Environmental Big Data
➔ Evidence for Policy?

Landcare Research Link Seminar 15

Feb 26th, 2013

Landcare Research
Manaaki Whenua

Robert Gibb

Informatics Science Leader

“scientists overestimate the utility of what they know …

while

… policy-makers underestimate what the do not know”

Sir Peter Gluckman,
IPANZ, 2013-2-21

http://www.ipanz.org.nz/Folder?Action=View File&Folder_id=84&File=Gluckman:Communicating-and-using-evidence-in-policy-formation.pdf

Global & Local Environment
NZ
$$
Policy & Govt.

PART 1 .. Policy & Data 2010

aspiration meets cold reality

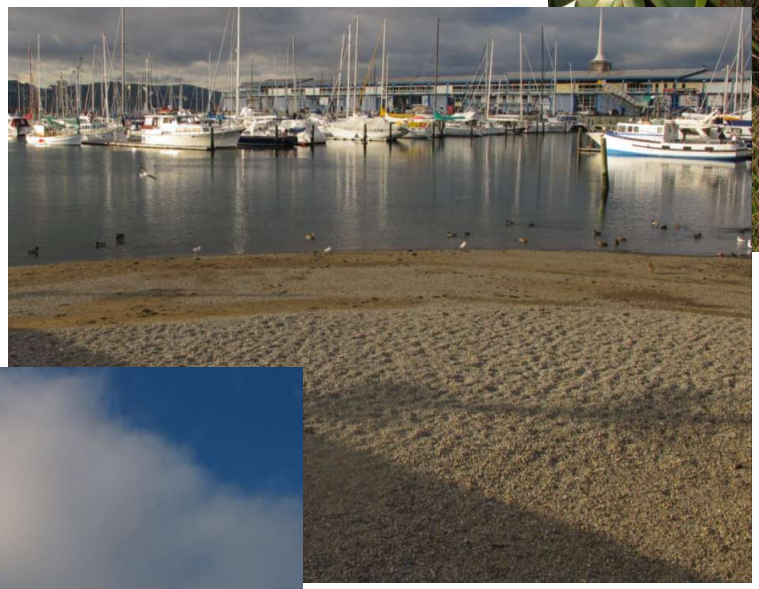
PART 2 .. Fast forward to 2013

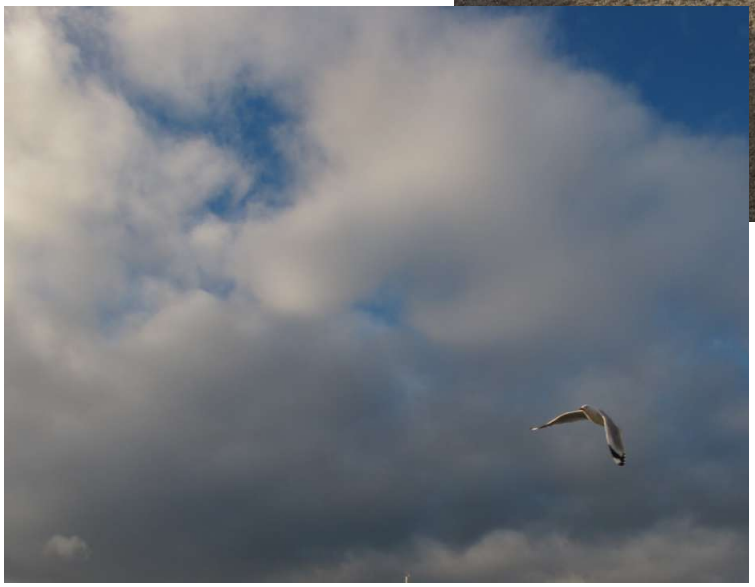
PART 3 .. Future perspective

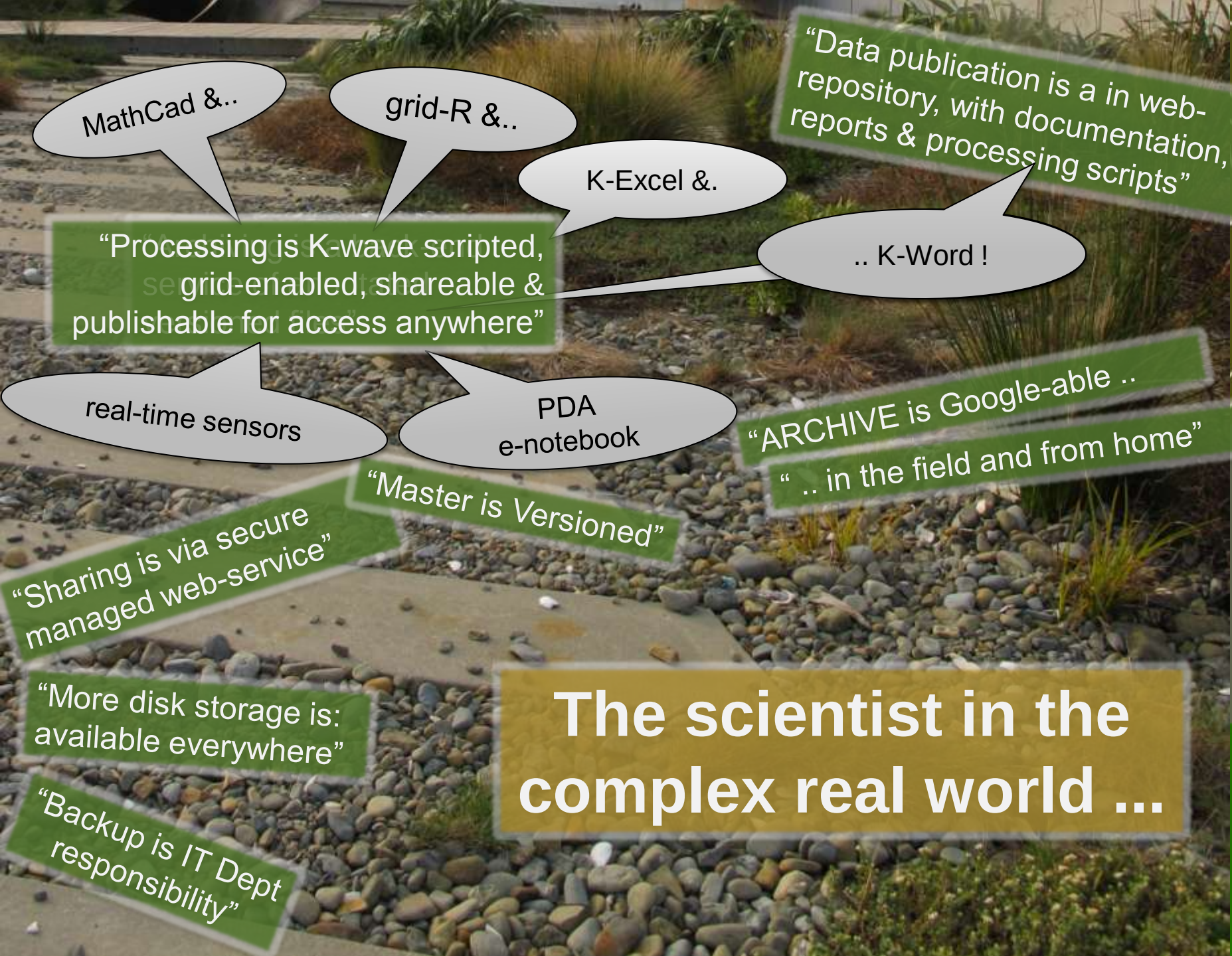
MathCad ?..
R? ..
Excel? ..
“Data publication? – you mean the scientific paper”
“Processing log is: notebook or email diary”
.. Word !
Field notebook
“ARCHIVE is a CD in a drawer”
“Don’t forget to take one home”
“Master Copy is My Copy”
“Sharing is email & USB sticks at a meeting”
“More disk storage is: a bigger USB drive”
“Backup is IT Dept responsibility”
Is this your scientist’s Data Management Reality?

