



# SMART FUTURE CITIES

## THE ROLE OF 3D CADASTRE, LAND AND PROPERTY INFORMATION

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# ACKNOWLEDGEMENT

- ARC-Linkage Project and all Industry Partners
- Int. Symposium on 3D Cadastre and Smart Future Cities, Feb 2015
- Centre for SDIs and Land Administration, The University of Melbourne





Industry Partners and Supporters



## KEY DRIVERS

- Increasing **urban complexity**;
- **Needs and opportunities** in the context of **future cities**;
- **3D land and property info** to support future planning and management of urban environment (e.g. leveraging **BIM, PIM**);
- **Future users vs current users**, including wider array of stakeholders;
- **Making sense of smart data**, smart utilities, 4D data.



## EMERGING NEEDS

- Smart Cities
- Digital Economy
- Vertical Living
- Consumer Expectations
- Process Improvement



### MY KEY MESSAGES ARE

- 3D cadastre offers new **engagement opportunities** and is fundamental for the future.
- Future cadastre needs to take into account the **expectations** of all stakeholders.
- Future cadastre requires the consideration of how the **needs of current users** should be **balanced against** the needs of **future users**.



### LAND, PEOPLE AND SUSTAINABILITY

RRRs   Scarc Resources   Population Increase   Social Inclusion

Climate Change   Urban Sprawl   Vertical Villages

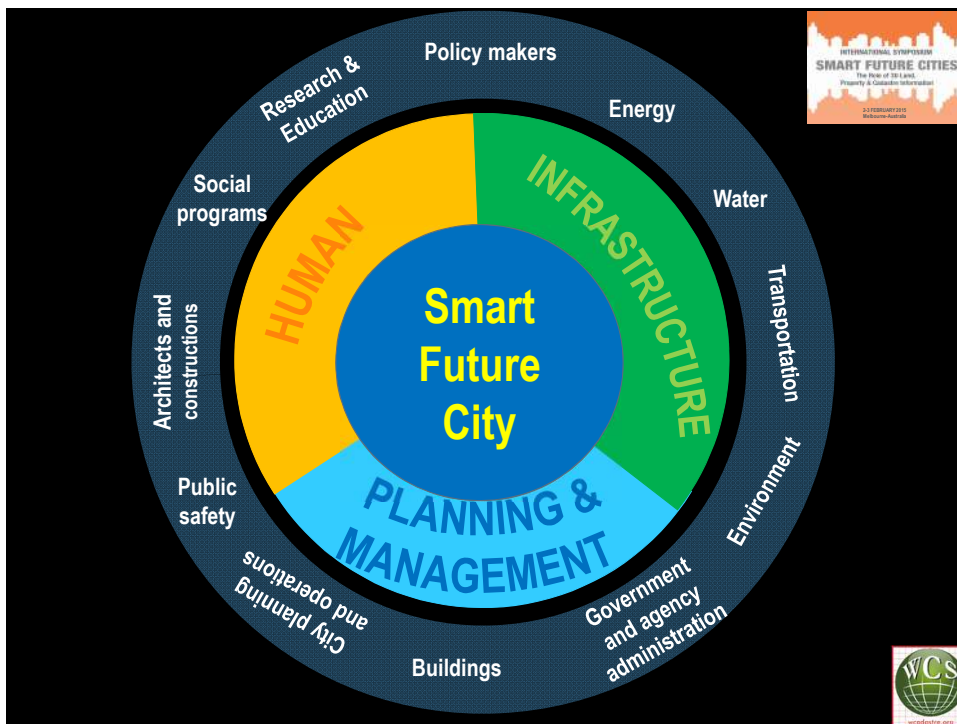
Degraded and Contaminated Land

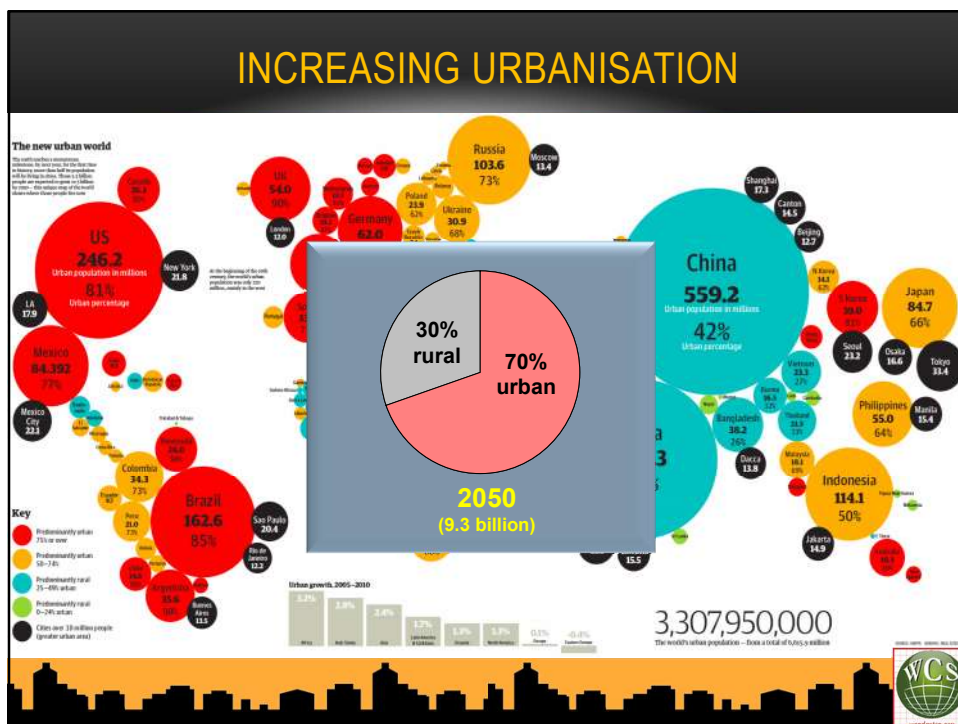
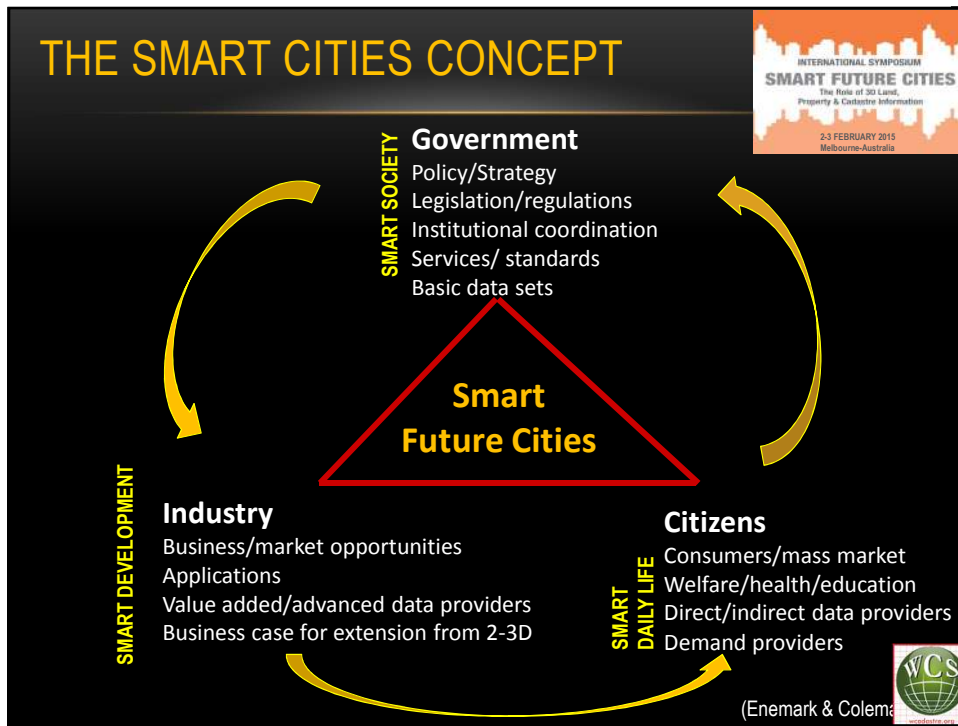
Health and Wellbeing

