Digging, Data, and Disruption – Mining in a world of change

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**Check against delivery**

Let me set the context, then cover our asset portfolio, Big Data and our enabling talent.

In the 145 years since Rio Tinto was founded, we have has been forced to continuously pre-empt, plan for, and adapt to change.

We changed our approach and practices in terms of safety because it is unacceptable that people get hurt while doing their job. And we will continue to do so.

In the 1990s, the pioneering approach that Leon Davis introduced to relations with traditional owners in Australia is something we are still very proud of.

From the ancient copper mines on Spain’s Rio Tinto, or red river, to the remarkable speed with which the iron ore business in the Pilbara was expanded to support the building blocks of a once in a lifetime transformation of China over the last few decades, our business’ success has been assured thanks to a willingness to spot the trends of the future and adapt quickly.

We now face what is perhaps the biggest period of change and disruption for a century. We have never before seen such a coming together of trends and challenges. Technology, society and markets are moving in a dramatic way which demands a fundamental shift in the way we think.

If the disruptive revolution of recent years has taught us anything, it is that no part of the economy is immune from these changes. Silicon Valley is taking industry after industry. I do not have to tell you about the industry “earthquakes” in photography, taxi, telecoms and, increasingly, news organisations and auto manufacturers.

We, the mining industry must collaborate and build bridges with the disruptive entrepreneurs. Right now, they are testing their ideas, innovating, and focusing on finding the next big opportunity. This is the world in which we now operate – and we will accept and adapt, or we will be pushed out of the way to join the ranks of Eastman Kodak, Nokia and others.

Active Portfolio Management

Now let me first talk about our recent developments and approach in actively managing our portfolio

I have been lucky to have had multiple careers. During my formative professional years, I spent more than a decade on Wall Street working as an investment banker working closely with the largest Private Equity firms to build and harvest their investment portfolios, executing dozens of transactions. I then made a switch to managing a private investment portfolio in Mongolia, including investing my own cash in a gold mine and running the pit.

This diversity of experience has become more relevant in my latest appointment to manage the Energy & Minerals portfolio of Rio Tinto, which has the most diverse portfolio of assets. It comprises of titanium and
industrial metals, iron ore pellets, coal and uranium, borates and “evergreen” salt harvesting. It is the group where the sun never sets, across nine countries and 14 time zones.

However, what excites me the most are the diverse end uses of our products in everyday live all around us. You will find our products in washing machines, detergents, jet engines, iPhones and iPads, buildings and food nutrients.

They are used in 3D printing, fire protection and really putting food on the table – nutrients and salt. You will even find our products in your Oreo cookies and we put the iron in your daily cereal!

In the near future you will also hear more about our lithium project in Jadar, Serbia, where we are looking to complete a feasibility study next year and bring it into production in the next 5 years.

It is a portfolio which, on aggregate, generated $1.8 billion of EBITDA last year and we are looking for growth options. This return to growth looks different from before. There will be no “second China” driving high growth demand for large bulk commodities. Demand is expected to be stable and moderate. Our resources are also depleting and exploration and expansion will continue to have a large role in delivering the needs for resources.

However, we also need to supplement it with additional avenues of growth including our ability to be nimble and agile in delivering smaller but needed projects.

Earlier this year, we announced the launch of Rio Tinto Ventures which is focusing on the commodities and opportunities which are set to benefit from megatrends:

- Continued industrialisation and urbanisation – think about the migrant workers in China;
- the ever increasing speed of disruptive technology development;
- greater global interconnection of global markets: Alibaba and Amazon;
- all of which is happening in a world where people are living longer and working longer against a backdrop in many Western countries where populations continues to shrink.

These trends, slower GDP growth and shifting consumer preferences for environmentally friendly technology are generating new opportunities for other metals and minerals, currently not in our portfolio, but essential for human progress.

Rio Tinto Ventures will look for strong partnerships with asset owners and joint venture partners. Beyond our core portfolio of large, low cost and long-life assets, we are seeking partnerships where we can add value – through our track record of engineering and operating excellence, sales and marketing channels, existing customer relationships or technical expertise.

Rio Tinto Exploration continues to look for new greenfield opportunities, including in partnership with junior miners. Ventures will be pursuing opportunities at the next phase of the investment cycle. For example, where there is a proven project post Pre-Feasibility Study and in Feasibility Study requiring capital for construction or expansion.

It is still early days for Ventures and, as always, we will be prudent with our shareholders’ capital. With our partners we will seek to maximise returns through active portfolio management of our Energy & Minerals portfolio. This means we will continuously analyse the growth profile of our assets against a set of return thresholds and other criteria, being ready to monetise at the right time for the right value. This is a different approach to how we manage our monolithic big iron ore, copper and aluminium portfolios.
Monetising an asset is a clear lever to deliver value for our shareholders. The divestment of our thermal coal assets in Australia is an example of this. The divestment will deliver outstanding value at the right time but we’re also confident that the assets will have a bright future under the new owner. For them, it will be a core and attractive business. Thermal coal has been historically important for Rio Tinto and exiting at the right time has required discipline. This private equity mindset will be increasingly important, allowing us to recycle capital and continue to grow and pioneer in new areas and commodities.

Data and technology

So what about the actual process of mining? Well, it is a mixed bag to be honest. We have made some strides and progress.