"Email is for communication, & SPAM is under control"
"We have a Disaster Recovery Plan"
"Scientific Publications are held by the library"
"The annual IT budget constrains network storage SAN size"
"Our procedures meet the requirements of the Auditor and the Public Records Act"
"HSM is the solution to total file volume management"
Is this your IT Dept's Data Management Reality?
"All network drives are backed up to a well defined schedule"
"Archive is, each scientists' responsibility"
"Off site and on-site backup tape storage"
"We can't control data if it is on another organisation's systems"

"International Best Practice"
"Metadata & Catalogues"
"Scientific Quality is measured in Publications & Reports"
"International Data Standards"
"We expect Best-of-breed Multi-agency, Collaborative teams"
"We fund results, Data Management is presumed"
Is this Your Funder's View?






MathCad &..
grid-R &..
K-Excel &.
"Data publication is a in web-repository, with documentation, reports & processing scripts"
"Processing is K-wave scripted, grid-enabled, shareable & publishable for access anywhere"
.. K-Word !
real-time sensors
PDA e-notebook
"ARCHIVE is Google-able .."
" .. in the field and from home"
"Master is Versioned"
"Sharing is via secure managed web-service"
"More disk storage is: available everywhere"
"Backup is IT Dept responsibility"
The scientist in the complex real world ...

"Science Collaboration tools pervade the science process"
"Disaster Recovery Plan: storage is replicated globally."
"Data publication is in a web-repository, with documentation, reports & processing scripts"
"The annual budget constrains network grid-storage pool"
"Our procedures define the standards for the Auditor and the Public Records Act"
"the pool is like cloud storage on steroids for NZ science,"
The IT Dept's NZ-science Club
"All storage is replicated, & distributed"
"Archive is: persistently referenced repository"
"Data is lifecycle managed on inter-generational timescales"
"Staff in other organisations have controlled access to our in-house systems"

Stakeholders as on-line participants in NZ Science
The IT Dept's NZ-science Club
The Scientist in the complex real world ...