Ownerships   Wealth Creation

*Location links us to where we are and what we are doing.*









## URBANISATION TREND WILL CONTINUE



## COMPLEX STRUCTURES




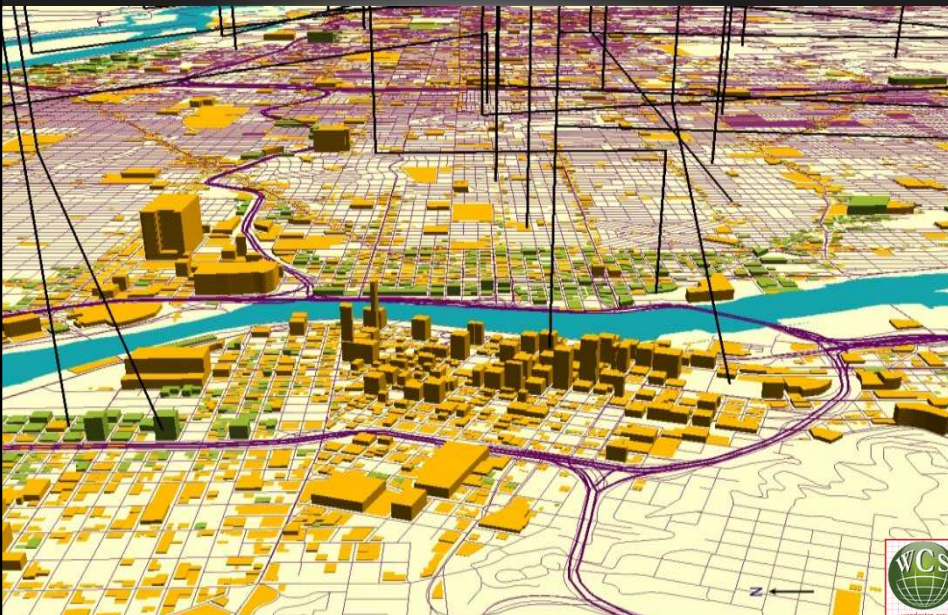
## URBANISATION AND COMPLEX HIGH-RISES



*What are the Challenges in managing ownership rights in high-rise buildings?*



## COMPLEX INTERDEPENDENCY





## LAND AND PROPERTY MANAGEMENT



This facilitates the operation of **property markets**, which underpin **national economies**.

AUD\$5.2 Trillion





**CADASTRE**  
defines and locates **land and property rights, restrictions and responsibilities**





(ICSM)

