

A DJI drone is flying in the air above a man in a hard hat and safety vest at a mining site. The man is smiling and holding a remote control. The background shows industrial structures and a large pile of material.

**BHP**

# Transforming BHP: Technology unlocking value from pit to port

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Bank of America Merrill Lynch  
SmartMine conference  
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# Our strategy to maximise value and returns

To have industry-leading capabilities applied to a portfolio of world-class assets in the most attractive commodities

**Culture and capabilities** that enable the execution of our business strategy

- ✓ Market intelligence
- ✓ Access, discovery and appraisal
- ✓ Value conversion in operations and marketing



**Highly attractive commodities**, matched to our capabilities

- ✓ Attractive supply / demand fundamentals
- ✓ Large market sizes
- ✓ Steep cost curves
- ✓ Upstream value chains
- ✓ Differentiated demand drivers

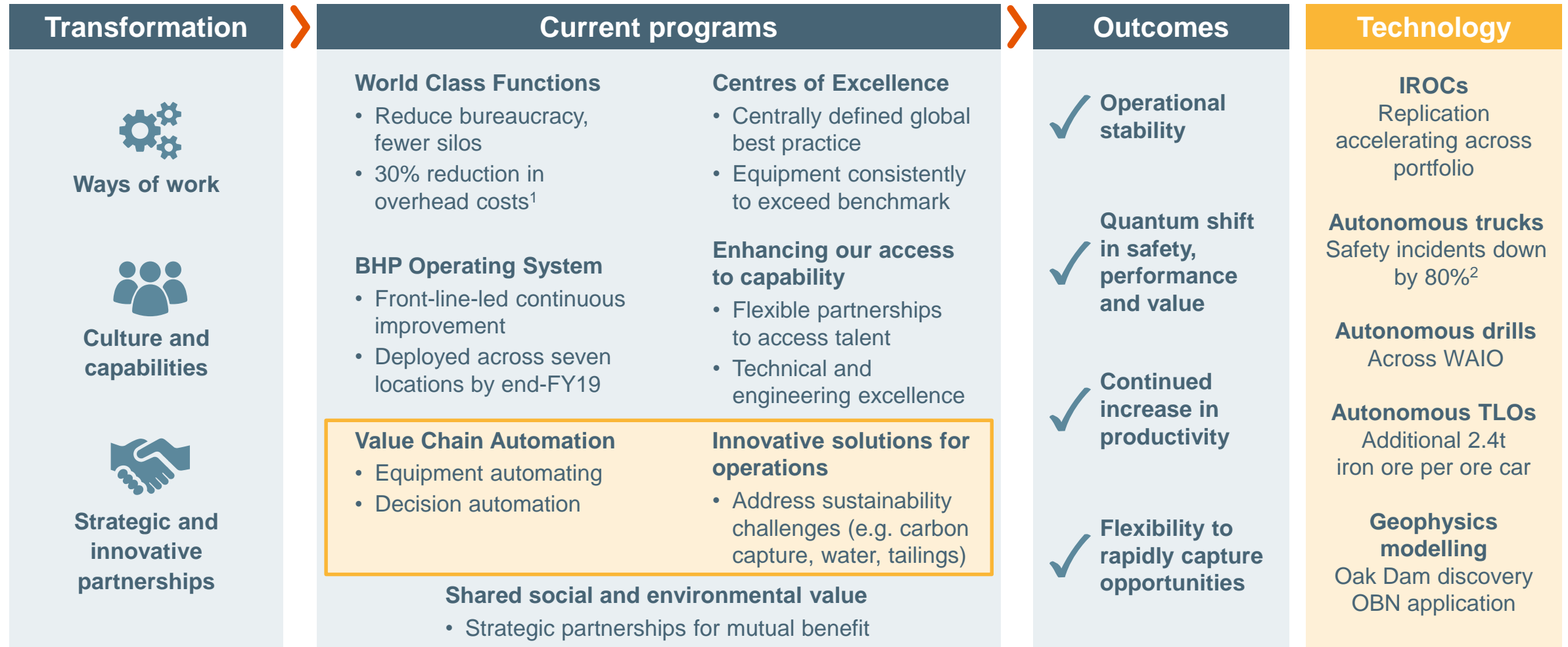
**World class assets**, uniquely suited to our capabilities

- ✓ Large
- ✓ Long-life
- ✓ Upstream
- ✓ High-margin
- ✓ Expandable

Driven by a commitment to transformation, capital discipline and social value

# Unlocking value for BHP through transformation

The world is undergoing significant change... we will be bolder and adapt faster to take advantage of this



Note: IROC – Integrated Remote Operating Centre; WAIO – Western Australian Iron Ore; TLO – Train Load Out; OBN – Ocean Bottom Node.  
 1. Represents potential reduction from FY18 in scope Global Function costs. 2. Represents safety incidents reduction in heavy vehicles.

