



# Developing Infrastructure Framework To Facilitate The Malaysia Multipurpose 3D Cadastre

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Commission No. 7



## Outline



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- TOWARDS DATA INFORMATION INTEGRATION
- CONCLUSION



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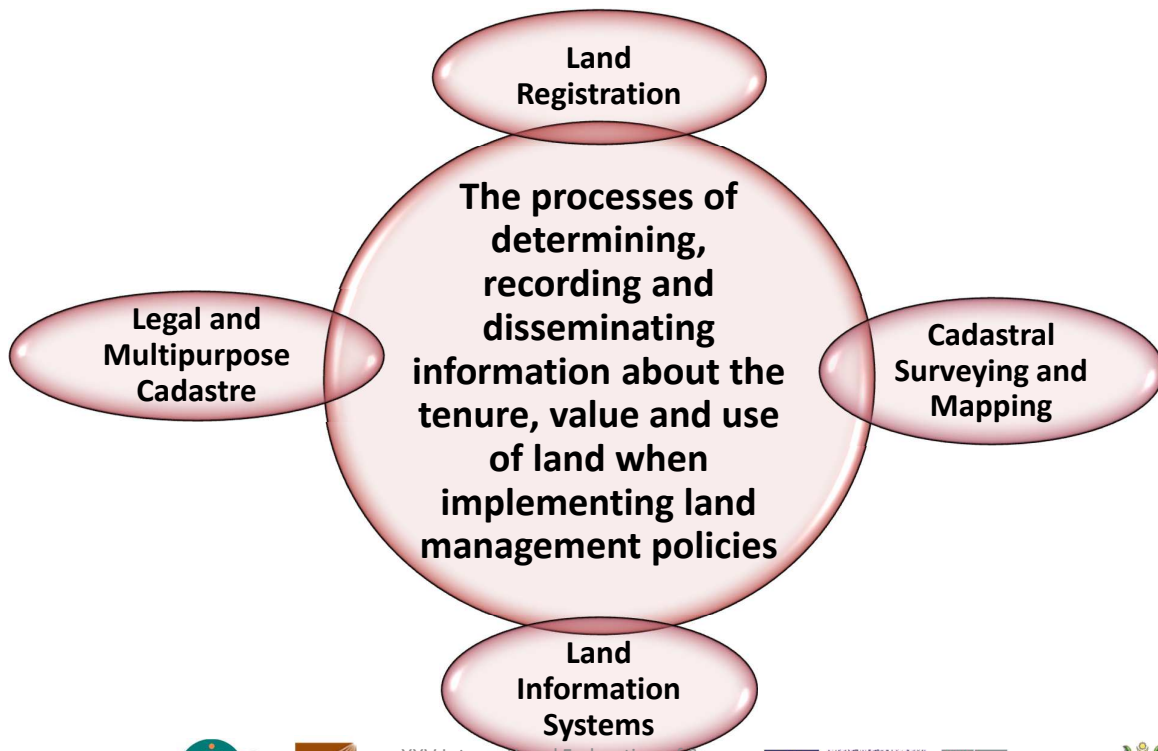
# INTRODUCTION



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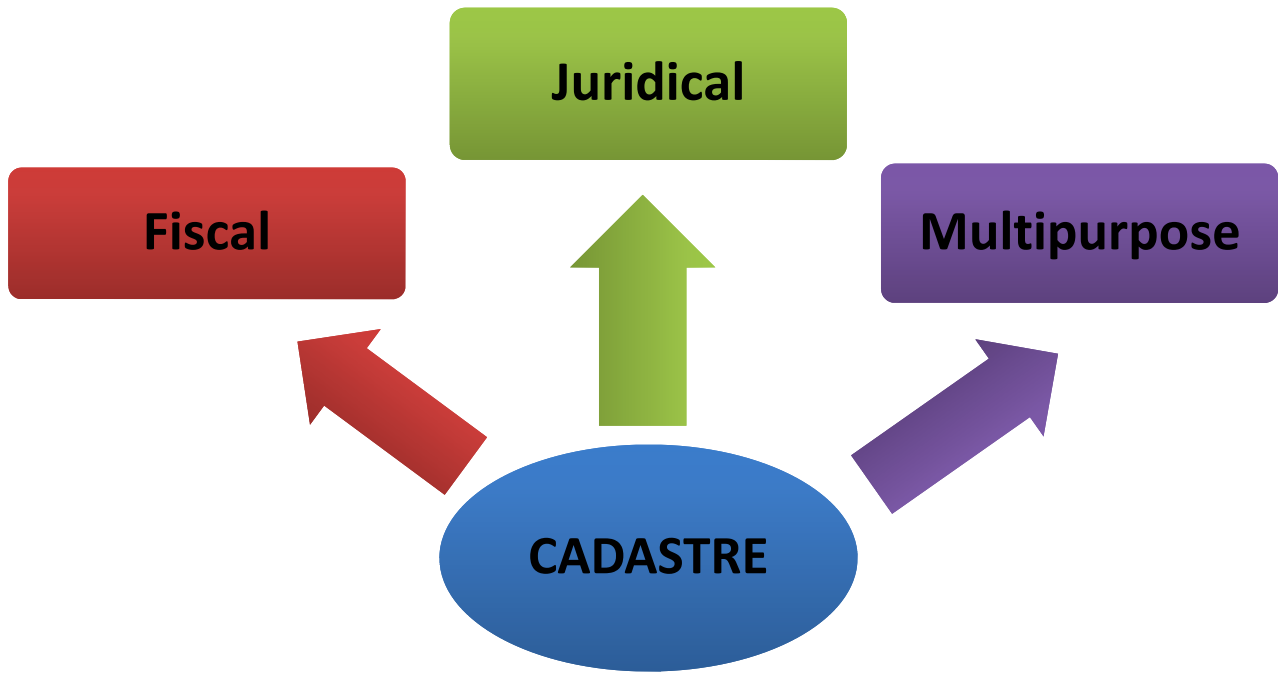


