

Application

Innovation Access Program (IaccP) – Industry

Submitted 05/09/03 by Joan Esterle on behalf of Minerals Council of Australia

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Technology Roadmap for Implementing Interoperability of Geospatial Data Delivery for Australian Minerals Industry

Consortium Members:

- CSIRO Exploration and Mining
- Geoscience Australia
- Social Change Online
- Predictive Mineral Discovery CRC

Project Synopsis

Problem/Market Drivers

Mineral exploration is a knowledge-based process that relies upon access to accurate, up-to-date geo-spatial data and related scientific knowledge. During the recent inquiries for the Minerals Exploration Action Agenda, the industry highlighted significant difficulties in gaining access to pre-competitive geoscience information, suggesting that existing information is commonly incomplete, fragmented across eight government agencies, each with their own information management systems and structures. These disparate systems lead to inefficiencies resulting in high costs, reduced effectiveness and increased risk incurred by the industry and its service providers."

Recommendation #9 of the Draft Minerals Exploration Action Agenda states "That the Commonwealth, the States, Northern Territory and industry cooperatively support the development and implementation of nation-wide protocols, standards and systems that provide for Internet-based access to, and effective storage and archiving of, all exploration-related data, including government-generated pre-competitive geoscience datasets and industry-generated exploration data. Increased expenditure is recommended to accelerate the on-line availability of Commonwealth spatial and other geoscience information, and permit the development of web-based services." (http://www.minerals.org.au/downloads/pdf/meaa_report_web.pdf)

A recent national workshop on "Building a Solid Earth and Environment Grid" found that, although the technologies and expertise to improve on-line delivery and web-based services exist within Australia, similar to the data they are distributed across several research and industry organisations(<http://www.glassearth.com/news.html>).

Therefore a concerted and externally funded effort is required to coordinate effective implementation of available integrating technologies to meet the needs of the sector.

Project Proposal

This proposed project provides the first steps in implementing interoperability of distributed, pre-competitive geospatial data and web-enabled access through bringing together Australian

expertise, middleware and data assets from 3 disparate organisations: CSIRO, Geoscience Australia and Social Change Online (an SME), with engagement of the industry through Minerals Council of Australia, the CRC for Predictive Mineral Discovery and internet access.

The project will be conducted in 3 phases, as outlined below, over a 12 month period beginning February 2004.

Part A) Development of a **technology roadmap** for achieving interoperability of distributed geospatial data sources across the Commonwealth, State and Territory digital geoscience data repositories in Australia;

Part B) Demonstration of a visual, **multi-level user access platform** to aspects of pre-competitive geoscience data repositories which will be made available through the existing Australian Geoscience Portal (<http://www.geoscience.gov.au/>);

Part C) Stakeholder **feedback workshop** of roadmap and demonstration tool, leading to an implementation plan to interconnect the various State, Territory and Commonwealth digital data repositories.

The administrative Grantee is the Minerals Council of Australia, the peak body representing the minerals exploration and mining sector, and its contributing technical agents will be CSIRO Exploration and Mining and Geoscience Australia. The technology to be disseminated has been developed through CSIRO Exploration and Mining's Glass Earth and XMML (eXploration and Mining Markup Language) project and its contributions to the OpenGIS Consortium, the Predictive Mineral Discovery CRC, Social Change Online, and Geoscience Australia. It is brought together here for demonstration and diffusion into the Australian minerals industry and has applications beyond this sector.

Benefits

A successful outcome will improve national and international access to pre-competitive information and, potentially, on-line processing tools that enable exploration companies, in particular junior and medium-sized explorers which lack high-level data processing capabilities, to assess exploration potential more rapidly. If interoperability can be achieved for the national minerals data assets, this same technology can be applied to other Australian industry sectors, as well as public domain issues such as disaster management and security. It also positions Australia as a global leader, not only in mineral exploration innovation, but in managing intelligence across sectors.

Contacts for this project are:

Joan Esterle CSIRO (07 3327 4411)-logistics

Lesley Wyborn Geoscience Australia/pmd*CRC (02 6249 9489)-impact

Robert Woodcock CSIRO/pmd*CRC (08 6436 8780) –technology

Participants

The administrative Grantee is Minerals Council of Australia with technical delivery through CSIRO Exploration and Mining and Geoscience Australia. Other Australian experts will be involved from the Government Geologists Information Policy Advisory Committee (GGIPAC)

and Social Change Online, a local pioneer of interoperable web services able to provide suitable technology as an in-kind contribution. Industry support will come through Minerals Council of Australia and direct industry participants in evaluating the roadmap and demonstrator.

Assessment Criteria

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Contribution to increasing Australian industry's access to global technologies and best practice

Web services are the medium of choice by minerals industry for the access and delivery of geoscientific information. Numerous research and applications activities are occurring globally, most notably lead by the Open GIS Consortium (OGC). The OGC is an international industry consortium of 258 companies, government agencies and universities participating in a consensus process to develop publicly available geoprocessing specifications and open interfaces and protocols to support interoperable solutions that "geo-enable" the Web, wireless and location-based services (<http://www.opengis.org/index.htm>). Members of this project work with the OGC, as well as the Australian Spatial Data Infrastructure (ASDI) and will demonstrate deployment and effective use of these technologies to benefit the minerals industry.