In 2008, Rio Tinto started the Mine of the Future programme. Well before Google’s driverless cars entered the public’s imagination, we began automating haul trucks the size of houses. We have been on this journey for almost a decade and continued to invest even during the downturn. Not just in trucks, but in drilling, fixed plant, and of course, through our AutoHaul automated rail haulage system. Today our automated haul truck fleet numbers almost 70. Last year, on average, each truck operated for an extra 1,000 hours and at 15 per cent lower unit cost than conventional haul trucks.

The exponential growth and seamless exchange of sheer volume of data is often taken for granted when operating these large 300 tonne monster machines safely. Each of our haul trucks is fitted with 45 sensors and generates about five terabytes of data every day. That is 4,500 terabytes across the Rio Tinto fleet of 900.

Each processing plant has another 20 to 30,000 sensors. Our trains, loaders, and ships many more. Properly exploiting and integrating this volume of Big Data has a huge impact on productivity and can provide a significant competitive advantage.

We are increasingly making better use of this data but we are still on a journey. Take the area of maintenance, where we use Predictive Asset Health to extend the length of life of a truck engine by 20 per cent.

I recently saw an amazing example right from the frontline. One of our haul truck drivers with a passion for computer development used his self-taught skills to develop an integrated real time digital monitoring system for the entire pit. This brought together all the existing streams of data in a highly useable, 3D touchpoint, visual platform – integrating drill, dig, load and haul data, equipment performance and availability as well as safety management all in one place.

An example of an outcome would be an increase in speed and decrease in haul cycle time which means we can park up a truck and still achieve the same volume. This is driving significant productivity improvements for the mine and is only possible thanks to the skill and spirit of innovation displayed by one of the team and encouraged by his leaders.

Replicating this spirit is central to our plan to deliver an extra US$5 billion of value through productivity over the next five years. Productivity is about sweating our assets – bringing them to peak performance. We can only do this if we understand where our performance is best in class so we can replicate it.

We have put together a team of experts who have begun to work across the Group to focus on data intelligence and analytics, integrating it into our operational processes. There is a lot of work ahead, but the early returns are promising.
People

So we are investing in resources, systems and processes. But we also need to focus on the talent and capabilities that will drive a shift in the core competencies of the mining professionals of the future. This does not just mean attracting young, smart MIT graduates. It means creating an environment where people can innovate from the bottom up. This means changing our focus from resource-orientation to people, human capital and brain power.

There are more than 3.5 million miners worldwide, including 50,000 working for Rio Tinto in 35 countries. Everything we see around us is either grown or mined and the work of these men and women makes modern life possible. They are a remarkable group of people.

We have to connect the institutional knowledge acquired over centuries with the new intelligence of the future. The combination of grey-haired experience and youthful enthusiasm found on any mine site has always been critical in adapting to change and ensuring continuous knowledge transfer. But the changes the next generation of miners will face are perhaps the biggest yet.

The mining engineer of the future will be as specialised – if not more – in software development as she will be in orebody knowledge. The haul truck driver will no longer sit in an air conditioned cab. They will sit in an air conditioned control room hundreds or thousands of kilometres away. And equipment maintainers will likely be plugging in a tablet before reaching for a spanner.

This revolution also means that our workforce will become more global and interconnected. We are already seeing this. Our data analytics team in India are refining and supporting our exploration on every continent. Some of the best copper process engineers in the world commute through traffic in Brisbane each day to monitor real time and optimise the concentration of copper in the Gobi desert in Mongolia – half a world away.

Automation and these wider workforce changes will of course affect mining communities – positively and negatively. As an industry we have an obligation to work closely with our Government partners around the world to proactively plan for and manage this impact when it comes.

However much we change, we are always going to need good people. In fact, the competition to be employers of choice will grow. The Silicon Valley generation – wherever they live – have different expectations and demands.

Our workforce increasingly expects purpose in their jobs, a well-articulated contribution to the world, and a much stronger focus on development and opportunity.

Whenever J-S travels to our sites and offices he spends time, one-on-one, meeting Graduate level employees. The feedback is shaping how we think about the future – because there is going to be much more competition for the brightest and the best around the world – and without the right people, nothing else is going to be possible.

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In 20 years’ time, we will see this era as a key turning point for our industry. Despite all the changes we have seen in the past, they have been largely evolutionary not revolutionary. What we are seeing now is quite different and requires a new approach.
Like an increasing number of other mining executives, I spend time in Silicon Valley and at places like MIT looking for inspiration. We are increasingly looking to form partnerships with cognitive computer and machine learning specialists, such as GE Predix and IBM Watson, and creating research institutions like the Rio Tinto Centre for Mine Automation at Sydney University.

Personally, I feel a lot of excitement to be part of Rio Tinto’s journey – and indeed the journey of our industry.

To recap, we miners have little choice but to adopt the mindset of Silicon Valley. In our case, Rio Tinto Ventures will seek to take a new approach to capitalise on the megatrends and commodities of the future. We also need to be matching innovation in technology with effective exploitation of big data. Finally, and perhaps most importantly, it’s about people and how we reinvent our capability and attract the dreamers and pioneers of the future.

Making these changes in our approach will help us to stay ahead in a competitive and challenging world being shaped perpetually by disruption. It will also potentially unlock huge returns. These are exciting times.

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