


**AN OVERVIEW OF 3D CADASTRE FROM
A PHYSICAL LAND PARCEL AND A
LEGAL PROPERTY OBJECT
PERSPECTIVE**

Sudarshan KARKI
Kevin MCDOUGALL*
Rod THOMPSON
(Australia)

UNIVERSITY OF SOUTHERN QUEENSLAND
www.usq.edu.au

fulfilling lives



Contents

- Background
- Parcels
 - Physical Parcel Object
 - Legal Parcel Object
- Evaluation Framework & Comparison
- Conclusion and Discussion

2

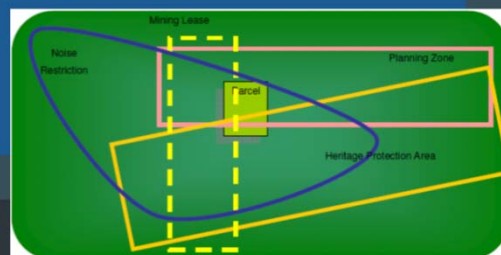
Background -1

- Modern land administration focus on comprehensive land management across multiple domains – rights, restrictions and responsibilities
- Land units - primary focus of a land administration, so cadastral systems and data models developed around the surface land unit with specific and/or universal ownership rights
- This model not flexible enough to accommodate the growing number of complex commodities and interests

3

Background-2

- Non-parcel based interests in land may not be restricted to a single parcel
- 3D objects may span various surface parcels
- Not readily incorporated into cadastral databases and models



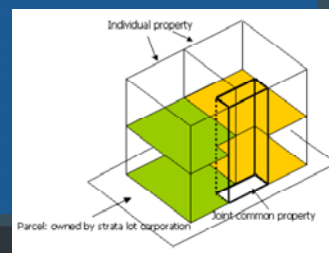
PARCEL OBJECTS

Physical Parcel
Legal Parcel

5

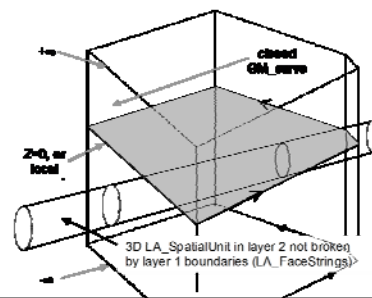
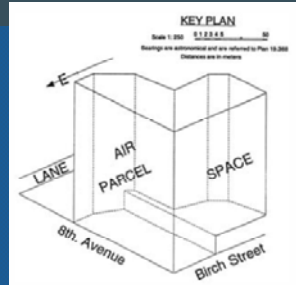
Physical Land Parcel – Defn.

- Parcel (Lot, Spatial Unit) – bounded figure on the *surface* of the earth
- Primary unit of unique identification, measurement and record-keeping (mapping and registration)



Physical Land Parcel – 3D

- 3D surface parcel - vertical column of rights
- 3D parcel - May not entirely be on the surface (apartments, networks...)
- Adds great complexity to the physical land parcel model

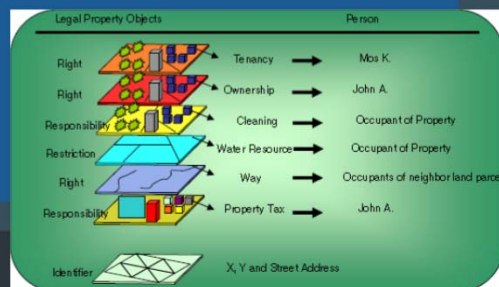


Legal Parcel Object – Defn.