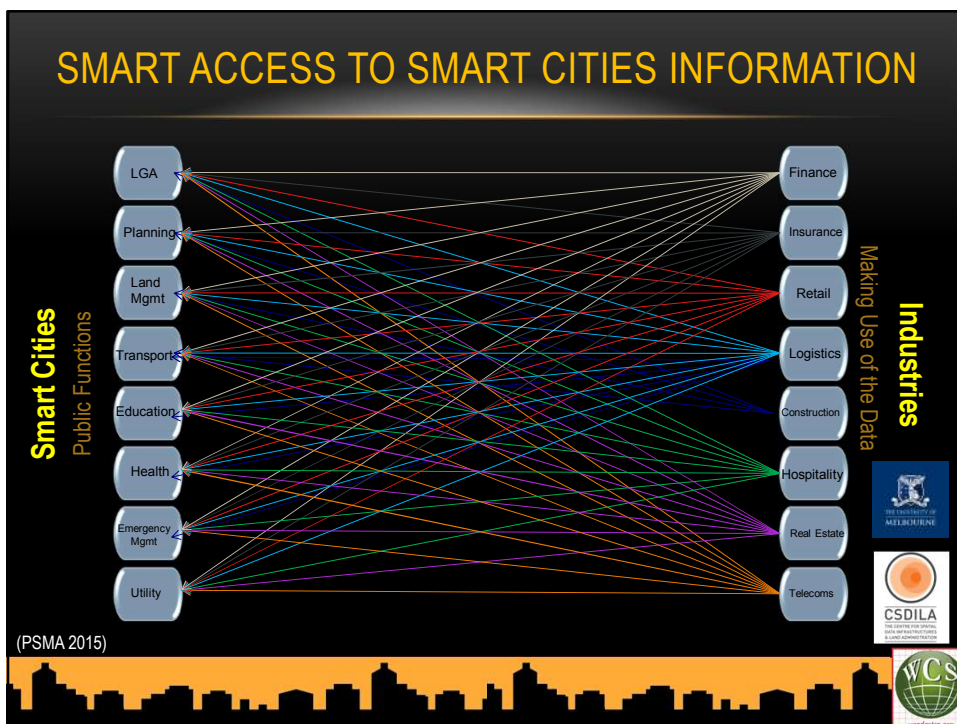
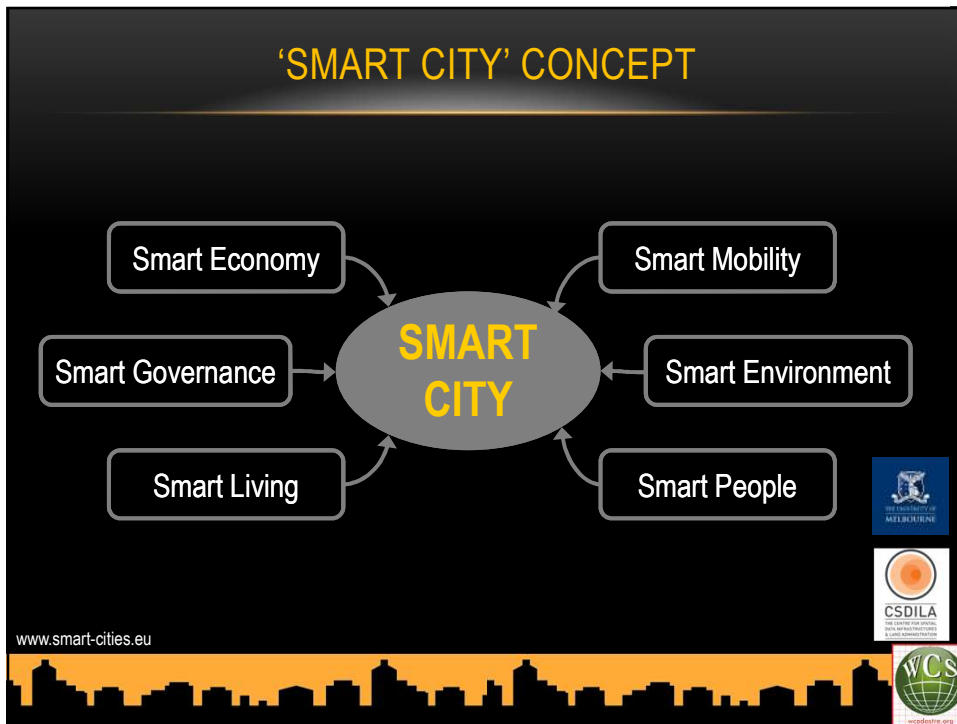
## INCREASING VERTICAL DEVELOPMENT

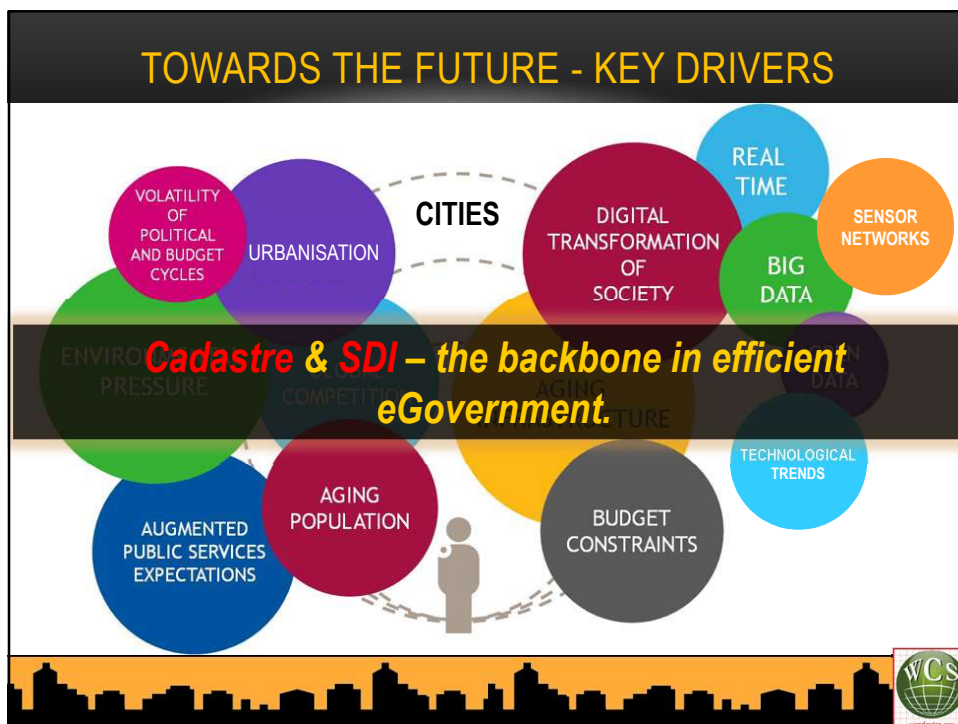


*How can the cadastre accurately and readily identify all property rights, restrictions and responsibilities?*









