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## Open pit mine planning using multivariate conditional simulation

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It is well recognised that mining is a high-risk business in which geological uncertainty accounts for one of the major contributors. To characterise the risk associated with geology, conditional simulation has been proved to be one of the best geostatistical approaches. In the cases of multivariate deposits that consist of various attributes which are spatially cross-correlated, the application of multivariate conditional simulation techniques is critical. In this paper, a case study where conditional simulation has been used is presented for a large-scale iron ore deposit in Western Australia with six cross-correlated variables, namely Fe, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, P, Loss on Ignition and Ochreous Goethite. The simulation results are also compared with Ordinary Kriging estimates to analyse the uncertainties associated with the grade/tonnage curves of the given deposit. Both stochastic and deterministic resource models generated by simulation and kriging respectively are then fed into our in-house mine planning tool, through which the impact of geological uncertainty on the project's Net Present Value is quantified.