PART 1 .. Data & Policy 2010

PART 2 .. Fast forward to 2013

POLICY+ ➔ DATA+ MAPPING+

PART 3 .. Future perspective

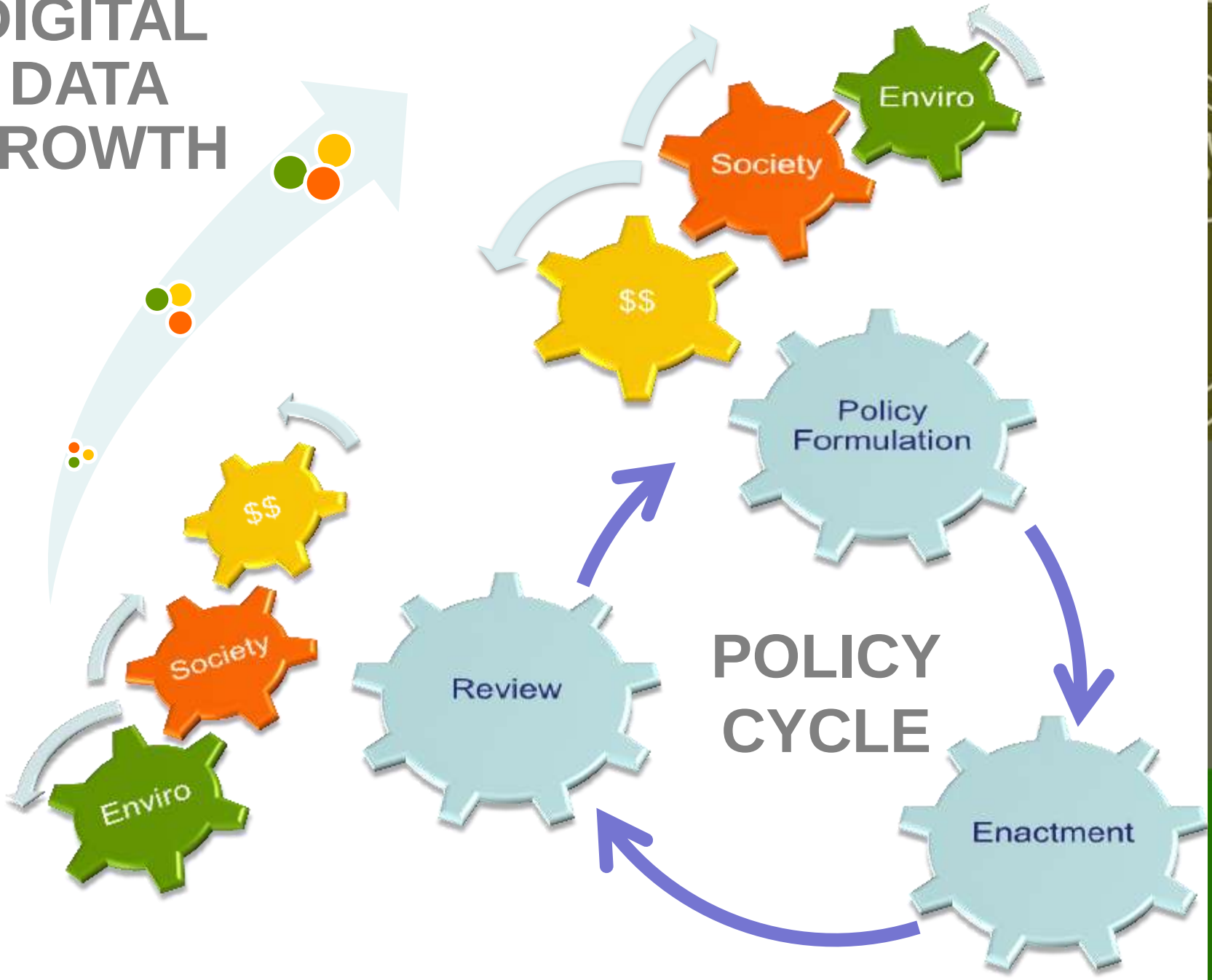
POLICY+

- New Zealand Government Open Access and Licensing (NZGOAL)
- MoRST Environmental Data Management Policy Statement
- Significant $$s moved from vote Environment to vote Science
  to do targeted research to enhance LCDB data-product &
  deliver LCDB3 & LCDB4 as by-products of Kyoto imagery

POLICY+ pivotal events in 2010

… that influenced data investment behaviour

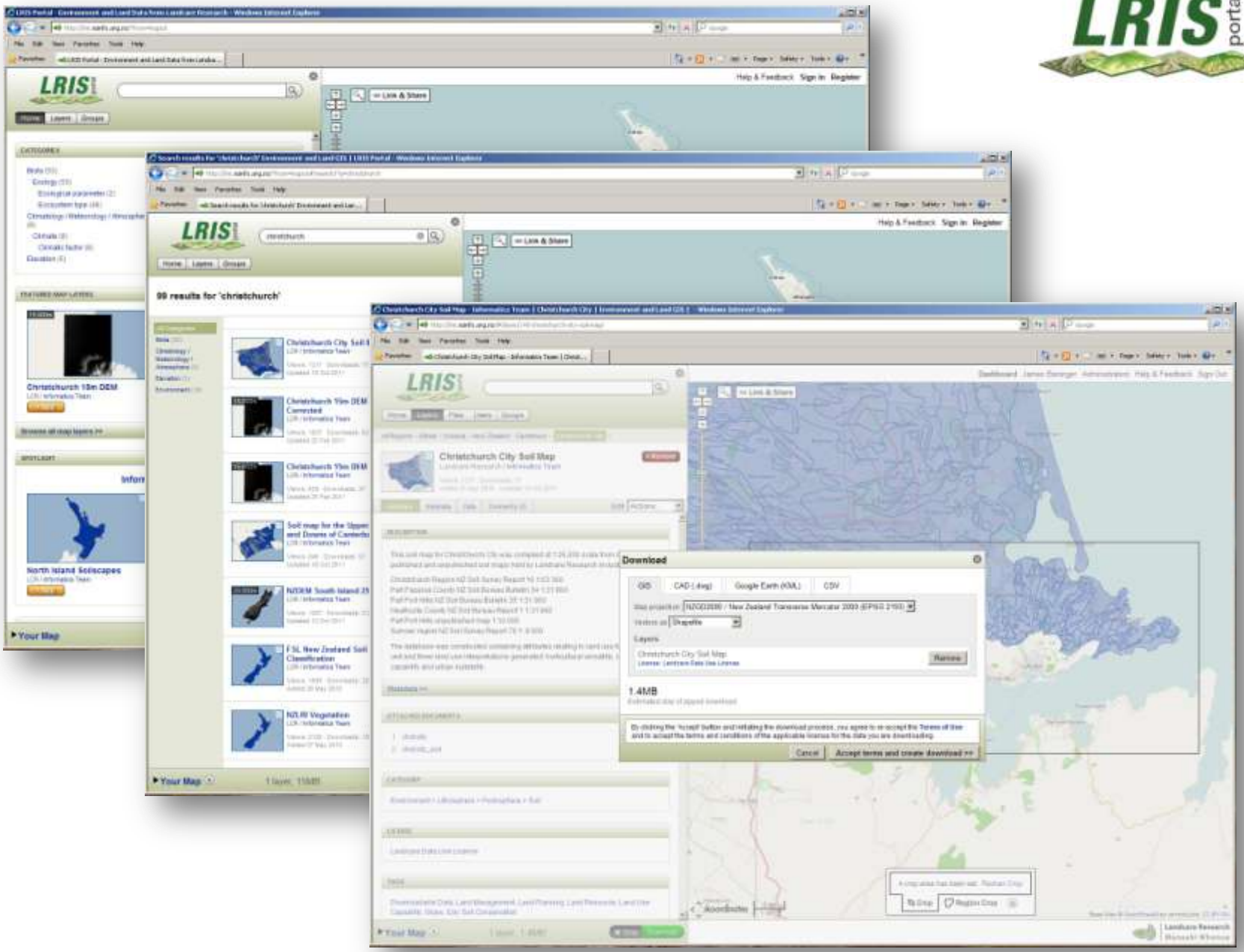
DIGITAL DATA GROWTH



POLICY CYCLE

DATA+

LRIS portal



http://lris.scinfo.org.nz

- Launched August 2010
- Data download focus
- Minimal visualisation capability
- Aimed at GIS professionals
- Requires registration
- Uses existing open source technologies
- Strong standards-based metadata component
- Many formats supported and different projections
- Web services
  - Catalogue Service - linked to data.govt.nz, GEOSS
  - WFS – Simple features
- Potential for user uploads and user comments

http://lris.scinfo.org.nz

not just Landcare Research

… but also **linz** data service,

niwa environmental information catalogue

and data.**govt**.nz – which harvests these catalogues

DATA+

MAPPING+

Principles

- K.I.S.S.
- Focus more on presenting knowledge and information rather than data(sets)
  - Inform users, assist in their understanding
  - Not “just” maps
- Goal-based design – users with questions they want answered
- Re-usable – both software and data/map layers
- Extensible
- Implemented using open source software
- Built on best practice and open standards

