

## **Prospectors Short Course**

# ***“Productive Prospecting”***

**November 04, 2015**

**St. John's, Newfoundland and Labrador**

## **Prospectors Short Course**

# **Mineral Industry Overview**

**November 04, 2015**

**St. John's, Newfoundland and Labrador**

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I am doing this for free and am covering my own costs.

# Summary

Things are bad and may get worse...but

***Be encouraged and get ready... the next exploration wave is going to be good***

# Acknowledgements

- Many of the slides in this presentation are from a series of presentations prepared by Richard Schodde of Minex Consulting.
- The presentations are publicly available at no cost at [www.minexconsulting.com](http://www.minexconsulting.com)
- Other slides are derived from other third party sources as referenced on each slide.

# Overview

Prospecting is an attractive business in a challenging global mineral exploration industry

- Exploration Spending
- Exploration Discoveries
- Exploration Drivers

# Overview

## Global Mining Stocks Slump to 2008 Low

■ Bloomberg World Mining Index



# Overview

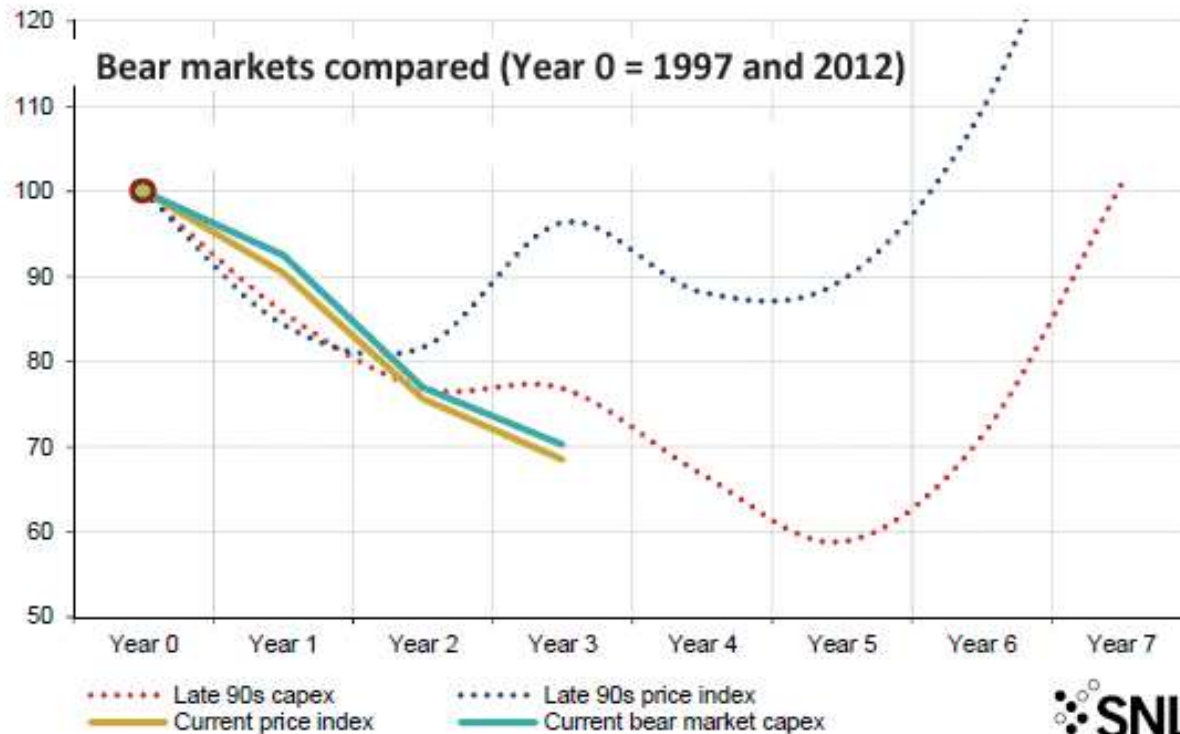


**The stock market for juniors peaked in 2007 with echo in 2011**



# Overview

## Haven't hit rock bottom



# Light at the End of the Tunnel



Historic Sala  
Silver Mine,  
Sweden

# PART “A”

- **Exploration Spending**
- **Exploration Discoveries**

# Overview

Prospecting is an attractive business in a challenging global mineral exploration industry.

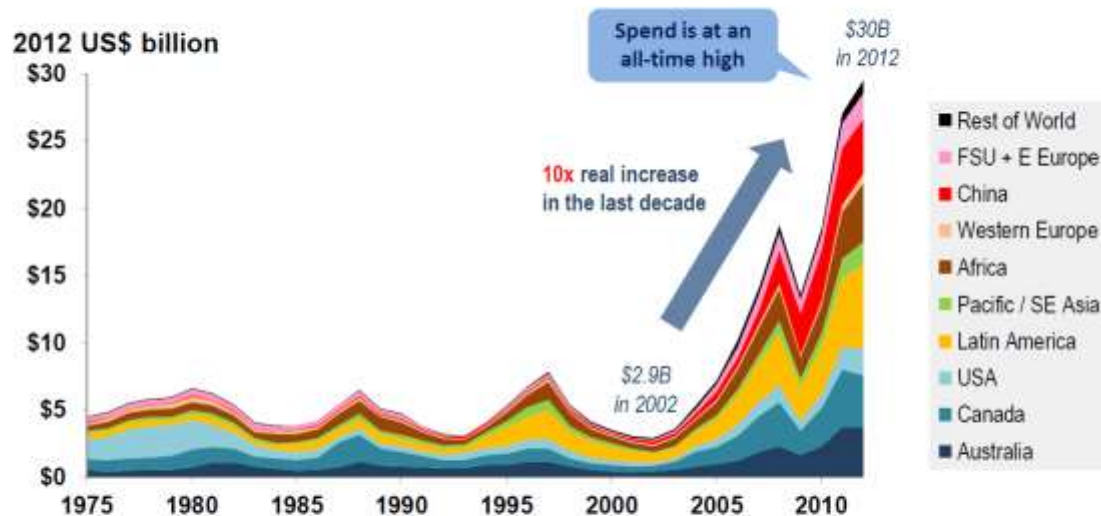
- **Exploration Spending**
- Exploration Discoveries
- Exploration Drivers

# Exploration Spending

- Exploration spending peaked in 2012
- Up 10x from \$2B to \$20B (2002-2012)
- Spending tracks metal prices with around one year of lag time

# Exploration Spending

## Exploration expenditures: World by Region : 1975-2012



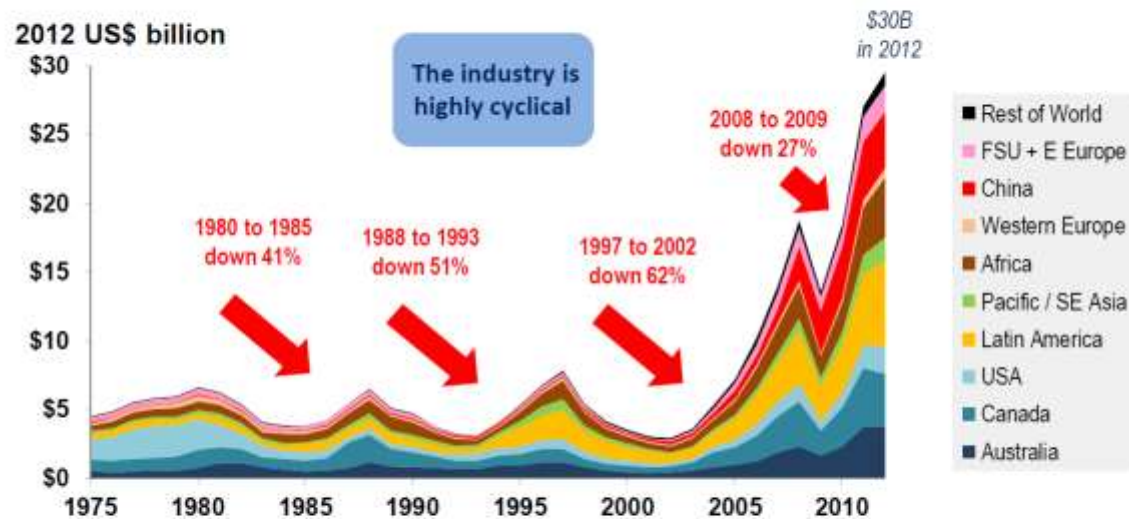
Note: "Rest of World" refers to, Mongolia, Middle East and South West Asia (including India and Pakistan)

Sources: MiniEx Consulting estimates © Oct 2013, based on data from ABS, NRCan, MLR (China), OECD and SNL MEG

**The recent exploration boom peaked in 2012**

# Exploration Spending

Exploration expenditures: World  
by Region : 1975-2012



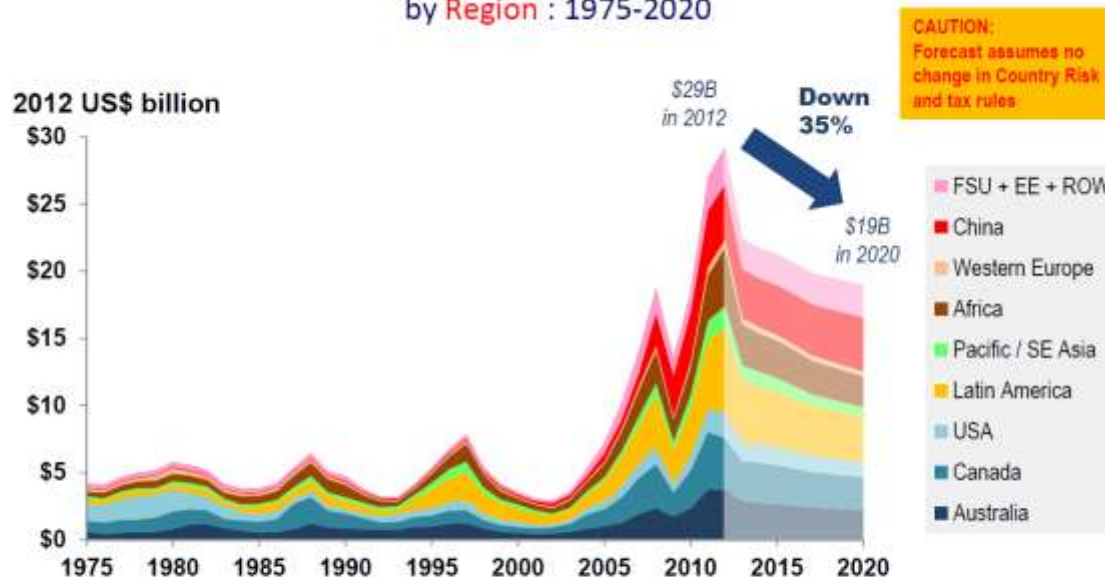
Note: "Rest of World" refers to, Mongolia, Middle East and South West Asia (including India and Pakistan)

Sources: MinEx Consulting estimates © Oct 2013, based on data from ABS, NRCan, MLR (China), OECD and SNL MEG

...and it was the biggest boom in decades

# Exploration Spending

Forecast exploration expenditures: World  
by Region : 1975-2020






Note: "Rest of World" refers to, Mongolia, Middle East and South West Asia (including India and Pakistan)

Source: MinEx Consulting estimates © July 2013, based on commodity price forecasts from Consensus Economics June 2013

**Average decrease in past 4 cycles is 45%**



# Exploration Spending

- 2013:  39%
- 2014:  26%
- 2015:  20% (projected)

Source: MinEx Consulting

**The rate of annual decrease in spending is slowing**

# Exploration Spending

- Boom & Bust
- Unbridled Optimism vs. Doom & Gloom
- This is normal

# Summary

- Exploration a long term business. The outlook is not promising in near term
- Current trends unsustainable for a decade
- Longer the downturn the bigger the boom
- The current downturn is the time to work

*“We tend to overestimate change in two years but underestimate change in ten years.”*

- Bill Gates

# Overview

Prospecting is an attractive business in a challenging global mineral exploration industry.

