Architecting The Solid Earth And Environmental Sciences GRID

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GEOSCIENCE AUSTRALIA

Introduction

- A Scenario
- Use-cases
- An Architecture
- To Take Home

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A Scenario

Inversion in Earth Processes

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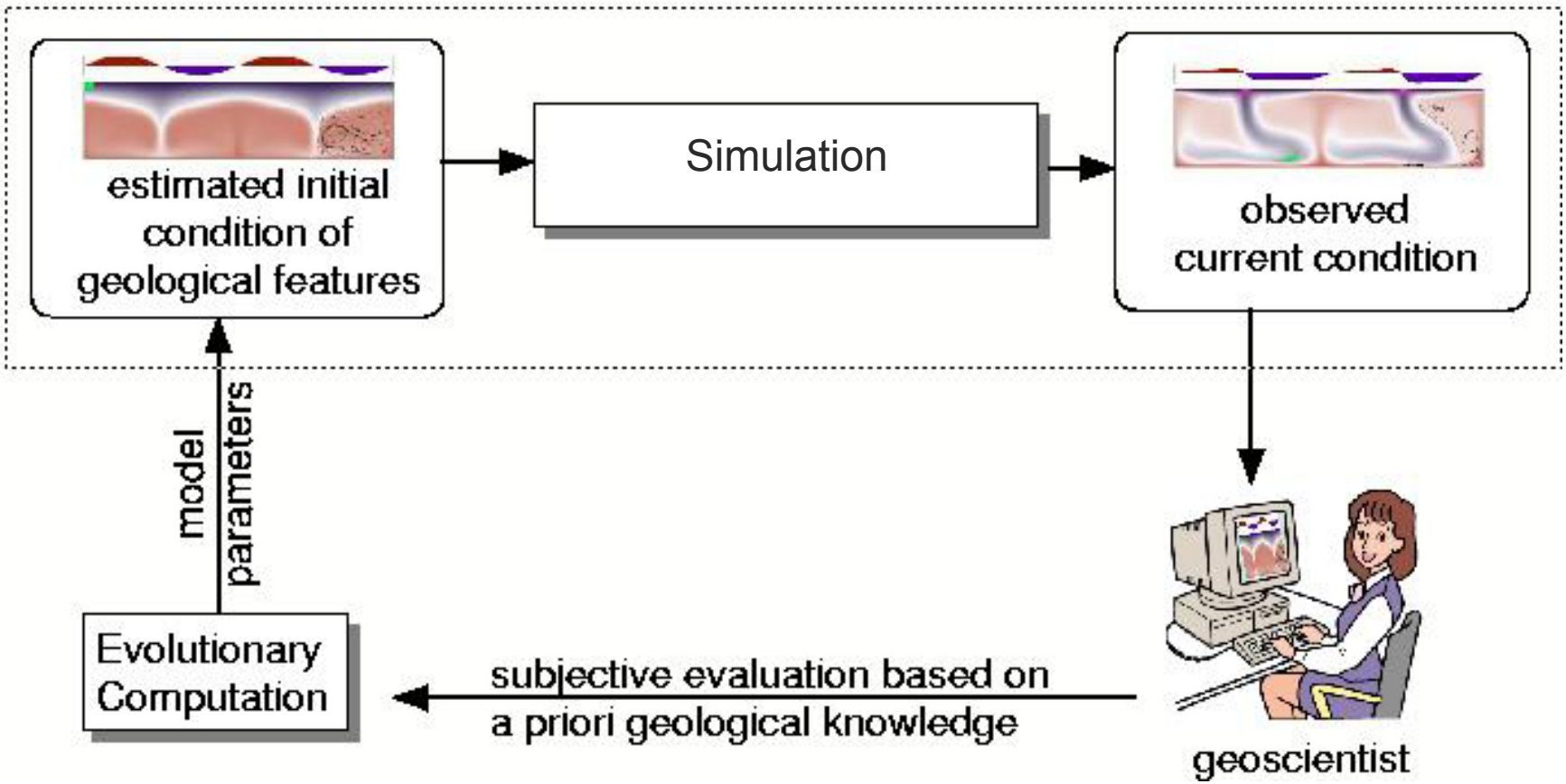
Geologic Inversion



