Strategic Collaboration between Australia and Asia in the Spatial Sciences

John Trinder

President

SSSI

SSSI

- SSSI – Surveying and Spatial Sciences Institute
- Formed in 2009 by the amalgamation of the Institution of Surveyors and Spatial Sciences Institute
- Managed by a Board which is elected yearly
- Continual Profession Development (CPD)
- High level certifications for professionals
- CPD topics which should be interest to the GeoSmart audience

Summary

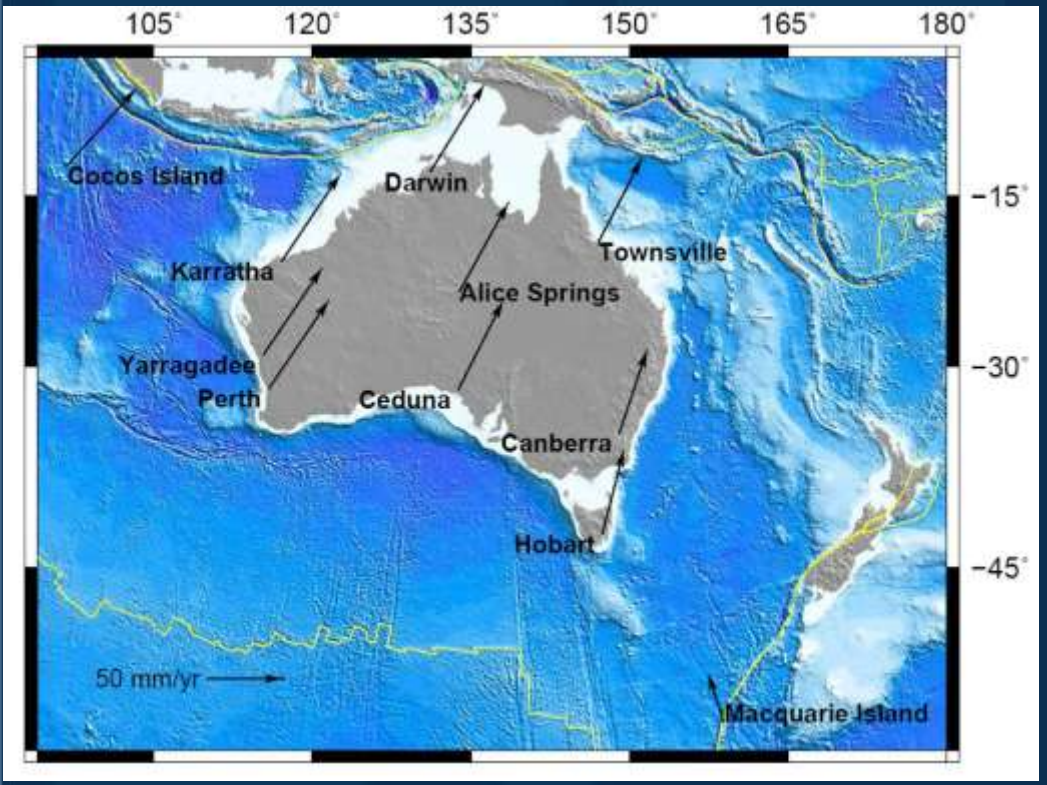
- Dynamic datum for Australia
- Australia's National Positioning Infrastructure
- Foundation Spatial Data Framework
- Cadastre 2034
- G20 Globe by Queensland Government
- Data cube by Geoscience Australia
- World Leading Lidar QA/QC Tools
- UAVs in the Australian market
- Professional ethics