# Land Administration



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## 3D CADASTRE

# Constraints In 2D Cadastre (Legal Aspect)



Situations have emerged where the dimensions **above** and **below** the ground surface, besides those on the ground, are **important** considerations in property ownership.

- ❖ 2D cadastre assumes the **earth as flat** which is unable to represent the real world, especially **overlapping** and **interlocking** mix development.
- ❖ The existence of overlapping and interlocking constructions called for the ability to **establish multilevel ownership**.

# National Land Code 1965



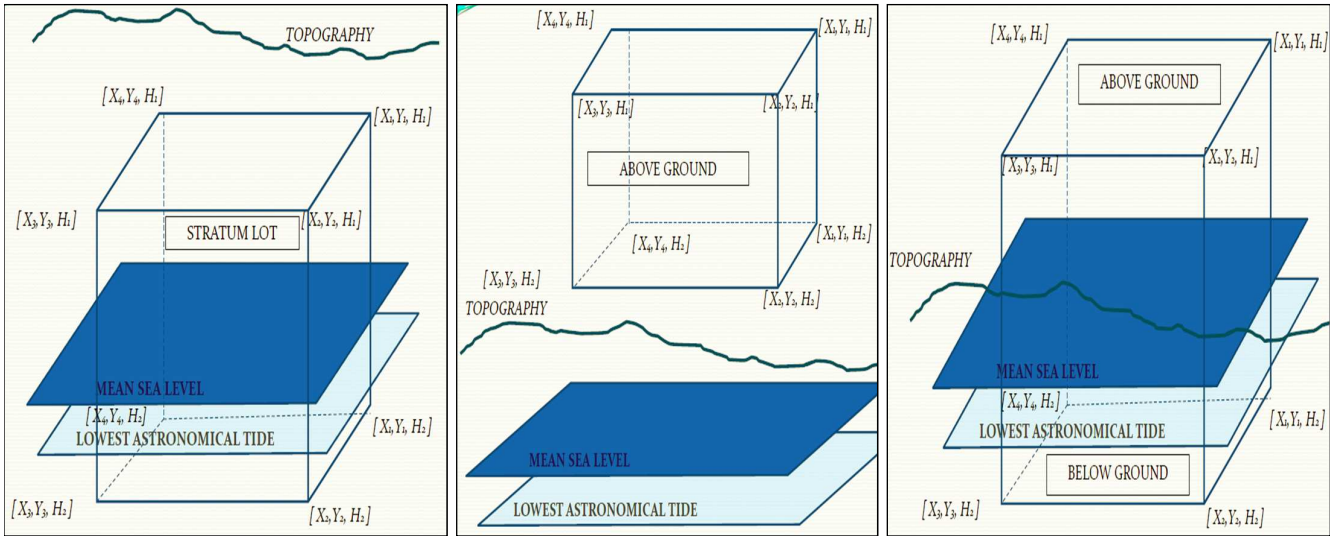
- The National Land Code 1965 only allows 3 types of lot/parcel, i.e.:
  - Land
  - Strata Parcel and Land Parcel in strata Scheme
  - Stratum
- The more efficient of cadastre system in future is to allow **3D lot/parcel** including **air space** and **marine space**.