- Exploration Spending
- **Exploration Discoveries**
- Exploration Drivers

# Major Exploration Trends

## Exploration Discoveries

Commodities

Location

Number

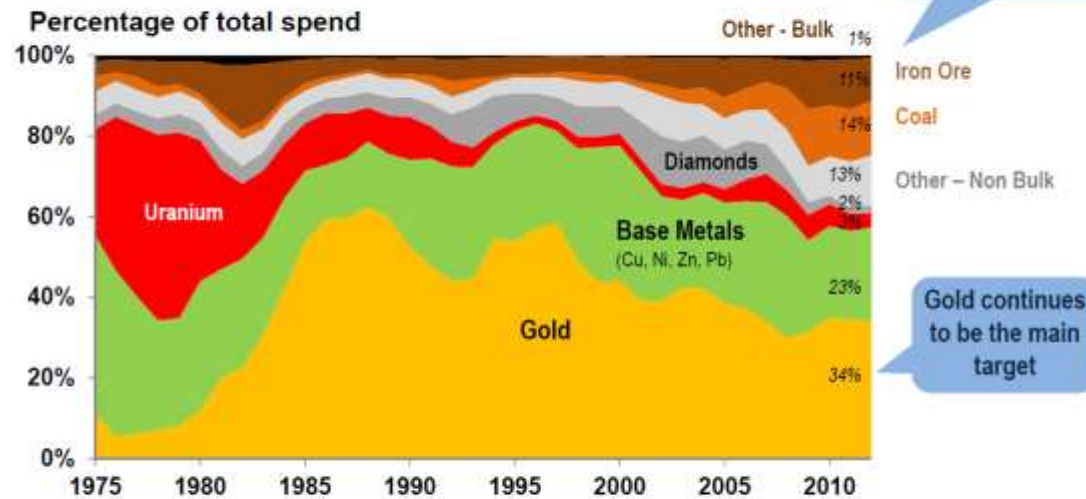
Quality

Size

Depth

# Commodities

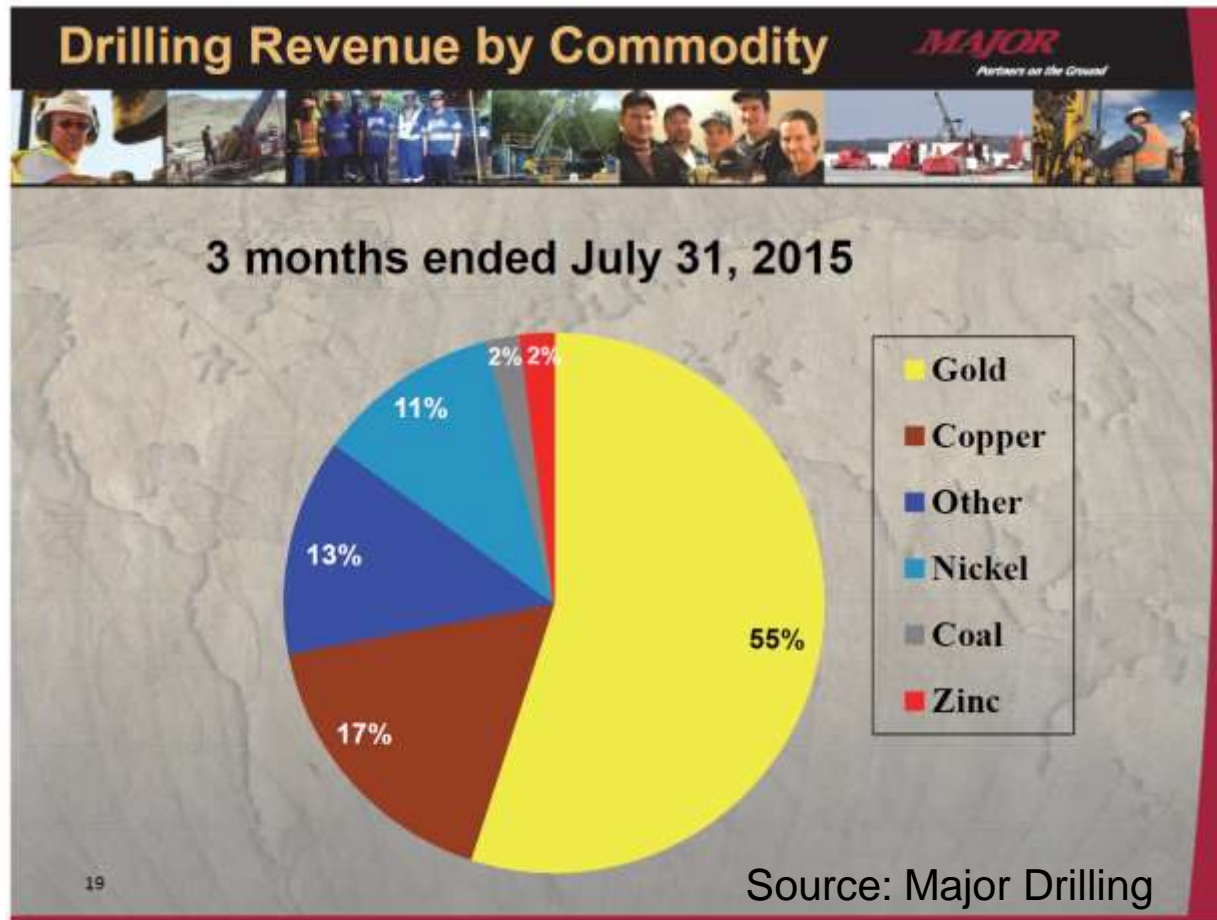
Exploration expenditures: World  
by **Commodity** : 1975-2012



Sources: MinEx Consulting estimates © April 2013, based on data from ABS, NRCan, MLR (China), OECD and MEG SNL

**Exploration shifts to different commodities over time**

# Commodities

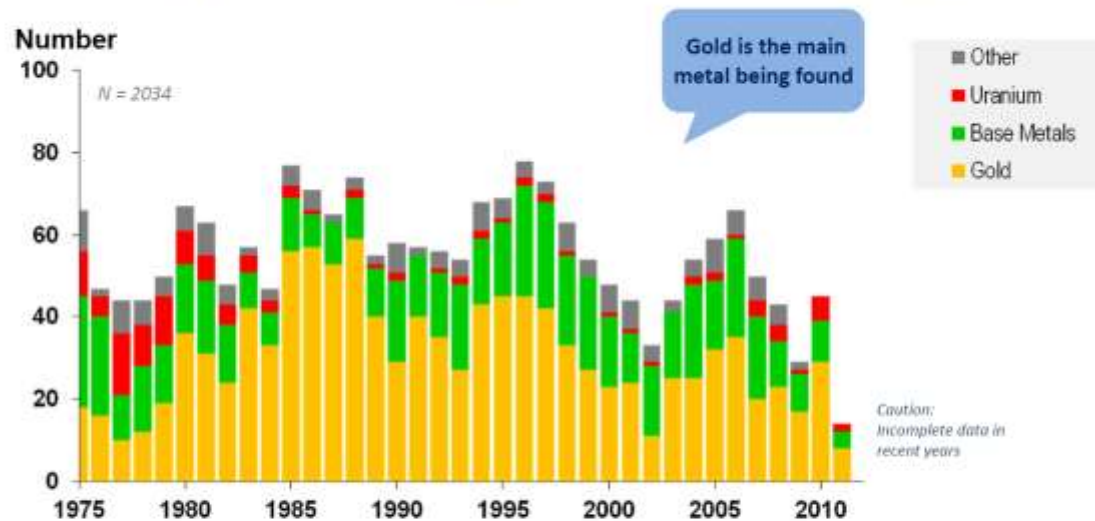


**Gold exploration dominates drilling expenditures**



# Commodities

Number of deposits found each year – by commodity  
Significant mineral deposits found in the World: 1975-2011



Note: "Base Metals" includes Cu, Ni, Pb and Zn  
"Other" includes Mo, Co, Sn, W, diamonds, mineral sands, rare earths etc

Excludes: bulk mineral discoveries (such as bauxite, coal and iron ore)

Source: MinEx Consulting © September 2012

**Finding fewer gold deposits... and little else**

# Gold Exploration

- Declining rates of gold discovery in past decade
- Gold exploration is about 42% of total
- Gold exploration to decrease 10-15%

# Gold Resources

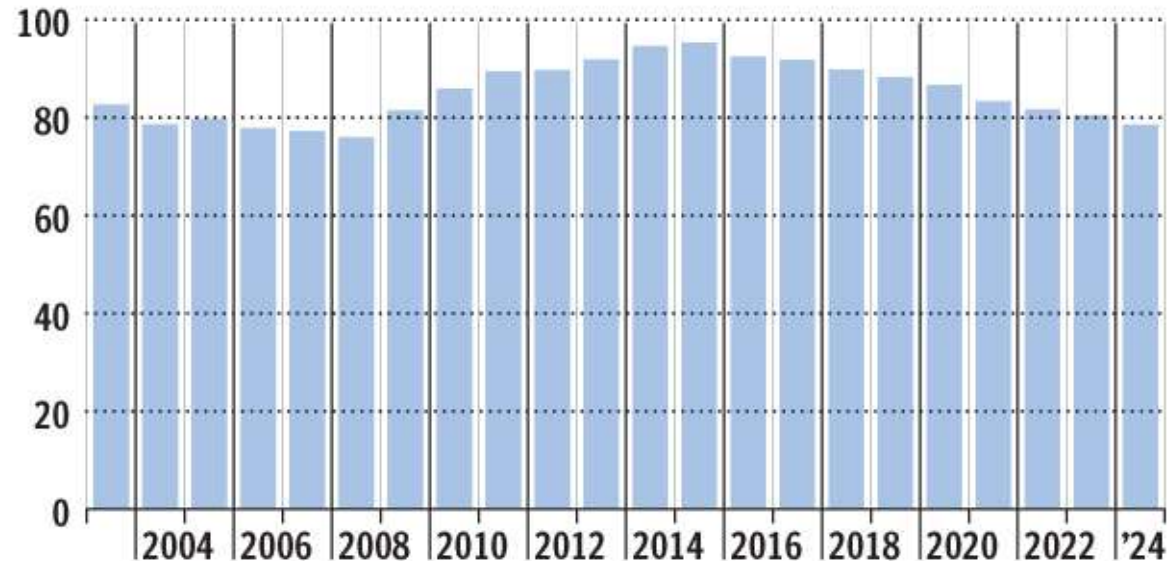
- Gold in feasibility studies: 22.4 Moz
- Gold in “Safe” jurisdictions: 18.7 Moz
- About 50% is considered “low-grade”

# Gold Production

## *GOLD PRODUCTION SET TO DECLINE*

### **ANNUAL GOLD PRODUCTION**

IN MILLIONS OF OUNCES



SOURCE: GOLDCORP DRAWN FROM VARIOUS SOURCES

ANDREW BARR / NATIONAL POST

# Gold Production

- Gold production kept climbing in 2014
- Annual production decrease of 2% to 2020
- Majors share of gold production increased from 40% to 47% over past decade

# Summary and Conclusions

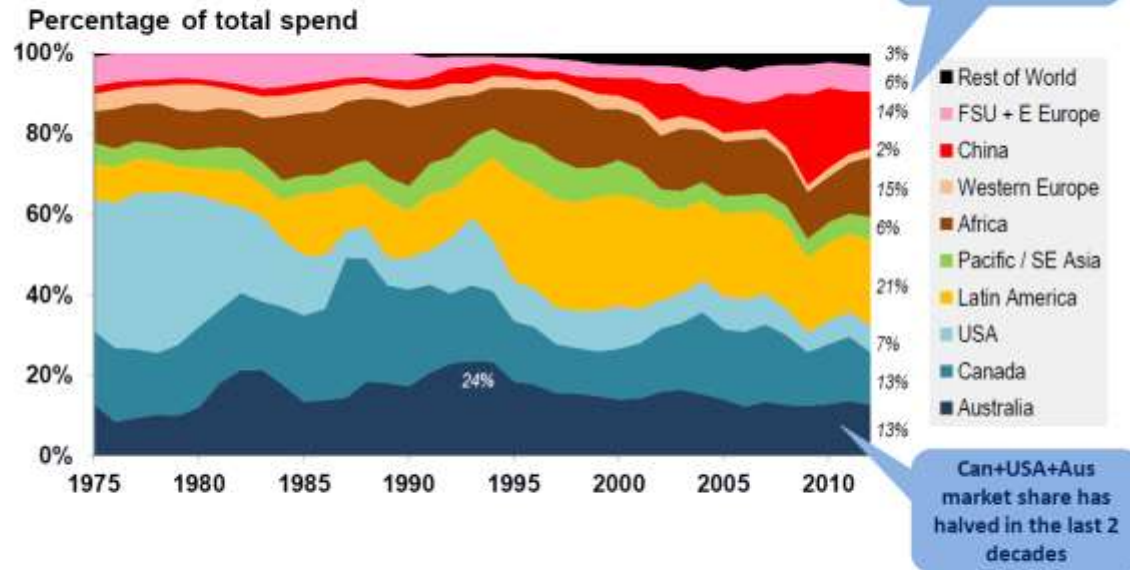
- Finding less gold at higher cost in tougher places
- Mining less gold at grades above reserves
- What will future demand for gold projects be?
- The picture looks worse for base metals

# Location

- Location is a vital factor in exploration
- Where does exploration take place?
- Where are major discoveries since 2000?