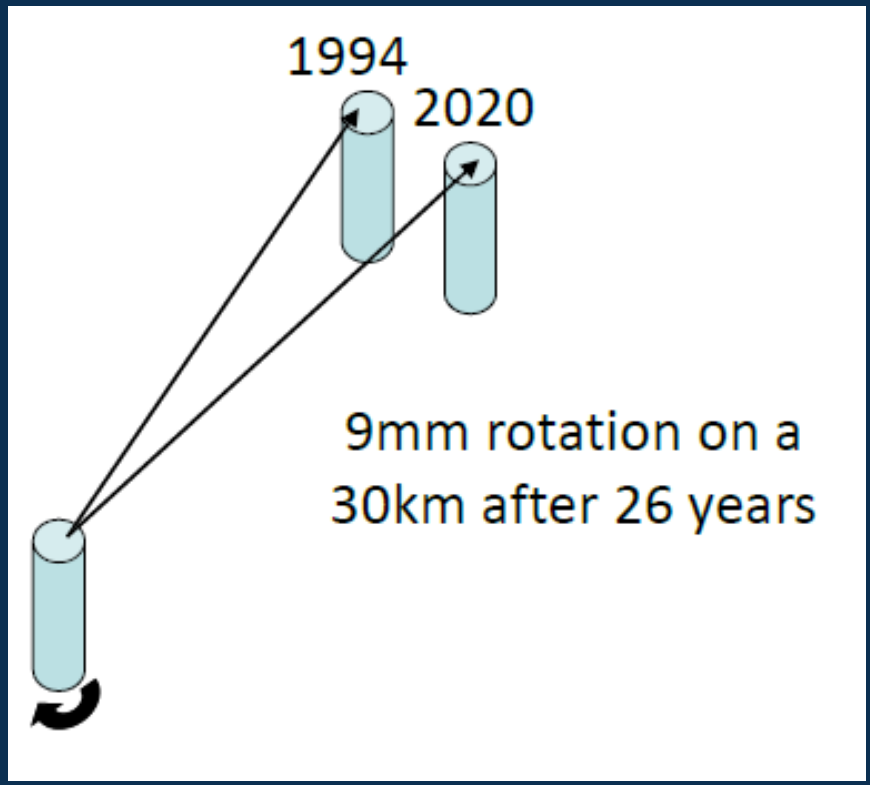
Dynamic datum for Australia

Australia sits on the fastest moving tectonic plate on Earth

Moving NE @ 70 mm per year

Rotation of the Australian Plate has become significant for survey applications





Dynamic datum for Australia

Issues

- Australia's datum (GDA94) does not meet users expectations now or into the future i.e. in terms of accuracy, consistency and uncertainty

- Users (industry, government, public) have an expectation that the positioning infrastructure will deliver +/- 2 cm (95% CL)

- These user expectations are realistic and achievable within the 2015-2020 timeframe

Dynamic datum for Australia

Modernising GDA: what should we aim for?

- Datum updated continuously as new observations are contributed and blunders detected
- Datum supports the continuous update of the national Geoid model
- Datum supports time-based corrections (i.e. deformation models)
- Datum has tools and services that facilitate its use by the mass-market (e.g, time based transformations)

Australia's National Positioning Infrastructure

NPI is fundamental to precise location in Australia in the future

- Benefits:
  - PNT Information is valuable
  - Public safety
  - Efficiency
  - Public good
  - Critical infrastructure
  - Improves productivity