S-mapOnline

Fast, simple access to New Zealand soils data

http://smap.landcareresearch.co.nz

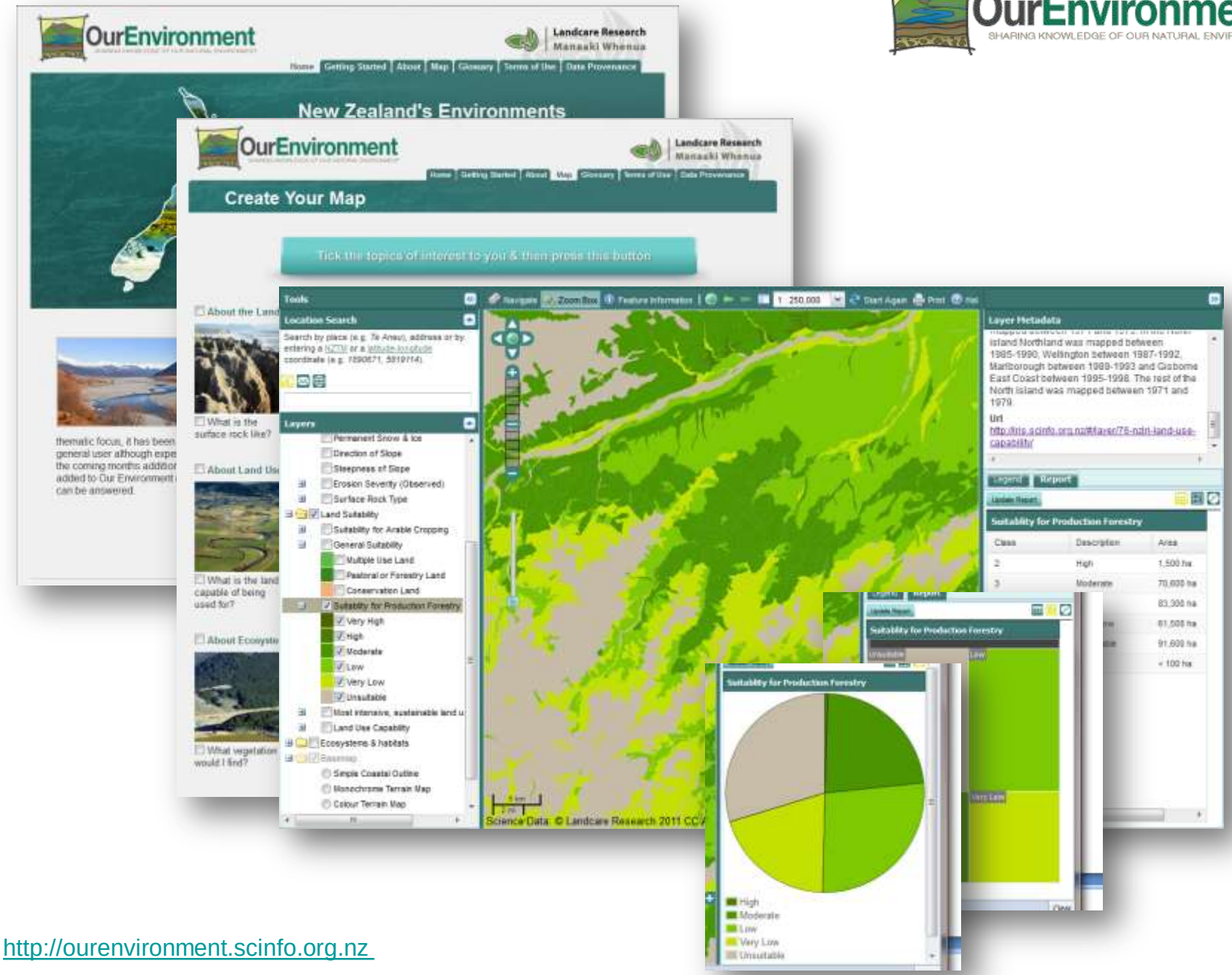
S-mapOnline
Fast, simple access to New Zealand soils data

First of the new portals

- Home page with good explanatory information
- Google maps-like navigation
- Reusable BASE layers from LINZ topographic data
- High quality on-screen cartography
- Speed of map redraws/zooms/pans
- Search by coordinates/location/address
- Use of metadata, legends and explanatory information to inform user
- Reuses existing link to soil fact sheets generator
- High quality hard copy cartography (PDF)

