

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



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

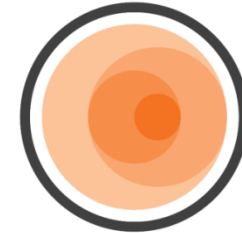
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Dr. Mohsen Kalantari

Prof. Ian Bishop

Ali Aien



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DATA INFRASTRUCTURES  
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**Land and Property  
Information in 3D**

October 26th 2012  
Shenzhen, China

# Project Partners

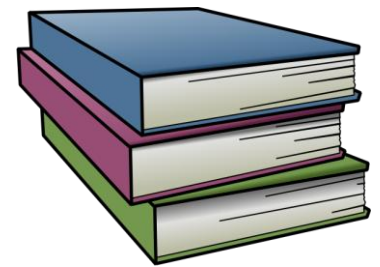


Land and Property  
Information in 3D



# Outline

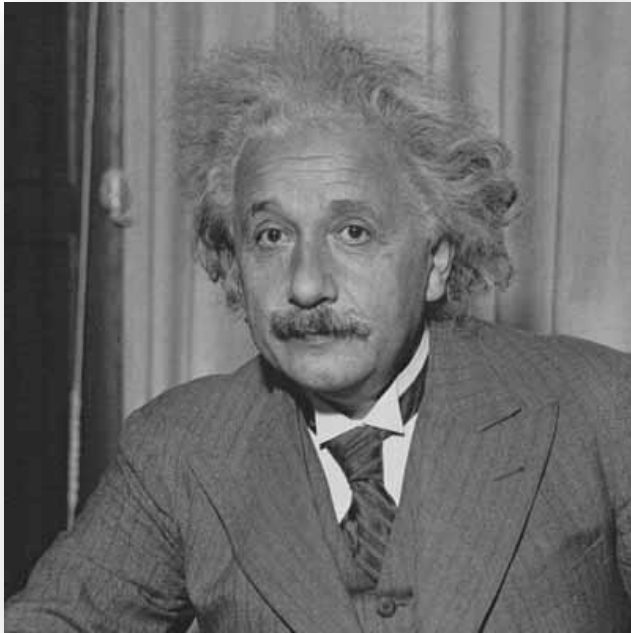
- **Cadastral in Australia**
- **Current issues and challenges**
- **ePlan**
- **Framework**
- **Prototype system**
- **Conclusion**



