

Shaping our future
Address to the Sydney Mining Club
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Good afternoon and thank you for the introduction Julian.

I would like to acknowledge the Gadigal people of the Eora Nation as the traditional custodians of this place we now call Sydney, and I pay my respects to their elders, past and present.

It's great to be here to address the Sydney Mining Club, and thank you for the opportunity.

It's almost three years since I took up the reins as CEO at Newcrest and the time has just flown by.

While it hasn't been easy, it's been very rewarding to put Australia's largest gold mining company back on a firm footing.

I quite often get asked about how we've gone about the turnaround of our business over the past few years. So today I would like to share some of Newcrest's journey with you.

But I don't just want to look back.

I'd like to look ahead and prompt greater discussion about how, as an industry, we can tackle the challenges and opportunities that lie ahead. How we can shape our future.

What's at stake is the long-term prosperity of Australian mining.

Let's set the context first, and reflect on where we are up to as an industry today.

The mining industry has proven itself to be a master adapter.

We have come out of one of the most turbulent periods in recent history and find ourselves not diminished, but stronger.

In Australia, the mining industry is three times bigger today than it was a decade ago.

Employment is nearly three times higher.

And resources exports are expected to reach record levels in this financial year.

This is remarkable when you consider the dramatic change in some commodity prices experienced over the past five or so years.

The gold price lost around a third of its value between the peak price in 2011 and mid-2013.

As they say, necessity is the mother of invention and the gold industry has been able to adapt to these much more challenging conditions. And that's because we've had no choice but to do so.

We have a rich history of this in mining.

This chart shows the copper price over the 1900s, more or less to today, as well as the industry costs during that time.

What you notice is that despite the fluctuations in price, the industry as a whole continues to adapt by finding new ways to reduce costs, maintain positive margins and meet increasing demand.

I've picked copper in this instance, but it is equally applicable to other commodities.

So, we know that when we are up against it, we had better adjust and adapt.

Right around the mining industry, this is what has happened over the past five years.

Miners have dug deep to cut costs, increase labour and capital productivity, generate cash and reduce debt.

And we are in a much healthier position today.

It is a position we must work hard to preserve and build upon.

What's good enough today won't necessarily be good enough in another three years' time.

The global markets we operate in are fiercely competitive and the challenges will only become greater.

The more attractive ore bodies are being exhausted.

Grades are declining.

New opportunities are in challenging depths and locations.

Energy costs are rising.

We must look harder and work smarter in order to create value.

The Australian resources industry should not be waiting for these challenges to get on top of us.

As a country, we are well-positioned to rise to the challenges that are coming our way.

Individually as companies, and collectively as an industry, we should be working to make our own luck.

Today I'd like to share a bit of the story with you about how Newcrest has restored itself to financial and operating health since the rapid fall in the gold price.

And how we are gearing up for the next set of challenges that will shape our industry.

It's well known that in 2013, Newcrest was in a tough position.

In 2012, the gold price – after having cracked the 1900 US dollar mark – started to fall.

In mid-April 2013, gold suffered its greatest two-day fall in the previous 30 years. And it fell further after that.

But input costs remained high, as the rest of the resources industry was still enjoying high commodity prices.

And Newcrest's costs of production, which had risen from first quartile in 2009 to third quartile in 2012, were suddenly uncomfortably close to the gold price at some of our mines.

The whole gold industry had a very long period of increased prices and as a result a lack of discipline had crept in.

We had to work quickly to improve our operational performance. To reduce our costs and expenditures. And to increase cash flow to restore our balance sheet to health.

I had personally had a lot of experience in tough cycles. I remember:

- lead-zinc in the mid 80s and 90s,
- nickel in late 90s and early 2000s
- and the aluminium price collapse following the massive growth of capacity in China.

In fact, I had just done a turnaround in the aluminium industry, and was able to bring some of the thinking and methods we developed there to Newcrest.

When I joined Newcrest in 2014, the company had already taken some initial steps to reduce costs but we were in a lot of trouble and the performance of our Lihir mine in PNG was a critical issue.

Our debt was very high and we were bleeding cash.

We needed to take rapid and transformative action.

There are two essential parts to any business transformation: performance and culture.

They go hand in hand.

As far as our performance was concerned, our first move was to introduce a transformation program we call 'Edge'.

It was about prioritising safety, operational discipline, cash and profitable growth.

And it is embodied in the slide behind me.

We went about this by initially doing a completely dispassionate top-down analysis of the company followed by a detailed bottom-up confirmation.

We set genuine stretch targets for our performance. Targets that weren't immediately obvious that we could achieve.

