

# Future of Minerals Exploration

Helping the mining industry go deeper.



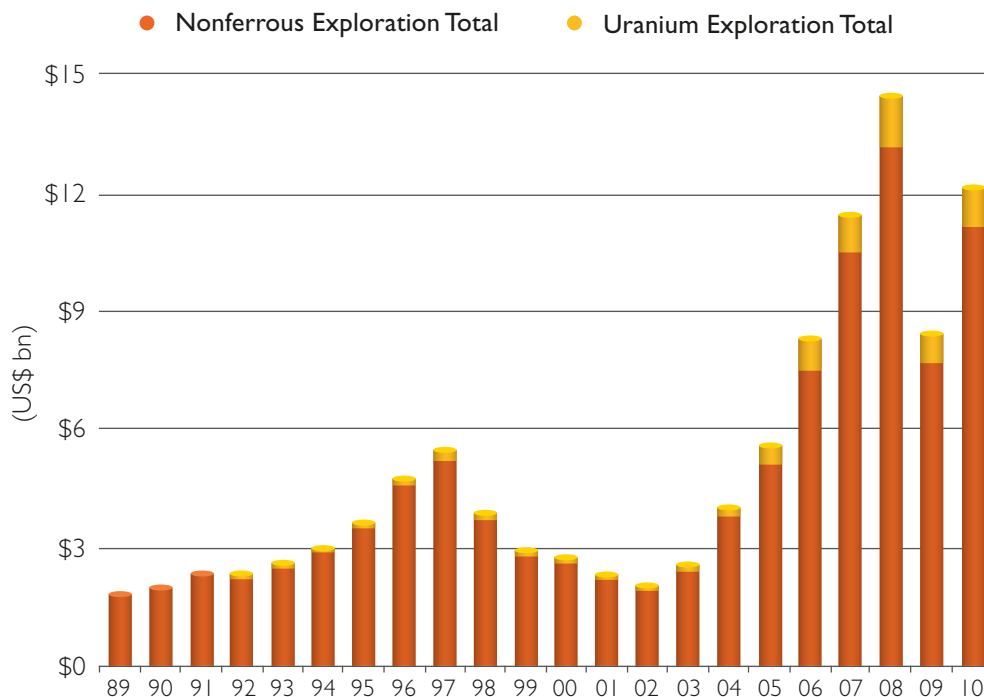
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## Future of Minerals Exploration

During the 1950's to 1980's the minerals exploration industry was very successful resulting in an impressive number of discoveries. However, several studies during the past 30 years indicate that for every 500–1000 mineral showings tested, one mineral deposit with sufficient value to mine is discovered. Consequently, while there have been significant discoveries since 1990, the discovery rate (measured in dollar value per year) has fallen.



Data source: MEG's Corporate Exploration Strategies.

### The key reasons for a gradual increase in exploration expenditures are:

1. Ore bodies close to the surface have mostly been localised. New deposits need to be located at greater depths / increased coverage.
2. Deposits are increasingly found in areas that are less accessible and more distant from facilities and markets.

3. Deposits are found in areas that are more inhospitable and exposed to more extreme conditions (altitudes, weather, seasonality etc.)
4. Easily accessible ore bodies of high grade have already been found. Ore bodies of lower grade are progressively being considered but (generally) the discovery / delineation of these bodies is increasingly complicated due to geoscience complexity.

In summary, most of the "easy" discoveries have been made and exploration is getting harder. Mineralized systems are extremely complex and difficult to identify, consequently it is not enough anymore to simply acquire information. The challenge now is to find new ways to analyze, integrate and model the collected/available information. The minerals exploration industry must now "go deeper" to discover resources both in physical and information terms.

## Minerals Exploration Industry Response to challenges – What we are seeing

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The increasing requirement to “go deeper” is comparable to issues faced by the oil and gas industry around 10-15 years ago. To counter similar challenges, energy companies made large investments in new technologies and were forced to re-think their approach to information management and tools. Similarly, for minerals exploration, advanced computer interpretations and innovative 3D / 4D modeling are now required.

While mineral exploration has embraced advances in modeling and analytical tools, maturity in the management of information and knowledge at an enterprise level is only now being recognized as critical to success within the minerals exploration industry. Further, it is increasingly being acknowledged that much of the information from previous years (decades) of exploration is of little value due to a failure of adequate information governance and management.

## Common Problems

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Over time, the way organizations have stored and described their data has changed meaning and it cannot be re-used.

