

Opportunities for connected data

The way forward workshop – Wellington, 4 – 5 April 2018

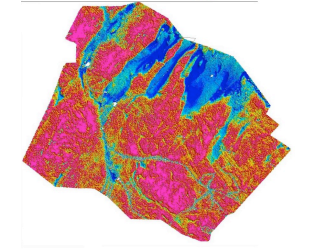
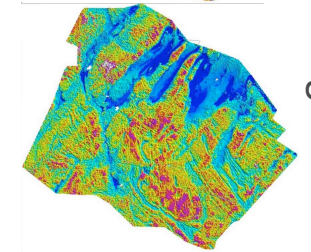
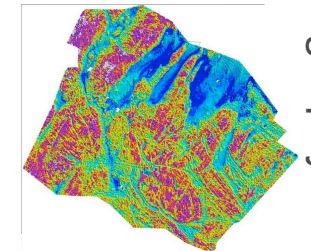
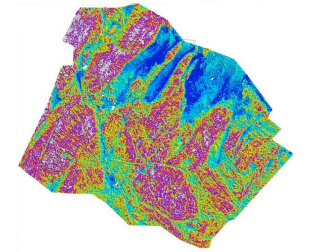
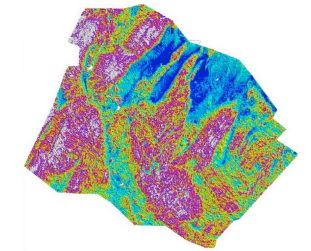
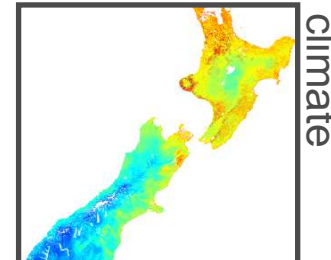
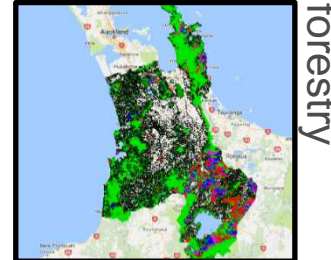
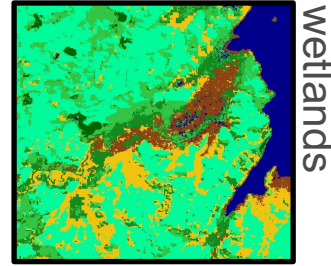


Rogier Westerhoff (GNS Science)
Paul Charsley (Massey University)
Mark Shepherd (AgResearch)



The opportunity

- **Data and characterisation technologies are rapidly improving, resulting in new, massive and free datasets (interregional or nationwide), e.g.:**
 - Satellite data in the Cloud
 - Airborne geophysics
- **New Zealanders under-utilise those data, still applying data piecemeal and inconsistently**
 - Impedes collaboration (IP, data-formats, models used)
 - Creates trans-boundary issues between regions / catchments
 - We need to upskill as environmental scientists!
 - We need to raise awareness for our stakeholders for the opportunities arising from these data.



Airborne geophysics Otago

Our proposed solution

We propose development of a suite of open data and open source Big Data and machine learning tools, applied mostly in the Cloud, for improved environmental and agricultural characterisation (and their interlinkages).

- Collaborative workspaces between institutes ('de-siloing') and regional councils.
- Significantly speeds up research, up to more than 50% (no downloading, processing, storing)
- Machine learning and deep learning will enhance data-fusion and bypass model complexity

With these tools, we will facilitate more rapid progress and cross-disciplinary research towards solutions for OLW

Impact

- **Big Data and machine learning in the Cloud will create a step-change in regional and nationwide characterisation of our land and water. This project will increase the uptake of open and big data technologies, hand in hand with existing research and platforms of NZ**
 - Connecting rather than build a new platform
 - Show benefit to NZ, both for environmental and agricultural gains and commercial uptake
 - Through use cases at different spatial and temporal scales, we will demonstrate value, understand barriers to adoption and identify gaps

