Translate P9 research outcomes to an integrated process prediction tool

Capability enabled via an industry tool:
Integrated Extraction Simulator (IES)
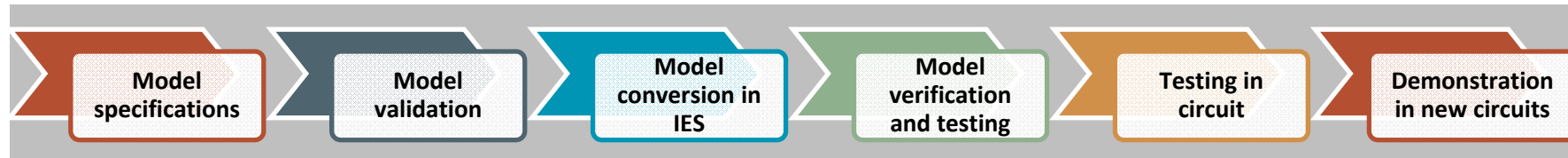
Differentiator

Current simulators

Single ore type

New capability

Multi-ore: Comminution

Multi-mineral: Recovery

(gravity, magnetic, flotation, …)

A focussed initiative designed to quickly deliver value to industry

Model specifications	Model validation	Model conversion in IES	Model verification and testing	Testing in circuit	Demonstration in new circuits

| Threshold funding	
1. Particle Based Flotation Model	Enhanced predictive capabilities added by relating ore floatability to particle surface liberation properties and predicting entrainment as a function of particle properties
2. Mechanistic Flotation	Independent models of pulp and froth zones i.　mechanistic froth transportation ii.　predict effect of particle attributes and operating conditions on entrainment and water recovery
3. Hydro-cyclone	Cut-size, separation and water split. Response to continuous density distribution.
4. Cone Crusher	Semi-mechanistic. Response to closed side setting, speed, chamber design. Full validation in Tier 1
5. HPGR	Piston and Die breakage. Verified on fully liberated material.
6. Dry Screen	Multiple decks, variable inclination, aperture +2mm. Response to generic media, throw, frequency. Particle size distribution predicted at every point on screen.
7. Jig	Response to component density, relative cut height, jig area, throughput.
8. Dense Medium Separator	Basic equipment model.
9. VR2 SAG/AG Mill	Accurate throughput-filling relationship. Power based breakage, improved discharge and slurry holdup. Full multicomponent in Tier 1
10. Mechanistic Mill	Use particle fracture tests. Inherently multi-component and predictive. Response to liner design, ball size & mill conditions. Full validation in Tier 1.
11. RoM Ball Mill	Same as VR2 with high ball load.

AMIRA P9Q project – Collaborative Research

Research collaborators

University of Queensland
Process modelling, SAG mill, stream structure
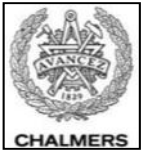
Chalmers University
Crushers, dry screening