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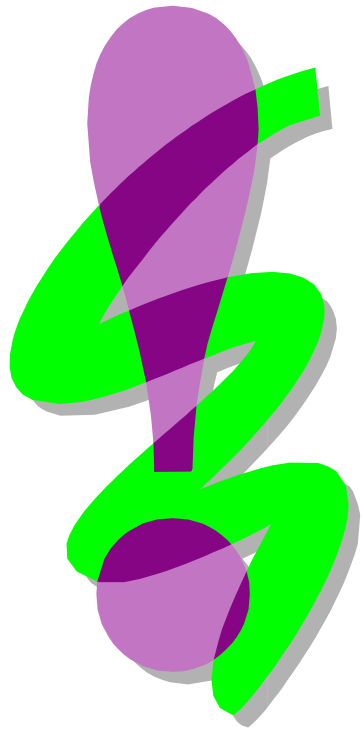
The Issues

- Massive search space
- Need to make use of as much information as possible
- Can be computationally intensive
- A lot of scenarios need to be explored!
- Needs to be accessible to exploration geologist



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Additional Use-Cases

Business to Reporting Agency
Laboratory to Business
Information Services
Computational Services
Value Adding Reseller

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Business to Reporting Agency

- Exploration companies are required to report geophysical and assay information to statutory reporting agencies

- Requires agreement on:
  - Information transport method
  - Information encoding standard
  - Information resource management

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Laboratory to Business

- Analytic laboratory sends assay reports to exploration company
- Requires agreement on:
  - Information transport method
  - Information encoding standard
  - Information resource management

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Information Services

- Involves Hardware, software and content
- **but** may not be the same organisation
- Example:
  - Spatial Data Infrastructure
  - Sensor networks

- Roles of actors:
  - ***A consumer*** who consumes the content
  - ***A custodian*** that hosts the content
  - ***A publisher*** that offers the content
  - ***A program*** that consumes the content.

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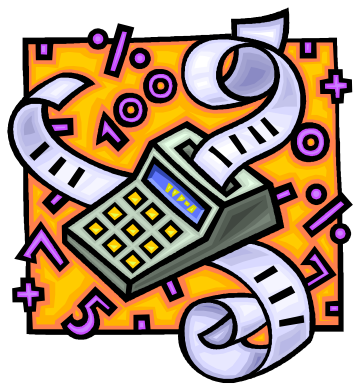
Computational Services

- Hardware and software provision
- **but** may not be the same organisation

- Scenarios
  - Providing simulation codes as “network services”
  - Providing access to “on-demand” hardware



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Value Adding Reseller

- Community agreement brings opportunity for new use-cases
- Example: Statutory report data mining
  - Combining information and computational services **established by others** to **provide a new value-added service**

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Use-cases

- Definitely not an exhaustive set
  - Contribute yours! E-mail it to Robert.Woodcock@csiro.au
- Use-cases have **not** (yet) had an economic analysis to determine business viability
  - some of these use-cases may not survive a real world business plan (caveat emptor!)

