



AUSTRALIAN RAIL TRACK CORPORATION ANCO SOLUTION

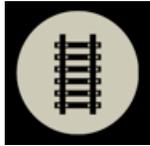
Presented by

Wayne Johnson | ARTC Ltd

October 2021

ARTC

ARTC, our vision is to improve Australia's productivity by making rail the mode of choice in the national logistics chain.



ARTC is one of the largest freight rail network owners in Australia – we look after 8,500km of track spanning five states.



We've invested more than \$7 billion over the past 15 years developing a reliable and efficient network across Australia.



We employ more than 1,800 people across 39 sites nationally, all working towards our common goal – to keep Australia moving.



Our people manage the safe transit of around 450 trains per day, moving passengers and more than \$14 billion worth of goods every year.



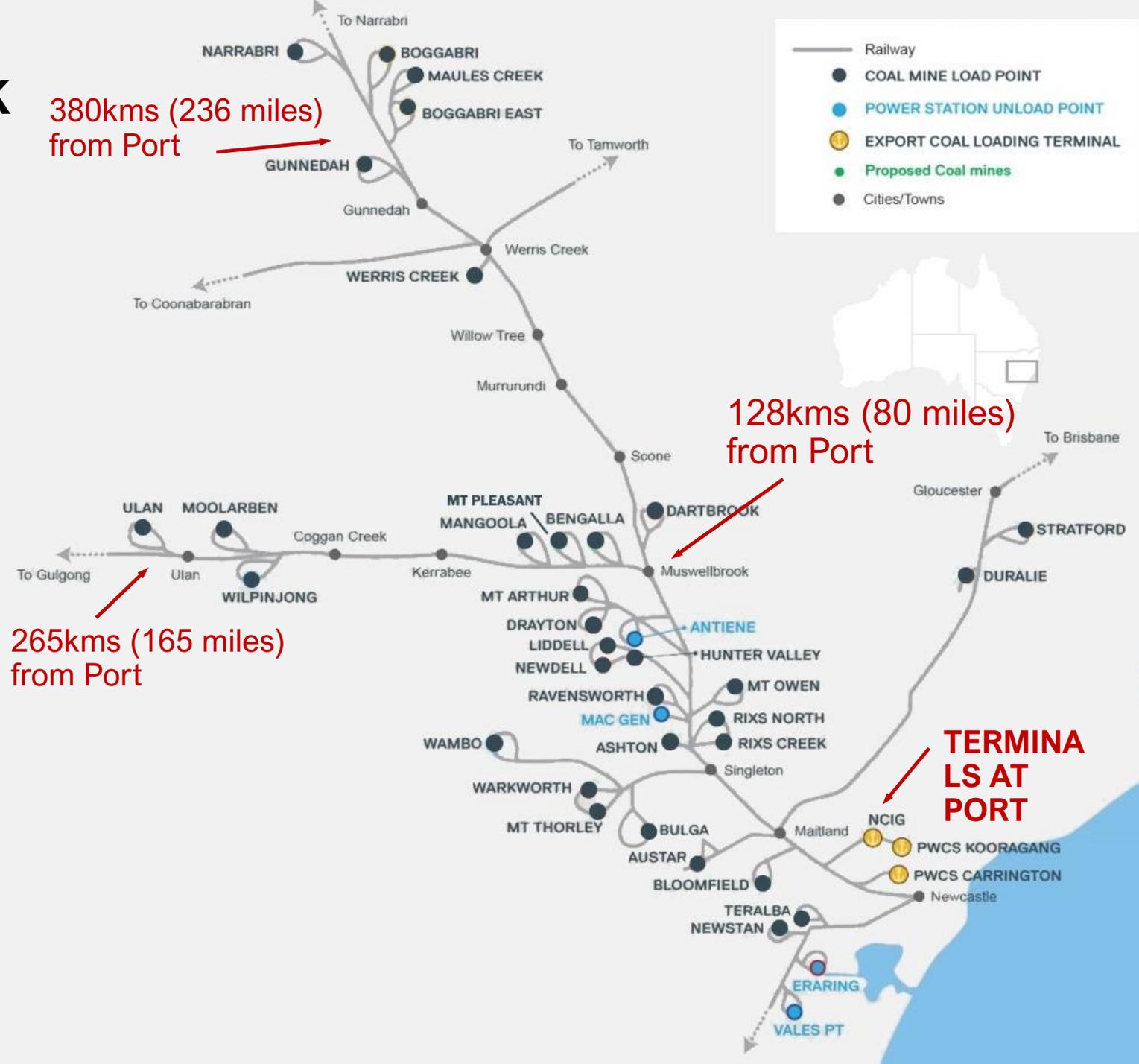
By moving goods, we link businesses, farmers and producers to domestic and export markets to help underpin our economy.



