

## Five ways to get value from digital in mining today

Around the world, we see lots of hype and interest in applying digital technology to mining operations. While there is clearly lots of energy, investment and experimentation, often we are waiting too long for bottom-line benefits.

There are many reasons why extracting value is hard, but we have found some consistent bright spots. We work with many clients to help them identify opportunities to extract value from new technology and have identified five areas where technology can change the game in the short term.

Five ways to get value from digital in mining



### 1. Safety

Any mine today can take advantage of a significant opportunity to use technology for improved safety. There are genuine difference making technologies available in several categories:

- Fatigue management and sleep monitoring solutions that ensure crew members are fit for work and can manage their state of wakefulness while operating equipment
- Use of locator technology either through wearable RFID or helmet-based locators that enable absolute visibility of everyone's well-being in the mine (a real change for underground operations)
- Proximity sensors for people and equipment that ensure collisions happen less often
- Fall detection that immediately alerts the team when a crew member is in a possible life-threatening situation

In most cases, implementing the technology is relatively straightforward. The big challenge is managing the introduction the right way. Because of the way the human brain works, it is extremely difficult to maintain safety without the right reinforcement, starting with Visible Leadership. So, if you don't make it clear that these new technologies are being rolled out because you are uncompromising about safety, then employees will create their own reasons why you're deploying the technology.

### 2. Short Interval Control (SIC) at the front line

We now can get real-time management information to the supervisor at a mine, plant, maintenance, rail, or port. What did the operation do in the last hour? How are we doing this shift, so far? Are we going to make the target? By deploying some simple tools, either with sensors on equipment or data entry on eForms on phones or tablets, real-time management has the potential to deliver 10-20% increases in productivity.

There are some challenges in deployment, specifically, connectivity in remote or underground locations. However, the more pervasive challenges are how to leverage the potential information wave that could be delivered:

- Which KPIs make sense with real time information?
- What frequency of data update makes sense to drive actions?
- How do the supervisors manage in a world where they can see priorities rather than being slave to a "milk round"?
- Managing when the decision making occurs in a remote center?
- What training programs should be provided?

This is a fundamental change in the **job of the supervisor** – you need to manage it.

### 3. Asset planning

Most companies we see have a meaningful opportunity in managing their assets in a more coordinated manner. However:

- Poor linkages from long-range to monthly to short-range plans means that planning becomes an act of science fiction instead of a reasonable stretch goal for the front line
- Often the daily plan is the week plan divided by seven, regardless of crew numbers, grade, state of equipment or other real-world limitation; a target that lacks intellectual integrity
- Plans are in silos; mine, plant, rail, port and operations, maintenance — there is no integration that shows a real-world understanding of conditions on the ground

These limitations lead inevitably to compromise. Since each of the inputs reflect a different reality than the plan, there is no single source of truth. The plans stop improving—as each plan is not rooted in real data, there is no way to tell if your plans are getting better or worse. The plans become a political exercise, finalized through negotiation rather than what the team can actually achieve. So, instead of having a big picture view of the whole operation based on data, you have a loosely related set of plans in silos.

We see Digital applications leading to real planning payoffs in the near term, where:

- Plans can be updated daily, even shiftily where appropriate, with changes being communicated to phones and tablets
- Planners can use actual data for equipment location, distance, grade, etc. and as plans are much closer linked to reality, there is higher level of alignment with the frontline
- Short-term plans are optimized based on facts, not negotiated. When one node of the system changes, bottlenecks are revealed or eliminated, resources can flow to the right place
- Management gets a system view rather than silo views
- A robust and connected system reinforces coordinated and consistent actions across the system, which lead to more predictable behaviours and more sustainable results.

### 4. Autonomous vehicles linked to Remote Operating Centers (ROC)

Autonomous and remote operated equipment promise to deliver step change productivity improvements. The remote operating and analysis center can power effective mobile short interval control and remote/autonomous equipment. Benefits include:

- Ability to see the whole mine/asset complex
- Knowledge and analytic power to make the decisions
- Can coordinate the total asset and corridor
- Respond more quickly to market/customer demands

Different companies are pursuing differing visions of the role and objectives for a remote center, perhaps an evolution. Some see the ROC as a remote analytic center focused on planning, with supervisors maintaining control of operational decision-making in the field. Others see it as a remote decision-making center. Accordingly, there is a real need to ensure you build the right relationships between the ROC and operations.

At the front lines, autonomous vehicles can operate in adverse conditions—heat, cold, air quality, altitude. Eliminating humans also minimizes blast delays and allows full shift operations. While drivers can be eliminated from the org chart, there is a meaningful financial cost to letting them go, as unions and regulators, in certain geographies, are very sensitive to decreasing headcount. Further, adding autonomous means hiring additional people with digital expertise, often in city centres. So, need to include all components to see if there is a viable business case.

To be clear, these gains are not available in every production environment. Clearly, Autonomous has proved its worth in large open pit environments. However, one size does not fit all—the technology has to be matched to the right conditions. In many places, we are years away from autonomous being an economically viable solution.

### 5. Big Data

Many mining companies are piloting Big Data across multiple applications. We have seen robust examples of Big Data technologies applied to:

- Exploration – getting greater insight from geographical data, even data collected years ago
- Equipment maintenance – predicting machine failures, identifying behaviors that lead to longer equipment life
- Improving plant operations – putting artificial intelligence on top of the current process control systems and removing the black art of running a plant.

Most of these applications are in the pilot stage, but with encouraging results—e.g., 15% improvement in tire life, Predicting SAG mill gear failure 3 – 6 months out. The big challenge is to ensure that you can effectively translate the real world into the math world and back to the real world. In our experience, you need excellent operational expertise as well as data science.

These five areas can deliver value from Digital Technology relatively quickly. But what about the other areas? In many cases, there is substantial capital available for digital tools, but only a moderate level of digital expertise, and a disconnect between management and the work at the frontline. This makes it easier for companies to choose the most exciting technology rather than something fit-for-purpose that improves a key value driver. Drones may be more interesting than eForms, but oftentimes the less exciting technology has the largest economic leverage.

