Value creation through innovation, productivity and partnership

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**Check against delivery**

Thank you for the introduction and let me start by paying my respects to the Traditional Owners of the land on which we meet, the Turball and Jagera people.

It is fair to say we have seen a lot of change since we gathered here in 2013.

It seems daily media coverage and, more recently, the Federal Budget are full of discussion on the impact of a fall in commodity prices.

We are seeing the commodity cycle living up to its name at present, which comes as no surprise to those of us who’ve been in this business for any length of time.

These are tough times for many in our sector, therefore the subject of my talk today, "value creation through innovation, productivity and partnership", is more important than ever.

While we still have a long road ahead of us, productivity and innovation are well embedded in Rio Tinto’s DNA - it gives us a competitive advantage over others in our sector and positions us to deliver value in the tough times and the good.

I would be equally comfortable with the title of my speech if I were giving it five years or ten years ago, because those key themes - innovation, productivity and partnership - have been at the core of Rio Tinto for decades.

It is the way we seek to operate our business, for the long term, riding out the highs and lows of the cycle, and in so doing driving value, creating wealth, and building opportunity for our shareholders.

I expect many of you will be following the national conversation about the role mining and the resources sector more generally can play in Australia’s economic future.

Productivity is key to this discussion.

The Australian mining sector must continue to embrace the challenge of innovation and productivity, if it is to gain a competitive advantage on the global stage over coming decades.

Rio Tinto, for one, is already starting to deliver the next wave of productivity improvements through innovation and I’ll talk today about some of this work.

There is a role for Government to play, as my colleague Phil Edmands explained earlier, but much of the response must come from the resource companies continually challenging themselves to be leaner, smarter and more productive.

Today I want to share some insights into the initiatives and programmes that are delivering added value for Rio Tinto: from our Mine of the Future™ activities, to operations and process excellence centres, to Big Data and automation, and the people who are at the heart of all of this.
These initiatives and programmes are not just R&D experiments, but in many cases are proven, are happening now, and are delivering productivity gains.

After all delivering productivity is what it’s all about.

As the economist Paul Krugman put it: “productivity isn’t everything, but in the long run… it’s everything”.

Now Paul won a Nobel Prize, and who am I to quibble, but from my perspective productivity is everything – both in the short and long run.

Why? Because the most productive are best equipped to shape their own futures.

First though, let me set the scene with a quick overview of where we operate with a brief world tour.

The 140-plus year history of Rio Tinto would be well known to many of you. Today we operate in 40 countries with 60,000 employees worldwide.

We have operations in almost every continent. Some are better known, like our iron ore operations in the Pilbara, bauxite at Weipa and coal here in Queensland.

Some are less well known like our 143-year old borates operation in California or Diavik diamonds on the edge of the Arctic Circle in Canada.

We are the world leaders in iron ore, but we also have a unique position in aluminium, with 80 per cent of our smelters at the bottom of the cost curve – upon commencement of the Kitimat Modernisation Project - predominantly powered by hydro and low carbon sources.

And we have new operations such as Oyu Tolgoi in Mongolia which we can monitor and improve from here in Brisbane at our Processing Excellence Centre, but more on that later.

Having great assets is one thing, but a disciplined focus is also required to create sustained value.

That is why we have a relentless focus on efficiency and productivity. We seek to ensure every dollar is spent wisely - every dollar in capex and opex. Every dollar in working capital, or in value-creating technology and innovation.

I have often said you cannot apply great technology - such as automation - to a poorly run operation and expect a good outcome. You just end up with a poorly run, high-tech mine.

The new technology or approach needs to be embedded as a part of a high performance culture of continuous improvement and operating excellence.

This is where Rio Tinto truly excels, bringing innovation and technology to bear in well run operations.

We take genuine pride in running our business as efficiently as we can, but it is important to point out our business also extends beyond the mine gate.

For there is a lot of value to be captured at the start of a project, through its supply chain, and also in the marketplace with premium products.

In logistics, for example, our Pilbara network of 15 mines, 1700kms, 4 ports, 11 berths, and a fleet of 200 vessels is integrated, innovative and immensely valuable.

So much of the value we create is along this entire value chain, not only in the pit.
And as a company we have great customer and consumer insights too; two examples spring to mind:

- our Aluminium business which works with the car manufacturers on new alloys; and
- our Diamonds business which has created new markets for champagne and pink diamonds.

Rio Tinto has a great history, and tradition can be a great source of strength, but we are also very aware that it can create inertia and resistance to change.

That is one of the reasons why we created our Mine of Future™ programme in 2007, to bring new energy and a new focus to a number of our innovations and, I should emphasise, also to our operational activities.

**Rio Tinto’s Technology and Innovation team**

The fact our Mine of Future™ captures the public’s imagination with “mission control” data centres and autonomous trucks is a good thing if it helps modernise the public’s understanding of our industry.

