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# Mineral Systems and the *pmd\* CRC* Cobar Project

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and Russell Korsch





# Outline

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## Background

## Mineral Systems and Exploration Science

### ***The pmd\*CR Cobar Project***

- What it is
- Cobar Mineral System





# Background

**Well-publicised historical data demonstrates that probability of exploration success is low: 0.5% to 2%**

**The *pmd\*CRc* was set up to help improve this % by**

“Generating a fundamental shift in exploration practice and cost-effectiveness by developing a vastly improved understanding of mineralising processes and a 4-D understanding of ... mineralised terrains, and converting this into low-cost targeting tools”

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# Mineral Systems

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**'All geological factors that control the generation and preservation of mineral deposits'**

**'stressing the processes that are involved in mobilising ore components from a source, transporting and accumulating them...'**

From *'Australian Proterozoic Mineral Systems: Essential Ingredients and Mappable Criteria'*

Wyborn, Heinrich & Jaques, 1994





# Mineral Systems Work Flow

## The Why Question

**Why is the ore body there?**

### 5 Questions

1. Geodynamics
2. Architecture
3. Fluid sources & reservoirs
4. Flow drivers & pathways
5. Deposition

### Inputs from:

Data Compilation  
New Data Collection  
Modelling Simulation

## The Where Question

**Where is the next ore body?**

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# The 5 Questions

1. What are the geodynamic, geological and P-T histories?
2. What is the architecture of the system?
3. What are the fluid sources and reservoirs?
4. What are the fluid flow drivers and pathways?
5. What are the metal and sulphur transport and depositional processes?

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*Developed during the AGCRC in 1997-98  
Walshe et al. (1999)  
Price & Stoker (2002) AJES*



# Implications of 5Q

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## **Geodynamic & PT history**

- Setting helps identify fluid source(s)

## **Architecture**

- Permeability distribution

## **Fluid sources & reservoirs**

- Where the permeability needs to tap

## **Drivers & pathways**

- Which bits of the architecture?

## **Deposition**

- Locally important features – architecture(s), lithology, etc.







# How do the 5Q help?

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**Mineral System focus: provides an integrated framework for understanding ore deposits**

**Move away from *Source – Transport – Trap***

Ignores geodynamic and geological context, mixes fluid, metal (and sulphur) sources, implicitly links fluid flow drivers and pathways and finishes with erroneous concept of traps

**Concentrate on processes (not deposits)**

**Provide the framework for a systematic (qualitative) approach to evaluating prospectivity**



# Why Do (Giant) Ore Deposits Form?

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...because a lot of the appropriate mineral(s) have been deposited



Zinc

*Century, Queensland*

So – what controls mineral deposition?



Gold

*Goldstrike,  
Nevada*



# Why Deposition of Minerals Occurs

$$\text{Rate of deposition} = \text{Velocity of transport medium} \cdot \text{Gradient in carrying capacity}$$

Deeper analysis allows key parameters controlling the two right-hand terms to be identified