# The Real World Is 3D But Cadastre Is Not



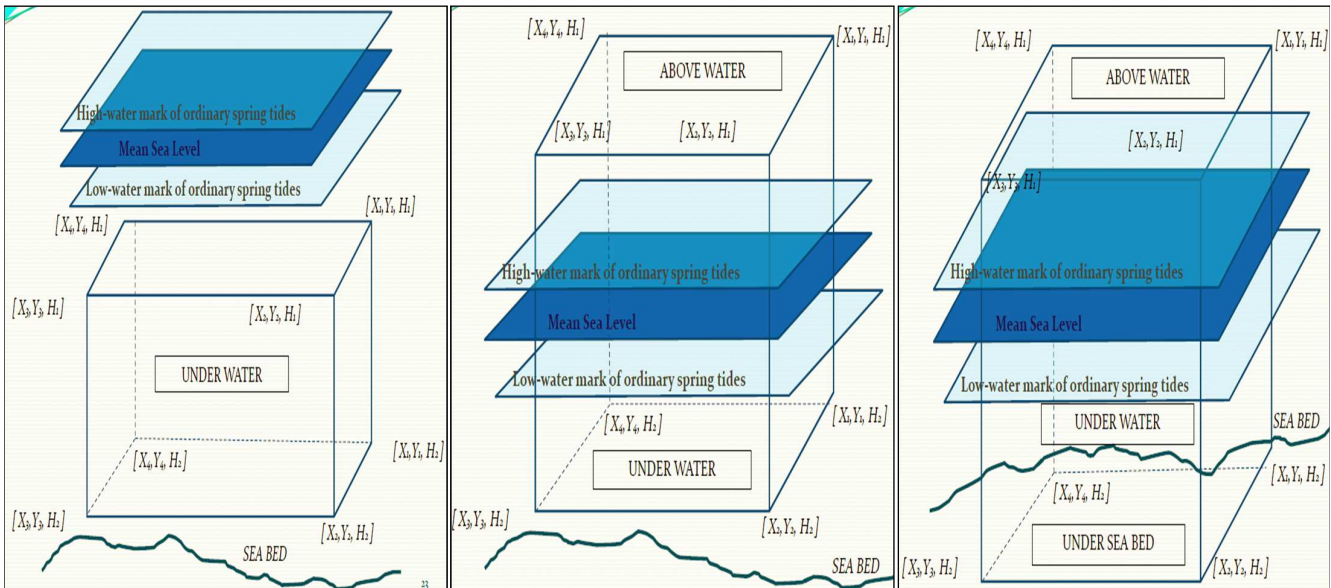
## 3D Space Conceptual Diagram



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## Marine Space Conceptual Diagram



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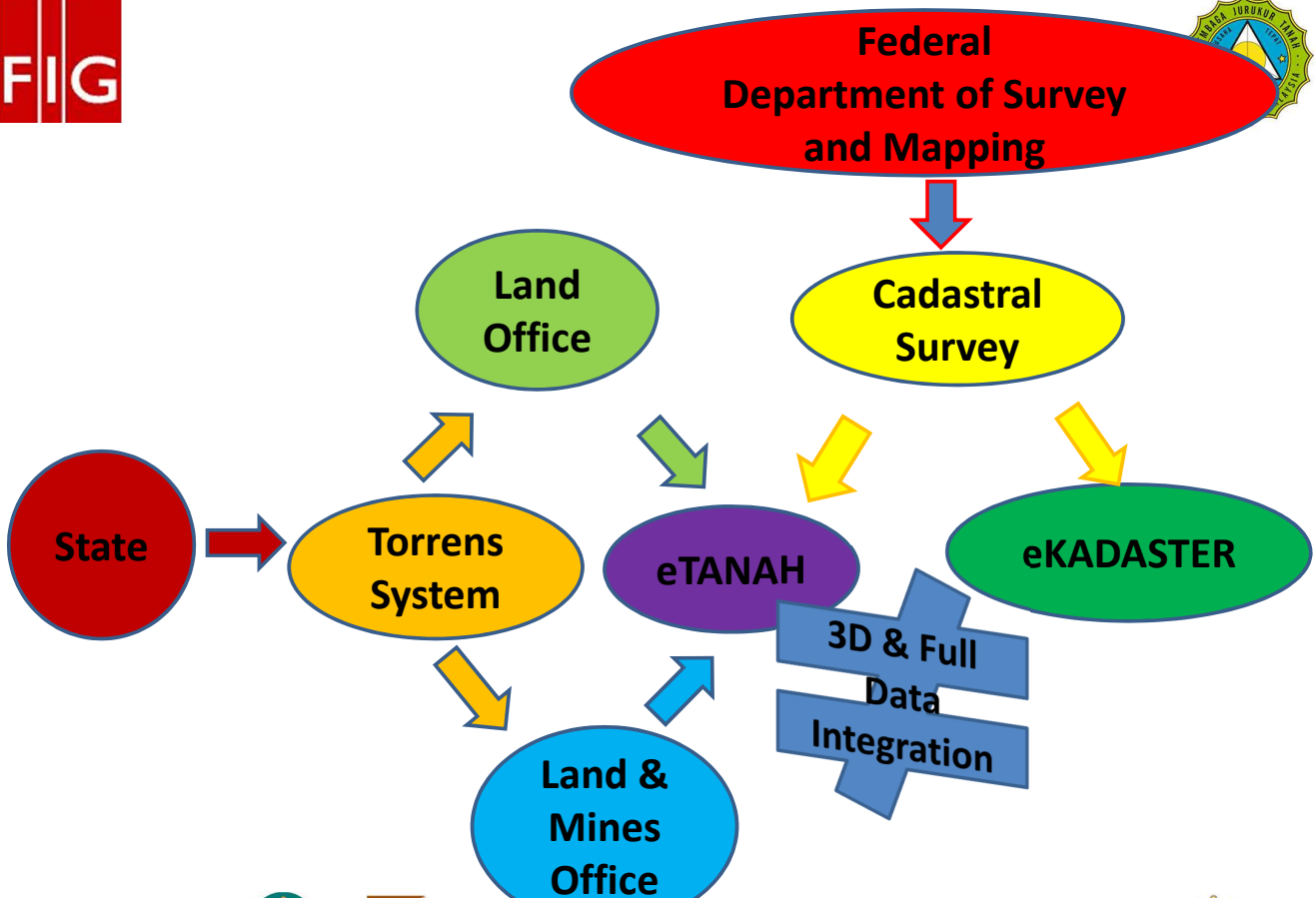




# MALAYSIAN LAND ADMINISTRATION



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# National Digital Cadastral Database (NDCDB)



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## NDCDB



- ◆ Based on a uniform coordinate system, i.e. GDM2000 Cassini Soldner system.
- ◆ Uniform spatial accuracy of about  $< 10$  cm throughout Peninsular Malaysia.
- ◆ Cadastral database and system that is “compatible” with GIS technology and GPS MyRTKnet system.