# Our vision is to be fully integrated and highly automated

Opportunities to replicate from other industries and accelerate mining specific breakthrough technology

Advanced car manufacturing technology...



...to inform the future of mining



# The transformative power of Technology

Systems approach to the integration and automation of our value chains to unlock resources and drive a step change in safety, volume and cost

## EXPLORE & PLAN



Optimised  
planning and  
reduced  
resource  
uncertainty

## EXTRACTION



Autonomous  
and higher  
productivity  
systems reduce  
variability

## PROCESS



Improved  
throughput from  
advanced  
process control

## LOGISTICS



Improved  
scheduling and  
automated  
loading with  
less unplanned  
events

## CUSTOMERS



Meet specific  
customer  
demand while  
maximising  
realised price

INTEGRATED PROGRAMS

# Value Chain Automation



## Getting a clearer view of our ore bodies' future

- Machine learning helps with data interpretation
- Oak Dam copper discovery: uncover additional information in historical data with the help of advanced geophysics modelling and improved data interpretation

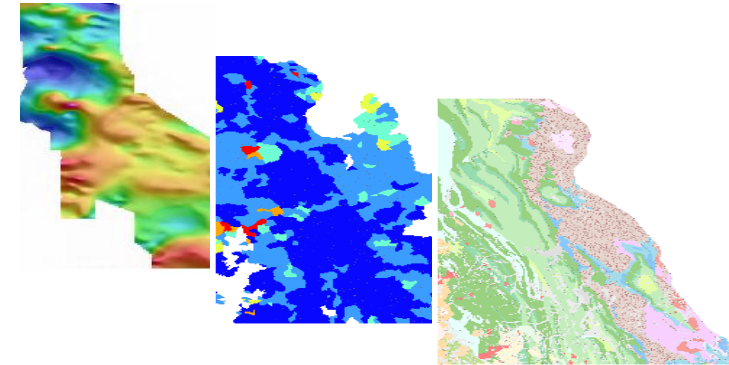
## Unlocking future opportunities with advanced seismic imaging

- Ocean Bottom Node survey helps us to navigate the technically challenging and underexplored Western Gulf of Mexico

## Shifting data acquisition and analysis to real time

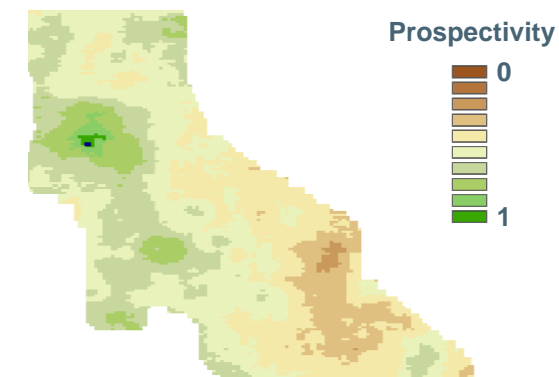
- Live 4D model to update resource knowledge; accessible by other processes along the whole value chain

## Geoscience data sources



## Machine learning

## Machine learning generated targeting aids



Exploration study example in Peru

# Value Chain Automation



## Safety and productivity through equipment automation

- Autonomous blast hole drill fleet at West Australian Iron Ore
  - 40% reduction in maintenance cost in Autonomous Drill
- Autonomous Haulage at Jimblebar
  - 80% reduction in heavy-vehicle safety incidents
  - 18% increase in truck productivity

