

Invent



Integrate

Implement



Introduce

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CRC ORE
General Manager
- Implementation



Site implementation projects overview

CRC ORE Annual Assembly 2017



Australian Government
Department of Industry,
Innovation and Science

Business
Cooperative Research
Centres Programme

CRCORE
Optimising Resource Extraction



integrate



invent

implement



introduce



Site implementation projects overview

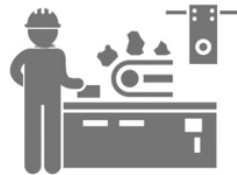
CRC ORE Annual Assembly 2017

Role of Site Implementation in CRC ORE



Program 1 **Define**

Improving feed quality



Program 2 **Separate**

Enabling mass separation



Program 3 **Extract**

Increasing extraction efficiency



Program 4 **Control**

Maximising system-value



Minera San Cristobal - Sumitomo



Escondida - BHP



Telfer - Newcrest



Obwasi - AngloGold Ashanti



Los Bronces - Anglo American



Carmen de Andocollo - Teck



Mt. Isa - Glencore

Objectives & Aims of Site Implementation Projects



Pilot Scale Application and Assessment of resulting changes

Key metrics are improved productivity & capital intensity



Demonstrate Integrated System Value Solutions

Conducted through simulation, modelling and site deployment



Large Scale Site Implementation

Demonstrate the value and application of technology outputs

***Business Case models and Organisational Change
required for routine implementation***

Operating Philosophy

End User Driven Partnerships



Ensure technology outcomes are matched to industry needs and expectations

Deploy new technology and operating strategies on identified sites to demonstrate value

Consortia based teams to facilitate technology transfer and commercial uptake



Innovation Delivery Group Role



ACCESSING TECHNICAL AND LOGISTICAL SPECIALISTS

IDG is an internal group of industry professionals available to support sites and research providers as a 'translation service' between inventors and operators



SUPPORTING INTEGRATED SITE DEPLOYMENT AND IMPLEMENTATION

IDG develops clear value proposition for technology solution stacks with a stage gated path to implementation to provide support for early site adopters



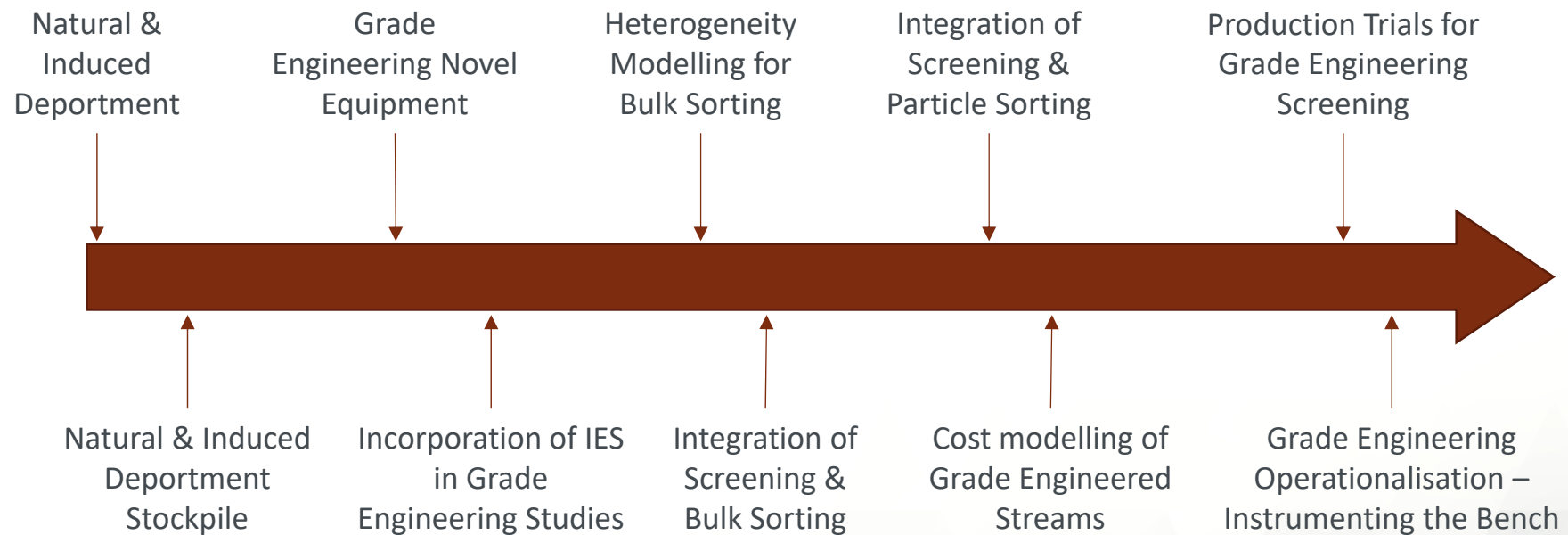
NURTURING THE PROTOTYPE TO PRODUCT TRANSITION

Key role of IDG group is to support site demonstration and validation of emerging technologies by working closely with sites and driving outcomes

