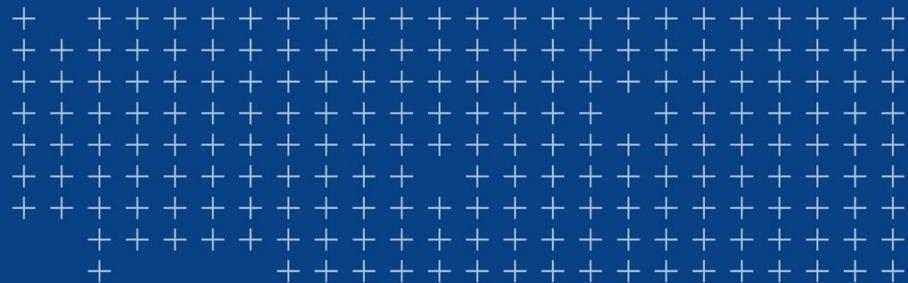




FIG Working Week 2016  
Recovery from Disaster  
Christchurch, New Zealand 2-6 May 2016

*Presented at the FIG Working Week 2016,  
May 2-6, 2016 in Christchurch, New Zealand*



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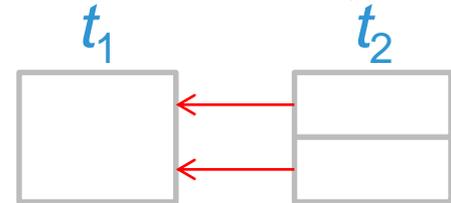
MAY 2016

# Supporting Dynamic, Evolving and Emerging Land Information



# Background

- FLOSS initiative and SOLA
- Solve problems related to meaning - every country has different needs, and different levels of sophistication
- Customization v configuration
- Space, Time and Meaning: Langran, and Roddick & de Vries (& co.) and many others



- Now: How the cloud concepts help address the same issues

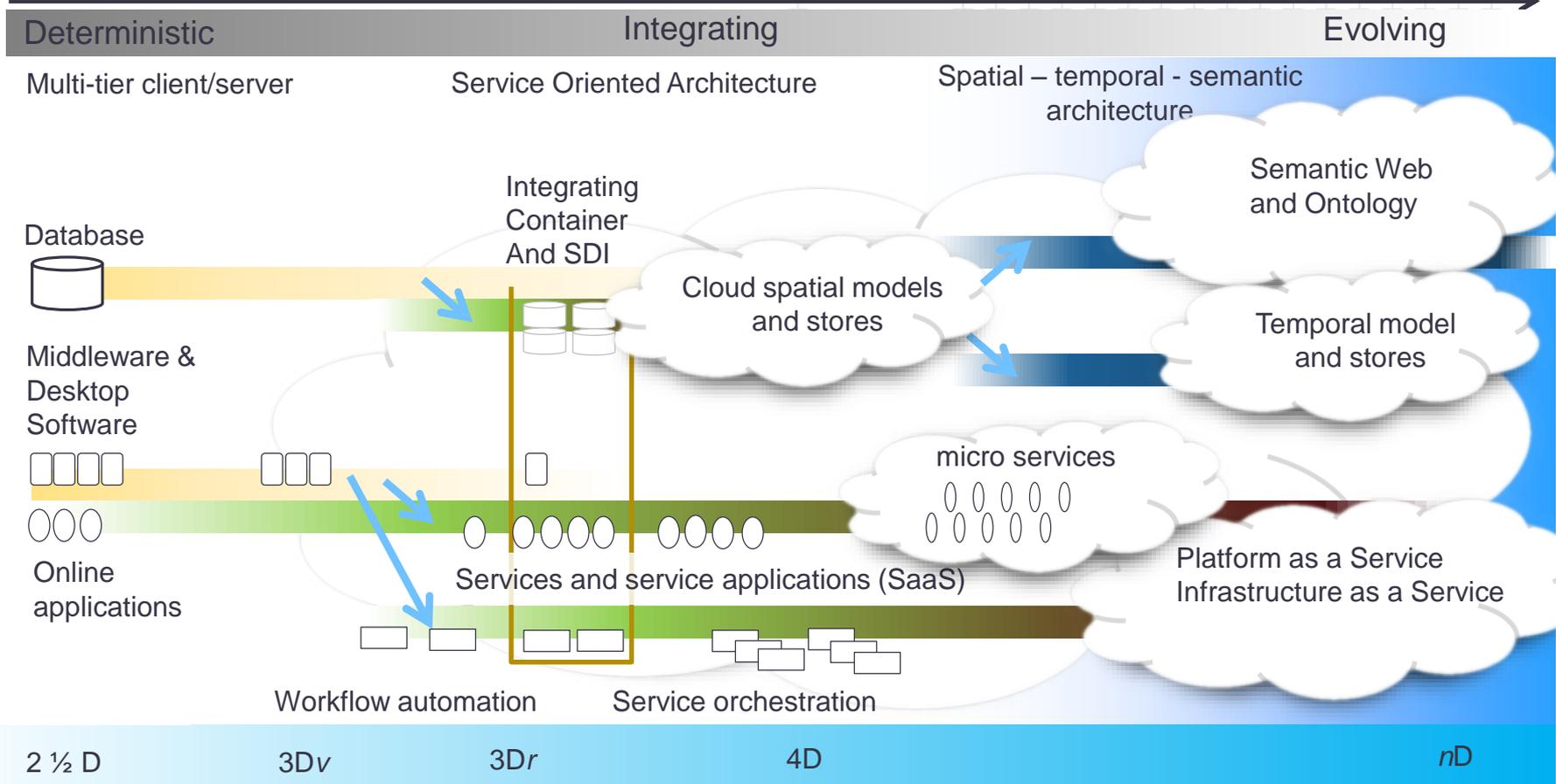
# Introduction: In today's world...