# Location

## Exploration expenditures: World by Region : 1975-2012



Note: Includes spend on Bulk Minerals  
"Rest of World" refers to, Mongolia, Middle East and South West Asia (including India and Pakistan)

Sources: MinEx Consulting estimates © Oct 2013, based on data from ABS, NRCan, MLR (China), OECD and SNI MEG

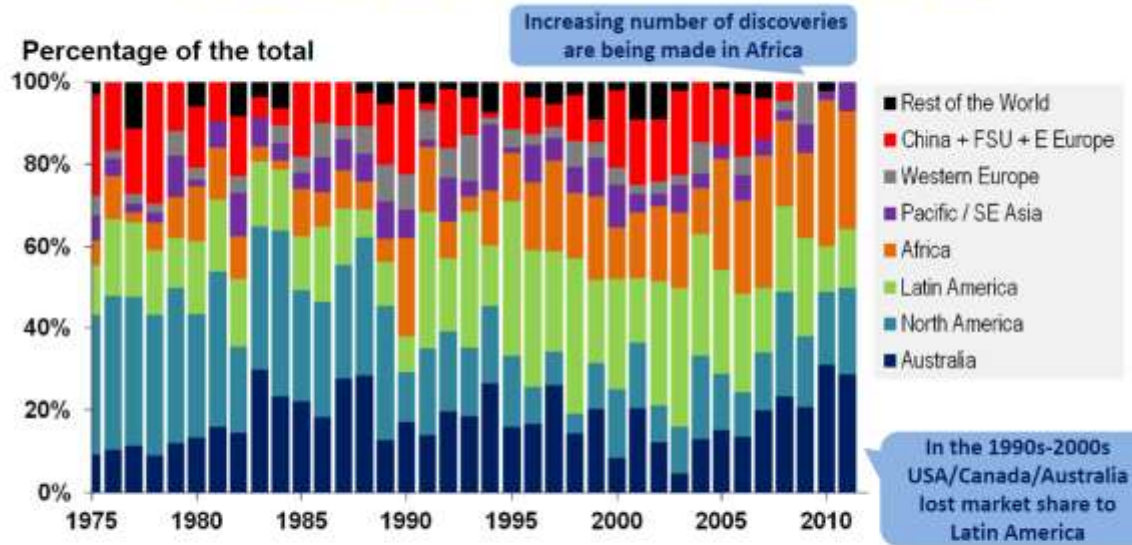
**China #1....NA and Aus down by half in 20 years**



# Location

## Number of deposits found each year – by location

Significant mineral deposits found in the World: 1975-2011



Note: Excludes bulk mineral discoveries (such as bauxite, coal and iron ore)

Source: MinEx Consulting © September 2012

**Rise in Africa + SA...Fall in NA + Aus**

# Location

## Significant mineral discoveries: All Years



Note: Supergiant >60 Moz Au, >125 kt U<sub>3</sub>O<sub>8</sub>, >10 Mt Ni, >25 Mt Cu equiv  
 Giant >6 Moz Au, >25 kt U<sub>3</sub>O<sub>8</sub>, >1 Mt Ni, >5 Mt Cu equiv  
 Major >1 Moz Au, 25 kt U<sub>3</sub>O<sub>8</sub>, >100 kt Ni, >1 Mt Cu equiv  
 Moderate >0.1 Moz Au, 5 kt U<sub>3</sub>O<sub>8</sub>, >10 kt Ni, >0.1 Mt Cu equiv

Note: Excludes Bulk Mineral discoveries

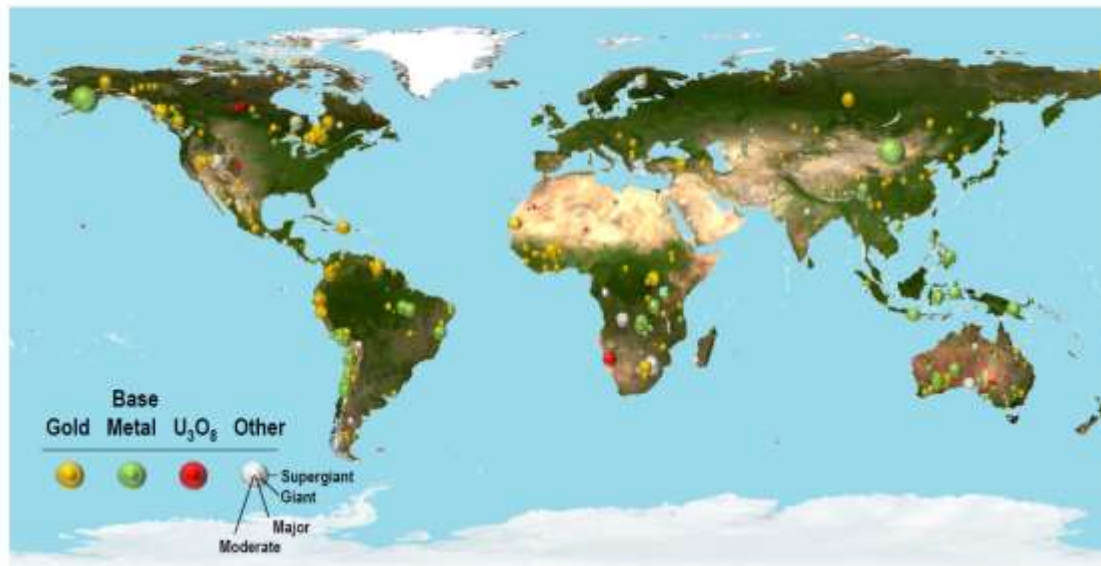
Source: MinEx Consulting © September 2012

**Numerous discoveries globally...**



# Location

## Significant mineral discoveries: 2000-12



Note: Supergiant >60 Moz Au, >125 kt U<sub>3</sub>O<sub>8</sub>, >10 Mt Ni, >25 Mt Cu equiv  
 Giant >6 Moz Au, >25 kt U<sub>3</sub>O<sub>8</sub>, >1 Mt Ni, >5 Mt Cu equiv  
 Major >1 Moz Au, 25 kt U<sub>3</sub>O<sub>8</sub>, > 100 kt Ni, >1 Mt Cu equiv  
 Moderate >0.1 Moz Au, 5 kt U<sub>3</sub>O<sub>8</sub>, > 10 kt Ni, >0.1 Mt Cu equiv

Source: MinEx Consulting © September 2012

Note: Excludes Bulk Mineral discoveries

**...but only a few giant discoveries have been made**

# Oyu Tolgoi, Mongolia



# Number

Number of deposits found each year – by company  
Significant mineral deposits found in the World: 1975-2011



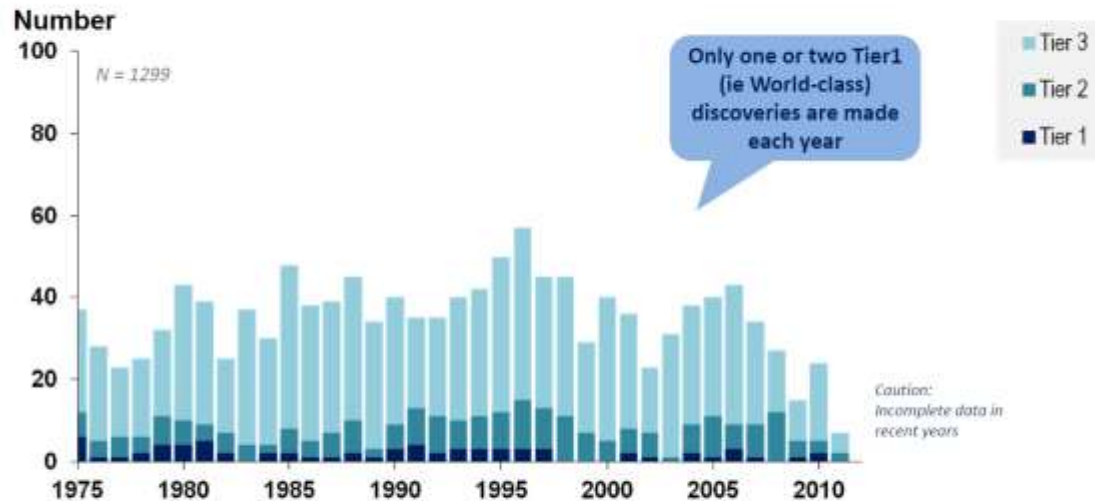
Note: "Other" includes petroleum, industrial and private companies

Source: MinEx Consulting © September 2012

**Fewer discoveries...**

# Quality

## Number of deposits found each year – by quality Mineral deposits found in the World: 1975-2011



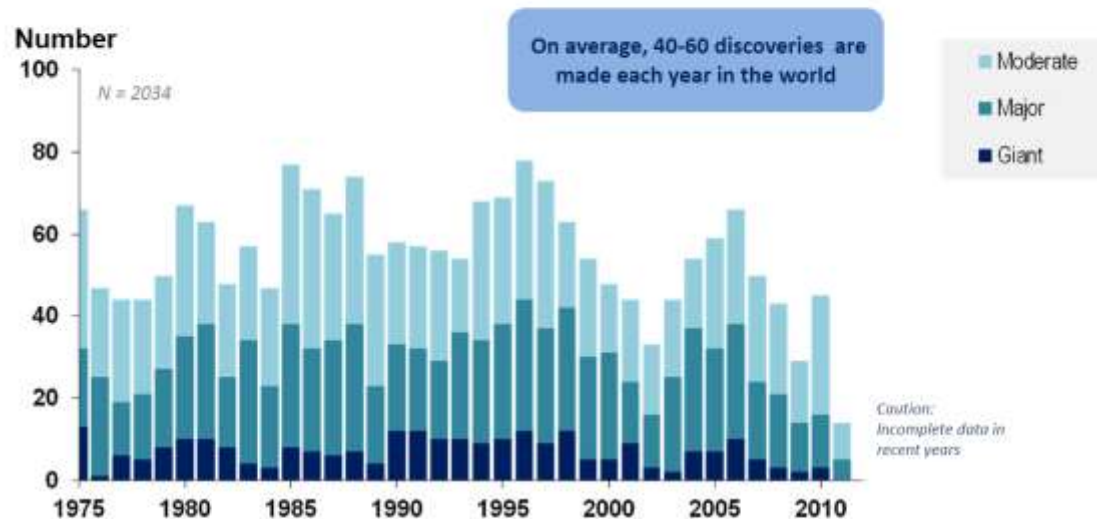
Note: "Tier 1" defined as deposits with large-scale, long-life and low cost (ie World-Class)  
 "Tier 2" defined as deposits some but not all the characteristics of a Tier 1  
 "Tier 3" deposits with limited mine life and/or marginal economics, and "Major" in size and above.

Source: MinEx Consulting © September 2012

**Fewer quality discoveries...**

# Size

Number of deposits found each year – by size
  
 Mineral deposits found in the World: 1975-2011



Note: Giant >6 Moz Au, >125 kt U<sub>3</sub>O<sub>8</sub>, >1 Mt Ni, >5 Mt Cu equiv
   
 Major >1 Moz Au, >25 kt U<sub>3</sub>O<sub>8</sub>, > 100 kt Ni, >1 Mt Cu equiv
   
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Excludes: bulk mineral discoveries (such as bauxite, coal and iron ore)

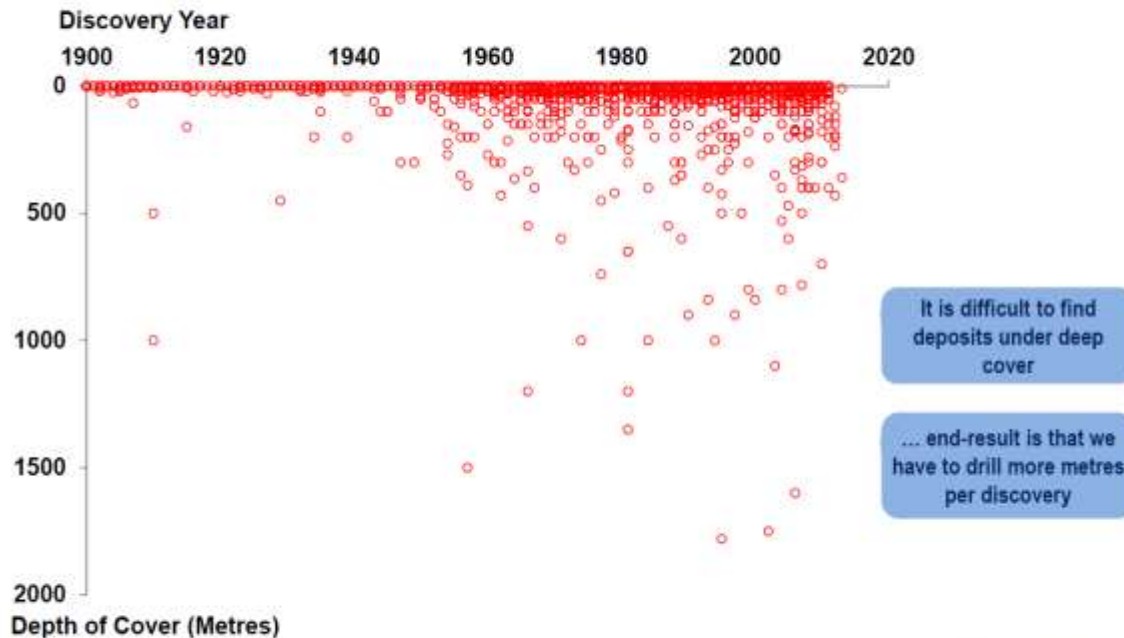
Source: MinEx Consulting © September 2012.

