Mining & Return on Investment

- Research Report -

THE NORTHERN MINER
Does mining have an ROI problem?

This is the provocative question we posed to a gathering of 10 top mining and financial professionals at a Roundtable discussion we hosted in Toronto, sponsored by PwC.

Return on Investment (ROI) is a simple enough calculation for an investor to make: the benefit (or return) of an investment is divided by its cost, and the result is expressed as a percentage. For longer-term investments, the ROI can be discounted to take in the time value of money.

ROI makes it easier for an investor to compare at a glance the profits they’ve made in their various investments, no matter the sector. And so our original question quickly branches off into two areas of discussion: are miners as profitable as they could be, and how does the mining industry’s profitability compare to other sectors?

These are critical questions to answer if the mining industry is going to continue to attract new capital, pay dividends and generate enough profits to internally fund growth.

According to CSI Market, the basic materials sector’s ROI, at 4.4%, ranked as the fourth-worst amongst all 13 major sectors during the third quarter of 2015, behind only consumer discretionary, financials, and utilities.

We also surveyed a select group of 475 mining professionals amongst our readership, asking for their views on ROI and how mining companies can improve their profitability. We found 96% of survey respondents consider ROI “very important” or “somewhat important” as a long-term measure of the financial health of a project, company or industry, and 72% correctly consider the mining industry as having a worse ROI than the average of all sectors. So from our readers’ perspective, mining definitely has an ROI problem.

In the pages ahead, you’ll see a stark contrast between our survey respondents and Roundtable participants when it comes to pinpointing the reasons for mining’s ROI problem, and what to do about remedying it. The survey respondents tend to blame poor management decision-making when it comes to mergers and acquisitions, weak commodity price forecasting and a lack of basic competence in completing feasibility studies. Our Roundtable participants are more likely see past ROI problems as the result of too great a focus on growth, and look to more technological solutions to improve profitability in the years ahead.

John Cumming, Editor-in-Chief, The Northern Miner
Return on investment (ROI) can be a versatile and simple performance measure used by stakeholders to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. The problem with the metric is that there is no one “right” calculation; factors such as time horizon and the definition of what is a return or cost will influence the calculation of ROI. In addition, given these and other factors, it is difficult to use as a meaningful comparator across industries, and even between different commodities in mining.

In considering whether the mining industry has an ROI problem, you will find as you read this report that there are a number of valid perspectives of firstly how ROI should be measured, and how ROI can be improved in the future for an industry that is currently starved of fresh capital. We are encouraged by the broad spectrum of responses to the question of why mining has an ROI problem and possible solutions as we believe there is no one answer. Most of all, the fact that this is now a widely discussed topic is good for all of us associated with the mining sector, as a broad understanding of the factors involved is required as much by analysts and investors as it is by mining companies and their management teams.

There is a wide range of ROI across the industry, however you choose to define it. Some assets are higher grade and more appropriately scaled than others, some companies are fundamentally better run than others, with more advanced and integrated systems used to plan and drive real time decision making. Committed capital is virtually impossible to replace, even if something newer and more efficient is available today, which effectively imposes a glass ceiling on the ROI for some assets. Recognizing limitations on grade and assets, and being ready to place mines into Care and Maintenance is becoming a more commonplace management tool today to improve portfolio ROI.

For any solution to be successful, the mining industry must embrace innovation, technology, diversity of workforce and boards, and collaboration with other industries. It will have to seek out creative and successful applications of existing leading practice, combined with innovative new, and in some cases, industry specific solutions. Selecting the right ore bodies to mine in friendly jurisdictions, appropriately scaling mining and processing assets, and adopting new technology and data analytics across the entire exploration, extraction, beneficiation and logistic cycle will be critical when combined with appropriate levels of automation, to both deliver an increase in ROI and keep people and environments safe.

One thing remains clear, using a future strategy that is largely based on what has been done before will likely not generate the degree of improvement required to make the industry resilient to future cycles. We hope you enjoyed reading the report as much as we enjoyed in participating in the discussions, which at times have been lively and have reflected a healthy degree of disagreement.
Panelists

GEOFF BURNS, Director, Pan American Silver
(Silver mining company)

ANDREW CHEATLE, Executive Director,
Prospectors & Developers Association of Canada
(Industry association)

CATHARINE FARROW, CEO, TMAC Resources
(Junior gold mine developer)

CHARLES A. JEANNES, President & CEO,
Goldcorp (Major gold miner)

CHRIS MACINTYRE, Vice-President, Corporate Development,
Reservoir Minerals (Junior copper-gold explorer)

ROB MCEWEN, Executive Chairman,
McEwen Mining (Junior gold and silver miner)

JASON NEAL, Managing Director & Global Co-Head,
BMO Metals & Mining group
(Metals and mining investment bank)

DOUG POLLITT, Analyst, Pollitt & Co.
(Boutique brokerage house)

CALUM K. SEMPLE, Partner, Global Mining Consulting Leader,
PwC (Major accounting and management consulting firm)

DAVID SMITH, Senior Vice-President, Finance & CFO,
Agnico Eagle Mines (Major gold miner)

Moderated by Anthony Vaccaro, Publisher of The Northern Miner
New focus on ROI

In our survey, 85% of respondents agree there is a “new emphasis on ROI in today’s more difficult financial environment” in contrast to the boom period that ended in 2011, when growth was arguably the primary measure investors used to appraise the mining sector.

