# Heterogeneity Index for Ore Mixing

PROJECT P2-008

This project aims to assist with the reduction of the economic loss associated with the mixing of ore during the mining process.

It is an important element in CRC ORE's Grade Engineering program, which is focused on extracting metal more efficiently by separating ore from waste before it enters comminution.

The project will involve developing a framework that evaluates the mixing and segregation of ore as it is extracted and hauled, ultimately predicting the exploitable heterogeneity profile across an ore extraction system.

invent. integrate. implement. introduce.

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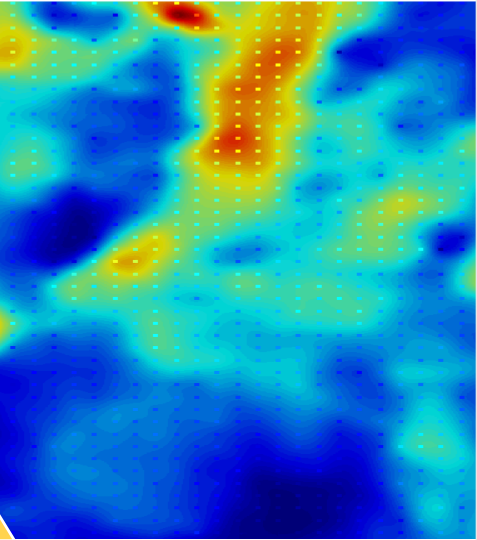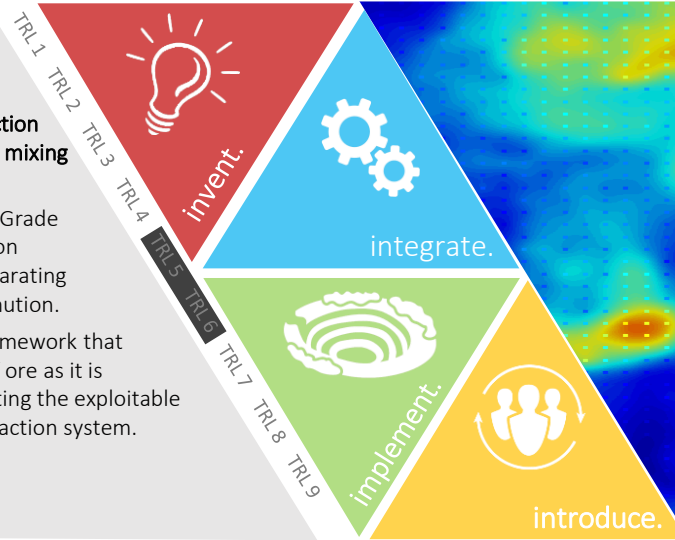
Project Scope

The mixing phenomenon – where small differences in rock size or density lead to flow-induced segregation – is poorly understood. It has a negative impact on the heterogeneity profile of the ore. The mixing decreases the quality and value of the material as it is transported and processed.

This project will assist in preserving the in-situ heterogeneity profile, which is important to allow the potential for earlier separation of waste and ore, generating value. It will use statistical physics to develop a proof-of-concept for a probabilistic methodology for transporting ore property information through the extraction and handling stages of mineral production.

The scope will be delivered in three stages:

- Stage one will determine the state of the sensor technology to measure rock material attributes pertaining to ore mixing and associated data required for model validation as well as define use cases for heterogeneity index assessment for ore mixing.

- Stage 2 involves two lines of research to quantify ore property transport and, hence, quantify mixing and segregation and its degree of variability during transport.

- Stage 3 will investigate optimisation strategies for different ore bodies, mining, equipment, conditions or constraints to reduce mixing and preserve heterogeneity.

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Project Leader:	Ruslan Puscasu, Mining3
Timing:	July 2019 – December 2020
Participant:	Mining3

Project Outcomes & Learnings

The outcome will be the development of the first technology available to quantify the heterogeneity index for ore mixing in mining operations.

The technology will support Grade Engineering solutions with the ability to identify 'exploitable heterogeneity', de-risking proposals for participants and enabling better uptake of technology.

Further, it will provide METS companies with an ability to understand how their operational activities impact on the ore heterogeneity.
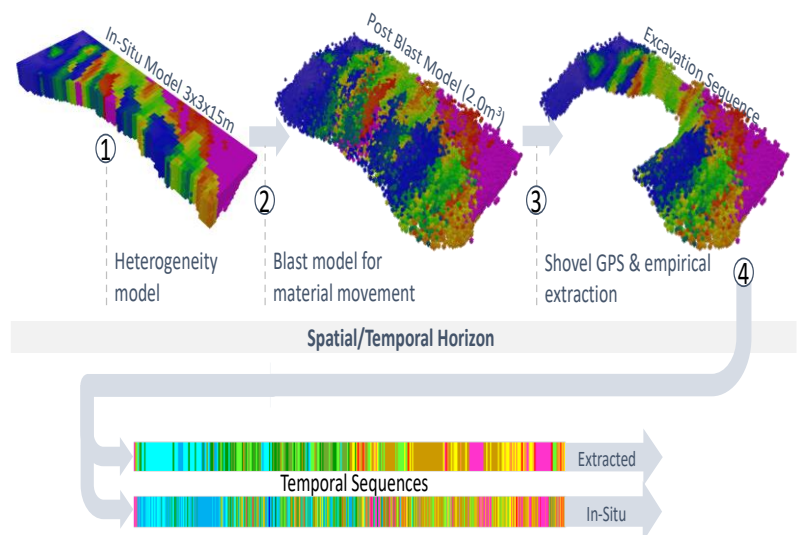

Image (above): Comparison metrics – Extracted versus In-Situ

Image (top): Example of conditional mineral simulation

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CRC ORE
Optimising Resource Extraction