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

**Albert Einstein**



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# Melbourne

The most livable city



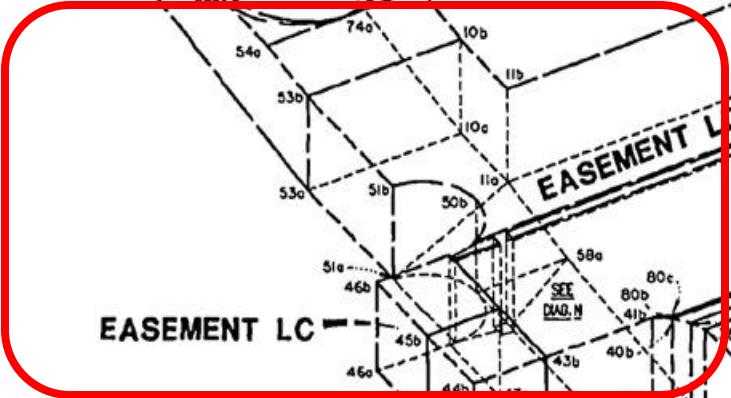
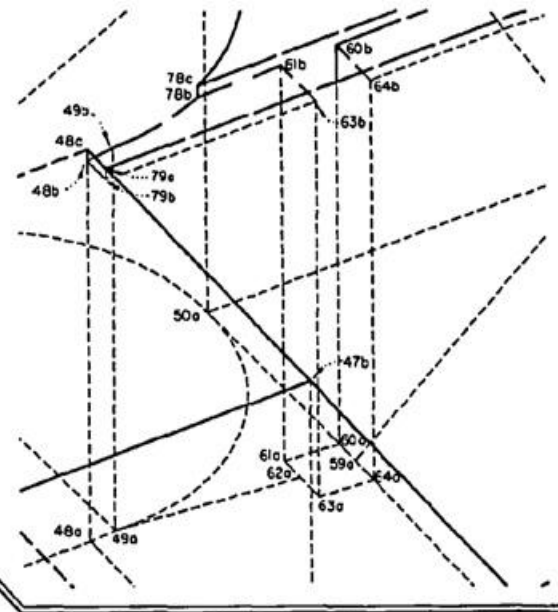
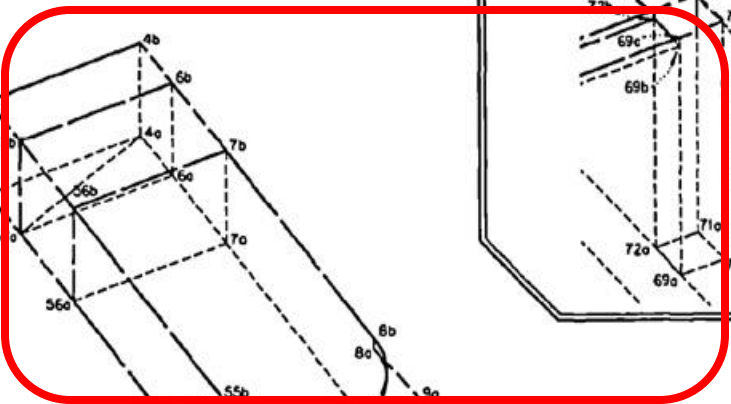
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**DIAG. M**  
NOT TO SCALE

**DIAG. N**  
NOT TO SCALE



**EASEMENT LC**

**EASEMENT LD**

**EASEMENT LB**

VOLUME OF EASEMENT LB  
**54 m<sup>3</sup>**

VOLUME OF EASEMENT LC  
**59 m<sup>3</sup>**

VOLUME OF EASEMENT LD  
**3073 m<sup>3</sup>**

**DIAGRAM L**  
ISOMETRIC VIEW  
1:200

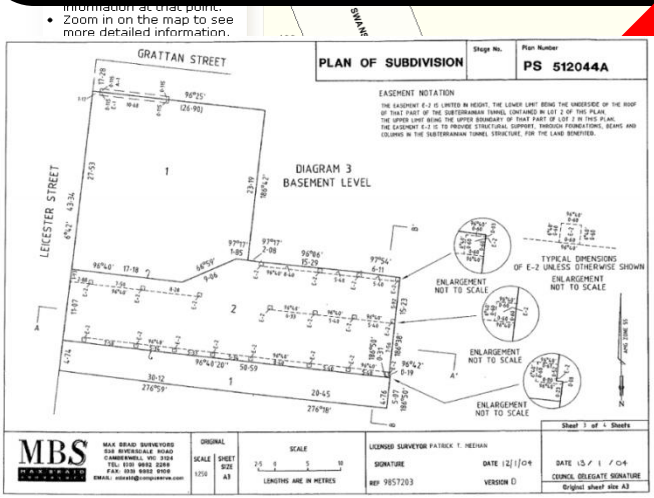
**DATUM FOR LEVELS**  
PM 10210  
Located at Old Post Office - Edward Street  
RL 5.305 AHD (Der)

