



# Minerals Industry Challenges: Unlocking Australia's Potential Through Collaboration

UNCOVER Inaugural Biennial Conference -31 March 2014



*Leading Industry Innovation*



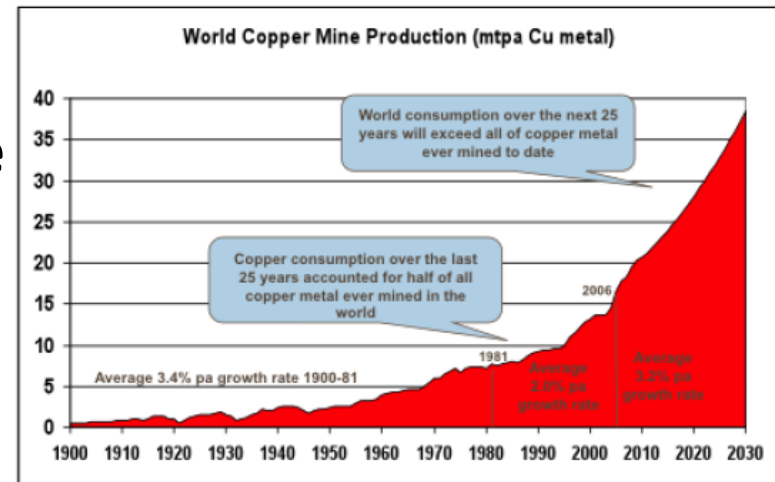
# Topics to be covered

- **The Context**
- **What does industry want?**
- **What are the challenges in Australia?**
- **The burning technical issues**
- **Why collaborate?**
- **The collaborative R&D eco-system**
- **The way forward**

# The Context

# Future outlook for the mineral industry

- Demand for most metals will increase



Annual resource-productivity improvement required to meet global demand 2010-30

**Materials**  
GDP/metric ton

**Food**  
yield/hectare

**Energy**  
GDP/Btu

**Water**  
GDP/cubic meter

1.3%

1.5%

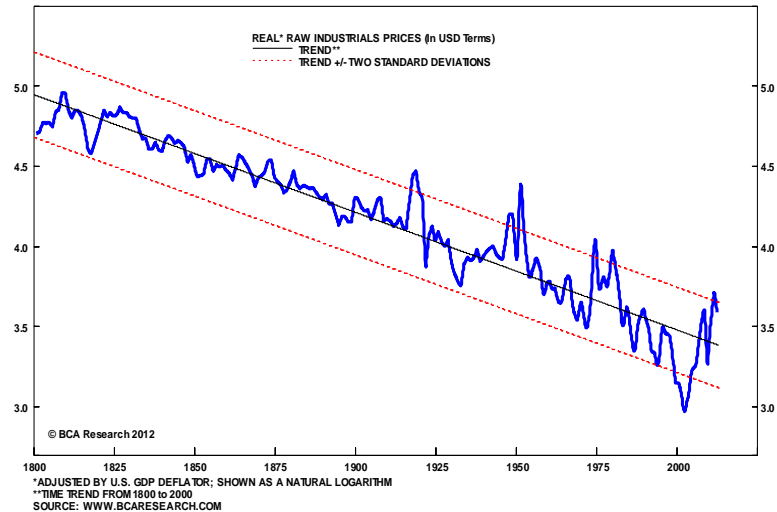
3.2%

3.7%

Bottom right image from McKinsey Quarterly, Stefan Heck and Matt Rogers, March 2014

