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The Role of Crowdsourcing in Gold Exploration

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Abstract

This paper discusses three cases in which companies have called upon crowdsourcing as a means of generating targets for gold exploration. The first example, the Goldcorp Challenge of 2000-01, proved spectacularly successful in that targets proposed by participants have yielded over US$6 billion worth of gold. The other two examples, the Karelian Gold Rush (organised by Endomines AB) and the Integra Gold Rush (organised by Integra Gold Corp.) have concluded only recently. Their success in generating new gold resources will not be known until several years of target-testing have elapsed. Repetition of wealth generated by the Goldcorp Challenge could result in a fundamental shift in the way the gold mining industry approaches exploration, and perhaps in an increased discovery rate. Thus, the outcomes of the recent crowdsourcing initiatives by Integra Gold Corp and Endomines AB should be closely monitored by the industry.

BACKGROUND

Targeting

One of the most critical steps in mineral exploration is the definition of targets, defined here as relatively small areas that should be:

- Based on scrutiny and interpretation of all available geoscience and exploration data and knowledge, and thus have a high probability of containing an economic mineral resource.
- Suitable for follow-up via direct detection methods such as soil sampling or drilling

Traditionally the role of the "target generator" has fallen to talented and experienced individuals or small groups within companies undertaking exploration, or to external consultants. Crowdsourcing offers an alternative to the traditional approach because it facilitates harnessing the accumulated wisdom of a much wider and more diverse group of individuals and teams, potentially numbered in the thousands. Crowdsourcing participants may not necessarily be trained in geoscience but may possess skills and contribute ideas promoting application of novel technology and disruptive innovation.

Crowdsourcing

According to Wikipedia, crowdsourcing is a modern business term coined in 2006 that refers to the "process of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from an online community, rather than from traditional employees or suppliers. Crowdsourcing combines the efforts of numerous self-selected volunteers or part-time workers, where each contributor adds a contribution that may combine with those of others to achieve a greater result; hence, crowdsourcing is distinguished from outsourcing in particular for a number of reasons; including that the work may

come from an undefined public, rather than being commissioned from a specific group." Significant advantages of using crowdsourcing include cost, speed, quality, flexibility, scalability and diversity.

The mineral exploration community has been slow to adopt the crowdsourcing model. Consequently, there are only a few examples with which to assess its potential benefits to our industry (Table 1).

THE GOLDCORP CHALLENGE (2000-2001)

The best known, and until recently the only, example of a crowdsourcing concept applied to mineral exploration is the Goldcorp Inc. Challenge of 2000-2001; the brainchild of Goldcorp's then Chairman and CEO Rob McEwen. In this challenge, the participants (addressed as "virtual explorers" and "online prospectors") were given access to all available geological data for Goldcorp's high-grade Red Lake gold mine in Ontario, Canada. In addition, Gemcom Software International offered participants free access to then state-of-the-art software for the purpose of visualising and interacting in 3D with the approximately 500 MB of data (www. infomine.com/index/pr/Pa038035.pdf).

The ultimate objective of the challenge was for the contestants to identify exploration targets with the potential for discovery of the next six million ounces of gold at Red Lake. The company offered a total of US$575,000 in prize money. Over 1,400 people registered for the challenge, including geoscientists, engineers, mathematicians, and military officers.

As Chairman and CEO Rob McEwen put it: "The Goldcorp Challenge successfully harnessed the instantaneous global reach of the Internet and tapped into the intellectual capital, creativity and insight of some of the world's best geological minds. We have done something nobody has ever done before in the mining industry and in the process fundamentally changed the way Goldcorp thinks about mining. We have created a new exploration frontier for Red Lake and have given the International mining community a model to work with that we have proven can be successful." (www.infomine.com/index/pr/Pa065434.pdf).

Table 1. Top three contestants of three gold exploration initiatives that used crowdsourcing.