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

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

# Current Cadastre in Victoria

**It includes 814 properties!!!**



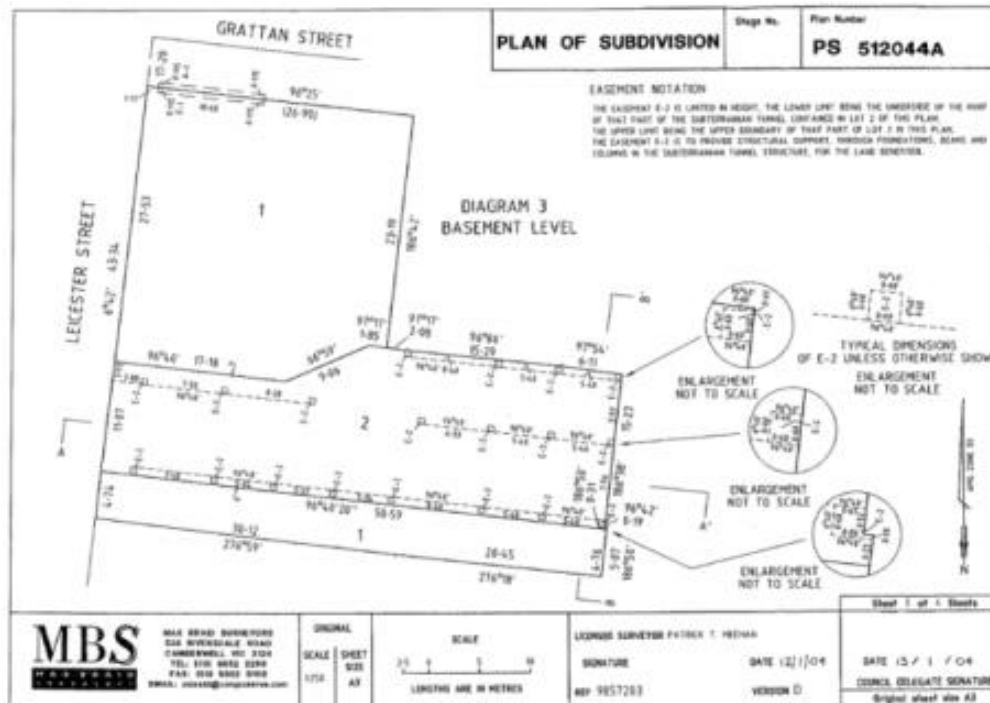
Employed	File	Name	Phone	Mobile	Address	Original	Scale	Sheet	Size	Scale	Version	Signature	Date	Version	Original sheet size
000	00	David	980.423.4668	980.423.4669	5/2/1991	IT_PROG	8000								
001	01	Austin	980.423.4668	980.423.4669	6/25/1997	IT_PROG	4800								
002	02	Yvonne	980.423.4668	980.423.4669	2/20/1998	IT_PROG	4800								
003	03	Clara	980.423.4668	980.423.4669	3/27/1999	IT_PROG	4800								
004	04	Nancy	980.423.4668	980.423.4669	8/17/1994	PL_MGR	12000								
005	05	Carol	980.423.4668	980.423.4669	8/16/1994	PL_ACCOUNT	9000								
006	06	John	980.423.4668	980.423.4669	9/26/1997	PL_ACCOUNT	8200								
007	07	Simon	980.423.4668	980.423.4669	9/30/1997	PL_ACCOUNT	7700								
008	08	Donna	980.423.4668	980.423.4669	3/27/1998	PL_ACCOUNT	7800								
009	09	Luis	980.423.4668	980.423.4669	12/7/1999	PL_ACCOUNT	6900								
010	10	Den	980.423.4668	980.423.4669	12/7/1994	PL_MGR	11000								
011	11	Alexander	980.423.4668	980.423.4669	5/18/1995	PL_CLERK	1100								
012	12	Shah	980.423.4668	980.423.4669	12/20/1997	PL_CLERK	291								
013	13	Sigal	980.423.4668	980.423.4669	7/24/1997	PL_CLERK	2803								
014	14	Guy	980.423.4668	980.423.4669	11/15/1998	PL_CLERK	2600								
015	15	Karen	980.423.4668	980.423.4669	8/10/1999	PL_CLERK	2500								
016	16	Harshani	980.423.4668	980.423.4669	7/18/1996	IT_MAN	8000								
017	17	Adam	980.423.4668	980.423.4669	6/10/1997	IT_MAN	13000								
018	18	Payan	980.423.4668	980.423.4669	5/12/1995	IT_MAN	7900								