- Many varied sources and potential sources of information and,
- Many varied and potential uses and end-users of information.
- Rapidly arriving, large volumes, with *variable* 'schema' and veracity
- The need to rapidly assimilate, integrate and respond to new information
- The need to scale rapidly to deal with *many* users
- Not all can be known in advance
- Replication and virtualisation are key principles

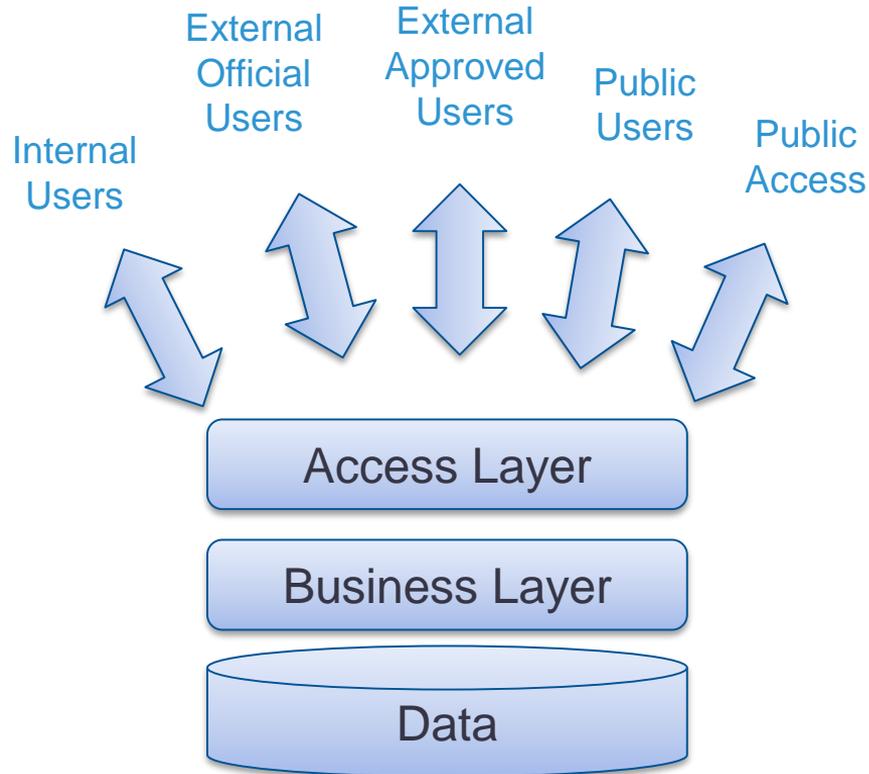


# Towards a land administration platform

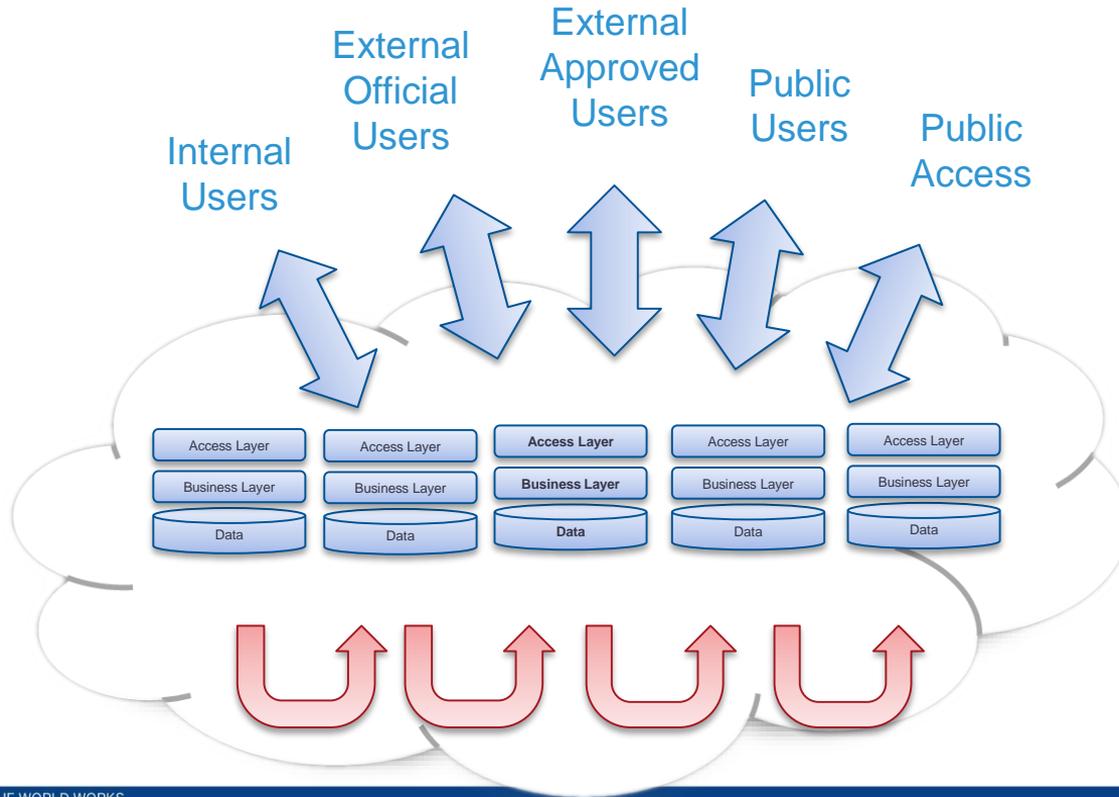
The 'vision' → *t*



# Conventional LIS

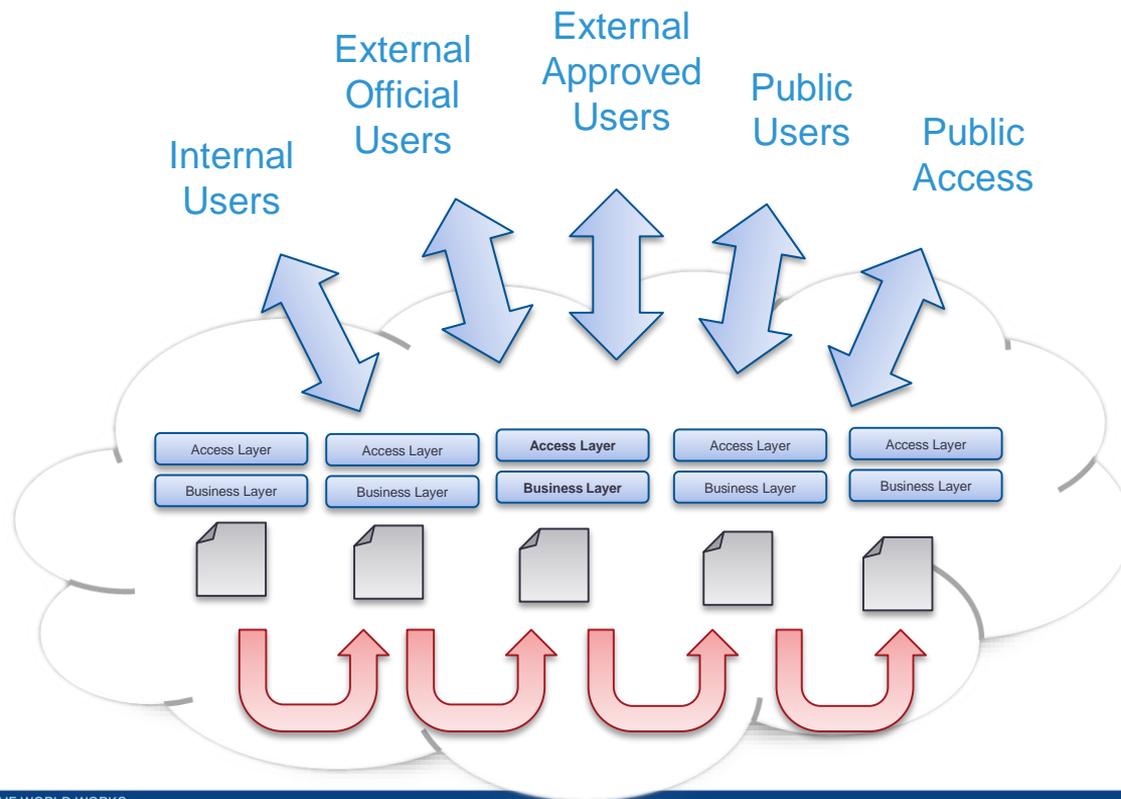


# Replication...

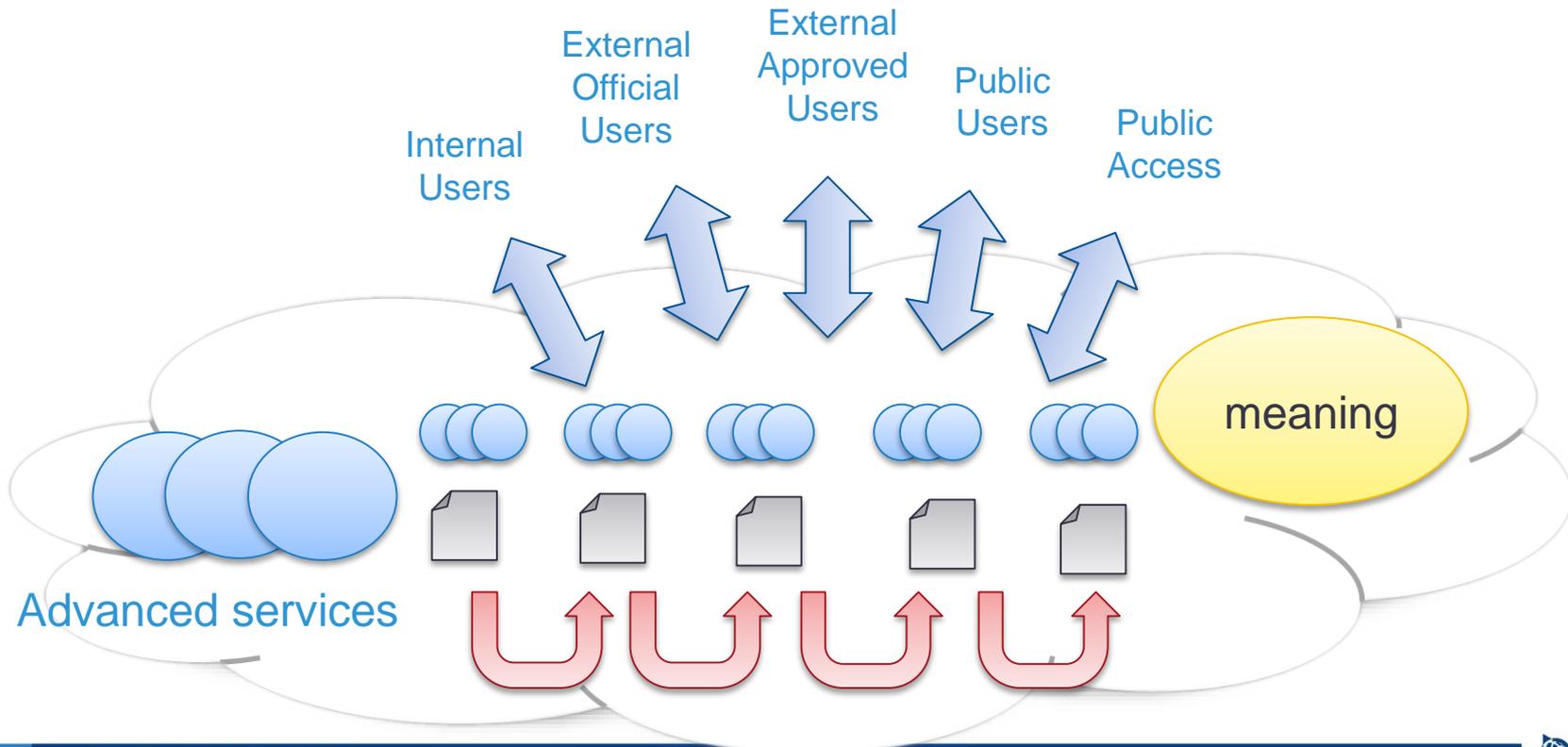




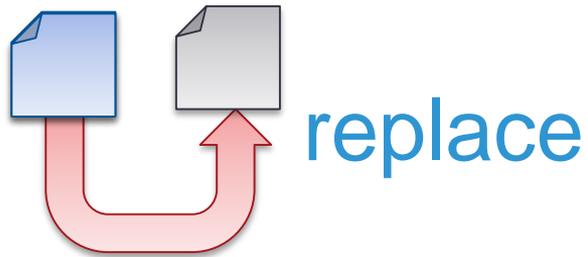
# Cloud file system...



# Service oriented...



# Keeping replicas in sync...



For everything!

# Argument

- Meaning – has to support variation, evolution, history
- Time – faithful representation of change – when does delete/overwrite make sense?
- I argue for:
  - **Time** as the 4<sup>th</sup> *explicit* dimension
  - **Meaning** as the 5<sup>th</sup> *explicit* dimension
- Once you do time:
  - you have to also manage meaning
  - and implementation...

# Append-only strategy for everything

- Includes
