crc•si Spatially Enabling Australia and New Zealand

Research trends from down under

Dr Zaffar Sadiq Mohamed-Ghouse

Manager- Business, Research Development &International Relations

Australia New Zealand Cooperative Research Centre for Spatial Information (CRCSI)

Melbourne, Australia

43•pl

Australian Government | Business business.gov.au

Research partners…

Curtin University

une University of New England

UC University of Canterbury
Te Whare Wānanga o Waitaha
Christchurch New Zealand

QUT

Telethon Kids Institute

UNSW
The University of New South Wales
Sydney · Canberra · Australia

RMIT University

The University of Melbourne

Swinburne

Government partners…

Landgate

Queensland Government

State Government Victoria
Department of Environment and Primary Industries

NSW Government
Land & Property Information

Australian Government
Geoscience Australia

energex

Ergon Energy

Government of Western Australia
Department of Health

Australian Government
Department of Defence

Government of Western Australia
Department of Agriculture and Food

Land Information New Zealand
Toitū te whenua

Murray–Darling Basin Authority

Affiliate

Affiliate

Affiliate

Affiliate

Affiliate

International Collaborations

crc·si

GLOBAL SPATIAL NETWORK

future position | 60°40'17" North 17°06'29" East 213.141.90.204

JAXA Japan Aerospace Exploration Agency

OGC

Land Information New Zealand Toitū te whenua

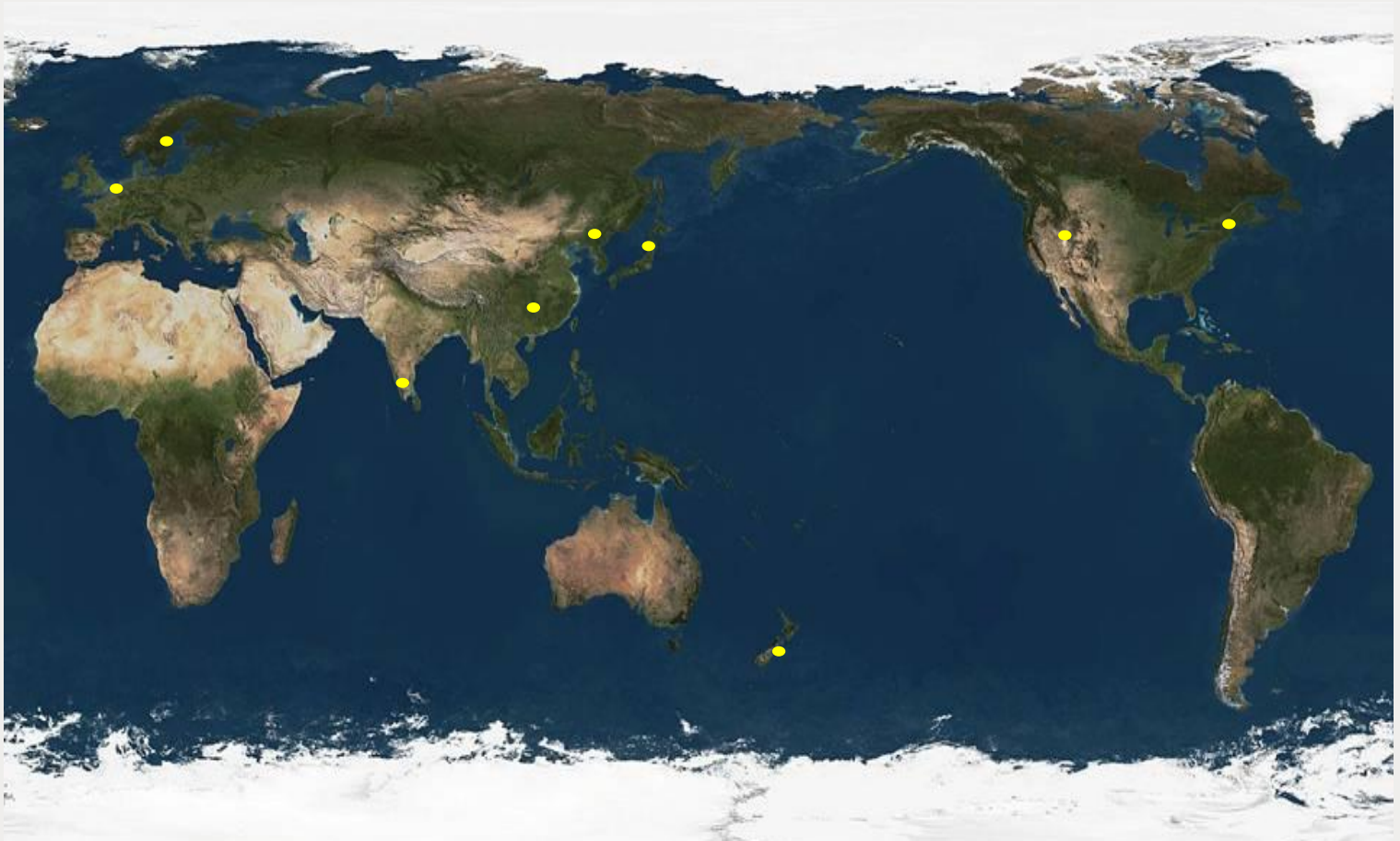
武漢大学

ITC UNIVERSITY OF TWENTE.

