

# Shifting Expectations– Enabling Federated Infrastructure

*A Regional Council experience*

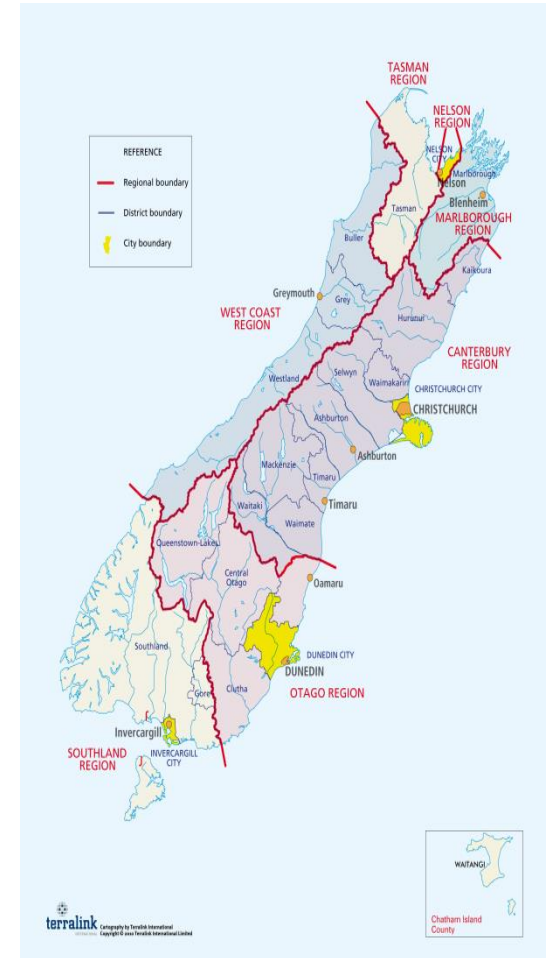
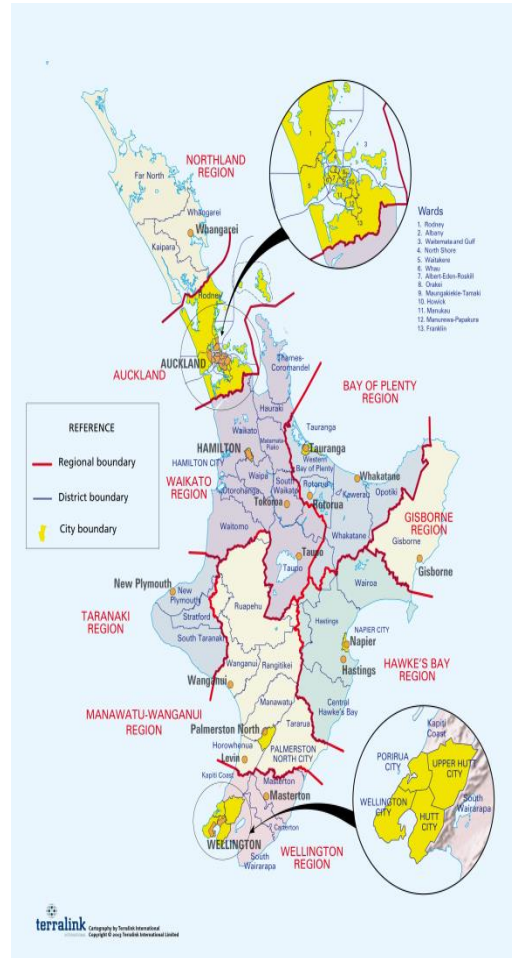
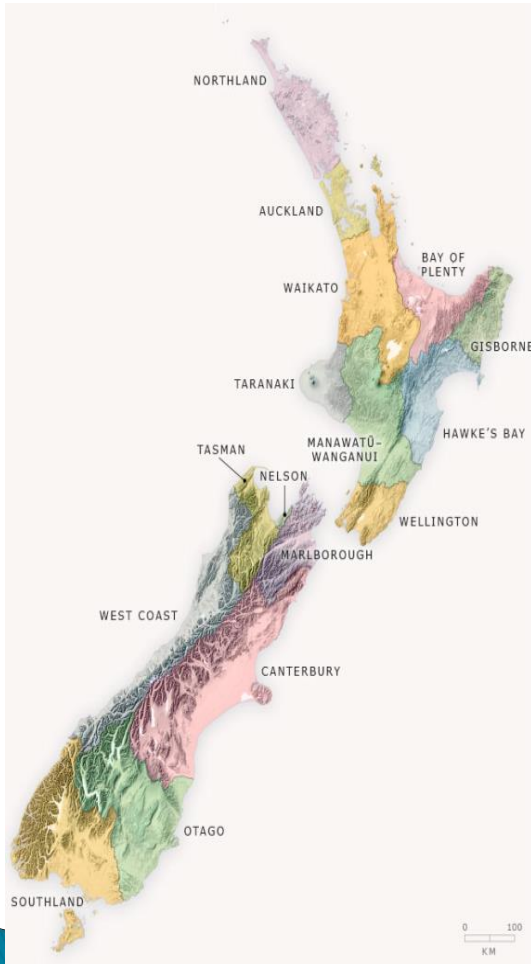


Brent Watson  
Coordinator Catchment Data  
Horizons Regional Council  
LAWA/FNDS Team.  
Environmental Data SIG

# Part1 . Background

»» What part does the regional sector play?

# NZ Local Government Sector



# New Zealand

## 2009-Land and Water Forum

The **Land and Water Forum** brought together a range of stakeholders consisting of industry groups, electricity generators, environmental and recreational NGOs, iwi, scientists, and other organisations with a stake in freshwater and land management.

## 2011-Open Government Declaration

The government holds data on behalf of the New Zealand public. We release it to enable the private and community sectors to use it to grow the economy, strengthen our social and cultural fabric, and sustain our environment. We release it to encourage business and community involvement in government decision-making.

## 2014-National Policy Statement

The NPS-FM provides direction about how local authorities should carry out their responsibilities under the Resource Management Act


## 2015-ICT Strategy

The Government ICT Strategy was revised in 2015 to ensure that, in a dynamic technology environment, it can achieve the government's aim of an ICT-enabled transformation of public services to New Zealanders

## 2015-Environmental Reporting Act

The purpose of this Act is to require regular reports on New Zealand's environment.

# 2009 Regional Government Information Value Proposition

- ▶ 2009 – Government seeks “new start for freshwater”
  - ▶ Regional Government is at the heart of this program.
  - ▶ Can contribute capacity, capability and scale
  - ▶ A monitoring network of more than 1000 sites per domain
  - ▶ A combined science, information and monitoring team of in excess of 450 people
  - ▶ A sector investment of about \$75 million per annum in the environmental information and monitoring outputs.
- 

# 2009 Regional Challenge.

- ▶ Commitment to national synthesis while maintaining ownership.
- ▶ Development of a single endpoint.
- ▶ Adopt Best Practice.

