Exploration Strategies for the Next Decade

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7 March 2016
Outline

• What hasn’t changed
• What has changed
• What are the implications for exploration strategy development?
What hasn’t changed...

Exploration Strategy 101

1. Focus on world-class deposits
2. Define new search spaces
3. Aggressively collect your own primary data in this search space
4. Test targets and feedback learnings into next cycle of testing – need for *Thematic* approach
Exploration Portfolios need a Strategic Theme to drive learning

- **With Learning**
  - Base rate improves by 20% after every 10 trials

- **No Learning**
  - Constant 0.01 Ps base rate

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**Overall Program \( P_{\text{success}} \)**

<table>
<thead>
<tr>
<th>Number of Targets Tested</th>
<th>Without Learning</th>
<th>With Learning</th>
</tr>
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</table>

**Legend**

- Red line: No Learning
- Blue line: With Learning
What in the strategic landscape is changing...

1. Failure of M&A driven growth strategies
2. Failure of the risk-capital funded junior exploration model to sustain delivery of economic greenfield discoveries
3. Commodity price reversion to mean
4. Transition to under-cover (and deeper) search space
5. Increasing Social LTO challenges – transition to new paradigm of greater sharing?
6. Emerging disruptive technologies – mining and exploration
According to research from Citi, the world's biggest miners have now written off about 90 per cent of the value of the assets they have acquired via M&A since 2007.

Ninety per cent! This suggests the bulk of deals done by our big miners have been pretty much worthless for shareholders. A sea of dud deals. Billions in wasted capital.

According to Citi's numbers, miners have written down the value of assets by $US85 billion in the past seven years, representing about 18 per cent of their assets base.

Source: James Thompson, AFR on-line, June 23, 2015, quoting a Citi Bank study
• Major mining companies will need to reprioritise greenfields exploration, with a much sharper strategic focus than in the past few decades

• But a significant improvement in exploration performance is required!

• Luckily, there are massive opportunities for improvement – the successful groups will grasp these
Need to Focus on High-margin Metal throughout the entire cycle

Doggett (2015) analysis of current major Cu projects

“Economic” defined as IRR ≥ 12%; Cu price assumption – US $2.75/lb
“Anglo American has given notice that it is withdrawing from the Pebble copper project in Alaska.”

- Anglo American, 16th Sept 2013

Social LTO needs to be considered more strategically

Understand the strategic linkage:
Low-margin deposit = larger footprint = greater Social LTO challenges

Doggett (2015) analysis of Social & development risk for global Cu projects
Typical 21st Century exploration play?

Our industry is going through a profound transition to under cover exploration:

Implications are *Strategic* not just project-level

Petroleum did this 100 years ago
Once upon a time, we found outcropping petroleum deposits...
...but not any more
Mineral System-based Predictive Targeting Required

Implications for organisational capability!

McCuaig and Hronskey, 2014
But the best predictive models are useless without data to apply them to

Availability of Pre-competitive geoscience data now becomes strategic
Cover Type Becomes Strategic

### Cover Type Attractiveness for Exploration

<table>
<thead>
<tr>
<th>Cover Type</th>
<th>Type A</th>
<th>Type B</th>
<th>Type C</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>A2</td>
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<tr>
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<tr>
<td>B1</td>
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</table>

#### Zones of Type A cover can be further subdivided:

- **Type B** cover can also be subdivided on basis of presence (B1) & absence (B2) of supergene weathering.

#### Type A Details:

- **A1**
  - Redox Front
  - Thin Veneer - Stable Shield
  - Supergene weathering penetrates basement (e.g. Yilgarn)

- **A2**
  - Thin Veneer - Stable Shield
  - No supergene weathering blanket preserved; may be glaciogene sed. (e.g. Superior)

- **A3**
  - Intramontane Cover
  - Neotectonic areas; rapid variations in cover thickness (e.g. Andes)
Do we need to look for different deposits under cover?

- 20th Century focus was large low-grade Cu deposits but are these viable under > 200m of cover?
- Correlation between target deposit type and likely cover environment?
- Flat-lying deposits more attractive targets?
Innovation and Exploration Strategy

- Innovation can be strategically important but only if it changes the *where* not just the *how*

DET CRC Objective:
Develop a Coiled Tubing Drill Rig for greenfields exploration which can drill to 500m at $50/m and weigh < 10 tonnes (minimum footprint)
Robot Mining: As Exploration Managers we have one key question

*Will it change the type of deposits that can be mined, and are therefore worth looking for in the next decade?*
Can we change how we finance Mineral Exploration?

Price-expenditure correlation indicates exploration finance is irrationally sentiment driven.
• The key is to build an interface of trust between early-stage exploration and sophisticated, strategically-focused risk capital

• Trust... that capital will be allocated effectively
The Exploration Aggregator Model

Sophisticated Risk Capital

trust, $

Exploration Aggregator

strategic, portfolio approach technical discipline, $

Greenfields Exploration Projects:
Selected, technically-strong juniors

Direct agent
Specialist 3rd party
Major mining company
Conclusion- Key Actions for the Future

• “Act like it is true” – base your exploration strategy on the current reality

• Ensure your technical capability is fit for purpose to make the next generation of discoveries, not the last

• Ensure your portfolio has a strong strategic theme

• Monitor possible disruptive technologies

• Look for opportunities to innovate exploration finance