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An Architecture

The pmd*CRC architecture and technologies

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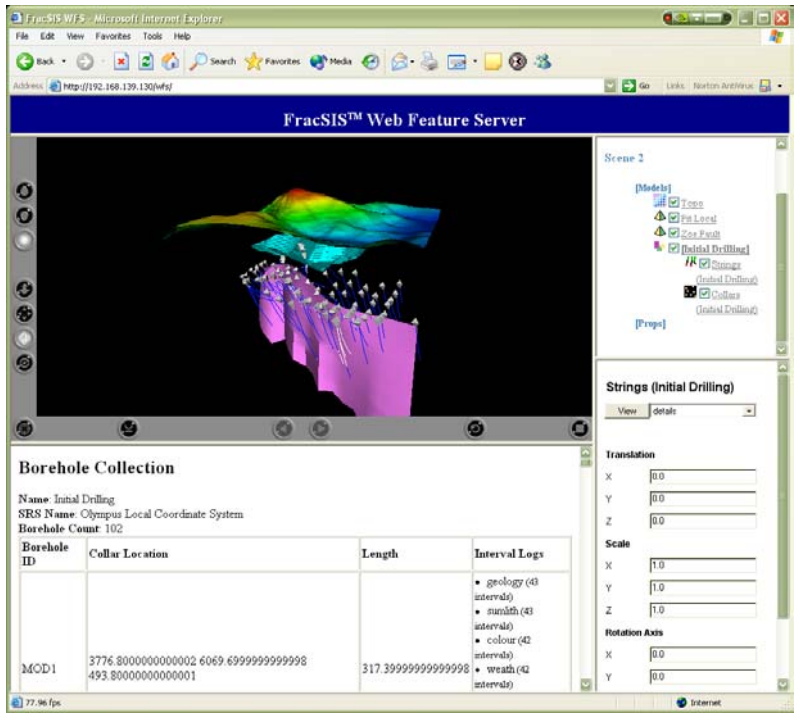
User experience

- Web applications
  - Great for content retrieval
- Desktop applications
  - Great for content creation
- Both can use Grid services



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Information services

- REST vs SOAP
  - Barrier to entry is higher for SOAP
  - REST appears more popular for information retrieval because of its simplicity
  - SOAP more appropriate for finer grained access – content creation, computational service interfaces
- REST – simple consistent semantics
- SOAP – user defined semantics
- Projects:
  - OpenGIS® Web Feature Server and Standards
  - FracSIS WFS
  - Geoscience Australia Corporate Databases

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Information Encoding

- OpenGIS® GML
  - Geography Markup Language
- XMML
  - eXploration and Mining Markup Language

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Computational services

- Modelling codes
  - Exposed as Grid services
  - Can use Grid resources
- Can be **coupled** via Grid interface:
  - Chemistry+Mechanics+ Fluid Flow
- Brokers
  - Job control, load balancing

- What about Registries?
  - Not yet!
  - Very important – system not scalable without registries
- Problem descriptions for computational services

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Peopleware

The human side of SEE Grid

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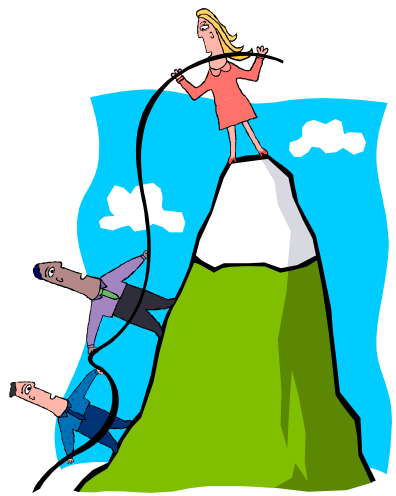
Community of Practice

- Technology is about:
  - Functional Interoperability
  - Information Interoperability
- Success is:
  - Information community
  - Computational community



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To Take Home

- Information and computational services can operate on the Grid, using standard interfaces to maximise interoperability
- In order to leverage this the **Community** needs to get itself in order

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Where to from here?

- More Use-Cases - Community request for more
- Develop Community of Practice
- Proliferate GML/XMML/WFS skills throughout community
- SEE Grid portal site – community virtual meeting place
- Core toolkit development and Patterns for design – community development model?
- Real-life test beds – pmd*CRC are doing this between GA and CSIRO Glass Earth

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pmd*CRC Vision

- To develop a software framework which enables industry and government clients to evaluate potential and explore prospective locations (at all scales) for large high value ore bodies far more efficiently than they can do now.

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The Services

- Facilitating simple access to super computing facilities and information resources from explorationists desktop and handheld computers
- Supporting individual and coupled computational codes and information resources by providing consistent patterns for discovery, access, and communication between components
- Easing development burden for additional components by providing a standard set of development patterns and encodings that support the services

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