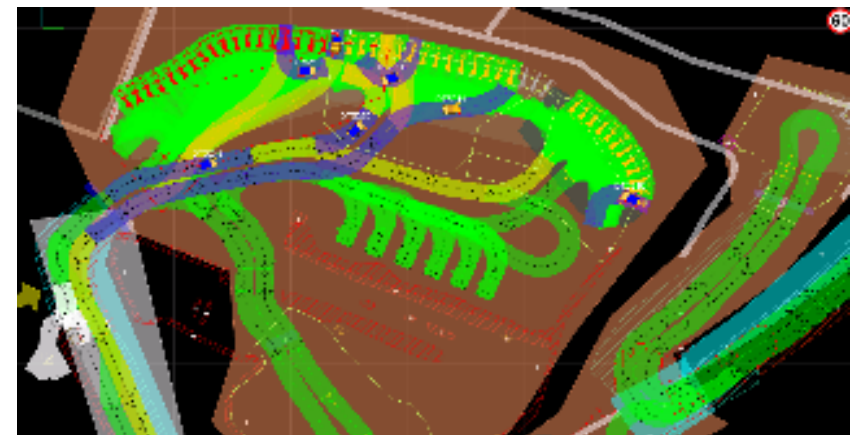
## Autonomous truck hauling program (feasibility studies phase)

- Automating up to 500 haul trucks across WAIO and Queensland Coal
- First of several investment decisions expected in CY19; total capex of <US\$800m (represents full amount)
- Staged rollout between CY20 and CY23

## Trucks automatically navigate using pre-defined GPS courses



## System continuously calculates actual location, speed and direction of all manned and unmanned vehicles



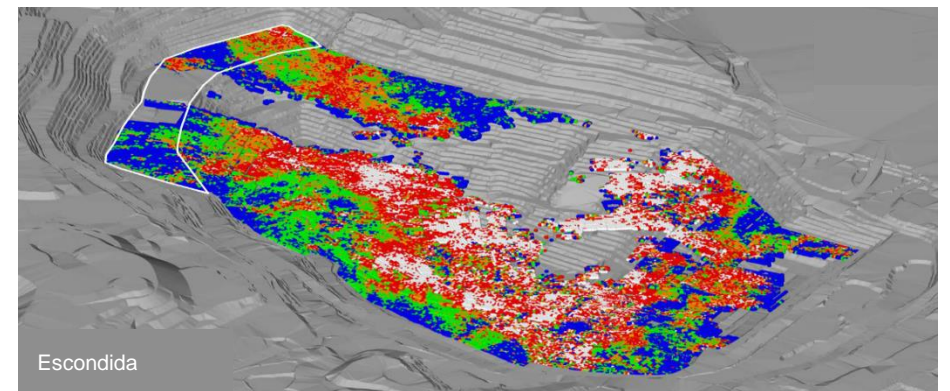
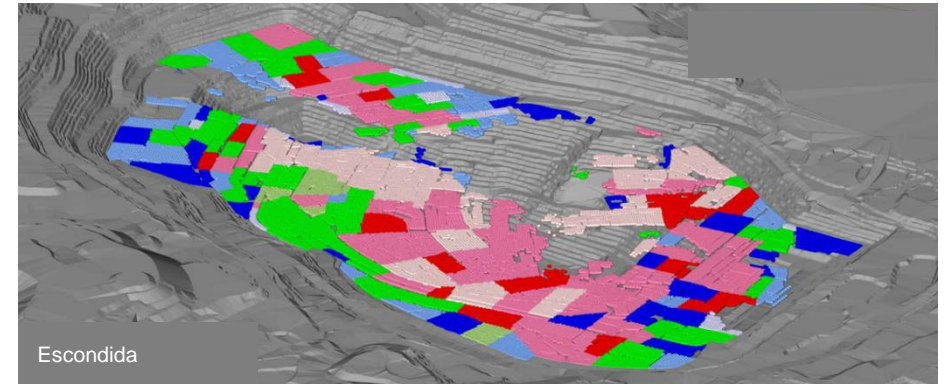
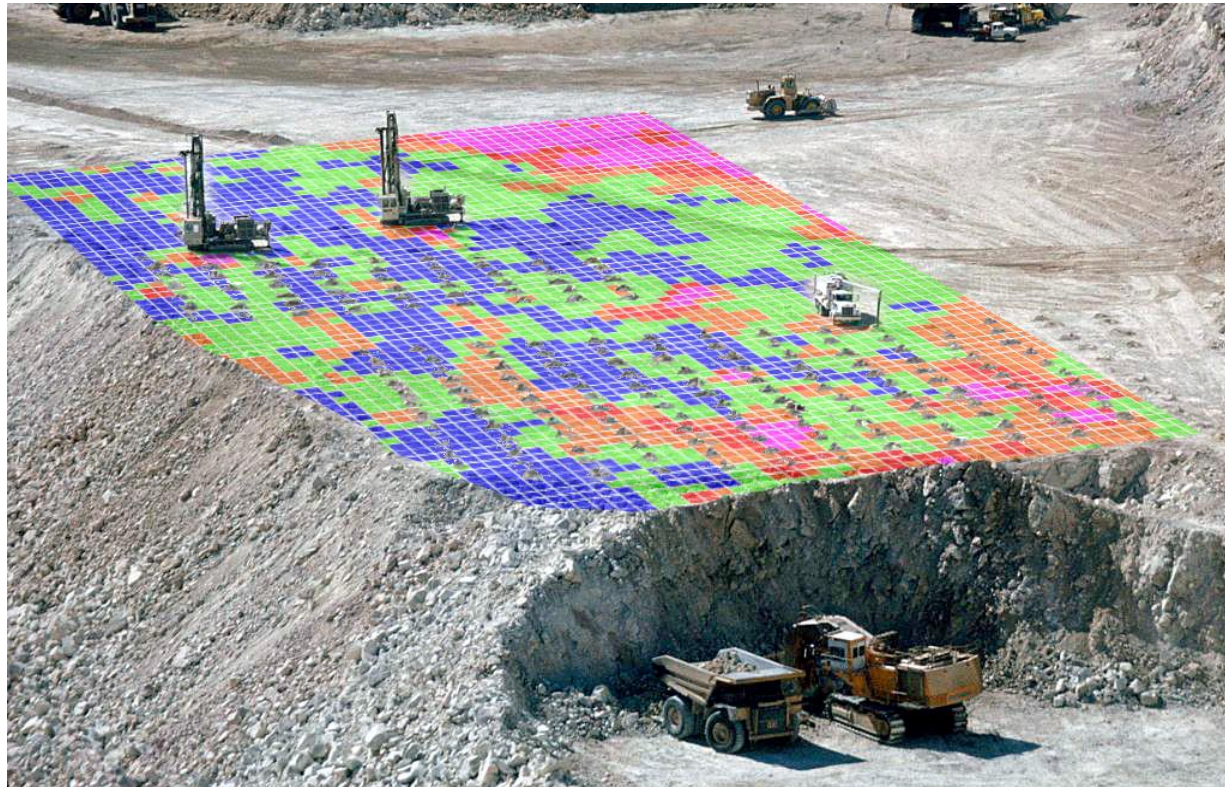


