Victorian Digital Cadastral Modernisation Adjustment Project

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Managing Director
Melbourne, Australia
The State of Victoria

About our State

6.65 million
*Current* Victorian population

Top 10 most liveable
Ranked in world’s top 10 most liveable cities since the Economist Intelligence Unit’s index began in 2002

Second-largest
economy among Australian states

90% residents
live in cities and towns, making it the most urbanised Australian state

We’re experiencing unprecedented population growth...

10.1 million
Population in 2051

...which means big business for property

33,800
Houses

8,600
Semi-attached, townhouses & low rise apartments

6,100
High rise apartments

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ABS, 3105.0.65.001 - Australian Historical Population Statistics, 2016

ABS, 8731.23 – Building approvals, Australia, July 2021
The development of housing, transport, environmental and social infrastructure to ensure our sustained economic resilience, liveability and well-being depends on reliable and accurate mapping of land ownership.
The Digital Cadastral Modernisation Project

Client: Victorian Dept of Environment, Land, Water and Planning

Government Investment: $47 million

Scope: the whole State of Victoria (3.1 million parcels)

Duration: 3 years
Prior to the DCM project:

>4% of parcels met spatial accuracy requirements

Out by up to 10m metro & 50m rural
DCM is delivering 10cm metro & 1m rural

Hidden ‘costs’ from poor spatial accuracy

Regulatory compliance gaps, poor decision-making and reputational risk

Inaccuracy impedes planning and slows development

Non-digital processes inefficient, duplicate effort
Cadastral Data Improvement – intended lifecycle

Surveyor retrieves digital cadastre; undertakes survey; prepares plan; submits ePlan and survey.

Registration of title, ePlan and survey.

End goal is continuous improvement.

Vicmap products updated to reflect changes in the digital cadastre.

Automated update of digital cadastre via adjustment.

Phase 1 - Back Capture

Phase 2 - Adjustment

Phase 3 - Integration
Perceived barriers

**COMPLEXITY**
- Disparate data quality
- Data preparation and management
- Computing environment
- Adjustment software
- Resolution of problematic adjustments
- Maintaining cadastral intent
- Analysis and interpretation of results
- Quality assurance

**INEFFICIENCY**
- Data compilation and cleansing
- Data volumes
- Computational demands
Practical solutions

AUTOMATION

• Data segmentation
• Phased approach
• Detection/correction of association errors
• Adjustment
• QA of adjustment results
• Post-adjustment node association/validation

SYSTEM DESIGN

• AWS-based cloud computing
• Multi-thread processing
• Purpose built QGIS adjustment/data editing interface and data management system
Data Hierarchy

- State
- LGAs
- Zones
- Blocks
- Plans
- Measurements
Survey plans to blocks

- Successful least squares adjustment of cadastral measurements requires an understanding of cadastral surveying legislation, policies and practices over 150 years.

32 Plans in Block 11567
Blocks to zones to LGA

21 Blocks in Zone 427

22 Zones

LGA - Bayside
DCM Production System – high level workflow

VICTORIAN GOVERNMENT

- Raw data
  - Digital surveys
  - Aerial images
  - Control points

- Adjusted data
  - Adjusted parcels
  - Shift vectors
  - Process attributes

Spatial Vision

Zone and block definitions

QGIS

- Auto adjustment
  - Operator supervised adjustment

- LGA package supply
  - Data and metrics

QA

DynAdj

Dynamic network adjustment software
DCM Production System – customised QGIS operator interface
Quality Assurance - Block QA System Form

Adjustment incomplete
Adjustment statistically successful

But Mandatory Test pass in AutoQA failed, needs actions
Validation Tools

Validation (v2.1.126) - Block 354000020308

Auto QA Shift checks Detail checks Fit for purpose

Type: Near points
Threshold (m): 0.01

3 records found

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Validation (v2.1.126) - Block 354000020308

Auto QA Shift checks Detail checks Fit for purpose

Type: Gaps

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Data volumes (per LGA)

Number of measurements and unknowns

National geodetic adjustment
- 2.4 million measurements
- 332,328 stations

(Just) 5 Victorian LGAs
- 4.9 million measurements
- 1.2 million stations

Bar chart showing data volumes for different LGAs in Victoria, Australia.
Key outcomes

- Project will deliver 3.3 m adjusted parcels
- High level of productivity/efficiency achieved
- Optimal use of available data
- Cadastral intent maintained
- Validated statistical quality estimates
- Valuable by-products (e.g. shift vectors)

Spatial Vision has developed highly scalable and automated system/workflow – based on an open source tech stack.

Talk to us about how we can help you with your cadastral improvement project.