## “BUSINESS AS USUAL” vs SUSTAINABLE URBAN DEVELOPMENT



Urban Sprawl > Compact




Segregation > Integrated






Congestion > Connected

*Lehmann 2013)*

**..business as usual is not an option!**



## UBIQUITOUS MOBILITY



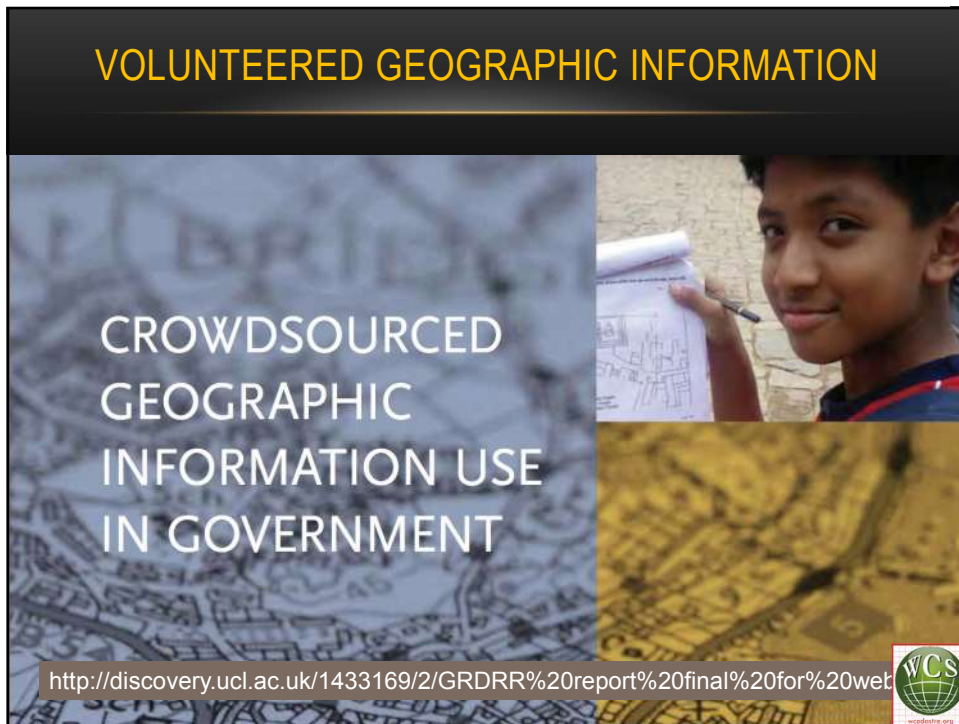




## VOLUNTEERED GEOGRAPHIC INFORMATION

CROWDSOURCED  
GEOGRAPHIC  
INFORMATION USE  
IN GOVERNMENT

<http://discovery.ucl.ac.uk/1433169/2/GRDRR%20report%20final%20for%20web>





*Enabling **evidence-based planning**  
and decision making ..  
..with **location (3D land & property)**  
to manage and deliver information.*

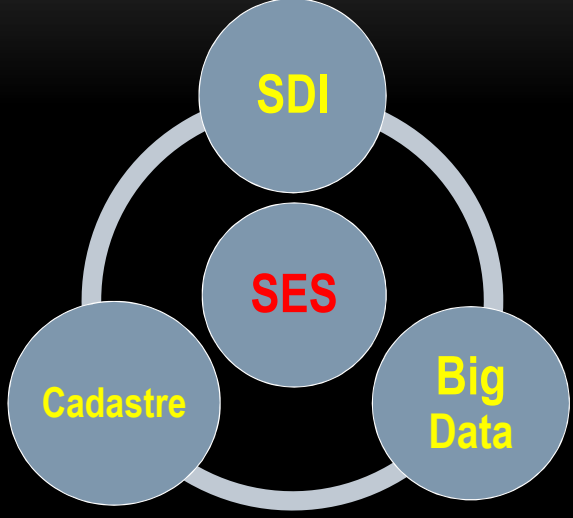


## CADASTRE SHOULD BE USED IN ..



.. every day decision making across the jurisdiction.



## SPATIALLY ENABLED SOCIETY - SUPPORTING SMART FUTURE CITIES



The diagram consists of four overlapping circles arranged in a diamond shape. At the top is a blue circle with 'SDI' in yellow. At the bottom left is a blue circle with 'Cadastre' in yellow. At the bottom right is a blue circle with 'Big Data' in yellow. In the center is a red circle with 'SES' in white. A thick grey line connects the outer edges of the four circles, forming a continuous loop.





**Urban Connectedness**  
– engineering the nervous system of the city –

**PLANMELBOURNE**  
METROPOLITAN PLANNING STRATEGY



**‘Plan Melbourne’ (to 2050)**

**PLANMELBOURNE**  
METROPOLITAN PLANNING STRATEGY

**“MELBOURNE WILL BE A GLOBAL CITY OF OPPORTUNITY AND CHOICE.”**

- **House, employ and move** more people around the metropolitan area, and beyond.
- **Build confidence, investment and employment**
- **Become a global city of opportunity and choice.**



## Planning and spatially-enabled data

*"everything happens somewhere"*

**But most information is static or in 2D format**

**CSDILA**  
THE CENTRE FOR SPATIAL DATA INFRASTRUCTURES & LAND ADMINISTRATION

**Land and Property Information in 3D**

**WCS**

## LIMITATIONS OF 2D INFORMATION

architectural plans   sketches   site survey   engineering plans   subdivision plans   other documents