As for what should be a mining project’s minimum anticipated ROI before a company decides to develop it, 53% of respondents say the ROI should exceed 10%.

Respondents pick gold and potash & other fertilizers as the two subsectors with the best ROI, and coal and iron ore as the two with the worst — a perfect reflection of the recent price history of the respective commodities.

ANDREW CHEATLE ▶ In terms of investors, we’re perceived as very high risk. And the fact of the matter is we are high risk. No more so than the exploration side of things. Some of our studies show that if you take 100 companies over 10 years, only 22 of those will give you a positive return on your investment. But those that do give you return on your investment are massive.

There are obviously people around the table here today who have made hundreds of millions of dollars, and their investors along with them. So there’s that opportunity, but how do you discern which companies to go with?

I say you have to go back to fundamental issues: what is the underlying geology, and then have you got flexibility in grade while mining? These are mines that will last for 30, 40, 50 years through several cycles, if you have the ability to manage through those down cycles, other than to open and close.

CALUM SEMPLE ▶ There are still people not making any money as a result of that flexibility because the prices have continued to come down and a lot of input costs have gone up. There are companies today, frankly, hiding behind exchange rates and low oil prices.

The big question now is how do you get leadership at these companies to say, “Look, everybody, we’ve got to do something different. We cannot keep doing things the same way.”

CATHARINE FARROW ▶ Everything is about margin and our operating philosophy at TMAC as we develop Hope Bay will be about margin. If we can get more ounces out of fewer tons, that means we’re not spending money breaking rocks, using our diesel to haul trucks up our ramp, or crushing and grinding the stuff, and so on. Everything will be about ounces but not just top-line ounces; margins on ounces.

I’ve found over the years, on the operation side and others, that the huge step change is getting the geology right and then full integration throughout the mine site on how you understand that. Geologists, planning engineers, everybody else sit in the same room and they must talk to each other and integrate all those parts. The other is metallurgy where you can make step changes.

DAVID SMITH ▶ At Agnico Eagle we’ve been focusing on per-share metrics and trying to drive those forward as we went from a single asset to a now multi-asset international producer. In some ways it’s been great that the market has kind of crashed, as it has allowed us to start refilling the pipeline for that next phase of growth.

Agnico was initially criticized for continuing to invest in brownfield and...
greenfield exploration, but also in junior companies. Our traditional technique has been toe-hold investments here, there and everywhere, and over 2013-14, we made around 15 such investments. Initially, people said, “What are you doing? The sky's falling. This is terrible.” And we thought, “Oh boy, I hope we're not wrong, but you're supposed to buy low, sell high,” and most certainly the juniors are low.

But engineering and drilling and all of those things also fell off the cliff, and that became more affordable. So in 2015, we doubled our exploration budget.

JASON NEAL ▶ Everyone has their share of sins and as a bank we’ve got lots of our own in working with companies. One of the toughest things — and I talk a lot about this with my clients — is you have the institutional and retail shareholders who are often evaluating things on a shorter time horizon than a management team and a board need to be.

So there’s this inconsistency, and when you think about some of the problems that we have now, there are lots of great assets that have been built that are currently attached to very terrible balance sheets.

One of the reasons that the balance sheets aren’t as great as they once were is that we had acquisitions that were done at a high point in the market and they were done with cash. And when you put cash in an acquisition, it turns from a relative exercise into an absolute exercise.

When you think about the return on investment, some things are in your control and then there’s a lot that are outside your control. One of the biggest outside your control is the commodity prices that you're dealing with. And so when you turn an acquisition, or a relative exercise, into an absolute exercise (by using cash), now you're betting on a commodity price because you're changing your capital structure at the same time as you're making an acquisition.

JASON NEAL ▶ One thing a lot of companies think about — and is part of the value of a mining company — is the ingrained optionality. The research analysts publish their net asset values and it’s basically a static market and when they change the gold prices one way or the other, what's going to happen to the net asset value when they change that? And the truth of it is that the way companies operate it’s not with a static model. You have to understand the underlying optionality.

One of the ways that you really kill optionality is by limiting the duration of an option. And limiting the duration of an option for my company often is creating a balance sheet that means that macro circumstances that allow you to generate a good return for your shareholders, that doesn’t come soon enough before your balance sheet causes you to dilute your shareholders … or maybe even have to sell yourself or be insolvent.

CHRIS MACINTYRE ▶ As a large shareholder myself in Reservoir, our fundamental objective is returning as much value to ourselves as possible on a per-share basis.

I promise you it is a pain to go out there and raise money as a junior because the industry’s been hurt so badly, and knocking on an investor’s door and explaining to them what you have when they’ve been so badly beaten by other mining investments. It’s tough out there.

DOUG POLLITT ▶ What is it about the sector that makes it tough? And this isn’t just recently; this goes back a fair ways. What makes it tough for gold guys to provide a decent ROI?