RADI

TECTERRA

TU Delft Delft University of Technology

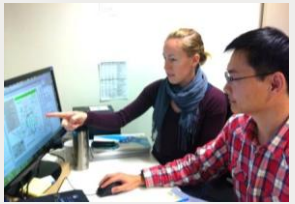
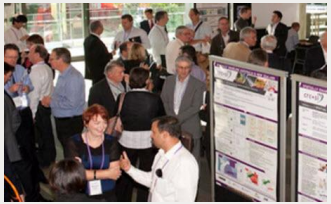
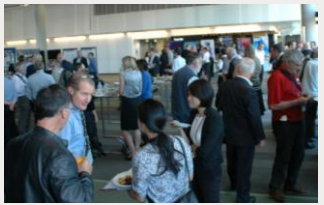


Our PhD Program

Since 2003:

- 32 active
- 46 completions

(Employed equally by industry, government, universities)

The Australian Spatial Landscape

- **GDP** growth of around 2.5% in 2014 (around world average)
- **Debt:** Federal Government debt levels low by international standards (<30% of GDP)
- **Productivity** flat and of real concern to government and industry
- **Strategy:** Both the Business Council of Australia and the Chief Scientist calling for a national strategy, especially for STEM, and to also address education and skilled capacity building
- Increased interest from Government in having Australia retain '**indigenous capability**' especially in GNSS and EO.
- **The 'Open' agenda** is driving Australian government to redefine their role in data production and management. They will do less creation, blend much more data with industry and community, focus more on standards, accept volunteered data, and contemplate more targeted regulation
- Increased tension between the 'open' agenda versus privacy and cyber security
- Impact of commoditisation
- **BuildingSmart** calling on the Australian Government to mandate use of BIM's for building and planning
- **Collaboration:** Australian businesses that collaborate are 55% more likely to report increased productivity (Australian Innovation Systems Report, 2012)

Recent Australian Policy Developments

- National Space Utilisation Policy (2013)
- National Positioning Infrastructure (2013)
- Space Community of Interest (commenced February 2014)
- Industry Innovation and Competitiveness Agenda (2014)
- Earth Observation Strategy (under development)

Drivers

Technology Drivers

- Global Navigation Satellite Systems growth*
- Satellite imaging growth*
- Web 3.0 semantic web*
- 3D and 4D fully topological and metric
- Digital Earth (Virtual reality) *
- Geolocation (Location Intelligence) *
- Sensor web and RFIDs (Internet of things)
- UAVs

Policy Drivers

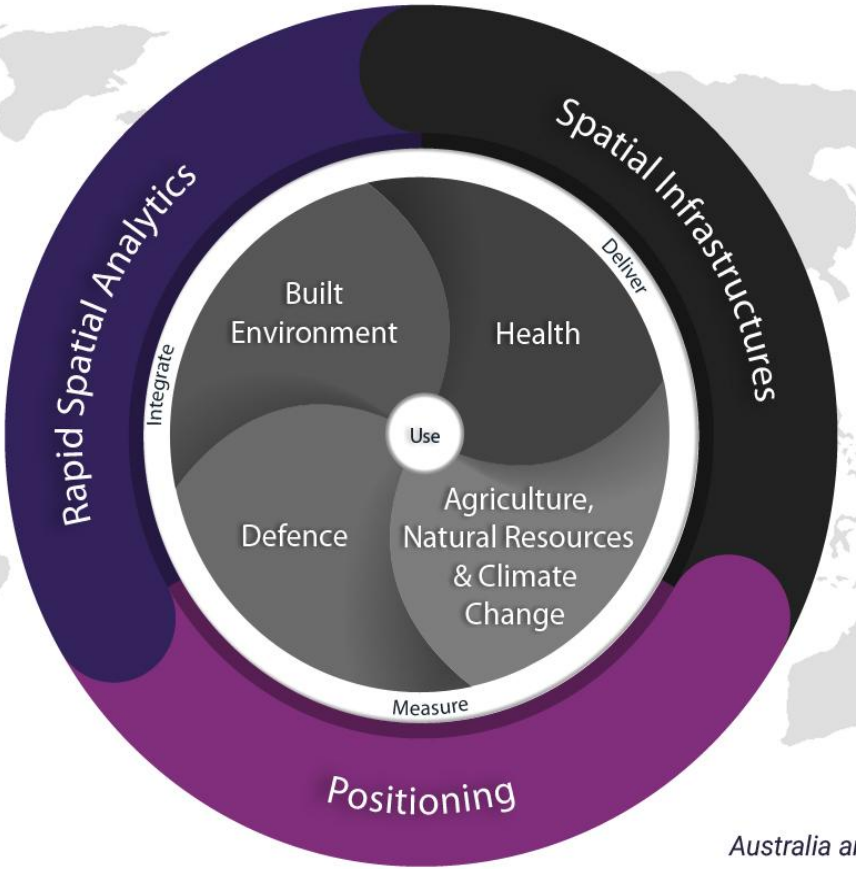
- Open source, open access, open standards, open data*
- Government out sourcing *
- Space policy *
- Broadband