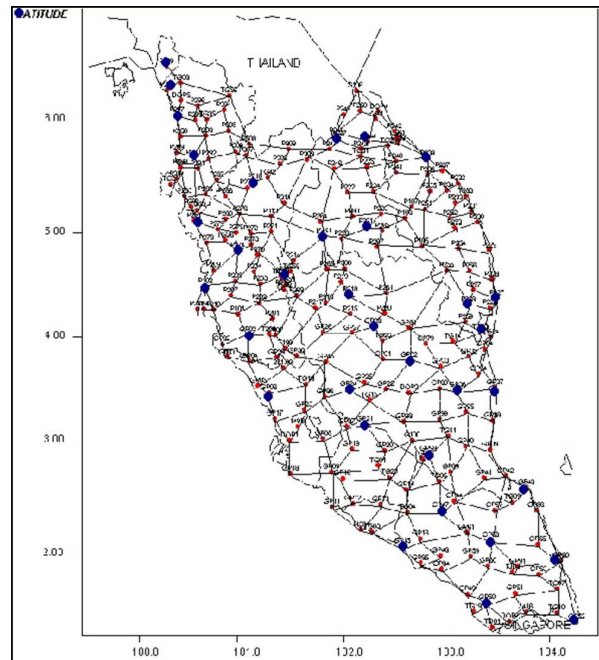
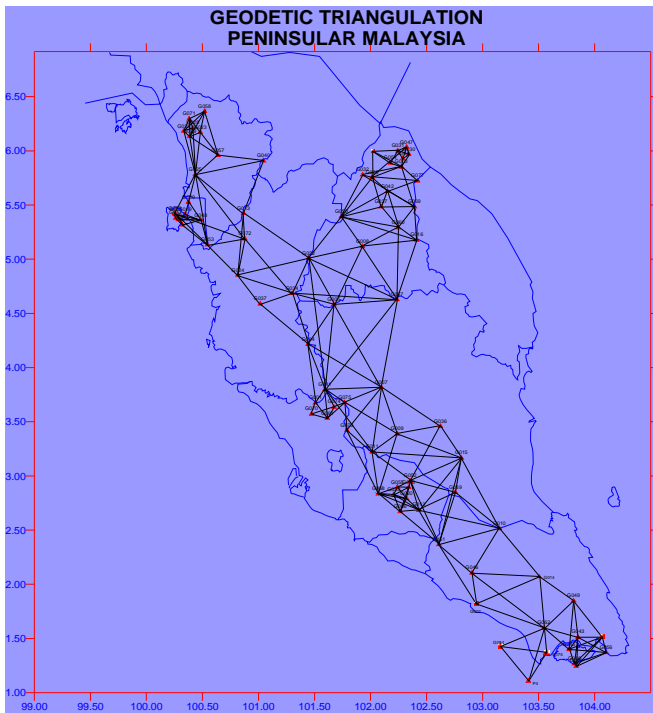


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# Old And New Geodetic Infrastructure



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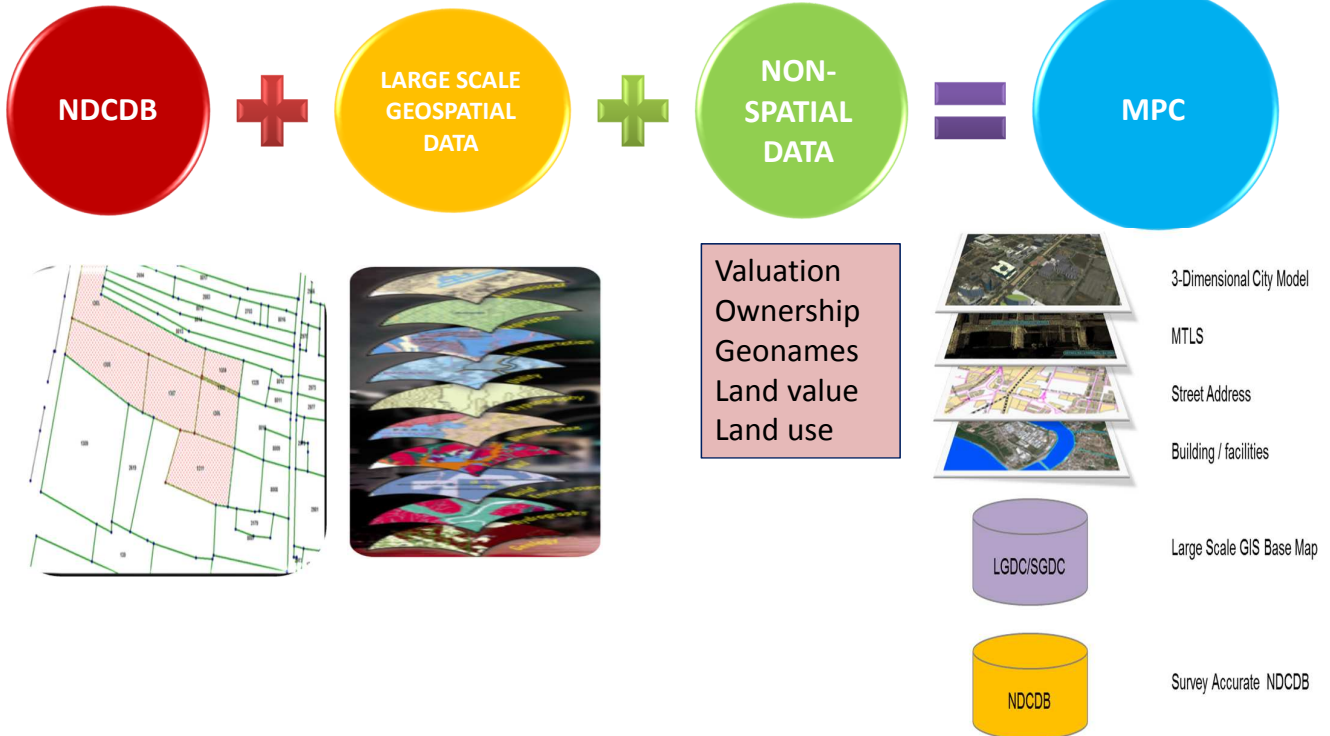
# MULTIPURPOSE CADASTRE