Site Implementation Project Summary CRC ORE II – Grade Engineering

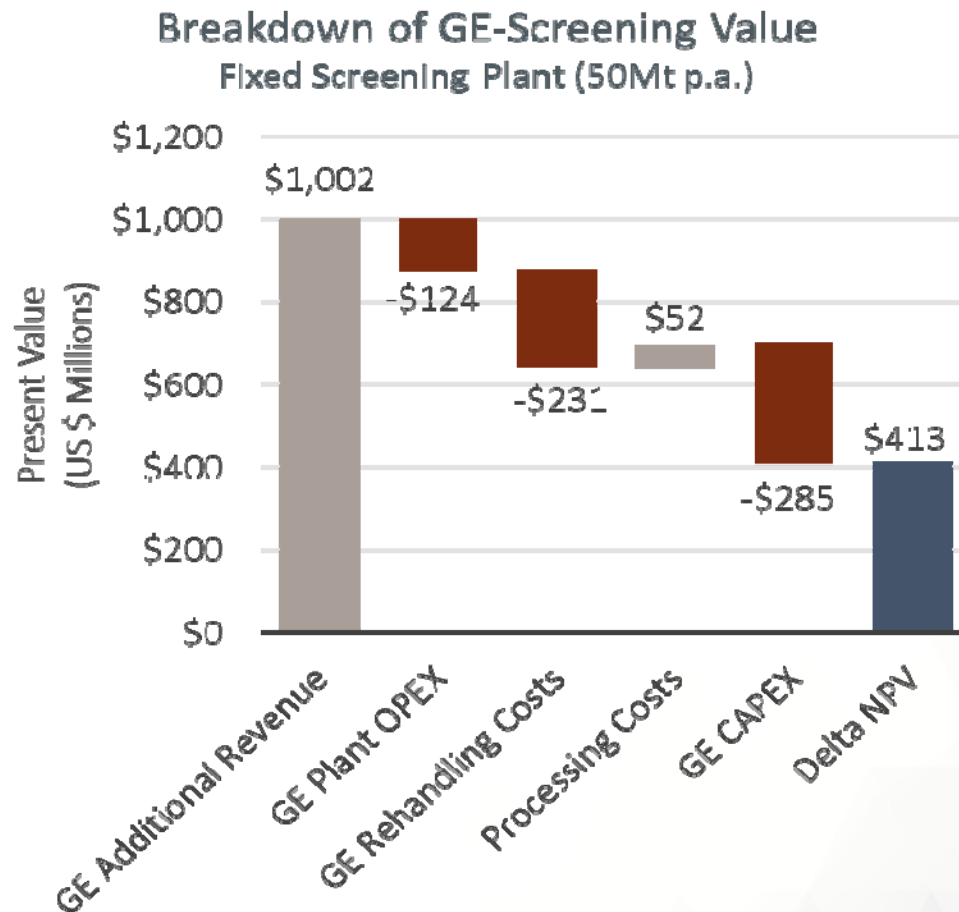


Evolution of Site Projects in CRC ORE II



As Grade Engineering continues to evolve – CRC ORE is actively seeking to form Technology Transfer Partnerships to investigate commercialisation opportunities for METS EP's.

Key Project – Crushing & Coarse Separation in the Pit Delivery Theme



The **largest operational cost** of Grade Engineering is the **rehandling** of material to processing destinations

Strategies that **minimise rehandling** will **increase value** from Grade Engineering

A **step change** in value could be achieved if Grade Engineering is included in material transfer during mining to **eliminate rehandling**

Key Project – Crushing & Coarse Separation in the Pit Delivery Theme



*Investigating Grade Engineering
“Platforms” for upgrading via
screening and sensing
technologies*