*CRCSI activity

All disruptive

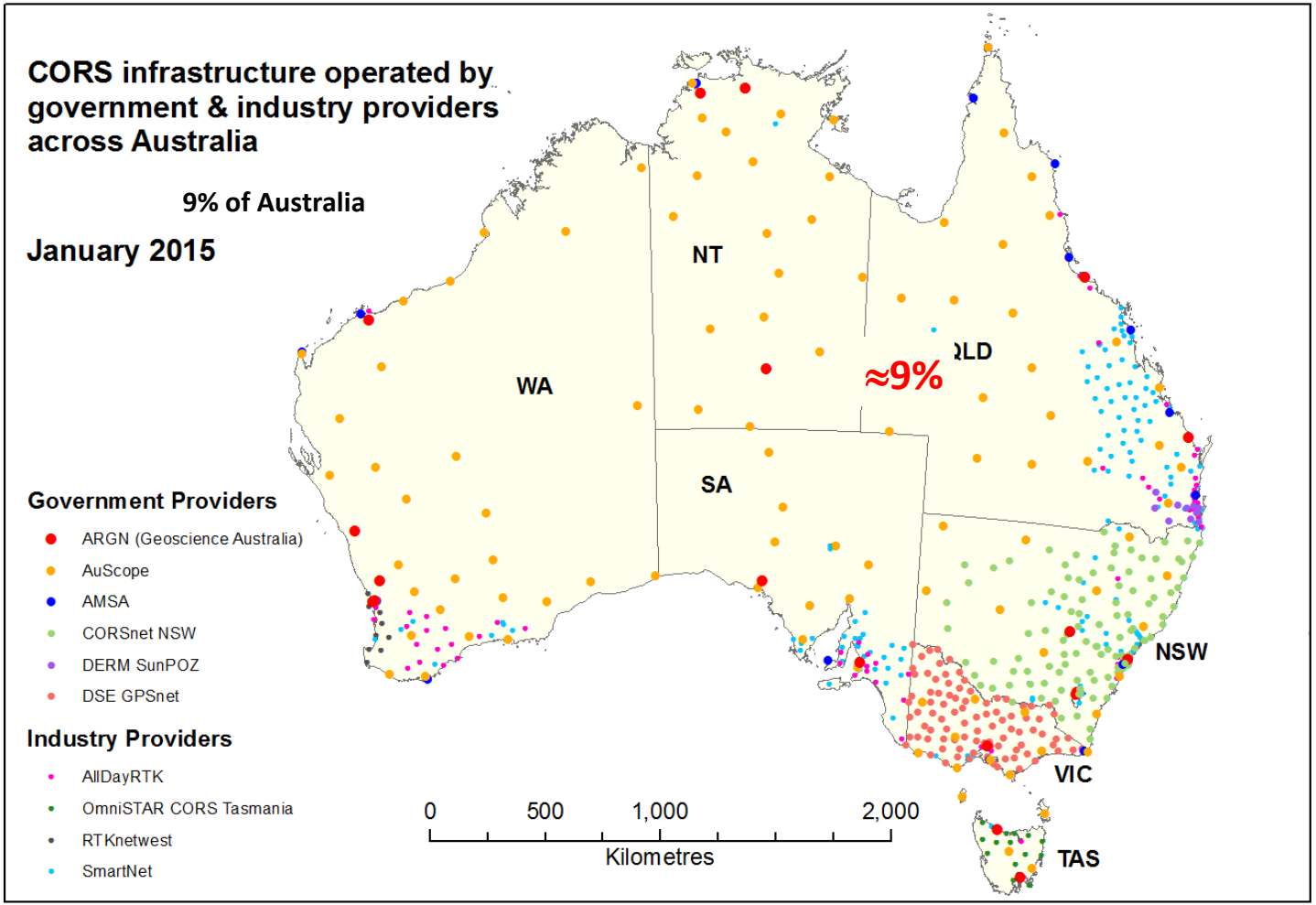
All capable of leading to productivity increases