planning

development

management

community knowledge

**UNIVERSITY OF MELBOURNE**

**CSDILA**  
THE CENTRE FOR SPATIAL DATA INFRASTRUCTURES & LAND ADMINISTRATION

**WCS**

## NEW TECHNOLOGICAL OPPORTUNITIES



**BIM**



**Digital data**



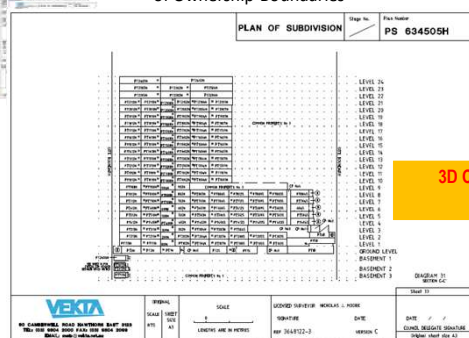
**3D trends**





## 3D CADASTRE DATA MODEL (3DCDM)

Paper based Representation of Ownership Boundaries




**3D Cadastral Data Model (3DCDM)**


**Includes:**

- ✓ Legal objects
- ✓ Physical objects

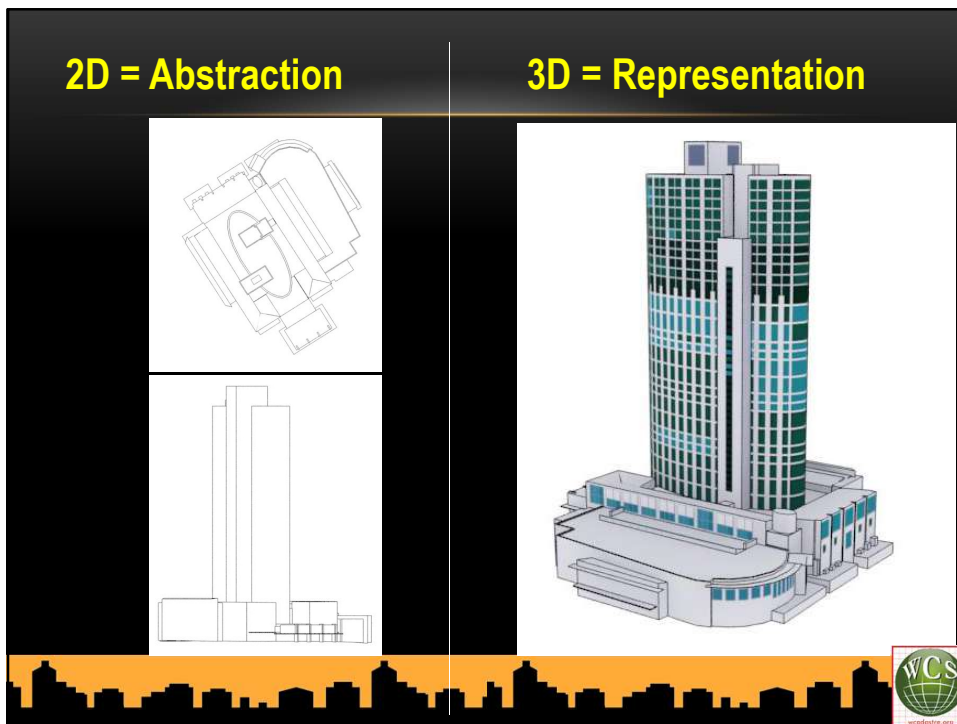
Digital Representation of Ownership Boundaries and Physical objects, including BIM

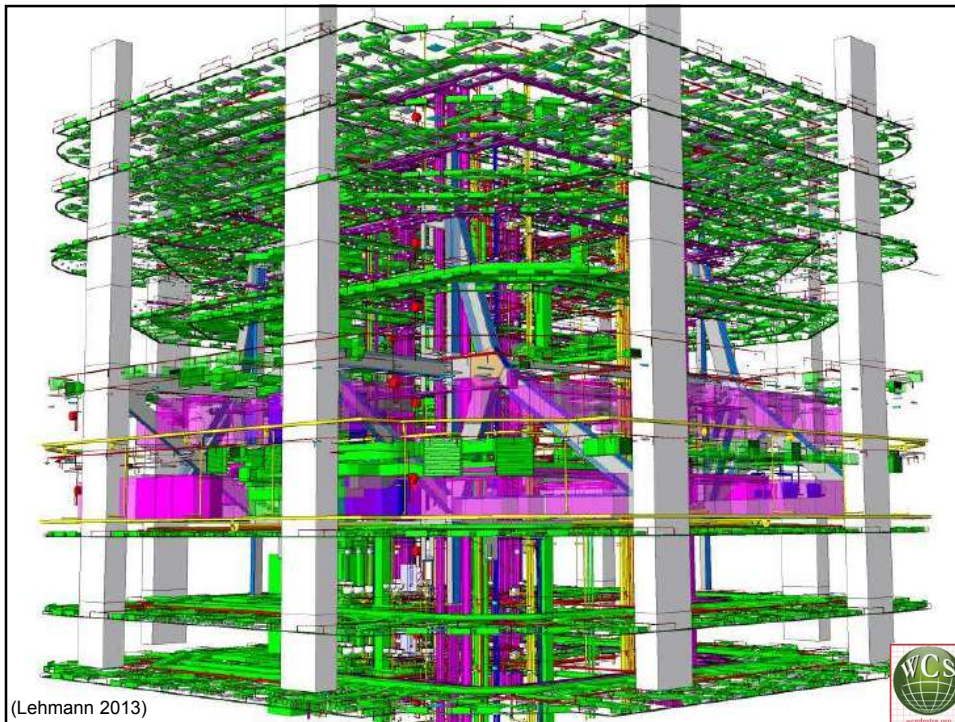


- ✓ Legal objects (eg. ownership boundary, easement...)
- ✓ Physical objects (eg. Wall, floor...)