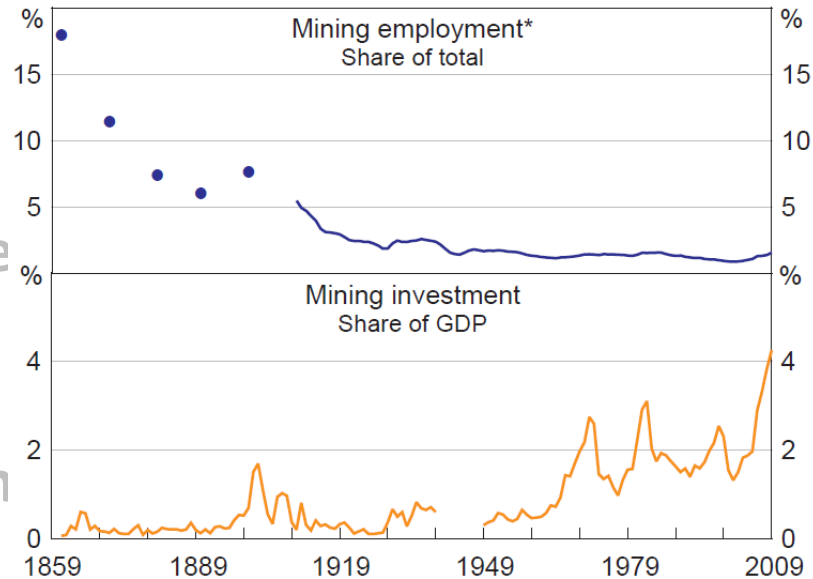
# Future outlook for the mineral industry

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- **Long term price of commodities will continue to fall because of innovation**

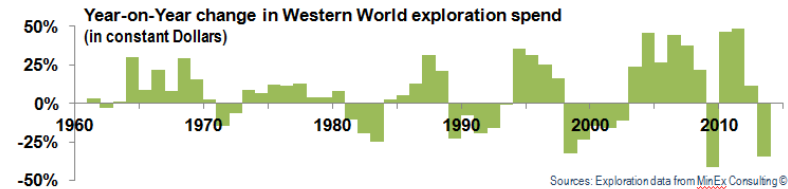
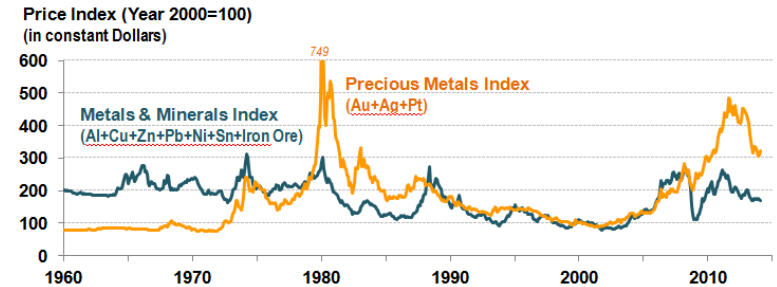


# Future outlook for the mineral industry

- Demand for most metals will increase
- Long term price of commodities will continue to fall because of innovation
- There will continue to be booms and busts



\* Data before 1890 are for NSW, Queensland, South Australia and Victoria  
Sources: ABS; Butlin (1964, 1985); RBA; Withers, Endres and Perry (1985)

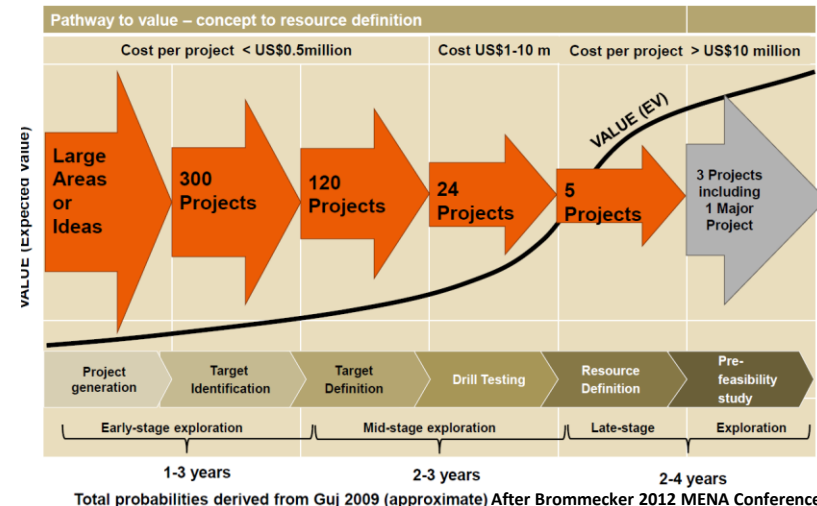


Sources: Exploration data from MinEx Consulting © March 2014  
Commodity Price data from World Bank Feb 2014