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## EMPIRICAL CASE STUDY

- Existing NDCDB database adopted is in 2D (x, y).
- The purpose of this paper is to examine the possibility of implementing 3D cadastre system in Malaysia, i.e. 3D (x, y, h) for each boundaries mark.
- One of the important principles in the development of cadastral system is the fully 3D information of land surface.

- a) Field Data Acquisition and adjustment calculation of observed data.
  - Field data collection to produce 3D coordinates in eKADASTER and MyGEOID using Digital Field Book interface with LSA, i.e. bearing, distance and height.
- b) Changes of survey procedures, output structure format, adjustment methodology, NDCDB structure and eKADASTER application.



# Output



## Digital Field Book-3D

Stesen	BEARING / SUDUT			Dari Stn	GARISAN Bearing Muktamat	Ke Stn	Sudut Pugak	Jarak	Suhu	Jarak Mendatar (D)	Beza Tinggi Stn	Tarikh Dan Masa	ALM	ALM
	Penyilang Kiri	Penyilang Kanan	Purata										Stesen	Stesen
			303 16 52	1	303 16 50	2	090 35 40	85.030	2	85.025	-0.932	12 Sep 2011	97.419	85.025
Garis Asas			M 000 00 00	PpBB		PpBB	289 24 30	85.030		85.025	-0.928	09:05:50	97.423	
						2								
				1.520			1.570							
				1	303 16 50	2				0.0000		12 Sep 2011		85.025
				PpBB	Ki	PpBB						09:01:17		
						2								
2	303 16 52	123 16 52	248 47 42	1	248 47 40	3	108 21 35	44.200	27	41.950	-13.962	12 Sep 2011	84.389	85.025
1	PpBB (Terabas)		M 000 00 00			Pkt	251 38 50	44.200		41.952	-13.957	09:08:01	84.394	
			R -000 00 01											
3	248 47 40	068 47 45 (-000 00 05)												

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## Least Square Adjustment (LSA)



```

#-----Heavily Fixed eCRM East, North & Orthometric Height (MyGeoid)-----
C 1 50924.413 -15174.944 98.351 ! ! !
C 2 50853.333 -15128.287 97.413 ! ! !
C 13 50616.295 -15306.801 56.237 ! ! !

# Boundary Lines
#
B 1-2 303-16-52 * #15
D 1-2 85.041 * #0.01
B 2-1 123-16-52 * #15
D 2-1 85.041 * #0.01
B 1-2 303-16-52 * #15
D 1-2 85.025 * #0.01
B 2-1 123-16-52 * #15
D 2-1 85.025 * #0.01
#
#-----Manually Input Vertical Distance - HI & HT commented for remarks-----
#
V 1-2 -0.932 #1.52/1.57
V 1-2 -0.93230 #1.52/1.57
#
B 1-3 248-47-40
D 1-3 41.950
V 1-3 -13.962 #1.52/1.56
V 1-3 -13.957 #1.52/1.57
B 3-1 68-47-45
D 3-1 41.952
#
#

