ICSM
ANZLIC COMMITTEE ON SURVEYING & MAPPING

3D Cadastres

7th International FIG Workshop on 3D Cadastres
11-13 October 2021, New York, USA

The Australia / New Zealand 3D Cadastral Survey Data Model and Exchange Project

Anselm Haanen
New Zealand Surveyor-General
Project Sponsor

FIG

Outline

- Introduction to Australia / New Zealand Cadastral Systems
- 3D Cadastre in Australia / New Zealand
- Enabling lodgement of fully digital cadastral survey datasets
- Project to develop the framework for fully digital lodgement
- Project progress report

Land Information New Zealand
Toitū te whenua

Australian Government
Geoscience Australia

Australian Government
Department of Defence

ACT Government
Environment and Planning

NSW Government
Spatial Services

Proudly sponsored by
Northern Territory Government
Department of Infrastructure, Planning and Logistics

Queensland Government
Department of Natural Resources, Mines and Energy

Government of South Australia
Department for Infrastructure and Transport

Tasmanian Government
Department of Primary Industry, Water & Environment

Victoria State Government
Environment, Land, Water and Planning

Government of Western Australia
Landgate

Who is ICSM?

Intergovernmental Committee on Surveying and Mapping

Jurisdictions / Land Administration Agencies

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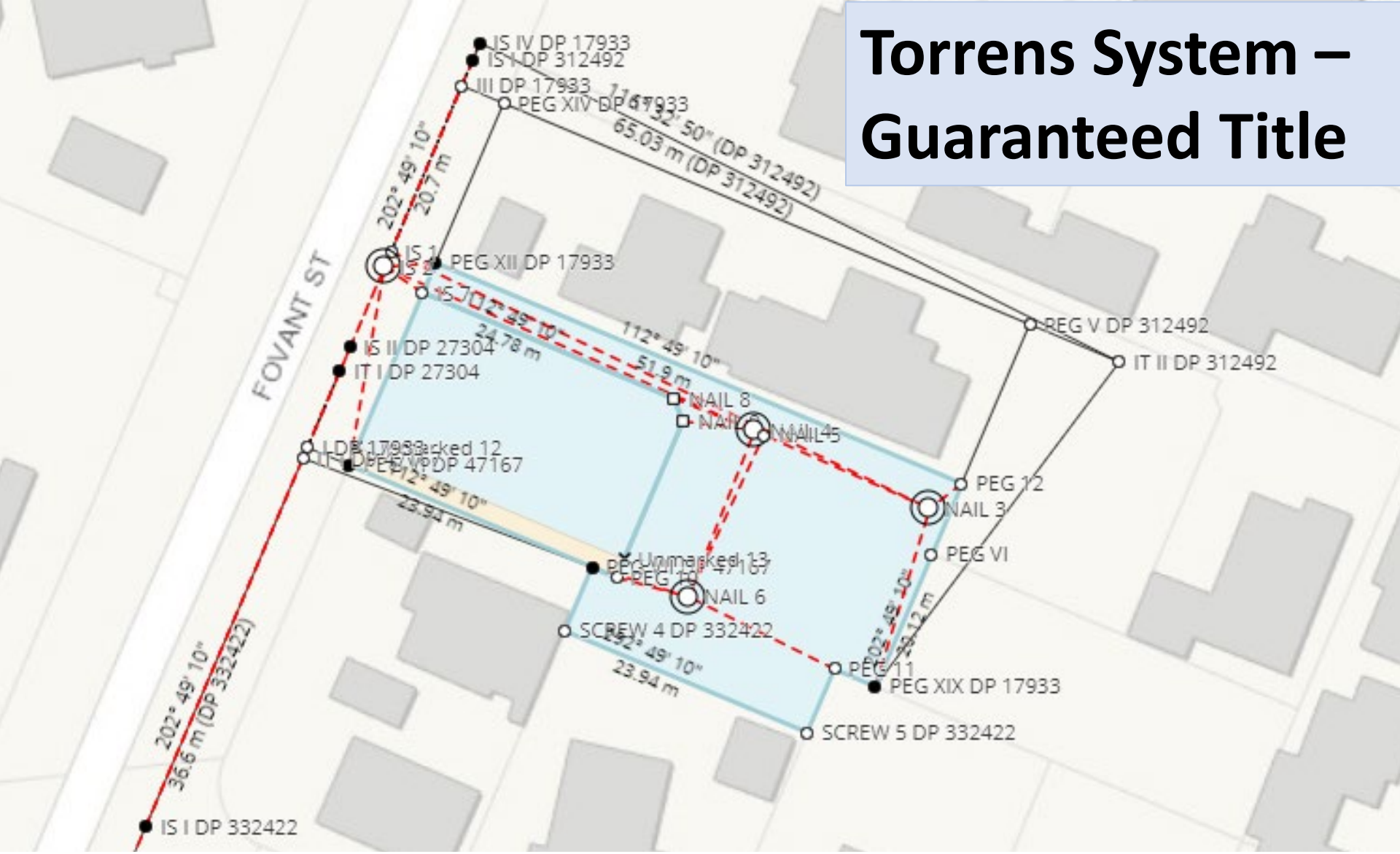
Torrens System – Guaranteed Title