Bottom right image from MinEx Consulting Group

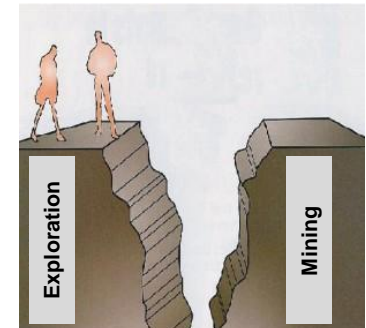
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- There will continue to be booms and busts
- Exploration is a going to get riskier & costlier without innovation
- **Continued separation between exploration and mining – leading to new business paradigm?**





# The Top Business Risks for the Minerals Industry<sup>1</sup>

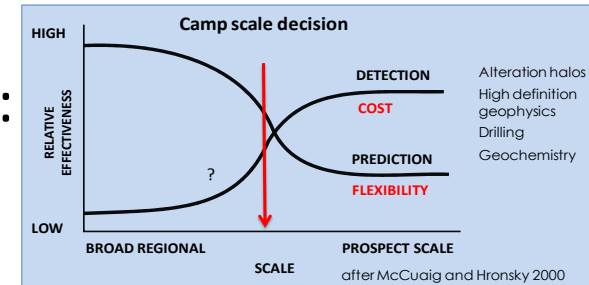
- Capital allocation and access
- Margin protection and productivity improvement
- Resource nationalism
- Social license to operate
- Skills shortages
- Price and currency volatility
- Capital project execution
- Sharing the benefits
- Infrastructure access
- Threat of substitutes



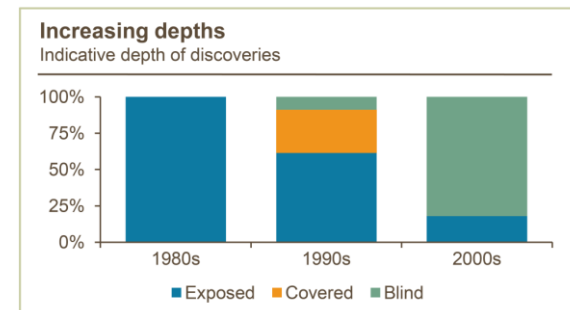
<sup>1</sup> Ernst & Young business risk facing mining and metals 2013-1014

# Management challenges

- Grass-roots exploration **not efficient/effective**: expenditures ↑ whilst the number of deposits found ↓



- We are having to look **deeper**<sup>1</sup>; risk and costs ↑

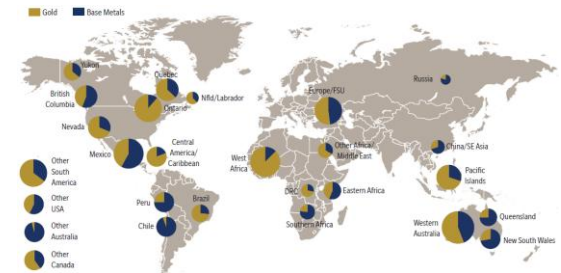
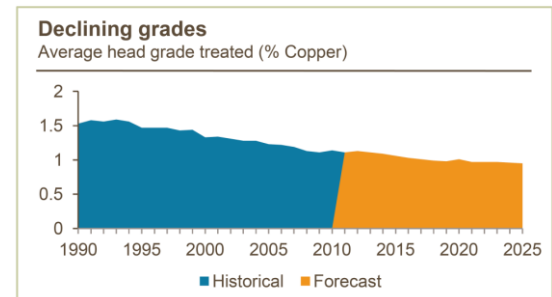


<sup>1</sup> [http://www.riotinto.com/documents/Media-Speeches/RioTintoInvestorSeminar\\_20Sept11.pdf](http://www.riotinto.com/documents/Media-Speeches/RioTintoInvestorSeminar_20Sept11.pdf)