**QV Building in Digital Cadastre DataBase**



# Current methods of registration RRRs in Australia

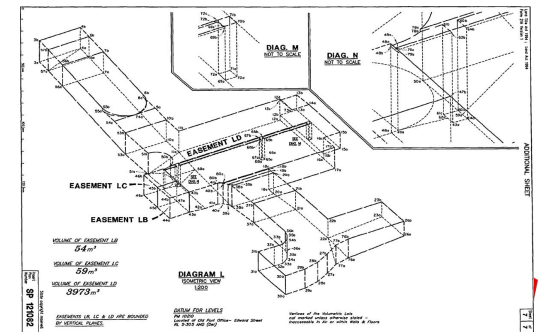
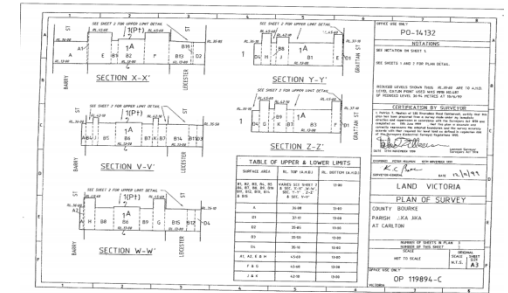
- Interests in land and properties in Australia are registered and visualised through subdivision plans.





# Current **Visualization** of Cadastral Data

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



Move

# Paper based to Digital



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# 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



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# 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



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

- a subdivision plan from Victoria was selected

**PLAN OF SUBDIVISION** Stage No. LTO use only  
CONDITION 1 ✓ PS.422525J

**Location of Land**  
County: Bourke  
Parish: Cell Pore Pore  
Section: 20  
Crown Allotment: 24 (Part)  
Crown Part: 1

**Council Certification and Endorsement**  
Council Name: City of Macleay  
Ref: Sub 54/01  
1. This plan is certified under section 6 of the Subdivision Act 1988.  
2. This plan is certified under section 6 of the Subdivision Act 1988.  
3. This is a statement of compliance issued under section 21(1) of the Subdivision Act 1988.

**Open Space**  
This is a statement of compliance issued under section 21(1) of the Subdivision Act 1988.  
This is a statement of compliance issued under section 21(1) of the Subdivision Act 1988.  
This is a statement of compliance issued under section 21(1) of the Subdivision Act 1988.

**Lot Reference:** LTO Base Record  
Title Reference: Cell Pore Pore  
Tel 3122 Fax 283

**Lot Plan Reference:** LOTS LPJ25  
Postal Address:  
147 - 149 Nicholson Street, Footscray  
VIC 3207  
M 5 00 340  
H 0 00 000 E 314 750 Zone 55

**Vesting of Roads or Reserves**  
Name: ...  
Date: ...

**Notations**  
Depth, Limitation: Does not apply  
Staging: This is a staged subdivision  
Planning Permit No.:

**Easement Information**  
Section 8(2) applies to the land in this plan.

Reference	Purpose	Origin	Land Beneath or Over	Easement
E-1	PARTY WALL	BURR	C.F. 181.226 VOL. 799	ENFRANCHISEMENT

