With Rio Tinto’s creation of the Operations Centre, the company has helped to advance the human-machine recombination work practice. The Operations Centre is exactly what it sounds like: a facility where equipment operators sit in a command center that may be hundreds or even thousands of miles away from the mine, but are still capable of controlling powerful machinery and equipment at mining sites. Built originally to provide a more attractive work environment for always-scarce skilled workers, the Centre brought operators face to face, to share common screen views of the mine and its environs, and to orchestrate their work in response to changing conditions like weather, truck breakdowns or major equipment moves.

Today, Rio Tinto’s skilled operators, data analysts and engineers guide the intricate interplay of gigantic drills and excavators, gargantuan earth movers and dump trucks, and trains pulling hundreds of cars headed to ports and refineries around the globe. But, by contrast to traditional
automation—where the objective is to replace direct labor with more consistent, accurate and repeatable mechanical processes—Rio Tinto’s engineers and managers have adopted a systemic view: where the objective is to achieve a quantum leap in performance through more effectively combining human and machine intelligence. In all, such digital enhancements meant giving analysts a window through which to view real-time operations and model alternative solutions to perennial problems.

“The Mine of the Future”

The centerpiece of Rio Tinto’s Mine of the Future™ is the company’s fleet of autonomous driverless trucks. The vehicles are equipped with remote sensors that feed data into an artificial intelligence system that learns the layout of the mine and documents driverless vehicles position. Using the data from high precision GPS capabilities, Rio Tinto’s remote data analysts and engineers coordinate the movement of driverless trucks and use “sophisticated modeling techniques” to predict how future movements should be coordinated to improve transportation efficiency. Of course, remotely coordinating mining vehicles cannot account for every contingent, such as a block in the road or even employee error.

Accordingly, Rio Tinto’s driverless vehicles are also equipped with an autonomous real-time collision avoidance system. Relying heavily on remote sensing technologies, including radio frequency tagging, sensors that collects real-time data about the physical trucks physical surroundings allow vehicles to automatically assess the distance of objects and even adjust their predetermined-GPS route in order to avoid a collision. Moreover, remote sensors are also used to ensure that driverless vehicles are maintained properly. Sensors that track vehicle health, such as tire pressure and braking patterns, allow Rio Tinto to predict maintenance problems. Rio Tinto is currently in the process of deploying further driverless trucks at its iron ore operations in Western Australia and the company is also moving towards using sensors to develop an automated rail transport system under its Autohaul™ program, which is scheduled for launch in 2014.

Based on similar technologies, Rio Tinto is also using remote sensors, along with drone robots, to automate its mine production operations. The company’s smart excavator employs visual sensors to determine the difference between muck and usable materials, allowing it to load a truck without guidance from a human driver. Autonomous drilling is also planned for some of Rio Tinto’s Pilbara mines. The drills are equipped with sensors that both relay their drilling position to remotely based operators and also sense when rocks have fractured along their natural break line, providing remote data analysts and technicians with information that helps them predict where to drill next.

Drilling down into human-machine relationships

The Operations Centre has turned out to be an essential ingredient in the transformation of mining operations. It serves as an operational hub and as a rich repository of mining, transport and supply chain experience. In many respects, the Centre represents the optimal combination of high-tech work environment and traditional mining know-how. And, it provides a hugely important link between the company’s growing staff of quantitative analysts and the mines themselves.

The Operations Centre has already demonstrated clear and impressive results: increased efficiency, improved reliability, decreased variability and better identification of performance issues.

Analysts, many of whom are scientists and mathematicians with only a passing knowledge of mining, grind through massive databases generated hourly by sensing equipment in mines throughout the world and make recommendations to operators in the Operations Centre about new approaches to their jobs. Common dedication to improving system yield—whether in the mines themselves or through timely maintenance of equipment or the avoidance of delays in the ports—complements common access to the operational data.
The net effect is a remarkably productive combination of human and machine talents. Moreover, the Centre is uniting operators with fellow colleagues, leading to greater levels of collaboration. As one senior executive put it, "they could finally look each other in the eye and know that the other person is going to make good on a commitment."

Ultimately, judgment is something that companies like Rio Tinto and GE are rediscovering even as they strive to bring digital technology to a wider expanse of industry. Rio Tinto managers discovered that bringing remote operators together gave an increased level of flexibility and agility to a highly interdependent set of operations. It enabled them to exercise the collective intelligence of a team of operators. It also gave those operators a systemic view of “pit to port” that made it possible to combine computers and people with deep operational knowledge to make decisions and evolve operating principles that saved millions of dollars.

Notes


3. Ibid.

4. Ibid.


About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with approximately 289,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world’s most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$28.6 billion for the fiscal year ended Aug. 31, 2013. Its home page is www.accenture.com.

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About Accenture Technology Labs

Accenture Technology Labs, the dedicated technology research and development (R&D) organization within Accenture, has been turning technology innovation into business results for more than 20 years. Our R&D team explores new and emerging technologies to create a vision of how technology will shape the future and invent the next wave of cutting-edge business solutions.