# Value Chain Automation



## Trialling Precision Mining to unlock value

Sensors and detailed analytics inform extraction decisions at Escondida



# Value Chain Automation



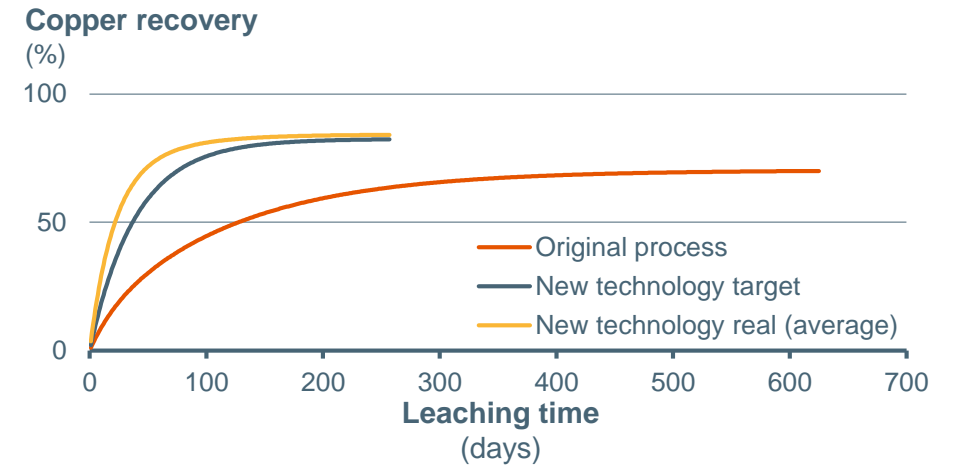
## Patented leaching technologies at Spence to replicate across assets