```

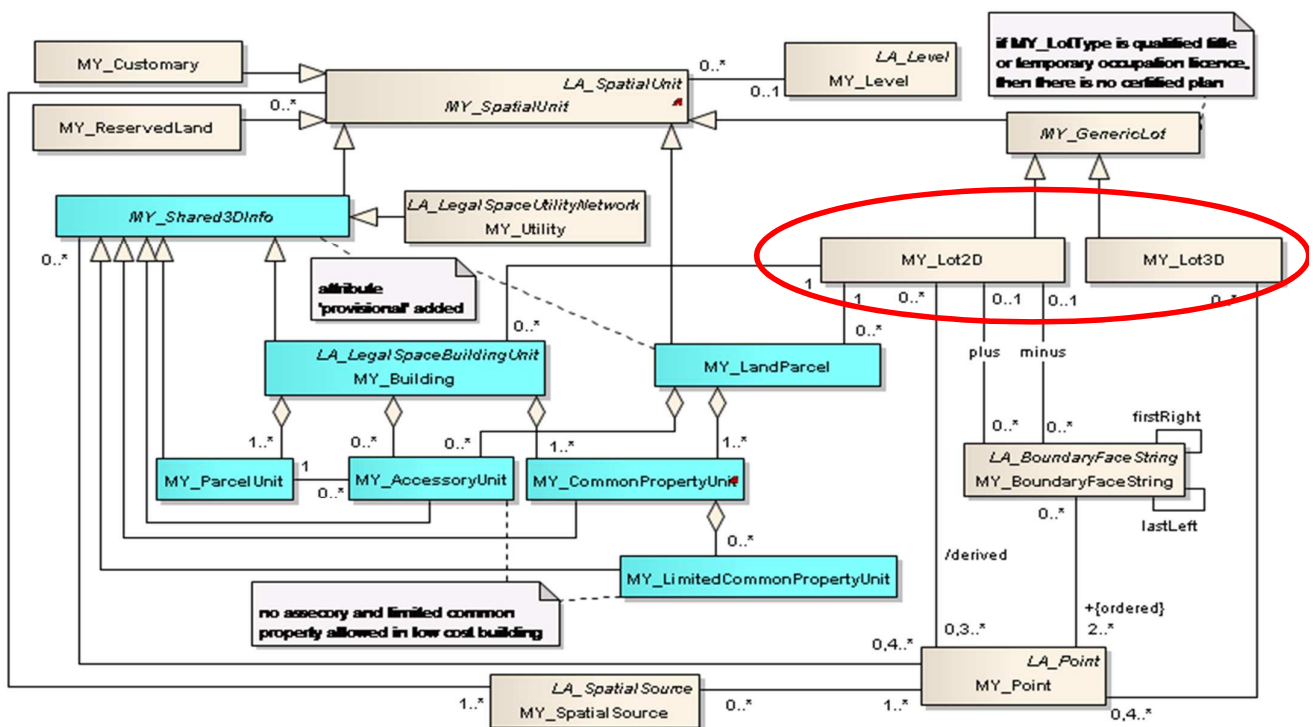


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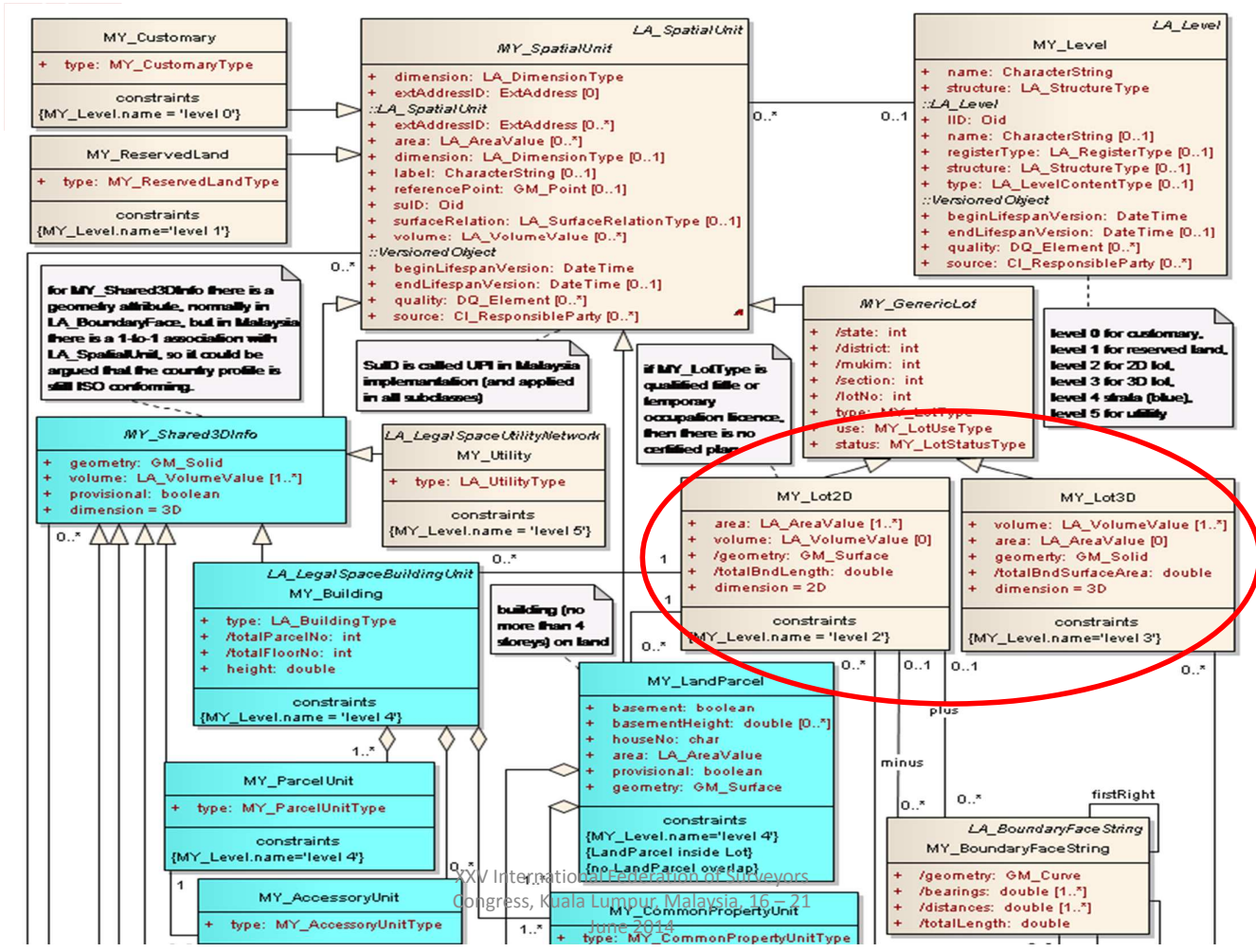


