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FMG's automated Thomas rail workshop sets the pace
→ 30% reduction in area
→ 60% cut in headcount

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Data mining – a new frontier for mineral exploration

A ground-breaking data mining initiative is developing new methods to target unidentified mineral deposits hidden under deep cover by harnessing Geoscience Australia’s rich datasets. Professor Dietmar Müller, from Sydney University’s School of Geosciences, spoke to AJM’s Mike Foley.

The mantra for mineral explorers is that all the easily found deposits in shallow bedrock have been discovered by now. The data mining initiative, which essentially is tasked with combining and analysing vast amounts of disparate information through space and geological time, will see computer scientists, financial analysts and natural scientists combine their know-how to realise the full potential of Geoscience Australia’s multi-dimensional data sets.

monitor plants for expansion or deformation of structures.
Typically these plants are very complicated, with lots of pipework and ducting and cables and so on. They are very intricate to measure by traditional measures, with big structures and getting people to move around them to take measurements is very hard.

An example of deformation is wear and tear of larger structures like crushers; laser scanners can measure the wear on the crusher in comparison to its expected life and determine if it needs to be replaced.

Terrestrial laser scanning systems can be set up in just a handful of locations to measure an entire plant. The system can measure where changes are occurring.

Perhaps the biggest demand we see for laser scanning is for upgrades on an existing plant. Typically existing plants have been around for quite some time and the existing information is in hard copy plan form and sometimes plans are not even in existence.

However, even if there are hard copy plans, nowadays that is very hard for an engineer to use, particularly with the digital environment that they work in.

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Geospatial services for miners and explorers are about more than just mapping. What else do you provide?

Terrestrial laser scanning is becoming a very attractive proposition. It is often on the mine site for mine monitoring. For example, a laser scanner is used to measure a stockpile on the ground, as opposed to an airborne survey that would measure it from the air.

On the industrial side, in the plant environment, terrestrial laser scanning is used to
EXPLORATION, SURVEYING & MAPPING

The venture is led by NICTA (National Information and Communications Technology Australia) and draws on expertise from Sydney University and Sica, a provider of financial analysis technology. It forms part of a $12m Big Data Knowledge Discovery project.

Geoscience Australia's data sets include gravity, magnetic, electromagnetic, radiometric and seismic data, drilled holes into shallow parts of the crust and information from aged rocks.

The project will assimilate these combined geological and geophysical data into a database and software framework which will "facilitate interpretations of geological processes that have previously been very difficult or impossible to achieve," Müller said.

Established data-mining methods will be connected to the GPlates open-source software (www.gplates.org), which was developed by Sydney University with international partners.

GPlates is a tool for visualisation and analysis of the interactions of moving tectonic plates through time. "It is like Google Earth with a time slider to display data through 'deep' geological time," Müller said.

Data mining is commonly applied to financial data to identify and predict trends in the market. Algorithms developed for financial data can be applied to other tasks, Müller said.

But he noted that "geological data is different, in the sense we have plate tectonics to consider. That means the way we think and the way we look at things today, it hasn't been that way through geological time. So it is not just about one golden algorithm that allows us to push a button and voilà! the answer is going to come out."