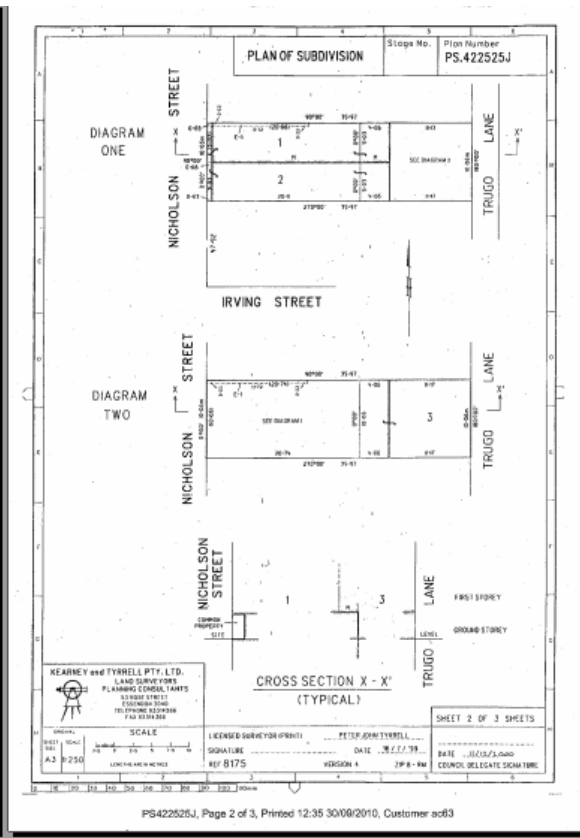
**Legend:**  
A - Appurtenant Easement  
B - Encumbering Easement  
C - Encumbering Easement (Road)

**Scale:** 1:1000  
L1000 only  
PLAN REGISTERED  
TIME 0.45  
DATE 1/2/2010  
REGISTERED BY 12345  
REGISTERED BY 12345  
DATE 1/2/2010

**KEARNEY and TYRRELL PTY. LTD.**  
LAND SURVEYORS  
PLANNING CONSULTANTS  
1100 STREET  
STATION ROAD  
MELBOURNE VIC 3000  
TEL 9339 3333 FAX 9339 3333

**REGISTERED SURVEYOR** PETER JOHN TYRRELL  
DATE 1/2/2010  
SIGNATURE REF 8175  
VERSION 4  
DATE 1/2/2010  
COUNCIL DELEGATE SIGNATURE

PS422525J, Page 1 of 3, Printed 12:35 30/09/2010, Customer ac63



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# 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.



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# 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>
```

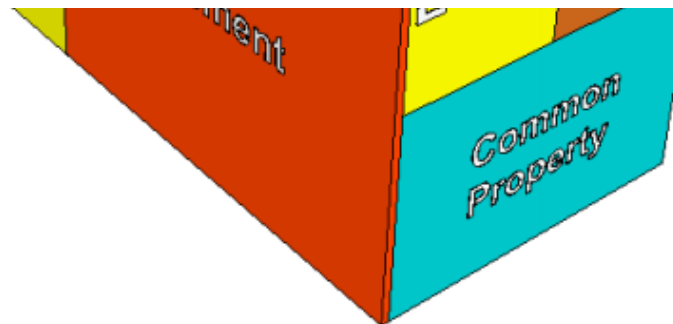




# 3D Model of the Subdivision Plan



