Development of a 3D ePlan/LandXML Visualisation System in Australia

THE UNIVERSITY OF MELBOURNE

Centre for SDIs and Land Administration
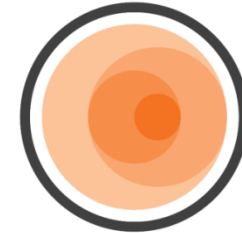Department of Infrastructure Engineering
The University of Melbourne

Davood Shojaei

Prof. Abbas Rajabifard
Dr. Mohsen Kalantari
Prof. Ian Bishop
Ali Aien

CSDILA
THE CENTRE FOR SPATIAL
DATA INFRASTRUCTURES
& LAND ADMINISTRATION

Land and Property
Information in 3D

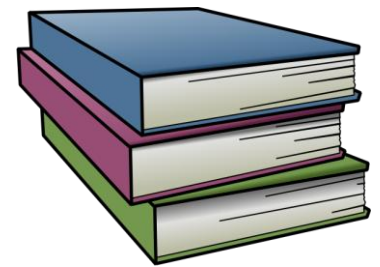October 26th 2012
Shenzhen, China

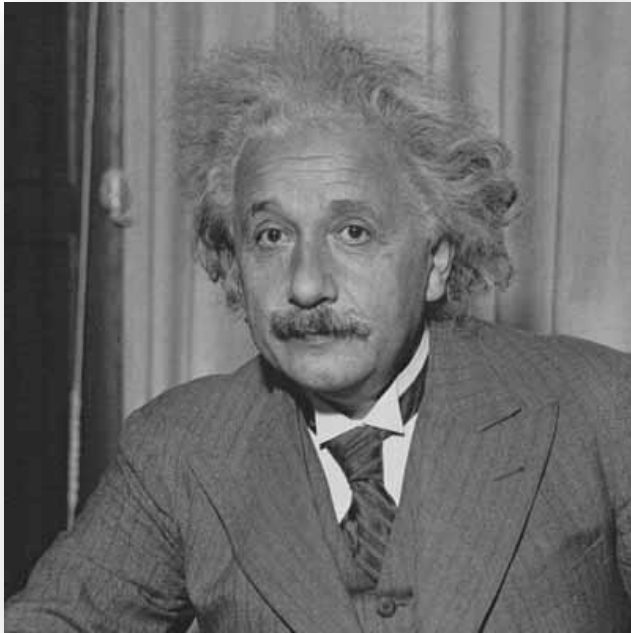# Project Partners

Land and Property
Information in 3D

Outline

- **Cadastre in Australia**

- **Current issues and challenges**

- **ePlan**

- **Framework**

- **Prototype system**

- **Conclusion**

"If I can't picture it, I can't understand it."

Albert Einstein

Melbourne

The most livable city

DIAG. M
NOT TO SCALE

DIAG. N
NOT TO SCALE

ADDITIONAL SHEET
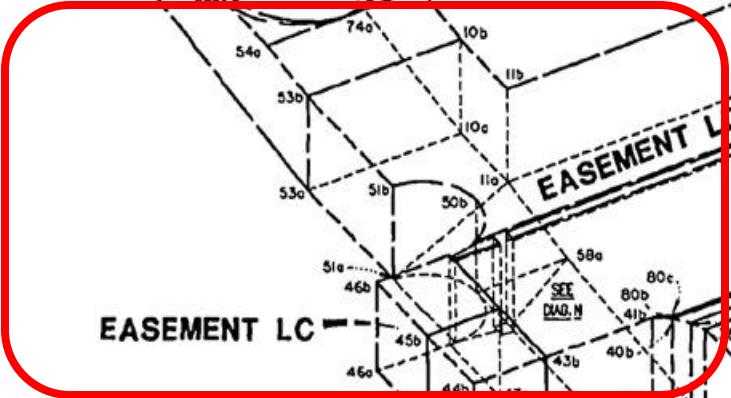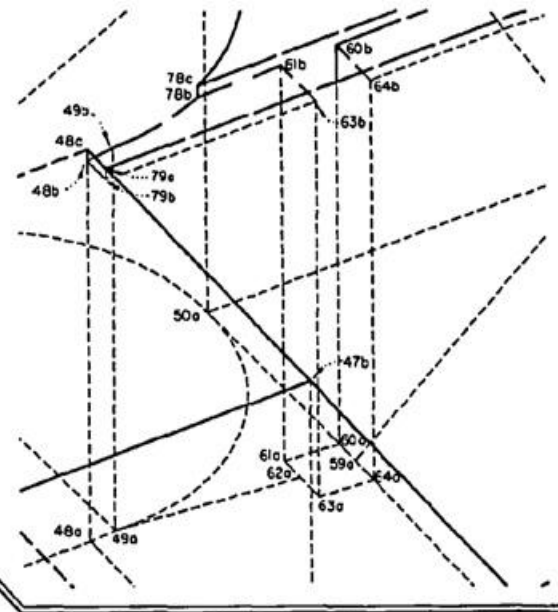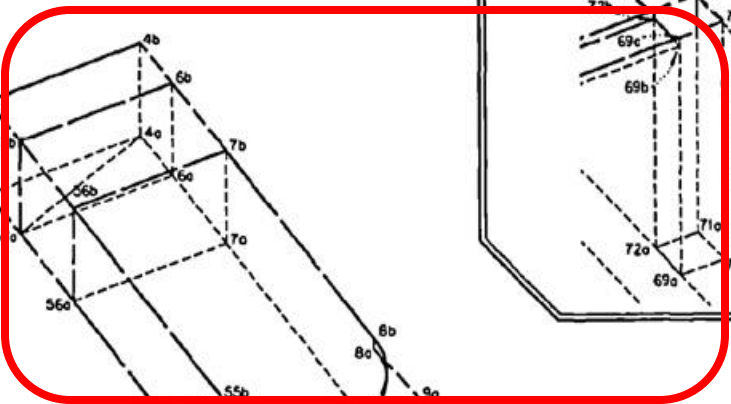
EASEMENT LD