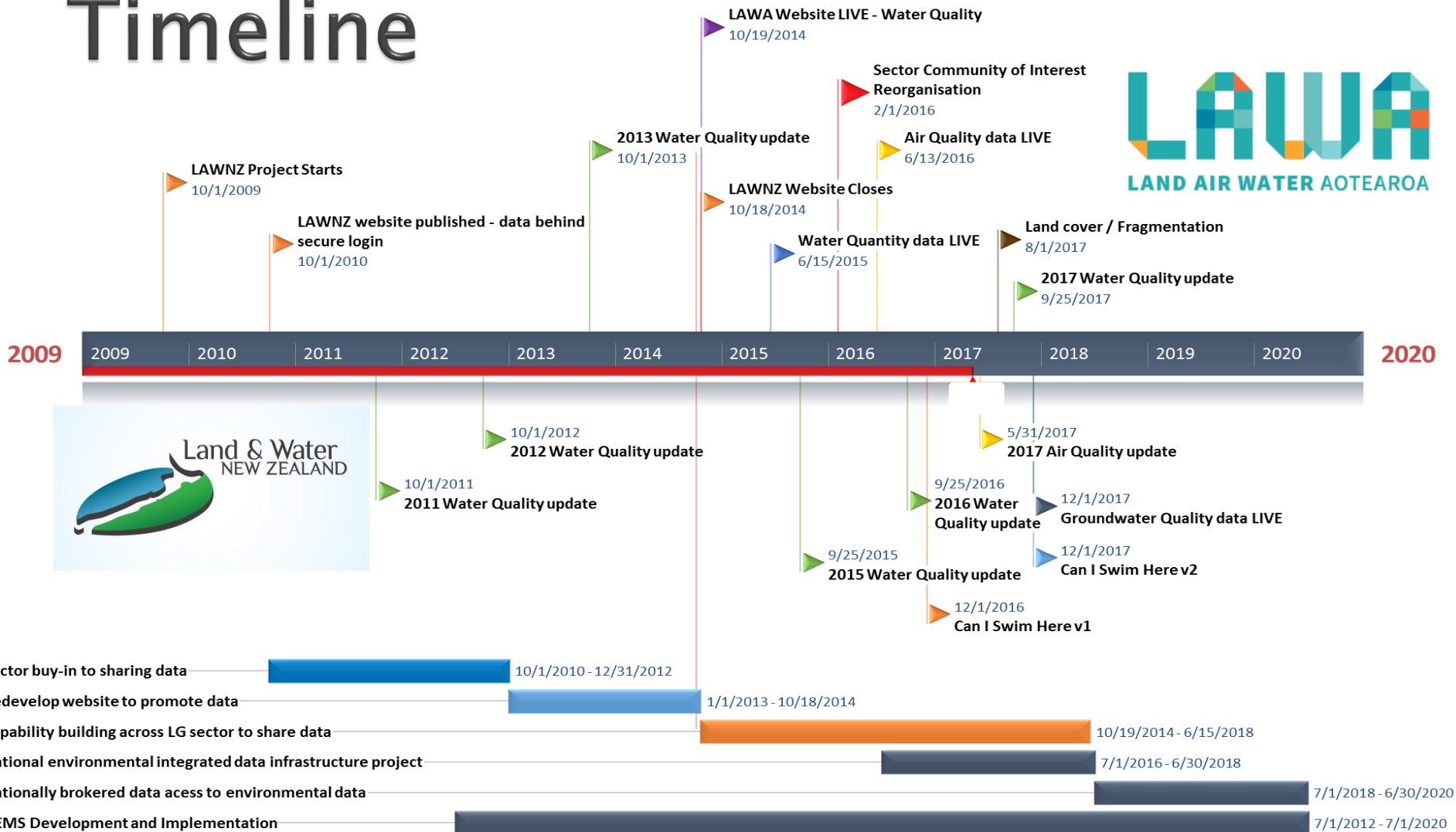




# Part 2. Changing the playing field

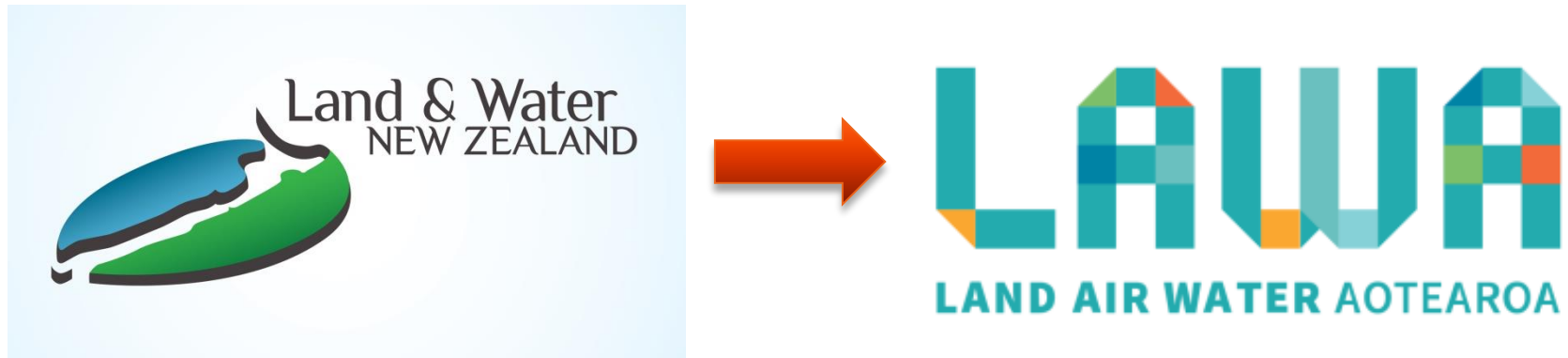
» Evolution or Extinction.

# Timeline





# Evolution of LAWNZ to LAWA



- Improved scientific communication to the general public.
- Scaling & Reporting – Catchment, Region, Country.
- No more CSV files – Webservices, Live Data.
  - Federation Model.
    - Analysis Services
    - Quality Issue Reporting and Resolution Process.