Multiple future GNSS

US - GPS

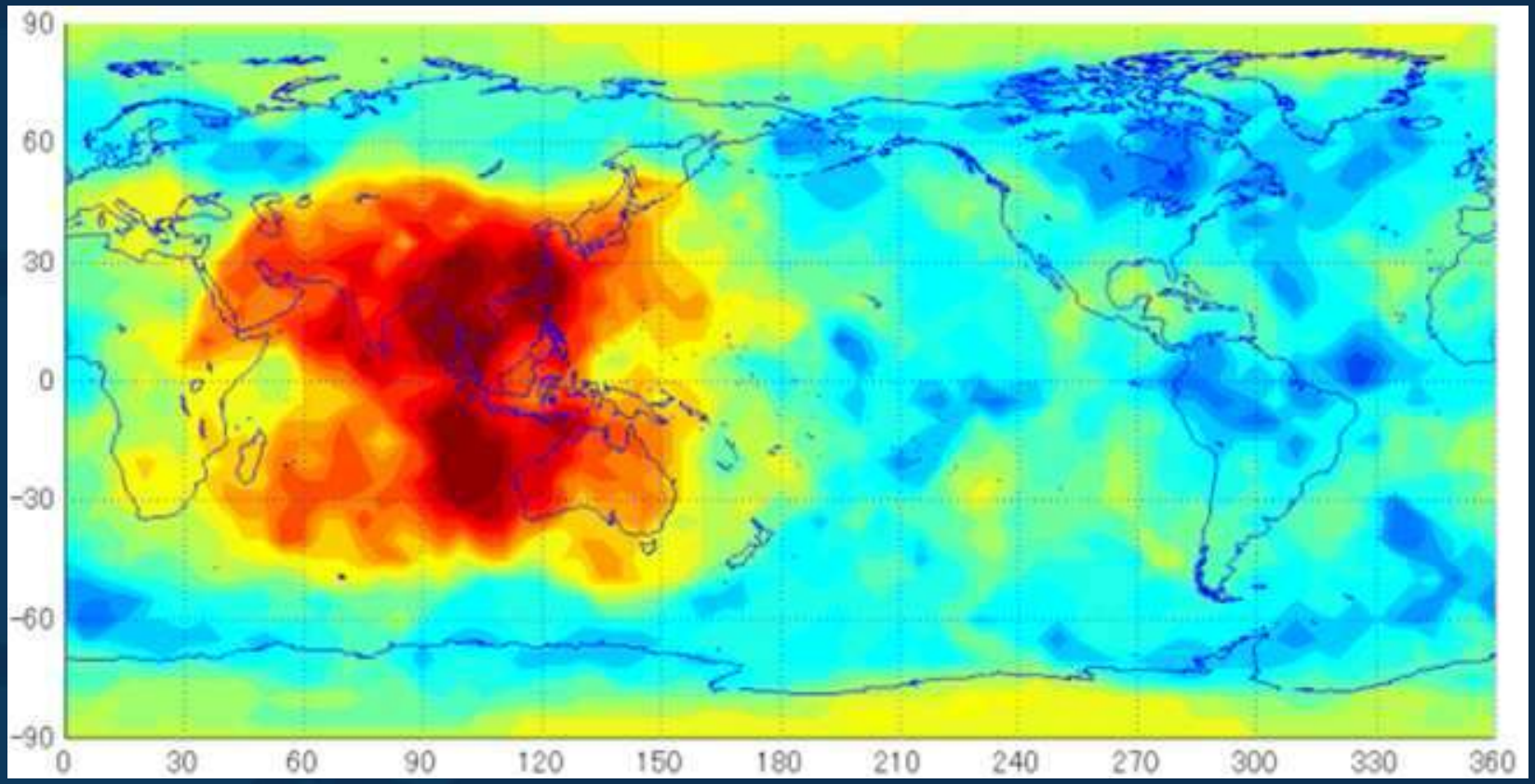
Russia – GLONASS

Europe - GALILEO

China – Beidou

India – IRNSS

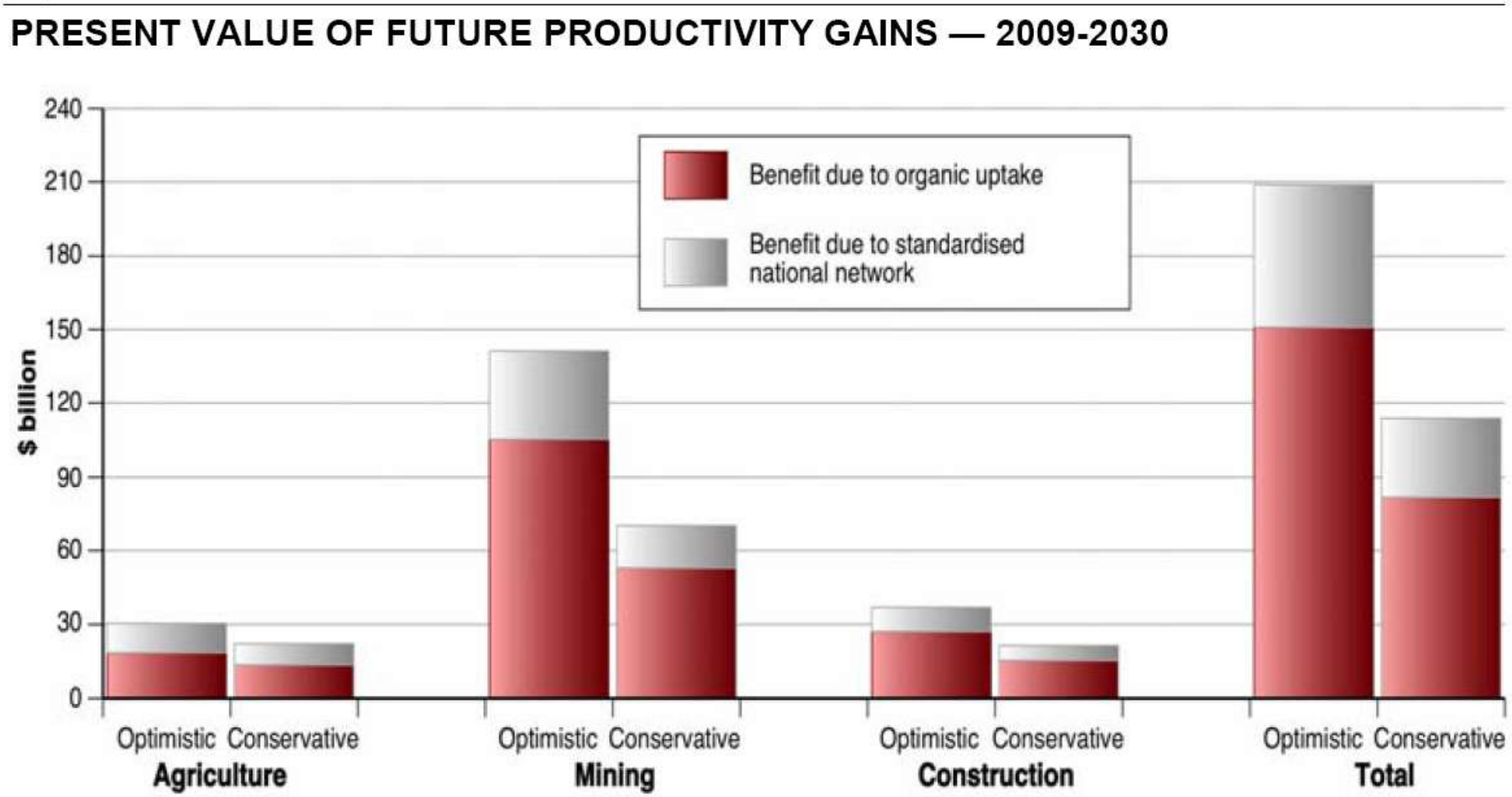
Japan - QZSS

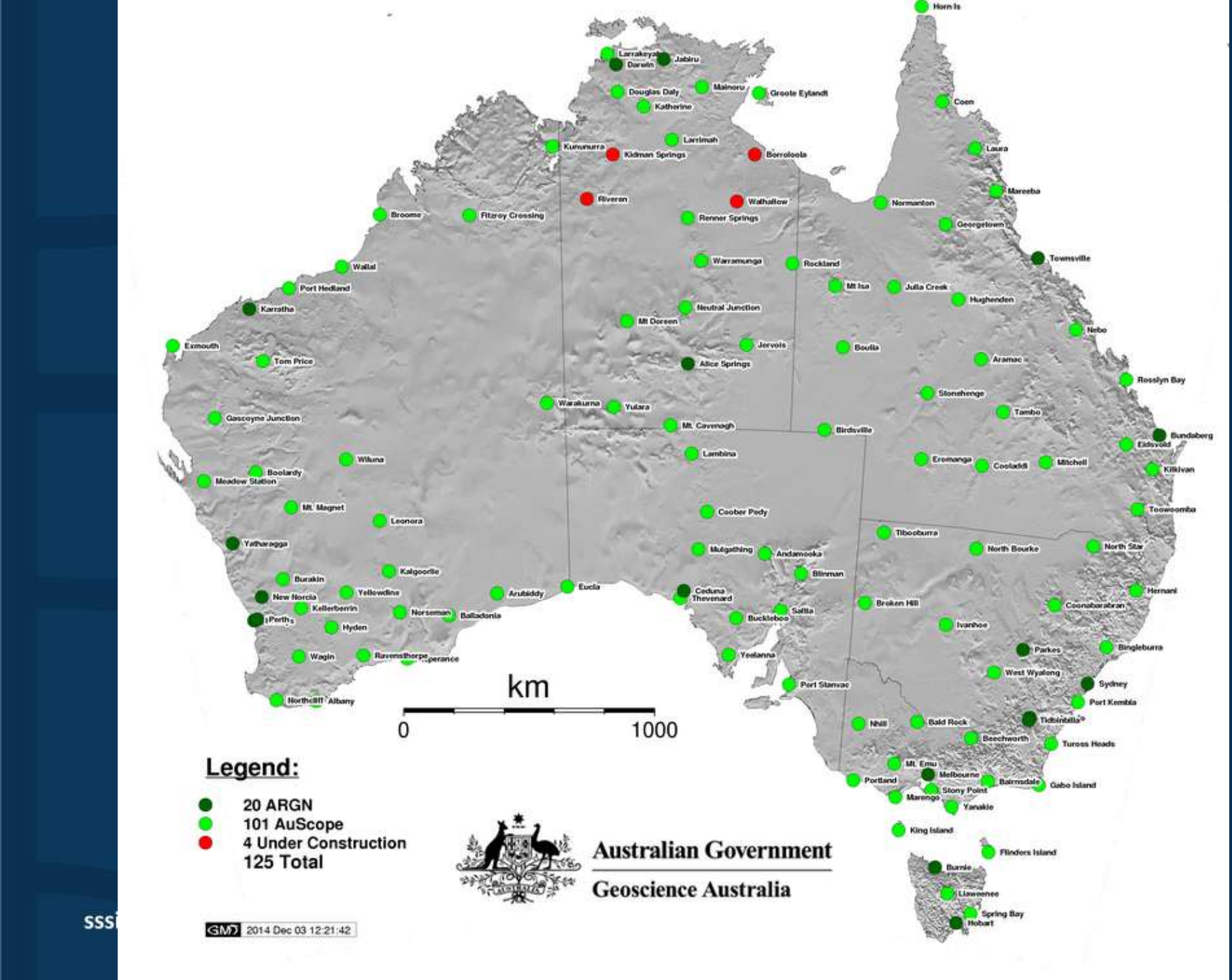


NPI - Economic Benefits

- Precise satellite positioning technology could add up to 2.1% to Australia's GDP by 2030 Productivity gains in mining, construction and agriculture alone
- (Allen Consulting Group 2008)