EASEMENT LC

EASEMENT LB

VOLUME OF EASEMENT LB
$54 m^3$

VOLUME OF EASEMENT LC
$59 m^3$

VOLUME OF EASEMENT LD
$3973 m^3$

DIAGRAM L
ISOMETRIC VIEW
1:200

Insert Plan Number
SP 121082

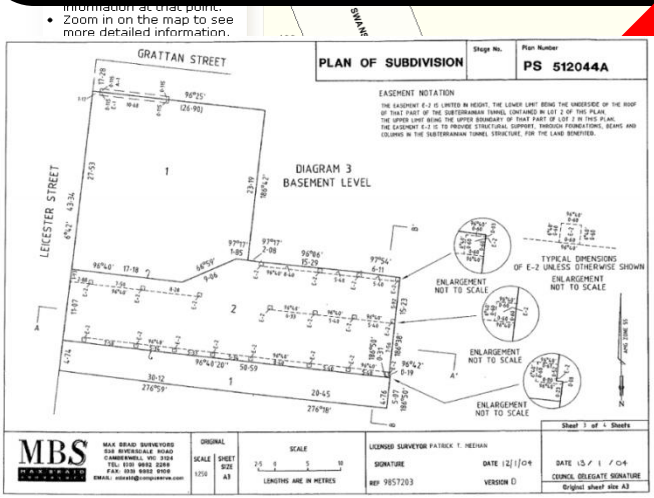Sheet 7 of 7

EASEMENTS LB, LC & LD ARE BOUNDED
BY VERTICAL PLANES.

DATUM FOR LEVELS
PM 10210
Located at Old Port Office- Edward Street
RL 5·305 AHD (Der)

Vertices of the Volumetric Lots
not marked unless otherwise stated —
Inaccessible in Air or within Walls & Floors

Fatih Döner *et al 2010*

Current Cadastre in Victoria

It includes 814 properties!!!

QV Building in Digital Cadastre DataBase

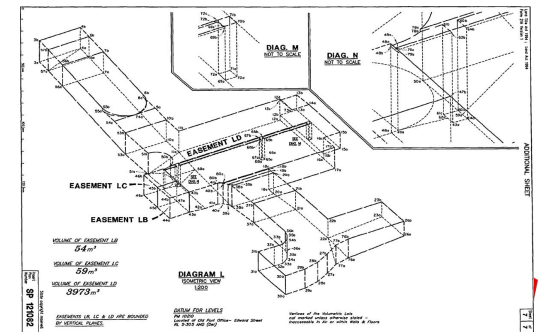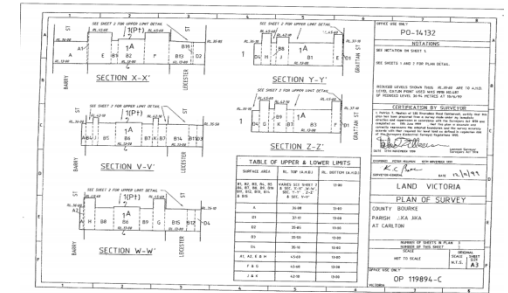# Current methods of registration RRRs in Australia