The gold sector is very small. At the end of the day, the gold sector cannot be bigger than there is gold available. And it's small in relation to the flows of capital that see this as an asset class unto itself.
So when the asset class comes into favour, there’s more money than there are available opportunities where returns are available at the margin. Then the money pours in and it’s got to go somewhere. Money doesn’t sleep, and so it goes into sub-optimal and somewhat new opportunities.

It actually doesn’t bode too well for the next cycle either, because there will be far less gold next time around, and there’s far more debt that has to be monetized.

It’s going to be pretty tough to sustain the industry going forward. We’re going to shrink and there’s nothing we can do about it now, and what are the costs to not shrink? It’s difficult to put a circle around, but I think it would be a more transparent and candid dialogue with investors, would go some ways towards improving their receptivity the next time we go knock on their door.

DOUG POLLITT ▶️ If we’re going to get better, we have to figure out the best metric by which to measure ourselves.

One thing that sticks out for me is we seem to be measuring ourselves, at least in this down draft, by the all-in sustaining cost. Well, the all-in sustaining cost is the price of gold at which the investor loses all his money. You mine dollars for dollars until it’s gone. Should we be measuring ourselves against something like that? I’m saying better than cash costs, at least it includes some other cost. But if we don’t know what we’re shooting for, we’re never going to get better and get to where we want to be.

MODERATOR ▶️ That’s a contentious statement. Many people feel that by going to the all-in sustaining cost, it was a massive improvement in how the mining industry measures itself.

CHARLES JEANNES ▶️ Well, I was one of the people who drove that change. And I did it because it drove me crazy that we would report US$300 per oz. cash costs and ignore the US$200 of development costs that it took to make those exact tons. Cash costs did not reflect the cost of taking an ounce of gold out of the ground and producing it.

CATHARINE FARROW ▶️ Let’s just touch on the “full enchilada” costs. For example, that all-in, all-in everything, including your dividend payments are already full-enchilada costs. So now you’ve taken exploration — which should be part of your DNA as internal, organic growth by drill bit — and said that’s a bad thing because it goes against your per-ounce costs.

GEOFF BURNS ▶️ We’re here a little bit self-assessing and beating ourselves up because of the lack of ROI. And we all sinned when prices went up, but the reality is if prices were higher right now, we wouldn’t be sitting around this table talking about ROI. We’d be actually in your office saying, “Okay, can you get me some money?”

But the one issue that hangs there is it’s incredibly tough to invest in R&D or continue to invest in exploration when you’re dealing with a commodity price — and I’m going to use silver, which I know...
best — that was US$35 an ounce in 2013 and is now US$14. So my revenue line went down 60%. Well, it’s nice to say, “Gee, I should really do some exploration,” but I really don’t have the money to do it.

There has been this tendency to try to apply conventional metrics to mining, particularly as generalists got into our industry who ask, “What is your multiple of EBITDA? Your NAV? Your bottom line earnings? What’s your growth profile?” And then at the moment you say, “Well, the price of silver is 35 bucks and I’d really like to hedge some,” they’ll say, “Fire you. You’re out!”

So you’re unable to do something on your revenue line to truly protect what other businesses have in some respects, by default. Have you ever seen Starbucks’ coffee go from $1.95 for a grande to 70 cents? It doesn’t happen. So you can measure their ROI.

CHARLES JEANNES ▶ Remember the R in ROI is your GAAP return. That’s your GAAP earnings in your financial statement. And the way you get that is you amortize over the ounces that you found today, right?

Perception of mining subsector with worst ROI

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I use Cerro Negro as the example. I know there will be plus 10 million ounces there. There’ll probably be a lot more than that over time, but today there’s 7 million. And so when we’re calculating DD&A, it applies to each ounce (we have today). And building the mine, that total dollar amount is amortized over a number of ounces today that does not reflect the reality of that overall asset, nor management’s view when we bought it.

But you go to New York and somebody says, “Gee, your ROI is not nearly what it should be on Cerro Negro.” And they don’t understand.

Whereas, in most base metal deposits, within a few million pounds, you know what you’ve discovered, for the most part, early on. In our gold business, especially these high-grade underground mines — Red Lake’s lasted for 60 years, right? — you don’t have the benefit of a very short-term look to say this was a good investment or not. You need a longer period of time. And it’s the nature of the geology more than anything.

DOUG POLLITT ▶ Over a long enough timeframe, if you look at cash in versus cash out, gold mining has been disappointing, certainly since 1980 on. Back in the old mining days in South Africa, where there were stricter controls on who got to spend the money and more money got sent, there you had much better discipline and you had much better shareholder returns.

Since the liberalization of finance, post-1980, the returns, cash in versus cash out—we’ve had 35 years of it now — they’ve been disappointing. And it’s fair to ask, why?

There’s always going to be industry-specific reporting. But they should reflect the state of the underlying business over the long term, and I’m not sure we’re quite there yet.

ROB MCEWEN ▶ There is a lot of mystery in all the metrics. But there’s the excitement the industry offers investors when there’s a stronger metal market and this industry roars. And then no one is really sitting on the sidelines and looking at ROI.

DOUG POLLITT ▶ But the ROI at the peak was also fairly bad. If you look at return on invested capital, even when times were good, wasn’t that good, at the business level.