**Fewer big discoveries**



# Depth

... and we are exploring under deeper cover  
 Depth of cover for Gold and Base Metal discoveries in the World: 1900-2012



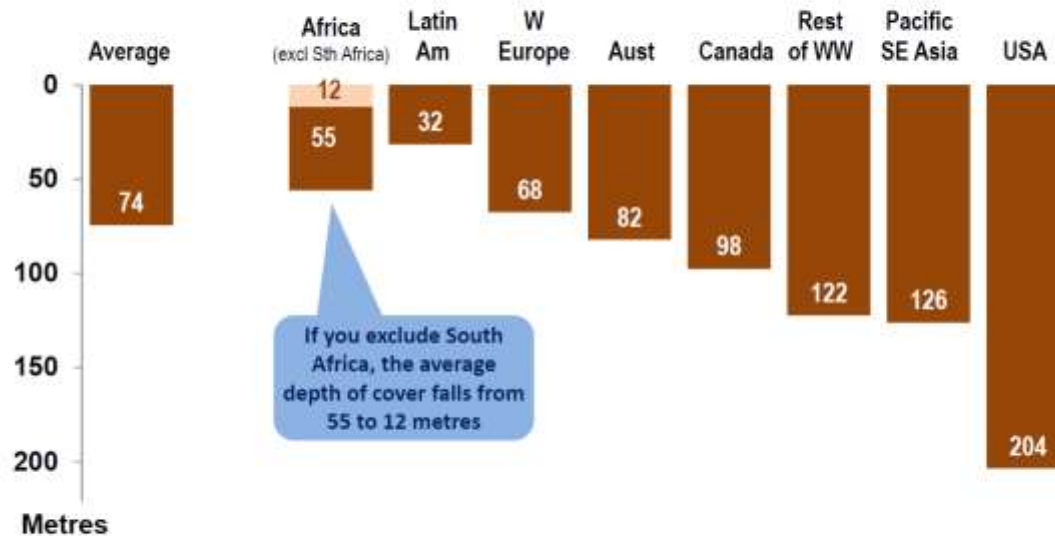
Note: Excludes satellite deposits within existing Camps  
 Excludes gold deposits in South Africa

Source: MnEx Consulting © July 2013

**Discoveries are getting deeper...**

# Depth

Average depth of cover for discoveries - **all metals**  
Western World: 2003-2012



Note: Based on deposits >0.1 Moz Au, >5 kt U<sub>3</sub>O<sub>8</sub>, >10 kt Ni, >0.1 Mt Cu-equiv.  
Excludes bulk mineral discoveries

Source: MinEx Consulting © July 2013

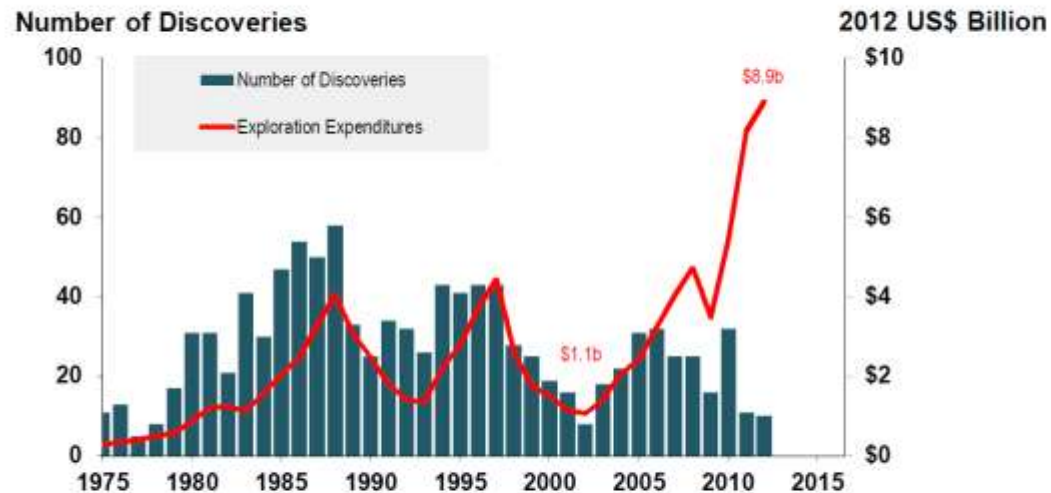
...and are under deeper cover

# Summary

- There is a shortage of good discoveries
- What if we spend more on exploration?
- Before we invest more, how does discovery performance look?

# Discovery Performance

## Discovery rate versus spend Western World gold exploration spend and discoveries



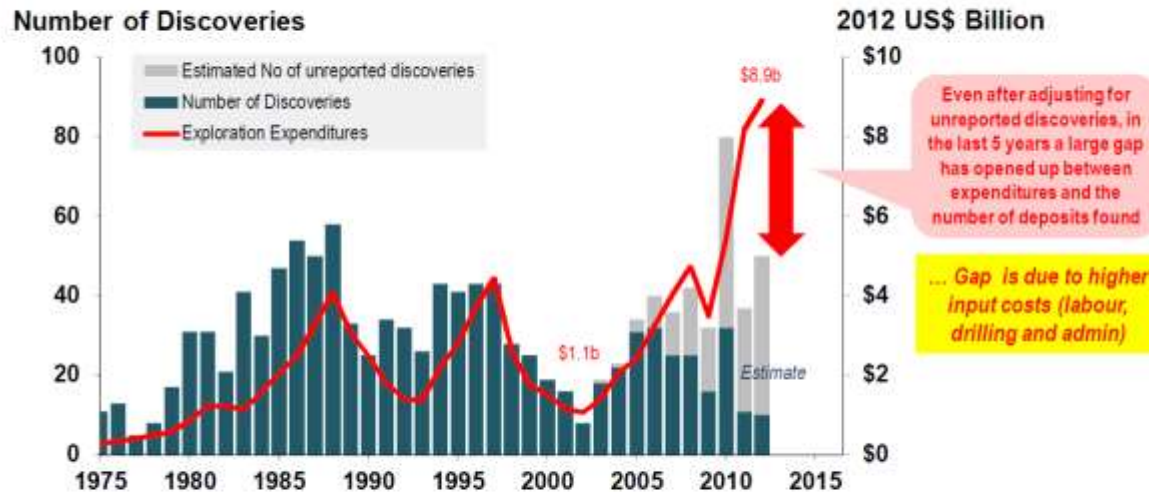
Note: Discoveries are for Primary gold deposits >0.1 Moz Au.

Source: MinEx Consulting © October 2013

**Spending more...and finding less**

# Discovery Performance

Discovery rate versus spend  
Western World gold exploration spend and discoveries



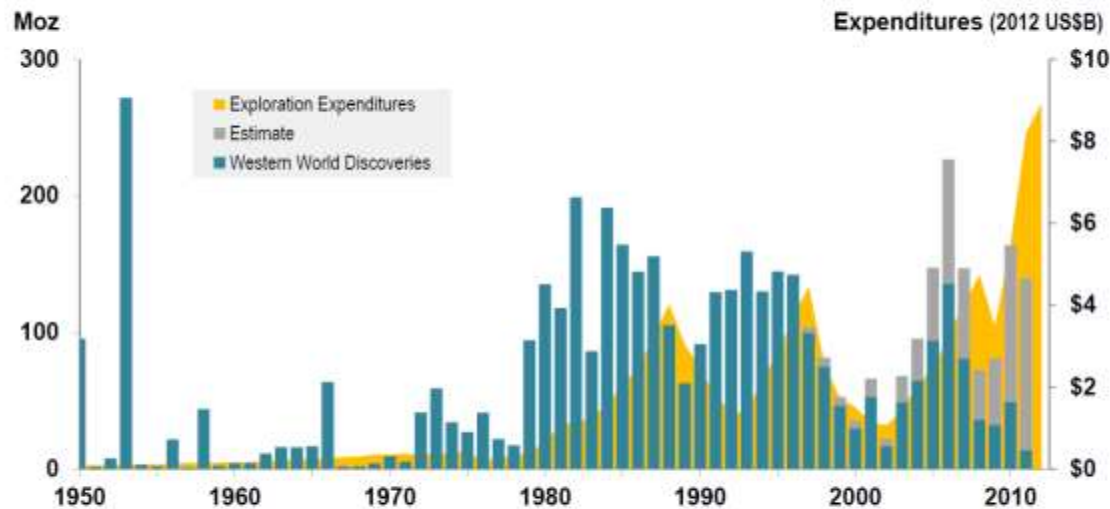
Note: Discoveries are for Primary gold deposits >0.1 Moz Au.  
Includes adjustment for unreported discoveries

Source: MinEx Consulting © October 2013

**More spending may not result in more gold discovered**

# Discovery Performance

Gold exploration expenditures and ounces found  
Primary gold found in the Western World: 1950-2011



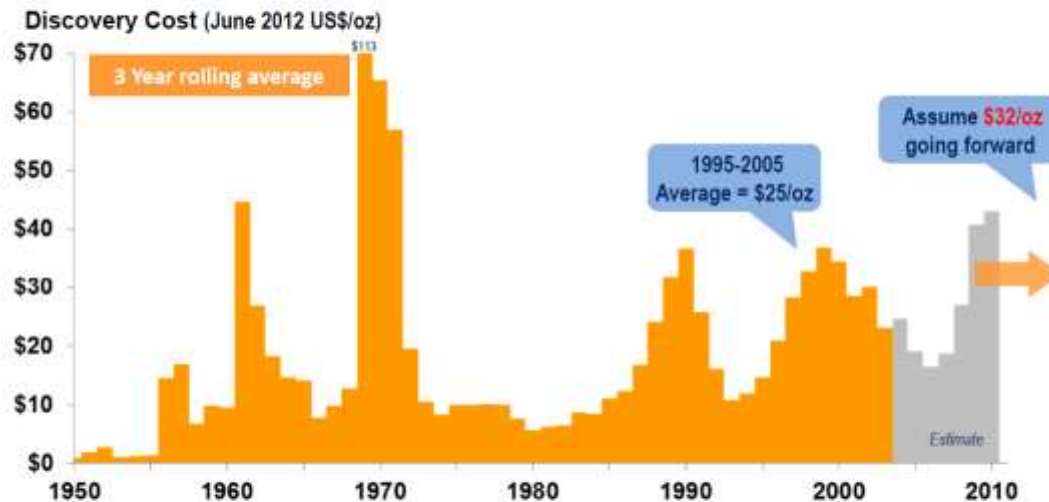
Source: MinEx Consulting © June 2012

**In past decade, gold exploration up...discoveries down**

# Discovery Performance

Discovery costs for **gold** are rising

Unit discovery costs for primary gold in the Western World: 1950-2011



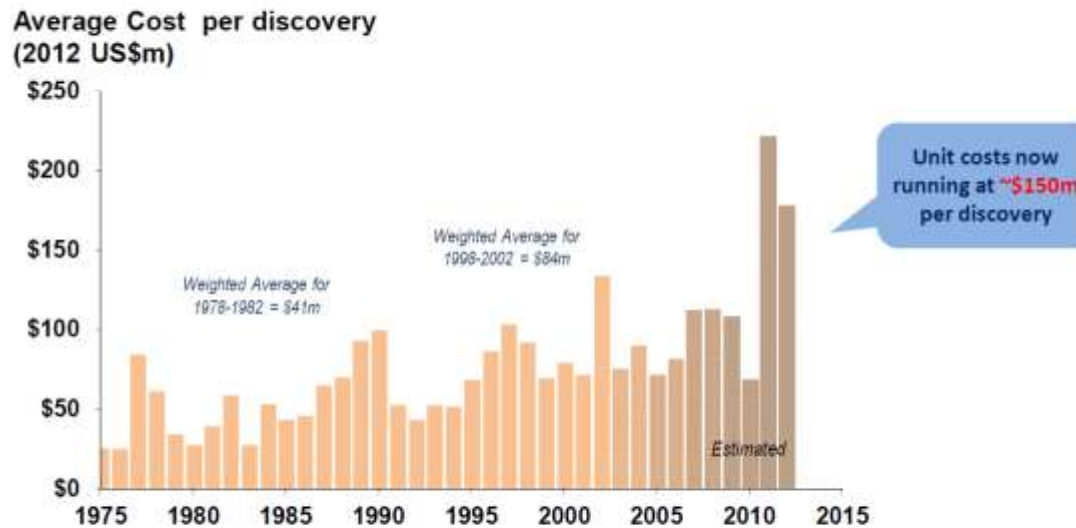
Source: MinEx Consulting © June 2012

**Discovering gold is costing more per ounce**

# Discovery Performance

## Trend in Unit Discovery costs: 1975-2012

Western World Primary Gold Deposits > 0.1 Moz



Note: Discoveries are for Primary gold deposits >0.1 Moz Au  
Data from 2003 onwards have been adjusted for unreported deposits.

