




Land and Property Information in 3D



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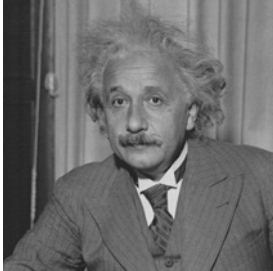


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**“If I can’t picture it, I can’t
understand it.”**

Albert Einstein



**“Come on Albert !
If I can’t understand it,
I can’t picture it.”**

Mohsen Kalantari



Objectives of the project

1. An improved understanding of the problems and issues associated with incorporating 3D property information into land administration systems;
2. A specification of the technical, policy, legal and institutional aspects of a 3D property information and representation system;
3. A 3D data model and database management system;
4. A visualisation model for 3D information in land registration; and
5. Prototype 3D property information and building visualisation systems



Project Objectives – Essence

- Model the 3D legal world (legal definitions)
- Link it to physical world
- Facilitate 3D land development process
- Facilitate a sustainable process to create
 - 3D digital cadastral databases
 - 3D city models
- Facilitate an interoperable data structure for different applications



Background -3D Initiatives at Local Government

City of Perth
 Melbourne City Council
 Wollongong City Council
 City of Sydney
 Brisbane City Council (Virtual Brisbane)
 Newcastle City Council
 Penrith City Council
 Adelaide City Council
 City of Greater Geelong
 Manningham City Council
 Gold Coast City Council



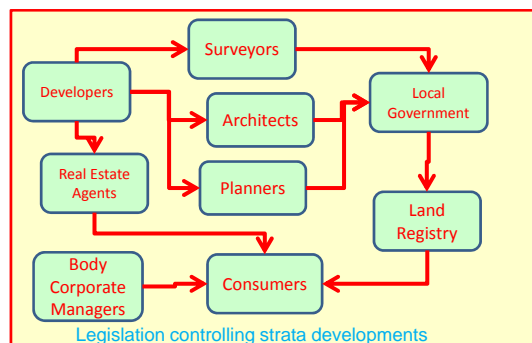
Background - Drivers for 3D Digital Information

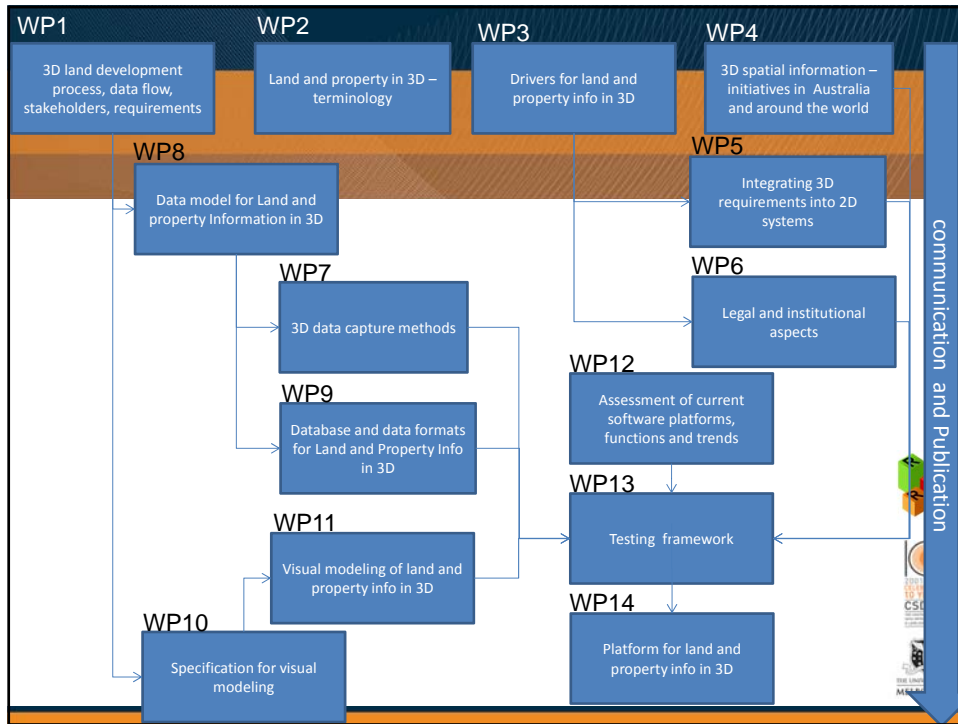
- Effective communication for planning
- Managing and representing 3D RRRs
- Managing 3D information in the Mapbase
- Climate change
- Disaster modeling and management
- Infrastructure below and above ground
 - escalating numbers of overlapping transport routes,
 - proliferating utility infrastructure including cables and pipelines,



Background - Scope of the project

- Major participants in the 3D property development and management arena.
- Many interrelated processes against a background of underlying legislation
- Can the implementation of 3D representation of the developments provide for improved processes and understanding of the developments between and across the participants?