OurEnvironment

SHARING KNOWLEDGE OF OUR NATURAL ENVIRONMENT

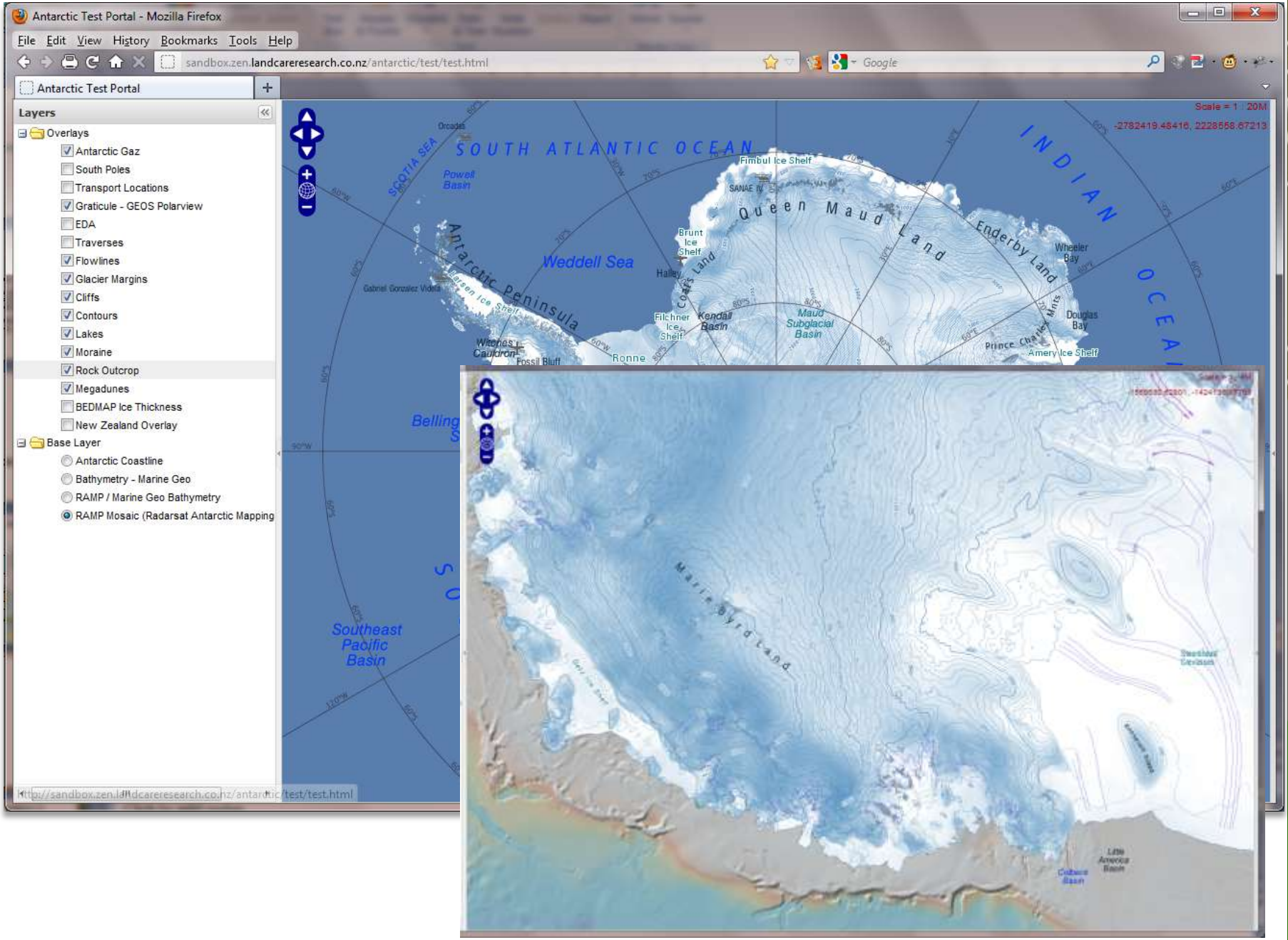


http://ourenvironment.scinfo.org.nz

OurEnvironment
SHARING KNOWLEDGE OF OUR NATURAL ENVIRONMENT

Second of the new portals

- S-map like features +
- Targeted at interested lay person but of value to scientist also
- Information pop-ups instead of factsheets
- Where available, links to LRIS data layers
- Reuses BASE layers and context layers
- More extensive metadata, legends and explanatory information to inform user
- Starts to introduce data visualisation & reporting
- Roadmap for further development


Antarctic Test Portal - Mozilla Firefox
File Edit View History Bookmarks Tools Help
sandbox.zen.landcareresearch.co.nz/antarctic/test/test.html
Antarctic Test Portal
Layers
Overlays
Antarctic Gaz
South Poles
Transport Locations
Graticule - GEOS Polarview
EDA
Traverses
Flowlines
Glacier Margins
Cliffs
Contours
Lakes
Moraine
Rock Outcrop
Megadunes
BEDMAP Ice Thickness
New Zealand Overlay
Base Layer
Antarctic Coastline
Bathymetry - Marine Geo
RAMP / Marine Geo Bathymetry
RAMP Mosaic (Radarsat Antarctic Mapping
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Weddell Sea
Antarctic Peninsula
Queen Maud Land
Enderby Land
Coats Land
Fimbul Ice Shelf
SANAE IV
Brunt Ice Shelf
Halley
Filchner Ice Shelf
Ronne
Kendall Basin
Maud Subglacial Basin
Wheeler Bay
Douglas Bay
Prince Charles Mnts
Amery Ice Shelf
Powell Basin
Orcadas
Gabriel Gonzalez Videla
Larsen Ice Shelf
Witches Cauldron
Fossil Bluff
Southeast Pacific Basin
Marie Byrd Land
Scale = 1 : 20M
-2782419.48416, 2228558.67213

Earth Beneath Our Feet

- Project
- Staff
- Graphics
- Get Geological Profile
- Get Geological Cross-Section

Geological Cross Section

Section name:

Start of section

Enter your location, either street address or coordinates

Please enter your street address below:

Find...