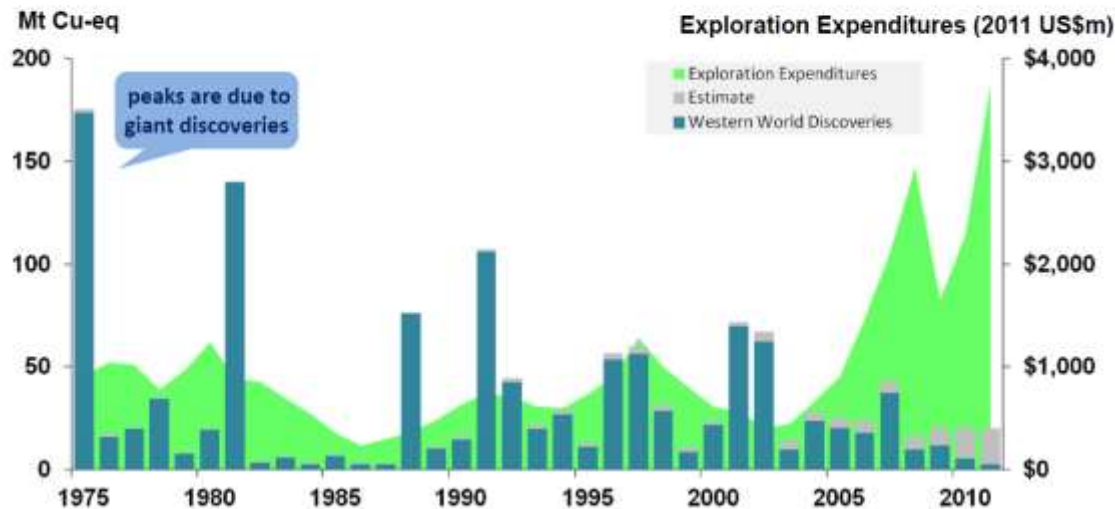
Source: MinEx Consulting © October 2013

**A gold discovery is costly**



# Discovery Performance

Exploration expenditures and amount of Copper found  
Primary copper deposits >0.5 Mt Cu-eq found in Western World: 1950-2011



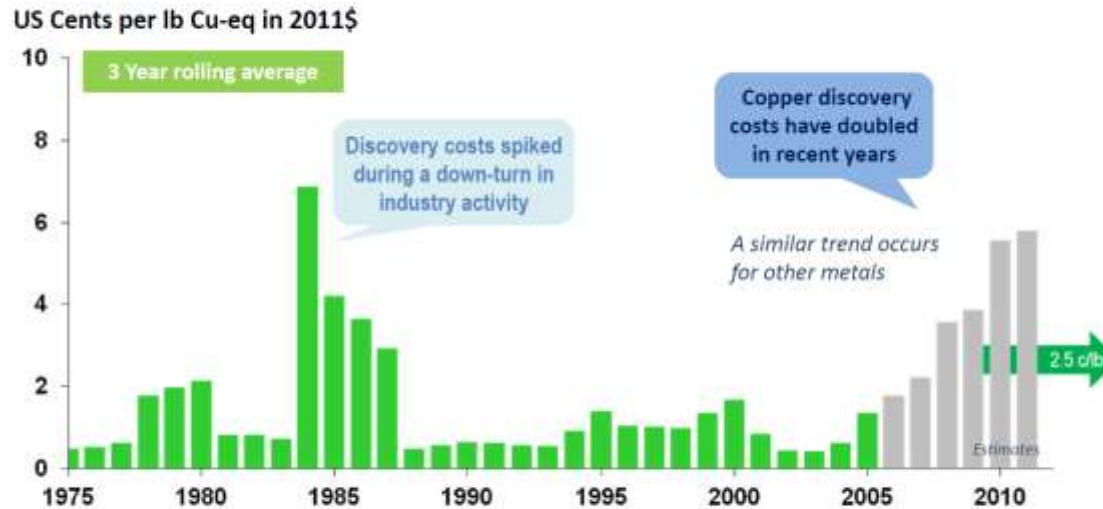
Note: Estimate includes adjustments for deposits with no discovery year and deposits missing from the database.

Source: MinEx Consulting © August 2012

Since 2000, copper spending up...discoveries down

# Discovery Performance

## Discovery costs in the Western World - Copper



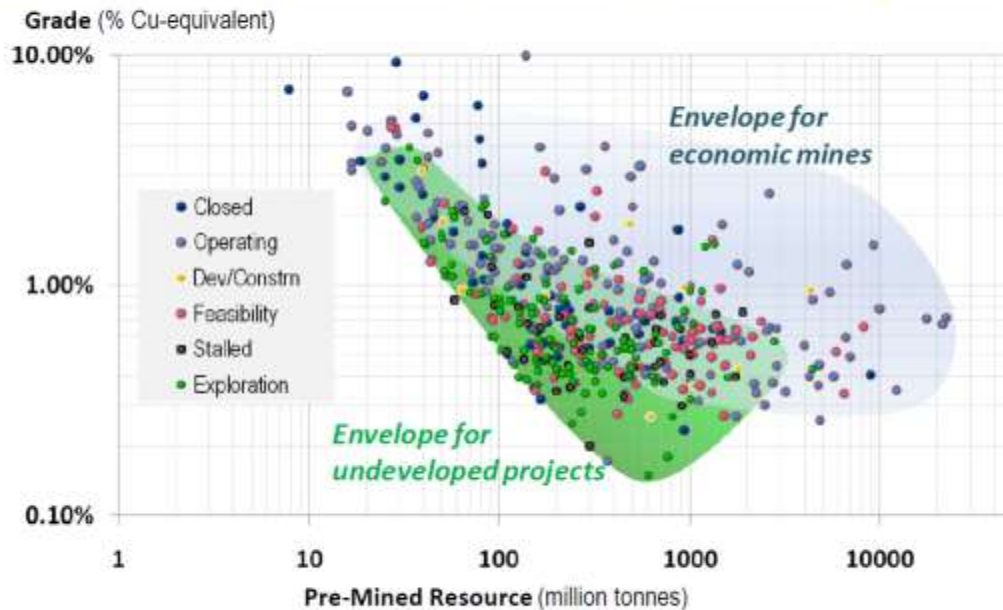
Note: The reported costs include credits for by-product metal

Source: MinEx Consulting © August 2012

**The cost of discovering more copper has increased**

# Discovery Performance

The challenge is that most discoveries are too small / low grade to develop as an economic mine  
Tonnes & Grade of all primary copper deposits in the world containing >500kt Cu

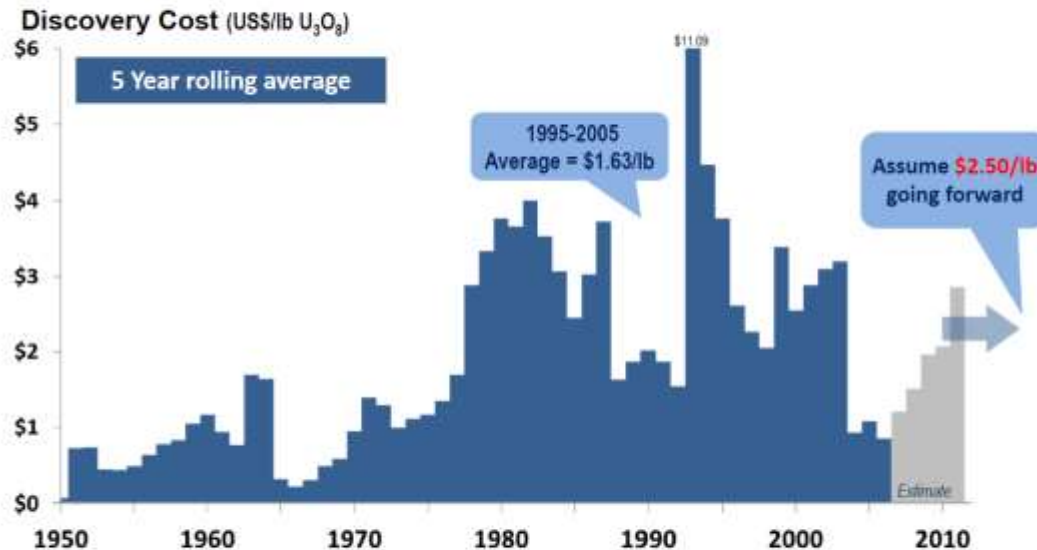


Source: MinEx Consulting, Sept 2010

**Economic mineral deposits will be in high demand**

# Discovery Performance

Average discovery costs for **uranium** are rising  
Unit discovery costs for uranium in the Western World: 1950-2011

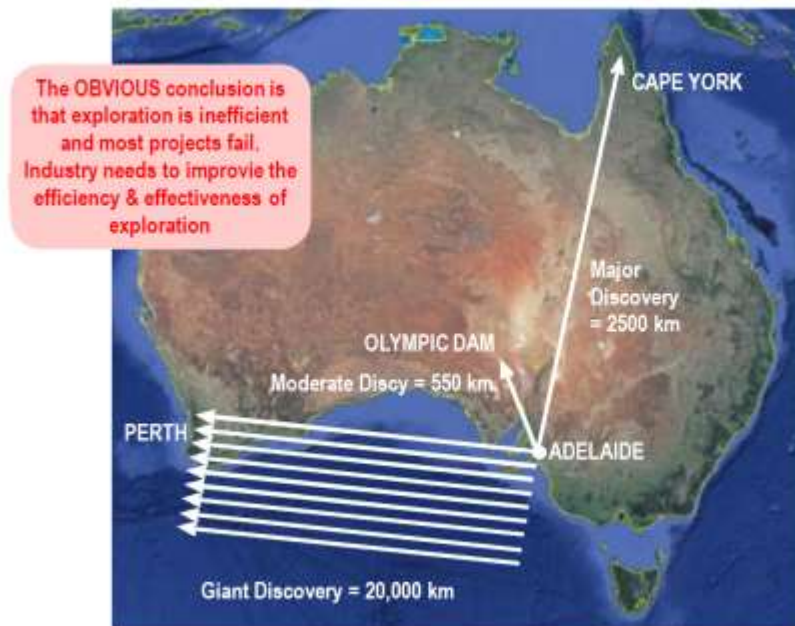


Source: MinEx Consulting © June 2012

**Major uranium exploration regions are high cost**

# Discovery Performance

The amount of drilling required is enormous !!



**Drilling a major orebody costs \$10's of millions**

# Summary

- We are spending more and finding less
- What we are finding is not good enough
- In the long term, we have to find many more large economic mineral deposits

# PART “B”

- **Exploration Drivers**

# Overview

Prospecting is an attractive business in a challenging global mineral exploration industry.

- Exploration Spending
- Exploration Discoveries
- **Exploration Drivers**



# What Drives Exploration?

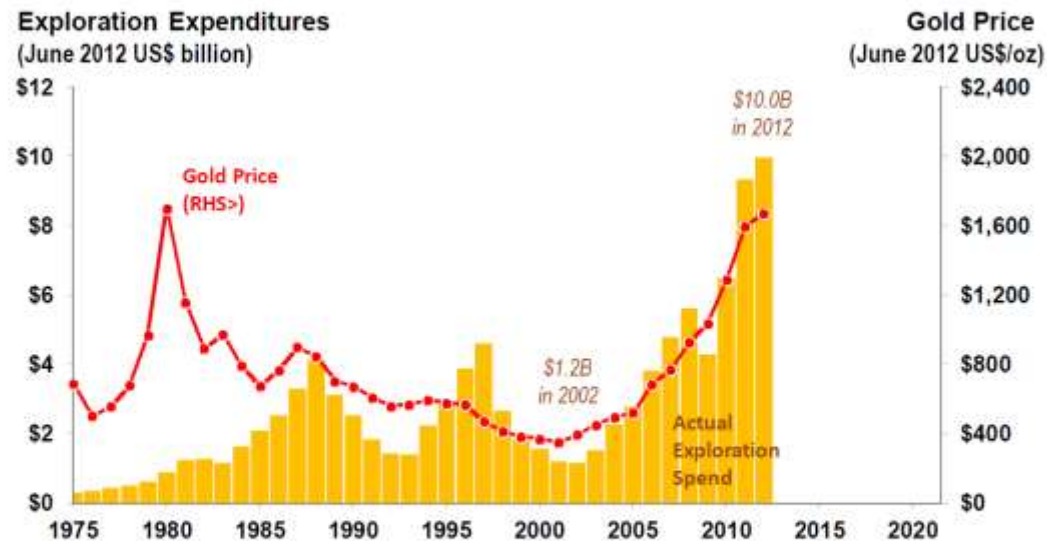
1. Current Commodity Prices
2. Future Supply and Demand
3. Capital Flow
4. Government Policies
5. New Discoveries

# 1. Commodity Prices

- Determines mining company revenues
- Profits support rapid reinvestment
- Influences investor demand

# 1. Commodity Prices

Exploration spend is closely linked to commodity prices  
World gold exploration expenditures versus gold price

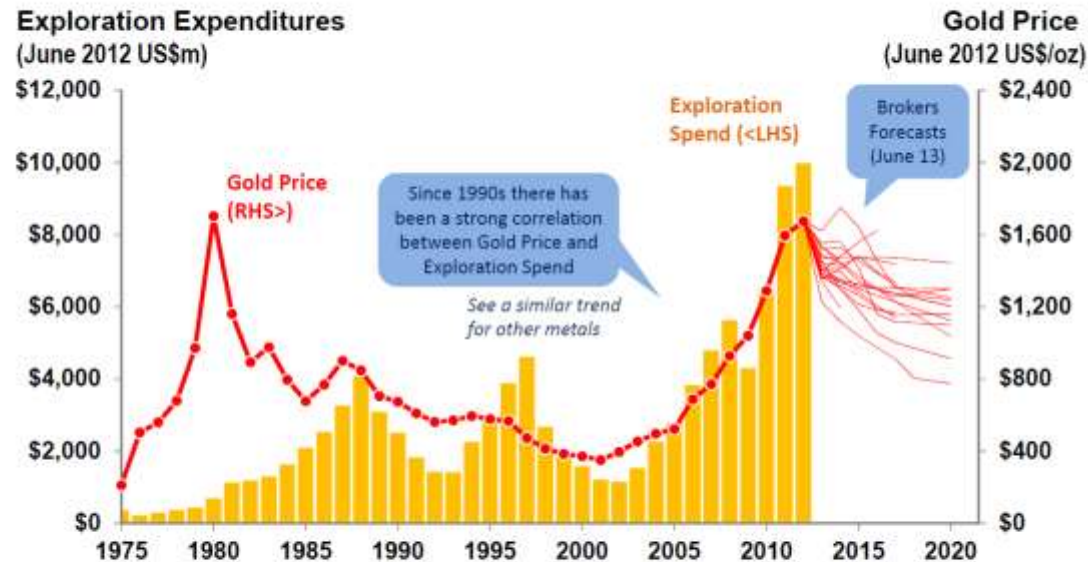


Source: MinEx Consulting © October 2013, LME

**As gold goes, so goes exploration ...**

# 1. Commodity Prices

Exploration spend is closely linked to commodity prices  
World gold exploration expenditures versus gold price



