



# The eGeodesy Project

of the Intergovernmental Committee on Survey and Mapping

**Jemma Picco, Matt Higgins, Robert Sarib, Gary Johnston and Graeme Blick**

*eGeodesy Project Team of the Geodesy Technical Sub-Committee (GTSC) of ICSM*

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## Outline

- Size and Shape of Australia & New Zealand
- Current Geodetic Environment
- Background – ICSM and the project
- Project Aims & Methodology
- Project to date – planning & analysis
- Next steps – analysis, design, implement



## Size and Shape of Australia & New Zealand

**Australia**

- 6th largest country (5% world's land area)
- Lowest, flattest and (apart from Antarctica) driest continent
- Nearly 22 times the size of Germany
- Consists of many jurisdictions, States and Territories

**New Zealand**

- Also an island nation
- Larger than the United Kingdom
- Lies across the obliquely convergent boundary between the Pacific and Australian tectonic plates
- Unlike Australia, only one body (LINZ) governs surveying, geodetic and mapping systems



## Current Geodesy Environment

- Australia and New Zealand both adopted geodetic datum in 2000
  - Geocentric Datum of Australia 1994 (GDA94)*
  - New Zealand Geocentric Datum 2000 (NZGD2000)*
- Australia has a single height datum whereas New Zealand has 13 orthometric levelling datums
  - Australian Height Datum (AHD)*
  - New Zealand establishing a national vertical datum*
- Networks of continually operating geodetic quality GPS receivers on geological stable marks
  - PositionNZ – 30 stations across NZ and Chatham Islands*
  - Australian Fiducial Network (AFN) & Australian National Network (ANN), some 8 and 60 stations respectively*



## Processes, data, storage (Australia)

- No single formalised process or database for geodetic data
  - National Geodetic Data Base (NGDB)*
  - Each jurisdictional database eg. Survey Control Data Base (SCDB) in Queensland*
- Jurisdictional resources and policies influence:
  - Which geodetic data and metadata is stored*
  - How it is stored, accessed and exchanged*



## Processes, data, storage (New Zealand)

- LandOnline
  - electronic system that holds and manages land information in a national database*
  - allows for the lodging of title dealings and survey information into the government systems*
  - includes geodetic data (both coordinates & observations)*



## Geodetic Authorities

- In both Australia and New Zealand geodesy is managed by government agencies
  - to maintain a reliable and accurate positioning infrastructure using a coordinated approach from local to national and through to the international level*
- A surveying mapping agency within each state and territory and an Australian Government agency, together with the Australian Defence Force and Land Information New Zealand (LINZ) which are ICSM members



## ICSM

- The Australian and New Zealand Intergovernmental Committee on Surveying and Mapping's (ICSM) core function is:
  - to coordinate and promote the development and maintenance of key national spatial data, including geodetic data, and*
  - to provide a consistent and modern approach to surveying, mapping and charting.*
- ICSM currently has ten working groups
  - including the Geodesy Technical Sub-Committee (GTSC) and the ePlan working groups*



## Project Background

- For the ICSM, Geodesy is
  - the business of monitoring, maintaining and enhancing the horizontal and vertical working datum and their associated elements.*
- ICSM GTSC Objective is
  - to effectively implement the national geodesy policies developed by ICSM by coordinating geodetic activities between governmental agencies.*
- The eGeodesy project driver
  - digital data management including the exchange of geodetic data and spatial datasets*



## The eGeodesy Project

**Aims**

- Standardise Exchange of Geodetic Information
- Standardise Publishing of Results
- Standardise Recording of Observations
- Enable the Archival of Observation Data
- Streamline process for generating adjustment files
- Seamlessly Interface with & between Vendor Packages



## The ePlan Project

- The eGeodesy Project builds on methodology from the ICSM ePlan Project
- The ePlan Project
  - Models a cadastral survey electronically*
  - Aims to standardise the exchange of cadastral survey information within Australia and Standardise Data Validation Routines*
  - Working with, and the support of, the vendor community and the LandXML data standard consortium*
- Many other "e" projects in Australia & New Zealand