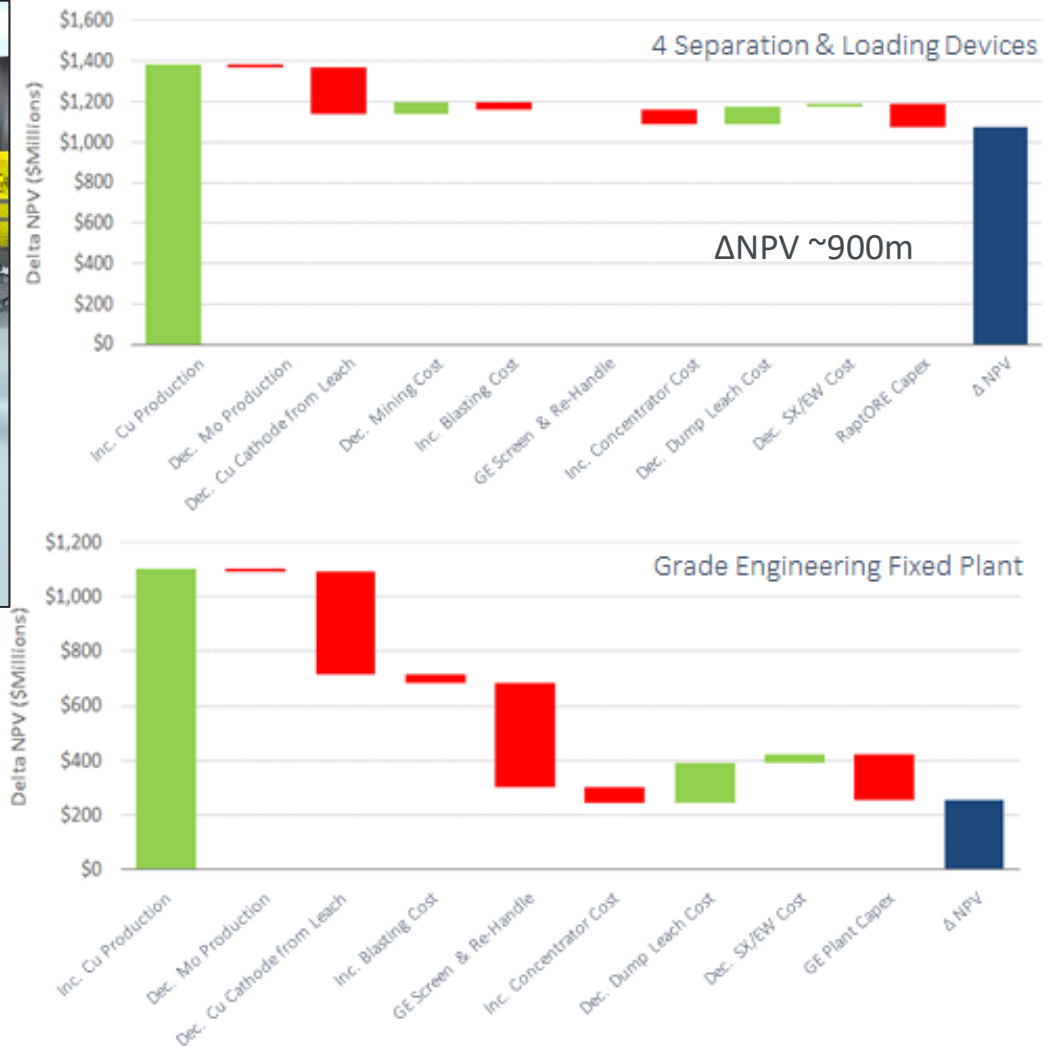
BHP



**ANGLO
AMERICAN**

HATCH

mining3
TRANSFORMING MINING



Grade Engineering Production Trials – Minera San Cristobal



Production Trial Aim:

- To prove the upgradability of MSC ores via screening at production scale
- Campaign Grade Engineered and direct ROM through the concentrator to validate the grade improvement
- Understand operational aspects of implementing Grade Engineering

2 options to source material:

- ROM ex-pit
- Stockpile

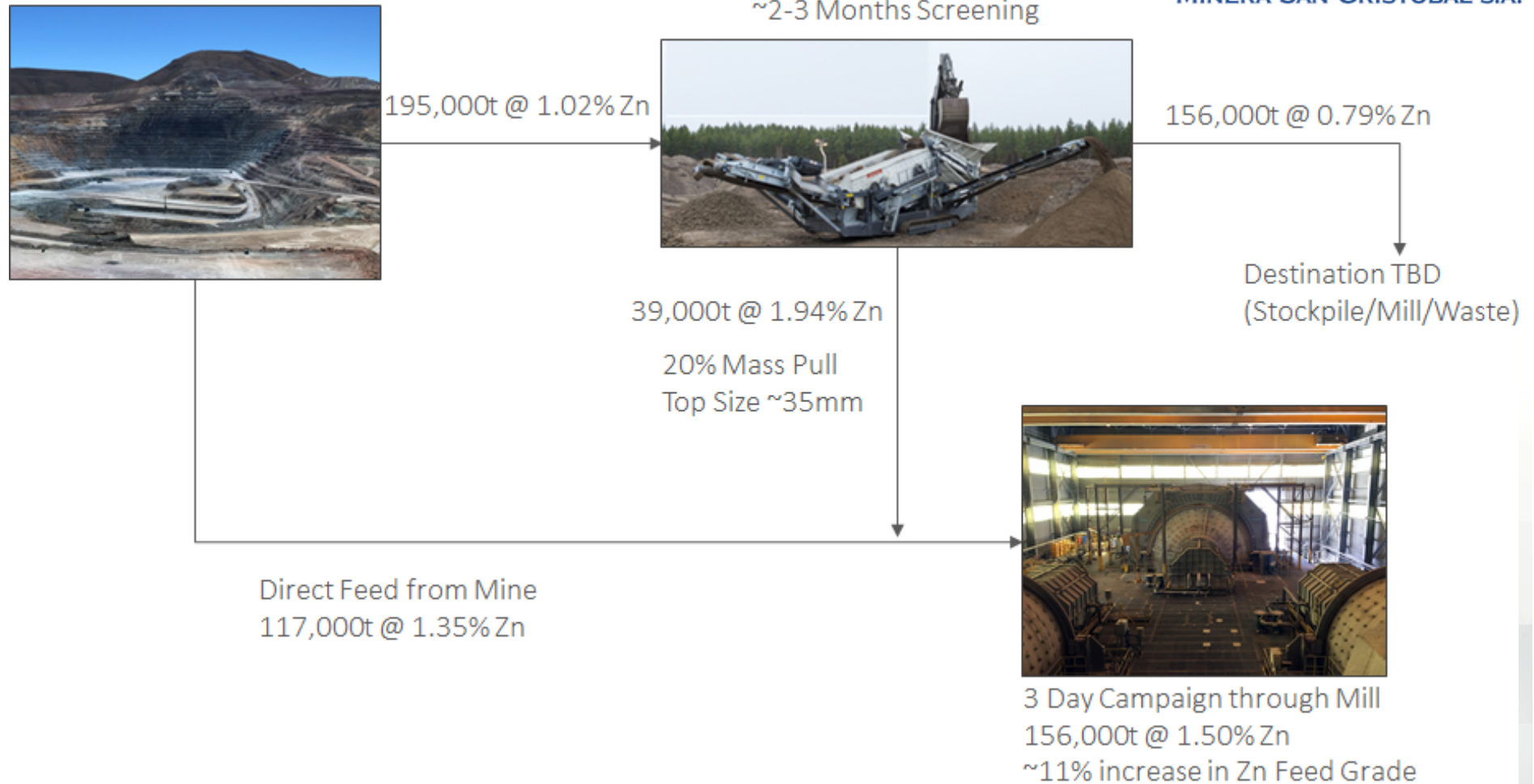
MSC Estimates Grade Engineering value >\$1b