```
<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>
```



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# 3D Visualization Platforms

K2Vi (AAM Group)

The screenshot displays a web-based 3D visualization platform. At the top, there is a Google Earth interface with a search bar and navigation tools. Below this is a browser window showing the URL [webgis.katastar.gov.mk/arec/7?lang=en](http://webgis.katastar.gov.mk/arec/7?lang=en). The main interface features a 3D map viewer showing a residential area with red-roofed buildings. A layers panel on the right lists the following layers:

- Base layers
  - Ortophoto Color - 2009.
- Vector cadastral maps
  - 3D objects
  - Cadastre parcels
- Labels
  - Settlements
  - Parcel numbers

At the bottom left, there are buttons for "Start line measure" and "Start area measure". A scale bar at the bottom right indicates 50 meters. The text "The Agency of Real Estate Cadastre of Republic of Macedonia" is overlaid on the right side of the interface.

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)

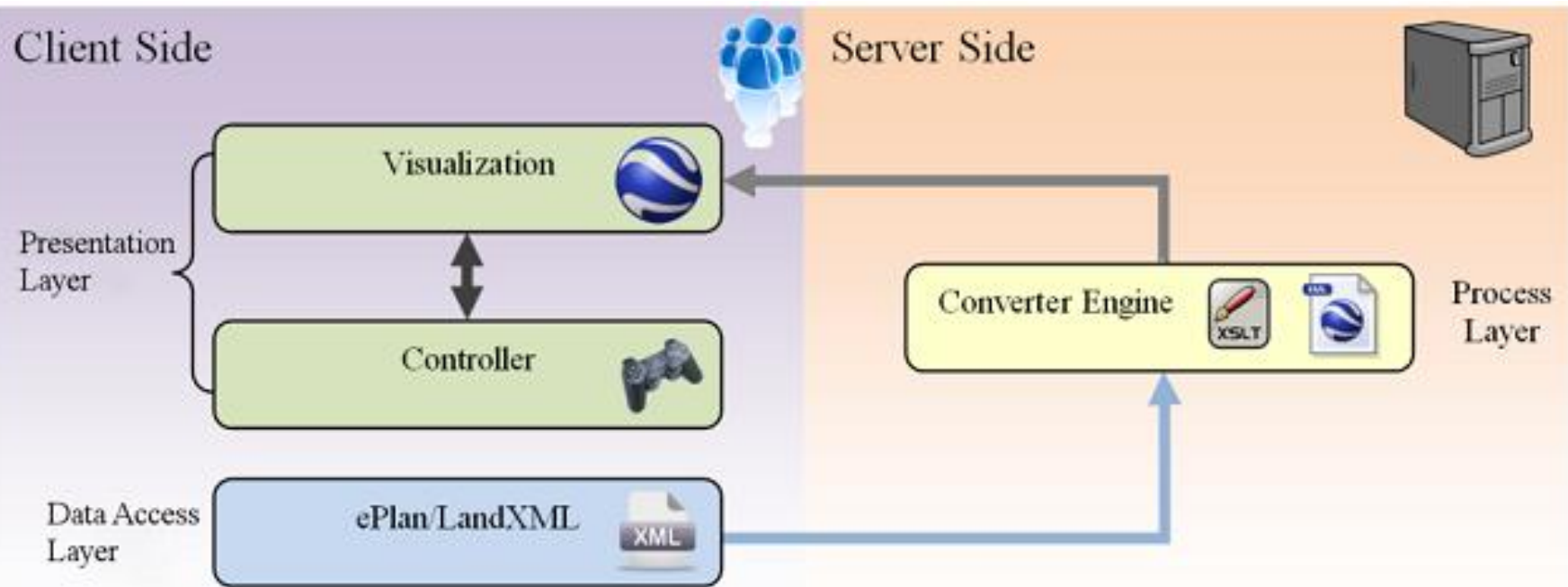


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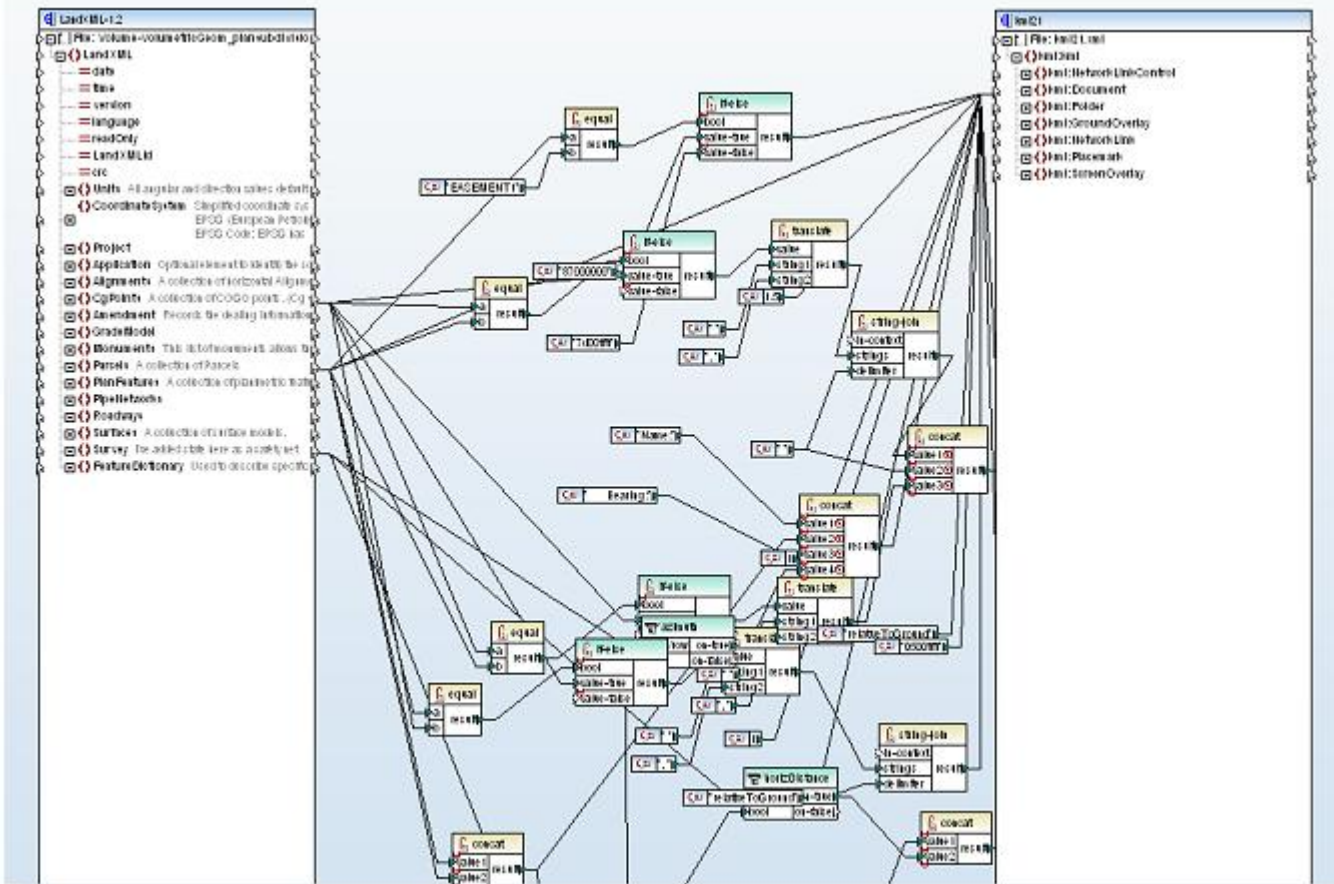


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# Architectural framework



# Mapping the schemas



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# Prototype System