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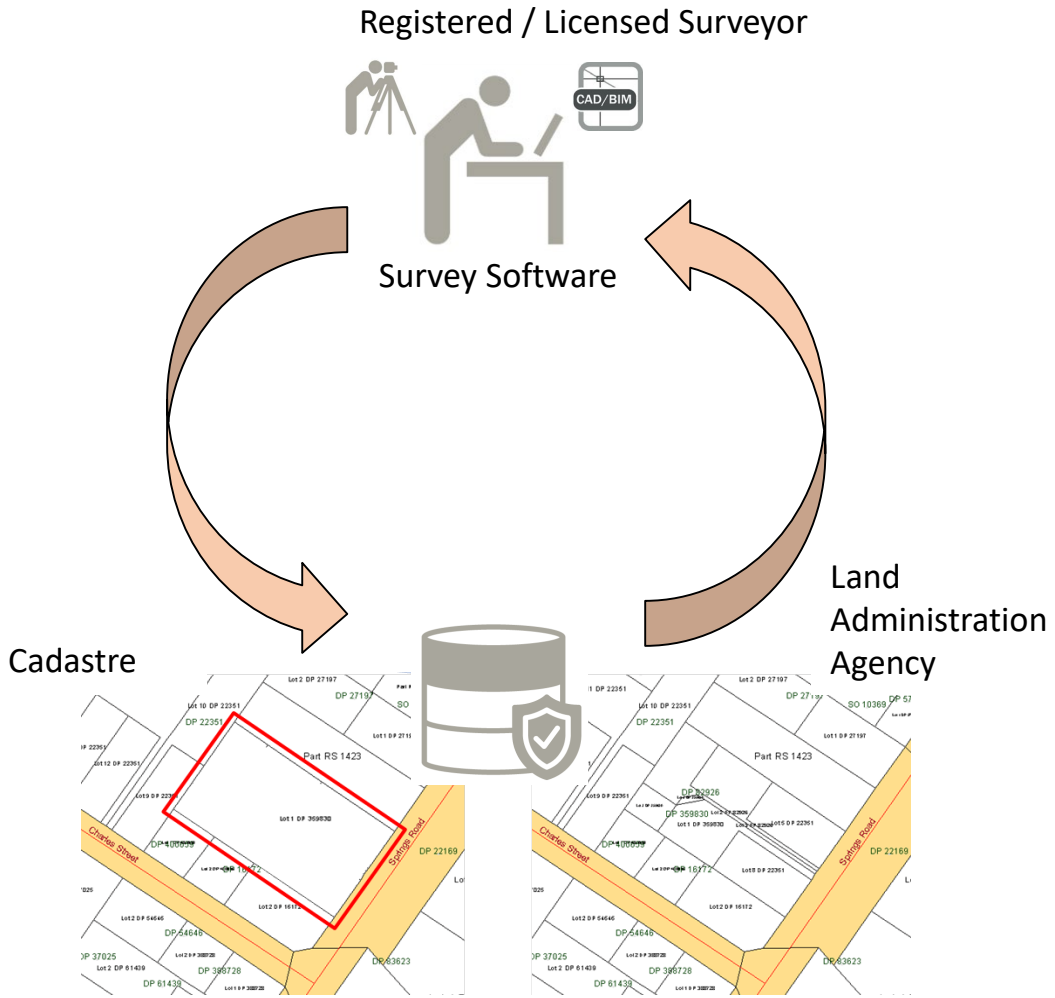
Aiming for Cadastral Modernisation

- All information in the cadastre comes from Registered / Licensed Surveyors
- Lodging survey plans or cadastral survey datasets
- Aiming for digital lodgement of datasets (no plans)