Far right image from SNL Metals & Mining, World exploration Trends 2014

# Management challenges

- Grass-roots exploration **not efficient/effective**: expenditures  $\uparrow$  whilst the number of deposits found  $\downarrow$
- We are having to look **deeper**<sup>1</sup>; risk and costs  $\uparrow$
- Grades are **diminishing**<sup>1</sup>; poorer quality ore being processed, costs  $\uparrow$  and recoveries  $\downarrow$
- Increasing **competition** for the investment dollar – less speculative money going into exploration, less riskier ways of investing in mining sector



<sup>1</sup> [http://www.riotinto.com/documents/Media-Speeches/RioTintoInvestorSeminar\\_20Sept11.pdf](http://www.riotinto.com/documents/Media-Speeches/RioTintoInvestorSeminar_20Sept11.pdf)

Far right image from SNL Metals & Mining, World exploration Trends 2014

# What does “industry” want?

# First, a thing or two about the “industry”

- **Needs are different** depending on nature of the company & geography: miners & suppliers, miners & explorers, big & small explorers
- **Very few companies think long-term** when it comes to exploration: at the mercy of the prevailing market sentiment, and type and tenure of CEOs whose KPIs are not aligned with the sort of risk taking required for long-haul grass-roots exploration
- **Appetite for, and capacity to fund, R&D is different:** Juniors simply don't have the money to provide sustained financial support and never had (Suppliers not much different). But Juniors can provide access to natural laboratories and access to specialist know-how (but so can the Majors)



# First, a thing or two about the “industry”

- **Capacity to uptake & utilise new technologies varies:**  
The resources necessary to embed and utilise new technologies/knowledge etc is much greater at the big end of town, but ironically perhaps its the Juniors who are more disposed to apply new ideas and technologies quickly
- **Certain needs are universal:** access to pre-competitive regional data sets at preferably zero cost
- **No company has a mortgage on experience and knowledge, competitive advantage is short lived**



# What are the Challenges in Australia?

# The challenges

Challenge	Solution paths
<p>1. <b>Improving efficiency / effectiveness</b> of exploration. It's about getting better return on capital employed.</p>	<ul style="list-style-type: none"><li>➤ Management appreciation that exploration is a critical part of the mining business, inherently a very risky business: one must be in it for the long haul</li><li>➤ More effective technologies for targeting</li><li>➤ Smarter interpretation techniques (multi-dimensional large scale inversions)</li><li>➤ More high value pre-competitive regional data sets in areas of deeper cover (UNCOVER)</li><li>➤ New business models</li></ul>



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<b>2. Finding top quality deposits at increasing depths/undercover</b>	<ul style="list-style-type: none"><li>➤ More effective technologies, pointing to large high grade systems: Vectors to ore (AMIRA – CODES); deposits signatures through cover (AMIRA-CSIRO)</li><li>➤ Novel technologies: Faster, better, and safer drilling (DET CRC); Airborne IP (AMIRA-RMIT), PGNA (CSIRO), Magnetic gradiometer (CSIRO)</li><li>➤ More high value pre-competitive regional data sets &amp; information in areas of deeper cover (UNCOVER)</li></ul>

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<p><b>4. Convincing management that Australia is an attractive investment destination:</b> perceived prospectivity declining wrt to some other jurisdictions; licensing and land access still an issue; high cost of doing business</p>	<ul style="list-style-type: none"> <li>➤ Reduce risk by accessing new high quality data &amp; information (UNCOVER)</li> <li>➤ Governments developing more investor friendly policy settings</li> <li>➤ Application of innovative business models</li> </ul>

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<p><b>5. Stemming the loss of research (&amp; teaching) capacity:</b> lack of funds, schools /departments closing/amalgamating</p>	<ul style="list-style-type: none"> <li>➤ Nurture &amp; sustain local research capacity to help develop tools &amp; information (and provide well-trained geoscientists) to improve the odds</li> <li>➤ Taking the UNCOVER initiative to a new level will help</li> <li>➤ More funding support from governments and industry</li> </ul>