or if you know your location enter it here

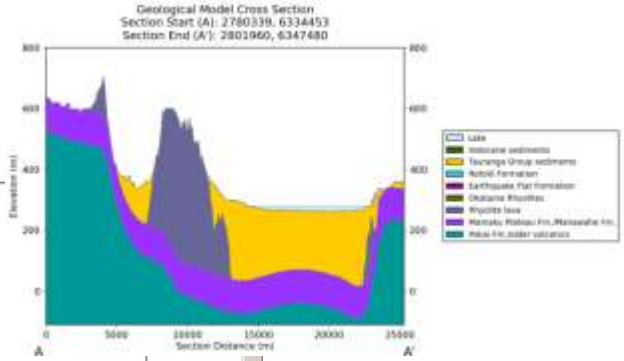
NZMG | NZTM | WGS84

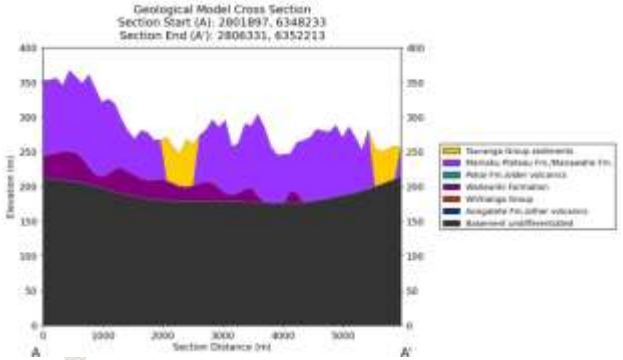
NZMG Reset

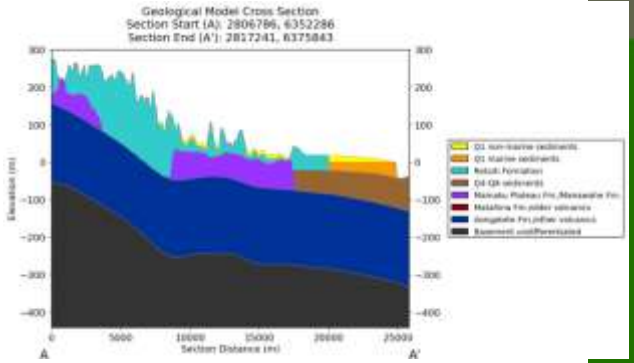
Easting

Northing

Process...







each portal is tailored for a specific audience

… are **your needs** catered for?