ROB MCEWEN ▶ The cyclical nature is one element, but there’s also the ease of entry of getting into the industry. It doesn’t take a lot of money to get in, and so we have a lot of entrants at various points when money’s plentiful. And so we’ll get a boom/bust mentality.
Mistakes of the past

In our survey, 55% of respondents agree that miners have “strayed from best practices in recent years, and ROI has suffered as a result” (as opposed to 22% who disagree). More specifically, they selected as the two drivers that most significantly lowered ROI in recent years as, “over-optimistic commodity price predictions over the life of a mine” and “capital expenditures underestimated.”

Both are due to poor planning and project execution at the highest levels of management. More optimistically, these are problems that can be addressed internally and mining companies have recently become far more conservative in predicting commodity prices, completing feasibility studies, and setting criteria for greenlighting projects and carrying out M&A.

CHARLES JEANNES ▶ Something Goldcorp shared as a sin along with a lot of other companies was that as the gold price was rising and as revenues were rising, we chased ounces.

You always try to make good decisions and do it based on sound analysis to make sure you’re getting a return on the investments that you make. But, as a whole, our industry allowed cut-off rates to decline just about as fast as the gold price was going up.

The net result was everybody would always say, “Well, we couldn’t help what the costs were.” They were going up on a per-ounce basis, because there was cost inflation, but also because we were chasing the top line growth, chasing the ounces. And by lowering those cut-off rates, the tons of material that you had to move to make an ounce of gold went up so the cost per ounce went up.

It’s a striking slide I used to use in a presentation: over a 10-year period the compound annual growth rate in the gold price was 16%, while the compound annual growth rate in the gold miners’ costs was 15%. That’s what happened to our margins. There are a lot of explanations, but that was a big part of it.

The challenge for everybody in our business is to recognize — hopefully they recognized it some time ago — that we must take actions that are a little more deliberate and actually provide the margins that our shareholders are looking for.

When the gold price went up, the people who made bets on the commodity were right. And yet the share prices of gold miners didn’t go up because we didn’t get the margins up; we just gave them top line. I think that we have to do a much better job of that.

DAVID SMITH ▶ All of us around the table, I think, are agreeing that growth became a problem through the last cycle. There are a couple of examples of growth at all costs, though I’m sure it was never quite that simple.

We all have a lot of constraints and criteria, but Agnico has really always been about per-share growth in all the
metrics that we can control. If we get a better market, we’re away to the races. If we have a worse market, at least I can still say that we have a manageable business. That’s very important, too.

**JASON NEAL** We’re in a market now where a lot of the transactions that are happening are more around dealing with some of the sins of the past and the balance sheets that have changed. There are companies that are selling things that they never, ever would have wanted to sell, but now to sustain the company they need to look at that. Then there’s opportunity cost — investments that they’d love to make or they don’t feel that they can make in this environment because they’re burdened with a poor balance sheet.

**DOUG POLLITT** There’s only a finite amount of gold and they’re printing money like crazy. But there’s not a finite number of gold companies, and that’s the problem. We got buried by supply. A guy makes an option deal, hires a geologist and boom, he’s in the business.

In the old days you’d have an exploration prospect and you’d never have any possibility of turning it into a mine yourself. Instead you’d go down to the PDAC convention over March break and cut a JV deal. And the big companies were far better at analyzing whether the guy was real or not, than the Street as it is right now.

With the liberalization of finance, and the mutual funds and the various different conduits for money to flow, it became far easier to finance these things, and with that, mismanage the role. And you’ve got the good guys and the not-so-good guys, and as Rob said, it became much more difficult to distinguish between the two. And that’s brought down the quality across the board.

"There’s only a finite amount of gold but there’s not a finite number of gold companies, and that’s the problem."

—**DOUG POLLITT**
The management factor

The near industry-wide changeover in top management at the world’s largest mining companies in the first years of the commodities downturn speaks to the deep dissatisfaction shareholders had in mining leadership.

Today as we enter the fifth year of the downturn, industry watchers are openly asking whether most management teams are even capable of building mining companies that can weather successive boom and bust without flirting with bankruptcy at every trough.

Intriguingly, there is new appetite in many mining quarters for bringing in outsiders, such as from the oil and gas and manufacturing sectors, and have them look at miners’ old habits with fresh eyes and suggest better practices.

CHARLES JEANNES ▶ Absolutely everybody is grinding their costs and being much better at cost control these days, but the real test will come when the price turns and you have that opportunity to take another lay back in-pit. It’s going to be higher cost, but it’s going to be more ounces.

Even though investors and other stakeholders might be calling for that higher production, we have to be disciplined and say, no, we need to remain at a level of production that allows our margins to grow rather than the top-line numbers.

ROB MCEWEN ▶ Right now we’re capital constrained, so that’s adding the discipline to the market. I think the investment dealers seduced the industry into believing there was an endless source of money and they’d give it to you on a handshake almost, and you’d go build.

But I don’t think we had the project management skills because as the money flowed in, it just begged for bigger and bigger operations and there weren’t a lot of people that had built a billion-dollar mine. And then there are all sorts of moving parts that if someone delays you by a day, suddenly you have trouble.

