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& Scientific Engineer

# Spatial technological futures – 2010 FIG Congress

Mary O'Kane
NSW Chief Scientist and Scientific Engineer
Chair, Cooperative Research Centre for Spatial Information

## Cooperative Research Centres are:

- "…end-user focused, research joint ventures in which the collaborating parties work together to a purpose which is mutually beneficial with resources they contribute themselves, with some help from the Commonwealth…"

  *Commonwealth of Australia (2008), 'Collaborating to a Purpose: Review of the CRC Program'*

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## CRCSI-1

- Came out of the Spatial Industry Action Agenda
- Ran from Jul 2003 – Dec 2009
- Decided to put together a new bid…

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## Current big global challenges in spatial research

- Theory and standards for spatial information quality
  - Complexity of spatial information, its reliance on data from highly diverse sources, & the increased societal use of spatial information, necessitates development of consistent and precise frameworks of spatial information quality descriptors
- Real-time high-accuracy ubiquitous positioning
  - Development of 'everywhere-available' (e.g. indoor and outdoor) positioning capabilities to support the increasing range of infomobility applications
- Low-cost high-resolution remote sensing
  - Development of high-resolution miniaturised sensors and low-cost autonomous platforms (e.g. formation flying UAVs, clusters of nano-satellites) for mass-market earth observation from air and space

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The summary version of big current global challenges in spatial research

- Data sensing
- Data fusion
- Data quality

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CRCSI-2

*Spatially enabling Australia*

- Building on community & cooperation built in CRCSI1 [featuring strong ANZLIC support & 43PL]
- New bid features ANZLIC plus other Govt entities; a bigger 43PL; and more end users.
- Four research programs

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## CRCSI 2

- 8 yr ≈AUD170M program
- Contributions from ≈ 115 organisations (industry, govt and academia)
- International linkages to 17 organisations across North America, Europe, Asia and New Zealand
- Principal tasks and objectives around Spatially Enabling Australia
  - **Research and Developemnt**
  - **Education and skills development**
  - **Industry and sectoral development**
  - **Utilisation - delivering major benefits back to Australia**

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## Participants & Stakeholder Overview

| | |
|---|---|
| INDUSTRY | 43PL SME consortium of 75 companies<br>Energy utilities & Agriculture |
| GOVERNMENT (all levels) | ANZLIC - Lands Departments including NZ<br>Diverse agencies e.g. Health; Planning and Infrastructure; Environment; Defence; Agriculture |
| RESEARCH | Universities - 4 Essential and 6 Other Participants including Internationals; and<br>Telethon Institute for Child Health Research |

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# CRCSI-2 Partners - Government

- NSW Land and Property Management Authority
- NSW Department of Environment and Climate Change
- NSW Department of Health
- ANZLIC
- Department of Defence
- Geoscience Australia
- Qld Department of Natural Resources and Water
- Vic Department of Human Services
- Vic Department of Planning and Community Development
- Vic Department of Primary Industries
- Vic Department of Sustainability and Environment
- Landgate
- WA Department For Planning & Infrastructure
- WA Department of Agriculture and Food
- WA Department of Health
- WA Main Roads

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# CRCSI-2 Partners – Industry+

- 43 Pty Ltd
- Energex Limited
- Ergon Energy

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# CRCSI-2 Partners – Research

- The University of Melbourne
- Curtin University of Technology
- The University of New England
- Queensland University of Technology
- RMIT
- McGill University
- Wuhan University
- Telethon Institute for Child Health Research

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## International Collaborations


## CRCSI-2 Research Programs

- Positioning: next generation GNSS (Global Navigation Satellite Systems) technology
- Automated Spatial Information Generation: from space-borne, airborne, terrestrial imaging and remote sensing systems
- Spatial infrastructures: access to (government) spatial data
- Applications: pull through to end users (health, agriculture, defence, energy & utilities, urban development)

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# However…

- let's consider national research centres doing 'spatial projects'…

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## ARC Centre for Excellence in Autonomous Systems

- Partnership between:
  - The University of Sydney
  - The University of New South Wales
  - University of Technology, Sydney

  with many government and industry investors, most notably Rio Tinto and US & Australian Defence Agencies

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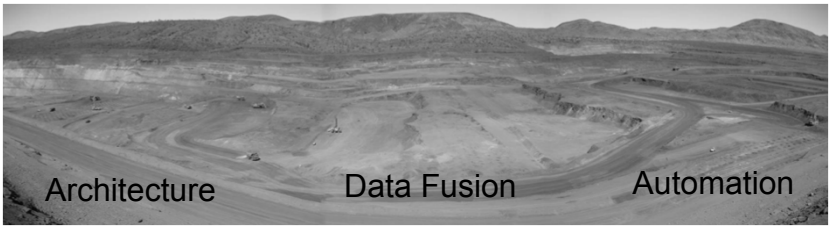
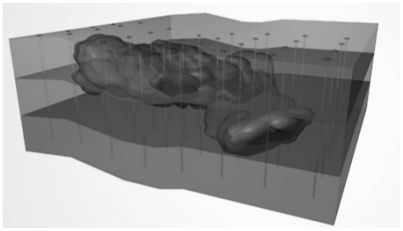
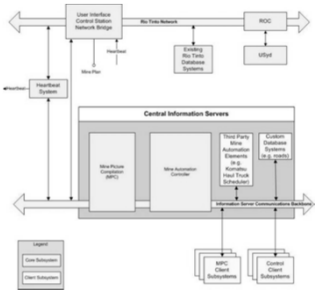
# Total Mine Automation