crc•si Global Spatial Enablement



Australia and New Zealand

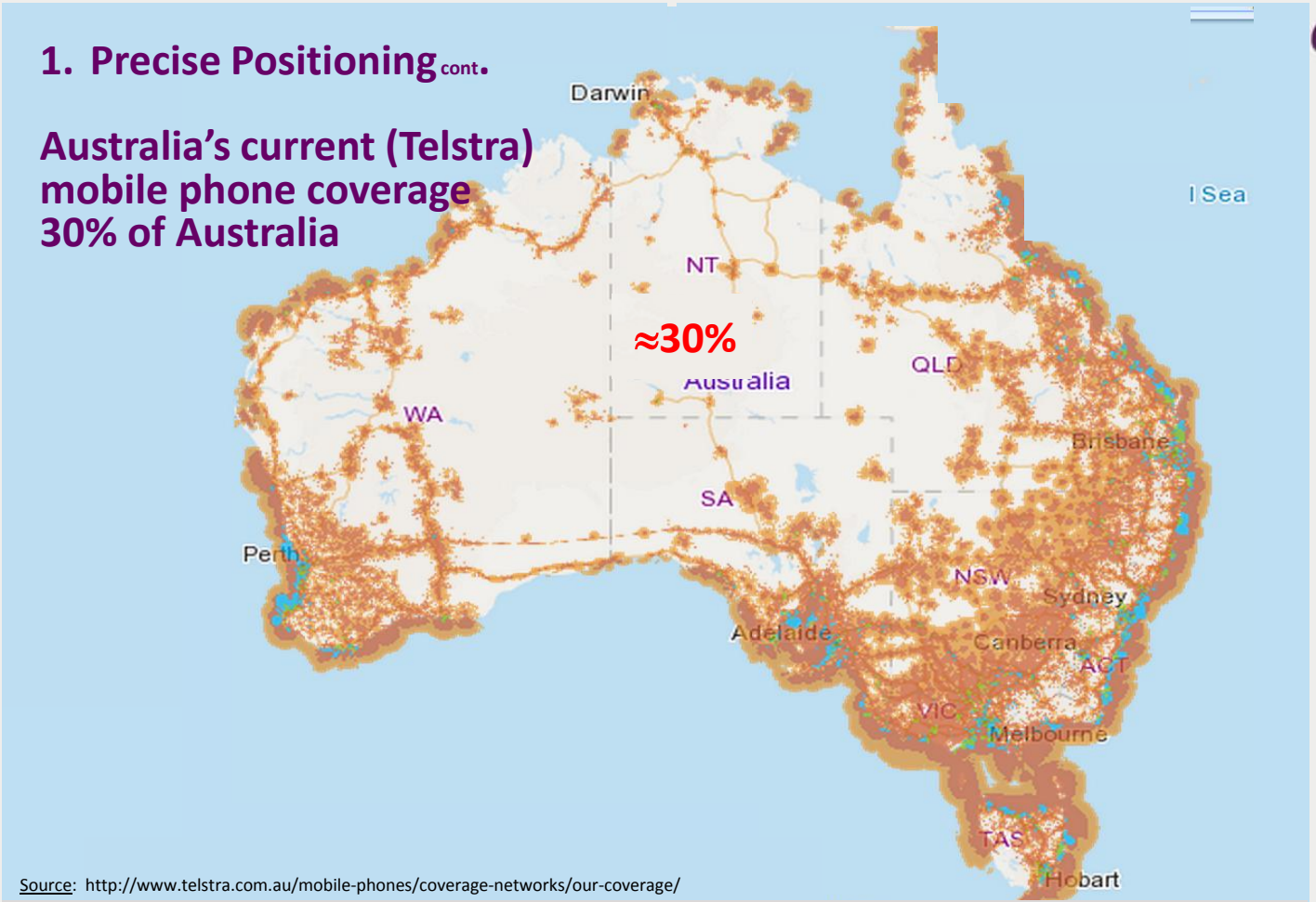
crc•si



Courtesy: Grant Hausler, Geoscience Australia, CRCSI

1. Precise Positioning cont.

Australia's current (Telstra) mobile phone coverage 30% of Australia



Source: http://www.telstra.com.au/mobile-phones/coverage-networks/our-coverage/

The Japanese QZSS solution….

Launch program….

2010 – 1 satellite (“Michibiki”)