  - Instance data (parcels, plots, documents...)
  - Meta-data (schema, SDI) - **Meaning**
  - Processes (workflows, services, application software!) versioning

How to do append-only (non-delete)?

- Append-only, Time referenced *events* that 'carry' *facts*.
- Amendments to state (rather than overwrite) facts *amend* previous facts
- Meta-data are also append-only and mirror the law/agreed understandings
- Processes are implemented by 'workflows' which interact with humans through task clients
- Transactions are (Web) applications that interact with services and humans
- Concept of 'prune' relating to archiving, authentic destruction.

Bi-temporal multi-linear object histories. Identities are made up of temporal attributes.

See technical details reference slide.



# Conclusions



- Time and meaning are essential dimensions of information if we want to more fully support evolution and emergence of data and systems required for long-lived systems.
- In addition to the spatial dimension, time and meaning should be explicitly modelled (i.e. 5D).

# Vision

- For the people:

A more socially aligned participative treatment and implementation of LA.

- Can property objects and people, and the linkages be organised in a similar fashion to Facebook or LinkedIn?
- Can we move away from predefinition (technological constraints) and acknowledge variation and emergence?
- Can the public contribute to the meaning?

- For the state:

The concept of a 'data infrastructure', a LA 'platform' (PaaS), i.e. LAPaaS.

- Can we gain more capability and at the same time reduce the difficulties and costs of developing, deploying and maintaining solutions.
- Can we integrate data and services across organisational boundaries (logical centralisation)
- Can ideas of *implementation* sharing and cooperation between states be achieved?

# Conclusions

- The ‘cloud’ technologies provide the basis for a more comprehensive, complete, and ‘responsible’ concept of land ‘administration’ – and the visions of land management and administration ‘as a service platform’, and a social media model of interaction.
- Support for evolution and variability, emergence, and volume are the essential technical problems (the problem of ‘fixing’ or predefinition).
- Key issue is the ‘model’
  - how to represent without ‘fixing’ – temporal/semantic model provides a solution
  - Cloud aligned model
- Processes are where we commit to (fix) specifics
- Can ignore issues of storage capacity, processing capacity, while being mindful of complexity

# Automation in fraud detection, dispute resolution, adjudication, prevention of corruption

- Append-only protects data from interference and aligns well with cloud/big data concepts, e.g. replication.
- Automated processes as the ONLY means to achieve change – cannot be subverted
- Queries and retrieval are also processes
- Semantics add meaning to documents and claims. Automated reasoning and inference (consequence) can be used in determination
- Big data analytics proven in BI so why not in LA?
- Redundancy in data -> truth analysis
- Supporting and conflicting ‘claims’ and assertions
  - LinkedIn, Facebook

# Technical details

Hay, G. C. (2014). *Architecture for instrument-centred land administration applications*, University of Otago.  
<http://hdl.handle.net/10523/4985>

*Instrument-centred* concept relates to:

- The translation of domain ‘prescriptive’ instruments into technical implementation.
- The implementation of prescribed transaction instruments as integrating workflow processes and the ‘fixing’ of a domain.

The *architecture* relates to the organisation of temporal, semantic, spatial, and process perspectives of information.

# Thank you!