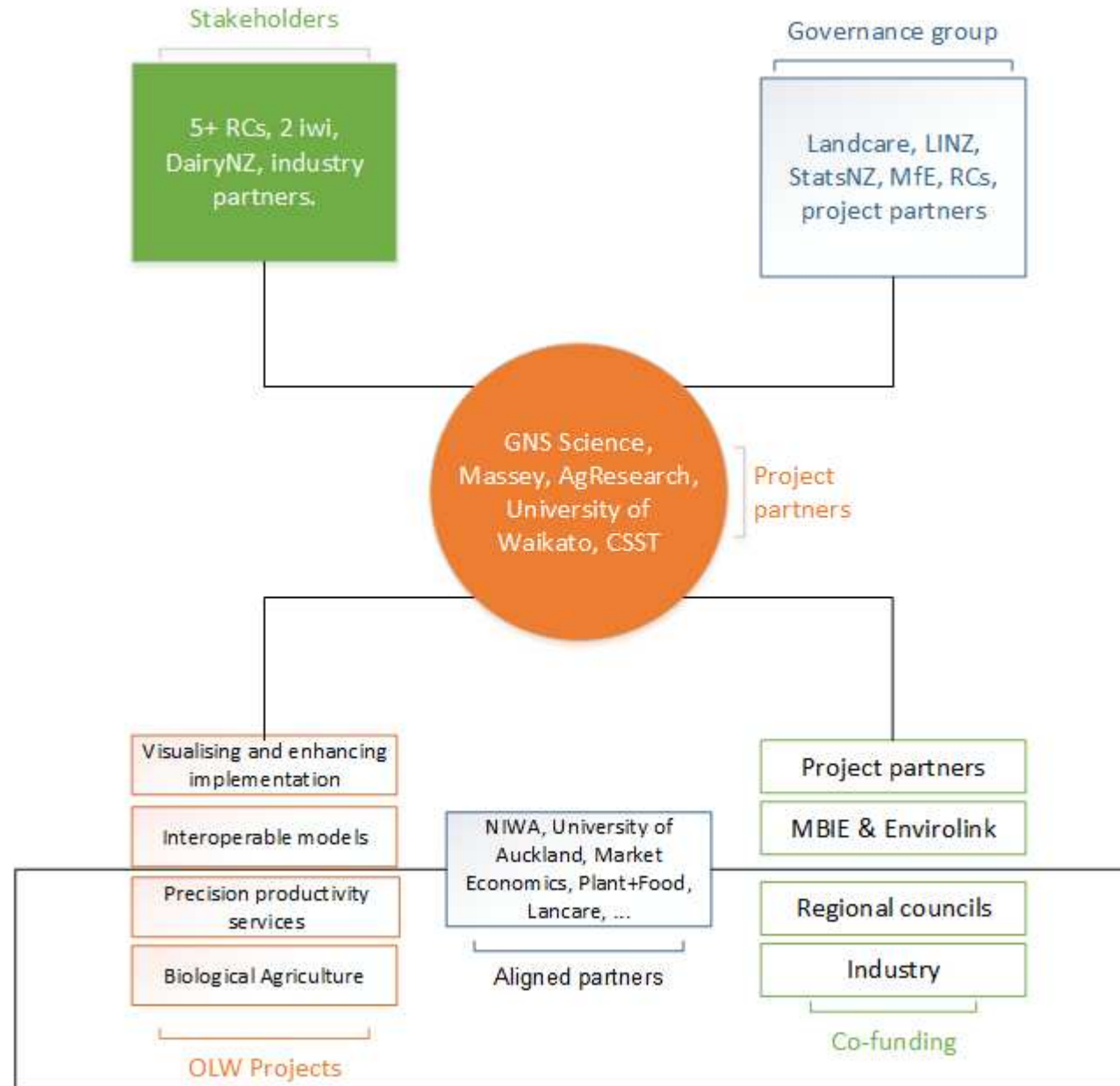
What happened after the first roadshow?

- **Mini-workshop GNS, Massey, AgResearch (Rogier, Paul, Mark)**
 - Identified excellence, impact and implementation of our project
 - Open data / open source technology
 - Incorporation of emerging datasets (satellite, geophysics, sensors)
- **Identified and talked to other projects:**
 - Precision productivity (Landcare)
 - Visualisation and enhancing implementation (AgResearch)
 - Biological Agriculture (Plant+Food)
 - This workshop as an opportunity to explore other collaborations

Co-innovation

How do Big Data technologies best add value without standing in the way of current research and commercial developments?