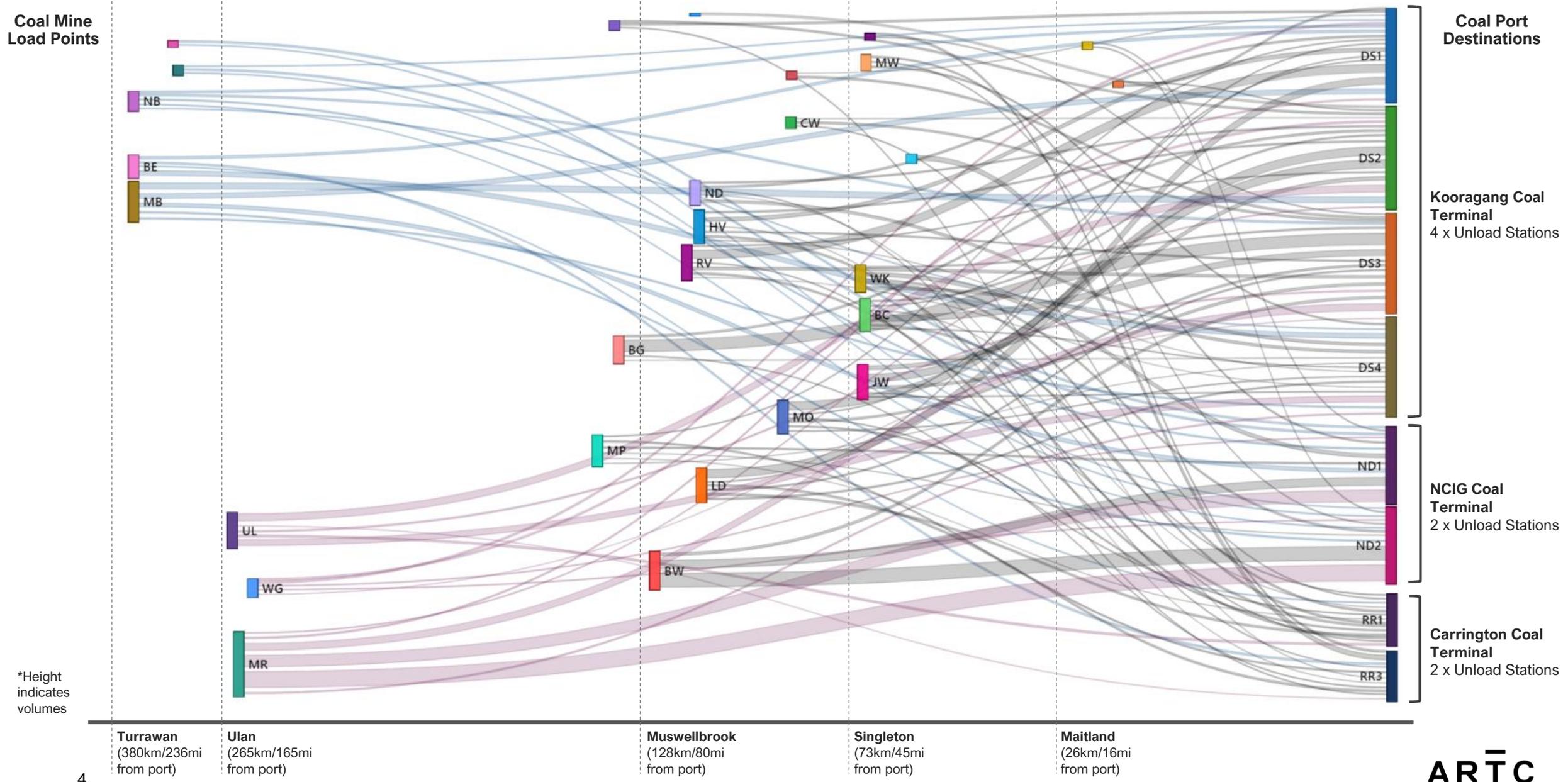
HUNTER VALLEY NETWORK MINE RAIL SITES

We are the key link in managing the safe movement of **25,000 tonnes of high quality thermal coal every hour** between the Coal Producers' Load Points and the Export Coal Loading Terminals or Domestic unload points.

And, we manage the passage of more than **125 mixed freight and local & regional passenger trains**.



COMPLEXITY OF DAILY COAL MOVEMENTS



OUR TRANSFORMATION

Capability

We are digitising routine work and de-risking operations by **systemising tacit knowledge and accelerating continuous improvement** through intensified data collection and intelligent analysis

Historically we manually tracked trains to ensure safe-working



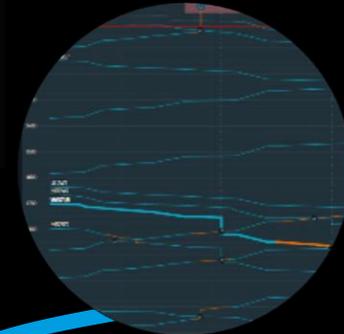
80 YEARS

...yesterday's focus was on electronic real-time tracking of trains



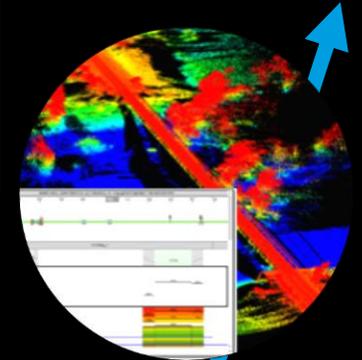
20 YEARS

... today we are digitally forecasting and deconflicting movements across the network as a single system to maximise train flow across a mix of traffic types