Uptake of global technologies by Australian firms, particularly SMEs

Australian resource industries rely heavily on access to the latest data and information as well as the computational tools to process and analyse them. To determine where exploration dollars can be most effectively spent is a knowledge intensive process demanding increasingly complex analysis of numerous large integrated spatial data sets, such as geochemistry, geophysics and remotely sensed satellite images. Daily, the size and complexity of the relevant individual data sets is increasing, in many cases exponentially, as more powerful modern computing systems combine with enhanced engineering capacity to design and build enormously complex automated instruments that are creating a data deluge that is increasingly hard for the exploration and the mining industry to efficiently access and effectively utilise.

Current Internet technologies only enable the downloading of data (if the connection is fast enough). Processing, integration and analysis of these data can only happen locally. As these data sets get larger and more complex, then the resources required to effectively process these data are only available to the major players. This creates a strong bias against the small to medium enterprises (SMEs) as well as researchers in the Universities. Current technologies, and access to them and to data do not allow full and or accurate integration of these data sets, reducing our capacity to explore.

Interoperable data models and grid technologies will allow us to link in real time almost anything to anything: databases, simulation and visualisation tools and computer power. If a new concept emerges for a particular ore deposit type then geoscientists anywhere, from large or small enterprises can scan the web for all available data that meet their needs. In real time they can access web enabled processing packages and on-line computers to obtain the required image on demand using the latest data. From their analysis, the company can then go onto peg the relevant ground, with out even having to leave their office, be it from anywhere in the world. Once the exploration program starts, grid technologies offer a much more cost effective and accurate way of rapidly integrating relevant data sets to provide greater precision for siting and testing of identified anomalies.

This project provides the first steps in this process.

Capability to conduct the project

The administrative Grantee will be the Minerals Council of Australia, the peak body representing the minerals exploration and mining sector, with technical delivery through CSIRO Exploration and Mining, Geoscience Australia, Social Change Online and the Predictive Mineral Discovery CRC. Other Australian experts will be involved from the Government Geologists Information Policy Advisory Committee (GGIPAC).

The CSIRO Division of Exploration and Mining and Geoscience Australia are increasingly being recognised as at the forefront of the application of Grid technologies to Earth Science data sets, through their collaborative work in the Predictive Mineral Discovery CRC. Social Change Online, a local pioneer of interoperable web services able to provide suitable technology as an in-kind contribution.

Each of these organisations in their own right have the managerial competence and expertise to undertake this project. The combined capabilities these organisations are developing will put Australian agencies at the leading edge of competition for international investment in sustainable resource development.

Key individuals in this project also have proven track records for delivering industry outcomes. Upon request, resumes for each member of the team can be provided. However, the 4 core people are described below.

Dr. Robert Woodcock (CSIRO, pmd*CRC) -Project manager Rob is a member of the CSIRO Computational Geoscience research group and is responsible for software engineering efforts in support of the groups research objectives. His current focus is on the development of a software framework to support modelling and simulation of geoscience problems using Grid and Web service technologies. Rob's interests include R&D project management, software engineering, distributed computation and information systems, and computer graphics.

Rob completed his PhD on "Physically based modelling for surgical simulation" at UWA. In 1992. He was the Chief Technical Officer for Super Software International and previously the Manager of Research and Development at Fractal Graphics who developed the FracSIS spatial information system database for use in the minerals and exploration industry. He also lectured in Electrical and Electronics Engineering at the University of Western Australia.

Dr. Simon Cox (CSIRO) - XMML, Architecture

After several years of experimental studies of fracture and friction in rock, Simon realised that the earth is the best laboratory, and started looking into ways of collecting statistically significant samples of brittle phenomena from natural settings. This led into image processing, visualisation, and information systems, particularly using the World Wide Web.

Since joining CSIRO Exploration & Mining in 1994, Simon has concentrated on developing and managing computer based tools. He is involved in various national and international standards efforts connected with geoscience data, metadata and information modelling. He is active in the ISO and OpenGIS Consortium and is one of the editors of the Geography Markup Language specification.

Dr. Rob Atkinson (Chief Technology Officer Social Change Online)- Specialist

Rob specialises in the development of strategies, techniques and technologies for the development of large scale distributed authoring environments, including web sites, databases and mapping technologies.

Rob has 20 years experience in information technology with a unique track record in pioneering design and successful implementation of large scale public standards-based distributed systems over the Web. He has practical and theoretical grounding in systems architecture, data modelling, GIS design, geospatial analysis, Web Services and XML technologies. Rob has lectured both Computer Science and Geography at the University of Wollongong, and worked in the private sector for industry and government clients.

Rob is a contributing author to several OpenGIS Consortium (OGC) specifications, including those underpinning the emerging ANZLIC/Australian Spatial Data Infrastructure. He is currently actively involved in a number of national and international communities of practice developing interoperable data models and web service implementations, including marine legal boundaries, marine navigation and XMML.