Trial 1: Ex-Pit Ore



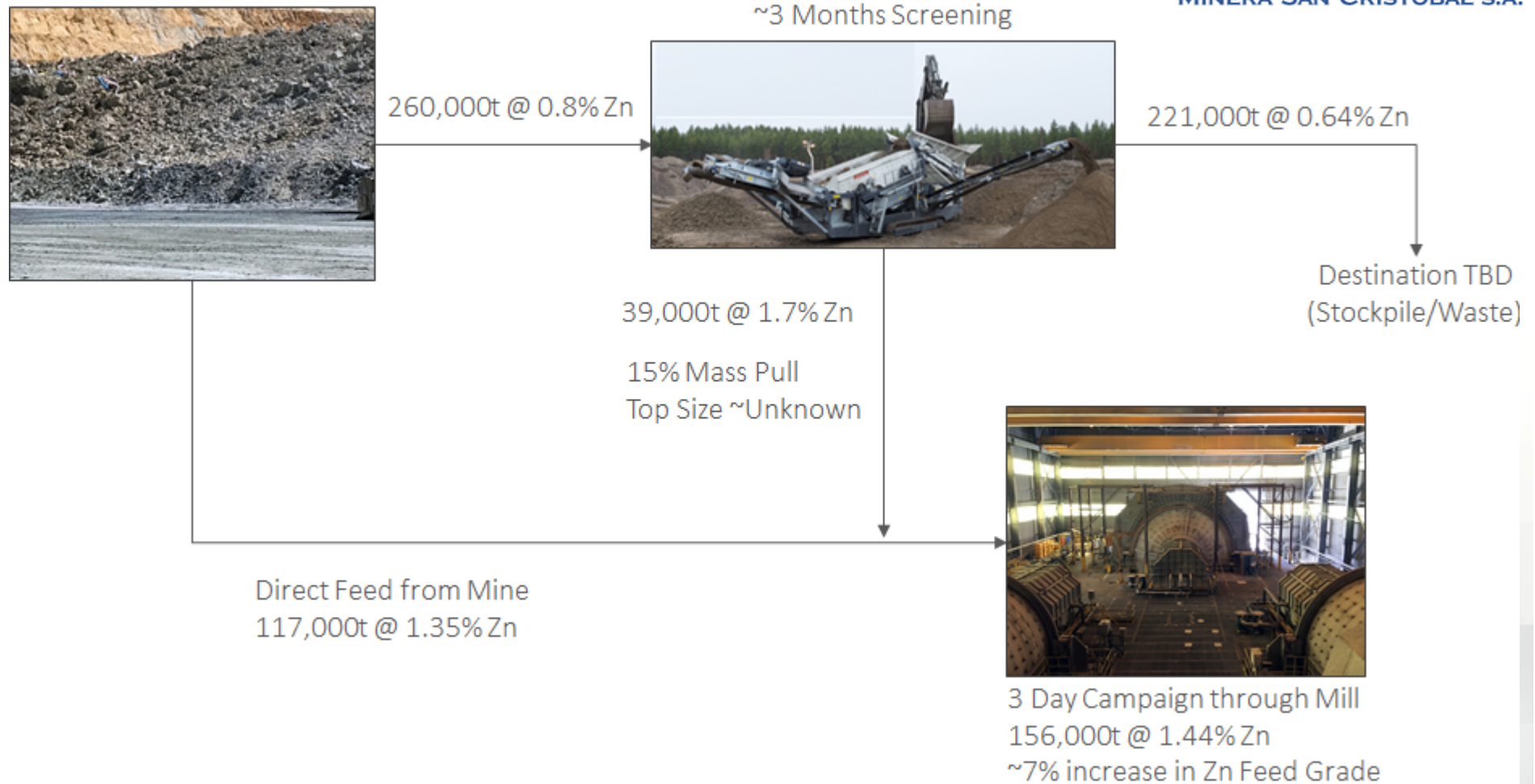
MINERA SAN CRISTÓBAL S.A.