# PROPOSED MALAYSIAN LAND ADMINISTRATION DOMAIN MODEL

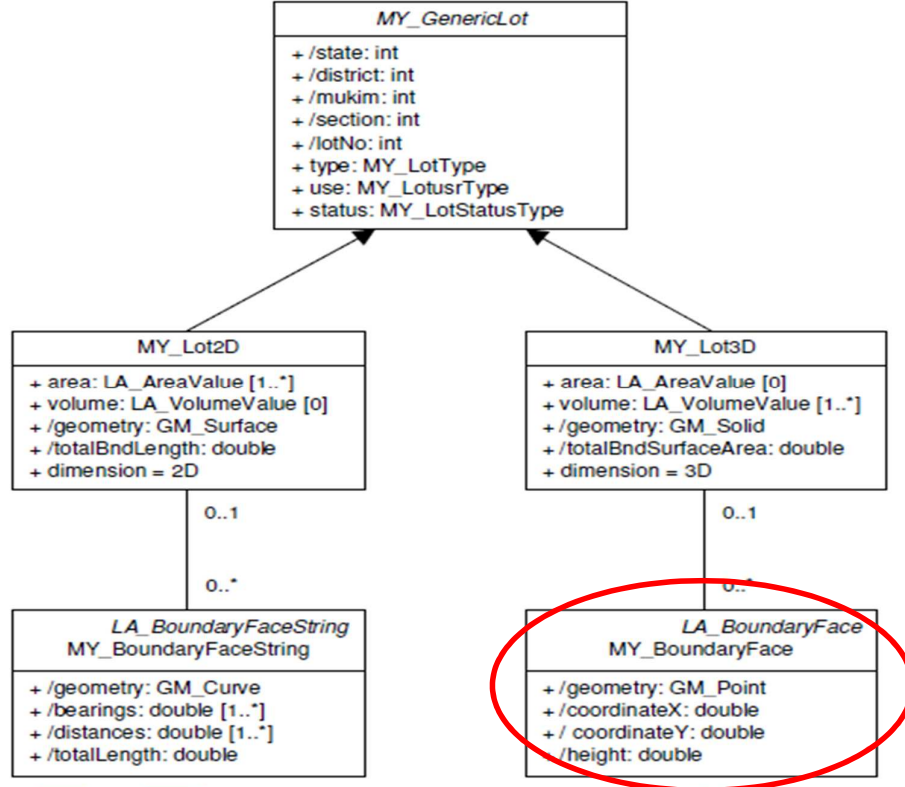
## Spatial Data Modelling for MY\_Lot2D and MY\_Lot3D







# Proposed MY\_BoundaryFace







# RECOMMENDATIONS FOR AMENDMENTS TO NATIONAL LAND CODE 1965



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## Proposed Interpretation On Alienation Of State Land



State lands which are alienated or otherwise disposed of, or in respect of which a lease or license to occupy is issued, under this Act may be alienated, leased or licensed-

- As a parcel of the surface earth, all substances thereunder and so much of the **column of airspace above** the surface as is reasonably necessary for the use and enjoyment thereof;
- As a parcel of **airspace or underground space or marine space** whether or not held apart from the surface of the earth; and
- Only down to such **depth below** the surface earth or to such a **height above** the surface earth as the State Authority may by order direct.



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## Basic Legislation

- Further explain on the definition of 'land'
- Further explain on alienation of '3D lot'
- Further explain on 'right to access' and 'right to support'
- Recognise access established through 'easement'

## Proposed Amendment of section 5 NLC:

Land includes:

- a) The surface (including air space) of the earth and all substances forming that surface;
- b) The earth below the surface and all substances in the surface;
- c) All vegetations and other natural products, whether or not requiring the periodical application of labour to their production, and whether on or below the surface;
- d) All things attached to the earth or permanently fastened to anything attached to the earth, whether on or below the surface;
- e) Land covered by water; and
- f) **Airspace or marine space whether or not held apart from the surface of the earth.**



# National Land Code 1965



## Proposed Amendment of section 396(1)(b):

Its boundaries as so determined have been demarcated on the surface of the land, **below surface of the land, air space and marine space** by boundary marks or, if by reason of the configuration thereof or for any other cause the placing of boundary marks on the actual line of the boundary is to any extent impossible or impracticable, boundary marks have been so placed as to enable that line to be ascertained

## Proposed Amendment of section 396(1)(c):

The area **and volume** enclosed by its boundaries as so determined has been calculated