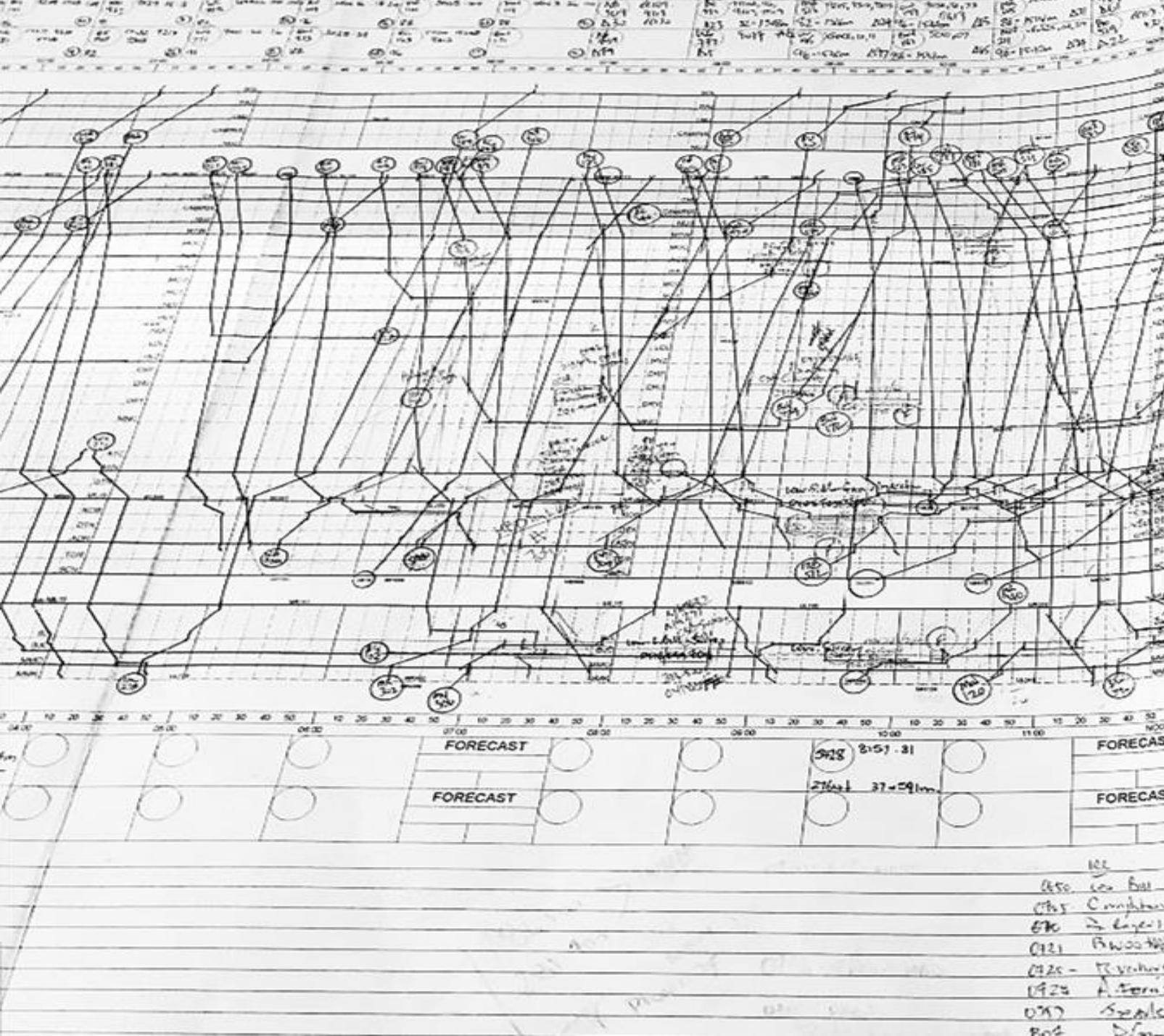


TODAY

...tomorrow we are fully integrated, using advanced analytics to manage network flow across the system. Highly predicated on integrated data and information, decisions and processes



NEXT 5 YEARS



THE PAPER TRAIN GRAPH

- A paper train graph for **each geographic dispatch/control area**
- Train plans were drawn in pencil, while actual train movements were in ink
- **Changes to the plan** required the Network Controller to **erase the affected parts of the plan and re-draw** the plan. This may happen often, depending on Live Run changes