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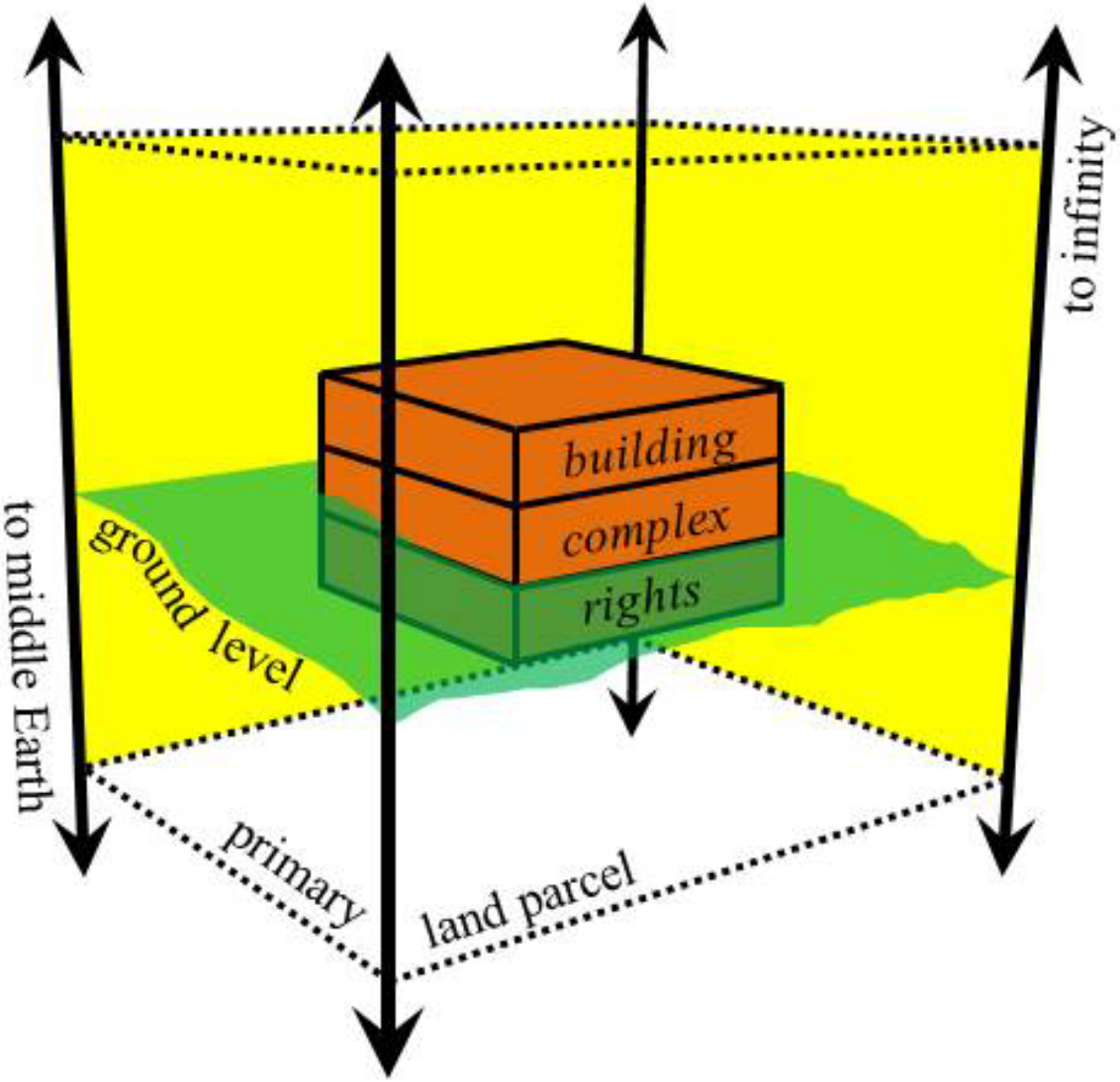
All property boundaries are 3 dimensional



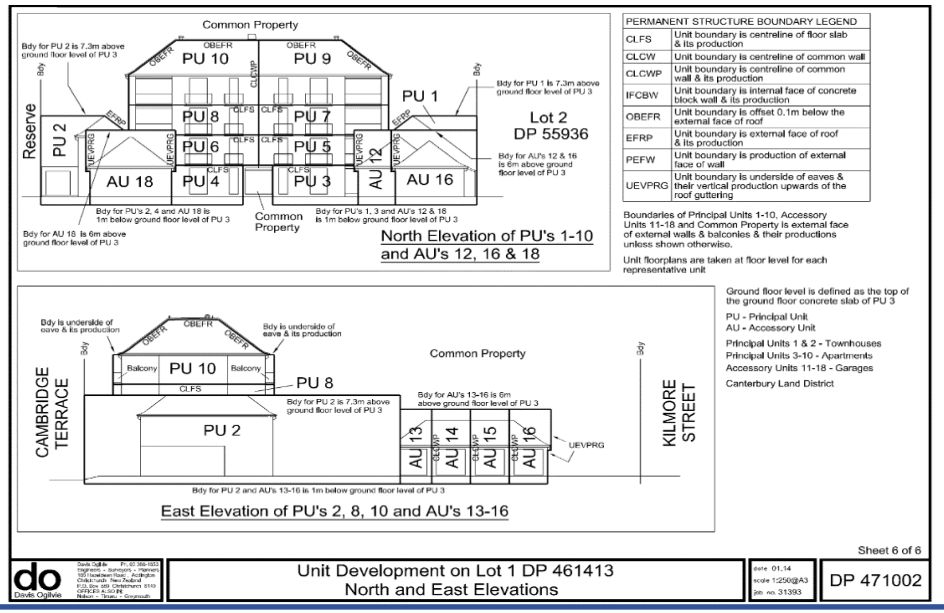
Extents of property rights in New Zealand
(Gulliver, 2015)

3D Cadastre

Australia & NZ already have 3D **legal** cadastres

Two types:

- **Unit titles** - primary means of multi-unit property ownership (approx. 160,000 unit titles)
- **3D Parcels** (eg. underground; air space)
- Neither are currently digital / spatial
- Looking for a 3D **Digital** cadastre