come and talk to us

MAPPING+

PART 1 .. Data & Policy 2010

PART 2 .. Fast forward to 2013

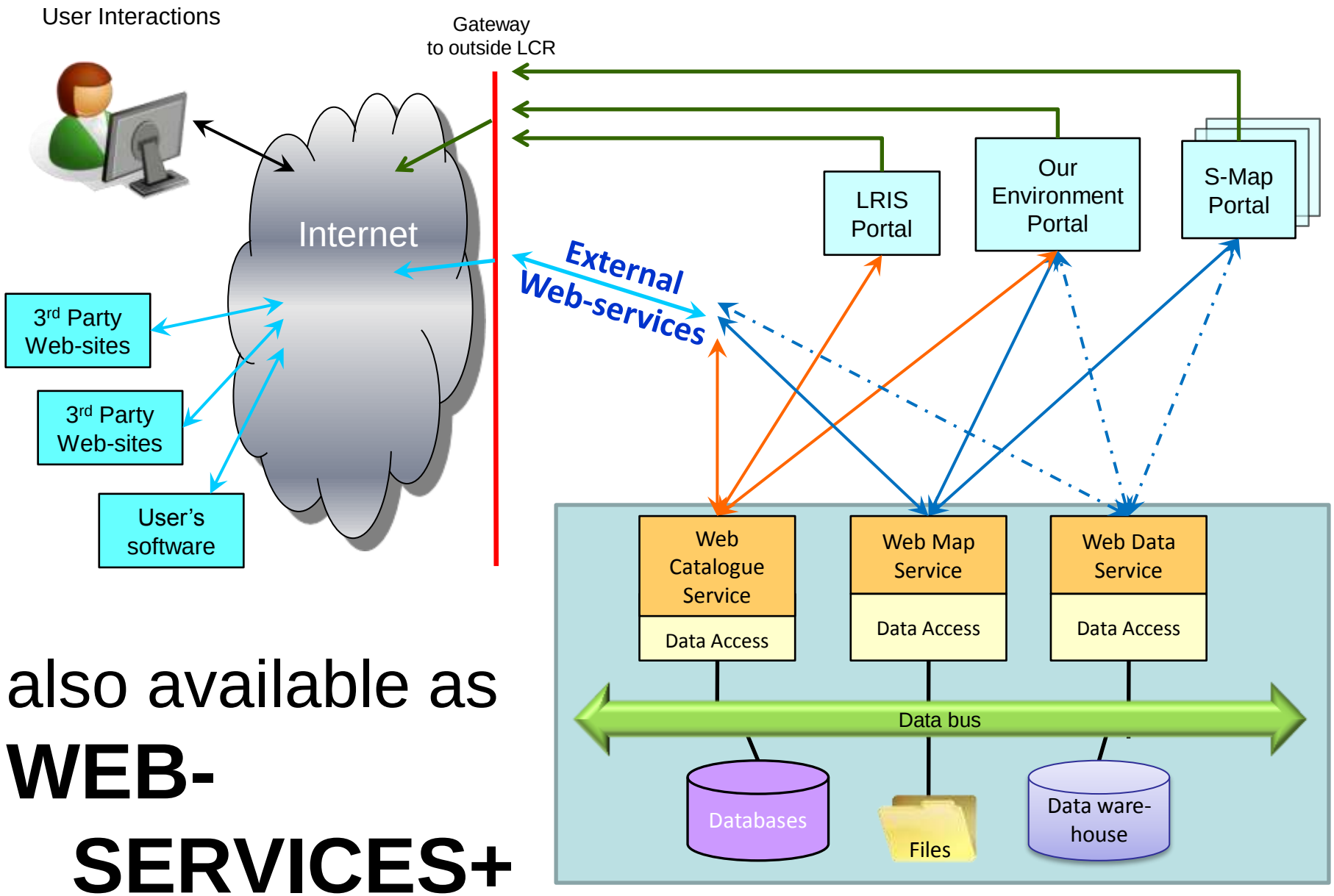
PART 3 .. Future perspective

WEB-SERVICES+

+ BIG-DATA ➔ POLICY++

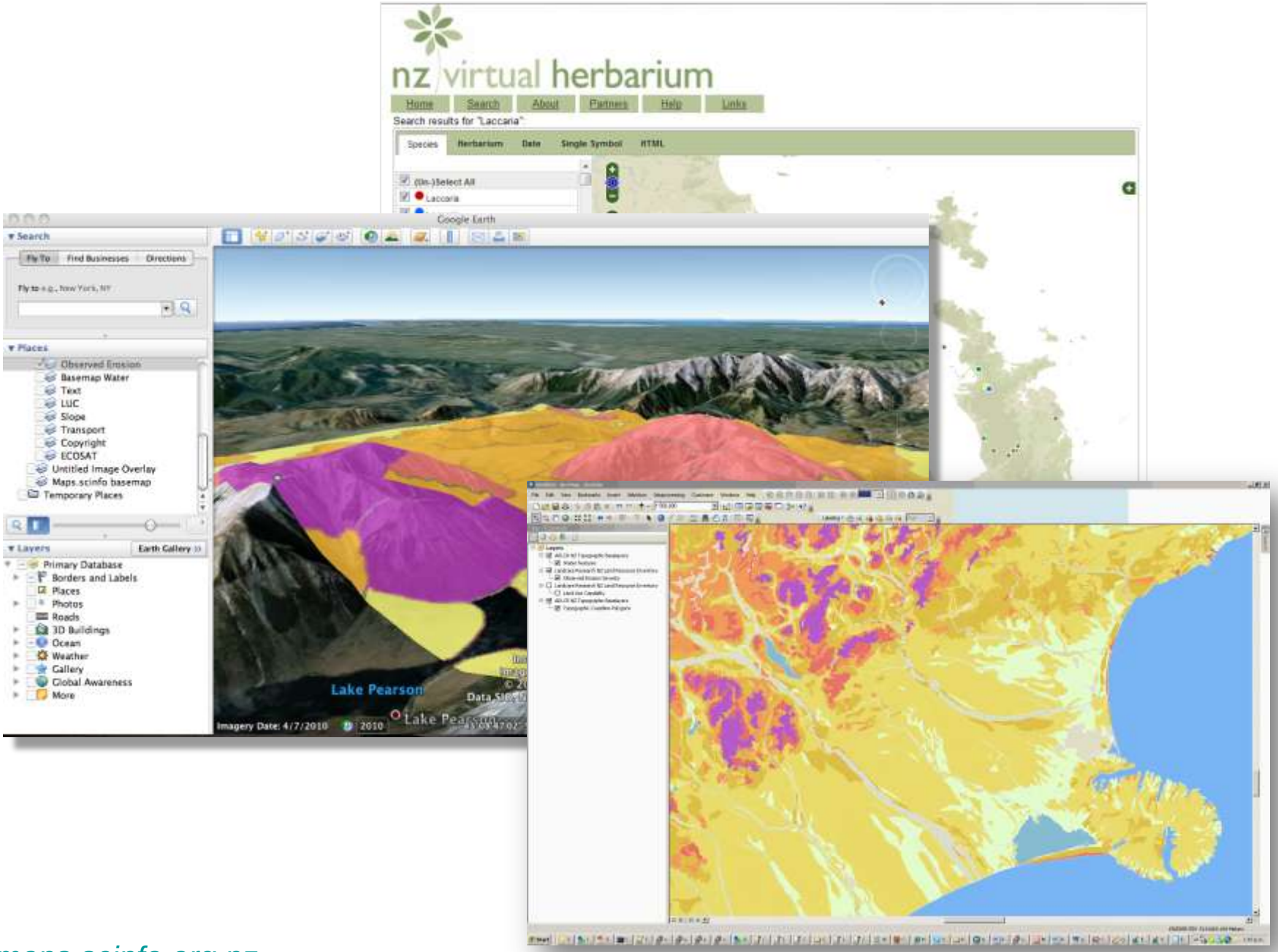
WEB-SERVICES+

DATA+ and **MAPPING+** content …



also available as

WEB-SERVICES+



maps.scinfo.org.nz

not just **Landcare Research**

… but also **gns** web-services & **niwa** web-services

and horizons.**govt**.nz with other RCs

WEB-SERVICES+

+ BIG DATA

BIG-DATA … what is it?

Not large homogeneous data sets

Rather a fire-hose of diverse data from
real-time internet usage &
web-service data feeds

With potential for real-time feedback to
influence individual decision-making
eg via smart-phone

BIG-DATA … for example

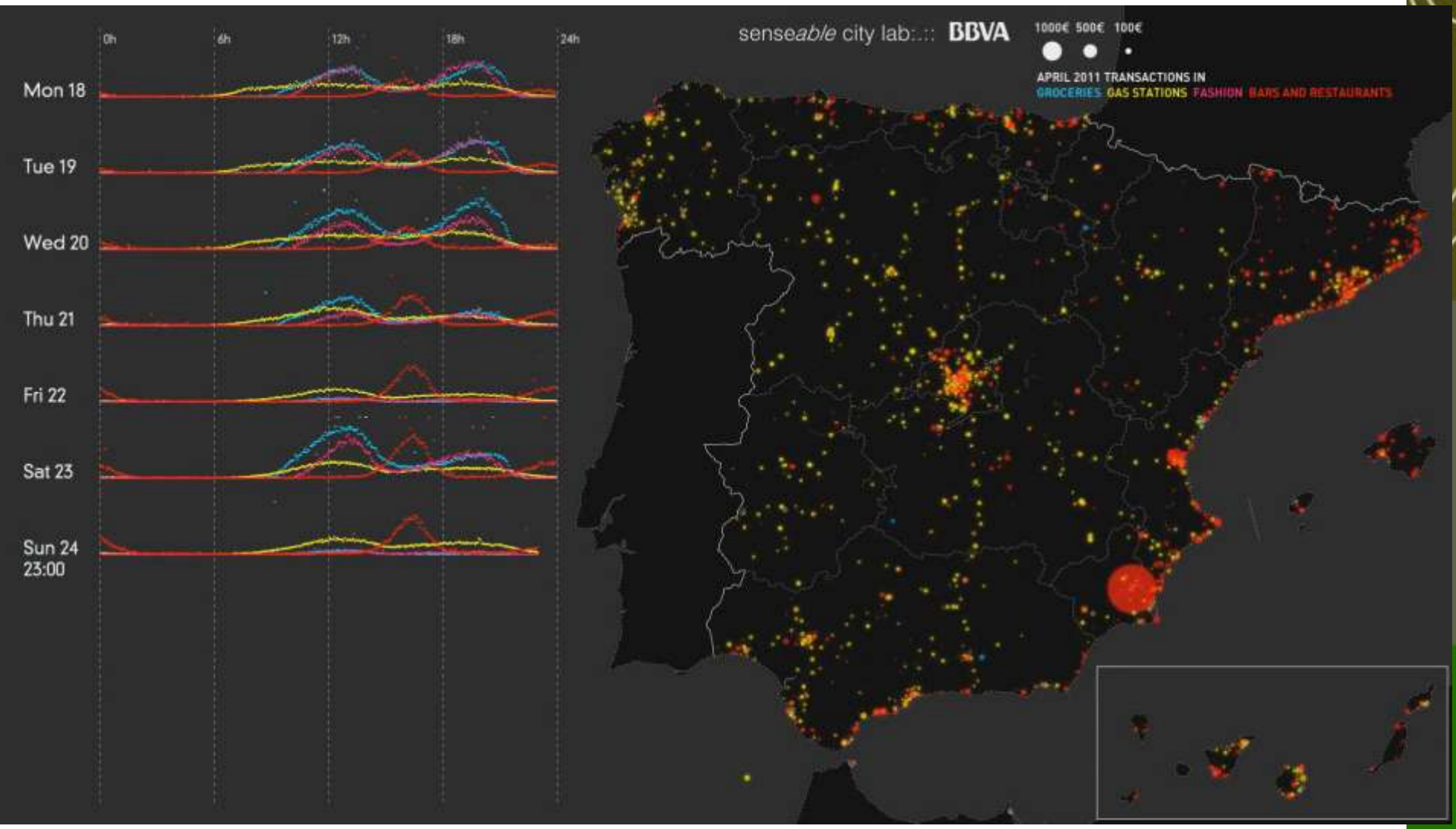
How should I travel to a cross-city appointment?