# The Burning Technical Issues

# The burning technical issues 18 years ago

- **Area selection:**
  - The continental-regional characteristics of prospective target areas and the special characteristics which distinguish world class target areas from weakly mineralised areas
  - Recognition of critical characteristics in areas of deformational and hydrothermal overprint
- **Recognition of ore bearing systems:**
  - Recognition of the special characteristics of the geological environment (other than ore itself) which distinguish significant ore environments from weakly mineralised environments, and how to detect/measure such characteristics
  - Definition of the characteristics which indicate proximity to ore, aureoles and vectors to ore.
- **Understanding and dealing with the regolith**
  - Recognition of critical ore body characteristics in the weathered zone, including the discrimination of alteration and weathering products
  - Measurement of critical ore body characteristics under the regolith (weathered zone and/or transported cover)
  - Characteristics of ore in the regolith
- **Data management, integration and interpretation**
- **Availability of basic geoscientific data**

# The burning issues now?

- **Characterising Australia's cover:** new knowledge to confidently explore beneath the cover.
- **Investigating Australia's lithospheric architecture:** a whole-of-lithosphere architectural framework for mineral systems exploration.
- **Resolving the 4D geodynamic and metallogenic evolution of Australia:** understanding ore deposit origins for better prediction.
- **Characterising and detecting the distal footprints of ore deposits:** towards a toolkit for minerals exploration.
- **Risk and value analysis of exploration:** understanding the value proposition of exploration (*added after stakeholder engagement survey<sup>1</sup>*).



<sup>1</sup> Cam McCuaig presentation to AMIRA Board, December 2013

**Its about collaboration stupid!**



# Collaboration: the way of the future

**“94% of technology executives believed that alliances were becoming critical to their (research) strategy”**

# Collaboration: the way of the future

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## Why do technology executives believe this?

- **Reduce R&D costs**
- **Decrease development times**
- **Increase R&D flexibility**
- **Access to unique competency**
- **Access to new markets**

# Encouraging signs?

**91% of Australia's CEOs believe that technology will be the biggest transforming trend for their businesses<sup>1</sup>**



**“We need to think more intelligently and strategically about the future needs of Australia's most important export earner. This is a matter of industrial survival, so let's make sure we share – and embrace – the intellectual load”<sup>2</sup>**