There are a lot more elements to our activities and we leverage a network of external partners to drive productivity.

In the time I have available let me just touch on two areas (i) project shaping and delivery, and (ii) driving productivity through innovation.

In project shaping and delivery we ensure Rio Tinto not only “does the right projects”, but also “does the projects right”.

Our strategy planning team works with our product groups to “shape” valuable development options so that attractive projects get the best start and the non-economic are reworked.

In addition to this project shaping we have a technical assurance team providing independent assessments to ensure investment decisions are rigorously reviewed and technically sound.

Our Projects team has delivered some A$20 billion in capital expansions in our iron ore business over the past five years and the project execution performance compares very favourably against industry norms in a time of cost inflation.

We’re delivering more than a dozen projects, from the Pilbara iron ore growth pathway 360 projects, to the Kitimat Modernisation Project in Canada and to some lesser known but operationally important projects such as the East Waste Rock Extension project for our copper operations in Utah.

My team is contributing to studies as diverse as:

- The South of Embley bauxite project here in Queensland;
- Mount Pleasant project and Hail Creek mine transition in our coal group;
- Zulti South mineral sands expansion in South Africa;
- Simandou iron ore project in Guinea; and,
- Oyu Tolgoi copper expansion project phase 2.
So if they are some of our project shaping and delivery roles, let’s look at how we drive productivity through innovation.

Our innovation focus encompasses a range of new ways to drive productivity through creating and adapting both automation and new technology platforms to our business.

Let me briefly share a few automation examples.

Autonomous Haulage System (AHS) - We are the largest owner and operator of autonomous trucks in the world with 57 trucks operating across three sites in the Pilbara and we are focused on optimising productivity through additional autonomous technology. Anyone who has seen these 300 tonne, three-storey high Komatsu trucks cannot but marvel.

AutoHaul® - Our newest innovation is AutoHaul, which will deliver the world’s first fully-autonomous heavy haul, long-distance railway system. It will eliminate the need for around 70,000 kilometres of remote area driving each week to get train drivers in place to start or finish their shift, as well as provide flexibility in scheduling and eliminate driver changeovers.

Autonomous Drilling System (ADS) - Our West Angelas mine in the Pilbara is now the world’s first full-time autonomous drill mine with seven rigs in operation having drilled almost two million metres by June.

Adopting ADS and AHS technology means we can leverage a third technology: our Rio Tinto Visualisation system (RTVis™).

RTVis™ - Imagine an ultrasound. A three dimensional image of the deposit delivered in real time to match the geological model inside the pit to the GPS-controlled block models to mine and extract the ore down to metres and centimetres if need be. Currently in operation at four sites in the Pilbara, it is also in trials in the Copper & Coal product group.

But innovation must have a focus and outcome - and for us that must be productivity.

Thanks to our Automated Drilling Systems (ADS) - now less than a year in the field - we have seen a 10 per cent increase in equipment utilisation and significant improvement in labour productivity at West Angelas in the Pilbara.

Combining that with our RTVis™ platform means we have greater ore recovery through sharper boundary identification, more accurate drilling and blasting, reduced explosive usage, improved waste classification and enhanced dig rates.

So what’s the productivity gain? At West Angelas, a high-grade recovery programme has enabled a two per cent increase in high grade ore recovery. And at our Yandi mine, more than 1 Mt of material has been reclassified from assayed waste to a high silica ore product, which is used in the blending process.

The use of both ADS and RTVis™ means our fleet of trucks is moving less waste and carrying more valuable ore.

And what of our fleet? At our Hope Downs 4 site our automated trucks have load utilisation rates 14 per cent higher than manned trucks and their operating costs are 13 per cent better.

And what of our maintenance of our fleet of trucks?

Well using asset analytics and the power of Big Data we can better predict and extend component life, improve maintenance schedules and, most importantly, reduce production down time.
For example there are more than 200 sensors on a haul truck. Rio Tinto has approximately 900 trucks and every day almost five terabytes of data is produced by this fleet of trucks.

How can we further harness the benefits of Big Data? Through our technology platform of operations and excellence centres.

For many years our most capital intensive business has been our Pilbara iron ore operations, which is why we established our Operations Centre outside Perth airport.

Similar to an air traffic controller, we wanted to see all the moving parts of our operation and run them as efficiently as possible.

Our Perth Operations Centre plans and operates our drills, trucks, plants, mines and rail system.

The knowledge we have from Perth we are now sharing across the company.

In Quebec in Canada we have the Aluminium Operations Centre to provide 24/7 technical support in real time for our primary metal smelting activities.

And in the Hunter Valley in Australia we are currently commissioning a smaller scale operations centre that brings together our mine control and coal monitoring teams.

The aim is to replicate the benefits we have achieved in the Pilbara and see how we can optimise the value chain and co-ordinate in the Hunter Valley our 11 operating pits, five wash plants and 100 kilometres of rail to the port.