DAVID SMITH ▶ Part of the core success of Agnico has been that, traditionally, we are identifying small-scale, early stage opportunities. In transacting, yes, you always have to pay a premium to get a dance partner. But transacting early enough that maybe it’s a high percentage premium to take them over, but it’s a small number of dollars.

What we’re really following here, I call it the “dancing geologist” because...
we don’t do anything until there’s a geologist dancing on the table saying, “We need to own this!”

There’s nothing easy about this business, but the easiest part of this really difficult business is creating value with your own drill bit. I do believe that the closer to production you get, the more predictable it is and therefore it’s easier to value.

So let’s capture that upside for ourselves by going early.

MODERATOR ► Some clever person should hold on to some of their bullion.

Is this pie in the sky, Rob, or is this feasible? How long do you go without selling your gold?

ROB MCEWEN ► It’s possible, but it depends on your operating budgets. At Red Lake we had 67% gross margins, 34% net margins. And we were rivalling pharmaceutical companies at that point. But not a lot of the industry is in that position.

And thresholds are important, those barriers. You don’t make yourself popular with investment bankers. If you’re ►

“I think the investment dealers seduced the industry into believing there was an endless source of money and they’d give it to you on a handshake, almost.”

—ROB MCEWEN
exercising this discipline in not pushing out a lot of stock, you might not get as much following in the marketplace.

**GEOFF BURNS** Does the fact that we have commodity cycles influence how management teams work? The answer is, absolutely.

The good management teams are long-term management teams that look beyond three or five years to go to 10 years, and say, “Okay, maybe I can grow a little bit and I’m still in the game with my optionality.” And optionality doesn’t have to be on one deposit, it can be on multiple deposits within a portfolio of assets. I want to stay in that game.

So you manage with the set of criteria that hopefully don’t take huge risk when the price is up here and don’t completely close up shop when the price is down there.

It absolutely does impact the style of manager you have in the room. Go back to when the money is plentiful, and you’re going to get operators who are going to take incredible risks because they can get money and they’re going to try to ride it right to the top. And, hopefully, probably, get out. And the ones who are still around at the bottom, they probably disappear.

**JASON NEAL** Management’s actually the most important thing in this environment. Absolutely. The IPO for TMAC last year was done really on the backbone of confidence in the management team.
You have a certain number of years where you’re going to make great returns. And you have other points of the cycle for which you’re trying to sustain your business, and while trying to sustain your business you’re trying to out-perform, you’re going to try to make sure you keep your team together. You’re trying to make sure that you’re building longer term optionality, you’re going to make careful investments in the down cycle, etc.

The environment that we’re in now really is about the all-in sustaining cost. And shouldn’t you add on top of that an amount for recovering the capital for building the next mine?

“" We don't do anything until there's a geologist dancing on the table saying, ‘We need to own this!’ ""  
—DAVID SMITH
New technology

While demand for minerals rises steadily around the globe, mining itself is a mature industry, and so operating an efficient and streamlined business is critical for maximizing profits during the good times and protecting the business from financial pressures during the down times.

Innovation can be expensive and carries unique technical and financial risks, but the adoption of new technology in mining undoubtedly has a huge role to play in squeezing costs going forward.

Our Roundtable participants look with some envy at our wealthier cousins in the oil patch, who create and adopt new technology so much faster than miners do. Indeed, there may be good business for an enterprising intermediary who can bring over to mining more of the oil and gas sector’s innovations.

ROB MCEWEN It struck me that Elon Musk comes along and he goes into the world of space travel. He’s never done anything in that field. The only people who have ever done it are superpowers that planned to reach the moon.

And since NASA said they weren’t going to Mars, Musk said, “Well, I want to go to Mars. How much does NASA spend on sending rockets up?” And it was 10% of their budget, with all the rest being other expenses. It was just really simple thinking, and looking at where are the costs in the business.

If we could get other people from outside the mining industry to have a look at us, maybe I’m suggesting tours of factories and so on, people who are using robotics and a lot of data processing. Can we employ those? We don’t have to re-invent the wheel. We just adopt something that’s being used in another industry.

CHARLE JEANNES I gave a speech to a bunch of mining engineers last year and one of the slides I used was a picture of a haul truck from 1910, a haul truck from 1950 and a haul truck from 2010. Other than the size and the colour, there were no changes whatsoever. The basic way we go about drilling and blasting and loading and hauling has not changed in a hundred years. I joked in this speech that a younger member of the audience would probably walk through one of our plants and say, “You know you can do that on your phone, right? Why are you doing it this way?” We need more of that. We need innovation.

CALUM SEMPLE Mining, at the end of the day, is a process industry. The way you find a deposit is unique to mining but the rest of it is extraction, it’s logistics, it’s chemical processing. You can’t change what’s there in the ground or the market price, but you can change everything in the middle.

There’s so much to be learned from energy and manufacturing. Mining, to me, is where manufacturing was in the late 1980s.

GEOFF BURNS I don’t think, fundamentally, we’re doing anything different than perhaps what we did 10 years ago when we were constructing a mine from scratch. I do take a little exception about miners not embracing technology. We do a lot more than we give ourselves credit for. A truck is a truck is a truck. On the other hand, our trucks all now have guidance systems and fuel control systems. We’re monitoring hours. We’re employing that technology. But it still looks like a truck.

