AuScope infrastructure providing a ‘telescope’ looking into the Australian continent.

Dr. Tim Rawling, CEO, AuScope
What is AuScope?
Australian Context

- Australia is old, cold and cratonised.
- Minerals search space is maturing, and exploration is being forced deeper under transported cover.
Australian Context

- Large, fast moving plate
- Complex active plate boundaries and geoid geometries
- Highly stressed crust – mostly in compression – and underestimated seismic hazard
Introduction

AuScope History

- Established in 2006 to implement an Earth and Geospatial Science Infrastructure program
- National Collaborative Research Infrastructure Strategy (NCRIS) Program “Structure and Evolution of the Australian Continent”
- $75M Commonwealth investment
$34M cash and $128M in-kind co-investment from partners
AuScope Purpose

To create universal access to earth and geospatial research infrastructure (equipment, data, analytics) to drive:

- Innovative Australian scientific research
- Support scientific investigations in government and industry
Introduction
Introduction
Infrastructure
Programs
Geospatial Program

- Responsible for acquisition and deployment of VLBI telescopes, GNSS sites, absolute gravity measurement, GPS calibration robots and satellite laser ranging sites throughout Australia
- Provides data that underpins Australia’s dynamic geodetic framework: observing movement, change and deformation in the Australian plate
Earth Imaging Program

- Works with GA and state GSO’s to support deployment of AusArray Passive Seismic and AusLAMP MT Arrays
- Manages an OBS research fleet
- Supports the national reflection seismic transect program
Earth Imaging Program: Magnetotellurics

- Australian Lithospheric Architecture Magnetotelluric Project (AusLAMP) program
- Collaboration with UA and GA
- National long-period MT data at approx. 2,800 sites across Australia to map electrical conductivity of the continent in three dimensions
Earth Composition Program

- Provides operational support for a suite of world-class analytical infrastructure
- Infrastructure is located at Curtin University, University of Melbourne and Macquarie University and includes LIMS, SHRIMP, Fission Track and TerraneChron access.
- Provides researchers with geochronological and geochemical data necessary to understand the formation mechanisms and evolution of the Australian continent
Annually, ~$600M is spent on drilling in Australian, but too often core is only partially logged, and then discarded. This program overcomes this massive underutilisation of core for research and thus, new mineral discoveries.

Materials & Properties Program: National Virtual Core Library (NVCL)
Materials & Properties Program: National Virtual Core Library (NVCL)

- Facilitates collection, storage and discovery of high quality, semi-quantitative hyperspectral mineralogical data from drill core
- Over 10,000 km of historical core logged from across Australia
- 10s of research papers produced in 2016 – 2017
Outreach: Seismometers in Schools (AuSIS)

- Deployment of research-quality instruments into Australian secondary schools
- Provides resources for student engagement in geoscience
- Simultaneously provides data to researchers about Australian crustal movements
eResearch & Data Strategy
IGSN and LIMS

- IGSN is a unique alphanumeric code assigned to specimens and related sampling features to ensure their unique identification
- GA, CSIRO and Curtin/AuScope

**IGSN and LIMS**

<table>
<thead>
<tr>
<th>Field Program/Cruise</th>
<th>Collection</th>
<th>Description</th>
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<tbody>
<tr>
<td>Geological Survey of Western Australia</td>
<td>Dovers Hills</td>
<td>This sample was collected from Dovers Hills, and 1.7 km north of Dovers Hills, and 1.7 km north of Dovers Hills.</td>
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Simulation, Analysis & Modelling (eResearch) Program

- A toolkit for 3D and 4D modelling, simulation analysis and data mining for geoscientists in Australia
- New data assimilation workflows ensure models are constrained by observational data collected with other AuScope infrastructure
Gplates and Underworld provide tools that allow geoscientists to explore the evolution of mineral and energy systems and their hosts through deep time.
The **AuScope Portal**, the Virtual Geophysical Laboratory (**VGL**) and the Data Enhanced Virtual Laboratory (**DeVL**) provide access to data collected or generated by both AuScope and collaborating partners. Data is freely accessibly, findable and interoperable. New development with DeVL will ensure data is FAIR – Findable, Accessible, Interoperable and Reusable.
Cloud enablement of research codes such as Underworld2, eScript and gPlates drives collaboration

Also supports tertiary teaching and student use
SISSVoc

- Provides semantic web-based vocabularies
- RESTful interface
- Allows humans and machine readable views
- Significant contribution to the domain
- Mostly through work led by Simon Cox with NeAT, then AuScope funding
- Used by Australian Government and other high profile groups
SISSPid

- Persistent Identifier Service
- Used by CSIRO, BoM, GA and internationally
- Initially under NeAT but then furthered by AuScope Grid and ANDS ASRDC project
Initially linking data to computation
VLs now instrumental in orchestrating workflows
Scientific Software Solution Centre (SSSC) provides registry for workflows that can be human and machine discoverable – and executable on the fly
Collaboration
Future Opportunities
$1.5B commitment over 10 years

Highlighted 9 x research infrastructure areas that will transform Australian research and deliver returns for community and industry partners

Inward focussed Earth monitoring and exploration, potential development of inward-looking ‘telescopes’
Enhanced capability for AuScope to include new Earth monitoring data, and utilise new remotely sensed data and visualise data

Key requirement for generational shift in technology resources and interconnectivity of all facilities

Including establishing a virtual laboratory network to enable large data share (incl. digitised collections) and improve real-time communication
Future Focus

NISA and the NRIR provides an enormous opportunity for AuScope and the geoscience community as a whole
Possibility for significant new investment in national programs in support of research initiatives such as UNCOVER
Building a *Downward looking earth telescope*
AuScope has developed two investment roadmaps over the last 5 years (available from our website)
AuScope is seeking community feedback regarding investment priorities over the coming decade
We will be hosting a workshop immediately after the AGCC conference in Adelaide in October and we welcome your input at this event
Thank you

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