If you know how you're going to deliver it before you set out to do it, it's probably not a stretch target.

That's where the name of the program – Edge – came from. It was about us pushing the envelope to define the edge of what was possible.

The underlying mindset was that, if we were the owners of the company, what would we do, what could we achieve?

It's well known that privately owned companies regularly outperform listed ones. The reason for that is that managers in these firms act like owners.

They are focused on generating cash on cash returns – using their funds – be it capital or operating cash – in a way that delivers sustainable returns.

If an initiative will cost \$1 million to implement, but return \$2 million in short order, you do it.

Indeed, the question you will be asked is *'why haven't you delivered it already?'*

We have empowered our frontline to think in this way and it is helping to bring a whole range of business improvements to the fore.

The owner's mindset also drives a sense of urgency. What we call a bias to action. If you see an opportunity, you have an obligation to act on it, otherwise you are burning cash.

In practical terms, we drive this sense of urgency through a 'weekly cadence'.

That is, we record each initiative and target timeframes for execution, and we track their progress each and every week in short, sharp 'performance meetings'.

This is where the operational discipline comes in.

The process has empowered some great improvements to be made to our business, and the ones I like best are those from our people on the frontline.

For example, one of our engineers at the Lihir mobile maintenance department has instigated four Edge initiatives with a combined value of 1.5 million US dollars to the business.

He came up with a plan to repair recoverable tyres, rather than writing them off, with a view to saving the business around 850,000 US dollars.

He and his team also eliminated the main cause of engine breakdowns on our haul trucks by installing magnetic filters to prevent contamination from metallic debris.

When we asked this young engineer about his seemingly unstoppable appetite for these initiatives, he told us that he found the Edge process immensely satisfying. He liked identifying initiatives and tracking them through to completion.

At Cadia, our ore processing team was battling regular trips in the motor that drives the high pressure grinding rolls for our main concentrator. They discovered that blockages in the water pipes were tripping the motor.

Preventing these trips would return 5 million dollars to the bottom line. However, the next available opportunity to install a long-term fix was three weeks away during a maintenance shutdown.

In earlier times, I suspect that the team might have just waited for that shutdown.

But their owner's mindset resulted in that team buying six pumps for a backyard pool from a local shop, having them shipped to site within a day and installed a few days later.

That small initiative saved around 350,000 US dollars in just a few weeks.

And in another example that I really like, a couple of our guys at our Telfer mine in the Pilbara saw how much time was being consumed by manually cleaning out underground stopes using metal scrapers. It was a full day's work.

They investigated using a water cannon and then worked with an engineering firm to redesign a water cannon product for this purpose.

The deployment of this solution improved safety, cut stope cleaning time by 75 per cent, and the capital required was paid back in less than a year.

It has now delivered in the order of \$1.5 million in value back to the business.

This is the essence of Edge.

Frontline employees taking the initiative to make the hundreds of relatively small fixes that are making a real difference to Newcrest.

And this has without doubt been one of the most rewarding parts of the transformation for me – witnessing the ownership and commitment from our people to improve the business.

I mentioned earlier that there are two parts to a transformation – performance and culture.

I don't believe you can have a great company if you have a poor organisational culture.

And hopefully some of the examples I have just shared with you illustrate the culture that we've instilled.

At the outset of this transformation process, we identified a set of management practices that are associated with companies who are renowned for operational excellence, and we adopted these as our guideposts for how we work together.

They're things like 'bottom up innovation', 'personal ownership', and 'employee involvement'.

These are a great complement to Edge, and they have helped us to deliver a real improvement in the business culture.

We measure the health of our organisational culture each year in a mass survey of our workforce. And we have gone from the bottom quartile to the third quartile and then the second quartile, when you compare our performance to that of the other 750 companies in the global database.

A dramatic improvement.

This focus on culture and performance has underpinned the big improvement in the company's health.

Our all-in sustaining cost has come down from around 1300 US dollars per ounce in 2013 to 713 US dollars in the last quarterly results.

We have also reduced our net debt by over 1.8 billion US dollars. And halved our leverage ratio.

While I think this is a great story and achievement, we're not the only ones in the gold industry who've put their shoulders to the grindstone over the past few years.

Our peers have also been improving and the whole industry cost curve has moved down, by about 12 per cent on average. This chart shows that shift.

If I can use a sporting analogy, I could say that we are all feeling a lot fitter.

And that's a good thing, because we need to be on our game for the next set of challenges on the horizon.

We know they are coming – we're already feeling some of them – and the Australian mining industry should be drawing on all of its natural and acquired advantages to get an edge on our international competition.