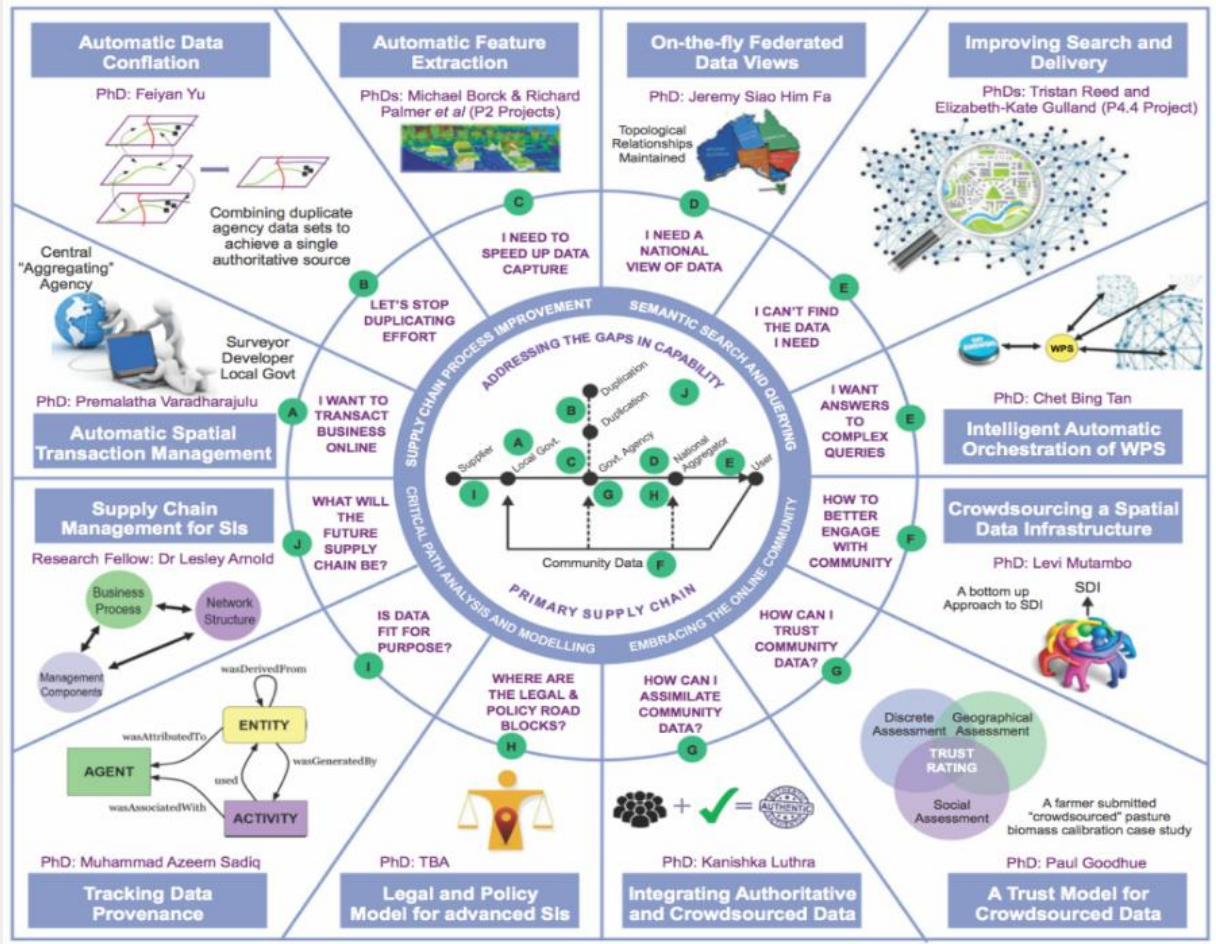
2018 – 4 satellites

2023 – 7 satellites (including

Courtesy: Suelynn Choy RMIT University

Autonomous tractor controlled by QZSS
at Jerilderie, NSW

Spatial Infrastructure: Priority Areas



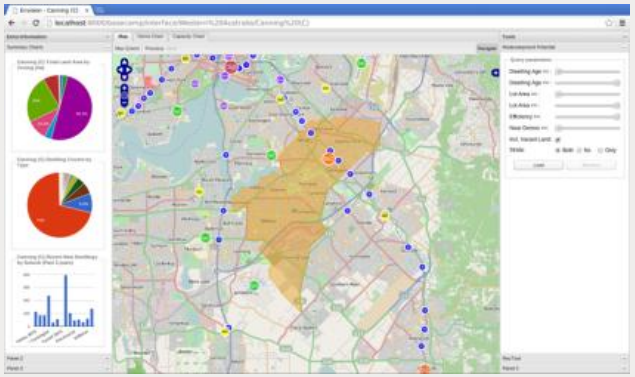
Urban Redevelopment: Greening the Greyfields

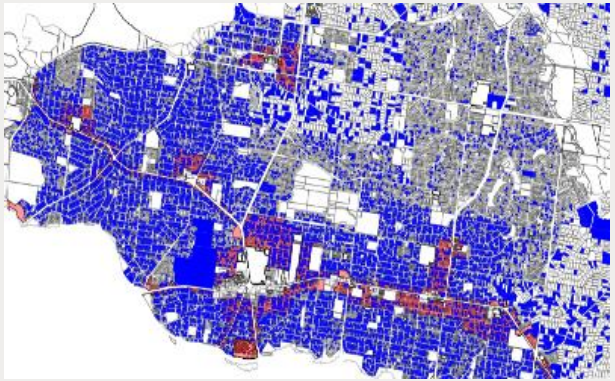
Objectives:

- Develop a set of strategies and decision making tools for urban planning
- Delivers enhanced economic, social and environmental outcomes for urban regeneration in the middle suburbs

Four modules:

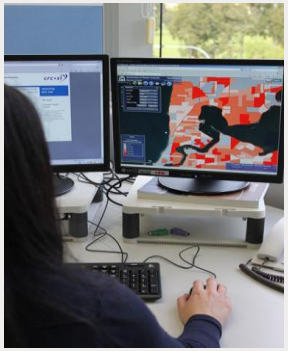
1. Spatial understanding of Australian urban economics
2. Shared urban spatial information platform
3. Visualisation tools to assess precinct level greyfield re-developments
4. Community engagement tools for regenerating greyfields
5. ENVISION analysis tool being adopted by governments across Australia and New Zealand