# Federated infrastructure

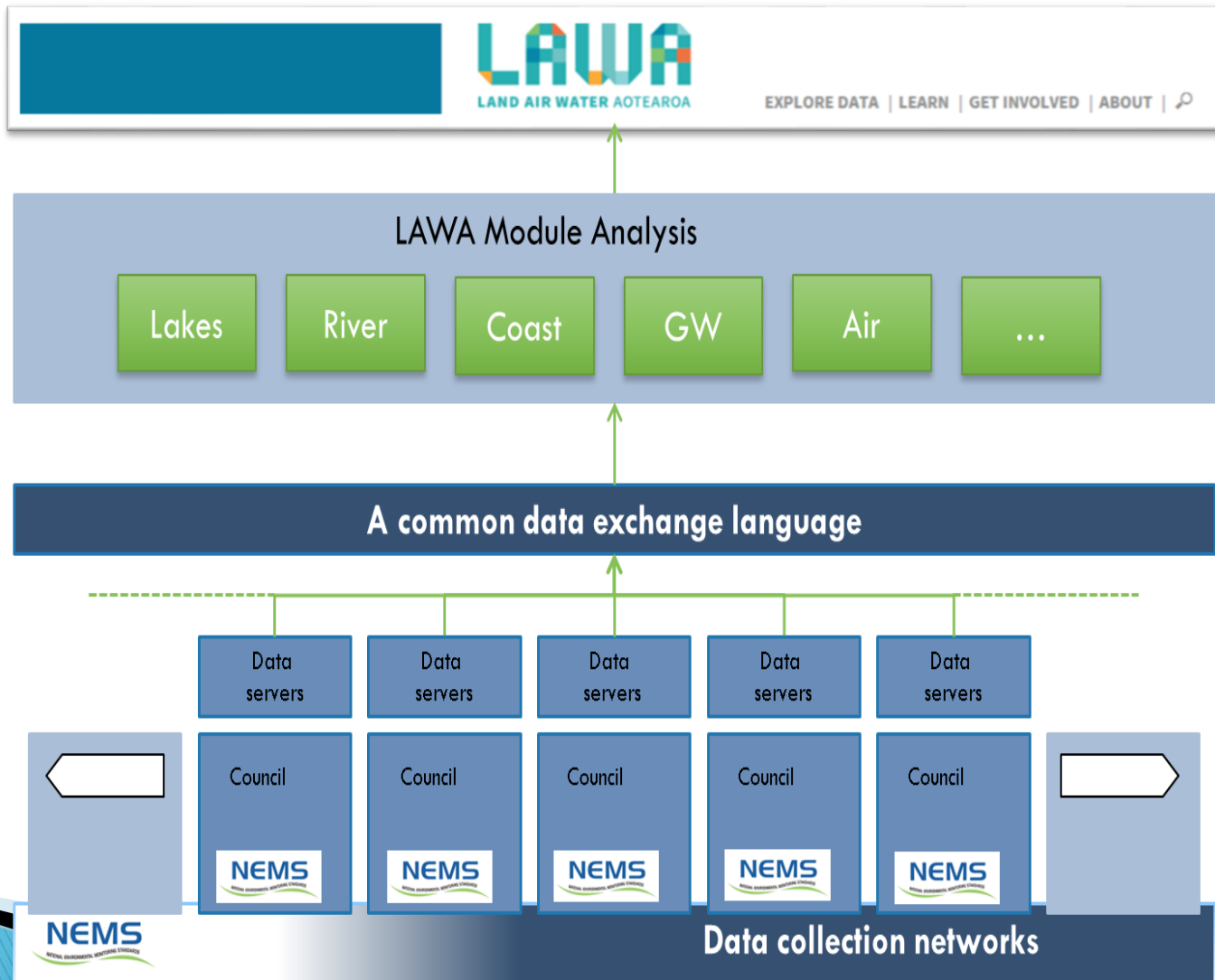
National (public facing)  
reporting platform(s)  
(LAWA)

Standard protocols

National (federated) data  
management system

Integrated collection  
networks

Standard monitoring  
protocols and methods.



Reporting

Analysis  
Teams

Data servers  
for LAWA

Secure  
Council  
Systems

# State of Play for NZ

Local  
Government



**16**

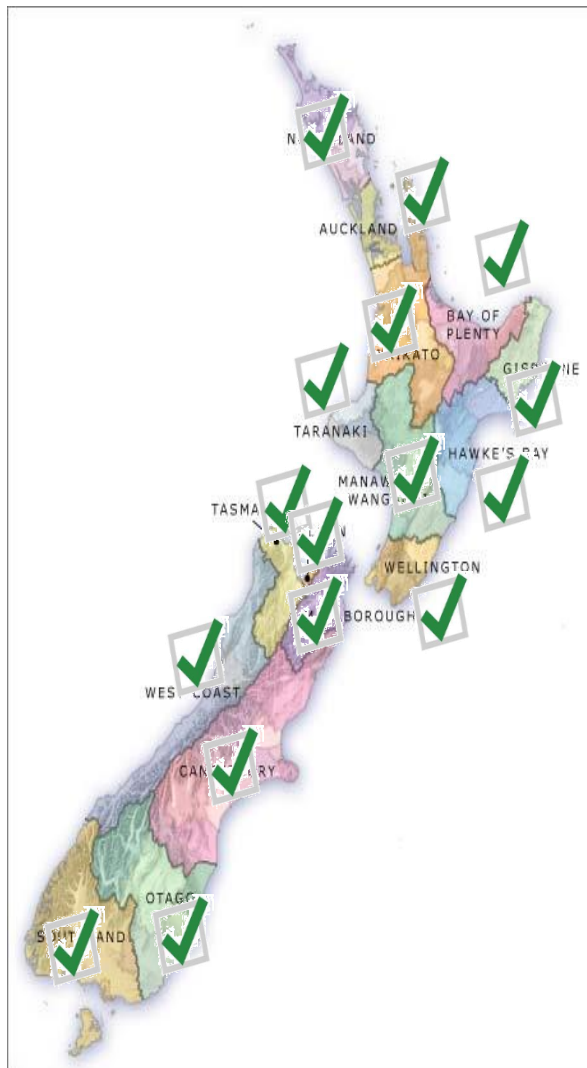
SOS2/WaterML2

National –  
CRIs



**3**

SOS2/WaterML2/TimeseriesML



# Products in use in regional sector

## ▶ Temporal Webservices

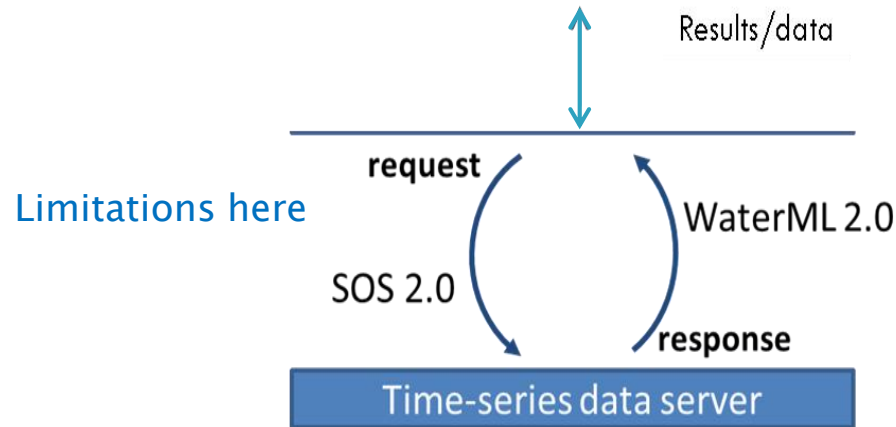
- Hilltop (13)
  - Native
  - Webservice broker
- Kisters (2)
  - Hydstra
  - Whiskey
- Aquatic Informatics / 52 North (1)

