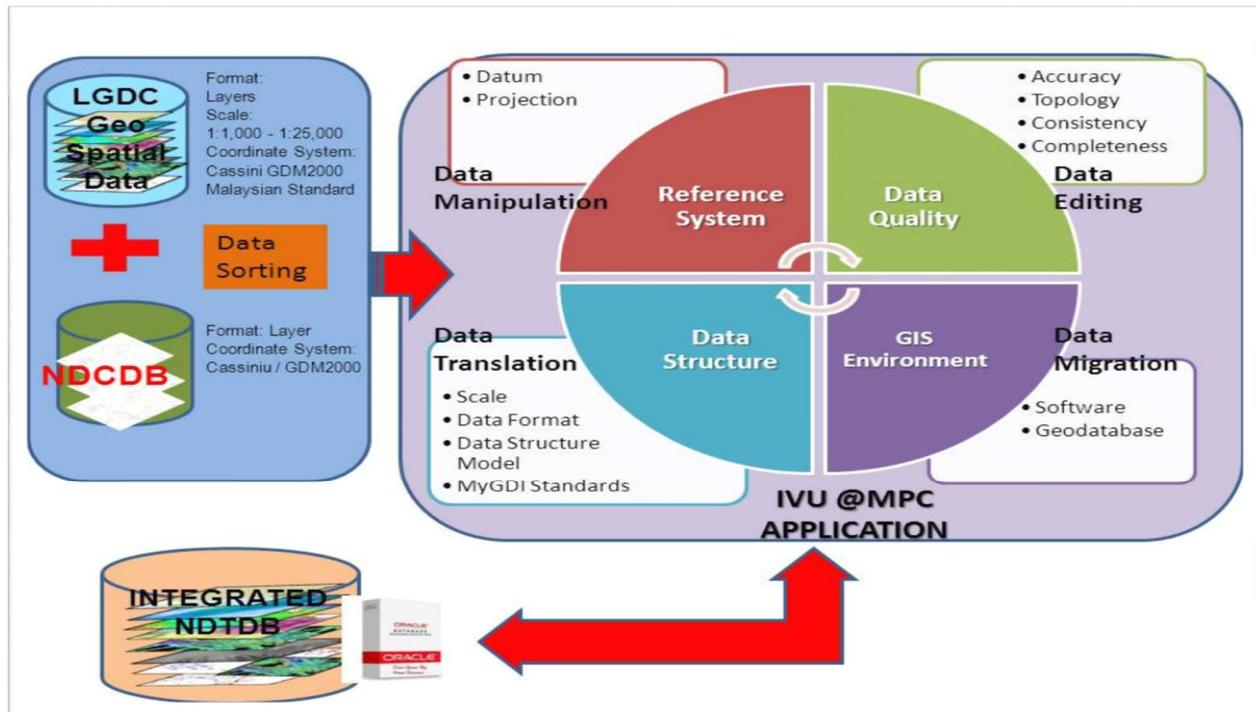
Transformed Point Cloud Data

- Northing, Easting (Geocentric Cassini)
- Mean Sea Level Height (H)

MTLS Data Processing Methodology



Data Integration, Validation and Updating Process





LoD 1

Basic block-shaped depictions of buildings

LoD 2

LoD 2 adds to LoD 1 detailed roof shapes



LoD 3

Represent further expansion by adding to LoD 2 structural elements of details such as facades and pillars and draping all objects with photo texture

LoD 4

The highest level is achieved when building can be virtually visited and viewed from the inside