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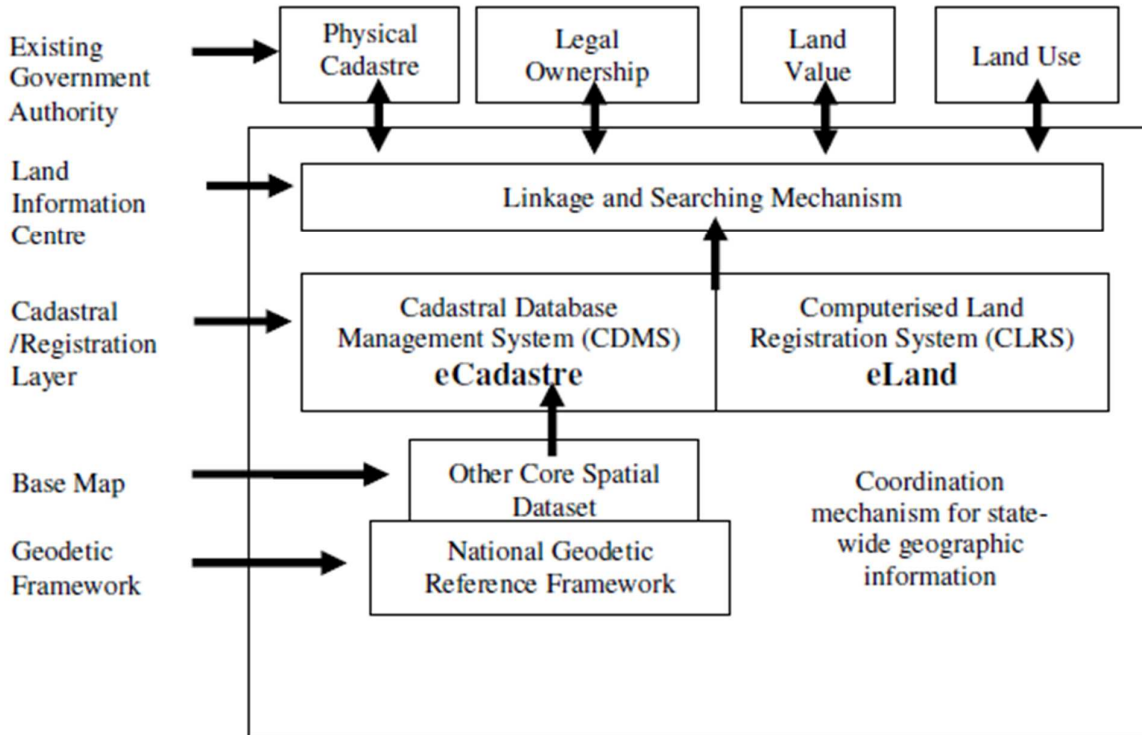


# TOWARDS DATA INFORMATION INTEGRATION



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Physical Cadastre (Certified Plan)	Legal Ownership (Document of Title)	Land value (Taxation)	Land Use (Planning)
<ul style="list-style-type: none"> <li>Area</li> <li>State name</li> <li>District name</li> <li>Mukim name</li> <li>Town name</li> <li>Current land/parcel number</li> <li>Date of Certified Plan approve</li> <li>Current Certified Plan number</li> <li>Land office file number</li> <li>Document of Title number</li> <li>Strata scheme number</li> <li>Standard sheet number</li> <li>Existing Certified Plan number</li> <li>Master title lot number</li> <li>Survey fail number</li> <li>Scale</li> </ul>	<ul style="list-style-type: none"> <li>Area</li> <li>State name</li> <li>District name</li> <li>Mukim name</li> <li>Town name</li> <li>Current land/parcel number</li> <li>Plan of the land/parcel</li> <li>Date of title registration</li> <li>Category of land use: Agriculture; Building; Industry</li> <li>Implied condition</li> <li>Express condition</li> <li>Restriction of interest</li> <li>Current Certified Plan number</li> <li>Land office file number</li> <li>Ownership number</li> <li>Strata scheme number</li> <li>Standard sheet number</li> <li>Premium</li> <li>Quit Rent</li> <li>Owner name</li> <li>Type of grant</li> <li>Management Corporation name</li> </ul>	<ul style="list-style-type: none"> <li>Area</li> <li>State name</li> <li>District name</li> <li>Mukim name</li> <li>Town name</li> <li>Current land/parcel number</li> <li>Address</li> <li>Date of payment</li> <li>Type of property: Agriculture; Building; Industry</li> <li>Premium</li> <li>Quit Rent/Assessment</li> <li>Owner name</li> </ul>	<ul style="list-style-type: none"> <li>Area</li> <li>State name</li> <li>District name</li> <li>Mukim name</li> <li>Town name</li> <li>Current land/parcel number</li> <li>Date of approve</li> <li>Category of land use: Agriculture; Building; Industry</li> <li>Type of mineral</li> <li>Zoning</li> <li>Assessment</li> </ul>

# CONCLUSION

# Conclusion

- ❖ The current Malaysian NDCDB and land legislation do not provide 3D information and do not allow registration rights for overlapping properties except underground land respectively.
- ❖ It is believe that the eKADASTER and eTANAH will make a paradigm shift and able to improve the current land title registration and cadastral survey practice.
- ❖ Malaysia cadastre and land administration systems should be transform to enable multipurpose cadastre, 3D cadastre, marine cadastre and LADM (Homogeneous Cadastre).





# Acknowledgment



- Financial assistance from Malaysian Land Surveyors Board (LJT).
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## Thank you for your attention!

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