Source: MinEx Consulting © July 2013  
Forecasts from Consensus Economics © June 2013

...but predicting the future is difficult

## 2. Future Supply & Demand

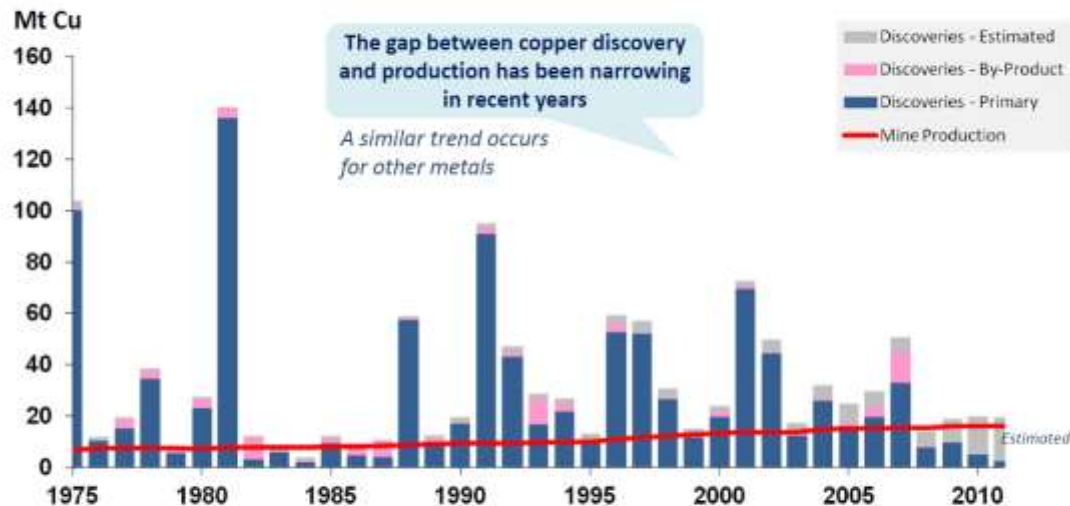
- Forecasting extremely difficult
- The key is to make regular revisions
- Expectations of future supply and demand can and does have a major effect on investment demand in mineral exploration

## 2. Future Supply & Demand

- Potential supply pipeline is well known
- Changes are difficult to predict
  - Business Environment and Prices
  - Policies and Politics
  - Competitive changes
  - Social factors
  - Disasters

# Discovery Performance

Amount of copper found and mined in the World  
Primary copper deposits >0.1 Mt Cu found : 1950-2011

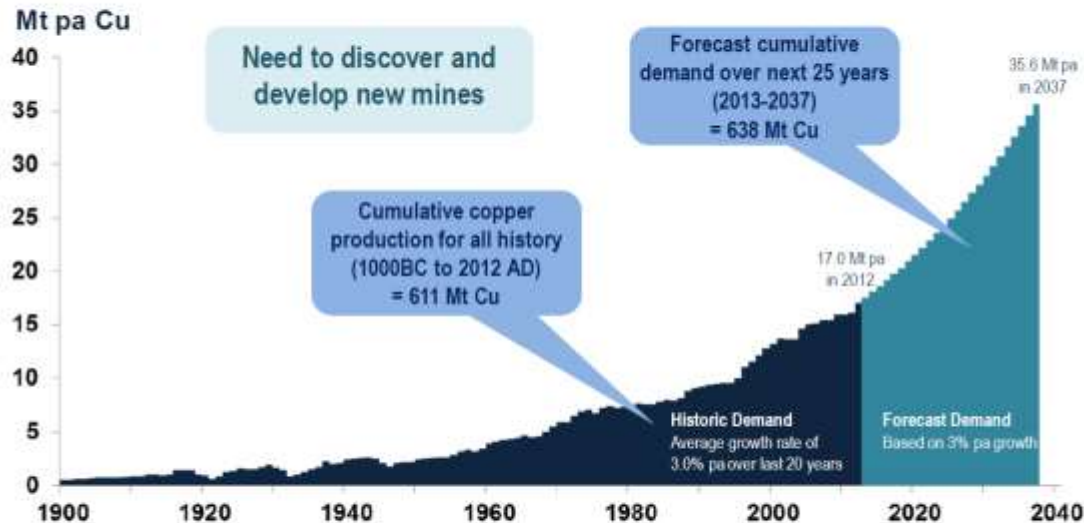


Source: MinEx Consulting © August 2012

Copper discovery rate is slowing...

# Discovery Performance

World's metal production doubles every 20-25 years  
Primary copper production: 1900-2040



Source: Historical data from USGS Jan 2013

**Yet demand for copper is growing**



## 2. Future Supply & Demand

- Changes in demand can be more rapid than change in supply
- Future demand can only be projected from current trends, which keeps changing


*“The future ain't what it used to be.”*

- Yogi Berra

## 3. Capital Flow

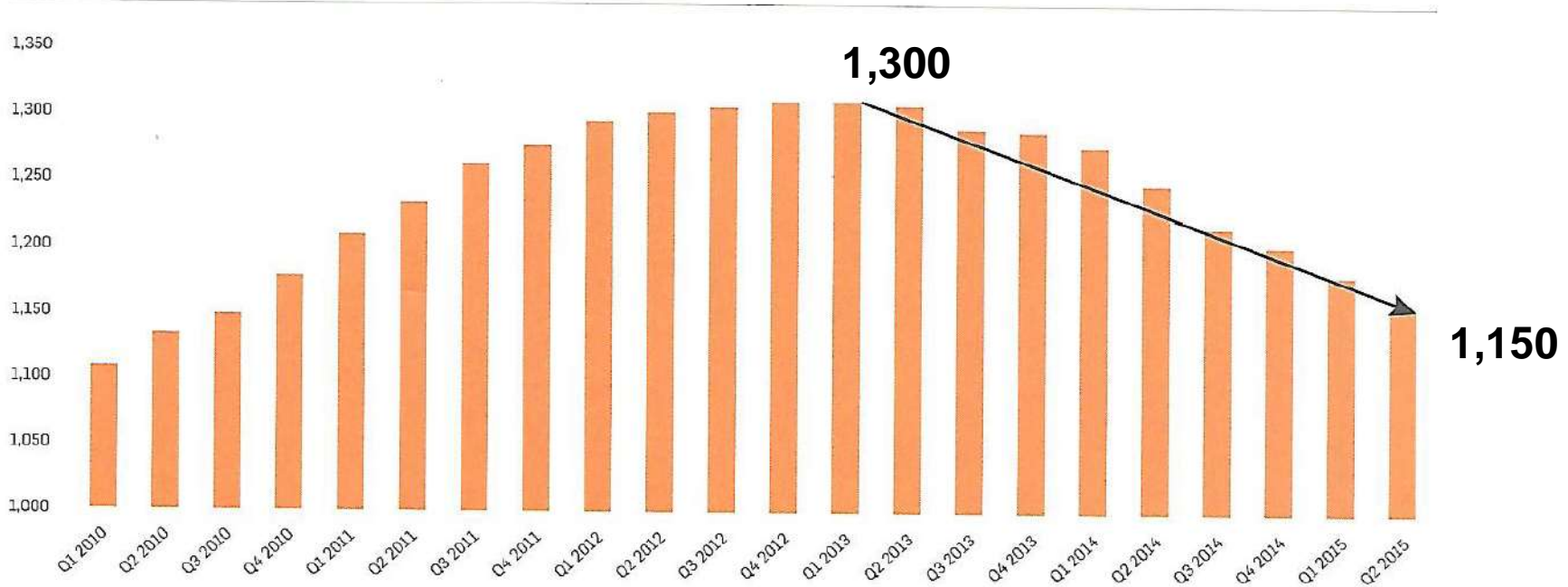
- Availability of Exploration Capital
- Speculative Investor Demand
- Mergers and Acquisitions

## 3. Capital Flow

- Juniors cannot raise the money
- Only \$410 million raised in 2015  
 60% from 2014
- Currently account for only 32% of gold exploration spending

# 3. Capital Flow

**Figure 1: TSXV Number of Mining Companies**

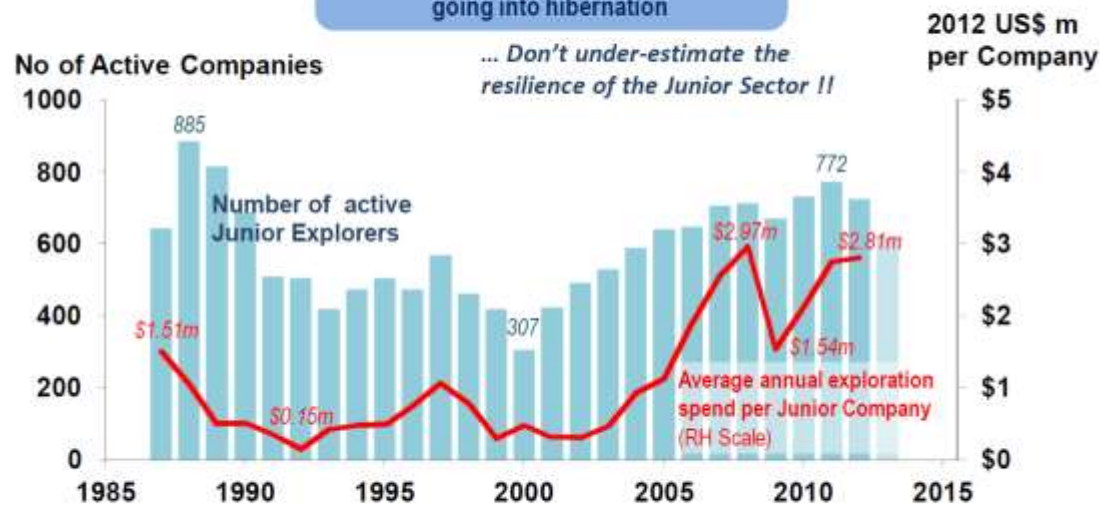


Source: TMX Group

# 3. Capital Flow

In the last major downturn the number of active explorers went down by 2/3rds

Canadian Junior Companies respond to downturns by cutting back on spend and going into hibernation



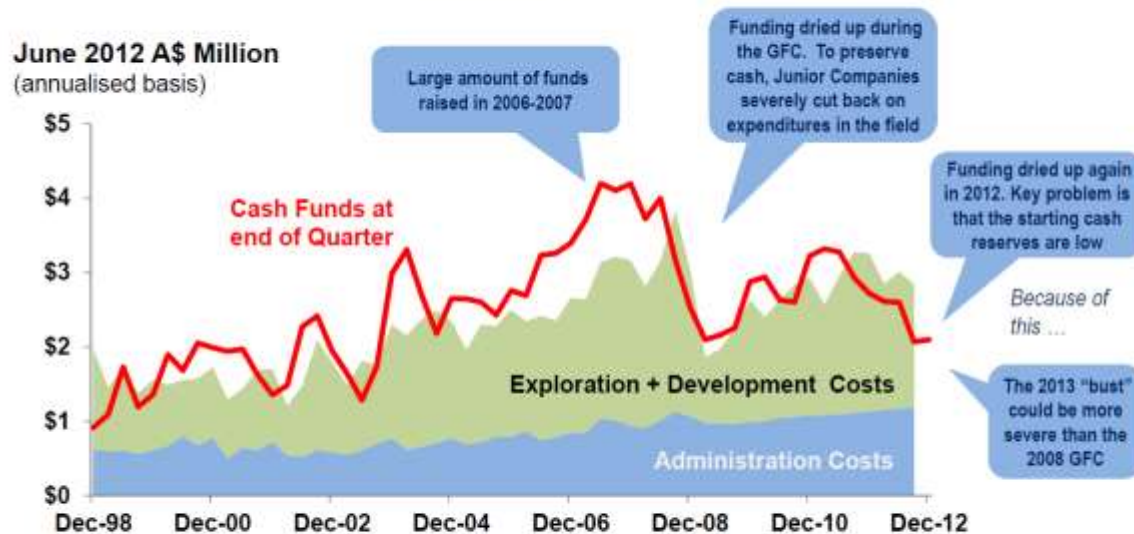
Note: Just because a Company has become inactive doesn't imply that it has permanently left the market

Source: NRCan

**Survive by decreasing or even stopping exploration**

# 3. Capital Flow

The Junior sector is facing severe funding problems. This will most felt in-terms of reduced “money into the ground”  
Cash and Expenditures for the MEDIAN Australian Junior company: 1998-2012r