Event & Year	Position	Team	Team Type	Prize Money
GOLDCORP CHALLENGE 2000/01	1	Fractal Graphics	Consultancy	US$95,000
	2	Mark O'Dea	Individual	US$80,000
	Tied 3	Alexander Yakubchuk	Individual	US$75,000
		George Langstaff	Individual	US$75,000
ENDOMINES KARELIAN GOLD RUSH CHALLENGE 2015/16	1	Caroline Izart, Loïc Salesses	Students	€40,000
	2	Grigorios Sakellaris	Consultancy (Malmi Geoconsulting)	€20,000
	Tied 3	Amanda Buckingham, Dan Core, Oliver Kreuzer, Alok Porwal	Consultancy (Corporate Geoscience Group, Fathom Geophysics, Indian Institute of Technology, Bombay)	€6,000
		Evgeny Plyushchev	Consultancy (Gecon)	€6,000
INTEGRA GOLD RUSH CHALLENGE 2015/16	1	Team "SGS Geostat": Claude Bisaillon, Guy Desharnais, Douglas Hatfield, Jean-Philippe Paiement	International Company (SGS Geostat)	C$500,000
	2	Team "Data Miners": Antoine Caté, Vincent Dubé-Bourgeois, William Oswald, Fabien Rabayrol, Nathalie Schnitzler, Sarane Sterckx	Students	C$150,000
	3	Team "The GoldCrushers": Kwesi Appiah, Amanda Buckingham, Oliver Kreuzer, John Mortimer, Greg Walker, Andy Wilde	Consultancy (Corporate Geoscience Group, Fathom Geophysics)	C$80,000

First place in the Goldcorp Challenge was awarded to a consultancy and software developer, Fractal Graphics, aided by Taylor-Wall Associates. This partnership developed what then was a cutting edge 3D model that clearly visualised the untapped and untested potential at Red Lake.

The challenge identified, and helped to confirm, 110 exploration targets of which 50% were previously unknown to Goldcorp Inc. More than 80% of the proposed targets yielded significant gold reserves and exploration time was reduced by an estimated two to three years. Approximately eight million ounces of gold have been discovered at Red Lake since the Goldcorp Challenge and the worth of this gold has so far exceeded US$6 billion in value (http://tinyurl.com/j5826j8; http://tinyurl.com/j8v2pwe). By any measure, the Goldcorp Challenge was a spectacular success.

“The challenge identified, and helped to confirm, 110 exploration targets of which 50% were previously unknown.”

THE KARELIAN GOLD RUSH CHALLENGE (2015-2016)

Fast forwarding to March 2015, Finnish gold producer Endomines AB announced the Karelian Gold Rush Challenge, a global crowdsourcing competition aimed at stimulating innovative and out-of-box thinking applied to the identification of new exploration targets and geological models capable of yielding a big gold discovery.

Endomines AB’s “Karelian Gold Line” property occupies a 40 km-long section of the Archean Ilomantsi greenstone belt in eastern Finland. In a press release announcing the challenge (http://tinyurl.com/jmj4fos), Markus Ekberg, the CEO of Endomines AB, stated that the company is “very excited about this competition. […] From the exploration history we do know that we have a [sic] highly prospective ground along the Karelian Gold Line and we would like to invite geoscientists from all over the world to provide new, innovative and perhaps even wild ideas for new exploration targets.”

As in the Goldcorp Challenge, participants were given access to all available data, representing more than 30 years of exploration at the Karelian Gold Line property. In comparison to the Goldcorp Challenge (and subsequent Integra Gold Rush Challenge described below), the Karelian Gold Rush Challenge was a relatively low key event. Only 150 contestants registered. Upon closure of the two month competition period, Endomines AB received 15 exploration proposals submitted by teams and individuals. According to CEO Markus Ekberg (http://tinyurl.com/zm7ndpn), “these high quality exploration proposals were really what we did expect when we decided to organize the competition. All new ideas and new targets but also high quality analysis and reworking of the existing data will be a good help when we in the future continue our exploration efforts along the Karelian Gold Line. The next step for Endomines will be a careful analysis and synthesis of all proposals”. The winner of the first prize was a team comprised of graduating students Caroline Izart and Loïc Salesses from the École Nationale Supérieure de Géologie, Université de Lorraine, Nancy, France. Their winning proposal was entitled “Multi criterion analysis for orogenic gold deposits, Karelian Gold Line”.