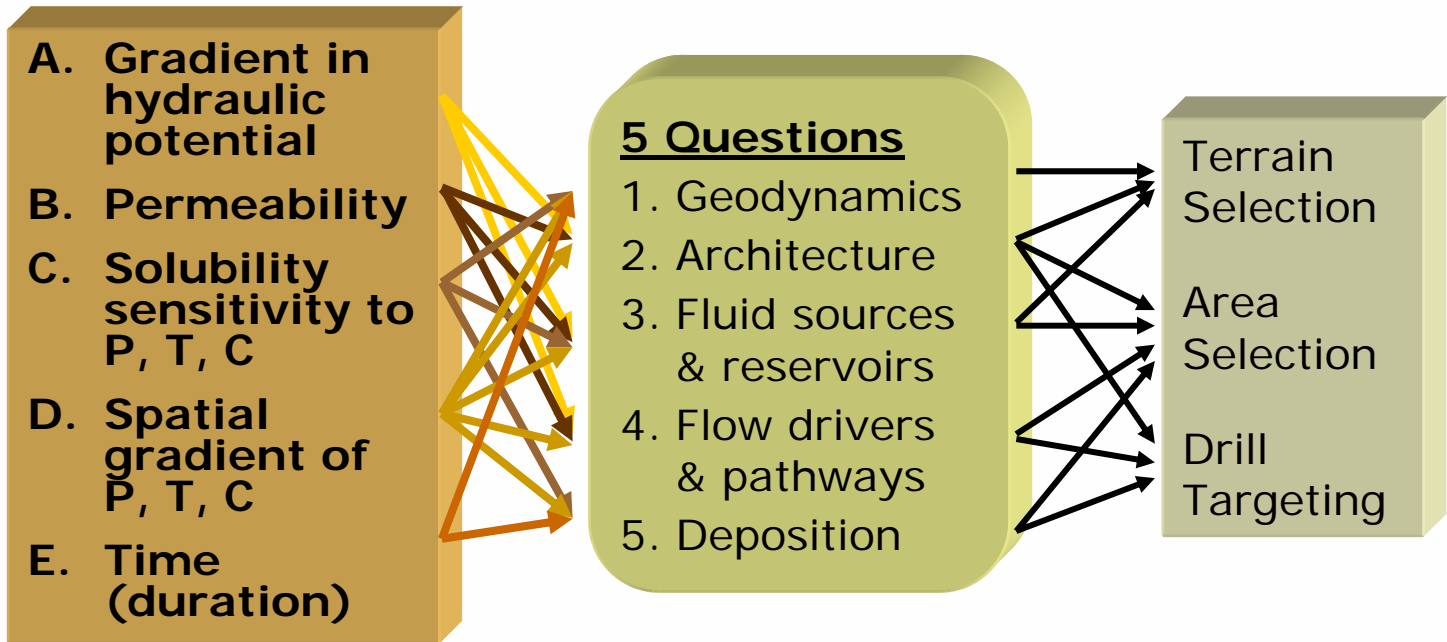
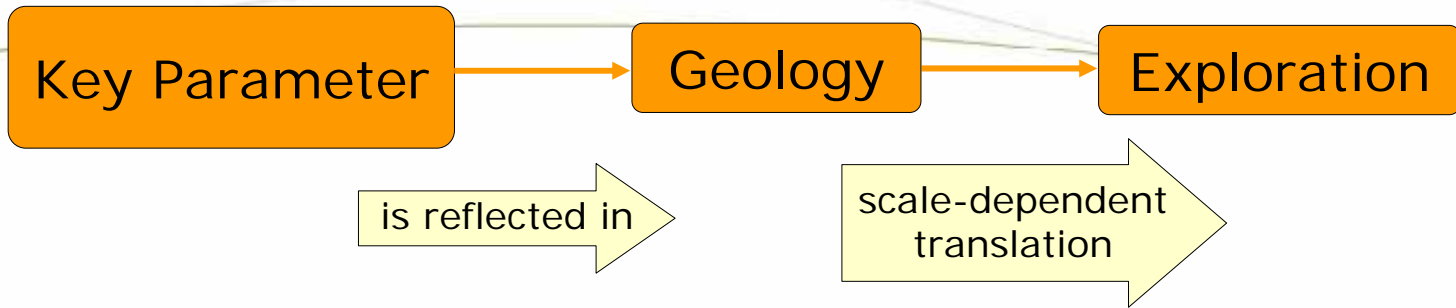
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# Exploration Science



**How?**

**What?**

**Where?**

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# Exploration Science – responsibilities