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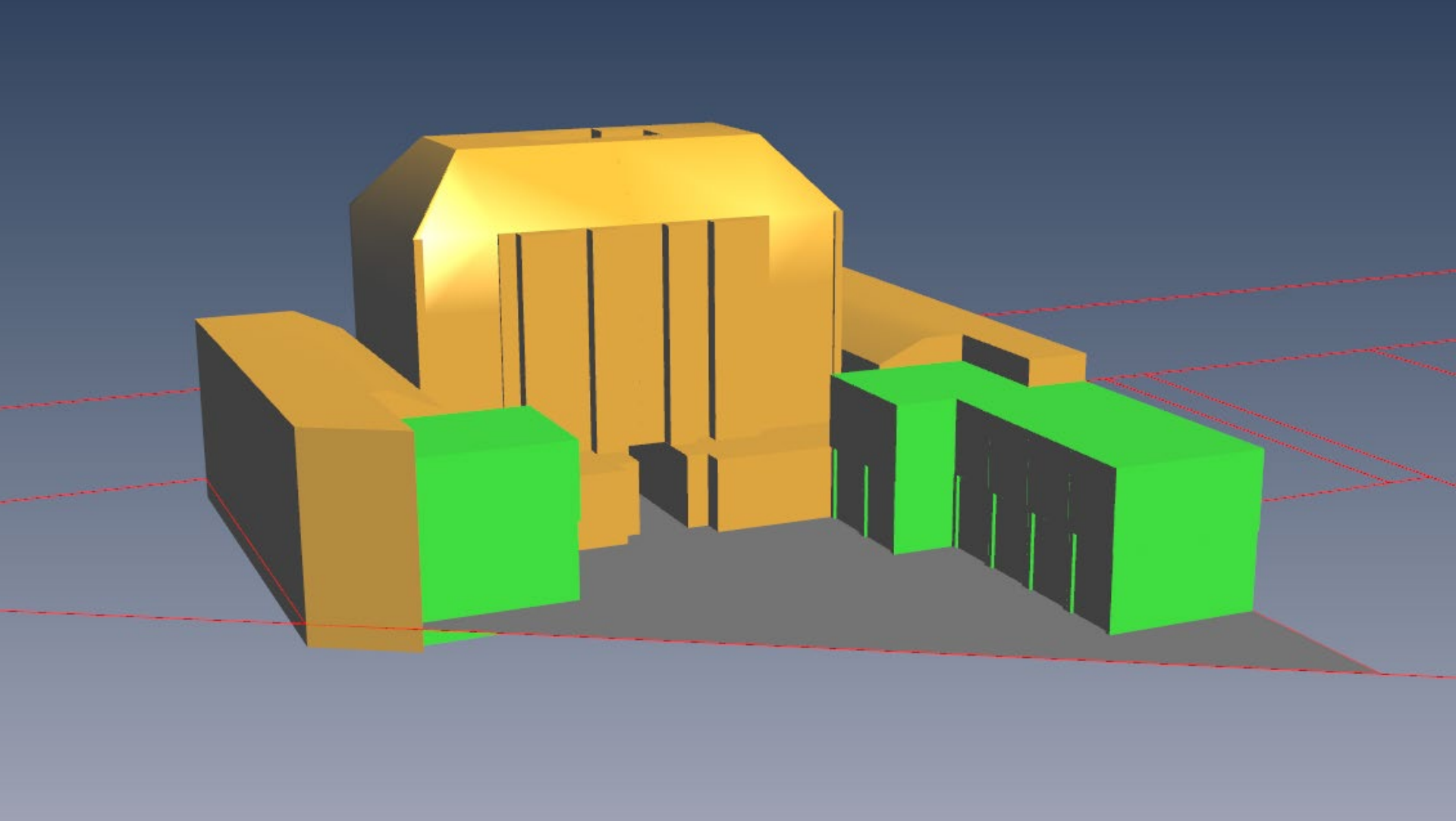

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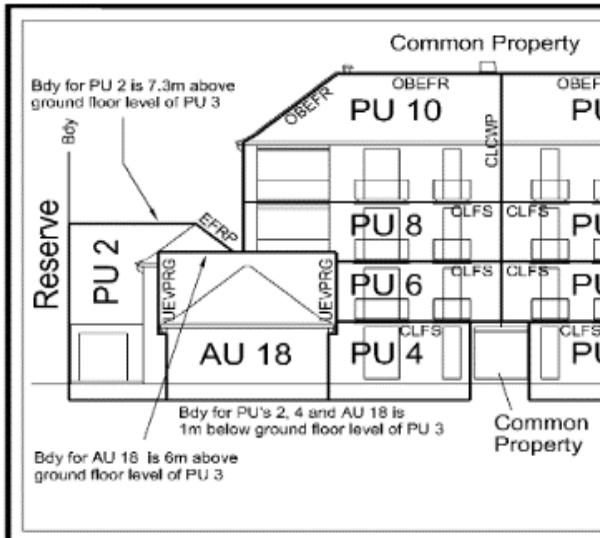
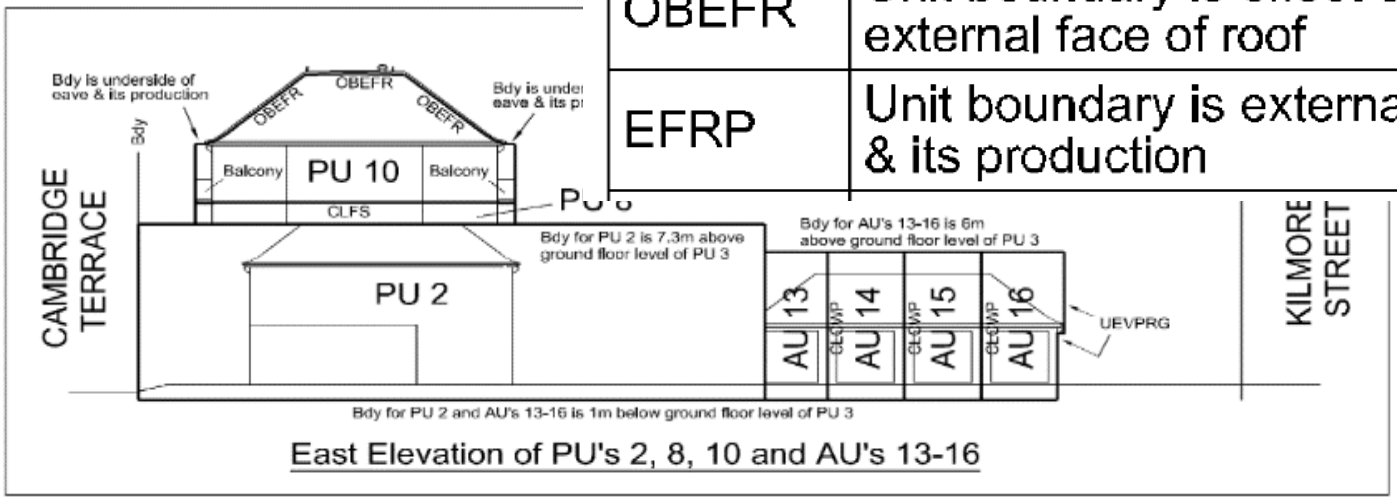