THE INTEGRA GOLD RUSH CHALLENGE (2015-16)

In September 2015, Canadian junior exploration company Integra Gold Corp launched the Integra Gold Rush Challenge, which to a large degree was modelled on the Goldcorp Challenge. Its main aim was to identify exploration targets with potential for a major gold discovery within Integra Gold Corp's Lamaque property at Val-d'Or, Quebec. Participants in this crowdsourcing competition were given access to six terabytes of historic data collected over 70 years of mining and exploration at the company's Sigma and Lamaque gold mines, "including over 30,000 historic drill holes, more than 500,000 gold assay, [and] detailed plans [of] hundreds of kilometres of […] underground workings" dating back to 1934 (www.integragold.com/goldrush/faq.html).

The Integra Gold Rush Challenge was launched on HeroX (https://herox.com/), a dedicated online crowdsourcing platform. The challenge was advertised and marketed very widely, both via traditional avenues (e.g., via professional organisations such as the Australian Institute of Geoscientists: www.aig.org.au/the-integra-gold-rush-challenge) as well as through today's omnipresent social media channels (e.g., Facebook, LinkedIn and Twitter). The fact that Integra Gold Corp offered C$1 million in prize money to help them find the next big gold discovery at Val-d'Or further ensured that news about the challenge reached a large global audience of potential contestants.

Integra Gold Corp envisaged a competition not limited to geoscientists and actively encouraged the participation of non-geoscientists as illustrated by this statement published in the Integra Gold Rush FAQ (www.integragold.com/goldrush/faq.html): "Data pattern recognition and trend spotting in a large database founded on six-terabytes of information is the same whether you are a geologist, a medical researcher, a video gamer, a business analyst, a student or a teacher." One explanation for wanting to cast their net as wide as possible may lie in Integra Gold Corp's willingness to "challeng[e] traditional thinking and break[…] new ground, [and] embrac[e] disruptive technology that is critical to the mining sector" (http://tinyurl.com/jr7nbue).

At the time of the submission deadline in early December 2015, a total of 1,342 participants (addressed as "innovators") had registered for the Integra Gold Rush Challenge, including 95 teams.

A total of over 100 individual submissions were received. These were assessed by a panel of five high-profile judges with substantial geoscience and exploration experience. A point of difference to the Goldcorp Challenge was that the top five contestants as selected by the technical judging panel were invited to go head-to-head "shark tank-style" against five industry titans (including Rob McEwen, the instigator of the original Goldcorp Challenge) to pitch and defend their ideas on how to make the next big gold discovery in Val-d'Or and, ultimately, win their share of the C$1 million prize.
The live finale, a sold out charity event with over 400 invited guests from the mining and finance sectors, took place in early March in Toronto during the annual Prospectors and Developers Association of Canada (PDAC) convention.

As reported by Betakit (http://tinyurl.com/glfhn8v), the first price was won by local Quebecois team "SGS Geostat [that] beat the odds, advancing out of the semi-final round and impressing the industry titans with their embrace of machine learning and virtual reality while also emphasizing the importance of tradition[al], data-driven geology." The second place went to the "Data Miners", a team of mainly Quebec-based students, which developed a machine learning platform based on the Random Forests concept to define targets within the competition area. In contrast to number one and two, the third placed team "The GoldCrushers" (Kwesi Appiah, Amanda Buckingham, Oliver Kreuzer (team captain), John Mortimer, Greg Walker, and Andy Wilde; all affiliated with Corporate Geoscience Group) built an "Intelligence Amplified (IA)" roadmap to fast-track discovery. This IA roadmap was based on the premise that a machine and a mind can beat a mind-imitating machine working by itself (Brooks, 1996).

DISCUSSION

The three gold exploration crowdsourcing events described above raise intriguing questions for the mining industry. Although the success of the Goldcorp Challenge model only became apparent several years after the conclusion of this competition, it could be asked why has crowdsourcing not been more widely used in the gold mining industry in recent years?

One answer may lie in the fact that most gold miners would be very reluctant to publically release their valuable mining and exploration data, perhaps for fear of competitors or suitors taking advantage, or opening the company's work to public scrutiny and criticism. And fundamentally, the industry is a conservative one that probably needs to see more proof that crowdsourcing can be an effective and cost-effective means of adding to a project's resource base.