NPI - Economic Benefits




Horn Is
Larrakeyah
Darwin
Jabiru
Douglas Daly
Mainoru
Groote Eylandt
Katherine
Coen
Larrimah
Kununurra
Kidman Springs
Borroloola
Laura
Mareeba
Riveren
Wathallow
Normanton
Broome
Fitzroy Crossing
Renner Springs
Georgetown
Townsville
Warramunga
Rockland
Wallal
Mt Isa
Julia Creek
Port Hedland
Hughenden
Karratha
Neutral Junction
Mt Doreen
Nebo
Exmouth
Jervois
Boulia
Tom Price
Alice Springs
Aramac
Rosslyn Bay
Stonehenge
Warakurna
Yulara
Tambo
Gascoyne Junction
Mt Cavenagh
Birdsville
Bundaberg
Eidsvold
Lambina
Wiluna
Eromanga
Cooladdi
Mitchell
Kilkivan
Boolardy
Meadow Station
Toowoomba
Mt Magnet
Coober Pedy
Leonora
Tibooburra
Yatharagga
Mulgathing
Andamooka
North Bourke
North Star
Burakin
Kalgoorlie
Blinman
Hermani
Yellowdine
Eucla
Ceduna
Thevenard
New Norcia
Broken Hill
Coonabarabran
Kellerberrin
Salta
Norseman
Balladonia
Buckleboo
Perth
Ivanhoe
Hyden
Parkes
Bingleburra
Wagin
Yeelanna
West Wyalong
Sydney
Port Stanvac
Albany
Port Kembla
Nhill
Bald Rock
Beechworth
Tidbinbilla
Tuross Heads
Mt Emu
Melbourne
Portland
Barrmdale
Gabo Island
Stony Point
Marengo
Yanakie
King Island
Flinders Island
Burnie
Launceston
Spring Bay
Hobart
km
0
1000
Legend:
20 ARGN
101 AuScope
4 Under Construction
125 Total
Australian Government
Geoscience Australia
GMT 2014 Dec 03 12:21:42

