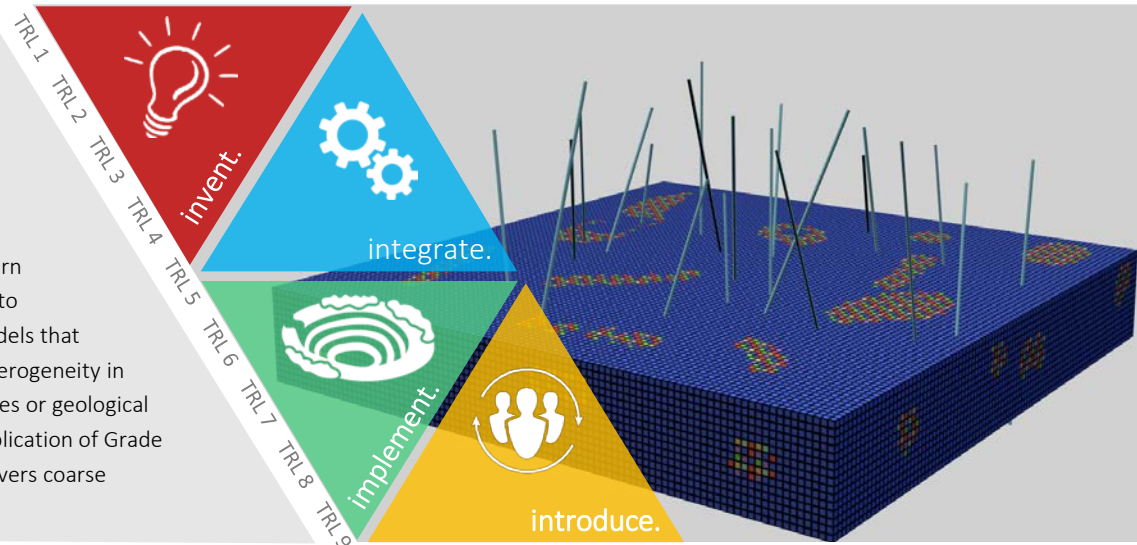


Orebody DNA

PROJECT P2-003

The project seeks to improve on state of the art technology for mineral resource estimation by going beyond standard geostatistical methods in defined block models.

Established forms of analysis and pattern recognition techniques will be applied to generate characteristic volumetric models that describe, infer and predict mineral heterogeneity in ore body masses across a range of scales or geological sub-volumes, thereby enabling the application of Grade Engineering® (GE) technology that delivers coarse separation outcomes



Research collaboration



This project is a collaboration with development and research staff from Mining3 and CSIRO-Data61, using orebody data and expertise support from CRC ORE.

Mining3 is a partnership between former organisations CRC Mining and the CSIRO Mineral Resources. Formed in July 2016, Mining3 brings the activities and capabilities of the two organisations into a new research organisation for the mining industry. As Australia's national innovation agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has been pushing the edge of what's possible for almost a century. CSIRO Mineral Resources works closely with industry partners and delivers innovation to grow Australia's resource base, increase productivity and drive environmental performance. Data61 is Australia's leading digital research network within CSIRO and is focussed on helping to create a data-driven future.

Program Coordinator: Fernando Vieira, CRC ORE
Project Leader: Charlotte Sennersten, CSIRO Mineral Resources
Timing: March 2017– March 2018
Participants: CSIRO Data61, Mining3, CRC ORE

Background & aims

The mining industry uses a variety of 3D modelling tools to delineate from drill core data an ore body representation and structure, creating block models that distribute smoothed ore grades within block cells using geostatistical methods.

Block modelling approaches represent a compromise between a useful level of resolution for mine planning and what can be justified geostatistically by available data. These levels of discretisation of orebody characteristics often lead to inefficient and unproductive mining practices, when volumes of higher ore grade are smoothed to reflect gangue volumes.

The current orebody delineation approaches, therefore, can lead to large amounts of dilution and value loss. Further, the resolution of block models masks heterogeneity and disallows target applications of early separation technologies.

Focus on outcomes

- Develop novel ways to define, characterise and predict heterogeneity in orebodies;
- Define and validate analytical functions for volumetric pattern analysis for the characterisation of ore heterogeneity.
- Test machine learning methods for automatically extracting rules from data for detecting and predicting heterogeneity features in the rock mass.
- Determine and predict ore body attribute spatial relations and distributions at data granularity below mineable block granularity.
- Investigate if there are forms of deriving response curves of mineral yield from heterogeneous ore bodies characterised using the techniques and methods proposed.

Image: Illustration fabricating heterogeneity through the voxel volume. Supplied by CSIRO.