Dr. Lesley Wyborn (Geoscience Australia/pmd*CRC)-Implementation

Lesley Wyborn is the Leader of the Knowledge, Information and Data Integration project of the Predictive Mineral Discovery CRC. The pmd*CRC is capitalising on the newly emerging GRID technologies to develop means of transparent online access to applications that can bind in real time to all relevant data, information and knowledge required for the prediction of ore deposits undercover. Lesley is also currently a member of the ARC expert Advisory Committee for Physics, Chemistry and Geosciences.

Benefit to Australia

Sustainable management of Australia's mineral, energy and environmental resources is a knowledge-based process that relies upon continual access to accurate geo-spatial data in its many forms, data processing and analysis tools, and integration platforms. In the solid earth and environmental sciences there is a need to tailor and apply frontier technologies in ICT to effectively gather and use information to commit breakthrough science that assists us in efficiently, safely and responsibly managing our natural, mineral and energy resources. Management in this sense includes sustainable exploration, extraction and utilisation. The Grid and associated web services provide a frontier technology that has the capacity to make access to earth and environmental science data repositories, processing packages and computer power as easy as the web has made access to information.

Local implementation of these technologies requires interoperable data models for connecting people to data, data to data, and data to processing tools. This project provides the first demonstration of web services technologies to the national and state geoscience data assets.

Priority Sector

Mining and Energy Technology and Information and Communication Technology

Specific Industry Outcomes and performance measures

The National Research Priorities recognise the contribution of a robust, world class minerals and energy sectors to the wealth of Australia, but also the need to transform these industries to environmentally and socially sustainable endeavours whilst creating wealth (NRP 1.2 and 1.6)

A successful demonstration of web services technology will provide a vehicle to achieve a sustainable and vibrant resources sector will come through innovation in the way that solid earth and environmental scientists work, both within and across their disciplines. Therefore we are looking to disseminate frontier technologies being developed in ICT to provide the infrastructure that will enable this paradigm shift (NRP 3.1, 3.2 and 3.4).

The Grid and associated web services provide a frontier technology that has the capacity to make access to distributed solid earth and environmental science data repositories, processing packages and computer power as easy as the web has made access to information.

Standard data models and interoperability are important components for achieving this vision. The minerals industry consists of large companies and SME's, many of the latter being service companies who write applications for processing and interpreting these data. Delivering spatially aware data, information and models will increase the efficiency of and potentially effectiveness of the exploration process. To quote Dave Pratt, Managing Director of a service SME Encom Pty Ltd "The ability to access land-use information from one government organisation in the same context as exploration data within a GIS applications will help improve the cost of doing business in Australia. Open access to this type of information can save many days of laborious communications for exploration companies. We are very keen to see these different organisations adopt equivalent transport standards."

A measureable outcome of this project is an increased industry awareness of grid technologies and the improved capacities offered by web services. This will be measured through the stakeholder feedback workshop in the last stage of the project, but will also be monitored through commitment to participate in trialling the demonstrator service through the Geoscience Portal and assist in gaining full scale deployment across geoscience repositories. Awareness will also be raised through presentations at relevant conferences/workshops and dissemination through industry journals and newsletters. Another key outcome will be an agreement from State and Territory surveys and other relevant bodies to work together to upgrade data repositories and link them through a common, interoperable language.

Extent to which project will not proceed without IAccP-Industry Funding

Need for funding The available technologies for demonstration, data repositories and expertise lie within disparate organisations that are brought together for this project. None alone have the capacity to implement the technologies required to achieve the outcomes stated above. The IAccP provides the incentive and the vehicle by which to make this happen-now.

Project relationship to organisation's core work

The Minerals Council of Australia represents the industry at large and as such does not conduct technical programs. It has vested responsibility in delivery of this project to member organisations that cut across government and SME's. CSIRO Exploration and Mining works in

aspects of web services through its XMML and web services architectures research projects within Glass Earth and the Predictive Minerals Discovery CRC. Geoscience Australia has core responsibility for curation and delivery of geospatial data for the nation, but does not develop nor disseminate technology. As such it, and the users of geospatial data are core benefactors of implementing this technology. Social Change Online is an SME whose core work is the development and implementation of web services. Each has a piece of the puzzle, that brought together for developing a national roadmap and demonstration of available technologies, create a positive force.

Project Timeline

PROJECT COMPONENTS	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Part A) Road Map: development of a technology roadmap for achieving interoperability of distributed geospatial data sources across the various digital geoscience data repositories in Australia													
Preparation													
Think Tank (Perth)													
Roadmap Write Up													
Milestone-Roadmap & Demonstrator Architecture				M									
Part B) Demonstration Portal: demonstration of a visual, multi-level user access platform to earth science data which will be made available through the existing Australian Geoscience Portal													
Architecture Review													
Implementation Plan													
Software Customisation													
Demonstration Portal													
Testing & Revision													
Stakeholder Evaluation													
Milestone-Functional Online Demonstrator for Evaluation												M	
Part C) stakeholder evaluation of roadmap and tool													
Stakeholder Workshop (Perth)													
Project Evaluation													
Milestone-Stakeholder Dissemination													M