### 3D LAND & PROPERTY INFORMATION

From an **individual** property and building level to a **city level**

***This requires a spatially accurate map-base and cadastre as a foundation.***

Building

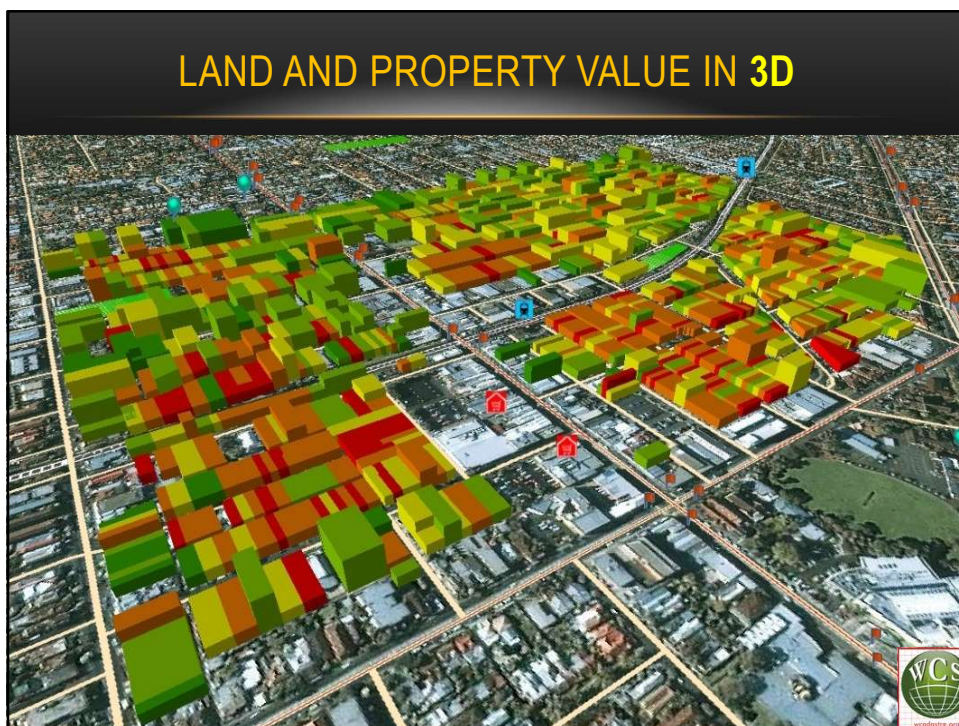
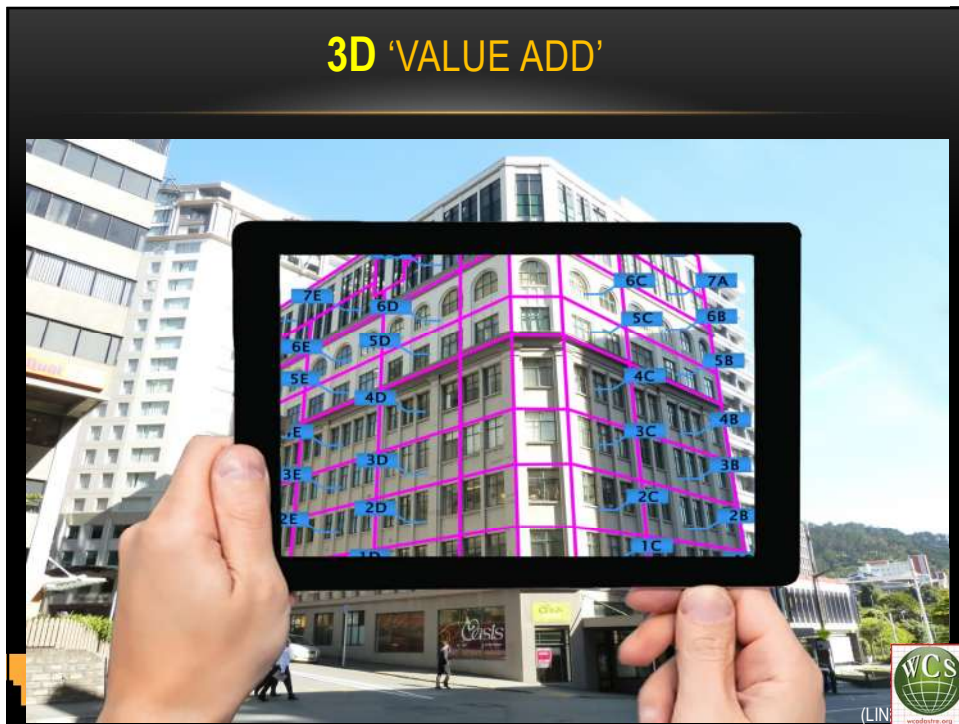
Precinct

City

(MUTOPIA 2013)