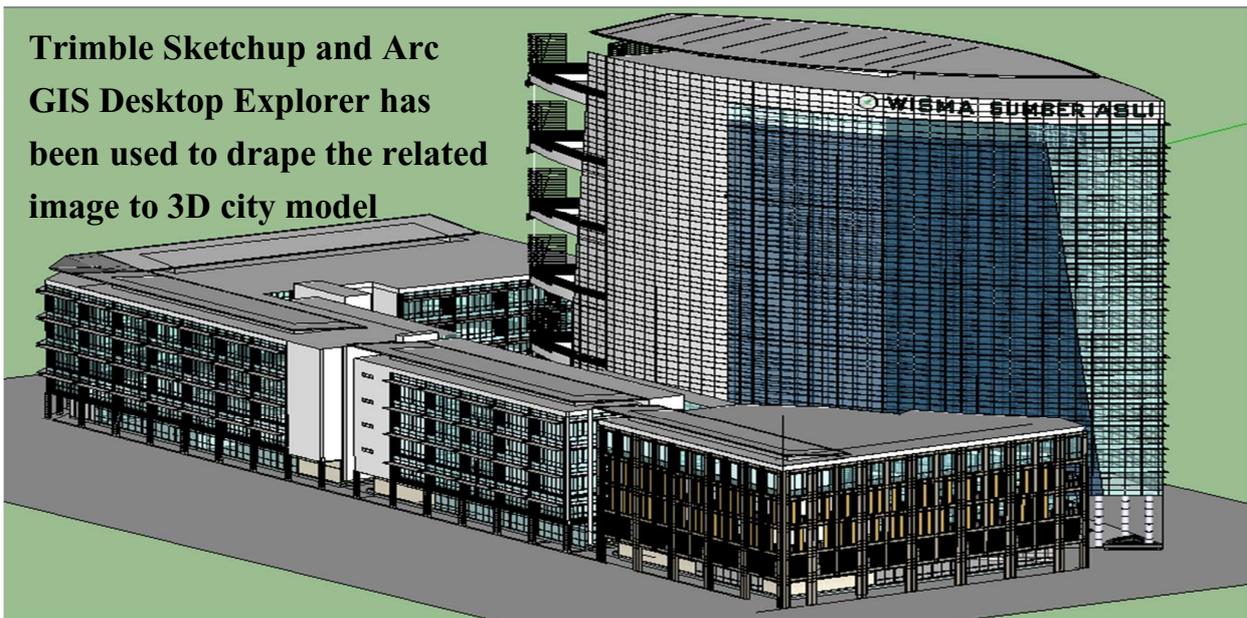


**3D
MODEL
OF
PART
OF
PUTRAJAYA**



**3D CITY MODEL OF A
BUILDING IN PUTRAJAYA**

Trimble Sketchup and Arc
GIS Desktop Explorer has
been used to drape the related
image to 3D city model



Identify

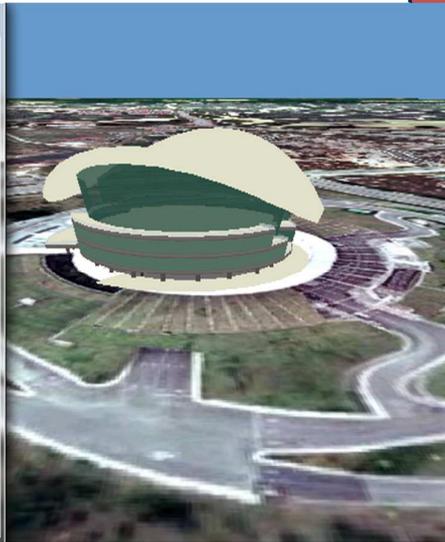
Identify from: <Top-most layer>

PICC
NoName

Location: 101.676499 2.894460 Decimal Degrees

Field	Value
OBJECTID	1
SHAPE	Multipatch
SUSourceFeatureID	<null>
SUSourceFeatureClass	<null>
SUInstanceName	NoName
Building Name	Putrajaya International Convention Centre
Address	Dataran Gemilang, Precint 5, 62000 W.P Putrajaya
Area Coverage	135000
Website	www.picc.gov.my

Identified 1 feature

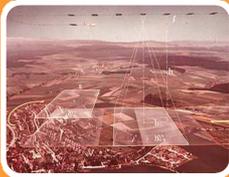


Data fusion from multiple geospatial datasets contains attributes information that can enrich the 3D city model





Incorporate the recent advances in computer and GIS technologies as well as the latest MTLs 3D geospatial data acquisition technology



Will revolutionized large scale geospatial data utilisation



Enable Large Scale Mapping (1:1000 or less)

MPC APPLICATION

- Utility mapping
- Land administration
- Urban and regional planning
- Land valuation
- Flood mapping
- GIS for local authorities
- Emergency responses
- Crime GIS
- Environmental and coastal management



