

## VIEWS II

## Exploration—People and Discovery

(These columns are the opinion of the authors and do not necessarily reflect the view of the SEG)

## INTRODUCTION

At the NewGenGold conference held in Perth in late 2009, presenters consistently expressed two major factors critical to the discovery of new ore deposits, “drill—often repeated multiple times, and strong management support.” Many agree with these sentiments, but what does it take to get these pieces in place at the right time and place? We argue that the key ingredient is people, but more importantly, the right mix of people with ability, education, experience, and determination, involved in all aspects of exploration from the outcrop to the boardroom.

It is a well-known fact that new discoveries are normally a team effort and more often than not, reflect a series of events leading to that key drill hole which excites the exploration team to shout, “We think we’ve found a mine!” In many cases, it is the exploration team that focuses on the rocks, has a full range of field skills, collects critical samples, differentiates the value of selected datasets and techniques, and provides novel interpretations which produces discoveries. Teams with these abilities are not formed instantly. They require enlightened support from management and directors over an extended period of time, and a critical blend of experience, organization, and energy. Whereas technology can define targets and manage data, simplistic reliance on new technology, particularly when office-based, and without vital input from people, rarely produces results.

In this column, we discuss the role of people and the issues that the industry faces. For convenience we divide the exploration career and process into three groups: students and new employees – *the energized learners*; mid-career workers – *the doers*; and late-career veterans and retirees – *the inspirers*.

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*The energized learners*

The lifeblood of the industry comes from young, enthusiastic, and educated employees. The problem is that the industry in general does a poor job of attracting these people and typically an even worse job of training them. During the last few years of booming prices, there was much discussion on the shortage of skills in exploration, and many in the industry argued that a greater effort was required to mitigate the effect of the pending loss of people and knowledge related to the retirement of the baby-boomer generation. While there was agreement on what was needed, the reality was often different. People were hired, but owing to shortages and program pressures, new hires were instantly promoted to positions of responsibility with little regard for preparation or training.

When the precipitous downturn struck in late 2008, companies fell over themselves to cut discretionary programs such as exploration and, hence, conserve cash. While this was a matter of necessity for some, many companies followed suit regardless of whether there were debt or cash flow problems. As usual, the layoffs followed and the first to go were those recent hires who were managing the programs that were chopped and who had never had the chance or the mentoring to develop



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transferable skills. Of course, this is not a new phenomenon—the industry has always cut exploration staff in downturns. The problem this time, however, was that the extraordinary boom years provided new employment with highly elevated salaries, considerable job flexibility and a broad dose of optimism. The downturn and cuts were all the more difficult, given the heady times that had passed. So if we are to fill the people gap and maintain the discovery rate that society demands, we have to become better at training and keeping our young graduates through the cycles, regardless of their extremes and volatility.

Earth science education in universities is continually changing. In many developed countries, programs have become broader and more complex, often at the expense of traditional geology, especially field-based courses. Although we are quick to decry the changes and loss of the skills that we require, the industry in general has not been particularly helpful. Compared to petroleum, support from the mining industry has been scattered and fickle. Only the few universities that

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**John F.H. Thompson**

Born in England, John Thompson obtained his BA from Oxford University and moved to Canada where he completed his M.Sc. and Ph.D. degrees at the University of Toronto. He joined the BP Minerals group (subsequently Rio Tinto) in 1982, based initially in Australia followed by the UK and US, and was involved in global exploration. In 1991, John became director of the Mineral Deposit Research Unit (MDRU) at the University of British Columbia, managing research for mining and exploration companies. In 1998, he joined Teck Corporation as Chief Geoscientist, and in late 2005 was appointed Vice President Technology and Development for Teck Resources Limited. John is active in several societies and associations, and is currently Past-President of SEG, Chair of Geoscience BC, and Vice President of the Canada Mining Innovation Council.

**Douglas J. Kirwin**

Doug Kirwin obtained his B.Sc. and M.Sc. degrees in Australia and has been involved in mineral exploration for 38 years. Initially this was with Anglo American and AMAX in various countries, including Papua New Guinea, Indonesia, Fiji, Australia, and Mexico. In mid career he formed a small consulting group which for 10 years was active in the Asian region, with considerable time spent in South Korea, Vietnam, Japan, Thailand, and Indonesia. In 1996 he was involved in acquisitions for Indochina China Goldfields which subsequently became Ivanhoe Mines and in 2004 he was a co-recipient of the PDAC inaugural Thayer Lindsley Medal awarded for the most significant international mineral discovery in that year. In 2006 he was the SEG International Exchange Lecturer and is currently the SEG Vice President for regional affairs. As the executive vice president for exploration for Ivanhoe Mines and a director of Ivanhoe Australia, he remains very active in the field for mineral exploration.