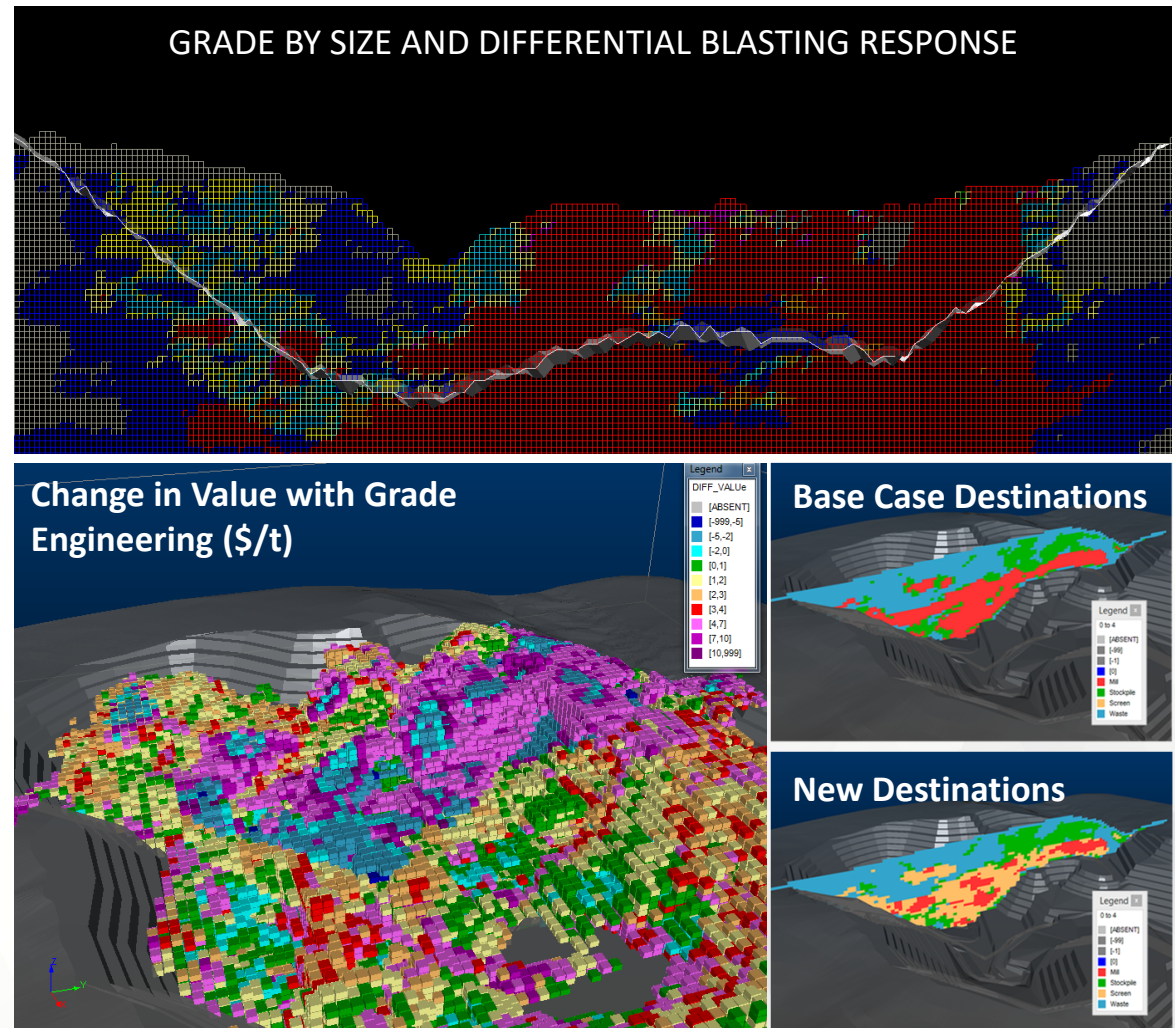
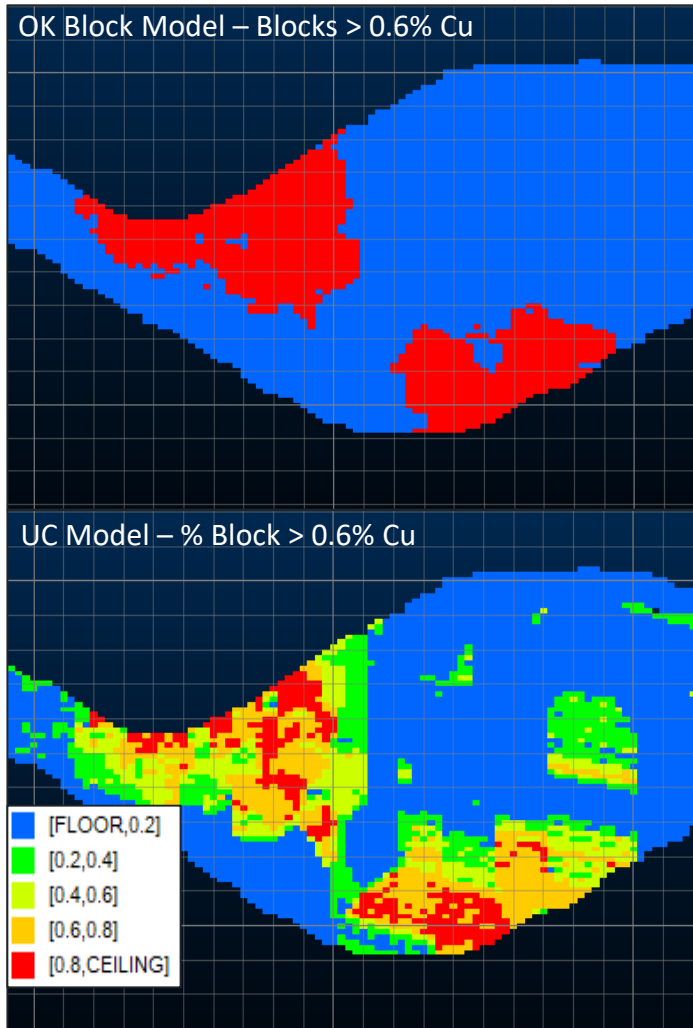
Trial 2: Mineralised Stockpile



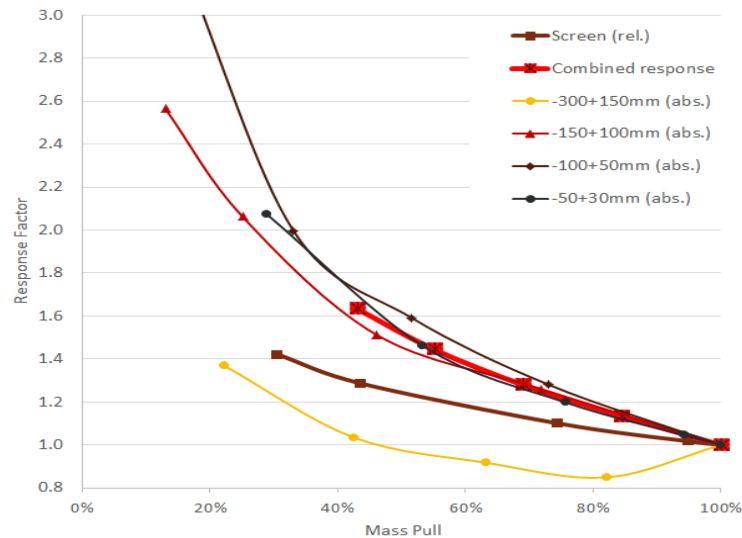
MINERA SAN CRISTÓBAL S.A.