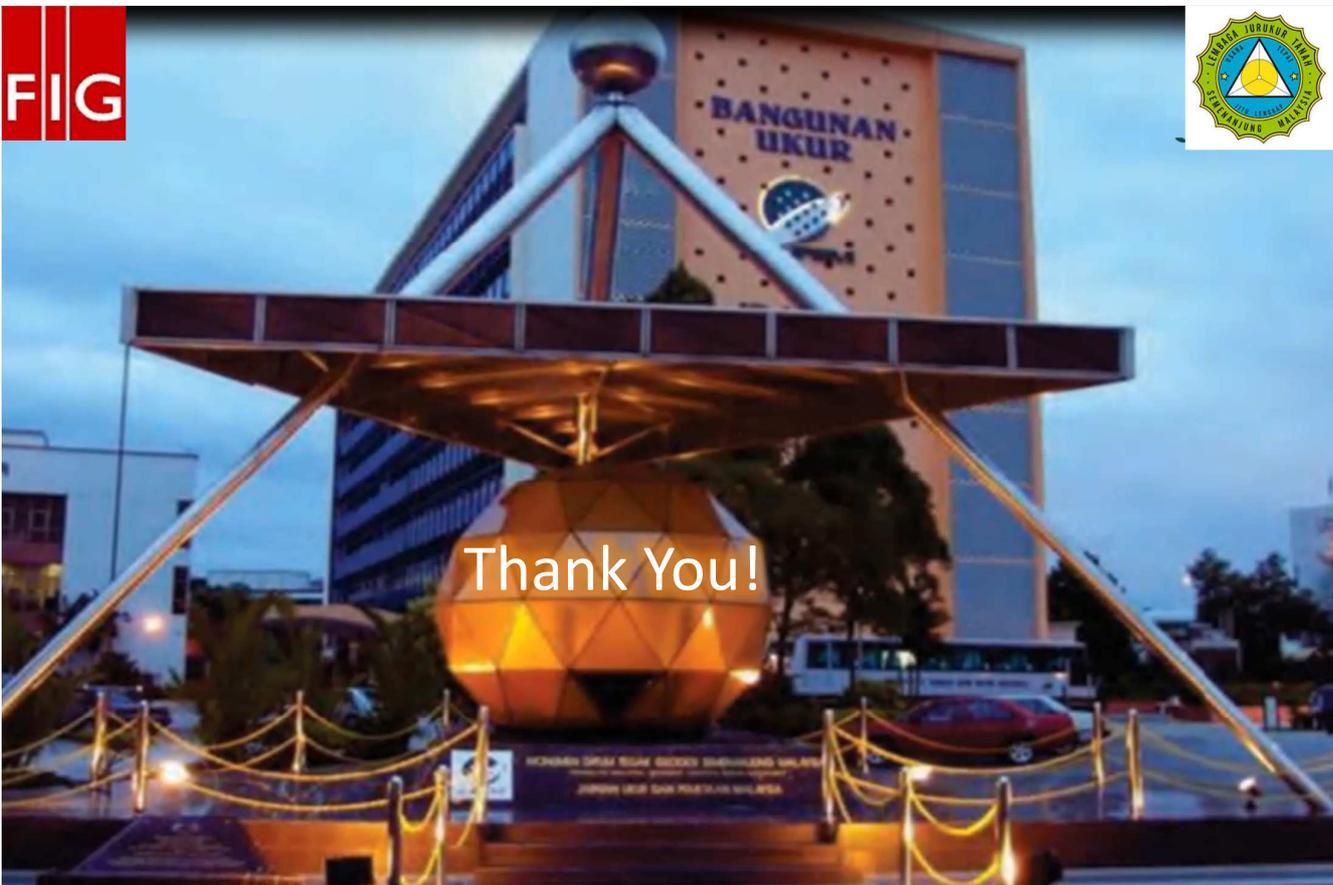
CONCLUSION



This study has enabled JUPEM to determine on setting up MPC Database and understand its complexity



Enhance the concept of spatially enabled government and society in Malaysia and fulfilling the nations's vision



Thank You!