## ▶ Spatial Webservices

- ESRI (16)



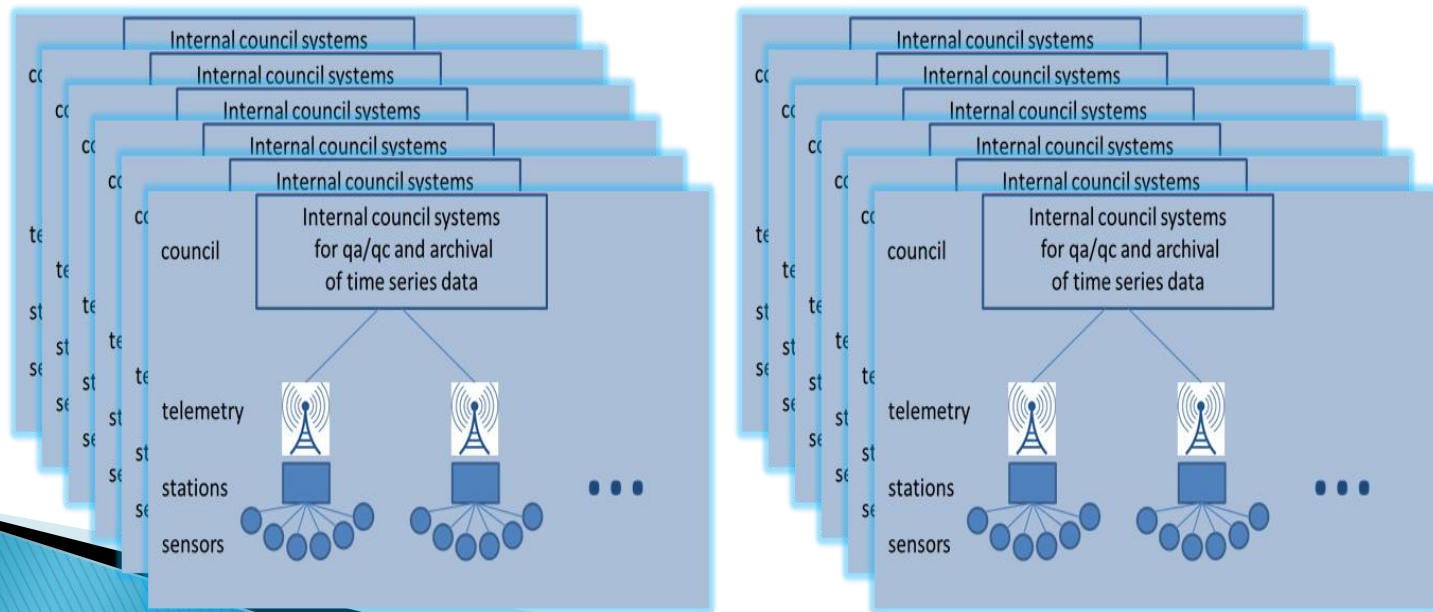
# Data federation premise (O&M)



SOS2 and WaterML2 are internationally-based Standard languages for asking a question to a time-series data server, and for getting the data back

**Constraints here – water quality**

Eg. Hilltop, Kisters, 52North



# Land Air Water Aotearoa



[EXPLORE DATA](#) | [LEARN](#) | [GET INVOLVED](#) | [ABOUT](#) | [🔍](#)

**LAWA connects you with New Zealand's environment through sharing scientific data**

Search for a site near you



Near me now



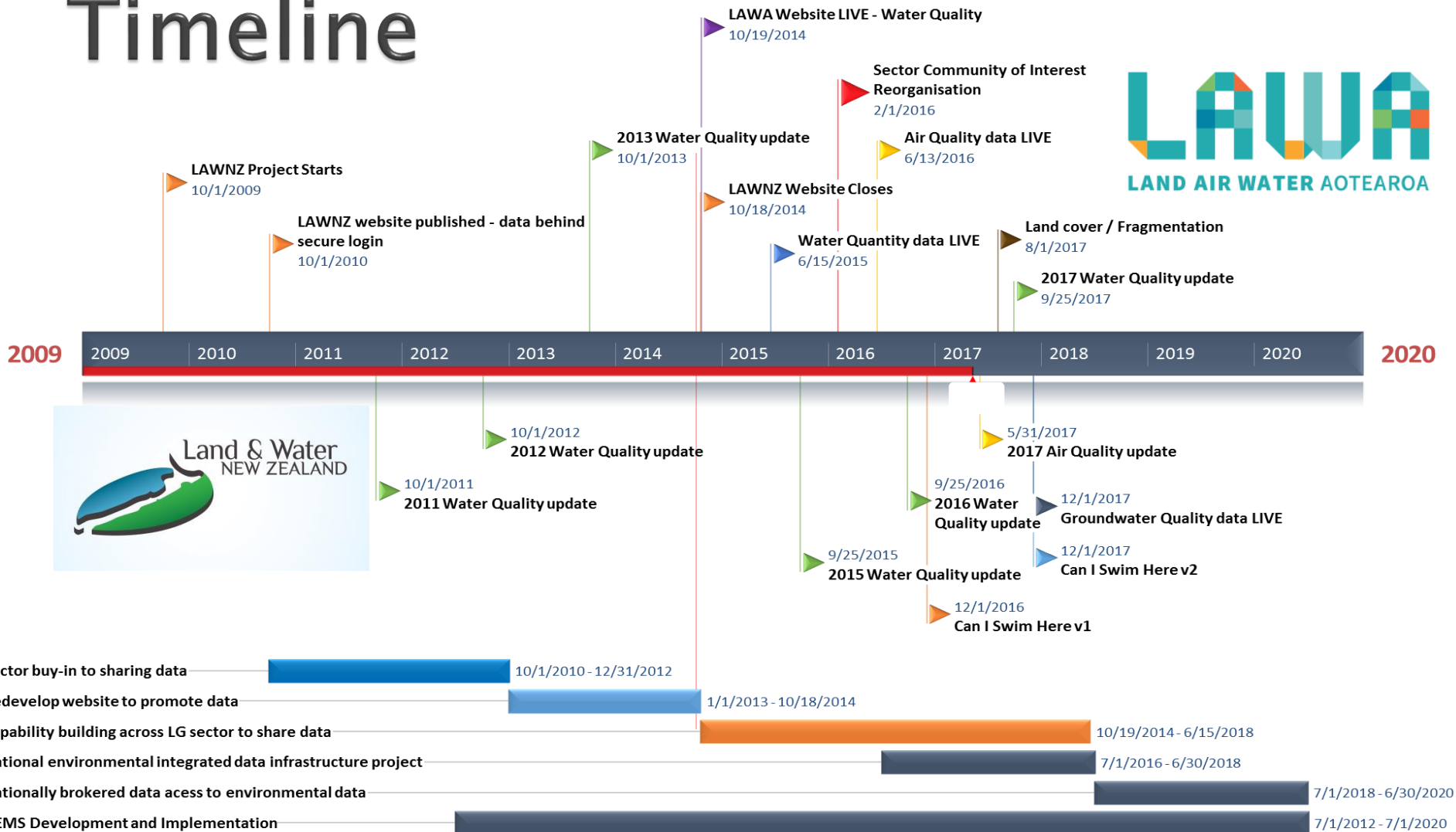
Or explore topics



[www.lawa.org.nz](http://www.lawa.org.nz)