PERMANENT STRUCTURE BOUNDARY LEGEND	
CLFS	Unit boundary is centreline of floor slab & its production
CLCW	Unit boundary is centreline of common wall
CLCWP	Unit boundary is centreline of common wall & its production
IFCBW	Unit boundary is internal face of concrete block wall & its production
OBEFR	Unit boundary is offset 0.1m below the external face of roof
EFRP	Unit boundary is external face of roof & its production



East Elevation of PU's 2, 8, 10 and AU's 13-16

Sheet 6 of 6

Davis Ogilvie
Engineers + Surveyors + Planners
105 Hazeldean Road, Addington
Christchurch New Zealand
P.O. Box 589 Christchurch 8140
OFFICES ALSO IN
Nelson - Timaru - Greymouth

Unit Development on Lot 1 DP 461413
North and East Elevations

date 01.14
scale 1:250@A3
job no. 31393

DP 471002

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Problems in Exchanging Digital Cadastral Survey Datasets

No widely adopted transfer mechanism

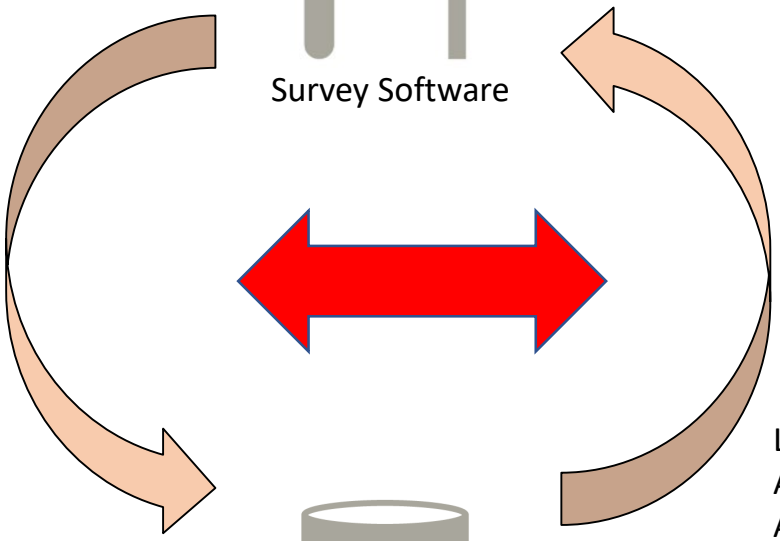
- Modest success with LandXML (2D) / ePlan
- LandXML difficult to implement
- Significant variations between jurisdictions undermines support from survey software suppliers
- No capability for 3D digitalexchange

Solution Approach (1)

- '3D Cadastral Survey Dataset and Exchange' - not '3D Cadastre'
- Applications used in jurisdictional cadastral systems (e.g. ArcGIS) can handle 3D data
- Survey and spatial software handles 3D data (competition!)
- Jurisdictions can specify the data that surveyors have to lodge

Registered / Licensed Surveyor

Survey Software



Land Administration Agency

Cadastre

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Solution Approach (2)

- Ask software suppliers to confirm if their applications and processes can deliver the required data
- Ask software suppliers to advise how best to encode the data
- Jurisdictions agree on new Standard framework for receiving and delivering data in their cadastral systems

The Project – Contract Deliverables

1. **A harmonised cadastral survey data model**
   - Covers all Australian and NZ cadastral survey datasets
   - 2D + 3D (new, opportunity)
   - Vendor neutral / independent of implementation
   - Jurisdiction mapping
2. **Options for transfer format/s and exchange mechanism**
   - Internationally recognised / widely adoptable encoding format

Project Scope

- Focus on ‘Exchanging’ data
- Not building or designing ‘3D Cadastre’
- Excludes database design / GIS Integration
- Excludes back capture
- Excludes direct relationship with BIM

Contractor: Surround Consortium

Surround

Data Modelling, Location Intelligence, Linked Data, Semantic Technologies.