We are already navigating a larger set of challenges than in generations before, including:

- operating within more complex political and social landscapes.
- arresting the long term decline in mining productivity

- and increasing costs of doing business – particularly in Australia where high labour costs are being supplemented with eye-watering rises in energy prices that are causing considerable pain.

It's not an industry for the faint-hearted.

The challenges I would like to focus on today relate to positioning ourselves to be competitive and profitable as ore bodies become deeper and lower grade.

Our ability to access new orebodies will depend on us becoming a lot smarter and a lot more efficient about our mining and processing methods.

So, let's look at the challenge of going deeper.

As you will know, the top 100 to 200 metres of the Earth's crust has been heavily explored in most regions.

That means that we will need to go deeper under cover for the next generation of discoveries, and that is both expensive and time consuming.

If and when you do find one of these deeper deposits, you have to be able to mine it cost-effectively.

And that's where many in our industry come up short: the economics often don't stack up.

So we need new methods to make the mines of the future viable.

Then there is the challenge that ore bodies are declining in grades.

Take gold for example: in the 1960s and 1970s, the global average gold grade was 12 grams per tonne of ore.

Today it's about 1.5.

And it's declining across a range of commodities at an average rate of 2.7 per cent each year.

Combine this with the substantial decline in total factor productivity over the past decade or so, and the result is lower overall global mine productivity.

That means that we are going to have to find ways to process ores more efficiently.

Innovation will be at the centre of our ability to deal with these challenges.

The technologies and the processes of the past won't be enough to help us make the next productivity step change.

We will need more breakthrough thinking. And we will need it faster.

We need to raise our level of ambition – not only as individual enterprises, but collectively as an industry.

Not acting will see our individual businesses, and the Australian mining industry more broadly, decline within the highly-competitive global market.

Today, we are a leader. But we cannot take this for granted.

Witness how South Africa's gold mining sector has slid from a position of global dominance to sixth place behind China, Australia, Russia, the United States and Peru in 2016.

That's as power and labour costs have increased and material mined has become deeper and lower grade.

If Australia is to remain a major force in the global mining industry in the next century – both here and offshore – then we will need to do things differently.

We will need to build an innovator's mindset.

At Newcrest, we have defined this as:

- Firstly, having a transformative vision – that is, knowing your objective, but not the solution for getting there.
- Second - being prepared to experiment and to fail
- Third - collaborating with others. Drawing in those who can offer expertise and ideas to find a solution faster.
- And finally – fast adoption. Putting the solutions into practice quickly.

Let me give you a flavour of how the innovator's mindset has shaped the way we meet the challenges at Newcrest.

The most significant example is at our Cadia operation near Orange, a four-hour drive from here.

In 2012, Newcrest began mining its new Cadia East underground mine – the third mine at Cadia.

It is more than one kilometre underground and is one of the lowest cost gold mines in the world. It's a world-class asset.

But it didn't always enjoy this status.

There was a time when it was regarded as too deep and too low-grade to be economic.

And it still would be today if Newcrest hadn't entered into an ambitious collaborative innovation project in the 1990s.

Cadia began as an open pit.

It was a solid asset, producing 4 million ounces of gold. But it was always going to become high cost over time as the pit got deeper so we needed to look at our other options.

We had two further deposits at the operation – Ridgeway and Cadia East.

We developed our Ridgeway underground mine using the relatively common technique of sub-level caving.

This had an average mining cost of approximately 11 Australian dollars per tonne.

Meanwhile, our giant Cadia East deposit lay there untouched, represented by a 'zero' on our Reserves ledger. We didn't know how to access it profitably.

Then an opportunity opened up which would bring this giant deposit into play and ultimately revolutionise the whole Cadia operation.

We joined an international caving study with participation from CSIRO, Rio Tinto, Codelco and others.

We wanted to find a way to prove a safe and dependable method for bulk underground mining, which would deliver a productivity step change.

We each trialled different caving techniques – Newcrest using Ridgeway as a test site – and sharing our learnings as we went.

The collaboration was important because if it had been left up to any single one of us to nail the techniques on our own, we would probably still be refining them today.

By 2005 Newcrest had the confidence that it could safely and reliably develop block caves in deep, strong ground.

So as a first step, we developed our first block cave at Ridgeway Deeps.

That allowed us to drop the mining cost to around 7 Australian dollars per tonne.

We then thought, this is interesting, let's take a fresh look at our Cadia East deposit. Can we mine it cost-effectively enough to justify the 2 billion dollars of investment required to build the mine?

The answer was yes. And in 2012, the Cadia East block mine was opened.

We had found a way to make an 'uneconomic' mine into a profitable one.