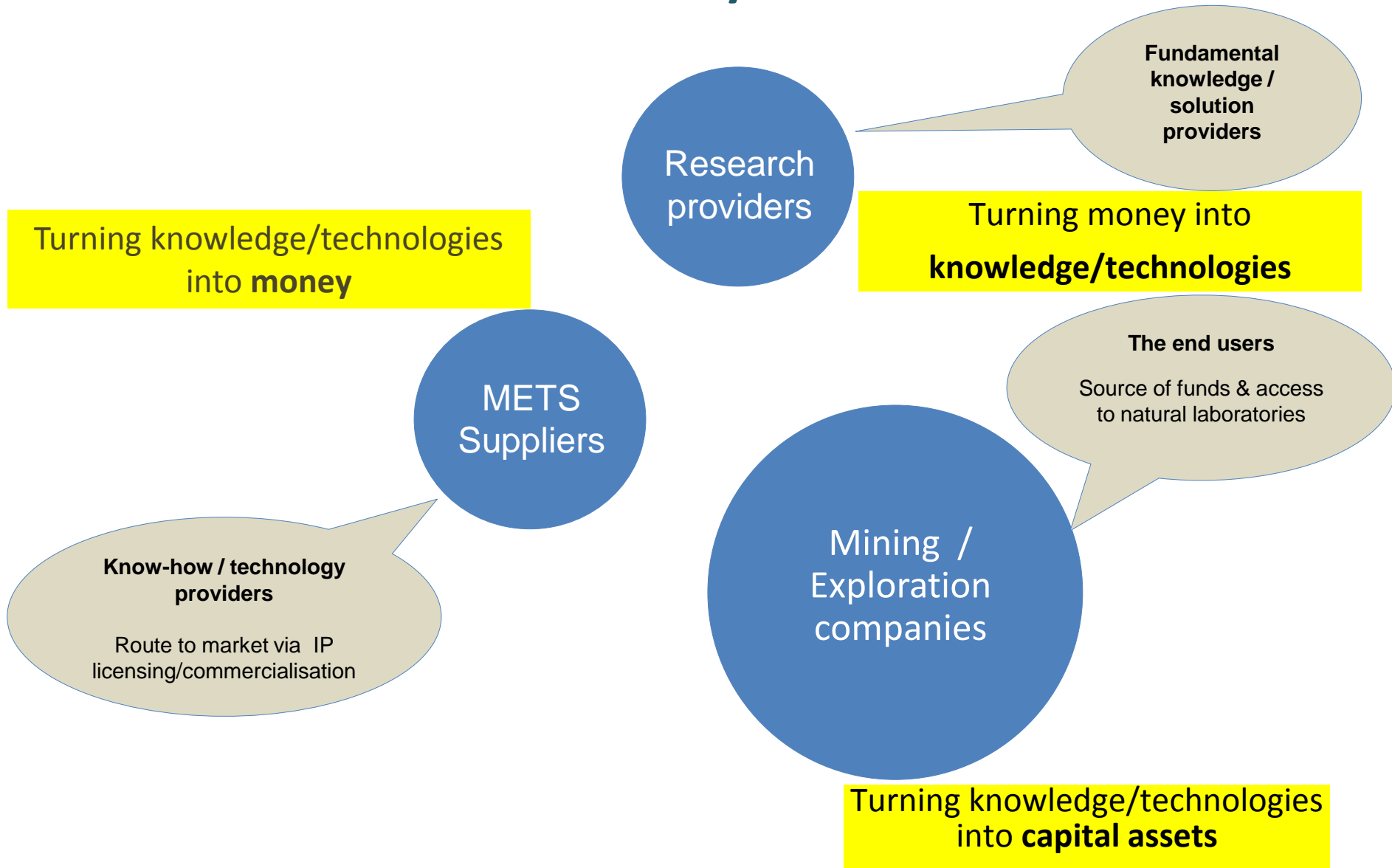


<sup>1</sup> Securing Australia's future – capitalising on global trends pwc Jan 2014

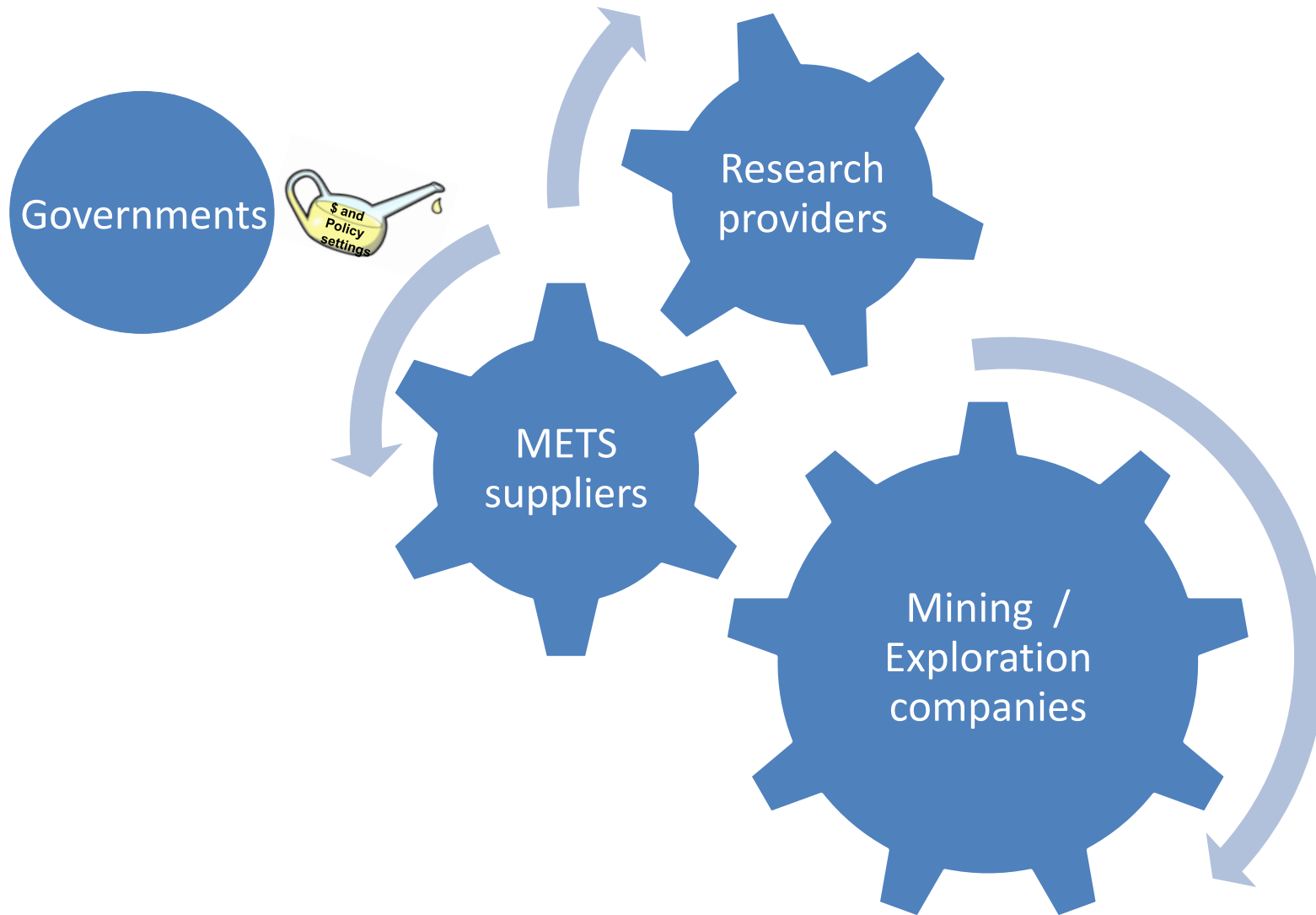
<sup>2</sup> Paul Dowd, Non-executive Director of Oz Minerals March 2014 CSIRO Resourceful Magazine