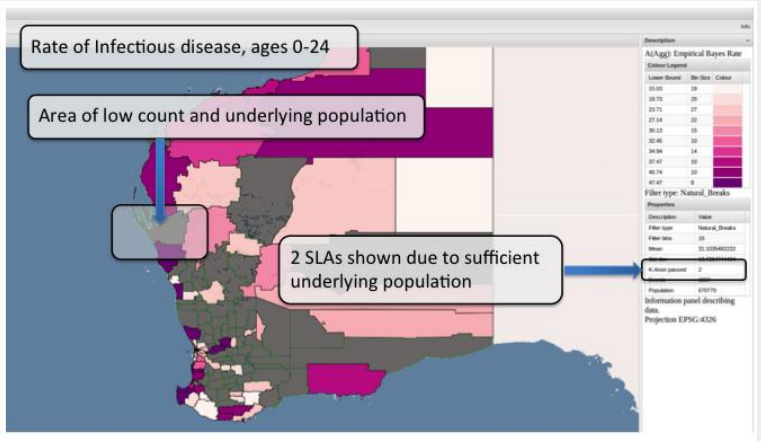


Prof Peter Newman, Curtin and Prof Peter Newton, Swinburne

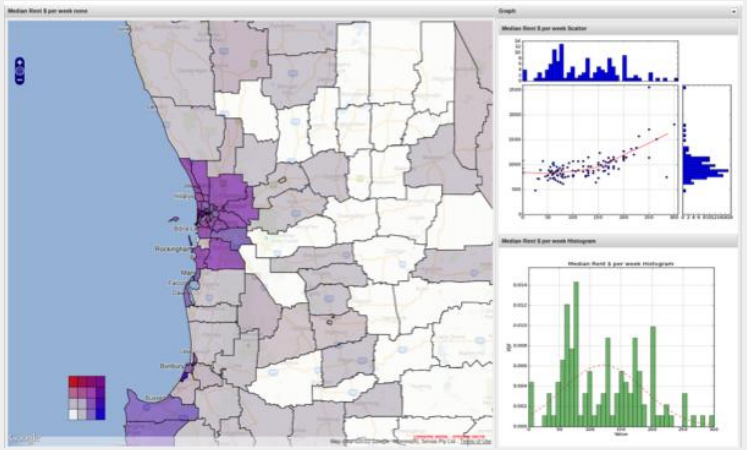
Health: Access to crucial population health data



HealthTracks and Epiphanee



- 150 Users in WA Department of Health
- 10,000 reports so far
- Open up access to millions of patient records
- Highly dynamic
- Processing on the fly
- Visualises complex health data in simple presentations
- Privacy issues addressed
- Being used for mapping obesity, diabetes and many other diseases
- On track for commercialisation through an EOI
- Adapted by Victorian Department of Environment and Planning for Land Capability Mapping



Courtesy: Narelle Mullan

Infrastructure Capture – Powerline Flight Assist System

- CRCSI developed technology enables efficient, accurate capture infrastructure from planes
- Achieves what a pilot can not
- Gave rise to the world's largest routine data capture program of powerline network (150,000km pa)
- Game changer – previously to fly 1/20th of this took days to plan, weeks to capture, months to process and analyse is now completed within 24 hrs
- System on track to save Ergon Energy $14M pa (reference Ergon CEO "The Australian" 17 Sept 2013)
- Technology licensed globally and spin off process well advanced

NRM Spatial Hub

Objective: Sustainable pasture and rangeland management

Caring for Our Country Program

Meat and Livestock Australia (MLA)

Queensland Government

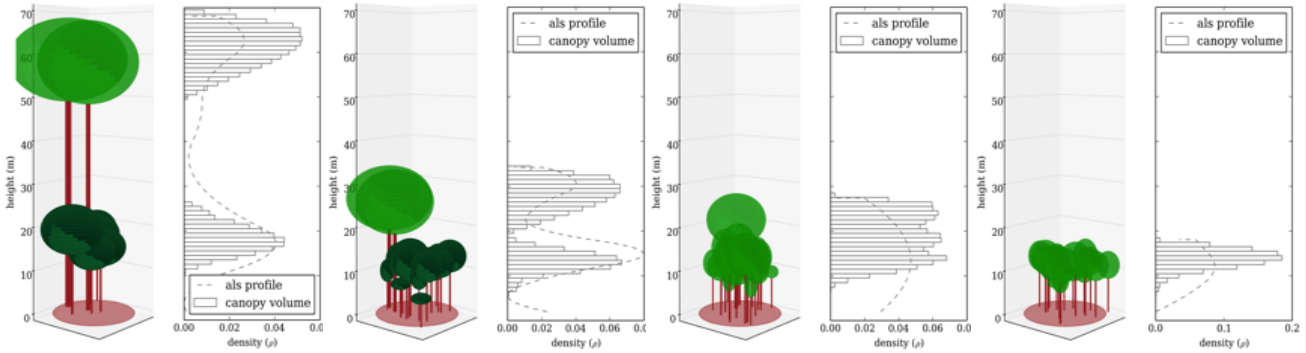
All NRM Regional Bodies.

Stage 1 funded for 2yrs (Mar 2014-16).

$1.6m cash and $2.8M in-kind

Courtesy: Phil Tickle

Canopy height profiles



Canopy height profiles from Airborne LiDAR data and forest inventory measurements.

Key result: an automated approach to estimate canopy layers; position and density from airborne LiDAR. Will lead to the creation of a tool kit for widespread operational use.

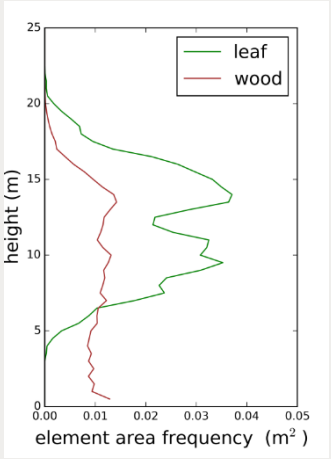
Courtesy; Phil Wilkes, CRCSI PhD candidate RMIT

