Seamless Geology of NSW
A paradigm shift in geological mapping

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What is it?

Joining the best available mapping across the state.

Approximately 500 data sources at different scales and ages.

Now in a consistent geodatabase format with a standard set of attributes.
• Connect line mismatches across boundaries, scale and units.

• Harmonise stratigraphic units.

• Create a series of eleven lithotectonic layers/provinces.
Consolidated cover (e.g. Devonian to Cretaceous basins)

Unconsolidated cover (e.g. Cenozoic)

Solid basement
Significance of the dataset
### Data attribution example: polygons

<table>
<thead>
<tr>
<th>Name and description</th>
<th>Unit hierarchy</th>
<th>Province, cycle, system</th>
<th>Lithology, chemistry</th>
<th>Age range</th>
<th>Depositional environment</th>
<th>Colour, shape</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**NSW Government**
Stratigraphic unit tables

- Best available compilation of literature and current field work.
- Replace explanatory notes.
- e.g. Illawarra Coal Measures
**Stratigraphic unit tables**

- Zone 54
  - All compiled
  - In QA and waiting editing

- Zone 55
  - Being compiled
  - Zone 55 east due 31/12/18
  - Zone 55 west due 21/12/19

- Zone 56
  - All compiled
  - In QA and waiting editing
Value adding
Metamorphic maps

- Metamorphic facies and isograds mapped by geodynamic event.
**Metamorphic maps**

- Zones 54 & 56 complete.
- Zone 55 currently underway.
  - Due early 2019.
Fault attribution

- Every fault attributed with:
  - geometry
  - order
  - parent
  - kinematics by geodynamic event.

<table>
<thead>
<tr>
<th>Sub System</th>
<th>Province</th>
<th>Structural features</th>
<th>Relevance for mineral prospectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olary Detachment</td>
<td>Curnamona</td>
<td>Faults located at the contact between the Broken Hill and Sundown groups.</td>
<td>Extensional detachment between the Broken Hill and Sundown Group is also a major redox boundary and potential site for Pb-Zn-Ag mineralisation (Gibson &amp; Nutman, 2004).</td>
</tr>
<tr>
<td>Cobham Kink Zone</td>
<td>Curnamona &amp; Delamerian</td>
<td>NE-SW striking faults located in the Cobham Kink Zone.</td>
<td>NE-SW striking zone of crustal weakness that may have favoured repeated igneous intrusions (Gilmore et al., 2007).</td>
</tr>
<tr>
<td>Arrowsmith</td>
<td>Delamerian</td>
<td>Dominantly NW-SE striking faults spatially associated with the Mt. Arrowsmith Volcanics.</td>
<td>Faults that are spatially related to the Neoproterozoic (c. 585 Ma) mafic igneous Mount Arrowsmith Volcanics. These igneous rocks and associated faults may host magmatic nickel-sulfide and remobilised copper (Gilmore et al., 2007).</td>
</tr>
<tr>
<td>Larapintine</td>
<td>Delamerian</td>
<td>Basin bounding faults associated with the formation of post Delamerian basins.</td>
<td>Post-Delamerian basins including the Nuntherunge andKayrunnera basins may contain orogenic gold.</td>
</tr>
<tr>
<td>Grasmere Knee Zone</td>
<td>Delamerian</td>
<td>Faults located in the Grasmere Knee Zone.</td>
<td>Zone of higher-strain that may host structurally modified and remobilised VMS/Besshi Cu, Pb, Au and Ag deposits.</td>
</tr>
</tbody>
</table>
### Fault Attribution Data

<table>
<thead>
<tr>
<th>Last Edited By</th>
<th>G Phillips</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMRCODE</td>
<td>Fault, position accurate</td>
</tr>
<tr>
<td>DMRCODE_Desc</td>
<td>Fault, position accurate</td>
</tr>
<tr>
<td>StructuralElementName</td>
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<tr>
<td>Parent</td>
<td>Wongwibinda Tia Fault System</td>
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<tr>
<td>Sub_system</td>
<td>Manning Fault System</td>
</tr>
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<td>2nd order fault</td>
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<td>FaultConfidence</td>
<td>Accurate</td>
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<td>Strike</td>
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<td>FaultDipDirection</td>
<td>Northwest</td>
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<tr>
<td>FaultDipAngle</td>
<td>Steep (61-85 degrees)</td>
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<tr>
<td>FaultCrustalDepth</td>
<td>Lower (Approximate 20 to 30 km depending on terrane)</td>
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<tr>
<td>Length</td>
<td>5586</td>
</tr>
<tr>
<td>GravityVisibility</td>
<td>low visibility</td>
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<tr>
<td>MagneticVisibility</td>
<td>not visible</td>
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<tr>
<td>Event1</td>
<td>Hunter Bowen Cycle (300-262 Ma)</td>
</tr>
<tr>
<td>EventKinematics1</td>
<td>Normal dextral</td>
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<tr>
<td>Event2</td>
<td>Hunter Bowen contraction (262-252 Ma)</td>
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<tr>
<td>EventKinematics2</td>
<td>Reverse sinistral</td>
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<tr>
<td>Event3</td>
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<tr>
<td>EventKinematics3</td>
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<tr>
<td>EventLast</td>
<td>Hunter Bowen contraction</td>
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<tr>
<td>EventKinestLast</td>
<td>Reverse sinistral</td>
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<tr>
<td>Source_Data</td>
<td>Dirks et al., 1992; Landenberger et al., 1995; Farell, 1992;</td>
</tr>
<tr>
<td>Comments</td>
<td>&lt;Null&gt;</td>
</tr>
</tbody>
</table>

#### Grouping

- Steep + 20-30km deep
- + active 300-262 Ma
Fault attribution

- Zone 54 and NEO complete.
- Zone 55 due 2019.
Integration of seamless and 3D geology

- Seamless outcrop & interpretation used to constrain 3D models.
- 3D models are then integrated with the seamless to improve it.
- This ensures a single geological model of NSW that is internally consistent in 2D and 3D.
Mineral potential mapping: New England Orogen

Seamless Geology
Reactive rocks
(Seamless Geology value-add)
Bedrock exposure map

- GSNSW Field Obs
- CSIRO Soil Grid
- NSW OEH Soil Map

Bedrock exposure with soil map overlay
Bedrock exposure map example: Greater Sydney region

- Shows a much more reliable outcrop estimation.
- Will lead to better outcrop and soils mapping.
Summary: a new approach to mapping
What’s next? It’s just the beginning...

- One map to rule them all!

- Iterative process, with periodical updates/releases

Contributions welcome!
Where do you get it?
Accessing the data

Project webpage and GIS download:

MinView:

Mobile maps:
**GIS Data**

- **ArcGIS**
  - Good performing GIS software esp. with access to ArcGIS Pro.

- **Mapinfo**
  - Some of the larger layers including the CSP are difficult to render depending on your computer specs.

- **QGIS**
  - Free open source software
  - Has similar capabilities to ArcGIS and MapInfo
Seamless ‘stitching’ team

Glen Phillips (now external)  
Liann Deyssing  
James Ballard  
Gary Colquhoun  
Kyle Hughes

Chris Folkes  
Joel Fitzherbert  
Alexa Troedson (now external)  
Phil Gilmore (Manager)  
John Greenfield (Director)