# The Collaborative R&D Eco-system

# The collaborative R&D eco-system: the actors & roles



# The collaborative R&D eco-system



# So where to from here?

# Uncovering Australia: The way forward



- ✓ **Success in this type of endeavour will require a new collaborative partnership : a whole-of-industry approach:**
  - Majors, mid-tier, juniors & suppliers need to be involved
  - Geological Surveys and Governments need to be involved
  - Critical mass of resources needs to be brought to bear
  
- ✓ **There is a significant public good element**

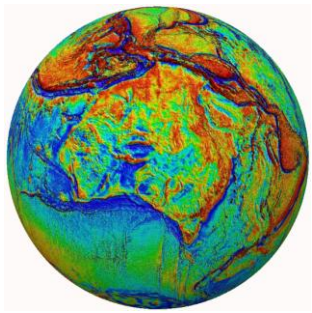






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- ✓ **An enabling platform is required:**
  - ARC - Industrial Transformation Research Hub
  - ARC - Research Centre of Excellence / Co-funded Centre
  - Cooperative Research Centre (guidelines updated to permit priority public good funding mechanism but...)
- Or perhaps**
  - Novel type of research centre based on a broad collaborative partnership : *Uncover Australia Partnership!*

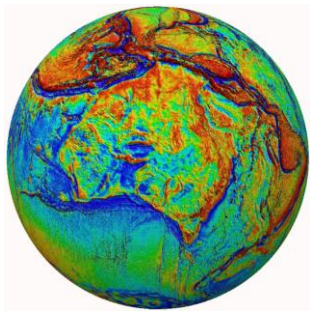


# Unlocking Australia's Hidden Potential

## The Partners

- Many researchers are eager
- Geological Surveys will no doubt play their part
- Government funding may be possible, but only if





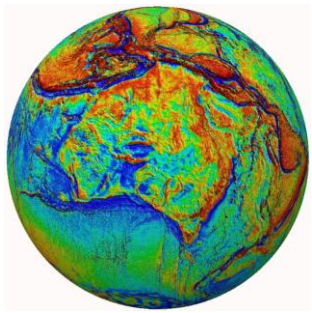
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**A challenge to industry**



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**AMIRA International stands ready to assist to make things happen: *but industry must be the principal driver and must stand ready to invest***

With Collaboration  
**Things can**  
Happen



WITH COLLABORATION  
**GREAT THINGS**

HAPPEN <sup>©</sup>