P 2.07 : Uncertainty in key vegetation products

Rushworth forest, Victoria

Simulated upward-looking hemispherical photo

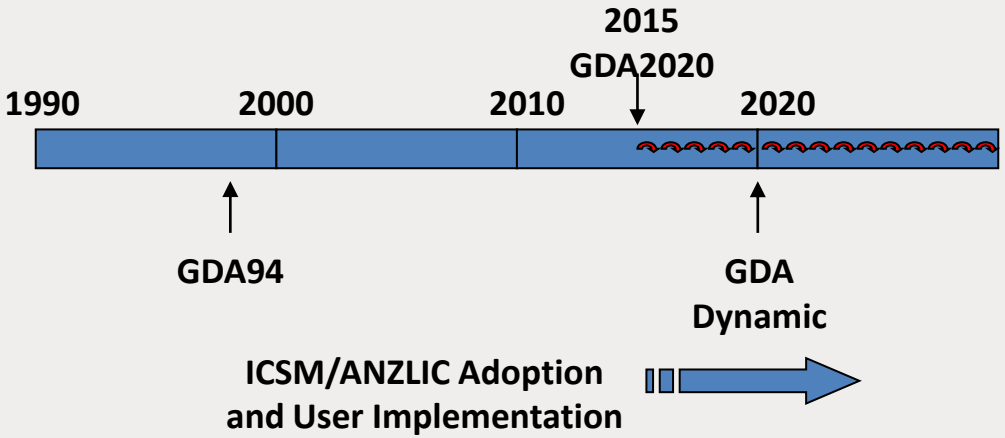
Oblique view of a simulated forest scene



Foliage and wood plant volume density

Courtesy Will Woodgate CRCSI PhD candidate RMIT

A New Australian Datum



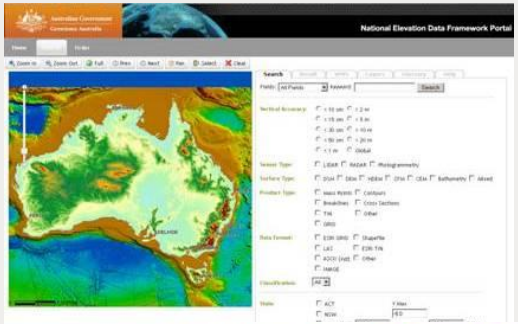
Datum:

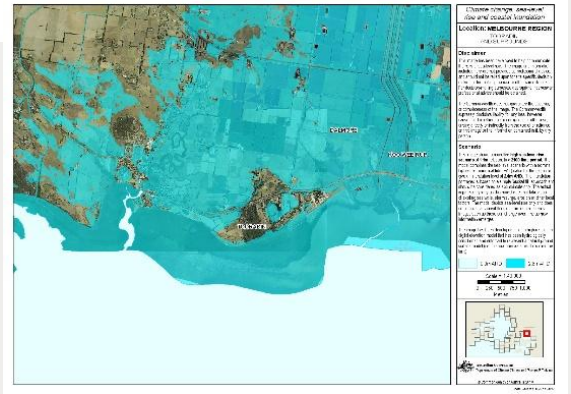
- Updated continuously as new observations are contributed and blunders detected
- Supports the continuous update of the national Geoid model
- Supports time-based corrections (i.e. deformation models)
- Has tools and services that facilitate its use by the mass-market
- To be known as ITRF2013