NPI - Plan

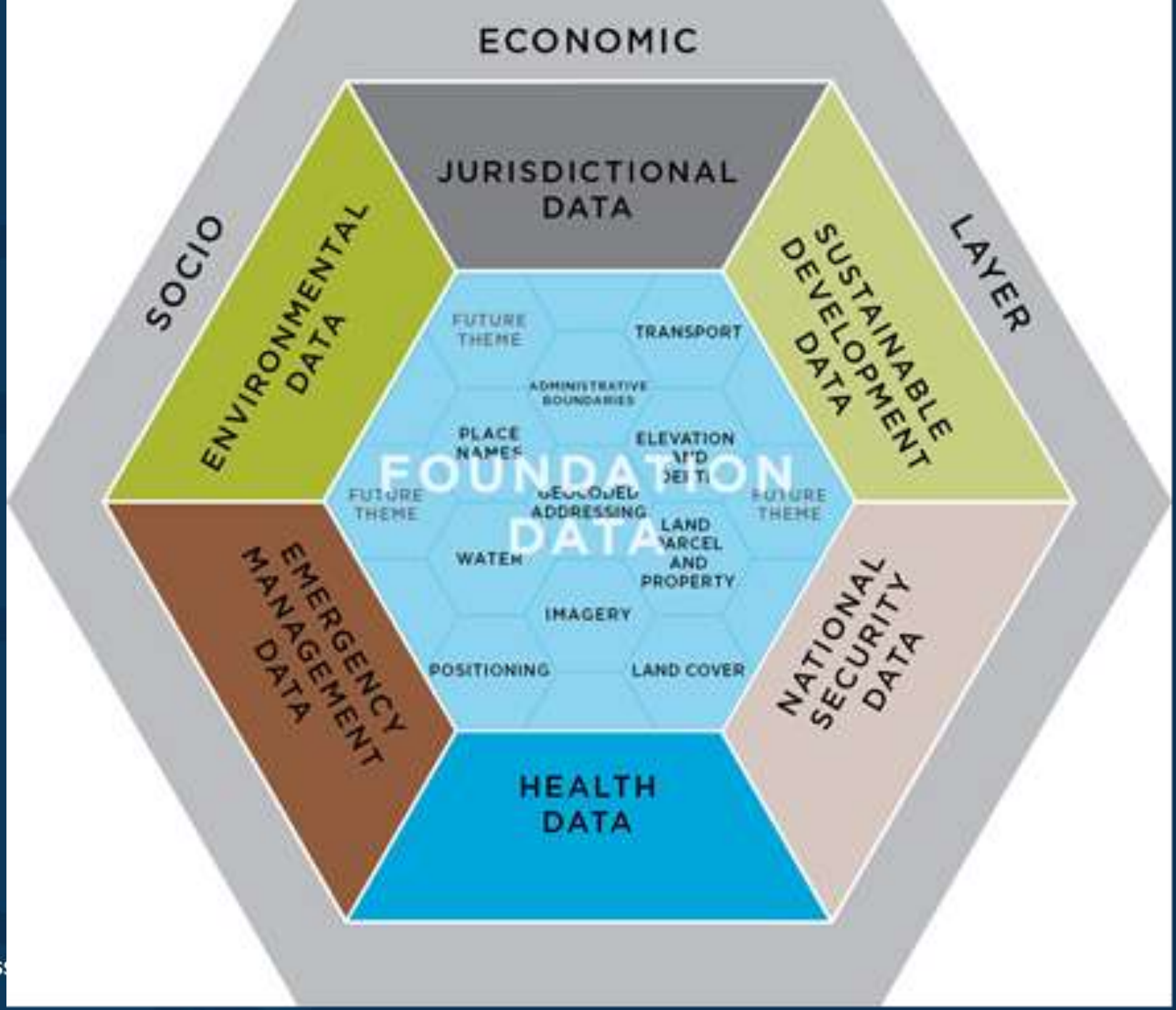
The NPI Plan has been developed

- Governance arrangements are being established
- The design of software is underway
- Densification and unification of infrastructure will continue
- Australian industry will expand its competitiveness through the use of precise positioning
- Opportunities for producing, communicating, applying, validating and improving precise positioning information will emerge
- Australian government will champion multi-GNSS technologies

Foundation Spatial Data Framework

- ***Foundation spatial data*** is the authoritative geographic information
- Underpins, or can add significant value to, any other information;
- Supports evidence-based decisions across government, industry and the community.

Foundation Spatial Data Framework


ECONOMIC
JURISDICTIONAL DATA
SUSTAINABLE DEVELOPMENT DATA
NATIONAL SECURITY DATA
HEALTH DATA
EMERGENCY MANAGEMENT DATA
ENVIRONMENTAL DATA
SOCIO
LAYER
FOUNDATION DATA
FUTURE THEME
TRANSPORT
ADMINISTRATIVE BOUNDARIES
PLACE NAMES
ELEVATION
FUTURE THEME
ADDRESSING
FUTURE THEME
WATER
LAND PARCEL AND PROPERTY
IMAGERY
POSITIONING
LAND COVER

Foundation Spatial Data Framework

Fundamental is a measure of the importance of a dataset
Foundation is a measure of how applicable a dataset may be to a number of applications.

Characteristics

For the purpose of the FSDF foundation spatial data must have one or more of the following characteristics:

- be geospatial
- essential for public safety and wellbeing
- critical for a national or government function
- contribute significantly to economic, social and environmental sustainability.

Foundation Spatial Data Framework

Features that are consistent with general information management principles:

Authoritative: comes from a reliable source that is known structured, coherent and consistent and responsible for ensuring that the data is accurate.