## Views II (Continued)

have focused centers and programs receive consistent support through the cycles—and even these have struggled at times. The industry has been slow to engage universities on education themes and has not recognized the talent being produced by programs that do not fit the conventional view of exploration. Finally, while earth science programs in industrialized countries have shifted toward other areas, the resource-based developing economies are starting to invest in relevant education and research. The industry has an opportunity to invest in these programs now and hence seek talent from within the countries that are the focus of their programs.

Regardless of the efficacy of tertiary education, it is widely accepted that the new graduate has much to learn when first joining the profession. The development of advanced field skills, the understanding of ore systems, and the use of appropriate exploration approaches all have to be learned on the job, although summer and contract jobs with industry or government surveys provide excellent building blocks. Once employed on a permanent or semipermanent basis, newcomers need training, a responsibility of both the individual and the employer.

Unfortunately, technical and field training is becoming more difficult for younger professionals to access. Industry needs to work with educational institutions to address these issues if there is to be a pipeline of field geologists to be part of future discoveries. The industry must do more to provide summer employment programs for undergraduate students with built-in training or cooperative-style education. The cost involved is minimal relative to major exploration expenditures but the potential benefits are enormous. For students and entry employees, field trips, short courses, and conferences are excellent professional development opportunities which should be an integral part of all company training strategies. Several universities now offer courses that can build to graduate degrees through flexible programs and may also meet “in-training”

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prerequisites related to professional registration. There are many opportunities to develop the training that is needed, but both the industry in general and many individual companies lack a systematic approach that develops people in a way that maximizes retention.

The most important ingredient that is often missing is individual mentoring to build on the natural energy and enthusiasm present in many young graduates. Energy and enthusiasm are magic ingredients that can make a difference to any program, but they need to be guided and nurtured for maximum benefit and success. This, of course, requires the efforts of more senior employees.

### **The doers**

The people in this group typically possess 10 to 25 years of experience and are the backbone of most exploration programs. At one end of the spectrum this group includes technical people, often with graduate degrees, who have developed specialist knowledge in one or more ore systems, and show little desire to manage, although in some cases they may be required to do so. At the other end are the organizers—senior project geologists and program/country/regional managers in major companies, and the CEOs and senior exploration managers in junior companies.

There are two emerging problems in this group. At the young end there is a shortage of people because the industry hired relatively few people through the 1990s. At the older end, there are limited opportunities for advancement because the senior ranks of many companies are still full of baby boomers. Over the next 10 to 15 years, many baby boomers will retire (up to 50% of the people in some companies with much more than 50% of the corporate knowledge). Their retirement will eventually make space for promotions, but unfortunately this may be too late for those in the upper age bracket of the “doers” because as they approach retirement they may be leapfrogged by younger people. The lack of a career

prospects may push many of the senior “doers” to early retirement or an ongoing search for better opportunities.

Not only do the “doers” carry out the bulk of the technical and organizational aspects of exploration, they are also responsible for hiring new employees and introducing them to day-to-day exploration work. The limited numbers in the younger age range of the “doers” means that students and entry geologists, geochemists, and geophysicists have few role models close to their age, and even fewer of these are women. This adds to the challenges of inspiring new people to join what is an energetic, rewarding, and vital industry.

In addition to building programs, selecting and defining targets, and setting the drills in motion, the “doers” have the primary responsibility for building community relations during exploration. Creating appropriate social and environmental awareness within the exploration team, and delivering a consistent and respectful message to the communities are critical to success. As the first point of contact, exploration teams can be very effective in this role, utilizing a common sense and open approach. Many senior “doers,” project and exploration managers, have considerable experience with communities that can ensure an effective approach, but as the industry loses these people and as community issues become more complicated, the learning curve for the next generation will be steep and severe.

The limited numbers of people in the lower age bracket of the “doers,” combined with mobility and early retirement in the upper age bracket, will create openings for rapid promotion by young and capable people from the ranks of the “energized learners.” The best will learn quickly and will adjust to new responsibilities, technical challenges, and community issues. What will be missing, however, are the years of experience on the rocks and interpreting data, experience that cannot be manufactured easily without the dedicated help of senior mentors.