- **Interests in land and properties in Australia are registered and visualised through subdivision plans.**
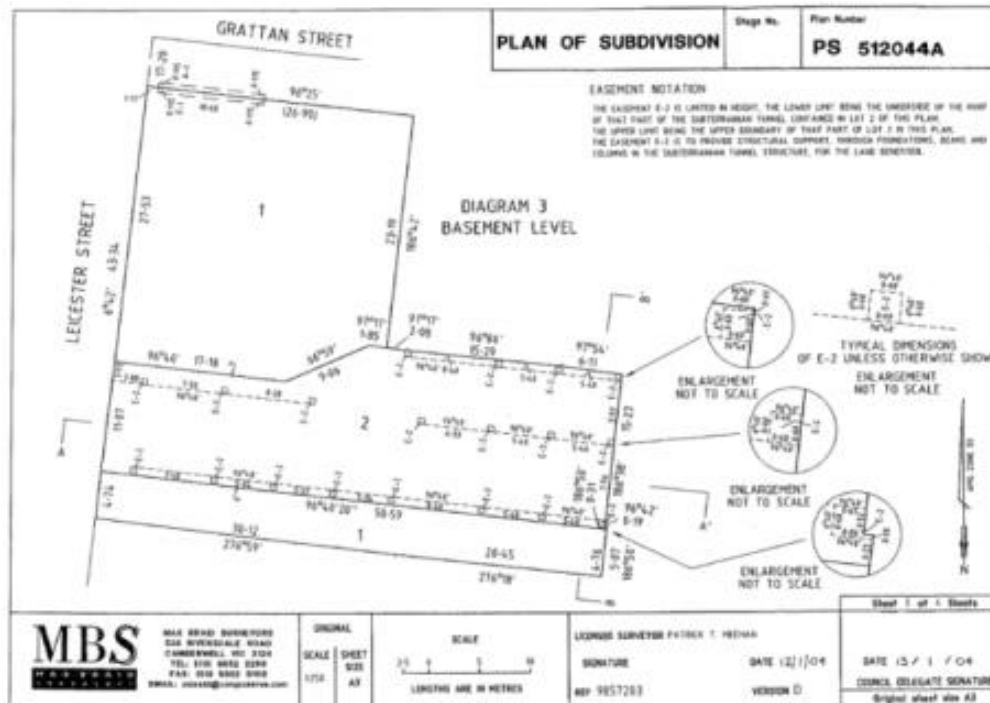
Current **Visualization** of Cadastral Data

- # Limitations
  - ## Only for Expert Users
  - ## Not Interactive
  - ## Hard to Measure
  - ## No Queries and Analyses
  - ## Storing, Editing and Updating

Paper based to Digital

SPEAR SYSTEM

- Streamlined Planning through Electronic Applications and Referrals ([SPEAR](#))

- SPEAR system has changed the subdivision plan delivery process from a paper-based method to an electronic process

ePlan

- In 2009, a working group sponsored by the ***Intergovernmental Committee on Surveying and Mapping*** (ICSM) developed the ePlan data model to transfer digital cadastral data.

- The ePlan data model was accepted as a national data model and adopted as a standard in Australia.

ePlan/LandXML

- LandXML is a XML-based data format which is widely used to exchange civil engineering and survey measurement data.

- LandXML schema has the following main components:
  - Initialization
  - Metadata
  - Geometry
  - Survey Data

Evaluating ePlan data model and LandXML schema to store 3D objects

- a subdivision plan from Victoria was selected

Data types in ePlan/LandXML

- In the ePlan data model, various geometric primitive objects such as point, line, curve, irregular line, polygon and volume are defined.

A cube in ePlan

```
<LandXML>
    <Parcels>
        <Parcel>
            <VolumeGeom>
                <CoordGeom><Line></Line><Line></Line><Line></Line><Line></Line></CoordGeom>
                <CoordGeom><Line></Line><Line></Line><Line></Line><Line></Line></CoordGeom>
                <CoordGeom><Line></Line><Line></Line><Line></Line><Line></Line></CoordGeom>
                <CoordGeom><Line></Line><Line></Line><Line></Line><Line></Line></CoordGeom>
                <CoordGeom><Line></Line><Line></Line><Line></Line><Line></Line></CoordGeom>
                <CoordGeom><Line></Line><Line></Line><Line></Line><Line></Line></CoordGeom>
            </VolumeGeom>
        </Parcel>
    </Parcels>
</LandXML>
```