## Project Methodology

- Systems Development Life Cycle
  - Planning, Analysis, Design, Implementation
- Each phase consists of a series of steps which rely on techniques that produce deliverables
- Object Oriented (OO) methodologies balance the focus between **data** & **process** by incorporating both into one model using self-contained modules called objects (containing both the data & processes)



## UML

### Unified Modelling Language

- UML objective is
  - to provide a common vocabulary of Object Oriented terms and diagramming techniques that is rich enough to model any systems development project from analysis through to implementation*
- UML is an open standard
- The best methods of a number of object-oriented graphical modelling languages
- UML uses a set of different diagrams to portray various views and elements of the evolving system or project
- Can be used to describe the current system and the to-be system. UML does NOT define a process for modelling systems (really nothing more than standardised notation)
- UML endorsed by ICSM for standard use throughout ICSM and its projects



## eGeodesy Planning

- **Planning Phase**
  - Project sponsor - ICSM
  - Project management – ICSM GTSC eGeodesy Project Team
  - Project plan, size & scope
    - Modelling current geodetic data, roles and business practices, including both horizontal and vertical networks
    - Ensuring capability for incorporating all acceptable data, observations and results (from Government and private industry)
    - Ensuring current, future and historical geodetic data is included



## eGeodesy Analysis

- **Project currently in the analysis phase**
  - Focus on business user needs & the 'what' of the business
  - Basically involves understanding current systems, identifying requirements and developing requirements for the to-be system
  - Takes the ideas (from planning) and refines them into a detailed requirements definition and the models ...
  - Produces a Functional Model (Activity Diagrams, Use Case Descriptions and Diagrams), a Structural Model (class & object diagrams) and a Behavioural Model (sequence diagrams etc)



## Analysis to date

- Detailed requirements document (through all GTSC members)
- Current geodetic data and processes have been modelling in UML
  - Use Cases, Activity Diagrams and Class Diagrams*
- The models are iterative (in both analysis & design)
- Activity Diagrams
  - Mapping business process & workflows*
  - Incorporate roles, tasks and outputs*
  - Mapped in a simplistic, high-level approach (to avoid technical "jargon" and ensure all steps are included)*
- Class Diagrams
  - Standards, Geodetic Planning, Mark Management, Field Measurements, Quality Assurance of Field Measurements, Reducing the Measurements, Adjusting the Measurements, Survey Data Acceptance*



## Future Stages

- Models currently being evaluated, reviewed and refined by all ICSM GTSC
- Models will be expanded to include various terrestrial survey techniques used for geodetic work such as EDM traversing and spirit levelling
- Cross-referenced with the New Zealand LandOnline Model
- After the analysis phase, written from the business perspective, move to Design phase



## Future Stages - Implement

- After the analysis and design phase, move into implementation. However this is also iterative and tested before installation
- The project does NOT aim to build a single geodetic system for implementation within the jurisdictions
- However most jurisdictions do not have a formalised archival method for storing observational data and results. It may be possible to build and 'active' observations database as an extension of the project that could be utilised across multiple jurisdictions.

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## XML

### Extensible Markup Language

- XML is a simple, very flexible text format derived from SGML (ISO 8879).
- XML provides a set of rules for encoding data structures
  - Is reliable and efficient for network transmission and parsing
  - Labels can be invented to suit individual needs
- Many industry sectors are developing variants of the XML Schema for their own use such as LandXML
- LandXML currently used in the New Zealand LandOnline system as a transfer format for survey components
- The Australian *ePlan* project has also liaised closely with LandXML and utilises LandXML
- XML & LandXML endorsed by ICSM for standard exchange of information

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- LandOnline New Zealand - [www.landonline.govt.nz](http://www.landonline.govt.nz)
- The UML Standard - [www.omg.org](http://www.omg.org)
- LandXML.org - [www.landxml.org](http://www.landxml.org)

## Questions?

Jemma Picco  
Department of Natural Resources and Water, Queensland, Australia  
[jemma.picco@nrm.qld.gov.au](mailto:jemma.picco@nrm.qld.gov.au)  
Ph: +61 7 38963038 Fax: +61 7 38915168