Dare to Transform: Leveraging New Ore Body Knowledge for Next-Generation Resource Estimation

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ABSTRACT

The minerals industry is experiencing a data revolution, driven by advancements in geoscience technologies that enable the collection of high-resolution, multivariate datasets. However, existing resource estimation workflows, including geological modelling, domaining, and classification, face challenges in fully harnessing the potential of these new data streams.

This paper explores the inherent constraints of current workflows in managing the scale and complexity of modern datasets and presents a framework for transformation. By incorporating advanced data processing techniques, multivariate geostatistics, and machine learning, resource geologists can enhance ore body models, improve classification decisions, and unlock greater value from collected data.

We also examine the evolving role of emerging technologies, such as artificial intelligence and quantum computing, and their potential to reshape resource estimation processes. Recognising the significant strides made by existing methodologies, this paper aims to build upon their foundation to enable more effective utilisation of modern geoscience data. Our call to action emphasises the importance of cross-disciplinary collaboration, workforce development, and investment in research to position the industry for a data-driven future.

The paper calls for the establishment of a Committee for the Future of Mineral Resource Estimation to drive cross-disciplinary collaboration, standardise practices, and guide competency development. By evolving workflows and leveraging emerging technologies, the resource estimation community can unlock significant value, enabling the minerals industry to harness deep geoscience intelligence and achieve precision mining outcomes.