

## **MINE OF THE FUTURE - Nick Holland, CEO Gold Fields**

### ***Summary of presentation at 120<sup>th</sup> anniversary of the School of Mining Engineering at the University of the Witwatersrand, Johannesburg on 23 March 2017***

Gold mining remains relevant and valuable in today's global economy. But for mines in the industry to prosper in the long-term they have to fundamentally transform themselves into mines of the future – mines that are sustainable and create value for all their stakeholders.

Gold mining's contribution to the global economy is significant considering that 60% of the top 30 gold-producing countries are in the low or lower-middle income bracket. About US\$180 billion per annum is added to total GDP. The global gold mining industry employs over 4 million people directly and indirectly, with a 5 – 10 dependency ratio for each direct employee in emerging countries in which Gold Fields operates, namely South Africa, Ghana and Peru. Despite what the gold bears think and say, gold has continued to be a safe haven during times of world crises, from the oil shock of 1975, the Soviet/Afghan war and Iranian revolution in the early 1980's, the stock market crash in 1987 and the latest financial crisis.

However, of late the industry has been confronted by a number of headwinds, which present significant risks to its long-term wellbeing. Today it takes an average of 18 years from discovery of gold to first production compared to 10 years a decade ago. While the grade of gold has fallen 3% per annum since 2000 and prices are dropping, cost inflation is ever-present. Both governments and communities are demanding greater benefits and incidents of clashes with local communities have risen 20% per year between 2002 and 2015.

Throw in a gold price that has declined by around 30% since its peak in September 2011, and it is not surprising that the sector has seen shareholder value slump significantly over the past 10 years.

At Gold Fields, we have recognised that a new recipe is required for the company - and the industry - to overcome these challenges. The gold mine of the future has to be set-up, structured and managed differently from what it is today, if it is to remain relevant and value-adding to all its stakeholders. This will require a focus on four key areas: operating practices and technology, talent and leadership, partnerships with key stakeholders and industry partners as well as governance.

The key operational challenges confronting gold mining can be grouped under four major headings:

- Embracing digital mining, advanced analytics and new software technologies
- Converting conventional mining practices to mechanisation and automation
- Improving the economics of low grade and residual ore bodies
- Embracing energy and water efficiencies

Optimising existing technologies and new technologies will provide the solutions to these challenges, but adoption by the industry has been slow, particularly in developing countries. Mines in Australia on the other hand have been rolling out new technologies with a significant impact on costs, productivities and safety. If mines in other countries want to be sustainable they will have to follow this course.

A number of technology companies are working on software advances in mining, which can be grouped under the “Big Data” heading, where data is captured by various sources, digitised, analysed and finally leveraged for better decision making. This has multiple applications for mines, such as geological mapping, geotechnical design, fleet tracking and operator safety. We believe that such technologies will provide us with the edge to fundamentally change our cost structure and improve safety.

Gold Fields has started embarking on this course of action: at our Australian mines we collect vast amount of data from a number of sources, such as sensors fitted on machinery and equipment and drones that scan our vast tenements. This information is then used for a number of projects and applications such as aerial magnetic surveying, remote fleet management and remote loading, among many other applications.

Similar we are using “Big Data” for an increasing number of applications at our South Deep mine in South Africa. Through telemetry nodes that transmit real-life information we can check the status of equipment and, most critically, inform our underground staff in case of possible emergencies. Remote control operations are also being installed, such as those used for rock-crushing at our ore passes, which are dangerous when undertaken by employees nearby.

A further feature of the mining industry’s technological transformation will be ever closer co-operation with Original Equipment Manufacturers (OEMs). These OEMs develop and operate best-of-class technologies and equipment at various levels of automation. It makes sense for mines to contract OEMs to utilise their expertise. This is particularly critical in South Africa’s gold industry, where the next big mining drive will have to take place in ever deeper and dangerous conditions. Technologies such as remote pillar mining and raise boring will only be possible in co-operation with OEMs and technology companies.

At South Deep Gold Fields is in many ways pioneering bulk, deep-level, mechanised gold mining on a significant scale in South Africa. The skills of operating and optimising of equipment don’t come easy in a mining culture that has been overwhelmingly conventional mining. But we are making gradual progress in setting the base for what could well be the country’s last major gold mine.

To meet these technical challenges, the mining workforce of the future needs to be highly skilled, specialised and trained. Mining companies and universities will need to work together to develop and train the personnel required.

Our relationship with the Wits School of Mining Engineering is such a partnership. The school is 120 years old today, Gold Fields is 130 years old this year. Over the past few decades our partnership has strengthened significantly. Gold Fields has trained and financed thousands of Wits students over the years and the mining industry in general, and Gold Fields in particular, have benefited from their skills sets once they become our employees. In addition, we have funded and sponsored a number of projects at Wits, including the Engineering Library, which we hope will assist students over decades to come.

Without doubt, the mine of the future will have a high level skills set that will lead to a smaller overall workforce. This creates a dilemma for many gold miners as adjacent communities rely on them for jobs and procurement. We need to find a new model for community engagement where

we train some community members for the new mine, but where we also encourage development of the local economy, so it is not reliant on jobs or services from mining alone. In addition, we believe that the most direct benefits for communities can be achieved by implementing shared value projects in these communities, where they and the mine itself benefit from the creation of sustainable value.

While today's mining CEO manages assets, tomorrow's leaders will be strategists, focusing on coaching and mentoring, integrated stakeholder management, collaborative decision making and managing a portfolio of mines. Operating decision making will be devolved down to mine site level.

Forging partnerships, with an emphasis on joint ownership, risk management and shared benefits, will be an essential element of the mine of the future. One of the trends already in evidence is that mining companies are increasingly co-operating in developing and managing gold mines to achieve economies of scale and address capacity constraints. Whether this trend will lead to a more formal consolidation of the gold sector remains to be seen.

The main benefit mines provide to society are job creation and paying taxes and royalties. But increasingly we are also seeing governments and miners work together in private-public partnerships, developing essential road, power and water infrastructure and supporting local governments in building educational and medical facilities. These partnerships, I believe, will increase in size and scope in future.

I also believe that our employees and trade unions need to embrace a risk-reward relationship with the mines that will see them sharing the risks in downtimes and participating in the rewards of strong earnings growth in better times. Wage increases linked to productivity-based performance are also likely to become the norm in future.

The fourth area of focus for the mine of the future is transparency in operational and financial performance, social development, environmental impact, regulatory adherence and corporate governance. The world is becoming more accountable and as mining companies we need to embrace the change and meet the new standards.

Future gold mines will not succeed without the support of shareholders, governments, employees and communities. They are rightfully demanding to see the benefit of the resources we mine. This brings with it many challenges, but through open engagement and partnerships I believe we can create a successful gold mining company of the future.