A flexible and open data approach that enables connection to Big Data methods, that **everyone** can tap into (public, commercial, research)



Implementation



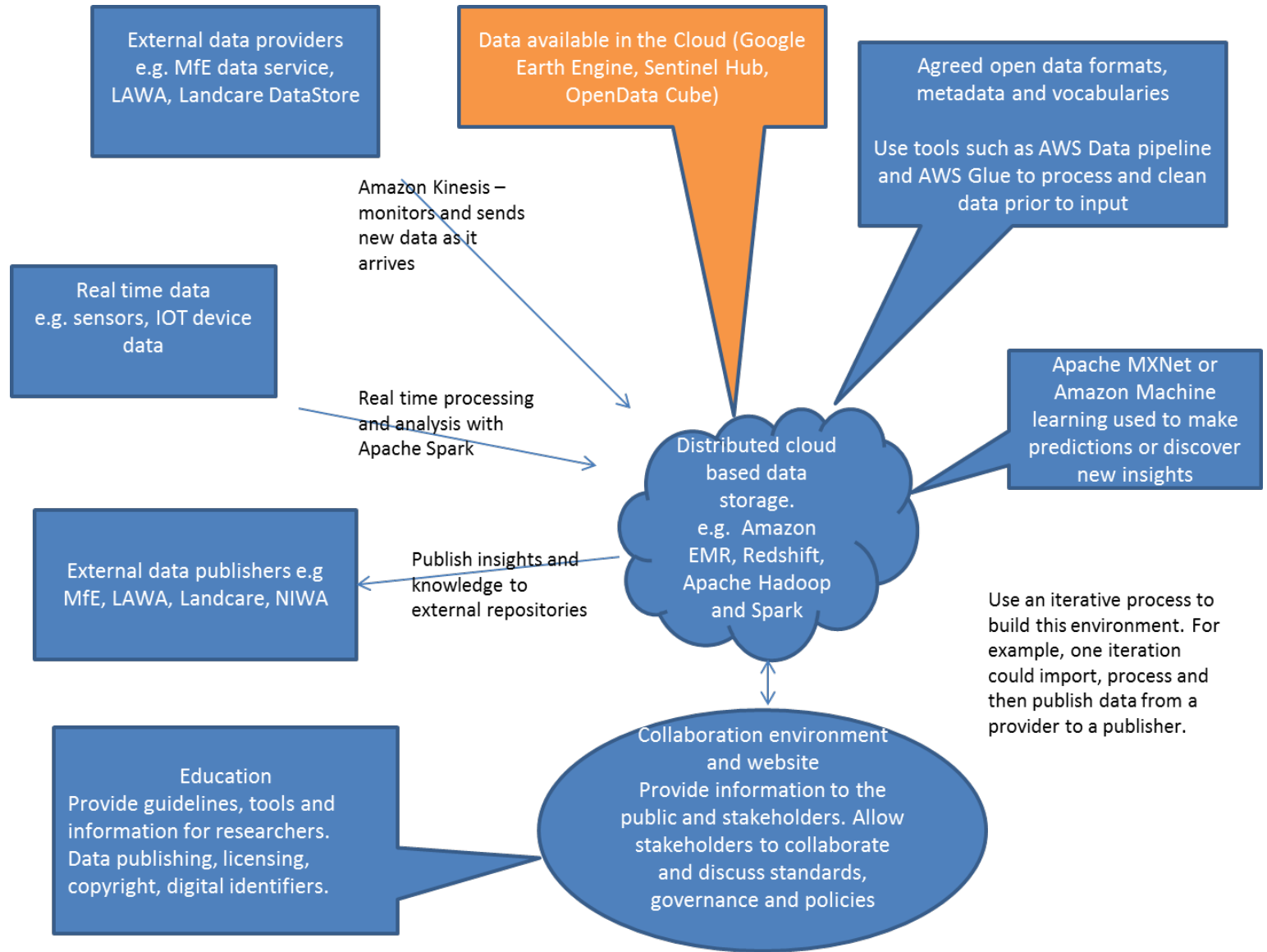
- Don't re-invent the wheel (white paper Data Ecosystem)
- Use cases at different scales (farm, catchment, season, long-term)
- Work bottom-up, with the available platforms.
- Using an iterative approach, with each iteration providing a measurable benefit, e.g.:

- Inter-CRI collaboration
- Facilitate co-development with stakeholders
- Facilitate demonstrators for regional councils
- Impact on climate impact
- Willingness to co-fund
- Agreement on open standards

1) LIC or DairyNZ with their commercial providers: can they do a better job if we give them Big Data (2000- now, all catchment).
2) RCs case studies in Waikato: land and water use vs water quality and quantity
3) BVD project: Paul
4) OLW projects

1) Spatially-explicit effects of
A. prolonged drought events on farming, environment
B. Economic efficiency of farm practices over time
2) Relation between catchment-based environment impact and land use
3) Above RC case study

requiring PhDs / PostDocs, deep learning, machine learning



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