- Increased metal recoveries by 10 - 12%
- Shortened the processing time by almost 50%
- Utilise the full 200 kt of tankhouse capacity

## Potential to replicate at Olympic Dam

- Heap leach technology development program successfully completed

### Spence leaching performance



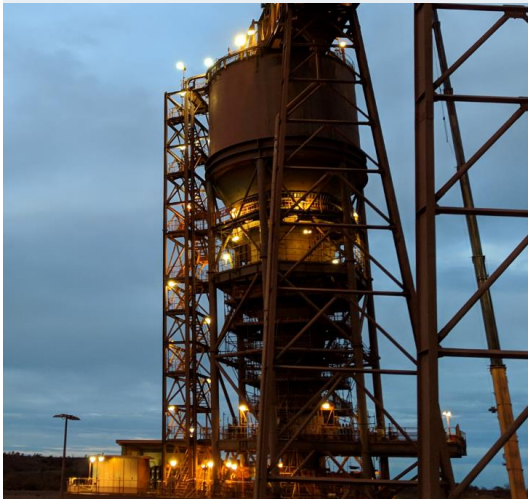
### Olympic Dam heap leach pilot plant



# Value Chain Automation



### Volumetric Train Load Out



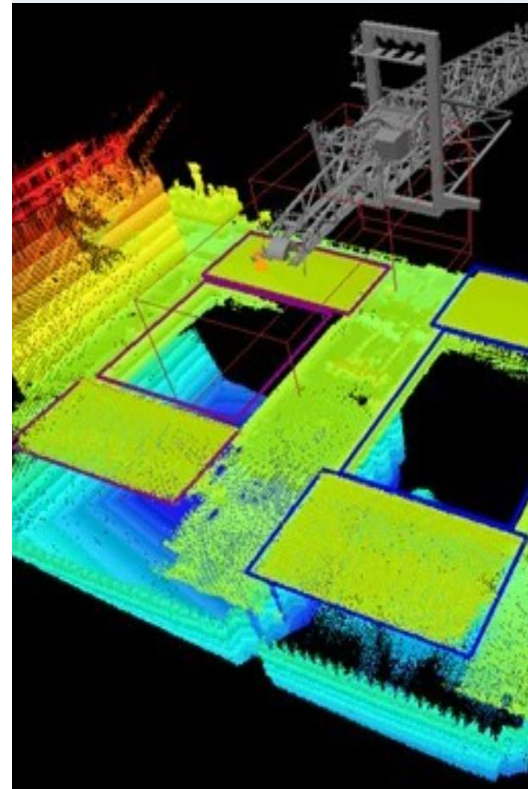