Supporting our sites and operations centres are our excellence centres. They provide some compelling examples of Big Data and leveraging our international network.

In March last year here in the Brisbane suburb of Milton, we opened our first Processing Excellence Centre (PEC).

The PEC pulls together our own process engineers, analytics teams and external partners to examine real-time plant data to provide expert solutions to operations as far away as Mongolia and Utah.

The PEC team has successfully helped improve the performance of a number of our copper and coal processing plants and their good work continues.

They utilise this new technology platform to reduce processing variability, improve recoveries and reduce raw material consumption - or to put it another way, to improve productivity.

We also have our new Analytics Excellence Centre (AEC) in Pune, India. The team uses Big Data and small data, mathematics, machine learning and advanced modelling.

Internally, the AEC team likes to talk of "predictive asset health solutions."

Externally, we just say they seek to "identify problems before they occur."

For example ‘data scientists’ assess massive volumes of data captured by the array of sensors attached to Rio Tinto’s fixed and mobile equipment. This enables our team to predict and prevent engine breakdowns and other downtime events, significantly boosting productivity and safety.

These initiatives are not just R&D experiments, they are proven, happening now, and delivering productivity gains that we embed in our business.
So if they are a few of the productivity gains with clear dollar values to our business, let’s take a moment to look at some of the intangible benefits of a technology and innovation focus too. For example:

- **Planning and knowledge** - Having great knowledge of ore bodies and the precise state of our mines, plants and networks means better planning and greater certainty. We can never have perfect knowledge, but for budgeting, scheduling and planning the data is of immense importance.

- **Work life balance** - Facilities such as our operations and excellence centres mean less travel, more varied careers and a chance to attract an increased range of people and skills. We can show that our industry offers a broad variety of skills and opportunities.

- **Safety** - Technologies such as autonomous trucks and drills significantly reduce employee exposure to hazards and risks associated with operating heavy equipment, such as fatigue related incidents (particularly on night shift) and also sprains, strains and other soft tissue injuries.

- **Amenity** - We all know industry can be a noisy activity at times. In the Hunter Valley we tweaked the software in 79 of our Komatsu 830Es to alter the electric drive system and achieve five per cent savings in fuel – you can do the maths on 70 million litres a year. But maybe just as interesting was the two decibel reduction in noise.

- **Emissions** - And if innovation is where we can make step changes, consider Canada and our US$1.1 billion Arvida Aluminium smelter. Our leading-edge AP60 technology is some 40 per cent more productive than its predecessor and when powered by hydro emits six times fewer GHG emissions than aluminium in China.

Why do I mention these? Because at times there is a lack of understanding in the wider community of how each year we make our operations cleaner, greener and safer so that productivity as an output also leads to better social and environment outcomes.

**Partnerships are the key**

We would not have been able to achieve these productivity gains without collaboration. And it is not only academic institutions; we also partner with businesses, original equipment manufacturers (OEMs) and customers. So it’s great to see a number of our partners here today.

We recognise we cannot do it all ourselves and that is why we have a partnership network of institutions in Australia and around the world. By way of a few examples:

- In Sydney with the University of Sydney we focus on mine automation with the world’s biggest commercial privately funded external robotics initiative. This collaboration was also the basis for our trial of the new autonomous drill technology.

- In Pune in India, the analytics centre I mentioned is a partnership with global business processing group IGATE.

- In China with Chinalco we are exploring opportunities to develop the next generation of initiatives in technology and innovation to benefit both businesses.

- In Perth with the University of Western Australia we are pooling our knowledge in orebody geology and advanced physics in the development of an Airborne Gravity Gradiometer.

Partners make all the difference, opening your eyes to new applications and new horizons.
Australia’s productivity challenge

Some media reporting and official statistics suggest Australia’s national productivity is declining.

While one can argue the validity of the statement, what is clear is that as an industry in absolute terms we move a lot more dirt for every tonne of saleable ore than we did a decade ago.

What we do know is that given the investment across the sector a lot more tonnes will be available for export in the future, but the key to economic extraction will be productivity.

These are challenging times not just for the mining sector but for the mining equipment technology services (METS) sector too.

Given Rio Tinto’s scale and global procurement, strategic sourcing can seem a barrier to some smaller METS firms, but I suggest it should not be.

If your idea is valuable at a local or mine site level, it is likely it has greater value globally to us.

My suggestion to the METS industry is help us to continue to reinvent our business from the inside.

There may well be technologies from manufacturing, food processing, oil and gas or aerospace which are ripe for application.

Whilst it is a challenging environment, the desire to innovate and deliver productivity gains faster is even stronger now.

Australia has been a world leader in METS for many decades and we believe that will continue.

You and I know that at face value a one per cent improvement may not seem a lot to some people outside our sector.

But we know that the aggregation of a number of one per cent gains makes all the difference.

For as I mentioned at the beginning of my speech, be it either in the short-run or the long-run, productivity means everything.

Thank you.
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