McKenzie & Co

Australia and New Zealand Cadastral Surveying

Evolve & Amplify

Delivery Management and Stakeholder Engagement expertise.

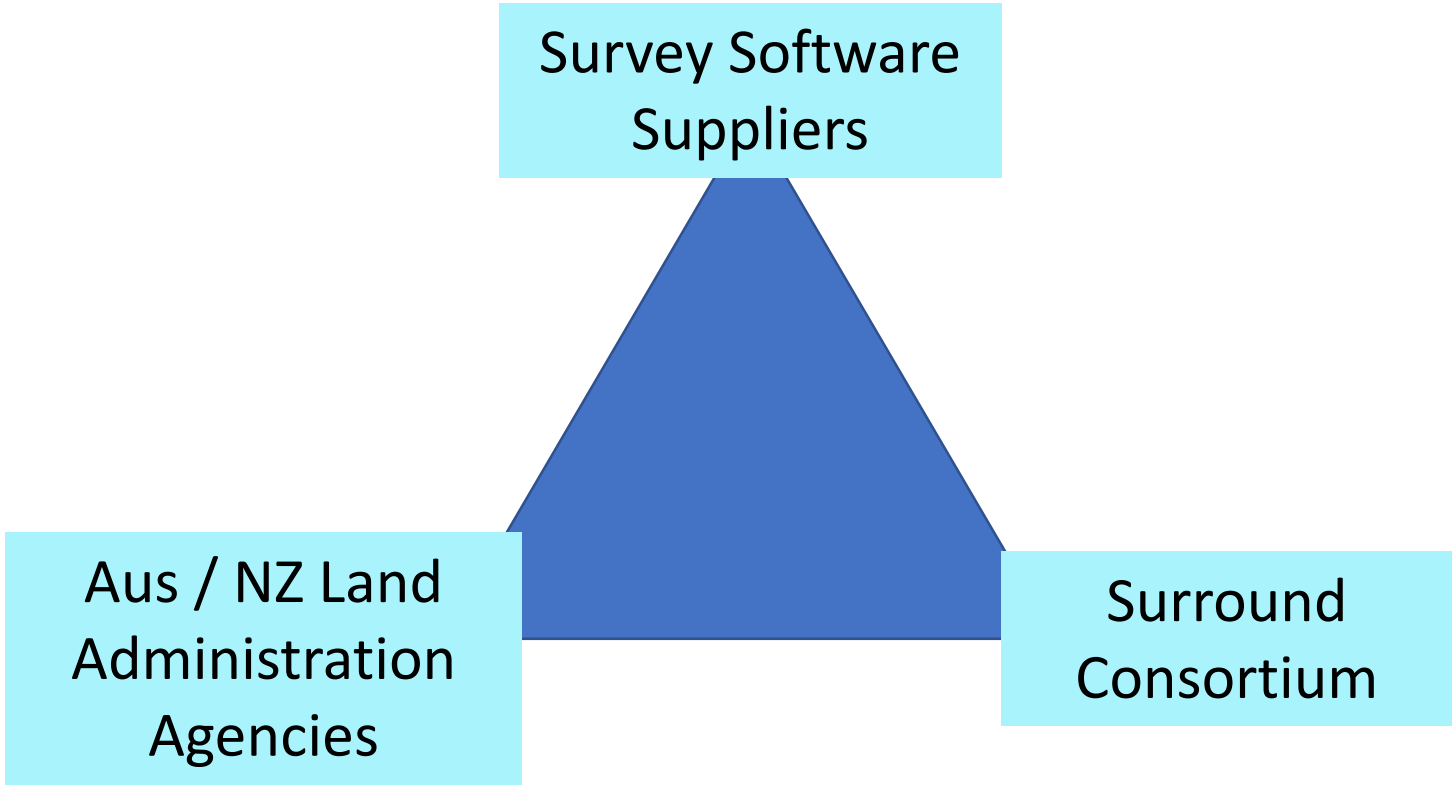
OpenWork

Interoperability, Open Data and Standards, Cadastre & Spatial Data.