University of Cape Town
Flotation, classification, fine screening

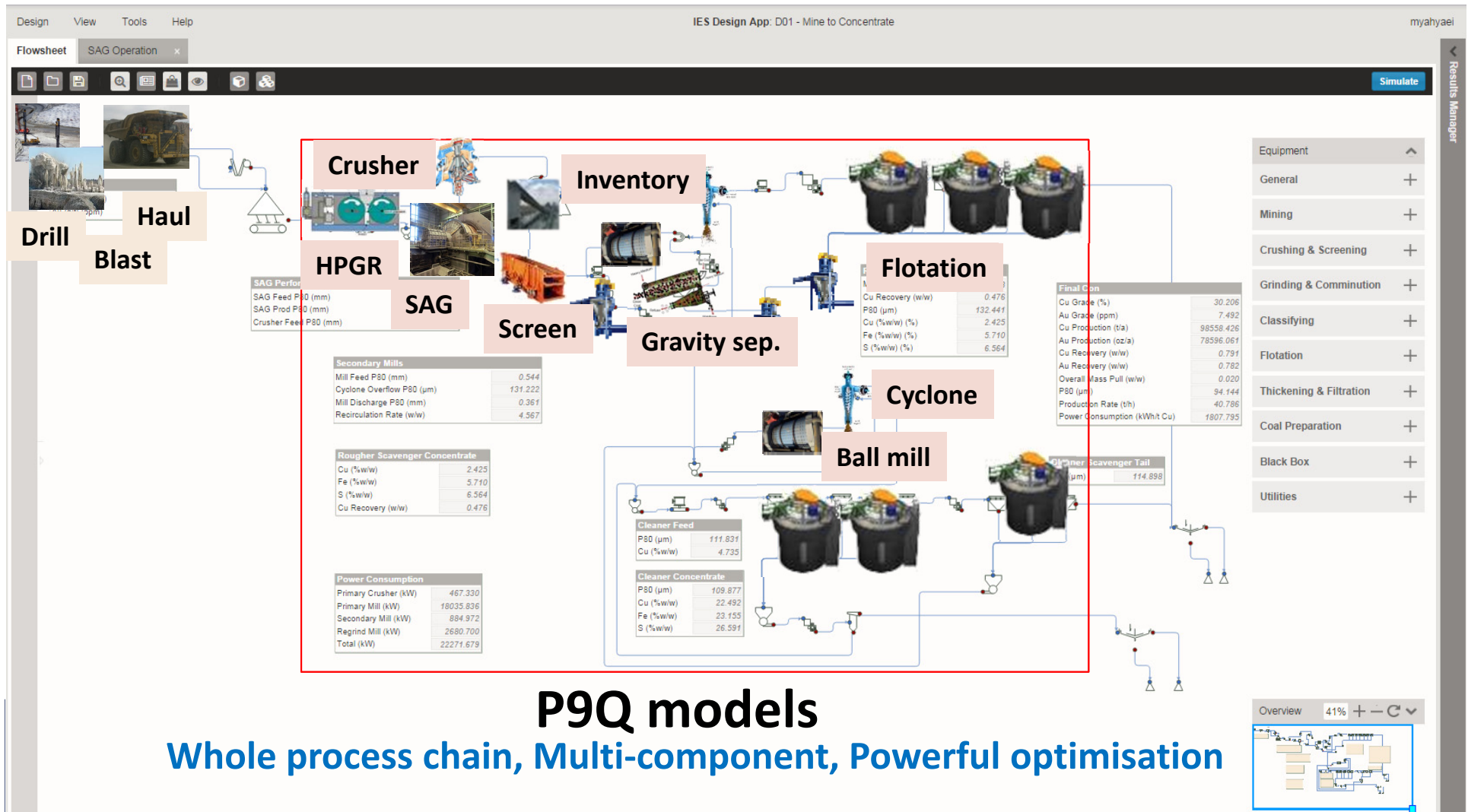**Federal University of Rio de Janeiro**
Mechanistic ball mill model, gravity separation