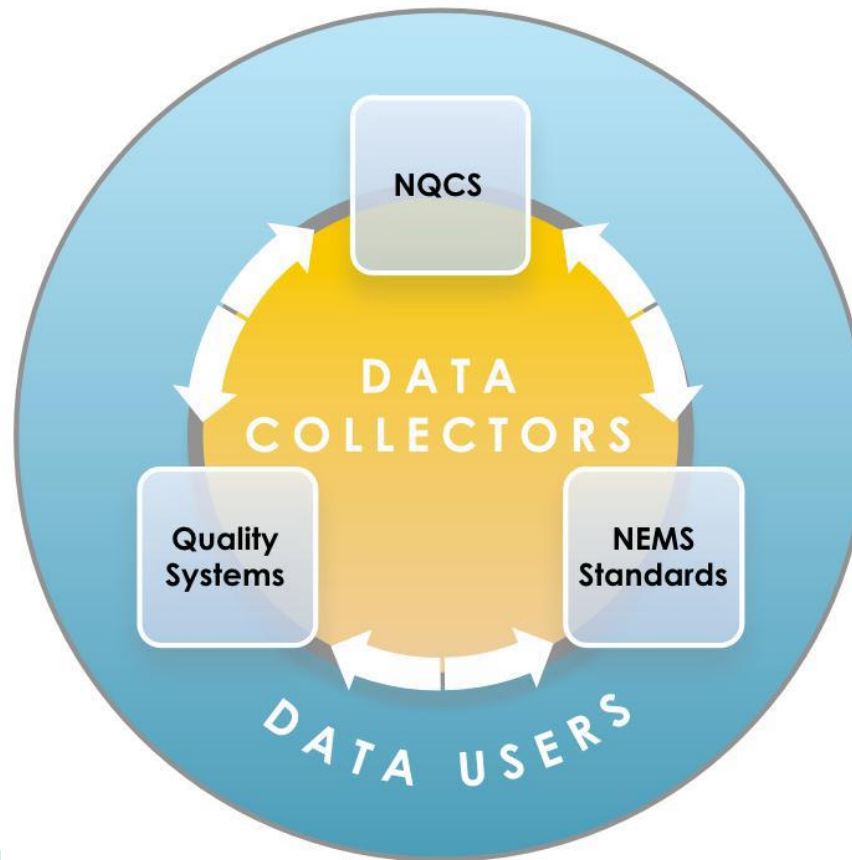
# Timeline





# NEMS

NATIONAL ENVIRONMENTAL MONITORING STANDARDS



<http://www.nems.org.nz/>

# National Environmental Monitoring Standards

**NEMS**

[DOCUMENT LIST](#)

[SUBSCRIBE](#)

[FEEDBACK](#)

[ABOUT NEMS](#)

The National Environmental Monitoring Standards (NEMS) are a series of environmental monitoring standards, prepared by the NEMS steering group on authority from the Regional Chief Executive Officers (RCEOs) and the Ministry for the Environment (MfE).

The NEMS initiative is led and supported by the Environmental Data special interest group (formerly known as LAEMG) to assist in ensuring consistency in the application of work practices specific to environmental monitoring and data acquisition throughout New Zealand.



## Key Dates

No workshops scheduled



<http://www.nems.org.nz/>

# NEMS – Outcomes for Users

- ▶ Recognised Authoritative sources
- ▶ Defined
  - Quality
  - Tolerances
  - Accuracies
- ▶ Data management.
- ▶ Common data access
  - Agnostic of software
- ▶ Common response
  - Allowing simple analysis across multiple agencies.
  - Single builds.
  - Portholes
  - Applications.
- ▶ Discoverability.

Collection

Distribution

# Part 3. 16 Flavours

»» Does an icecream shop sell more icecream if they have a larger selection?

# Hard learnt insights & points of action.

- ▶ Clear inward focus.
  - Inconsistencies:
    - Feature of Interest (naming conventions).
      - No national geo-fabric.
    - Observed Property & Method (naming conventions).
      - In-house naming.
    - Limited programme standardisation.
      - Test methods.
      - Sampling frequencies.
    - Metadata & spatial connectivity.
    - Quality control.

# Hard learnt insights & points of action.

- ▶ Lack of knowledge transfer across domains within organisations.
- ▶ Limitations within O&M
- ▶ No single supporting architecture:
  - Registries
  - Ontologies / Vocabularies
  - GeoFabric
  - Stable & persistent URIs
- ▶ Statistical data vs. Timeseries.

So there was a lot of effort hacking the system.