CALUM SEMPLE Even when people build new mines they tend to build new mines the way that they built old mines before. The problem is when you build a billion-dollar mine, or even design and engineer one, you tend to say, “Well, we’ve built a small one over here, let’s just kind of make it bigger. Let’s not approach it with a completely different mindset.”

As opposed to some of the ideas in manufacturing, such as you only touch things once, you don’t pick it up and put it down. And in mining this isn’t just
touching little things, this is a huge 400-ton truck and that’s a lot of material to fill, dump, fill, dump, fill, dump. Every time you put it in a truck bed, you create damage and create wear and tear and everything else. There’s a whole bunch of inefficiencies in the process that people bury.

It’s tough going into an existing mine site and trying to have these conversations with people. They say, “You’re just a whack job. We’re a different industry, this doesn’t apply to us, we’re special.” Well, okay, but a lot of this does apply.

A really good current example is if you’re expanding underground. Everybody, for the most part, still runs diesel equipment, super ventilation shafts and whatever else, which are expensive.

Electric-powered loaders, trucks and everything else are becoming more accessible. Or at least, the power units and the batteries to service them are. If you’re designing a new mine or a new expansion with a new asset base, it’s much easier to say, “Let’s design in electrical equipment because we don’t use much ventilation.”

So if you’re going into an existing mine site with ideas about really taking it to the next level in terms of how you operate, it’s tough. I would say most things we help people with, it’s a lot of stuff that people did before — labour efficiency, figuring out how to use the equipment you’ve got more effectively, minimizing downtime, optimizing procurement, and the like. To me it’s the simple stuff, the low-hanging fruit, and the majority of the mining industry has done this. But just think of how much more money the mining industry could have made had it done this five years ago.

GEOFF BURNS ➤ We’re embracing new technology more on an incremental basis than on a revolutionary one, predominantly because there hasn’t been any revolutionary technology adapted specifically to mining. We aren’t as big for example as the oil and gas industry, which has a lot more money to spend on research and development than the mining industry, collectively, does.

So they’ve come up with things like directional drilling, which, the first time I looked at that, thought, “Oh, why can’t we do that in mining?” The answer is we probably can, but no one’s made the flip to bring that technology over.

But we are embracing some newer technologies. Certainly in computer control systems, most of us remember when you went into a mill and you had switches and dials and everything was done by hand, with thick manuals. And now you have a control room with one computer and an operator who controls the entire mill.

You also see that in the labour forces. We’re doing more things and more projects with fewer people. We’ve all been forced, in the last four years, to do it with even fewer people than we thought was possible.

The one thing that’s certainly changed in my career is, you engineer from start to finish now. Whereas, you just used to engineer the process: “Okay, let’s get ’er built. Let’s get ’er done,” and then you’d operate. Now we spend a lot more time thinking about what’s going to happen when it’s done and how we can either expand or take it down. And that gets

Australians have done a fantastic job with things like CSIRO and gotten huge buy-in and built that up during the up-cycle.”

—CATHARINE FARROW

Canadian mining R&D
In 2013, Canadian mining and metals companies spent $677 million on R&D — more than the machinery, pharmaceutical and wood products & paper sectors — and employed 4,560 people in R&D, or more than the pharmaceutical and forestry sectors.*

>*Mining Association of Canada*
built into the program when you design, which is a huge change in the way all mining companies operate.

Are we still using some age-old practices? You betcha. You still need to find bedrock to properly seat your crushing systems and your mills and whatever, and that means you’ve got to drill and blast. And you’ve got heavy equipment scraping ground. We’re still diggers of dirt, that is what we are.

CATHARINE FARROW ▶ There have been a few major advances in the technology of metallurgy. If you look at things such as challenging copper ores or something like that, some of the things that have happened over the past couple of decades, very simple things like froth cameras, those are brilliant and can really help you in your processing plant. And once you have the processing capacity to actually make quantitative measurements about the size and shape of your bubbles and everything else, that kind of simple technology with a little bit of processing availability really made a difference in the industry.

DOUG POLLITT ▶ I’m all for tech. It hasn’t been sexy, but a lot of technology has been adapted to mining. You’ve got simple things like optimized dispatch systems, autonomous trucks in the big pits, and even GPS on the end of a shovel so you can selectively mine the pits and the benches. We have far more of an idea of what the hell is going on in your mine than you used to.

But measuring the economic impact is only one way to look at the effect of tech. We should also look at the tech that’s been installed for the purpose of safety. The industry safety record has been vastly improved over the decades because of it.

CHARLES JEANNES ▶ We’re doing teleremote scoops and some automated haulage and scoops now. But the technology has existed to have entirely 100% automated underground mine for 20 years and nobody’s done it, nobody.

Part of the reason is we don’t attract the kind of people who have that background. Every time we’re going to find a new mine manager or a new technical services manager, we’d look for the greyest hair, the guy who’s got the most experience, the one who’s built six other mines just like this, rather than somebody who may have a new idea. We’ll get someone from Australia, who are way ahead of us in terms of automation underground, and bring him up here and instead say, “Do the same thing here.”