3D Land and Property Information - Mozilla Firefox

file:///C:/Documents and Settings/dshojaei/Desktop/3D/Moein/Third week/LandXMLtoKMLConverter/panel.html

Control Panel

LandXML Visualizer

**LandXML to KML Converter**

Please Choose your LandXML File:

C:\Documents and Sett... Browse...

Please choose your UTM Zone number:

55

Hemisphere:

Northern  Southern

Please Click here to Convert your LandXML File

**File converted Successfully!**

Visualize Show 3D

3D Land and Property Information

EASEMENT1  
EASEMENT1

© 2013 Wharfedale Sensis Pty Ltd  
Image © 2013 Sinclair Knight Merz & Fugro  
Imagery Date: 1/1/2009 2000  
37°38'06.31" S 144°53'59.20" E elev 25 m

33 m

Eye alt: 117 m

earth

Terms of Use

Demo

# 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



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# Land and Property Information in 3D (website)

Land Property Information in 3D

csdila.unimelb.edu.au/projects/3DWebsite/

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Land and Property Information in 3D

HOME PUBLICATION ABOUT RESEARCH TEAM RESOURCES EVENTS PARTNERS CONTACT US

Australian Government  
Australian Research Council

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[View Online](#)





**Land and Property  
Information in 3D**

**Thank you**



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