



# Mining bonanza drives robot boom

*Difficulty in finding skilled staff is pushing miners to investigate smarter machines*

**Ben Woodhead**  
 Robotics

MINES in Western Australia's remote Pilbara region are replacing humans with robots, as the resources industry struggles to meet insatiable demand for iron ore and other minerals for China and other emerging economies.

A generational change that has young people turning their backs on one of the country's largest export industries is also driving the shift to autonomous vehicles, which perform tasks ranging from explosives to transportation.

The shift could pay big dividends for Australia as miners dramatically increase production and local robotics researchers steal a march on international rivals. "The China demand and the emerging market demand mean we have to rethink the way we've been looking at our mining operations," Rio Tinto innovation head John McGagh said.

"If we are going to fulfil our customers' needs we have to use new technology.

"We can't expand these operations the way we have in the past. We just won't get the people."

Mr McGagh pointed to iron ore export targets that Rio chief executive Tom Albanese had set,

as well as his aggressive five-year timetable to develop the so-called mine of the future, as an indication of how high the stakes are.

Mr Albanese wants Rio to triple its annual iron ore production to 600 million tonnes by 2016, up from about 200 million tonnes during 2007.

To put that in perspective, Rio's annual iron ore production increased from nothing to 60 million tonnes between the 1960s and the 1990s before jumping an additional 120 million tonnes a year over the past decade.

To meet its 2016 target, which includes a 220 million increase in production in the Pilbara alone, the company had no choice but to put machines on the job instead of humans, Mr McGagh said.

"The push for automation in the Pilbara is really to allow us to add capacity. It's not to cut jobs, because we will be employing far more people than we are employing today," he said.

Fortunately for resources companies such as Rio and BHP Billiton, which is also pursuing autonomous mining, the demand for minerals that has mines butting up against capacity has also provided the money needed to solve the problem. CSIRO information and communication

sciences and technology group executive Alex Zelinsky said the industry was poised to capitalise on robotic mining plans first hashed out in the early 1990s.

"The industry has reached a tipping point. Previously the mining companies didn't have the funds to invest in their future but because of the boom they have become highly profitable and there is more money for research and development," he said. "It's clearly the time to capitalise on research that has been going on in Australia and elsewhere."

Rio is not just spending internally to support autonomous mining. It has also pumped \$21 million over five years into the highly regarded Australian Centre for Field Robotics at Sydney University. There, researchers are working on developments that, along with activities in the CSIRO's own ICT and mining sciences division, are putting Australia at the forefront of mining technology development.

International heavy equipment makers are also staking a claim, with Kohatsu, a key Rio supplier, and Caterpillar, a research partner of the CSIRO, turning out autonomous trucks for the mining industry. "Australia is the world leader in mining technology de-

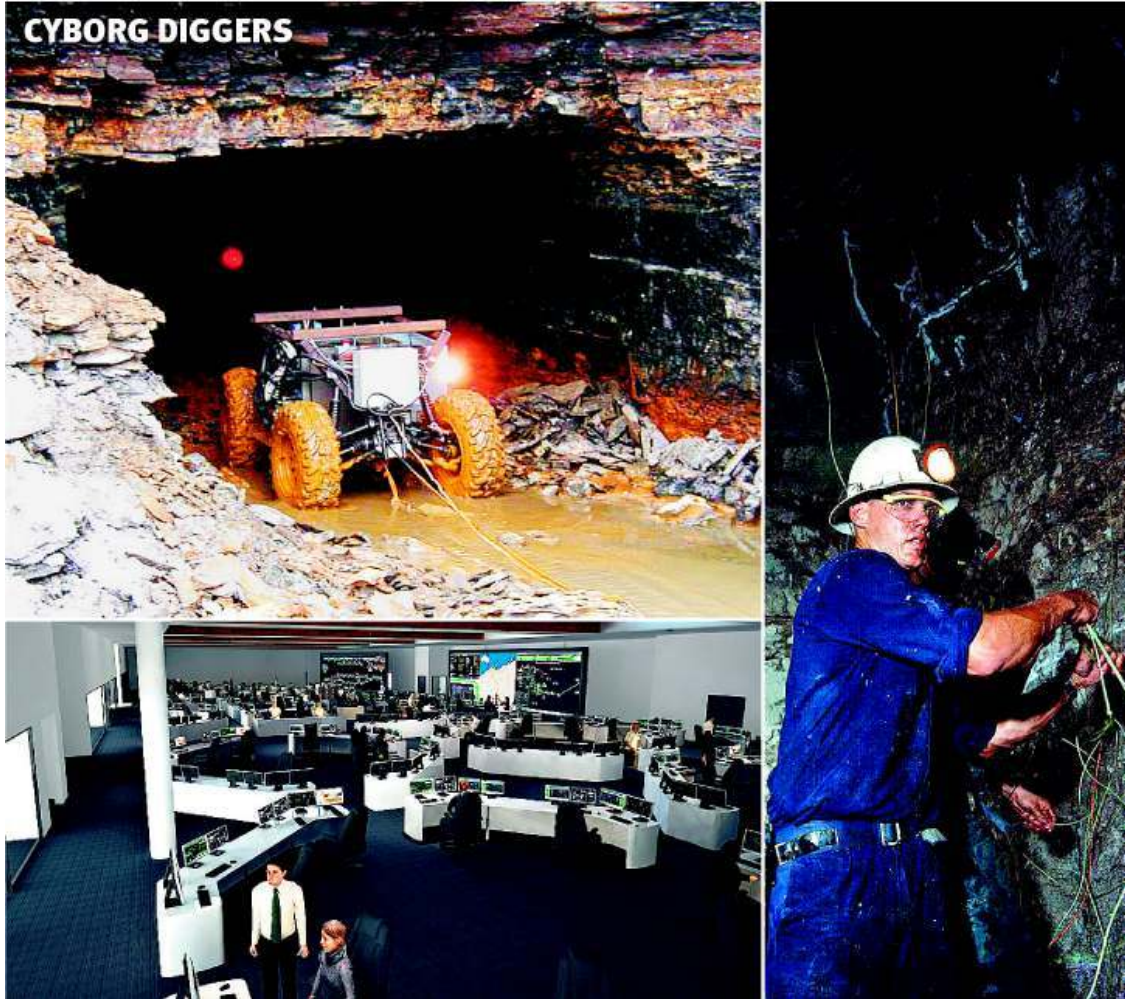
velopment," Dr Zelinsky said.

Technologies already in development at organisations such as the CSIRO include autonomous drills, haulage trucks and machines that can move along underground coal seams extracting ore.

Rio's vision of the future mine calls for some of this equipment and more, including driverless trains that would haul ore from mine sites and production plants to shipping terminals.

"Tom Albanese last year gave us three to five years to deliver the mine of the future and we're comfortable we're on that track," Mr McGagh said. "Will you see all of the Pilbara automated in that period? No. Will you see the components in the Rio Tinto Iron Ore world largely, academically put together, trialled, tested and in some form of deployment into our Pilbara operations? Yes."

Rio has no plans to build autonomous vehicles itself. Instead, its main challenge will be integrating networks and operations. By the end of the year robotic drills and haulage trucks will be working side by side and the company will trial autonomous trains.



**Future of mining:** Carnegie-Mellon University's Groundhog robot miner (top) and Rio Tinto's planned above-ground control centre (bottom)