Logos: THE UNIVERSITY OF MELBOURNE, CSDILA (CITY OF MELBOURNE'S CADASTRE, SURVEYING & LAND ADMINISTRATION), WCS



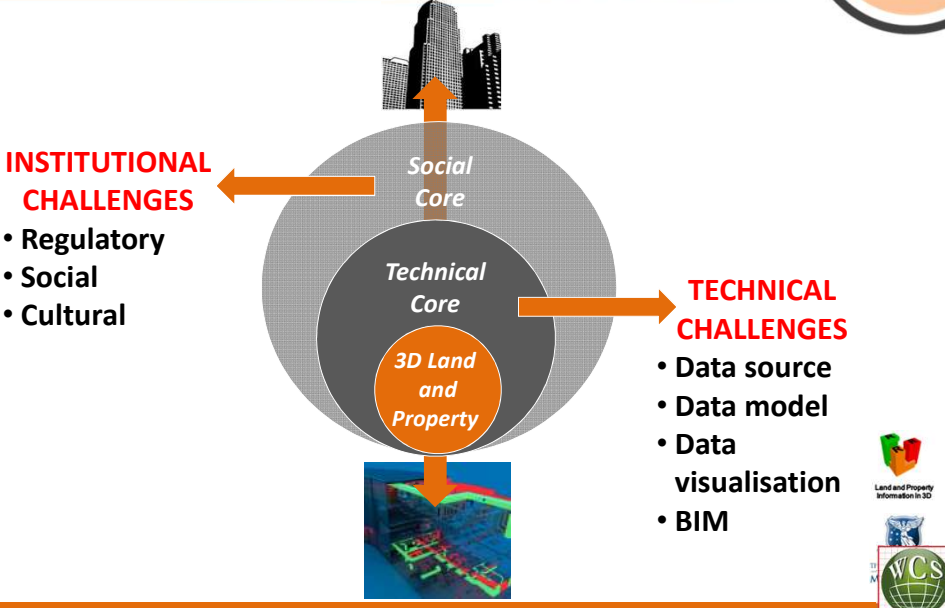




## Roadmap and Potential Strategies



## Project Focus



**INSTITUTIONAL CHALLENGES**

- Regulatory
- Social
- Cultural




Social Core

Technical Core

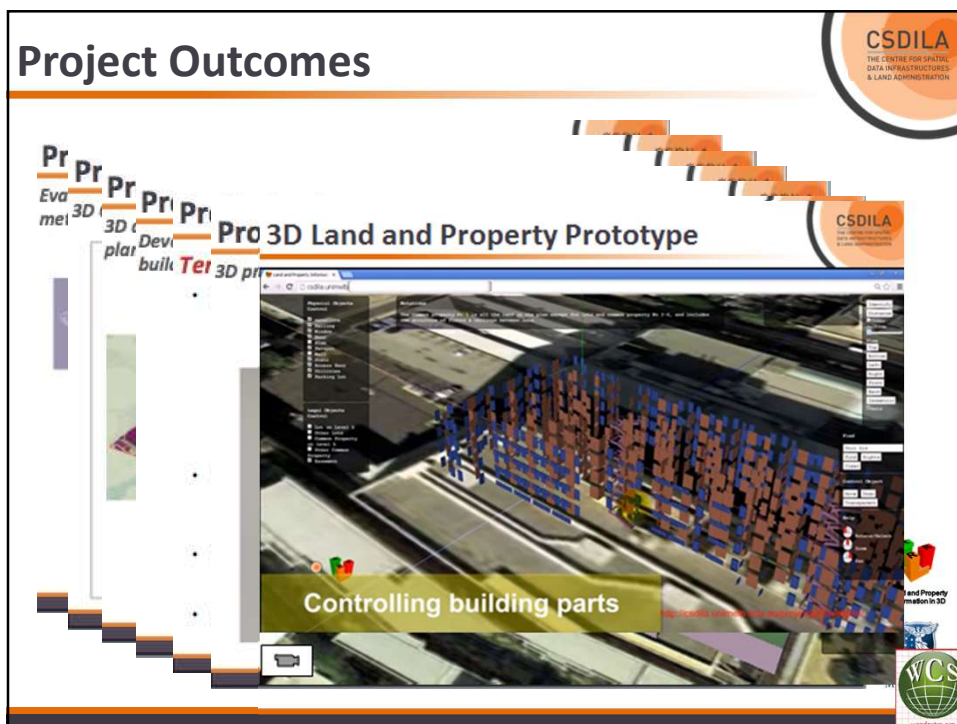
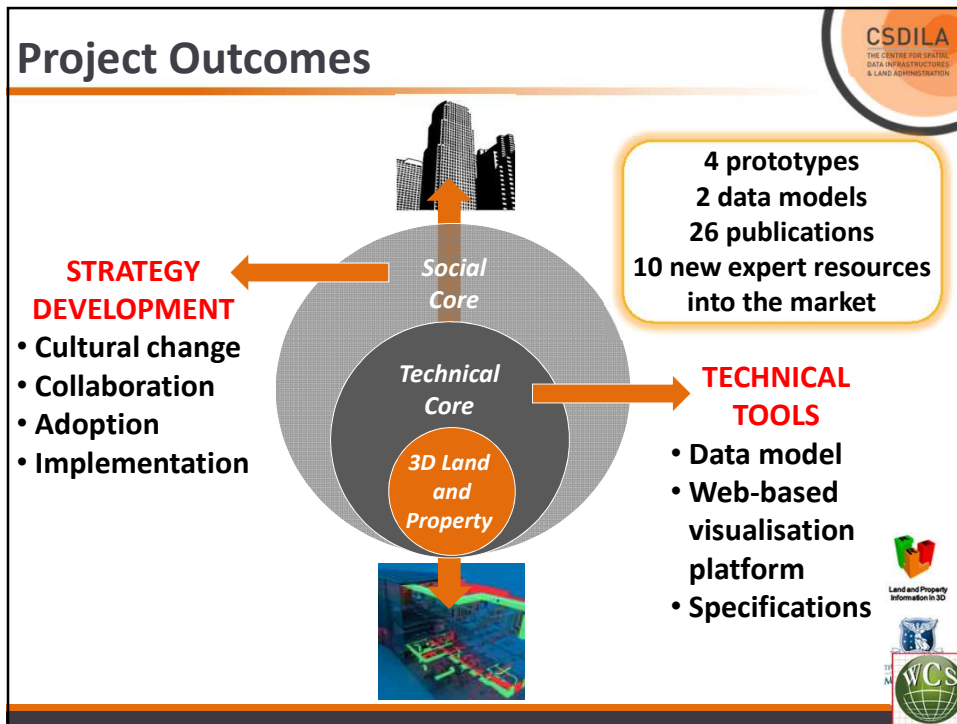
3D Land and Property

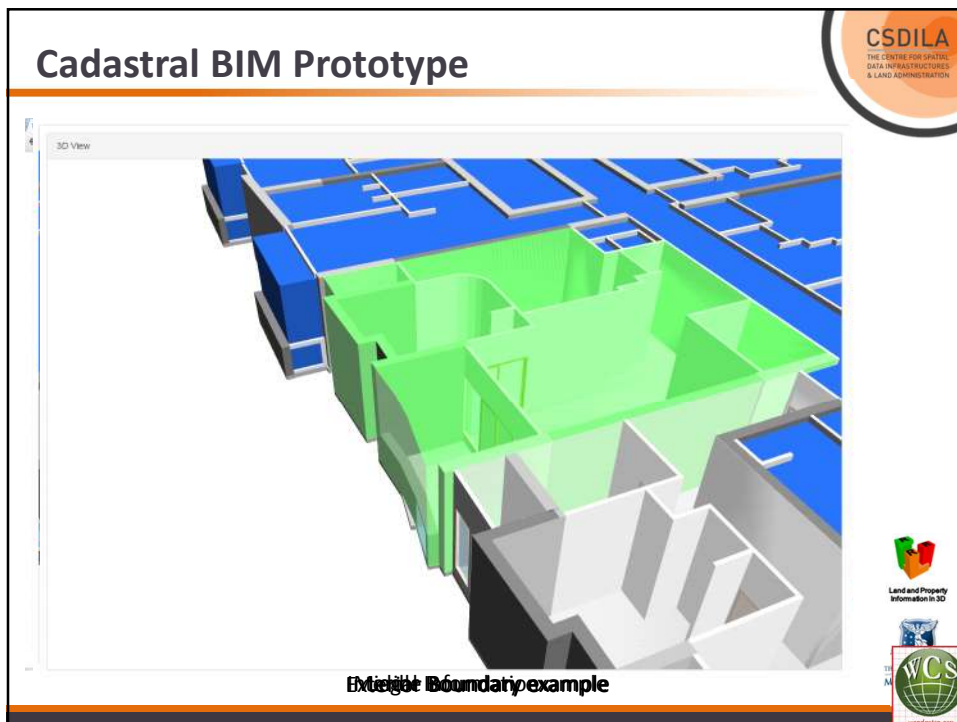
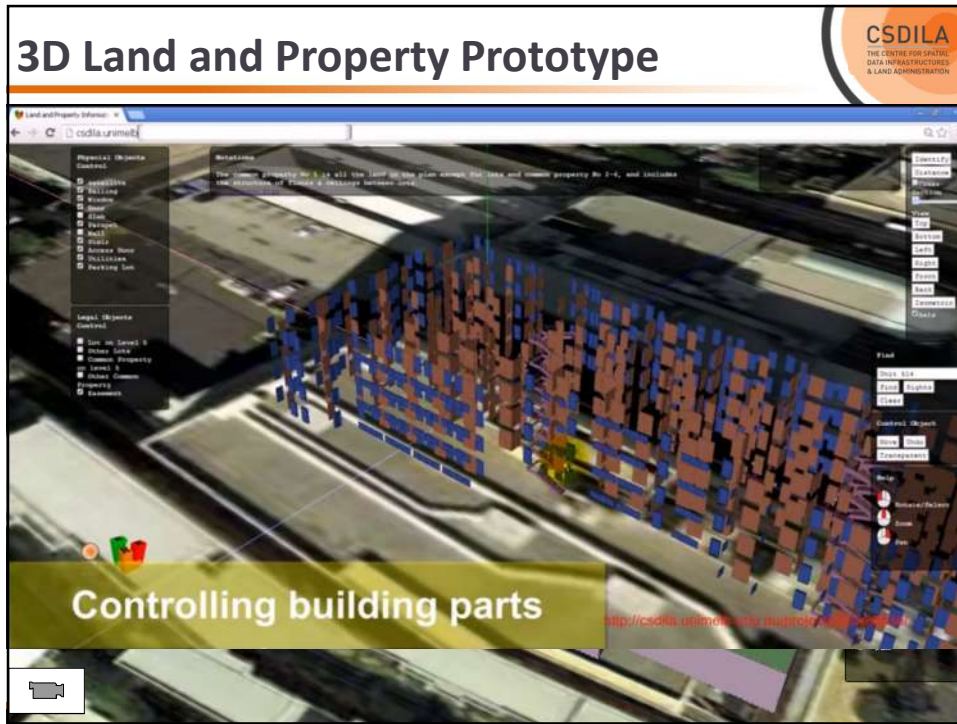
**TECHNICAL CHALLENGES**