But we have a vision of our next underground mine at Borden Lake in Ontario being fully autonomous, 100%. And fully electric.

CATHARINE FARROW ▶ Australians have done a fantastic job with things like
CSIRO (the Australian government’s national science agency, Commonwealth Scientific and Industrial Research Organisation) and gotten huge buy-in and built that up during the up-cycle when they had access to money and built affiliations with universities and across the industry.

CHARLES JEANNES ▶ They had the government putting in $55 million a year in mining innovation. And we tried to get $5 million last year in Canada.

CATHARINE FARROW ▶ When you say to people or future investors that you’re going to use new technology, that becomes a problem, too, because to capital markets that means high-risk and then they don’t want to give you the money.

CHARLES JEANNES ▶ Then why have other industries been so much better at innovating? The oil and gas industry in particular?

JASON NEAL ▶ More money. What’s the average life of a gold mine that comes in? The investment in technology, you have to have a long enough period to amortize till you get your return on investment. Many mining companies, especially smaller ones, are a collection of finite-life assets rather than going concerns.

ROB MCEWEN ▶ If you look at the tech industry they’re innovating all the time, and they don’t have very long-life duration on their products. And they can attract capital.

DAVID SMITH ▶ The way I see exploration in the mining business is that it is fundamental R&D. We’re going to have to protect our exploration spend when we all go into the budgeting phase because long-term, it’s going to be unbelievably painful without it. But investors have the ultimate hammer. They’re the ones deciding what they’re going to pay for and what they aren’t. And discretionary spending is just that. And so when times are tough, the low-hanging fruit gets picked.

DOUG POLLITT ▶ We shouldn’t be penalized for exploration. There should be receptiveness and a normalization that this is the cost of doing business. We know the cost of looking for gold, we don’t know the cost of finding gold. That’s an important cost if we’re to figure out what the true cost of sustainability is. I don’t know how you put a number on that, but that would be a job for smarter people than me.

CHRIS MACINTYRE ▶ More exploration spending doesn’t necessarily mean more discoveries.
The way forward

Our survey respondents said the best paths for mining management to follow to significantly increase ROI are: better financial discipline in deciding which projects to develop (47%); better cost estimation in feasibility studies (20%); and better financial discipline in mergers and acquisitions (10%).

Our Roundtable participants point with some urgency to human resources issues in the years ahead, especially with regards to proper succession planning; better recruitment and training of new graduates; and creating a more welcoming work culture for women, aboriginals and young people.

GEORGE BURNS ▶️ One big thing is it’s a nice time to be building. We’ve all probably experienced the incredible inflationary pressures on capital costs we went through in the boom part of the market. We’re now seeing the other side of that where we’re seeing prices coming back the other way. It’s a happy story to be able to say you’re on budget — and the original budget, not a revised, revised budget. That part is fun.

The other part we did learn during the up-cycle is we spent a lot more time on our purchasing and control systems so we don’t let the capital costs get out of control. That is something a lot of us rushed into and built without proper assistance in place to really track what we were doing day in and day out. And really track scope changes and things like that, that can allow you to bring a project in on time — because late is dollars — and on budget.

ROB MCEWEN ▶️ Adversity is often the mother of invention and innovation. I grew up outside the mining industry, and I just look at some things and think, “Why are we doing this this way?”

We need to question some of the fundamental underlying assumptions that are never questioned to get to the solution of a problem. Often, if you can import someone from the outside and give them enough responsibility and authority to push people maybe into an uncomfortable zone to look at the business differently.

GEORGE BURNS ▶️ We have learned from some very large mistakes made either by our own companies or others. I think the industry is going to be far better.

Memories are short, though, so at least for a period of time until the next bull market we’ll all do really well and then the pressure will come again — more ounces, more, more, more — and it might go the other way.

But we really have learned a lesson that a big chunk of your ROI is based on how much capital you put in it from day one. So you try to manage that much better than we’ve done even five years ago.

CATHARINE FARROW ▶️ We are process-driven. You start with the rocks and you end with, in our case, doré bars.

But at the end of the day, it’s about people, because you can get your processes working really efficiently only as long as you have a workforce that has bought in, is completely married to the idea and owning it and challenging each other on it.

Importance of mining companies getting involved earlier in exploration to increase ROI

22% Not important
73% Important
The one thing I’ll say about the grey-haired guys — and I work a lot with mostly grey-haired guys — is that they bring an understanding that you’re dealing with personalities who are going to drive engineering solutions. That is that wild card that doesn’t fit in an Excel spreadsheet and you can’t model very easily.

That is something we’re going to have to really get in tune with in our industry, because we’re alienating young people, either by not giving them jobs or if we maintain the attitude of “bang the table, thou shalt deliver 1.45% to the mill,” then the kids aren’t going to work. They look at that kind of culture and go, “I’m not working in this industry, I’m going somewhere else.”

That culture is the same thing that drives women away from the industry. Also Aboriginal people, because they tend not to be confrontational and don’t like it when the guy’s pounding the table and screaming at them.