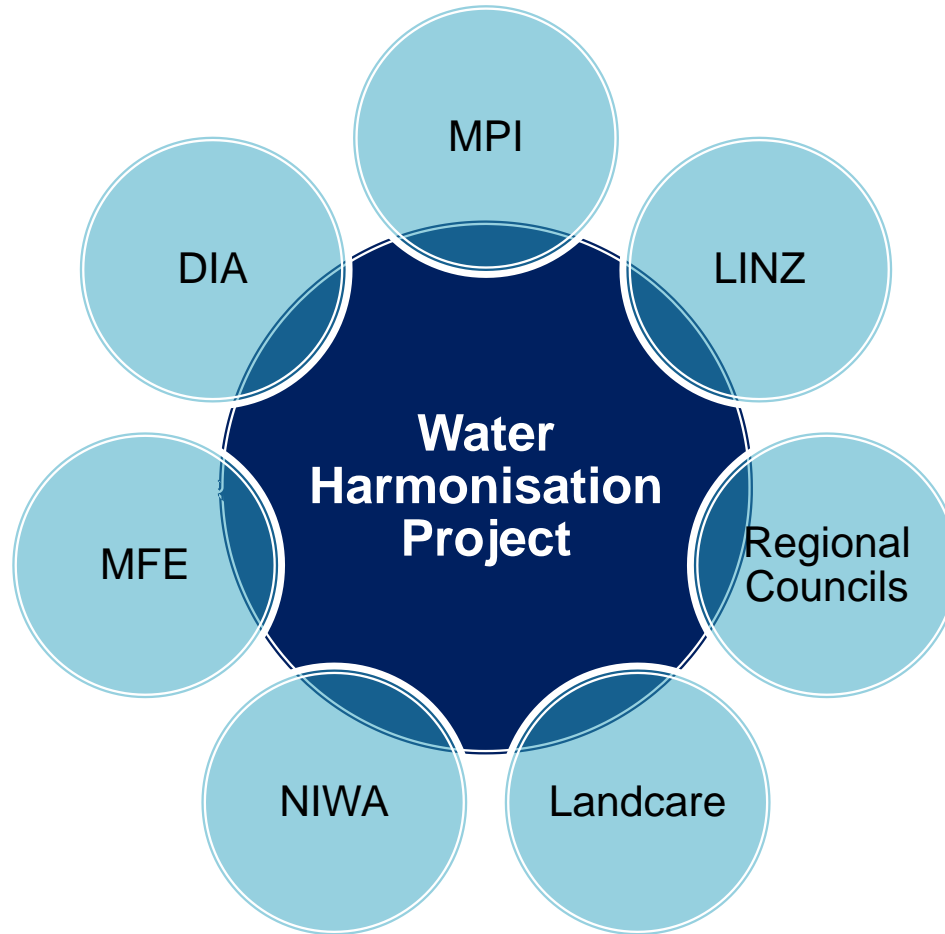


# Part 4. Towards a Water Data Infrastructure

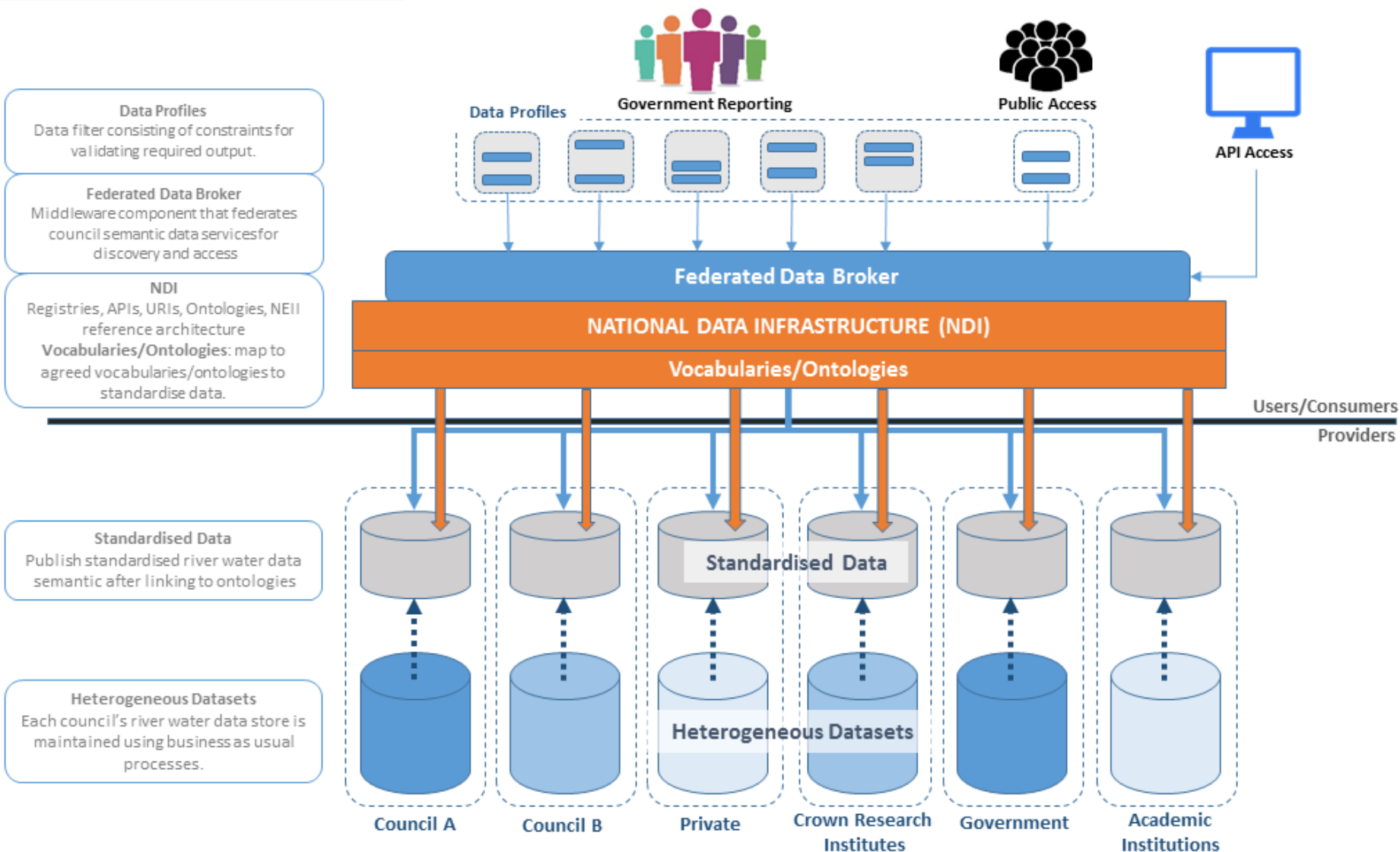
- » Collective approach to resolving the issues limited true data accessibility.



# 2017 – NRS Water Harmonisation Project



## Proposed Project: NRS Water Infrastructure



# Linked Data Environment

The screenshot shows a web browser window with two tabs: 'New Zealand Environme' and 'New Zealand River Monitorir'. The address bar shows 'envdatapoc.co.nz/#explore\_home'. The website header is dark blue with the text 'NEW ZEALAND Environmental Integrated Data Infrastructure' and 'Proof Of Concept Beta'. Navigation links include 'Explore', 'Tools', 'Search', and 'Help'. The main content area is also dark blue and contains the following text:

This site holds regularly updated river flow data from four New Zealand regional councils: Canterbury, Hawke's Bay, Horizons and Waikato. The data can be viewed, explored and downloaded through this [map-based user interface](#).

The data is organised into a series of [datasets](#) and stored as '[Linked Data](#)'. This makes the information available through the Web for use in other software applications. You can also explore it through this website. Just explore the links, or take a look at the [Getting Started page](#).

Read about the [background to this project](#) and please take note of the [Disclaimer](#) section: this site is a proof of concept and not suitable for operational use.