Integration of Grade Engineering Levers – Bulk Sensing & Screening



Integration of Grade Engineering Levers – Particle Sorting & Screening



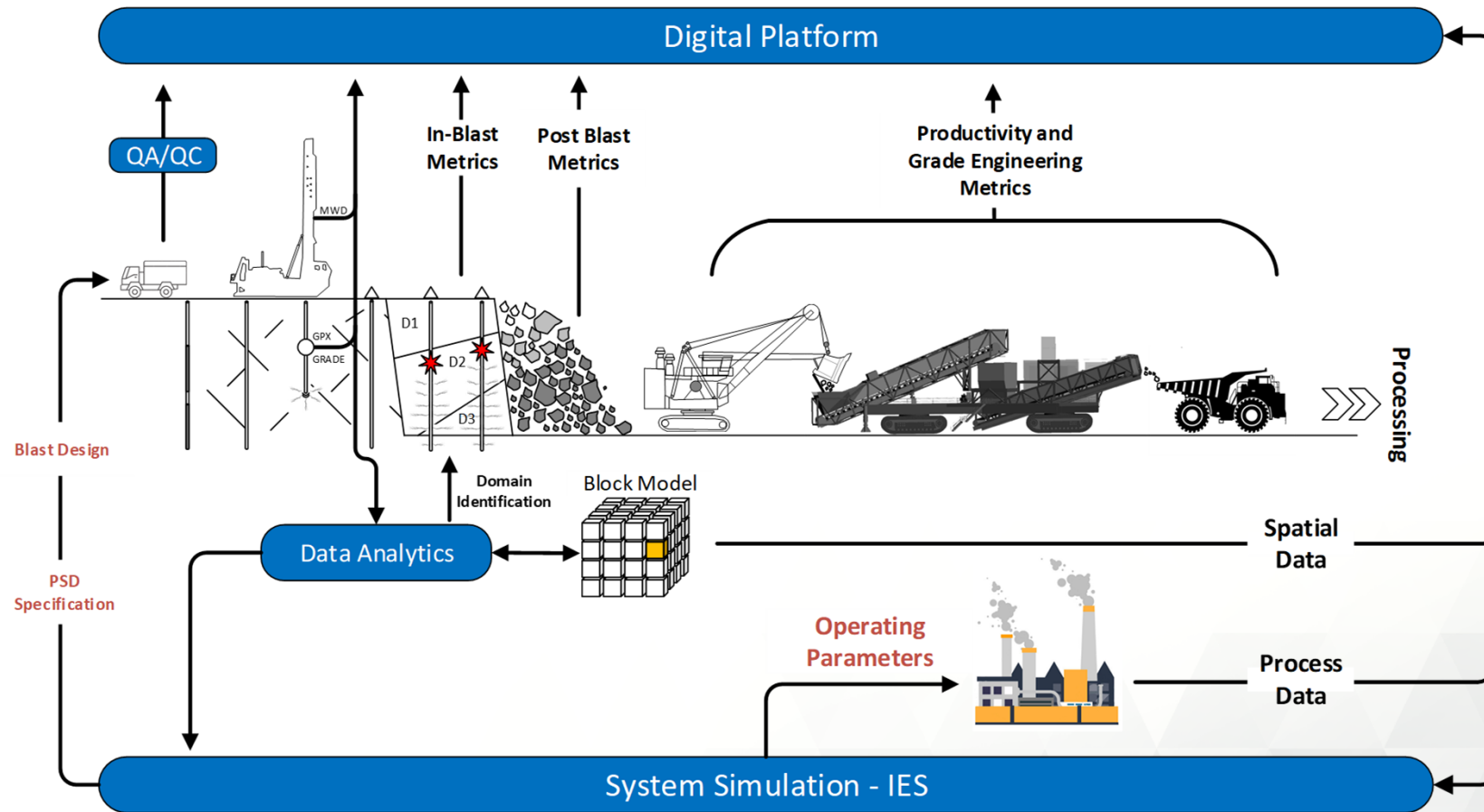
Head Grade 0.53g/t		
Screen	Sorting	
-300+150mm (0.36g/t)	Reject (0.62g/t)	Accept (0.31g/t)
-150+100mm (0.38g/t)	Reject (0.13g/t)	Accept (0.48g/t)
-100+50mm (0.45g/t)	Reject (0.11g/t)	Accept (0.57g/t)
-50+30mm (0.51g/t)	Reject (0.13g/t)	Accept (0.54g/t)
-30mm (0.76g/t)	0.18g/t 20% mass	0.62g/t 80% mass