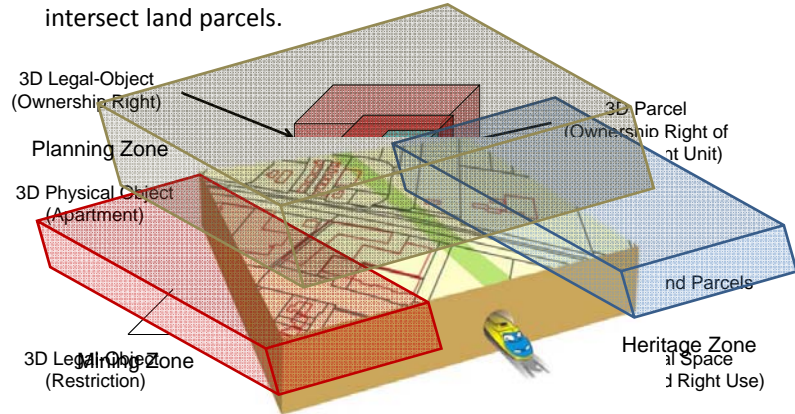
3D Cadastral Data Modelling

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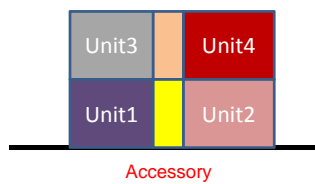
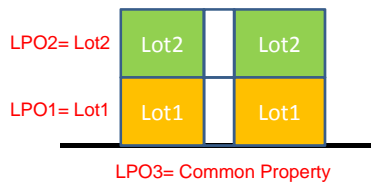
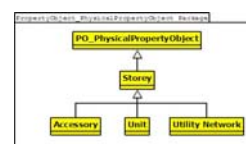
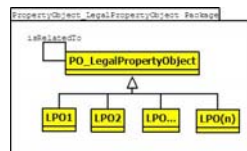
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Introduction- Problems of current cadastral data models

- The use of land involves multiple dimensions.
- Increasing number of different RRRs (e.g. Ownership, Easement) intersect land parcels.

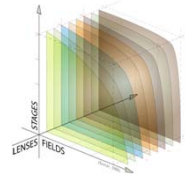


Developing a 3D Cadastral Data Modelling (3DCDM_First Version)- An Example



Building Information Model(ing)?


- “a computable representation of the physical and functional characteristics of a facility and its related project/lifecycle information using open industry standards to inform decision making for realizing better value” (by NBIS)
- A holistic approach to manage the lifecycle data about a “single” building
- It is data-rich, intelligent, uses Object Oriented (OO) approach to provide a parametric digital representation of the facility.
- includes modular units that “understand” their own scope of parts and features





BIM and 3D Cadastre

- Emphasis of literature on the use of BIM and its benefits on 3D Cadastre (why?)
 - Geometrically and semantically rich
 - Up-to-date information about the building/site
- Land and cadastral information are normally implemented in GIS or LIS and integration with BIM still pose a challenge.
- Bringing 3D Cadastre into BIM Process by extending the BIM data model (e.g. IFC) to include cadastral data models too






3D Cadastral Visualization



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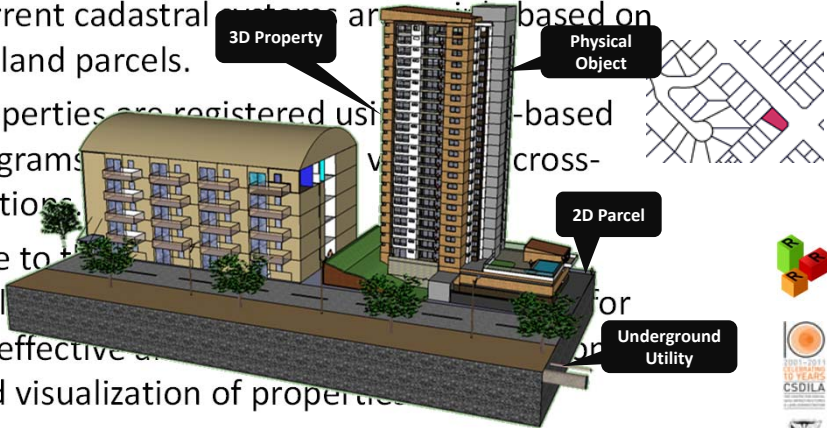


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3D Cadastral Visualization



- Current cadastral systems are based on 2D land parcels.
- Properties are registered using diagrams and cross-sections.
- Due to the complexity of the physical world, an effective and visualization of properties is required.