Pangaea Innovations

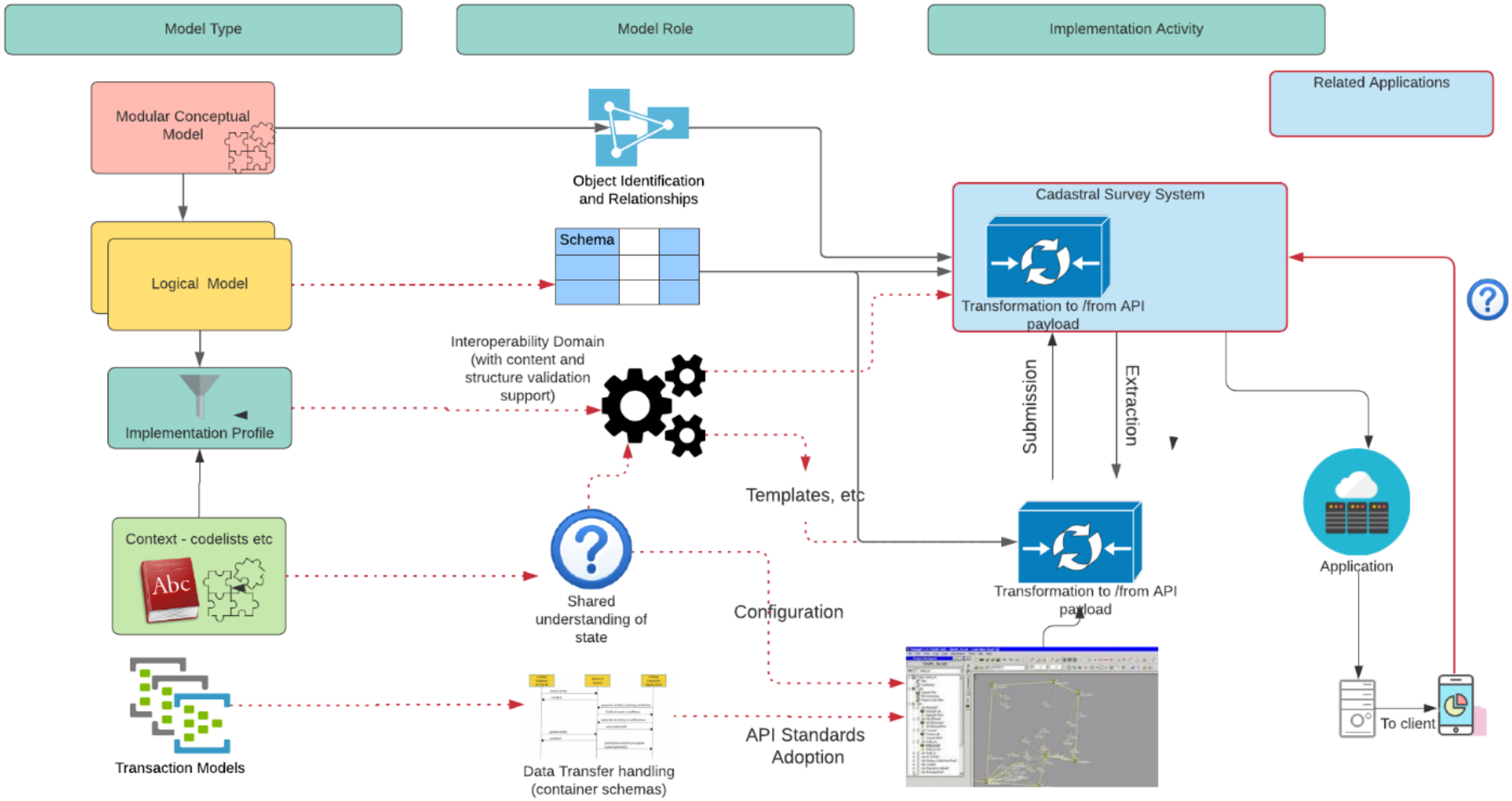
3D/4D geospatial data integration, geospatial modelling, and visualisation.

Collaboration



Progress to date (1)

- Surround Ontology Platform – the 'engine'
  - Requirements driven
  - Common Terminology
- Multi-level Integrated Data Model (Conceptual, Logical, Physical)
- Jurisdiction Profiles – of the Harmonised Data Model



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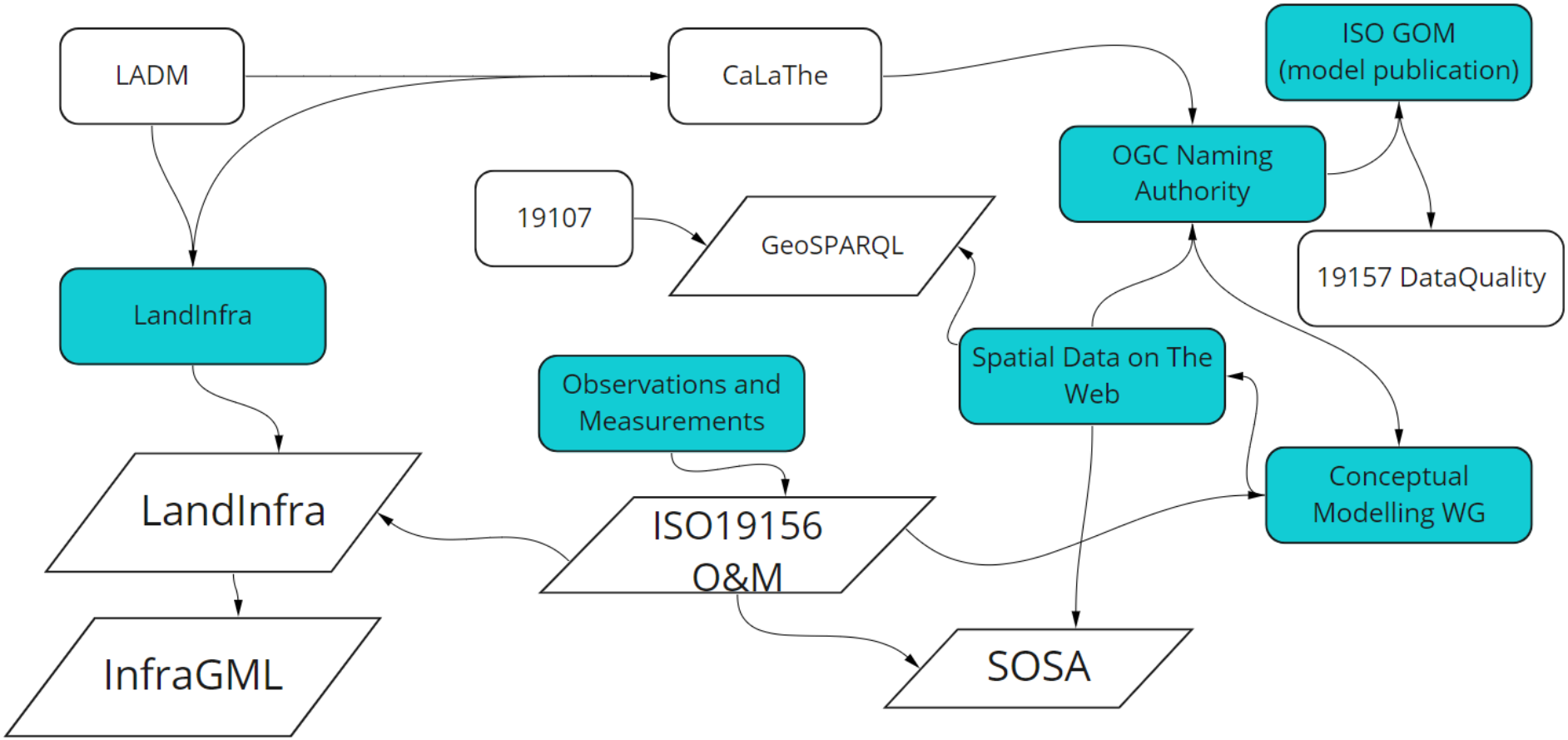
Progress (2)