Very close linkages
to Natural
Department due to
preparation of
narrow size fraction
for sorting



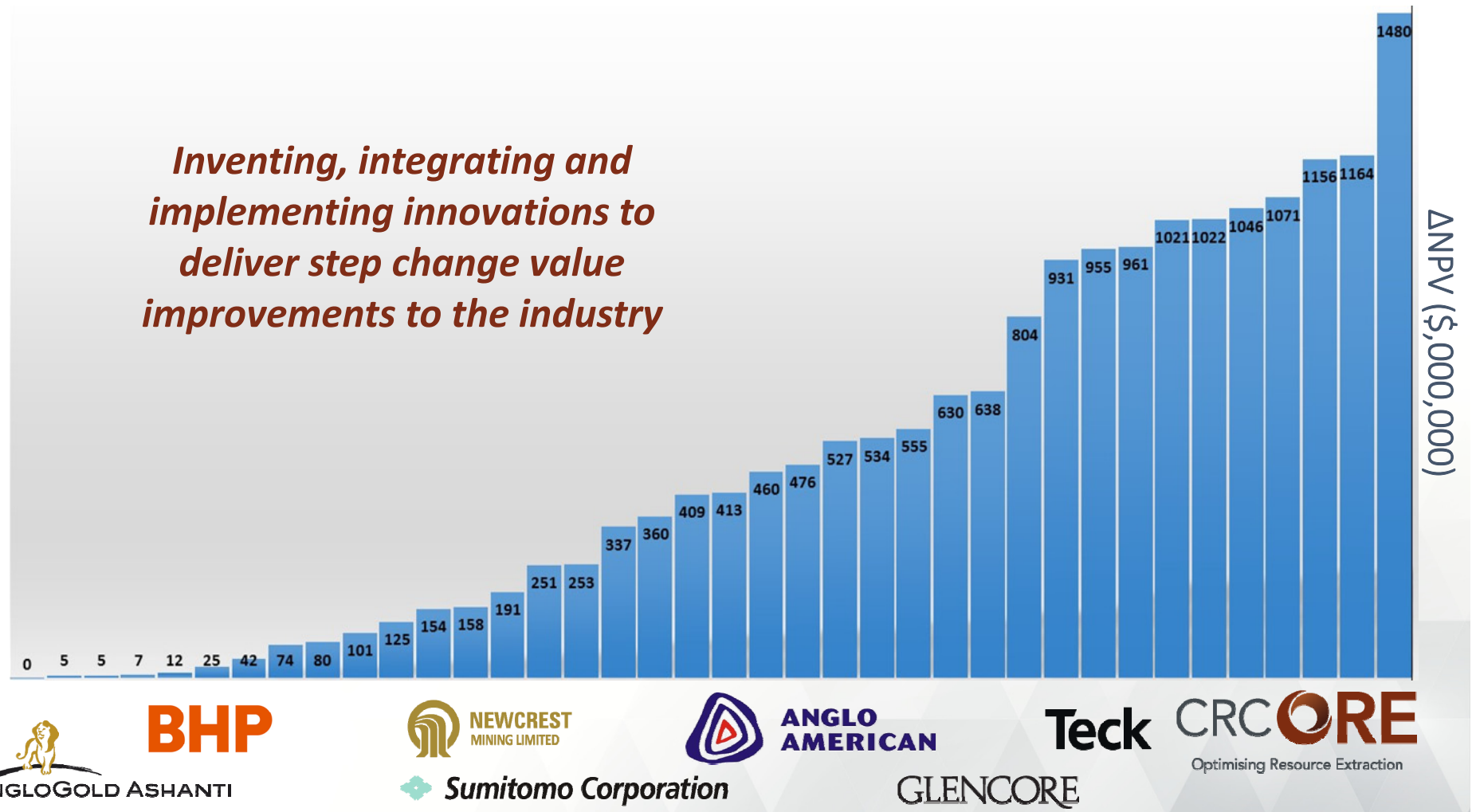
Key technical focus through Kalgoorlie-Boulder Mining Innovation Hub

Operationalising Grade Engineering – Instrumenting the Bench



Grade Engineering Lever Integration & Novel Exploitation Options Driving Value

Inventing, integrating and implementing innovations to deliver step change value improvements to the industry



For more information about CRC ORE Site Implementation Activities



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