- Primary unit is a legal object with associated physical parcel
- Entity consisting of interests in land as well as spatial dimension
- Allows all rights, restrictions and responsibilities, and commodities to be registered spatially

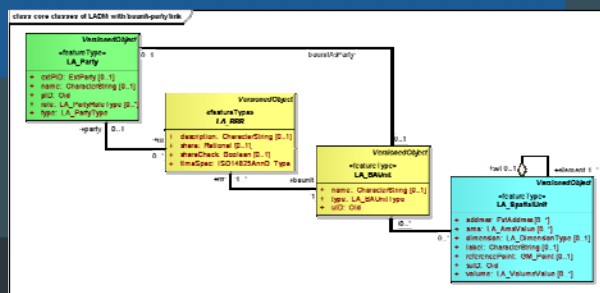
Legal Parcel Object – Model

- Data model – focus on preserving homogeneity of legal attributes based on spatially indexed objects
- Extensible model to accommodate new legislations, interests and commodities



ISO19152 - LADM

- Core model consists of classes *LA_Party*, *LA_RRR*, *LA_BAUnit* and *LA_SpatialUnit*
- *LA_BAUnit*, *LA_Party*, *LA_RRR* with a spatial component *LA_SpatialUnit* - comparable with the legal parcel object



COMPARISON OF 3D CADASTRAL OBJECT MODELS

Mapping
Registration
Land development
Land valuation

11

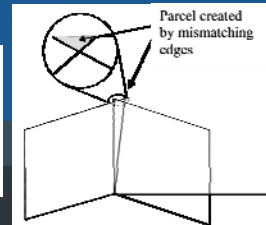
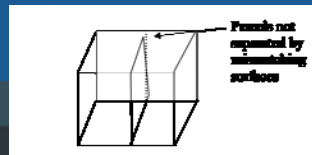
Evaluation Framework

- Based on Land Administration components
 - Mapping
 - Registration
 - Land development and
 - Land valuation
- This paper evaluates - suitability of the two models for 3D cadastre only

12

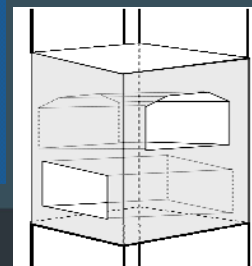
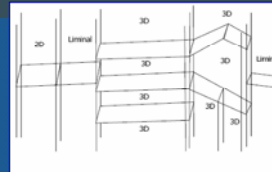
Mapping perspective

- Mapping - collection of data and storage/visualisation
- 3D cadastre - no homogenous approach to integrate data into existing cadastral systems
- Mapping and validation – a requirement in both models



Mapping - 3D

- Strata titles – presently based on surface parcel
- Complex situations very difficult to handle in physical parcel data model
- May be possible to register as legal parcel object
- Mapping still dependant on storage geometry



Registration and titling-1

- **Ownership** – Both models can record ownership
 - Legal parcel object model can register 3D objects
- **History and time series** – Both models capable of 4D cadastre

15

Registration and titling-2

- **Tenancy** – stored in both data models
- **Rights, Responsibilities and Restrictions (RRR)** – Both models capable, but legal parcel model built on RRR so can deal better
- **Interests and overlapping interests** – legal parcel object deals overlapping interests better
- **Spatially enabled identifier** – better in legal parcel object model

16

Land development

- Most jurisdictions have a development plan or land use plan associated with land
- In most cases stored as an attribute of the parcel in the physical parcel data model
- For a 3D object - individual strata elements may have different zoning; non-spatial information can easily be stored
- Both models capable but additional complexities

17

Land valuation

- Basis of fiscal administration, facilitates land transaction by providing a reliable and authoritative indication of the property market
- 3D object – adds complexity to the valuation process but both models capable of handling it
- Volumetric determination needs a mathematical representation

18

Conclusion-1

- Physical land parcel based models: very successful in fulfilling the requirements of general land administration to date
- Legal parcel object: potential to fulfil the requirements of integrating the existing and future interests and commodities

19

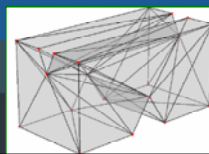
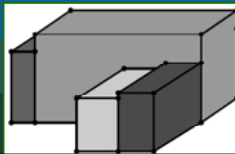
Conclusion-2

- Physical parcel based model: need to improve land administration systems by looking to integrate new interests and commodities into land management systems
- To change over to a legal parcel based model, issues ranging from technical, legal to administrative need to be investigated in detail

20

Conclusion-3

- For 3D cadastre – a key issue at present is geometry and storage
- Further investigation required to determine the technical, legal and administrative impacts as well as the flexibility to adapt to existing schemas and future innovations



Thank you