### Ore car volume productivity

### Rail scheduling algorithms



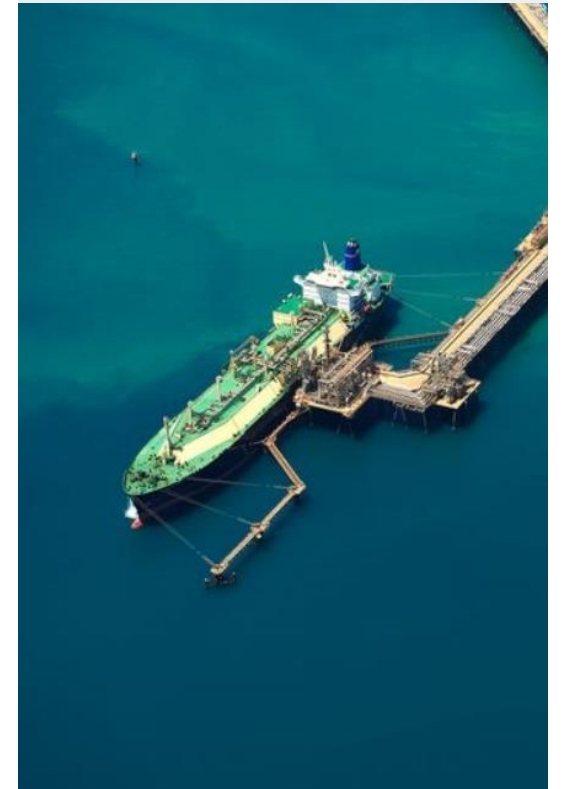
### Rail network efficiency

### Autonomous ship loader



### Loading productivity

### Brand Relativity Evaluation Tool



### Product strategy optimisation

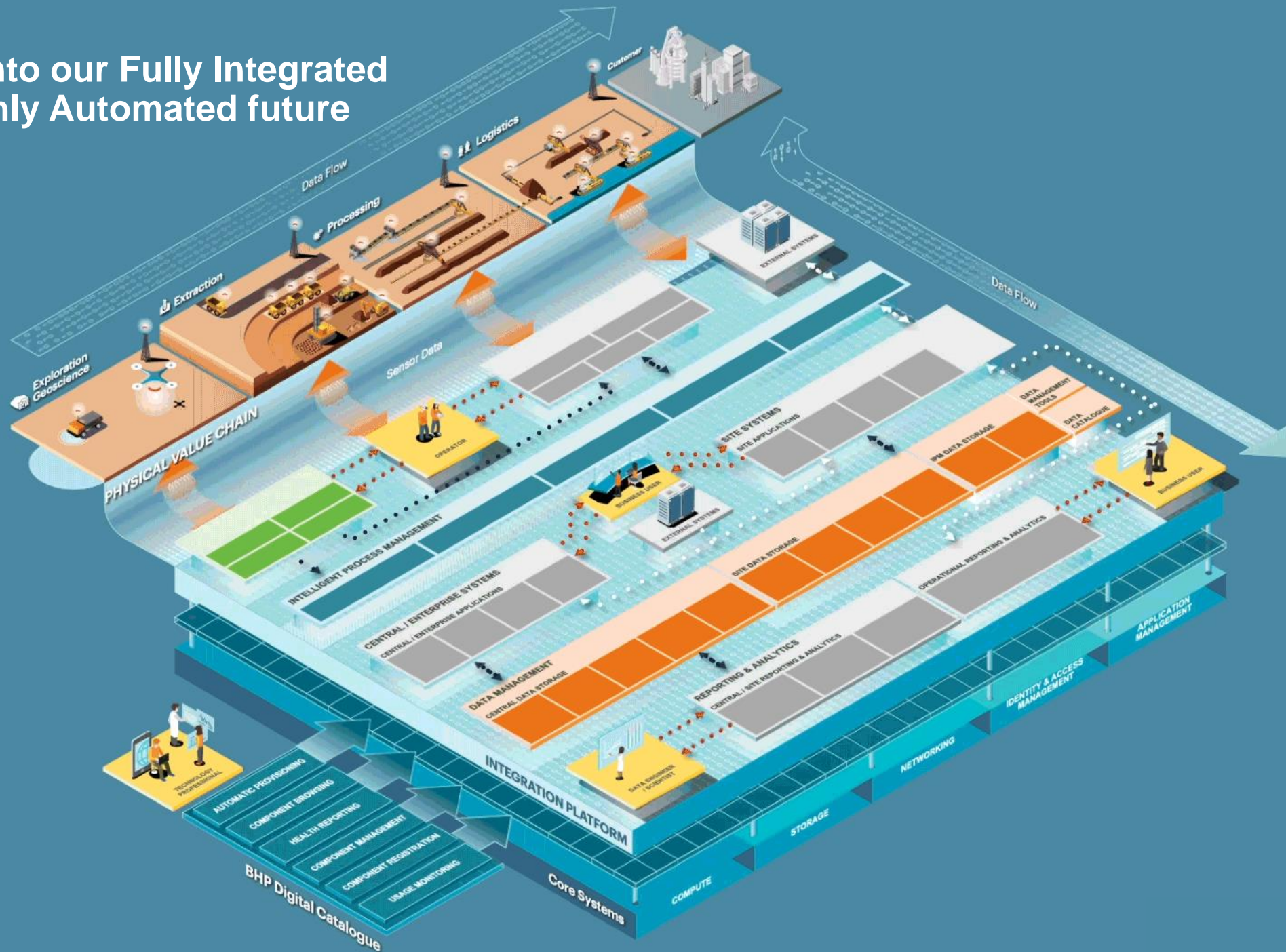
# Social value secures our strategy

Drives transformation and the shift from social 'licence' to 'value'



Brisbane IROC

# A look into our Fully Integrated and Highly Automated future



**BHP**