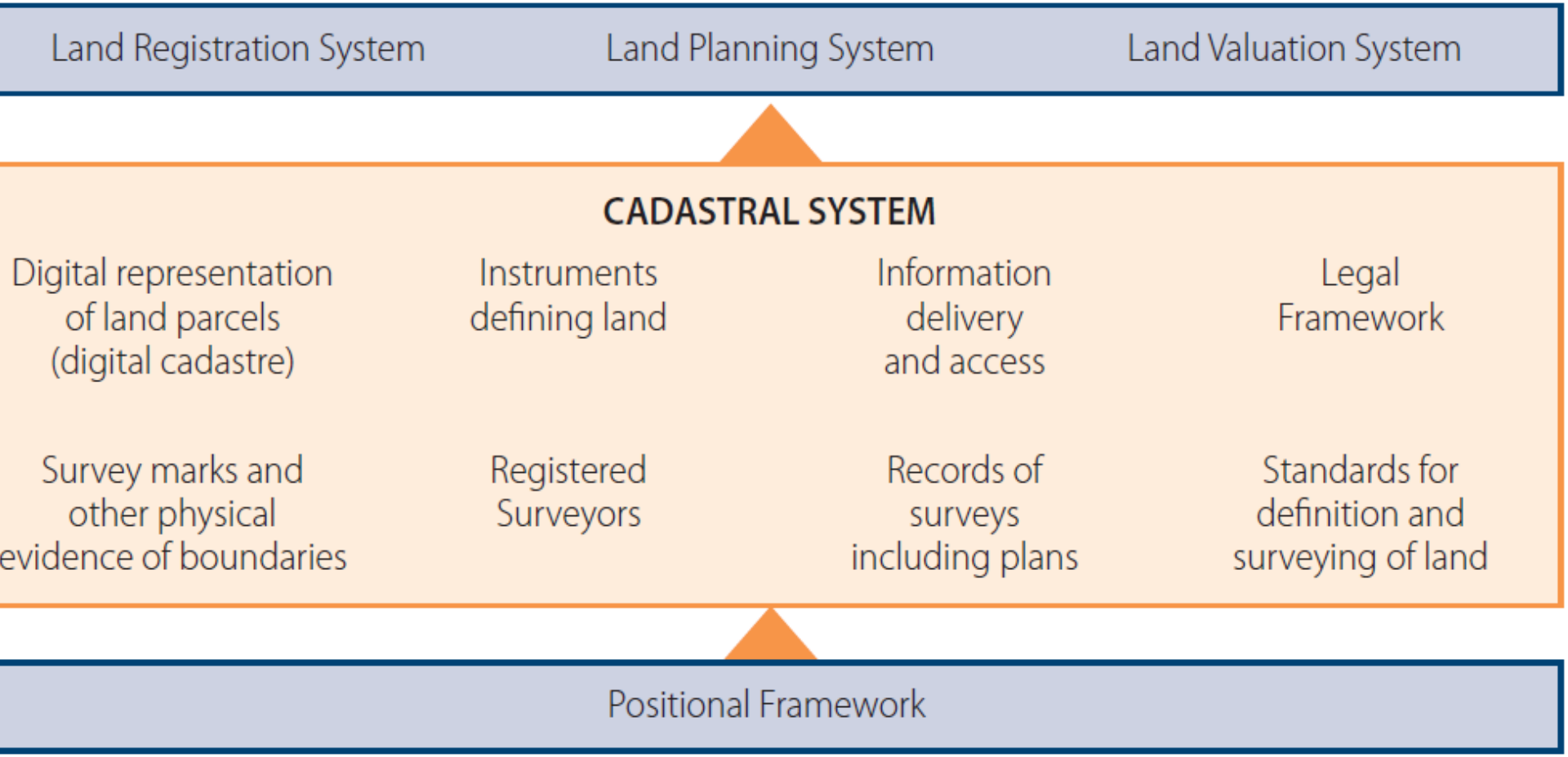
Accurate: includes measures such as positional accuracy, attribute accuracy, currency and coverage.

Accessible. Easily discoverable and ready to be used with little or no further manipulation.

Cadastre 2034 by SGs

- Being directed by Surveyors General
- The cadastral systems of Australia underpin stable and reliable registration of land based property rights.
- They serve as the foundation for effective land tenure transactions
- Secure the legal status of property boundaries.