So industry collaboration and experimentation have delivered a very valuable capability to Newcrest, and an important example of how we can shape our future.

And it's not only in the area of mine design.

We also need to be smarter about how we process ore.

There is some excellent work being carried out by our leading research and innovation institutions right now, to help us adopt more sophisticated, and more selective approaches to ore processing.

In many metalliferous mines, around 20 per cent of the rock has 80 per cent of the metal.

And standard practice is to grind everything.

But what if we could find a way to more efficiently separate out the metal from the rock?

If we could crack this problem, it would lower unit costs, reduce energy and water consumption, make otherwise uneconomic mines profitable and secure longer-life operations. And that would be good for everyone.

Newcrest was pleased to be an early partner of CRC ORE, which is working to improve overall productivity in Australian mining and processing.

In its first collaboration with industry a few years back, CRC ORE worked with our Telfer operation in the Pilbara on a large experimentation program to identify at which point in the process we could liberate waste from ore.

We collected loads of samples over a six month period and our tests found that we had been putting SAG mill scats through the plant that were near tailings grades.

Armed with that knowledge, we could then reject the scats, which boosted our processing rates by 20 per cent and reduced unit costs, with a very small impact on recoveries.

The beauty of this collaboration with CRC ORE is that they have now been able to share the learnings with other program participants who have benefited also.

So it's been an important advance for reducing unnecessary processing.

But the journey isn't complete.

The techniques are still in their infancy, and we need to expand and accelerate this co-operative R&D work in order to refine the approaches and technologies as soon as we can.

We could all go it alone, but broad-based industry co-operation will get us there faster and as they say, 'a rising tide lifts all boats'.

So it would benefit the Australian mining industry for us to seize these opportunities for collaboration.

Another significant challenge and opportunity for the mining industry is our relatively low asset utilisation.

This chart shows our overall equipment effectiveness, based on global data collected over the past 10 years across a range of industries.

You can see that a sizeable gap exists between ourselves and our peers in the oil and gas sector, who are operating at or near world-class OEE levels.

So, relatively speaking, there is huge potential for us to improve our productivity. And while the processes differ, we obviously have a few things to learn from oil and gas in particular.

For me it begs the question of what it would look like if we were able to run all of our assets at comparable OEEs?

It would need a different mindset, including one of continuous manufacturing, rather than the stocks and flows that characterise much of the mining industry.

The digital evolution of our mining operations could make a significant contribution to improving asset utilisation rates.

This evolution has been under way for decades.

But in recent years, we have seen big advances in technology, instrumentation, interconnection, processing power and big data analysis that provide a platform for step changes in productivity.

And so at Newcrest we have got a large program under way to leverage the enormous amounts of data we're collecting to improve our business.

Over the past two years, we've entered into a collaboration with a great little organisation called Uearthed.

Uearthed convenes hackathons for the resources sector.

And for those who don't know, hackathons are intensive competitions for programmers, data scientists and engineers, typically university and Masters students, to produce the best prototype solution to an industry challenge.

During one of these hackathons, we came across a data-science start-up called Petra, who we began working with to develop predictive models that could accurately forecast mill overload events.

At Lihir, our three mills had been experiencing multiple overload events each year, resulting in significant downtime.

Traditional engineering-based approaches had failed to adequately identify when overload events would occur.

Over 360 million lines of data across 130 variables were collected, and by cross-referencing this big data, the Petra team was able to identify causal factors and develop machine-learning algorithms which could predict future outages.

Newcrest created a visualisation of the algorithms in its analytics platform, and Lihir's control room operators now receive advance warning of any likely overload events.

Whereas this advance warning might have once been 1-2 minutes before the mill overload took place, the algorithms now help them to detect early warning signs much sooner. Perhaps an hour in advance.

And that's valuable time when it comes to preventing an event that could cost in the order of tens of thousands of dollars in lost productivity.

By May 2017, four months following the introduction of the algorithms to Lihir's three mills, no overload event had occurred.

So these are the sorts of data science solutions that we have been deploying in collaboration with the data science and start-up community.

And we expect them to increase our asset productivity and generate tens of millions of dollars in additional value for Newcrest.

So innovation, and particularly collaborative innovation with industry partners, is playing an important role in driving the next productivity leap for Newcrest.

And more collaboration is needed among miners and research institutions to accelerate our progress on all these fronts.

In Australia, we have a great advantage in being a hub for many resources companies, having access to a highly-skilled workforce, and being home to many world-class research and innovation institutions.

We must leverage this valuable base in order to build our competitive advantage within the global market.

And continue to sustain and grow the Australian mining industry, and the important contribution it makes to our nation's prosperity.

Thank you.