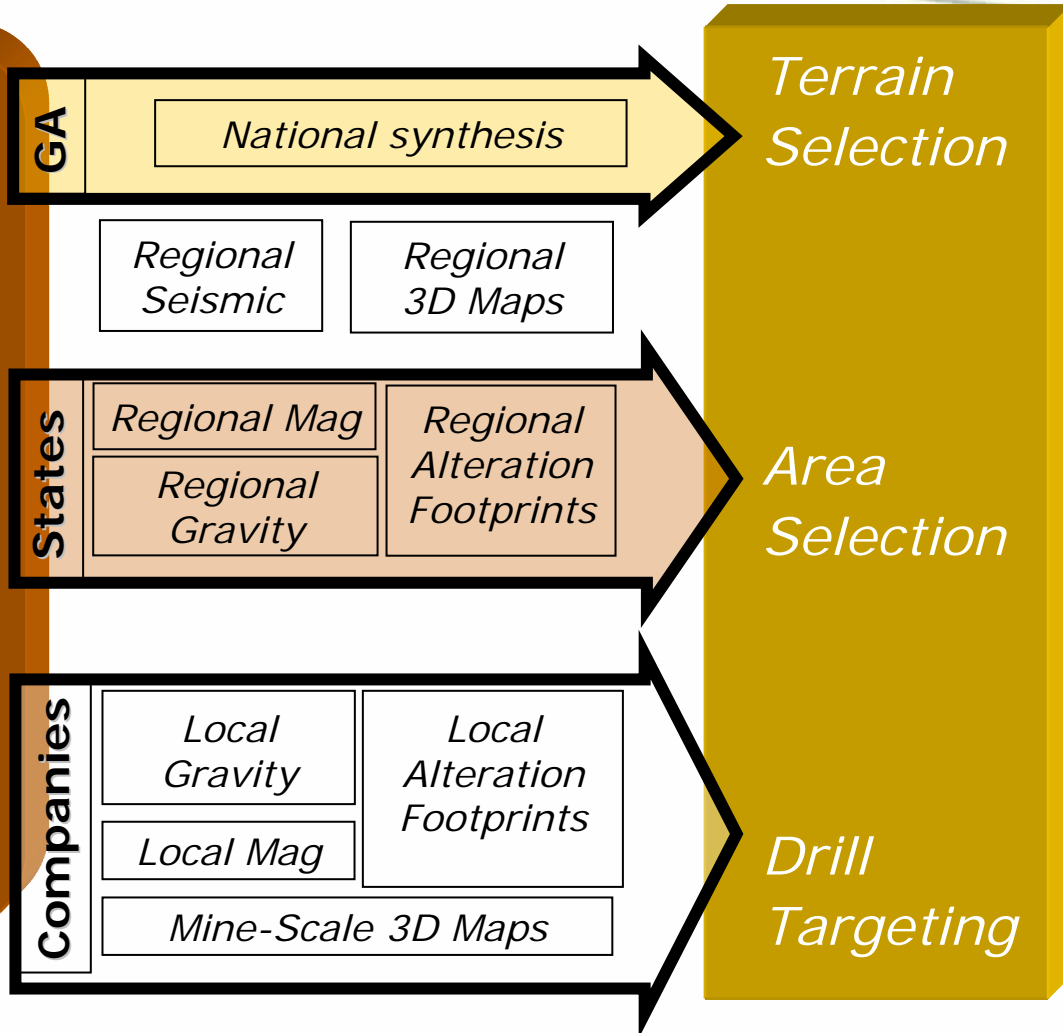
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## 5 Questions

1. Geodynamics
2. Architecture
3. Fluid reservoirs
4. Flow drivers & pathways
5. Deposition





# Cobar Project

## Objectives

1. Assemble and integrate the available geoscientific data in the region as input data to (3D geology) computer models
2. Construct an integrated (3D geology) model that links the geoscientific data to the known mineral occurrences in the region to help predict new target areas
3. Identify key parameters, gaps and opportunities for predictive mineral discovery and for future work by NSW DPI

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# Cobar Project

## Sponsors

Tritton Resources  
Triako Resources  
Peak Gold Mines  
Cobar Management PL  
CBH Resources

NSW DPI  
(through GSNSW)



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# Cobar Project

## Project staff

Simon van der Wielen (GA)  
Barry Murphy (University of Melbourne)  
Indrajit Roy (GA),  
James Cleverley (CSIRO)  
Steve Harrisson (Geomix Pty Ltd)  
Dick Glen (GSNSW)  
Terry Mernagh (GA)  
Anthony Schofield (GA)  
Andy Barnicoat (GA)  
Richard Chopping (GA)

Total = 3.1 + 0.9 = 4.0 man/years

ENCOM - Dave Pratt, Matt Perkins, Kerryn Mitchell

Russell Korsch (*pmd\*CRc*)  
Bob Haydon (*pmd\*CRc*)

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# Confidentiality

**Confidential to sponsors for 12 months after completion of project (confidentiality ends September 2008)**

**Note: high level promotional results may be released by NSW DPI to generate support for future DISCOVER NSW initiatives (with sponsor approval)**