**LATEST UPDATES**

<a href="#">Horizons stage measurements</a>	09/04/2018
<a href="#">Hawkes Bay flow measurements</a>	09/04/2018
<a href="#">Hawke's Bay stage measurements</a>	09/04/2018
<a href="#">Waikato flow measurements</a>	09/04/2018
<a href="#">Waikato stage measurements</a>	09/04/2018

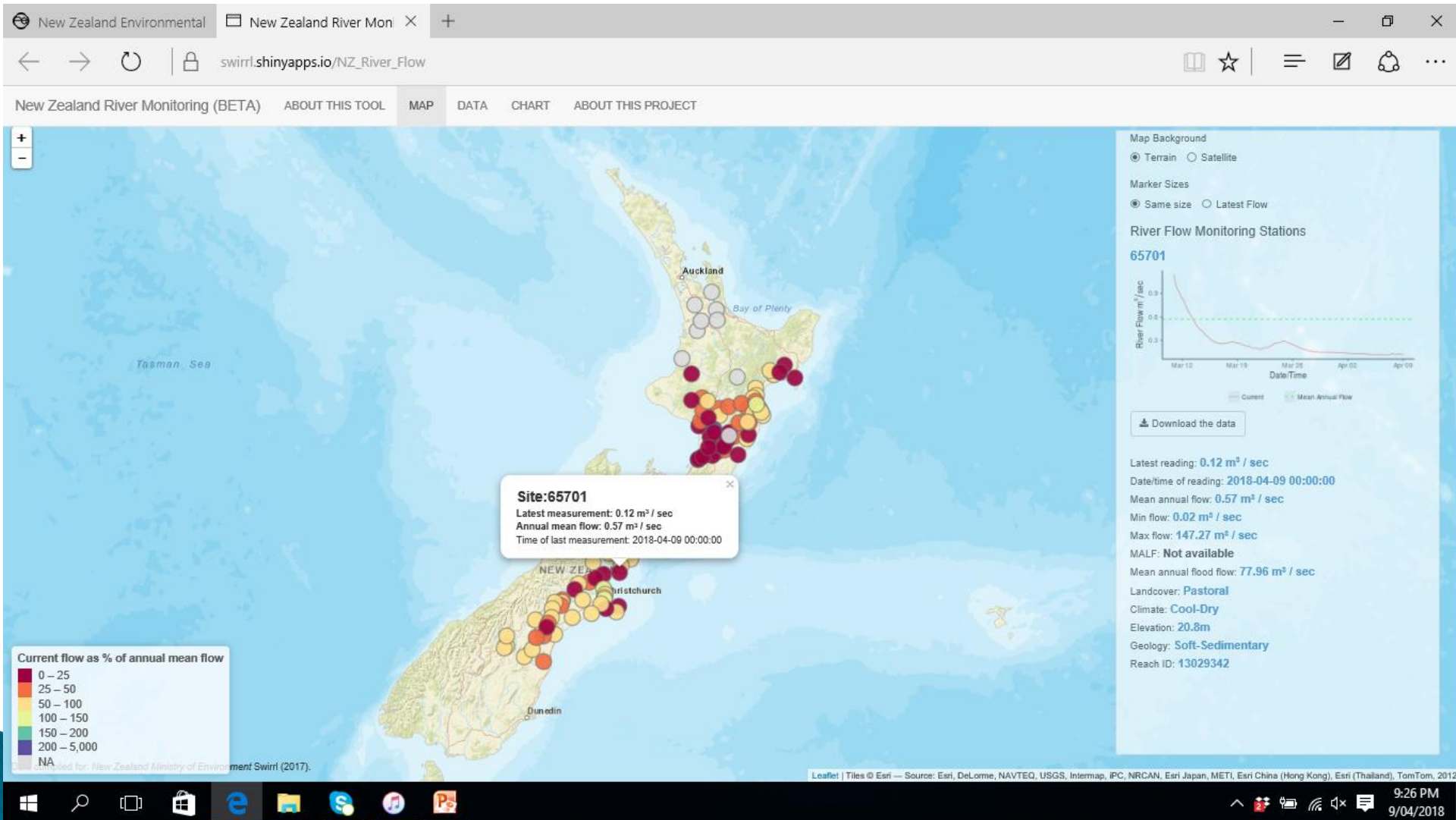
**EXPLORE BY THEME**

- [Flow data](#)
- [Geographical information](#)
- [Monitoring sites](#)

The Windows taskbar at the bottom shows the Start button, search icon, and several application icons (File Explorer, Edge, Skype, Music, Photos). The system tray on the right shows the date and time: 9:25 PM, 9/04/2018.

[http://envdatapoc.co.nz/#explore\\_home](http://envdatapoc.co.nz/#explore_home)

# Shiny Interface Example



[https://swirrl.shinyapps.io/NZ\\_River\\_Flow/](https://swirrl.shinyapps.io/NZ_River_Flow/)

# Spatial Connection

New Zealand Environmental | New Zealand River Monitor | New Zealand Environme ✕ +

envdatapoc.co.nz/doc/reach/13029342

NEW ZEALAND  
Environmental Integrated Data Infrastructure  
Proof Of Concept Beta

Explore ▾ Tools ▾ Search ▾ Help

✦ A resource in the dataset Canterbury monitoring sites.

## 13029342

DATA API

### URI

This is a **linked data resource**: it has a permanent unique **uri** at which both humans and machines can find it on the Internet, and which can be used an identifier in queries on our [SPARQL endpoint](#).