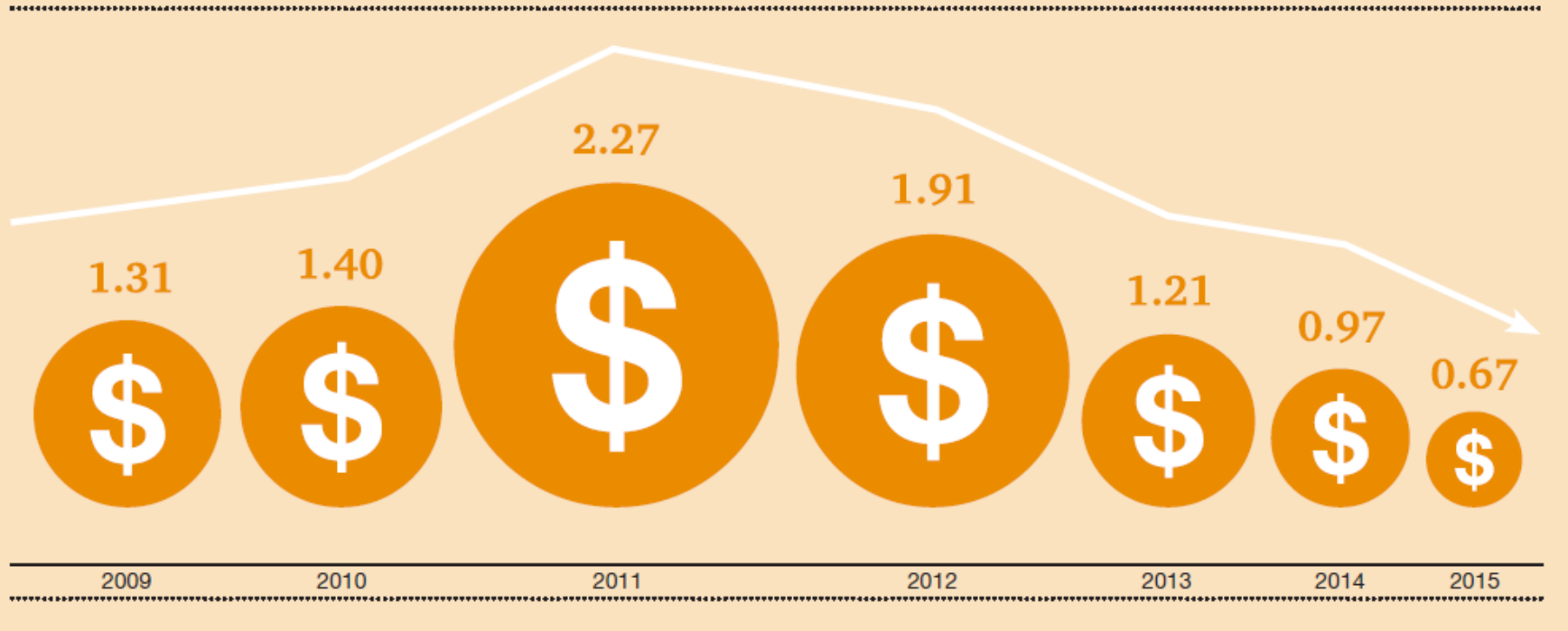
Note: Expenditure data is reported on a Quarterly basis, but has been annualised to be comparable with Cash Reserves

Source: MinEx Consulting © February 2013 based on Quarterly Reports to the ASX

**It's the same story in Australia**

# 3. Capital Flow

Figure 7.0 Cash, Top 100 (\$ billions CAD)



**Total cash holdings of the Top 100 has decreased**



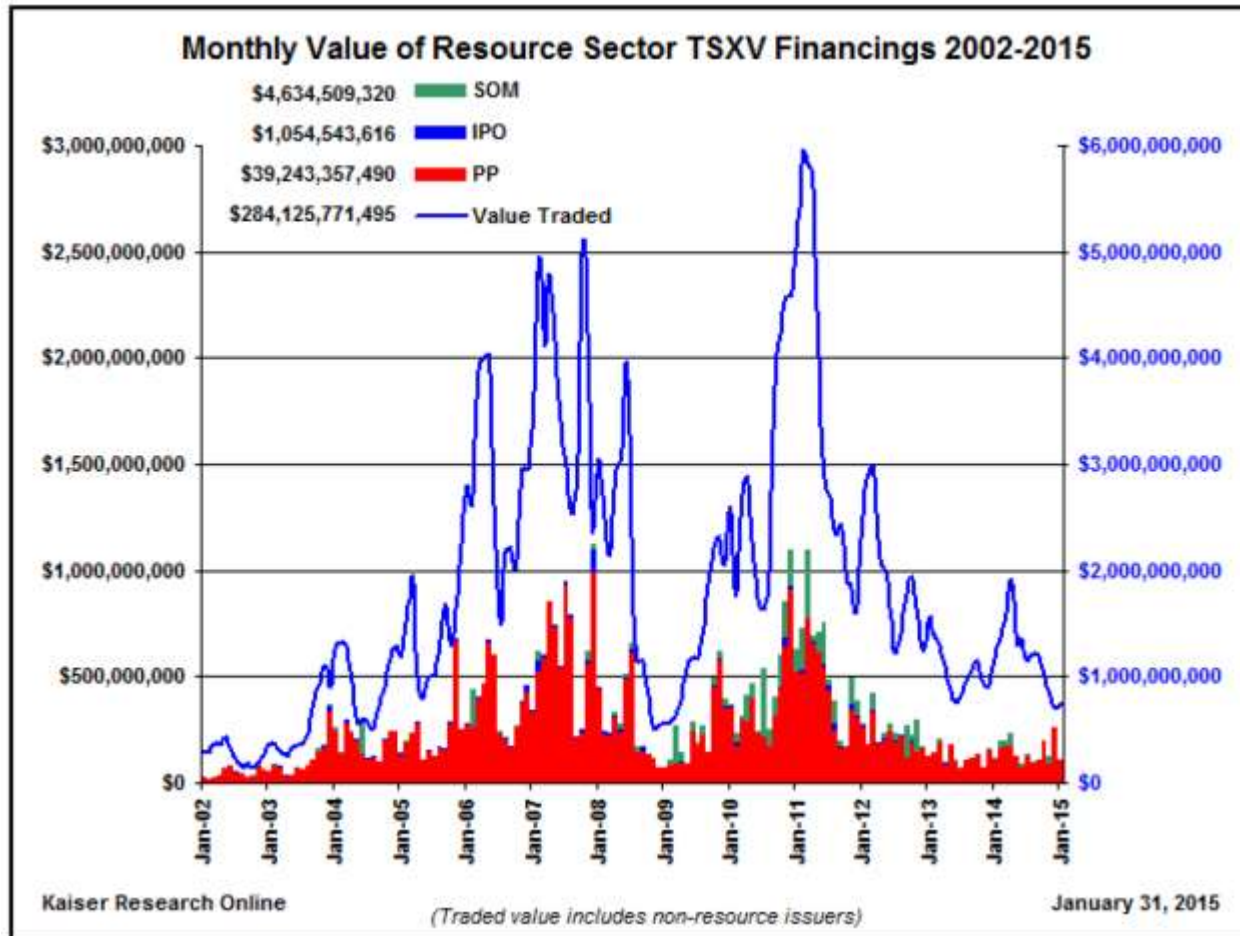
# 3. Capital Flow



Source: PWC

**Average cash holdings have dropped sharply**

# 3. Capital Flow



## 3. Capital Flow

- Juniors will spring to life when money becomes available
- Speculative investor demand will improve when money begins to move
- A major discovery or a takeover will spark new investment in exploration

## 3. Capital Flow

- Majors are cutting back
- Revenues have declined sharply recently
- Percentage to exploration has decreased



3.5% in 2012

2.3% in 2014

## 3. Capital Flow

John Gravelle of PwC told MINING.com in June:

"You need to get investors excited about the mining industry overall. The money will flow into low risk companies first. There's always going to be the investor that wants to get in early, but the junior market would only really start to benefit once majors have instilled investor confidence."

*“Capital will flow where it is wanted and stay where it is well treated.”*

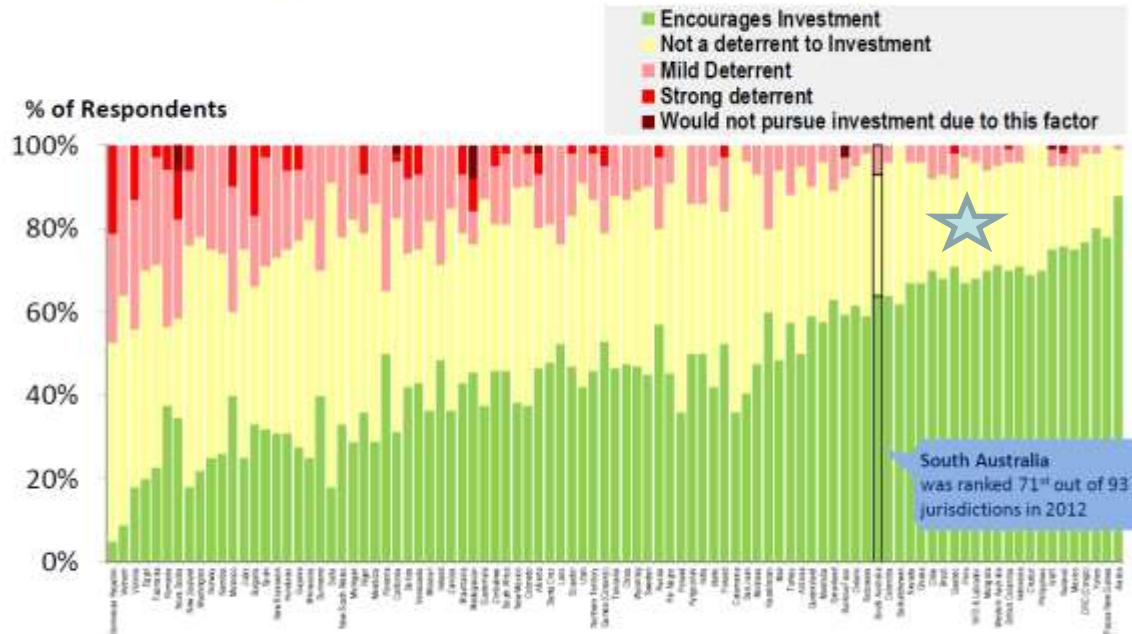
-Walter Wriston, CEO of Citibank 1967-1984

## 4. Government Policies

- Recent mining boom noticed
- Mineral exploration is a global business
- Government policies are important

# 4. Government Policies

Mineral Potential in 2012  
(ie the "attractiveness of the rocks")



Note: Assumes full access to land, and best practice by industry.

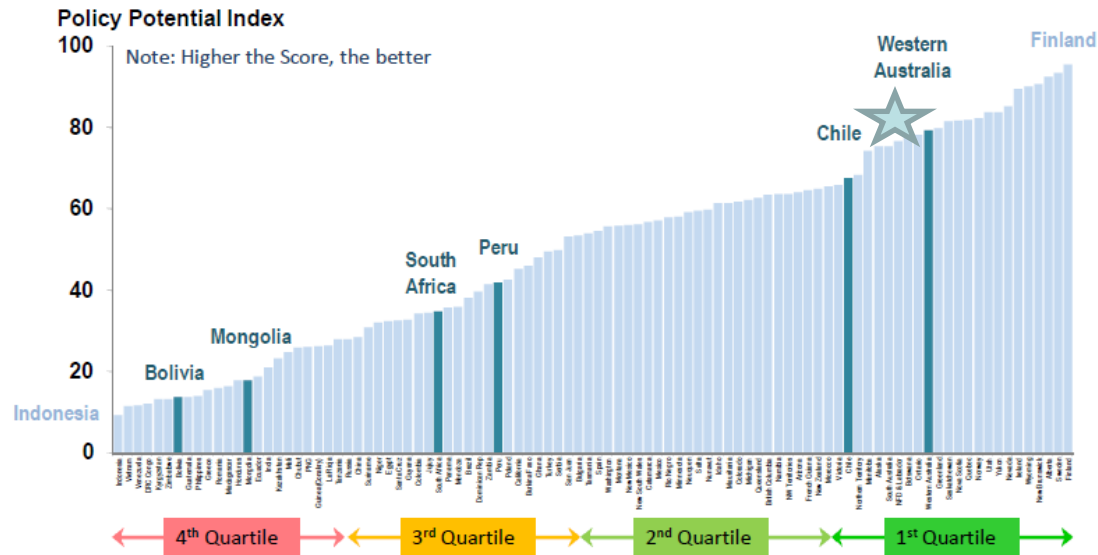
Source: Fraser Institute March 2012

NL is perceived as being prospective



# 4. Government Policies

There is a wide spectrum of business risk



Source: Fraser Institute March 2013

NL is in lower part of 1<sup>st</sup> Quartile

# 4. Government Policies

## Recent actions by Governments

COUNTRIES THAT HAVE **DECREASED** / **INCREASED** THEIR TAXES & ROYALTY RATES  
OR INTRODUCED **NATIONALISM-TYPE** RULES SINCE 2011



**Government policy influences exploration spending**

# Summary

- Prospective geology is always first priority
- Perceptions of mineral potential change
- Policies tend to shift at highs and lows

## 5. New Discoveries

### Trends in Successful Exploration Methods

- The challenge is to find new prospects
- Main methods have changed over time
- Quality discoveries will have “Scarcity Value”