- Possible to generate an OGC-type Standard
- Initially for Australia / New Zealand
- Within framework for international standards:

Surround Ontology Platform …



Some 3D Issues

- To what extent the model includes **building elements** (as references for the location of boundaries);
- To what extent the model can simply embrace **3D spatial objects** (= 'Volumes' or polyhedrons) and rely on survey and spatial software to manage them;
- How to manage Volumes with **unlimited height** (depths);
- To what extent the model embeds **cadastral rules** e.g.
  - Volumes (including original '2D' volume) to be completely replaced by new volumes (i.e., no gaps and overlaps in primary Volumes)
  - Secondary Volumes cannot to overlap primary Volume boundaries

Project - Next Plans …

- Complete information input from all jurisdictions
- Collaborate with survey software suppliers to confirm model and encoding options
- Project Deliverables completed by March 2022
- Proposal for adoption to ICSM – mid 2022
  - Jurisdictions agree to support the framework / foundation
- Publication – late 2022

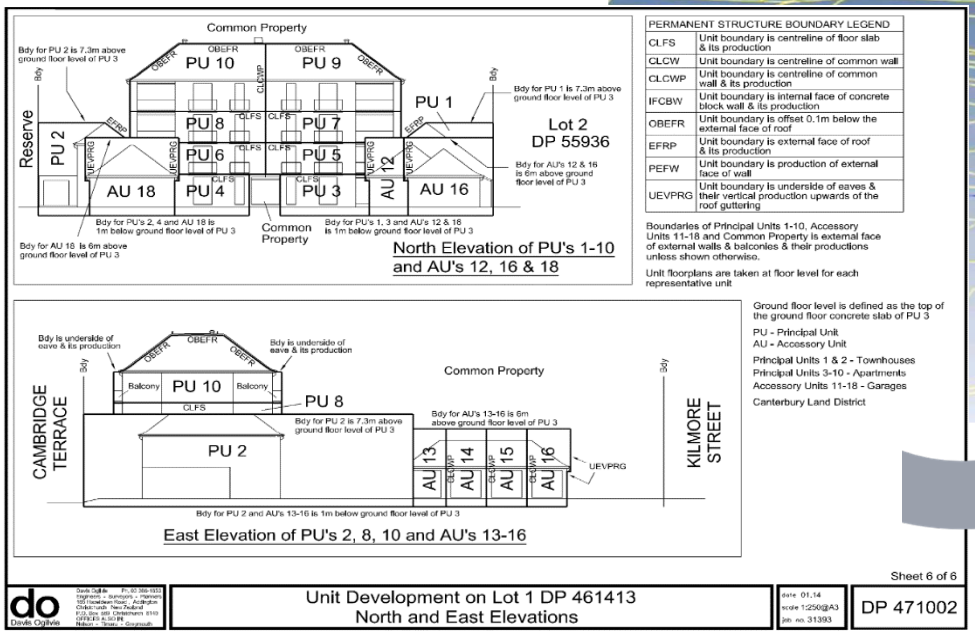
Subsequent Implementations

- Survey software suppliers adopt standard and develop solutions for surveyors
  - Competitive market
- Each jurisdiction responsible for their own implementation, different:
  - Progress
  - Timing
  - Breadth

New Zealand's Implementation Plan

- LINZ's 'Rebuilding Landonline' programme (to 2024-25)
  - Surveyors lodge a complete digital cadastral survey dataset (not a plan)
  - System generates views ('plan') of the cadastral survey dataset
  - Initially for 2D datasets (already prototyped)
  - Then add 3D datasets

3D Plans ➔ 3D Datasets



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