<http://envdatapoc.co.nz/id/reach/13029342>

### ALL METADATA

In Graph  
<http://envdatapoc.co.nz/graph/canterbury-monitoring-sites>

**Label** rdfs:label  
<http://www.w3.org/2000/01/rdf-schema#label> 13029342 xsd:string

In Graph  
<http://envdatapoc.co.nz/graph/river-environment-classification>


**Catchment area**  
<http://envdatapoc.co.nz/def/catchmentArea> 9.0355536E7 xsd:double

**Climate**  
<http://envdatapoc.co.nz/def/climate> **Cool-Dry** ▸  
<http://envdatapoc.co.nz/def/rec/climate/cd>

<http://envdatapoc.co.nz/doc/reach/13029342>

**Water Data Infrastructure is  
possible.**

**Adoption of a standardised  
approach and development  
and on-going support for  
national registries.**





# Partners / Providers





# Building on federated systems

## High Level Infrastructure Architecture (Project Scope)

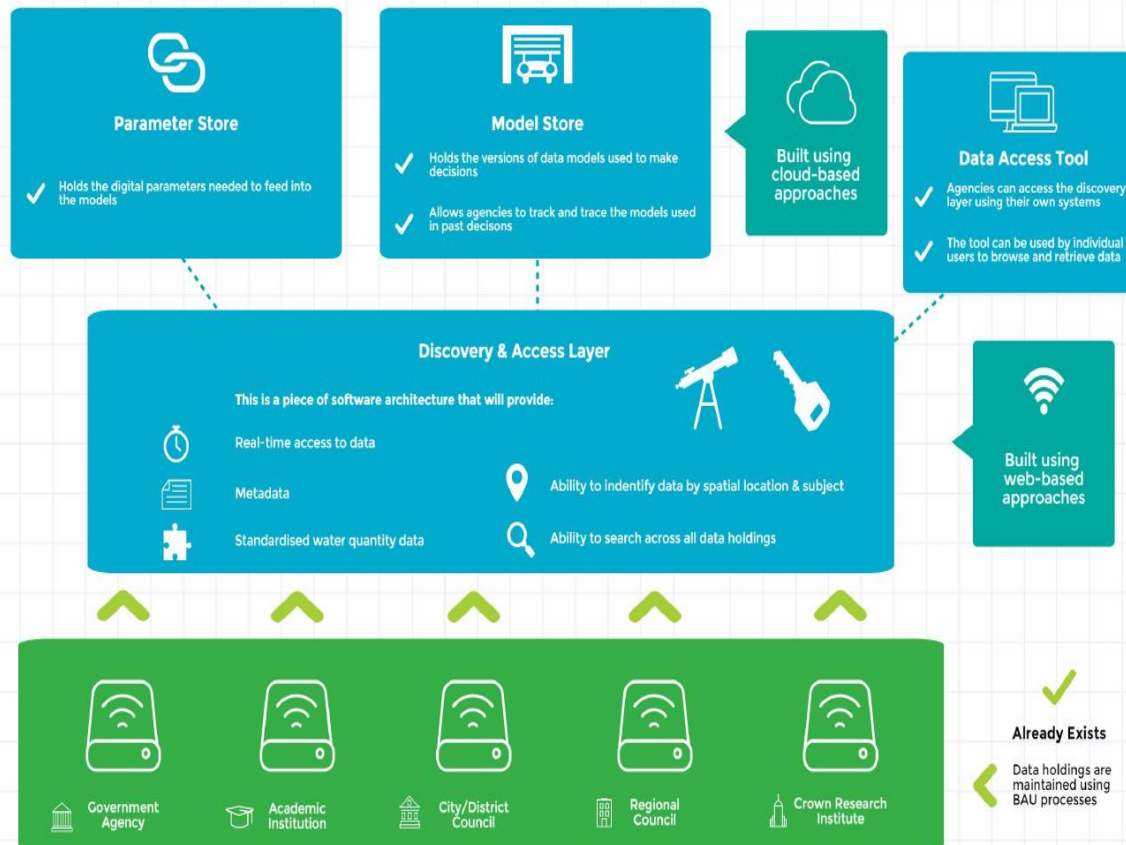


Ministry for the  
Environment  
Māori Mo Te Taiao

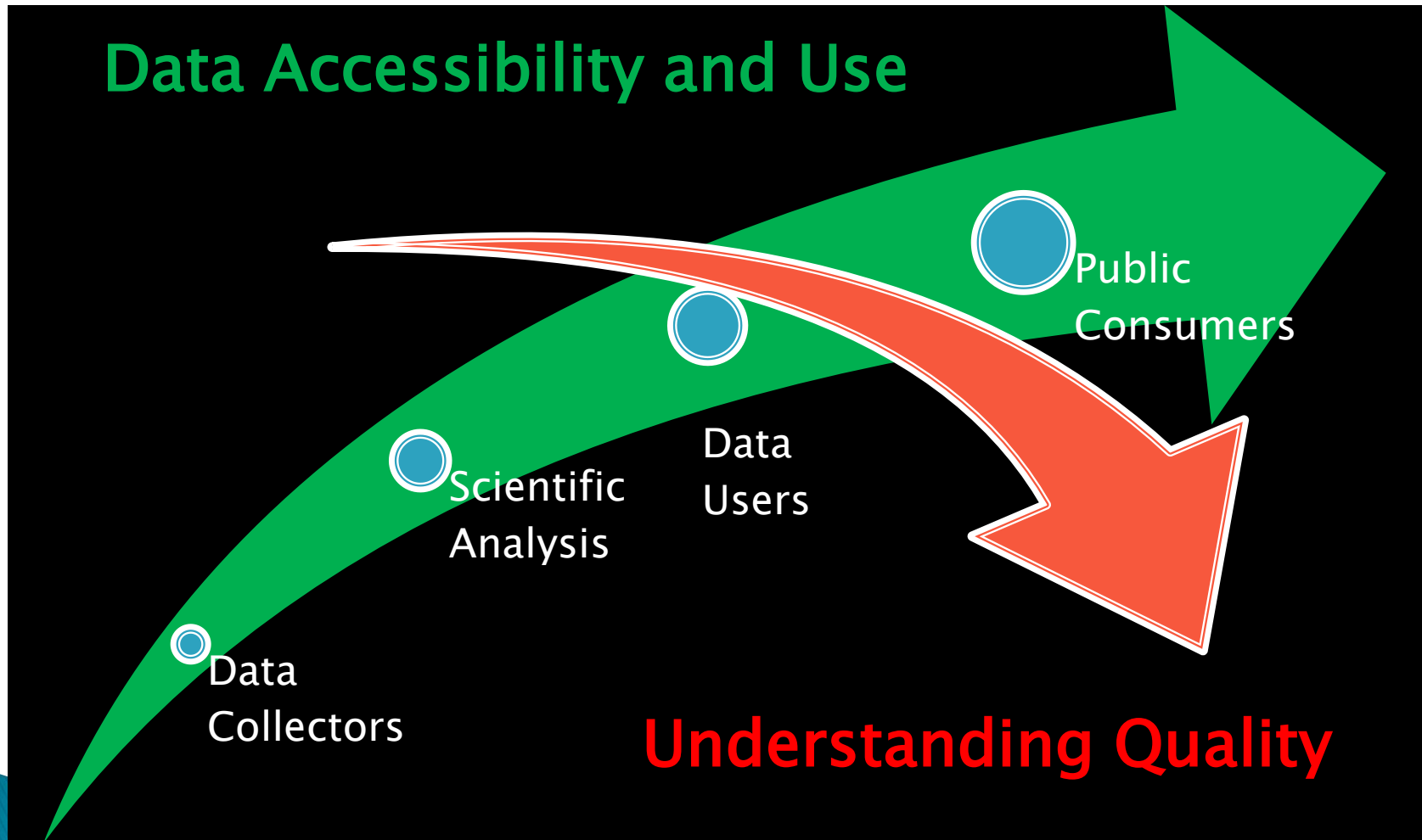


Land Information  
New Zealand  
Taiti te Whenua

Conceptually, what are we building?



# The Understanding of Quality



# 2009 – Collective Response.

- ▶ NZ's natural capital defines our place in the world
- ▶ Underpins our economy and identity
- ▶ Understanding our natural capital is essential
- ▶ A strong local picture via the natural resource information investment by regional councils
- ▶ Growing need for a more complete national picture
- ▶ Regional Government monitors our Natural Capital
- ▶ Regional Government have the infrastructure/IP/history
- ▶ Regional Government is committed to help assist in national reporting
- ▶ This work is a priority for the regional collective

Natural Capital

Regional Government  
Position

# Hard learnt insights & points of action.

- ▶ Documentation of issues we passed upwards to senior management to action.
- ▶ Sector / domain reviews:
  - data management
  - quality assessments
- ▶ The learning curve for domains with Establish NEMS and data transfer maturity; performed better than domains that have never shared data.