Hacettepe University
HPGR, dry classification, VRM

Integrated process prediction tool

P9Q models
Whole process chain, Multi-component, Powerful optimisation

First Sponsor Review Meeting - 22-23 of August 2017

Six Process models in IES P9Q platform

SAG VR2, Cone Crusher, Hydrocyclone, Coarse Screen, HPGR, Jig

Hands-on Workshop with IES

- **Introduction to IES (CRCORE team)**
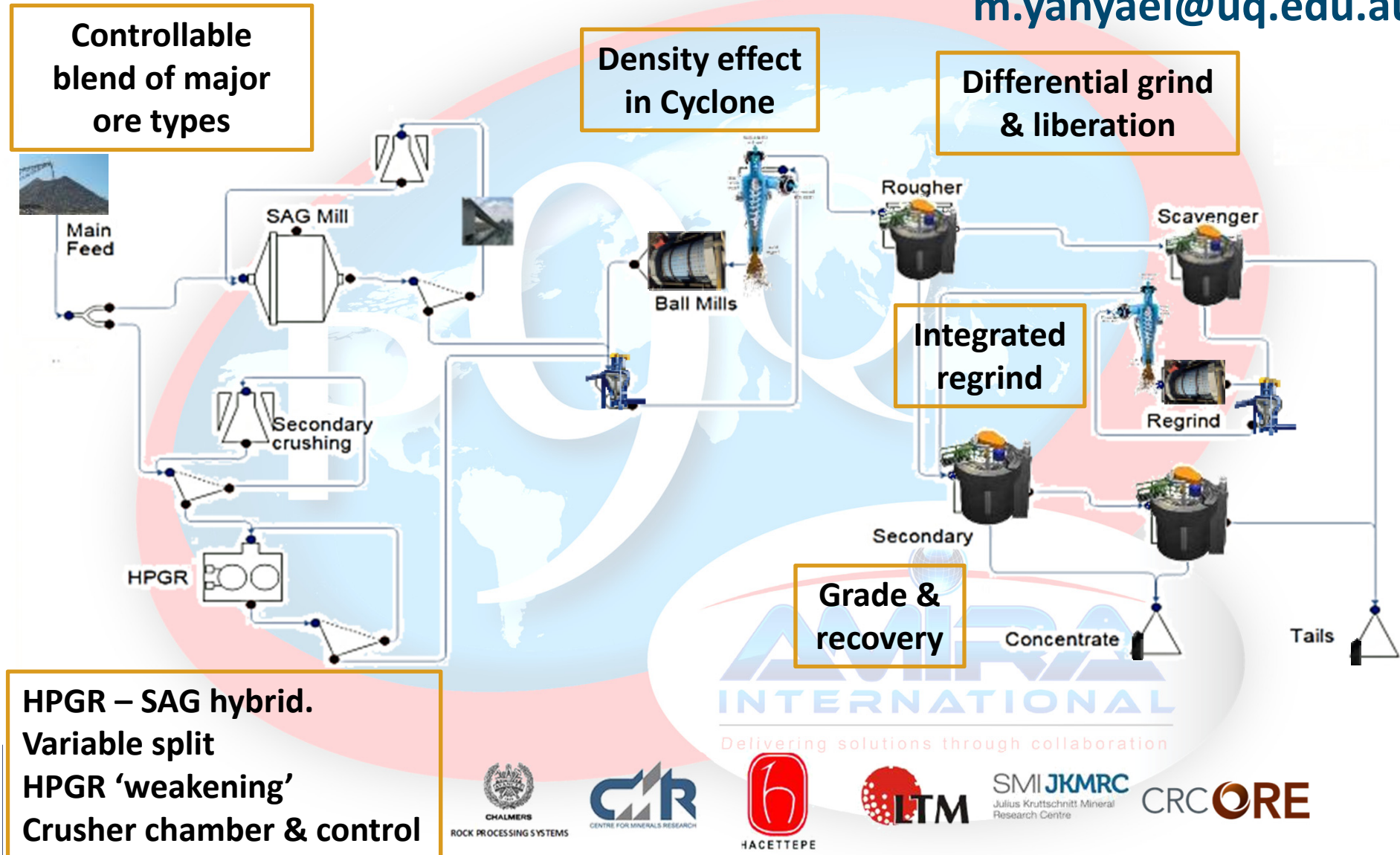- **Process models (Researchers)**

IES workshop in Brisbane – August 2017

Creating value through translating research models into industry process improvement tools

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Controllable blend of major ore types

Density effect in Cyclone

Differential grind & liberation

Integrated regrind

Grade & recovery

HPGR – SAG hybrid.
Variable split
HPGR 'weakening'
Crusher chamber & control

Thank you

Dr. Mohsen Yahyaei

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UQ-JKMRC

crcore.org.au

THE UNIVERSITY OF QUEENSLAND

Australian Government
Department of Industry,
Innovation and Science

Business
Cooperative Research
Centres Programme

CRC ORE
Optimising Resource Extraction