**Hence Sponsors are thanked for permission to show the material that follows**

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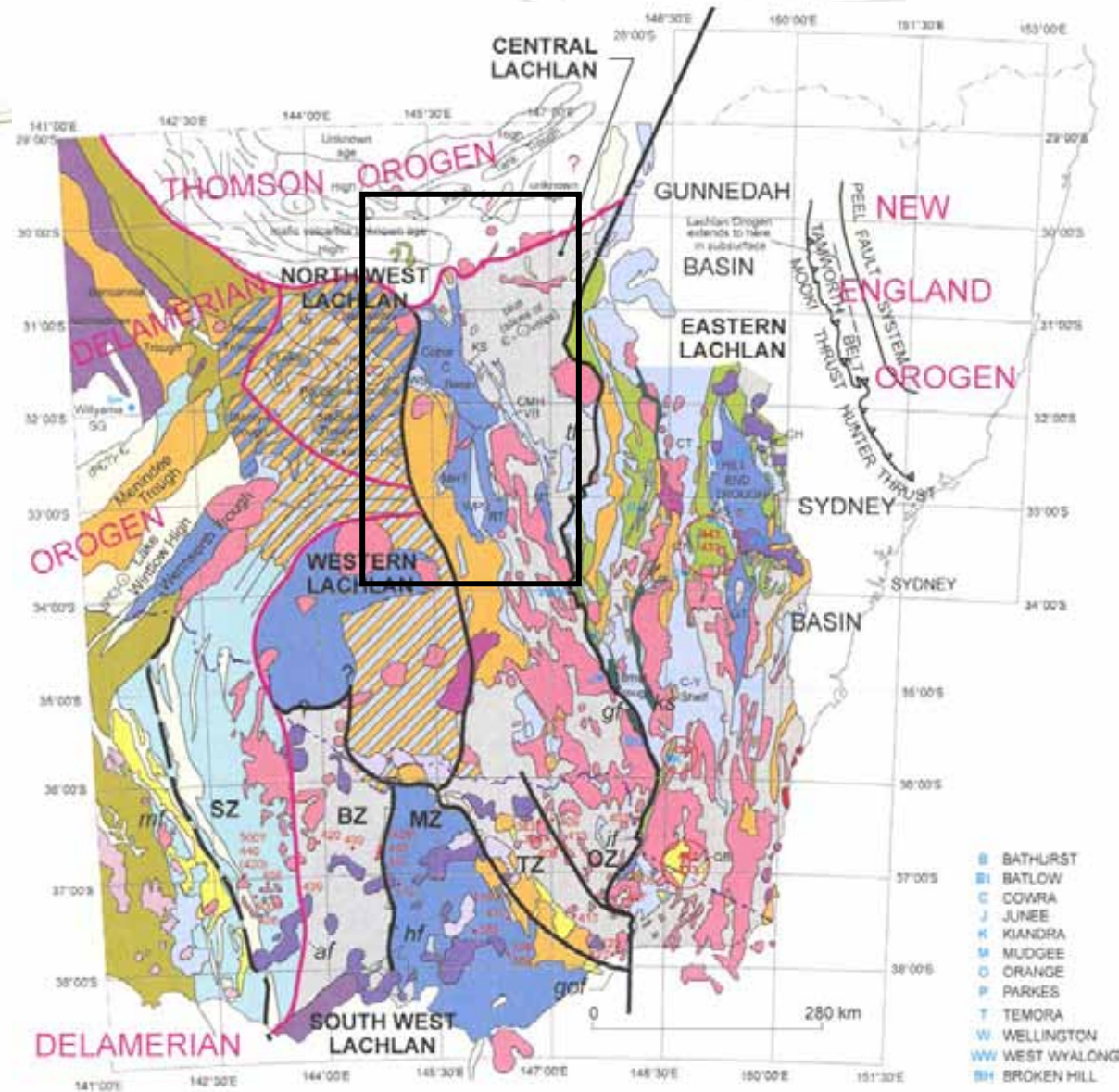


# Project Area

Project area is 440 x 240 km

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# Summary

**Mineral Systems help understand orebodies  
in context**

**Exploration science connects**

- Fundamental physico-chemical controls on deposition to
- Observable view of the Mineral Systems and
- The exploration process

**Cobar Project applies a Mineral Systems  
approach to the greater Cobar Basin area**

- Confidential to sponsors for 12 months after completion of project
- Confidentiality ends late September 2008

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# Progress

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Peak Mine, Cobar, NSW

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-  **pmd\*CRc working with industry**
-  **pmd\*CRc research areas**
-  **pmd\*CRc research node**
-  **pmd\*CRc working with State/Territory Surveys**

