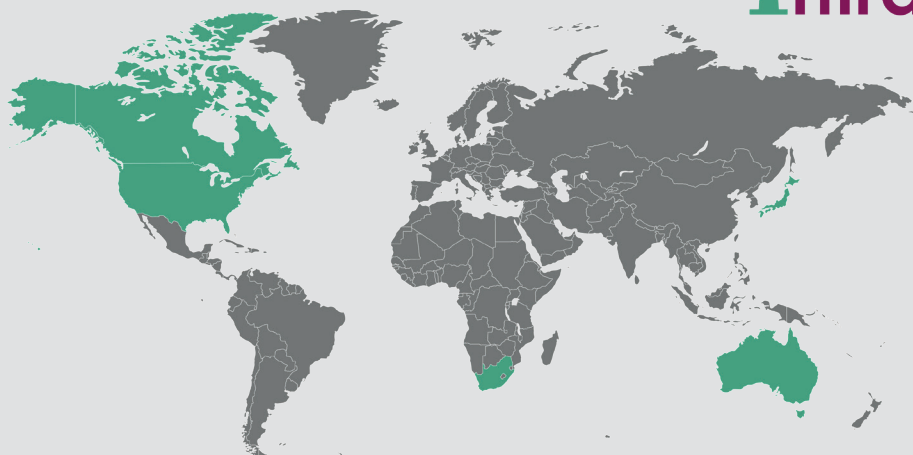


RESEARCH & INNOVATION

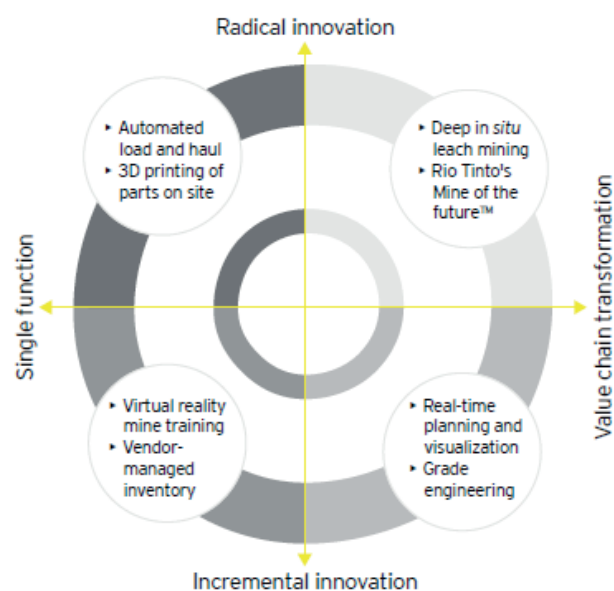
Current and future challenges



R&I in mining is a complex subject, because there are **drivers** that push R&I in mining, while others are **barriers** to R&I and stakeholder interests often diverge. From a government perspective, for instance, increased R&I could drive higher levels of automation, which would increase productivity and raise the competitiveness of the mining industry in times of low mineral prices.

Increased levels of automation, however, could also reduce the required manpower to run a mine, leading to more unemployment. Given the characteristics of mining (long cycle times, high investments), developing or adopting something 'new' is very expensive and risky for mining companies, which is why **mining can be considered a rather conservative business in terms of Research & Innovation.**

Research & Innovation in mining takes place, but it happens in a **complex interplay of different organisations** (miners, suppliers, service providers, research organisations, government bodies) and it has proved **difficult to identify clear patterns of Research & Innovation.** Recent studies suggest, for instance, that bigger mining companies have a more structured approach to research and development than smaller miners. They have the resources to pool innovation efforts, to build innovation centres and to make use of the results on a global scale.



Mining Innovation Matrix. Source: EY, 2014