RioTinto



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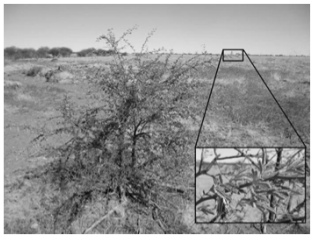
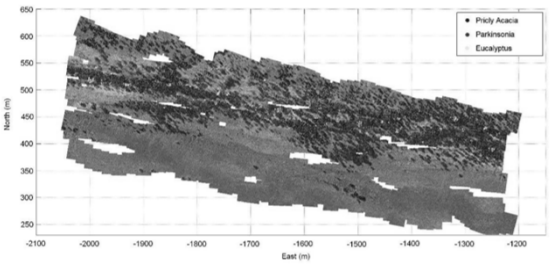
# Weed Identification from UAVs



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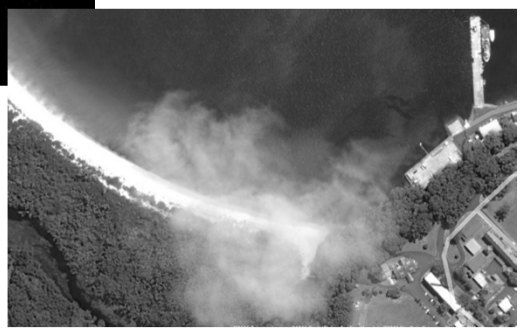
## Littoral Mapping: Sub-sea and Ground Terrain



Navy Hydrographic Office

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NICTA

# Smart Water

**National ICT Australia – Victoria Research Laboratory**

**April 2010**

Australian Government
Department of Broadband, Communications and the Digital Economy
Australian Research Council

NICTA Members
ANU
UNSW
Department of State and Regional Development
NICTA Partners
The University of Sydney
Griffith University

# Today's water supply-chains are inefficient


- **GMW - seven river basins covering over 27,000mi$^2$ (Central Valley, CA is 40,000mi$^2$)**
- **Average total water use in GMW is 471 billion gallons per year**
- **Up to 211 billion gallons is lost every year**
- **Melbourne's average annual water consumption is 132 billion gallons**
- **Los Angeles' average annual water consumption is 199 billion gallons**
- **Southern Australia could have up to 30% less water inflows by 2050**

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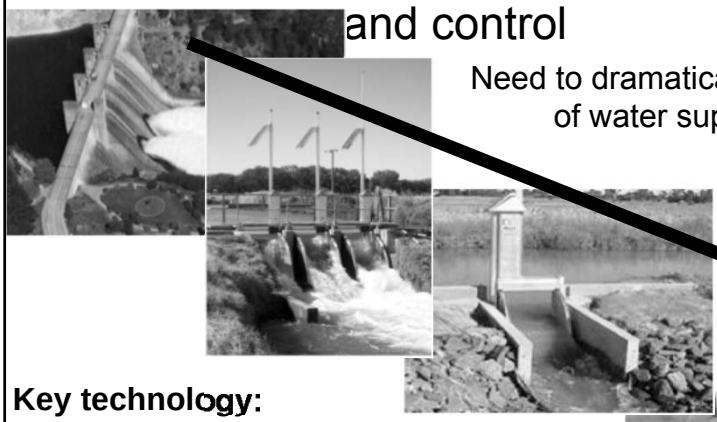
# Technology – Measure, predict, optimise and control



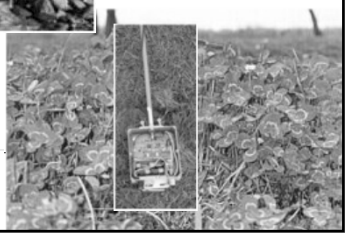
Need to dramatically lift efficiency of water supply chains

**Global average is 50%**

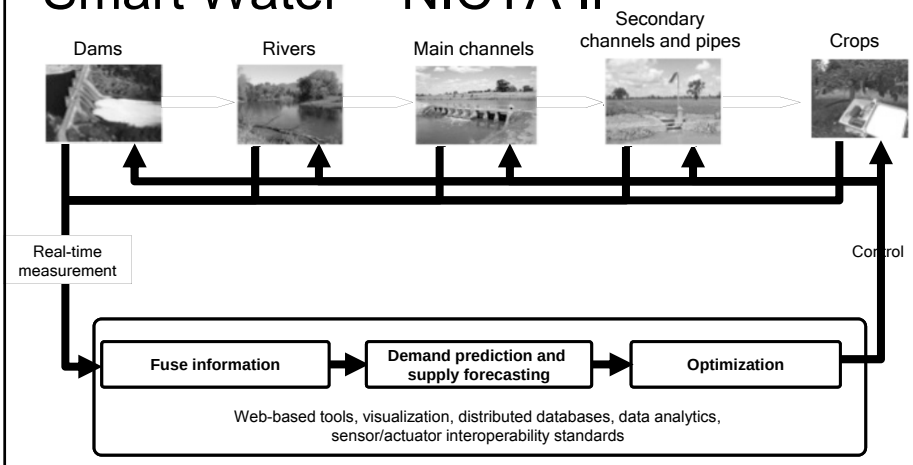
**Our goal is 10%**

**Key technology:**

- **Real-time measurement**
- **Forecasting and prediction**
- **Optimization and real-time control**



# Smart Water – NICTA IP




- **Smart Water – An integrated platform for water resource management at basin-scale**

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# IMPCA Curtin University

- Virtual Observer takes the data collected by front-facing video cameras in many buses, & constructs an interface so that one can view any place at any time.
- Virtual Observer uses the information from a fleet of mobile cameras in combination with GPS data
- Offer new possibilities for crime prevention, policing, intelligence collection etc


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# What does this mean for CRCSI-2?

- A dual focus:
  - Addressing the challenges in providing continental scale very fine positioning and spatial data infrastructure
  - How to manage research collaborations with and spatial infrastructure support for 'non-spatial' spatial researchers

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