### **The inspirers**

The ability to focus on an effective exploration process typically requires the guidance of a highly experienced individual, one who over a period of several decades has seen a great

number of rocks, deposits, and mines, and has the ability to communicate this accumulated knowledge. The team leader or mentor figure needs to have a rapport with the exploration team to teach, and very importantly, to motivate inexperienced but enthusiastic graduates. Inspiring young geologists to go the extra mile to reach a remote area of interest (e.g., with reports of unusual geology, a strange color anomaly, anomalous values in a drainage, or a geophysical feature) and collect samples that might produce an interesting assay or have significant mineralogical and textural characteristics can lead to discovery. Personal interaction and a genuine interest in each team member are essential and this takes time and the patience that comes with experience.

Many of the seasoned “inspirers,” whether working as technical leaders (chief geologists or consultants) or program leaders (exploration managers, vice presidents, junior company CEOs) are approaching or are even beyond typical retirement age. Nobody can predict how long these people will stay and to what extent they will be willing to work with young people in the field, but we need to create a work and social environment that encourages them to stay as long as possible. The industry and groups that work with industry, such as the Society of Economic Geologists, must create ways to keep the older generation involved with the young “energized learners” in field trips, courses, and conferences. These are the best environments for an informal exchange of information, but the approach needs to be different from the conventional dawn to midnight (and beyond) trips accepted by the current “doers.” Combining rocks, insightful discussion, stories of discovery—and a few stories that go far beyond discovery—are the ingredients that will capture the hearts and minds of adventurous youth.

To a large extent, the senior ranks of companies and their boards are dominated by people in this upper age bracket mixed with a few highly talented younger people. As introduced at the start of this piece, management support is a critical ingredient in exploration and discovery, but it is by no means a given. In junior companies, there is an expectation that exploration will be supported and this is certainly true among the best and most successful juniors. In reality, however, the

leaders of junior companies are not all motivated equally nor do they all have an equivalent level of understanding and experience. In producing companies, intermediates and majors, successful operations are critical to cash flow and inevitably become the focus of management and boards. In some cases, the leaders of these companies (CEOs and chairmen) remember and understand the roots of the company and the process that exploration may have played in success—both through discovery and critical evaluation of the upside in acquisition opportunities. With this understanding and critical review comes support and budgets, and the ingredients are in place for discovery. For those without understanding and involved management, the task is harder. In these cases, senior management and boards will turn to the inspirational leaders whom they trust to justify and explain exploration. This is a huge and continuous responsibility. Many explorers are convincing talkers, which makes them effective communicators for junior and major companies alike. Using the drama and romance of exploration to full effect can work well to secure funding from management and investors alike, but success must follow quickly. In major companies, overplaying these cards can be a recipe for disaster and it is certainly not sustainable. Eventually, management will tire of the stories and will increasingly seek metrics and measures of exploration success that will dilute and distort the process of discovery. Successful exploration groups have people throughout their ranks who understand the probability of discovery, can realistically convey these complex concepts to their management, and hence gain the respect and continuous support necessary for discovery. As the older generation moves on in the coming years, filling the gap in the exploration and communication process will be one of the challenges.

### Conclusions

Exploration and discovery are people-driven and will remain so. While there will be a dramatic increase in the amount and type of data that we will acquire, and a similar increase in our ability to handle the data in complex 3-D databases, people will still be involved in the acquisition of data, particularly in the field, the interpretation of data, and most importantly, deci-

sions resulting from the interpretation. The industry needs new and enthusiastic employees, the knowledge, experience and determination of mid-career technical and project leaders, and the steady hand and inspiration of seasoned explorers. The combined strengths of these groups generate the targets for drilling and develop the understanding with senior management, boards, and investors that ensures support.

Unfortunately, the economic cycles and the resulting shortsighted nature of industry have made it difficult to attract, train, and retain the optimum mix of employees. This problem is about to be seriously affected by the retirement of the baby boomer generation and the attendant loss of knowledge and experience. The ability of individual companies to plan for and cope with this issue will define the successful explorers and discoverers.

This perspective is of course based largely on a traditional range of exploration companies based in Australia, Europe, North America, and southern Africa. Increasingly these companies will be joined in international exploration by companies from other countries, e.g., Brazil, Chile, China, Mexico, and Peru. The demographics in these companies will be different, as will be the educational and training opportunities that evolve in their host countries. In fact, at least some of the demographic problems discussed above, such as the limited numbers of people in the lower age range of the “doers” may be solved by an influx of people into industry from outside the traditional places mainly considered herein. What may be missing, however, for many of the new up-and-coming international explorers will be the years of experience found in seasoned veterans, the group that is about to leave just when the demand for their services is higher than ever.

Many claim that lifestyle choices are enormously important for current youth. One wonders what kind of lifestyle choices will be made by the potential retirees. Their collective decisions will have a profound influence on discovery. <sup>SEG</sup>