Young people, women and Aboriginal groups are an opportunity in our industry. We have to get that people piece right because that’s going to really make a difference as we get into the crunch that we’re creating right now on the human capital side.

**CALUM SEMPLE** It’s product innovation versus process innovation. The tech industry attracts the kind of people that are thinking like this. They’ve managed to break that habit of saying, “We’ve got to have people that have done this ten times before.”

But you know what? Everyone new that comes along, they might have a hundred ideas in the first six months they’re around before we can change them and program them. But one of those ideas will be good. And as long as we’ve got a system that’s receptive enough to accept that, then that person just paved the way for the next couple of years.

**CHRIS MACINTYRE** But the industry doesn’t take in young people. It doesn’t attract them. Take Queen’s University as an example — Right now there are 120 mining engineers graduating from Queen’s Engineering. How many jobs are they going to get? Five? They’re going to be driving buses for the City of Kingston.

So you’re going to have these huge age gaps in the workforce and you start losing information being passed down. And then what? Instead of these cycles, there needs to be a better way of bringing these people into the business in different ways.

**ANDREW CHEATLE** In our industry at the moment there’s a complete dearth of mining analysts looking at exploration companies. It’s very difficult for the individual investor to gain an understanding of our industry and to receive sound advice. Those of us that know a bit more about it can still muddy the waters. But it is actually a very appealing industry. There is a romance, I think, still in this industry and an opportunity for people to make very good returns on their investments.

**ROB MCEWEN** We’re a cyclical business, but you don’t have many companies that have been able to go through the cycles. In cyclical businesses, you’ve got pulp and paper and other areas that are consistent performers. There are a few, but not many.

And I just think that most of the analysts right now are hiding under rocks. They don’t want to look at anything other than the cash flow. If you don’t have that, they don’t want to talk to you — they consider you a “sell.”

**GEOFF BURNS** When you’re making an investment decision, what commodity price do you use? That is the big question and ultimate gamble that this business takes. And I’ll confess, we made some bad pricing assumptions three or four years ago on a couple of things. Now we’ve gotten way more conservative on our pricing assumptions.
Another challenge for the industry is we’re seeing the disappearance of a lot of the members in the investment community. The smaller ones have been concentrated in the hands of the banks. A lot of mining companies will no longer be relevant or be able to be followed because they’re too small. And we’re seeing just an attrition in the industry … so the only real place to make money is investment banking, and that’s also being squeezed.

CATHARINE FARROW It’s a really sad case in that we IPO’d in July with BMO’s help and less than 20% of it came in from Canada. The rest was either U.S. or Europe. Where Bay Street used to be a hub globally of mining investing and venture capital, it’s gone. It was pretty dry. Yes, the U.S. is happy, there seems to be some excitement in Europe, but, boy, I’ll tell you, down the street on Bay is pretty dismal.

Calum Semple Any good management team is not just looking at today, they’re looking ahead. And they’re not just looking at the portfolio; they’re looking at the team, they’re looking at succession. So Geoff and Chuck can say, “Hey, I’m off to retire.” And they can stand in front of their shareholders and the day they tell them they’re retiring, the share price doesn’t hit the floor.

The one thing that concerns me probably the most when I look at the good management teams, is they haven’t all done a great job at succession.

—CALUM K. SEMPLE

**Best way for management to increase ROI**

<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Better financial discipline in deciding which projects to develop</td>
<td>10%</td>
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<tr>
<td>Better financial discipline in mergers and acquisitions</td>
<td>47%</td>
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<tr>
<td>Consolidation of mining companies to reduce G&amp;A</td>
<td>5%</td>
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<tr>
<td>Teleremote mining and automation to reduce labour costs</td>
<td>1%</td>
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<tr>
<td>Better cost estimations in feasibility studies</td>
<td>20%</td>
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<tr>
<td>Better negotiation by miners of tax regimes</td>
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<tr>
<td>Changing the composition of boards of directors and C-suites to have them more focused on improving ROI</td>
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Better financial discipline in deciding which projects to develop | 10%
Better financial discipline in mergers and acquisitions | 47%
Consolidation of mining companies to reduce G&A | 5%
Teleremote mining and automation to reduce labour costs | 1%
Better cost estimations in feasibility studies | 20%
Better negotiation by miners of tax regimes | 1%
Changing the composition of boards of directors and C-suites to have them more focused on improving ROI | 7%
More pressure from shareholders on management to focus on ROI | 7%
Hiring of consulting companies to improve management performance with respect to ROI | 2%
More outsourcing of infrastructure development | 1%
The downturn will come to an end, eventually — yet when it does, it won’t be business as usual. Decisions must be made, actions taken and opportunities seized. Miners need to act now — today — because tomorrow may simply be too late.

At PwC, we’re committed to helping mining companies understand the challenges the industry is facing over the next 10 to 20 years and how their businesses can evolve to meet and overcome these challenges.

We believe there are options for every mining company in today’s market. We’ll help you explore and evaluate these options — from optimizing your assets and portfolio to tax structuring and transaction evaluation, all focused on optimizing value with the latest tools and techniques developed specifically for mining and leveraging our broader industry base. And we’ll work alongside you from mine-site to boardroom as you execute your strategy and emerge from the downturn ready to build a mine for the future.

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