3D Model of the Subdivision Plan


```xml
<Parcels>
        <Parcel name="PS123456789">
                <VolumeGeom name="Lot1"> </VolumeGeom>
                <VolumeGeom name="Lot2"> </VolumeGeom>
                <VolumeGeom name="Lot3"> </VolumeGeom>
                <VolumeGeom name="Easement1"> </VolumeGeom>
                <VolumeGeom name="CommonProperty"> </VolumeGeom>
        </Parcel>
</Parcels>
```
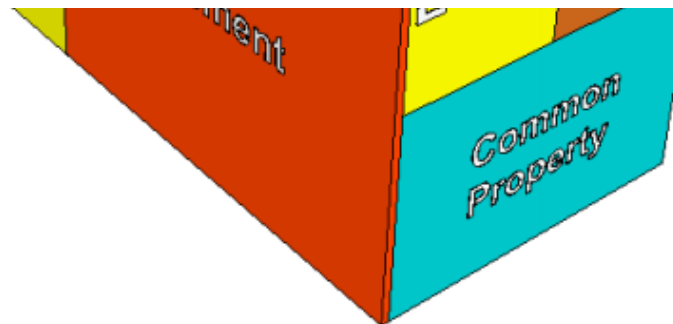
3D Visualization Platforms

K2Vi (AAM Group)

The Agency of Real Estate Cadastre of Republic of Macedonia

Google Earth as a Visualisation System

- Visualise ePlan/LandXML files

- Convert ePlan/LandXML files to KML
  - Both XML based
  - Different Schema
  - Loss of information
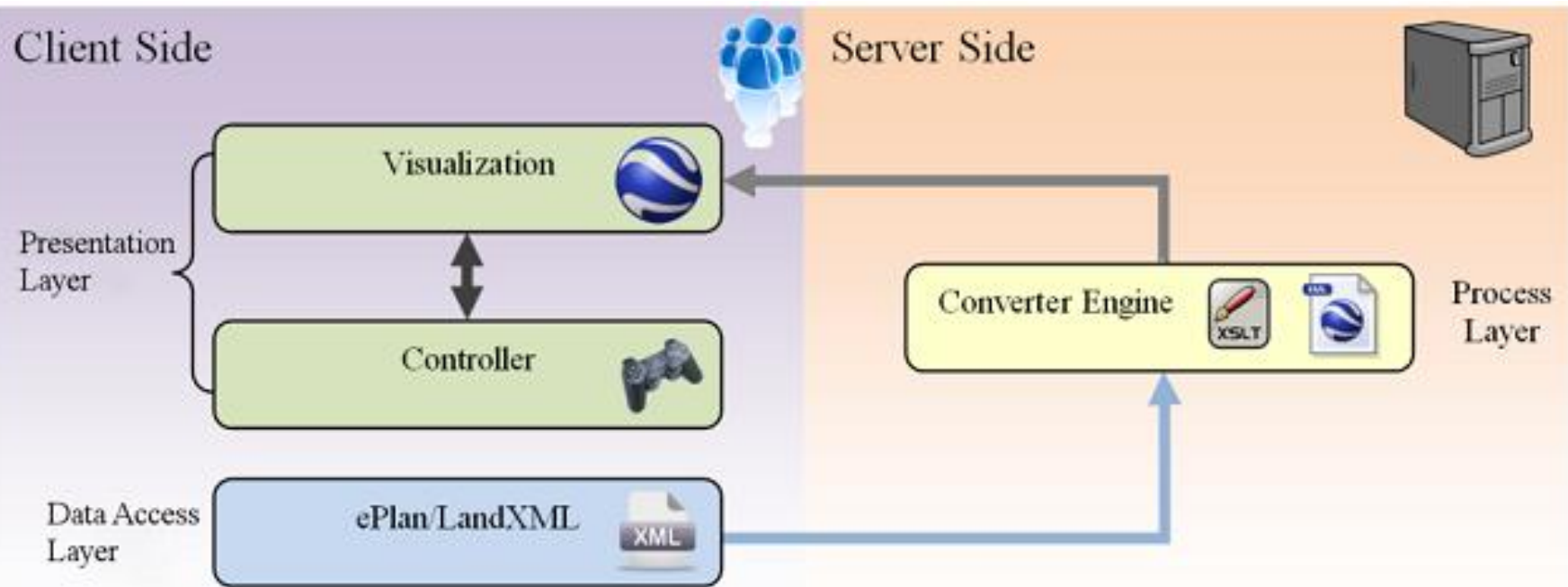 - Coordinate Systems (MGA to Geographic)

Architectural framework

Mapping the schemas

Prototype System

Conclusion and future work

- eplan is able to be used to transfer data among authorities and surveyors

- ePlan is able to store 3D volume objects

- Challenge in ePlan validation in 3D

- Google Earth limitations

- Extending the prototype system

- Improve the mapping process to bring other information

Land and Property Information in 3D (website)

View Online

Thank you

Land and Property Information in 3D