walk, jog, bicycle, public transport, car or **combination**

web-service analyses routes based on: current gps position; appointment address & time; real-time feeds of traffic flows, public transport bus and train locations, routes & timetables; green-bike usage patterns & availability; congestion statistics during the trip; and … relative risks of being late

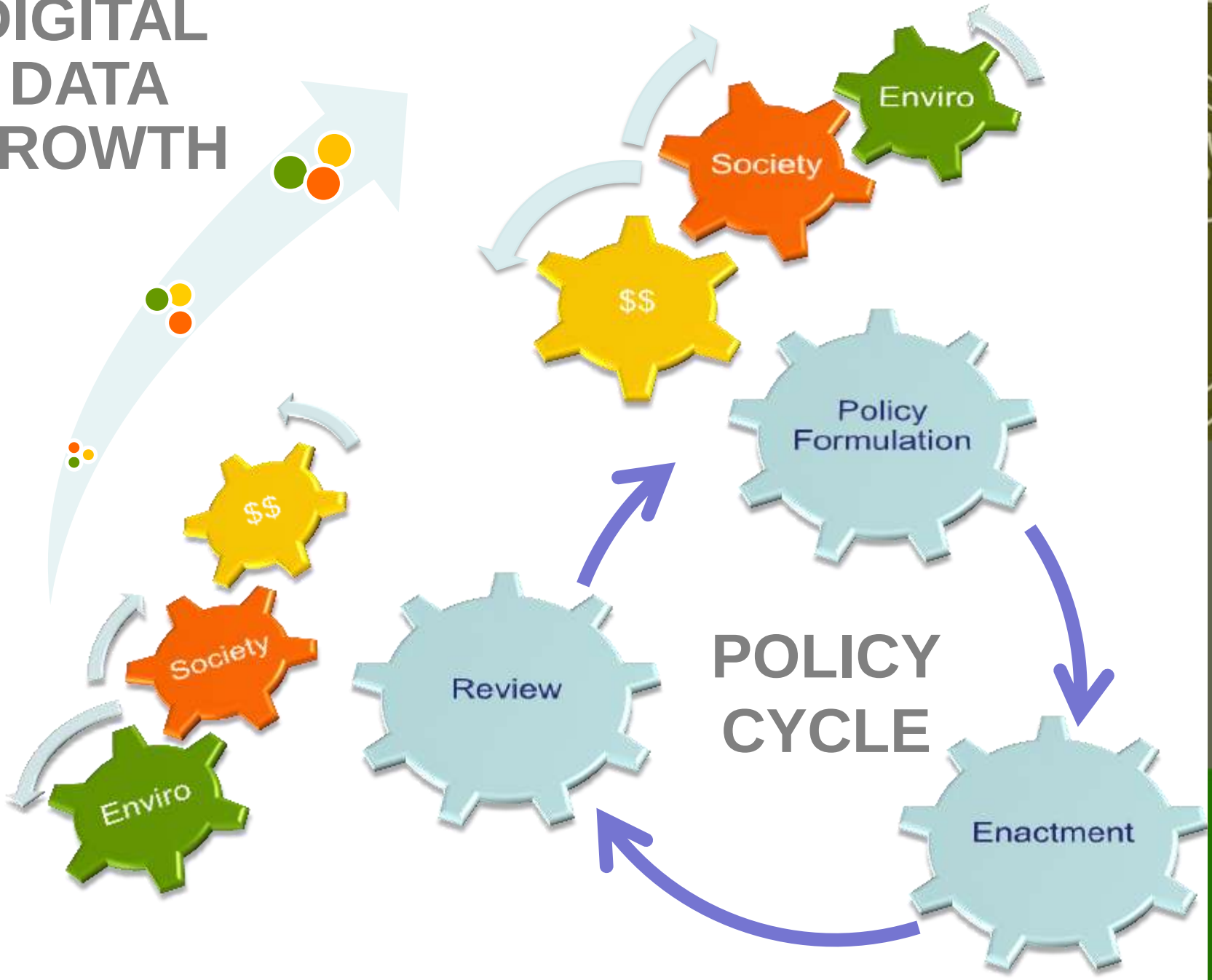
app consumes web-service & advises fastest, cheapest, personal fitness target &/or greenest options which update continuously as travel progresses & situation changes

Social Behavioural Big-Data



Spanish credit-card spending Easter 2011

DIGITAL DATA GROWTH



POLICY CYCLE

Social Behaviour Big-Data with Environmental Impact … **201?**

What if data is available real-time &
instead of matching $ transactions with
Groceries, Fuel, Fashion and Bars & Restaurants

… **we match** $ transactions against
map of embodied energy footprint, or
map of employment impact, or
health outcome alternatives, or
balance of trade impact … or ?

How would … this impact
policy formulation ? or
policy review ?

Environmental Big-Data … 20??

There are many private sensors in the environment

eg soil moisture for irrigation control or
heavy farm equipment monitoring to schedule maintenance
but **is the data available**?

… should it be as **proof of 'license to operate'**
… what policy would encourage or mandate availability

… how would this influence world perception of

'NZ 100% Pure' ?