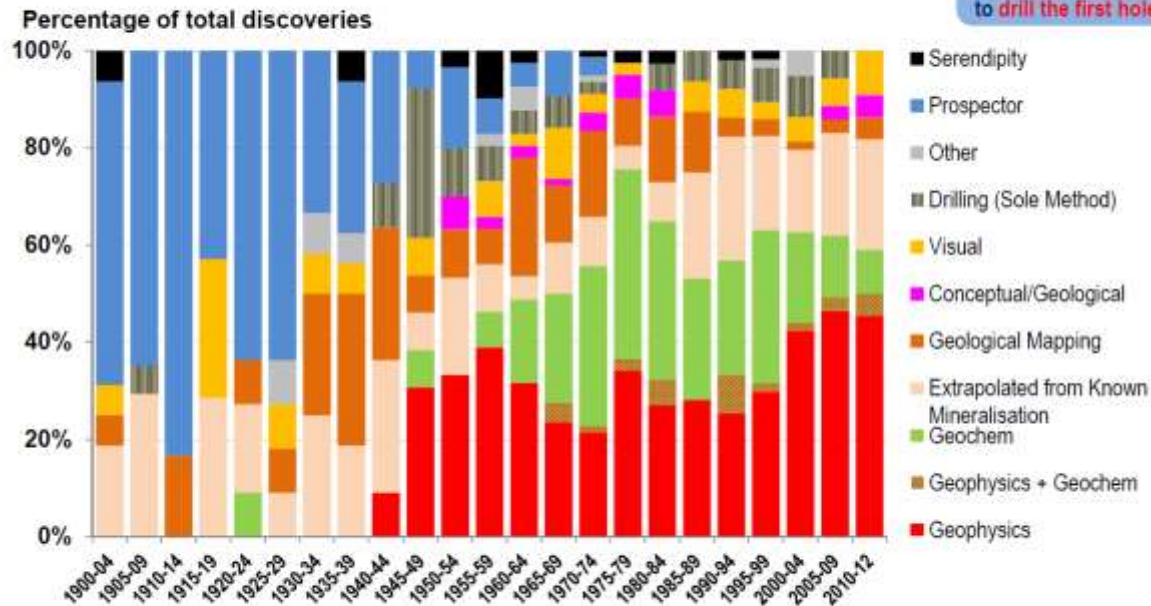
*“What has been will be again,  
what has been done will be done again;  
there is nothing new under the sun.”*

- Ecclesiastes 1:9 (NIV)

# 5. New Discoveries

Primary search method used at the **prospect-scale**  
**BASE METAL** discoveries (>0.1 Mt Cu-eq) in the World: 1900-2012

ie What method was used to decide where to **drill the first hole**



Note: Analysis based on detailed analysis of 757 Cu+Ni+Zn+Pb projects (out of 1344 known discoveries)

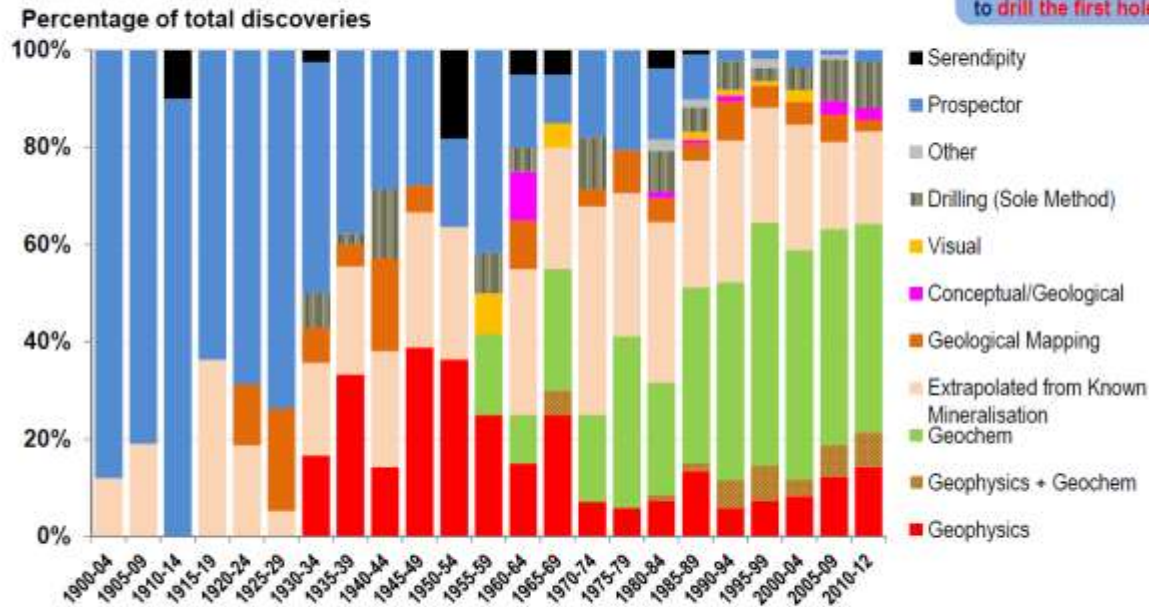
Source: MinEx Consulting © July 2013

**Base metal prospecting success is very rare...**

# 5. New Discoveries

Primary search method used at the **prospect-scale**  
GOLD discoveries (>0.1 Moz) in the World: 1900-2012

ie What method was used to decide where to drill the first hole



Note: Analysis based on detailed analysis of 993 gold projects (out of 1779 known discoveries)

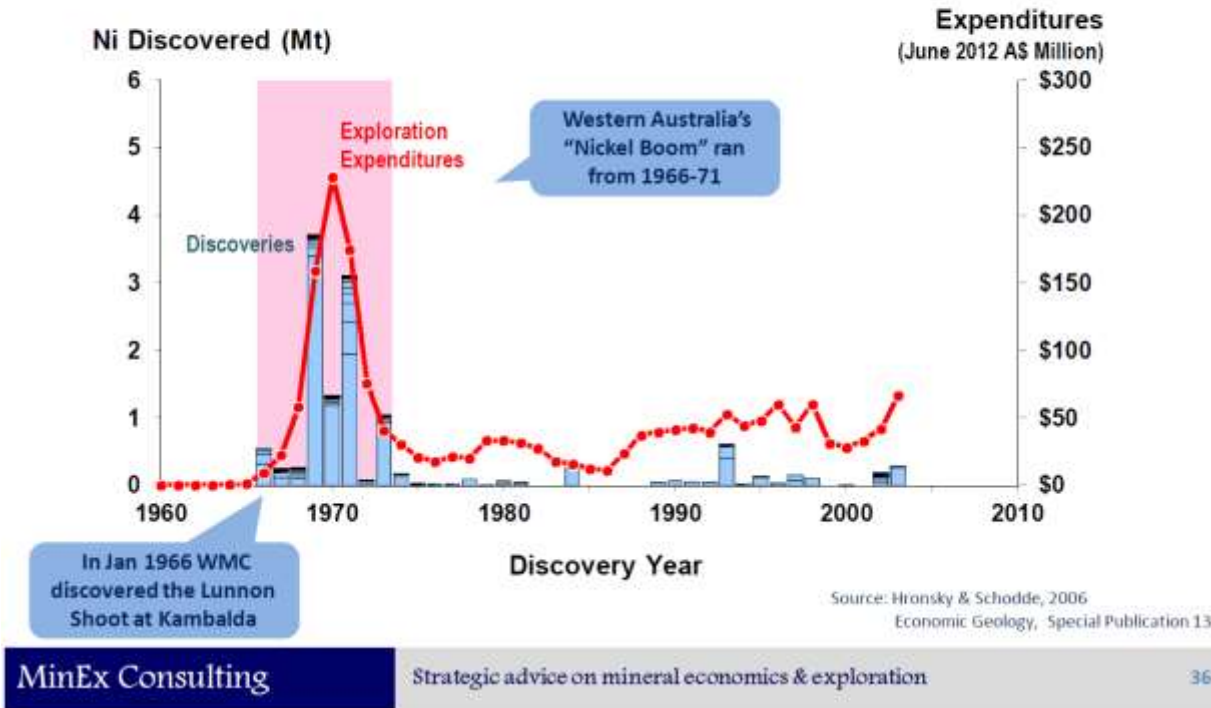
Source: MinEx Consulting © July 2013

...but remains slightly more successful for gold

# 5. New Discoveries

## Key Drivers for Exploration: Discovery

NiS discoveries and exploration expenditures in Western Australia: 1960-2004



**Ekati in NWT and Voisey's Bay in NL had a similar effect**



## 5. New Discoveries

*“You need a champion”*

-Terry Ortslan, November, 1994

# Summary

- Mining is in a cyclical downturn
- Exploration funds are scarce
- Exploration getting more difficult and costly

# The Prospector

- What is the opportunity for the modern prospector?
- How can a prospector compete with junior exploration and mining companies?
- If we explore deeper, how does prospecting at surface matter?

*“You can't connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future.”*

- Steve Jobs

# The Prospector

## New Discoveries

- Valuation set by Supply and Demand
- Supply of good discoveries is going down
- Future demand will be high...

*“A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty.”*

- Winston Churchill

- Good discoveries are rare
- Will be in high demand in the next boom
- They will be highly valued
- Timing is everything

# The Prospector

The competitive advantages come from:

- Creative thinking
- Building contacts and knowledge
- Spending time in the field making keen observations



*“A creative man is motivated by the desire to achieve, not by the desire to beat others.”*

- Ayn Rand

# The Prospector

- The prospector is an entrepreneur bucking all the trends and trying to beat the odds
- Apply business principles to the dream
  - Know your customers
  - Develop repeat customers
  - Keep costs low
  - Stay focused and efficient

# The Prospector

*“To be a successful mine finder, one must have determination, knowledge, tenacity, a rugged constitution to withstand the rigors of outdoor life, and enjoy overcoming obstacles of every description. Also, a little dash of imagination and enthusiasm is helpful.”*

-Thayer Lindsley

# The Prospector

- Hammer and Hand Lens
- Keen Mind
- Work Ethic
- Luck

# The Prospector



**Yep, luck is good...**

# The Prospector

The trend is that most new discoveries are made at ever greater depths

How is the prospector supposed to be successful?

- Prospecting new areas
- Observing new things in explored areas

# The Prospector

*"It is always surprising to me that so many new discoveries, even those made in recent years, have a recognizable, though often subtle, surface expression. The reality is that we are still a long way from the search being reduced to that for blind orebodies using remote sensing, even though explorationists have been griping about this since the 1970s."*

- David Klingner, Rio Tinto Exploration, 2002

# Alturas, Chile





# Alturas, Chile



# The Prospector

- Develop a business plan on probabilities
- Focus. Avoid “Gambler’s Ruin”
- Develop 1,2 or 3 of your really good ideas

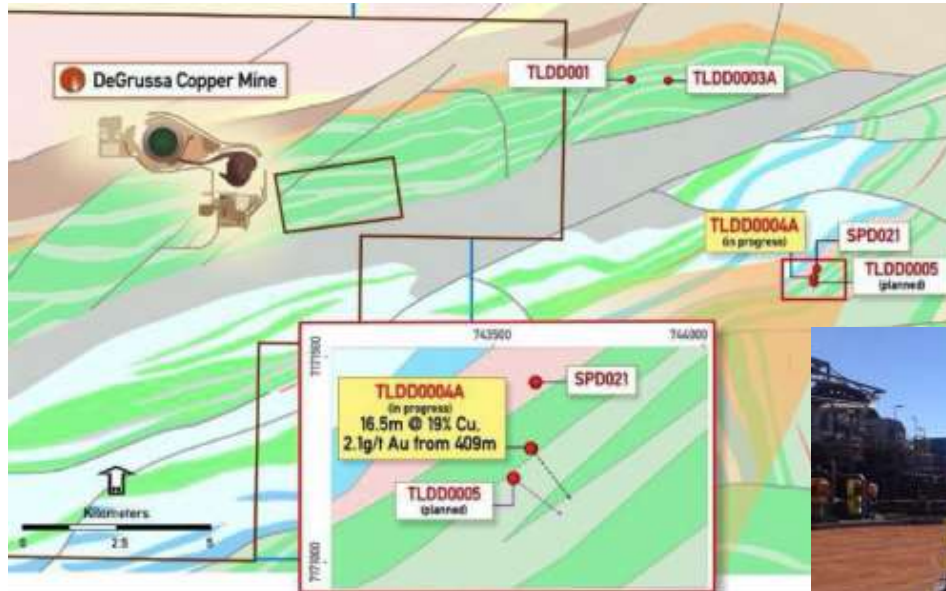
# The Prospector

- Focus on “*bread and butter*” commodities mined by the majors
- Focus on “*First Mover Advantage*”
- Focus on *return of capital* and then *return on capital*

# Success Stories



- Springfield



# The Prospector

- Adopt new technology where possible
- Be sure time and money is on your side
- Your good name is worth more than gold

# The Prospector

- Decrease in greenfields exploration
- “Safe” Jurisdictions preferred
- Should be good for places like NL

# The Prospector

**“I skate to where  
the puck is going  
to be, not where  
it has been.”**

**99**

Wayne Gretzky

# The Prospector

- Need new ideas
- Need new discoveries
- In the future, newly discovered greenfields prospects with above average grade and size located in a safe, mining-friendly jurisdiction will be extremely rare and therefore be ***very highly valued***



*“Never, ever, ever give up.”*

- Winston Churchill