Success at Endomines AB's Karelian Gold Line and Integra Gold Corp's Sigma-Lamaque properties may provide the impetus for crowdsourcing to be more widely adopted in gold exploration. The next few years, then, will provide a critical test of the success of the recent competitions and whether or not the benefits of such competitions consistently outweigh the perceived negatives discussed above. For example, increasing use of crowdsourcing applied to target generation will lessen companies' need for specialised staff and have substantial implications for consultants. However, timing appears to be very important in the overall equation. All gold exploration crowdsourcing challenges to date have been carried out during major industry downturns, most likely based on the perception that it could be very difficult to source and engage potential competitors during industry boom periods.
So, companies may only be able to successfully undertake and capitalise from crowdfunding competitions during those periods when we see a high rate of un- or underemployment even amongst very talented geoscience professionals, enticing groups or individuals to spent significant time working on these problems without any guarantee of success or financial reward.

In fact, the total prize amount on offer to the winners of an exploration crowdsourcing challenge appears to play a huge role in terms of the attractiveness of a particular competition and how many competitors may enter the challenge. For example, the Karelian Gold Rush Challenge with total price money of €40,000 (c. A$60,000) only received 150 registrations, whereas the highly endowed Goldcorp (total price money of US$575,000 or c. A$775,500) and Integra Gold Rush (C$1,000,000 or c. A$1,006,000) challenges each attracted over 1,300 competitors.

Having said that, we believe that a number of additional factors need to be considered in gaining a better understanding as to why the Karelian Gold Rush Challenge may have failed to attract the same attention as the Goldcorp and subsequent Integra Gold Rush challenges? These include:

- The global profile and gold endowment of the Karelian Gold Line are low compared to those of the Red Lake (Goldcorp Challenge) and Sigma-Lamaque (Integra Gold Rush Challenge) mines. The current ore reserves at Pampalo, the largest deposit of the Karelian Gold Line, stands at 175,000 t of ore at an average grade of 2 g/t gold for just over 11,000 ounces of gold. In comparison, at the time of the Goldcorp Challenge the Red Lake mine was already addressed as one of the largest (endowment of c. six million ounces of gold) and highest-grade gold deposits on the planet (reserve grade of 57.6 g/t gold: http://www.infomine.com/index/pr/Pa065434.PDF). Integra Gold Corp's Sigma-Lamaque mine is an equally impressive and globally significant high-grade gold mine with historic production greater than nine million ounces of gold at an average grade above 5 g/t gold.
- In contrast to the Goldcorp and Integra Gold Rush challenges that played out in the shadows of the respective headframes, the Karelian Gold Rush Challenge was set over a relatively large area of approximately 400 km^2. The district-scale nature of this competition requires a more extrapolative and conceptual approach to exploration targeting that may not have the same universal appeal as targeting based on extensive, detailed mine and drill hole databases as were available in the Goldcorp and Integra Gold Rush challenges.
- Endomines AB organised and ran the Karelian Gold Rush Challenge without the help of any external parties or platforms, and did not advertise this competition very widely, at least not outside Finland.

CONCLUSIONS

The gold mining industry has been slow to adopt a crowdsourcing model of gold exploration targeting, despite the spectacular, measurable success of the Goldcorp Challenge. The ultimate benefits to recent Karelian Goldrush Challenge by Endomines AB and the Integra Goldrush Challenge by Integra Gold Corp. have yet to be realised and quantified. If these recent crowdsourcing initiatives were to result in the discovery of significant new gold resources, then we anticipate that crowdsourcing will become a more frequently-used avenue for gold miners open to sharing their data and novel approaches to discovery of additional gold resources. Given the potentially very significant benefits of crowdsourcing applied to gold exploration, the outcomes of the recent Karelian Goldrush and Integra Goldrush crowdsourcing initiatives should be closely monitored by the industry. However, companies should be aware that such initiatives may only work during industry downturns when un- or underemployment are high even amongst very talented geoscience professionals.

REFERENCES

Brooks, F.P., 1996. The computer scientist as toolsmith II. Communications of the Association for Computing Machinery (ACM), v. 39(3), p. 61-68.