Cadastre 2034 by SGs



Cadastre 2034 by SGs

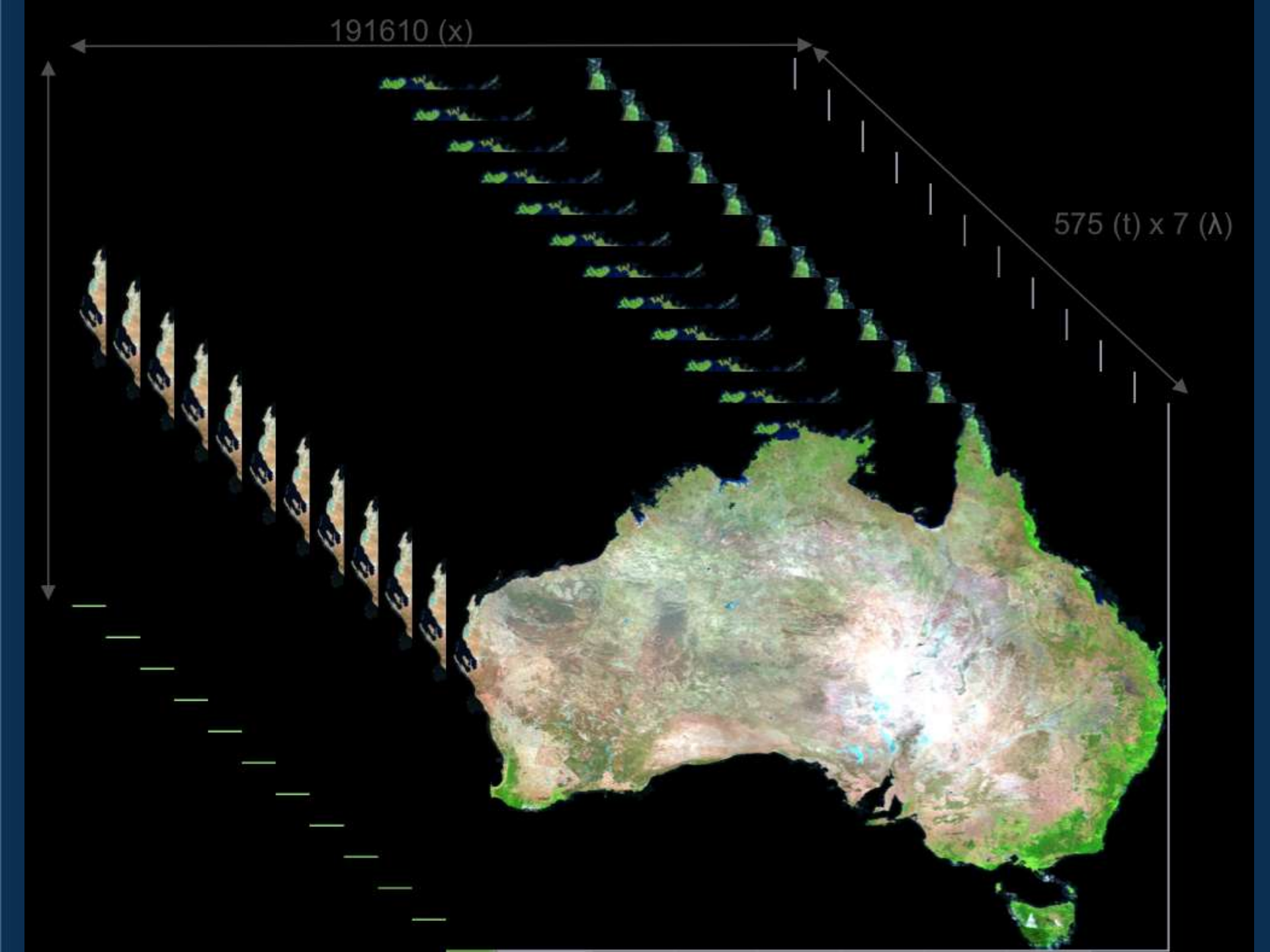
- Goals
  - A cadastral system that is fundamental to land ownership and managed sustainably
  - A cadastral system that is accessible, easily visualised and readily understood and used
  - A cadastral system linked with broader legal and social interests on land
  - A digital cadastre that is 3-dimensional, dynamic and survey accurate
  - A federated cadastral system based on common standards

G20 Globe by Queensland Government

- Indigenous technology used in G20 meeting in Brisbane by the Queensland Government
- Can explore Queensland using a geographic framework across six economic sectors including:
  - agriculture
  - construction
  - resources
  - tourism
  - science and innovation
  - education and training.
- https://www.dnrm.qld.gov.au/mapping-data/queensland-globe/globe-for-g20

Data cube by Geoscience Australia

- The application of big data for earth observation on supercomputer
- The concept is to ‘cube’ datasets by stacking Landsat image ’tiles’ in time sequences.
- Data Cube prototype contains 15 years of Landsat 5 and 7 imagery for surface water
- Covers Australia’s total land area with 3,960,528 tiles using 110TB of compressed geoTIFF files in 2 days


191610 (x)
575 (t) x 7 (λ)

World Leading Lidar QA/QC Tools

- Standards that have been developed in the Cooperative Research Centre for Spatial Information (CRC-SI);
- LiDAR Quality Assurance tool "QA4LiDAR“
- Tutorial on CRC-SI web site
- Award winning project

UAVs in the Australian market

- An explosion of UAVs in Australia
- Multiple applications:
  - Crop monitoring
  - Stock piles for mining
  - Remote sensing applications
  - Localised mapping
- Licensing requirements can be lengthy
- Suitable for small areas

Professional ethics.

- Important to modernise the ethics statement
- Growth in global activities in real estate, infrastructure investment and ownership,
- Professions are advising on assets worth between 50% and 70% of the world's wealth
- Real estate and infrastructure are favoured 'alternate asset classes'
- International standards of ethics that should guide the performance of professionals wherever they operate
- Compliance with standards is essential