3D Cadastral Visualization

Currently it is not possible to represent a 3D property and associated rights, restrictions and responsibilities effectively in the complex scenario.

There are no specifications for visualization of 3D cadastral objects



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Specifications

Requirements of 3D Cadastral Visualization

- Cadastral Features
- Visualization Features
- General Features





3D Data Capture



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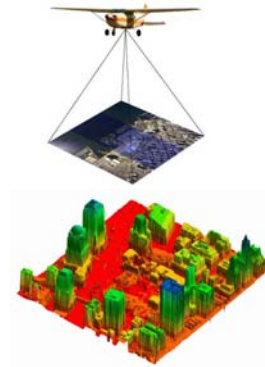
3D Cadastral Data - input

- Architecture Drawings
- Engineering Drawings
 - Verification
 - Orientation
 - Conversion



3D Data Capture Techniques

- Laser scanning
- Aerial imagery
- Satellite imagery
- LIDAR
- Photogrammetry
- Remote Sensing
- Pictometry
- Traditional surveying



2D to 3D: Engineering Institutional Change in Land and Property Management



Institutions: Land and Property

LAS = processes

"institutions are rules of the game"
- Feder and Feeny, 1991

Multiple scale = repeat processes

Integrity of process (i.e. LAS) depends on:

- Legislation
- Regulations (organisation/profession)
- Norms (language, culture, etc)
- Enforcement



"institutions are the prescriptions
that humans use to organise all
forms of repetitive and structured
interactions"

- Ostrom, 2005



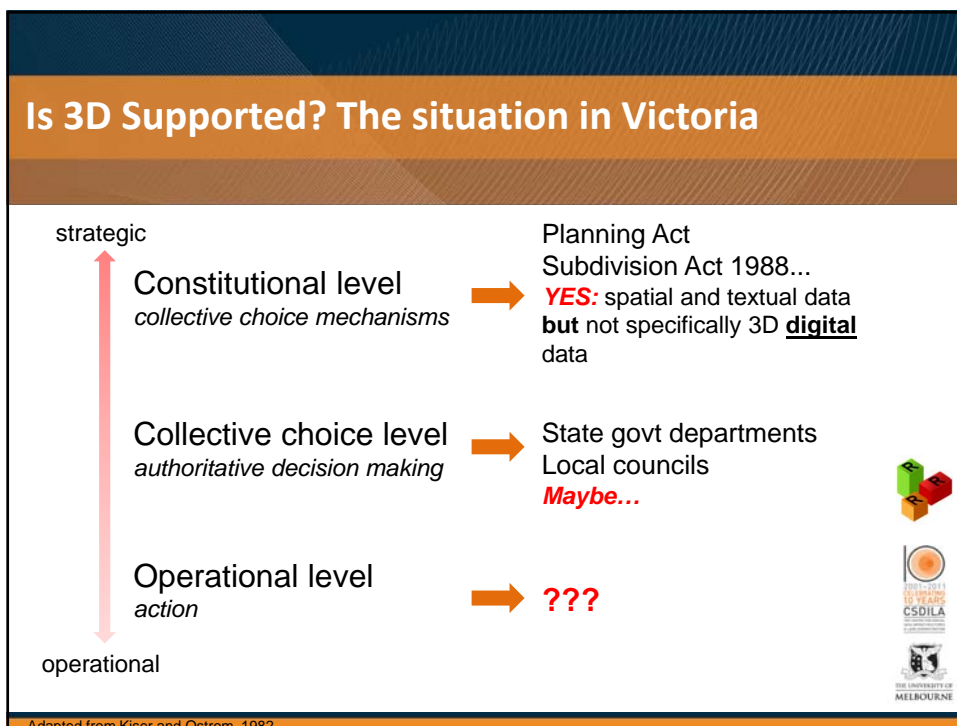
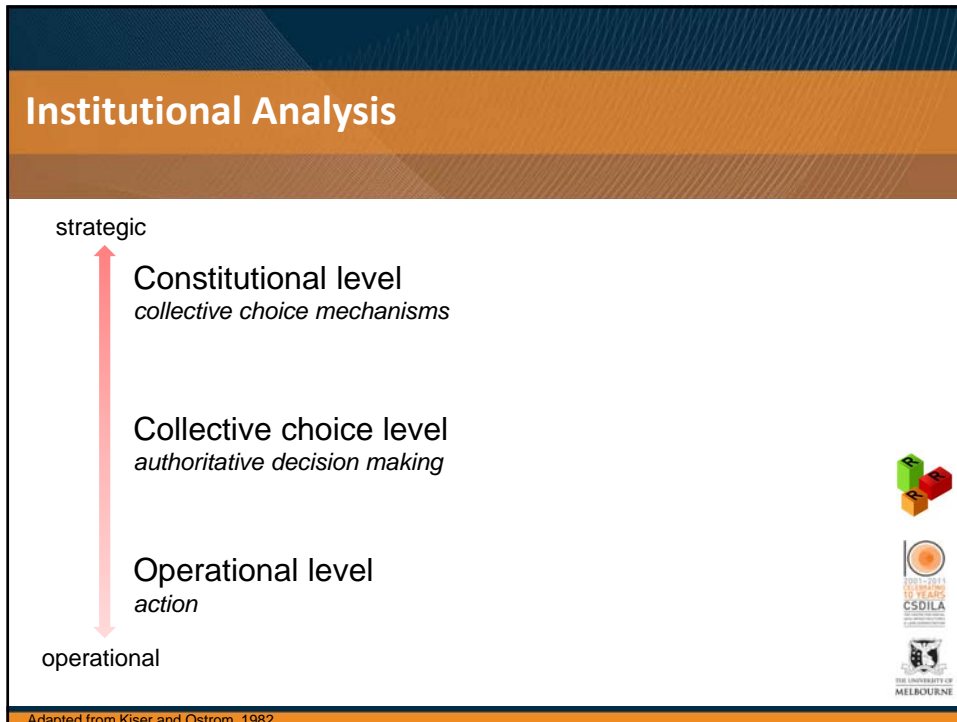
Research Problem