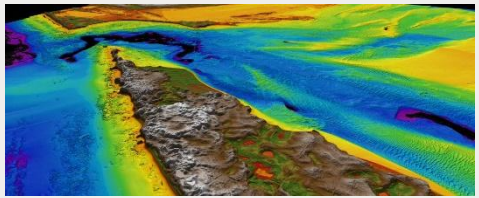
Courtesy: John Dawson, GA

Partnerships: National Elevation Data Framework

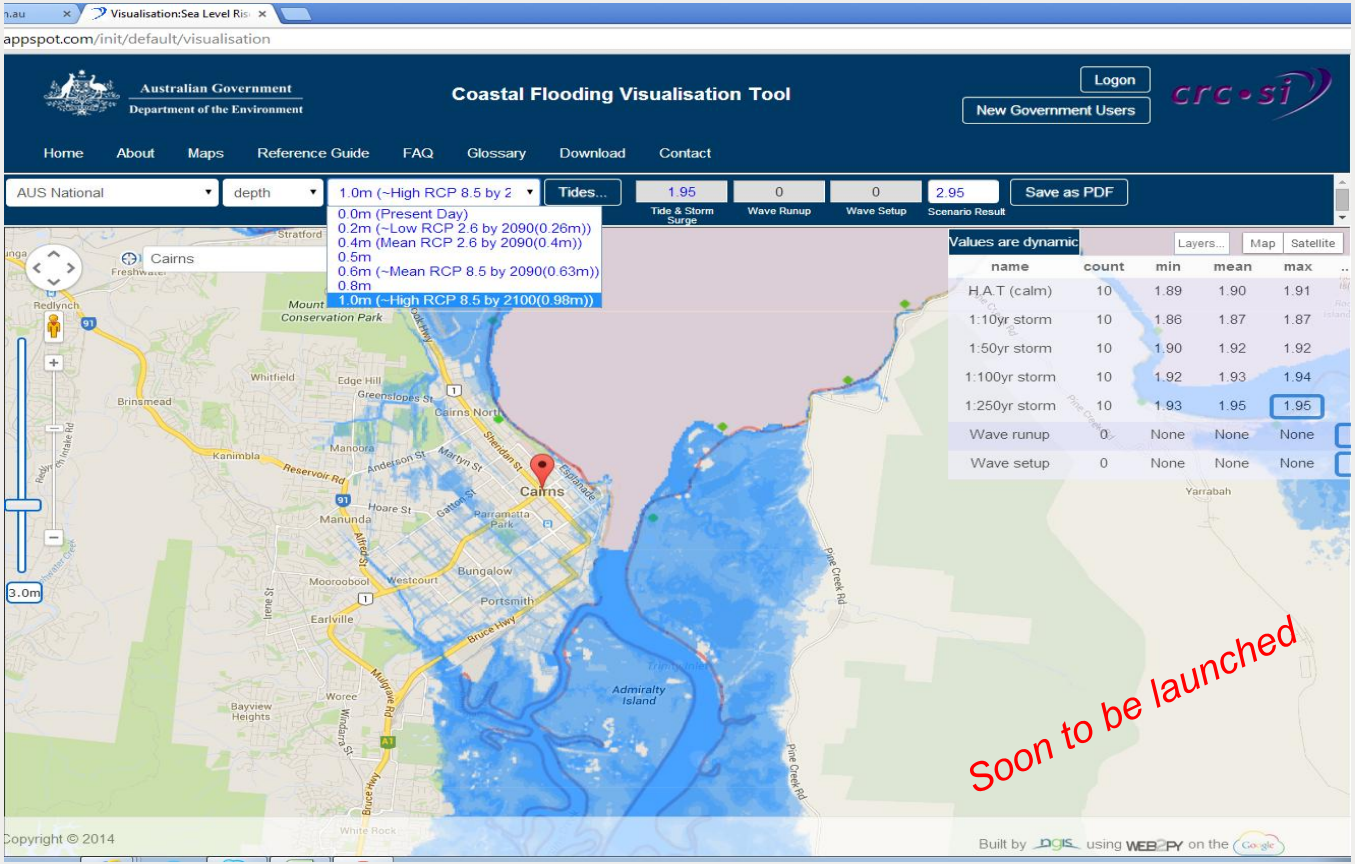
- **National Priority** – Coalition of Australian Governments
- **Coordinated national approach** for acquisition and distribution
- **Applied research** into acquisition, integration and analysis
- **Development of tools** for analysis and visualisation systems
- **Data portal** for data and derived products – 300,000 pdf downloads over 4 years (via Geoscience Australia website)
- **Online sea-level rise visualisation tool**
- **National guidelines** for collection and processing of data
- **200,000 km2 of 15cm DEMs** covering 80% of Australia's pop







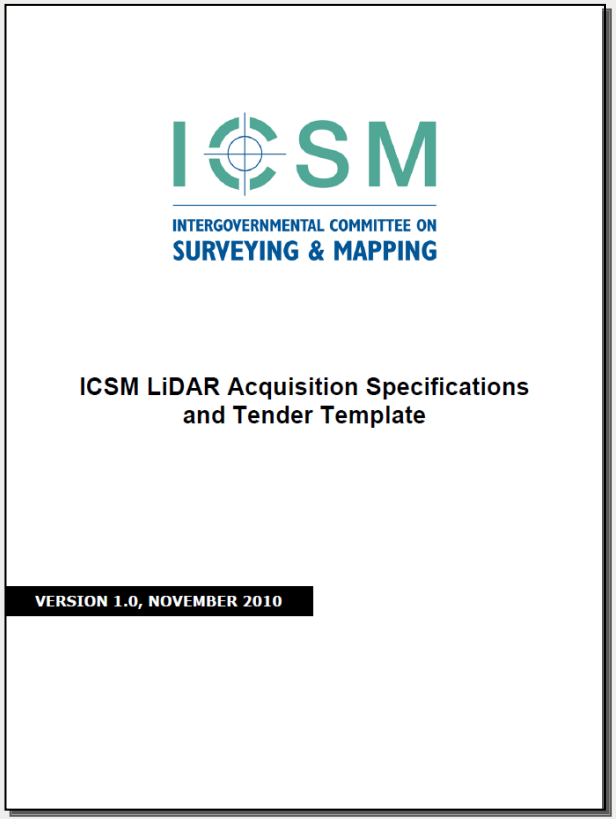
The Coastal Flooding Visualisation Tool



Driving National LiDAR Standards

- Over the last 5 years the standard has led to a dramatic improvement in data quality, interoperability, reduced investor risk and increased industry efficiency

- The Specifications have provided the basis for new automated tools for testing compliance and quality assurance (LiDAR QA) and a new tool has been developed (QA4LiDAR)



Pacific-Australia Climate Change Science and Adaptation Planning (PACCSAP) Programme

1. LiDAR acquisition
2. Building tailored hardware and software
3. Comprehensive training program tailored to each country
4. Developing a initial coastal risk assessment reports for all survey areas

Significant insights and lessons for future programs

Port Vila, Vanuatu
LiDAR DSM and Aerial Photography

Vanimo, Papua New Guinea
Coloured LiDAR Point Cloud

Nuku'alofa, Tonga
Highest Tide 2090

Courtesy:
Nathan Quadros

Globes

Queensland G20 Cube Globe

Source: QDNRM, QUT

Benefits Expected

Positioning Program	**~$118m**
Information Generation Program	**~$188m**
Spatial Infrastructures Program	**~$122m**
Spatial Applications Program $14.2 m	**~$152m**
TOTAL	**~$580M**
For	**~ $180M investment**

Thank You