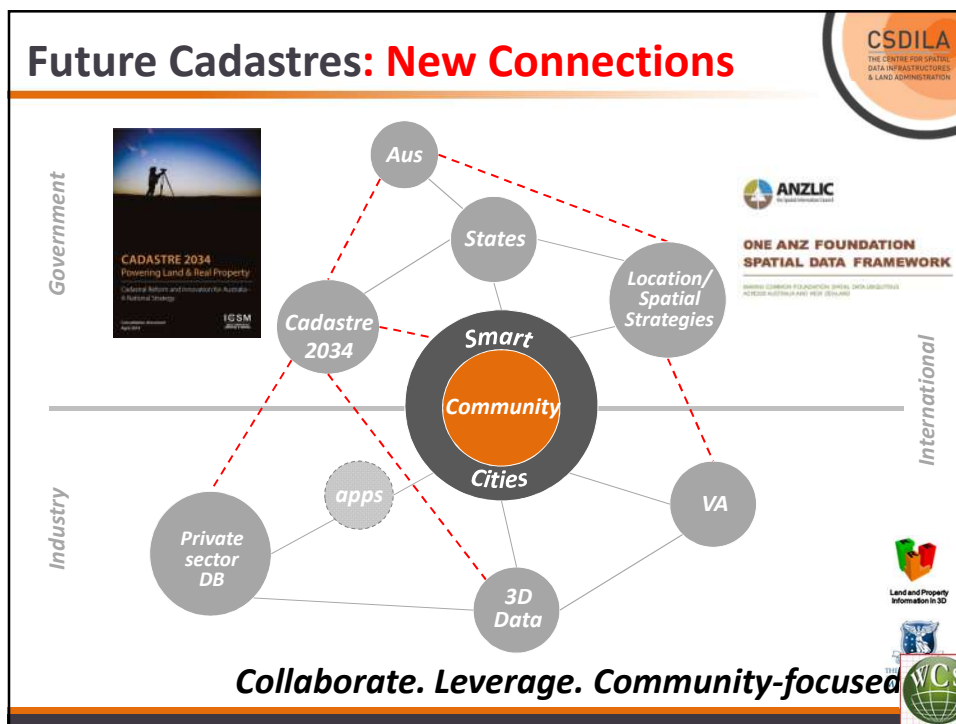
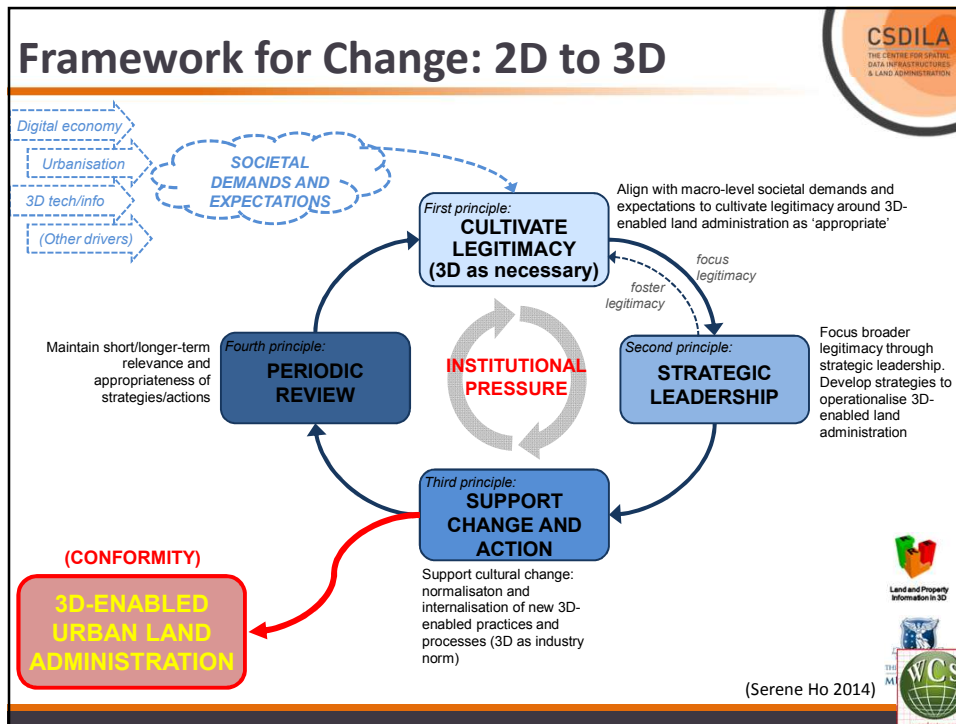
- Data source
- Data model
- Data visualisation
- BIM













**THANK YOU**

[www.csdila.unimelb.edu.au](http://www.csdila.unimelb.edu.au)

Logos: The University of Melbourne, CSDILA, and WCS.