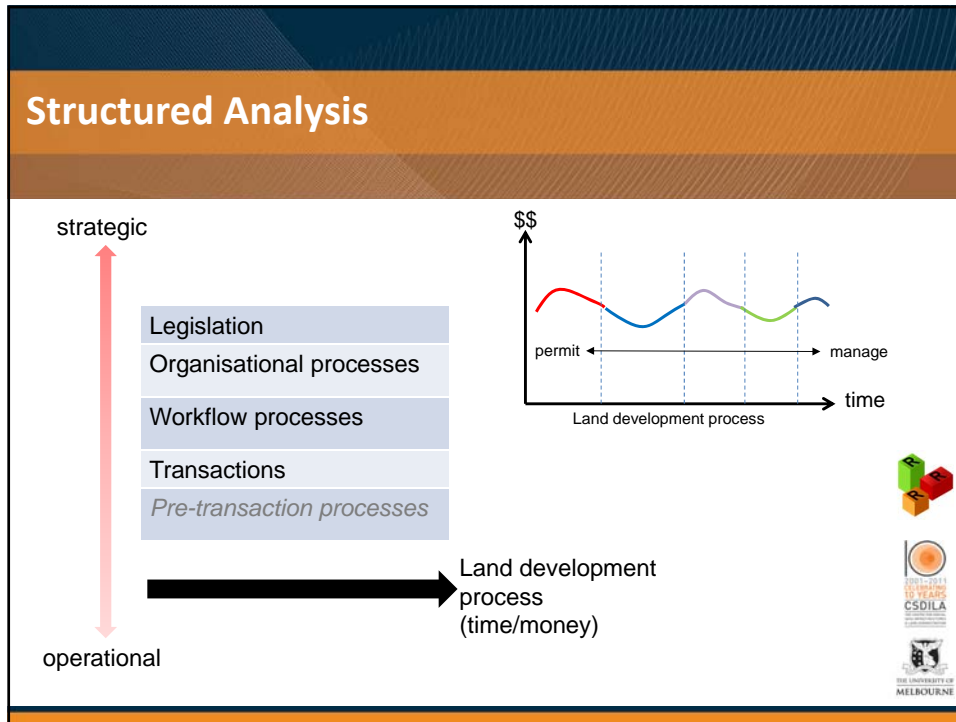
“ The current institutional framework **does not** actively support the use of 3D land and property information in the land development process and land registration.

This limits the ability of the land administration system to accurately reflect and manage real world interests in land.

”







Team 3D

- Chief Investigators
 - Prof. Abbas Rajabifard (Project Leader)
 - Prof. Ian Williamson
 - Dr Tuan Ngo

- Researchers
 - Dr Mohsen Kalantari (Lead Researcher and Coordinator)
 - Prof. Ian Bishop
 - Dr Ida Jazayeri (RF)
 - Mr. Brian Marwick (SRA)
 -

- Postgraduate Scholars
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 - Mr. Davood Shojaei
 - Ms. Serene Ho
 - Mr. Sam Amirebrahimi















... and other members of CSDILA and the Department of Geomatics





Thank You

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