- Geoscientists increasingly require access to large amounts of processing power and data rich environments in more remote locations.
- Many organizations still manage exploration as a distributed function (or at a personal/desktop level). Data is not shared, collaboration is limited.
- Lack of data management processes means that organizations continue to “lose” information leading to poor decision making, high levels of “search” activity and/or recapture of information (purchase, fly or drill again, etc.)
- Information standards are not centrally (or formally) controlled or managed

Significant investment in previous exploration activity has essentially been lost or wasted. In addition to the identified causes of cost increases, the impact of the GFC has meant that finance available for exploration has contracted and the number of juniors exploring is reducing. As a consequence of the rising costs of exploration and associated risks, many of the larger mining houses and exploration organizations are becoming more global and increasingly more cautious regarding exploration activity. Organizations are now demanding more and “better” use of available information including value from existing data and the way market information is accessed and utilized.

This has in turn given rise to issues of control and management of complexity. In response, many organizations have recognized the increasing need to centralize and more formally manage decisions around standards and tools.



## Future Opportunities and Complexities

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Dramatic advances in materials, technologies, communications and processing power over the last 10 – 15 years have added both significant complexity and opportunity to exploration:-

- The “internet of things” will continue to grow; more devices will generate relevant and useful data in real time. Data analytics tools will also improve to allow real-time decisions. Loosely coupled services and applications will connect and respond to each other. For example:-
  - Improvements in mobile devices “in the field” – it is now possible to combine data collected remotely with broader information sources in real time.
  - Improvements in drilling technologies will allow both deeper holes with same drills (carbon rods), but also core analysis “at the tip” and in real time.
- “Systems Thinking” or “Big Data” approach to management of information:
  - Managing, linking and “combining” disparate technical data sources and types to uncover previously hidden relationships and patterns between data
  - Using interrelated data to drive “real-time” decision making
  - Leveraging advancements in querying technologies to discover new opportunities and patterns
  - Integrating public/internet data sources and aggregators to in-house technical/geoscience data
- Improvements in telecommunications and cloud computing mean that services can now be offered consistently to “anywhere” in the world. Virtualization means that processing power is available when needed and “on demand”.
- Expectations of geoscientists and technical staff have risen. As more of IT is commoditized, staff assume full access to available services, tools and data including web based technologies and “unlimited” processing, storage and communications resources.

## The IT Response

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The exploration demand to “go deeper” means that IT must be able to ensure more processing power, with reliable access to more trustworthy information when and where it is needed. While similar objectives have always existed, a new level of maturity and approach along with the ability to exploit new technologies means that this is now a reality. The following steps and possible solutions should be considered:-

### TECHNOLOGY

- Manage centrally but deploy globally. Cloud computing offers significant opportunity as a platform for ubiquitous and continuous access to data storage and on demand processing power. CIOs should consider consolidation of regional databases into a single “in cloud” view of a globally replicated and managed data “instance”.
- High demand data modeling tools should be migrated to “On demand” processing platforms.
- A service integration layer to “connect” disparate data and services should be considered.
- A GIS and/or sophisticated search tool should be implemented across data stores. Data must be easy to find and retrieve.
- “Librarian” tools (and processes) should be implemented to control versioning and access rights (security)

### STANDARDS & PROCESSES

- Establish standard data definitions for agreed key data types. Business ownership and decision rights must be clearly articulated and agreed to. Everyone must describe data in a common and agreed way. Standards must be managed and be under formal change control processes.
- Establish standard data sources for agreed data types and standard processes for adding new data. This includes data movement standards with 3rd parties for analysis, laboratories etc. Alternatively, establish data management services that can “map” data to standards.
- Establish standard collection and import/export processes in conjunction with tools.
- Establish data management and custodian services to ensure completeness and consistency of data. Health checks should be routinely undertaken with data given a “hygiene” rating to measure quality.

## Conclusion

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All exploration relies on Earth sciences (geology, geophysics etc.). Consequently, all exploration and ongoing mine planning relies on access to better and more reliable information. To meet increasing pressures, exploration IT Directors and CIOs must now face the difficult tasks of adopting and implementing strong data management disciplines into their organizations. Additionally, they are expected to identify ways to exploit new technologies and tools to significantly improve the chances of discovery.

## About the Author

David Lee, former CIO Minerals Exploration at BHP Billiton has significant international experience in minerals exploration, the development and implementation of IT/IM strategies to create business value and the management of organizational growth and change. David has 25 years experience in technology and information management, 20 years of this in strategy development and change leadership.

## About Wipro's Energy, Natural resources and Utilities (ENU) SBU:

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Wipro's Energy, Natural resource and Utilities (ENU) Strategic Business Unit (SBU) has over the last decade established itself as a trusted partner to clients across the globe to address their business challenges using its deep industry domain competency and technology expertise. It has over 6600 dedicated consultants serving businesses in the oil & gas, metals, mining, agriculture products, water, natural gas and electricity industries. Having a strong relationship with over 40 customers spread across Americas, Europe, India, Middle East, Southeast Asia, Australia and New Zealand, the ENU SBU has been continuously investing in building competencies to help them do business better. Recently, Wipro has acquired SAIC's Global Oil and Gas business unit, reinforcing its focus on this industry.

## About Wipro Technologies

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