- Being paper-based, there was **limited opportunity to collate data** for continuous improvement opportunities.

DATA CRITICALITY FOR ACCURATE PLANS

INPUTS



PORTS & LOAD POINTS

- Coal Orders
- Priorities
- Sequence

- Track Topology – signals, switches, routes, lengths
- Topography – grade, curves
- Constraints – Speeds, Blocks
- Non-coal schedules
- Real-time train location

- Horsepower
- Weight
- Length

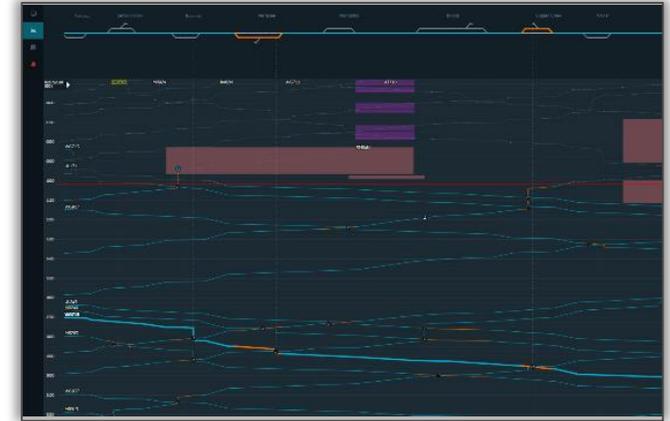
- Forecast load/unload completion

ARTC

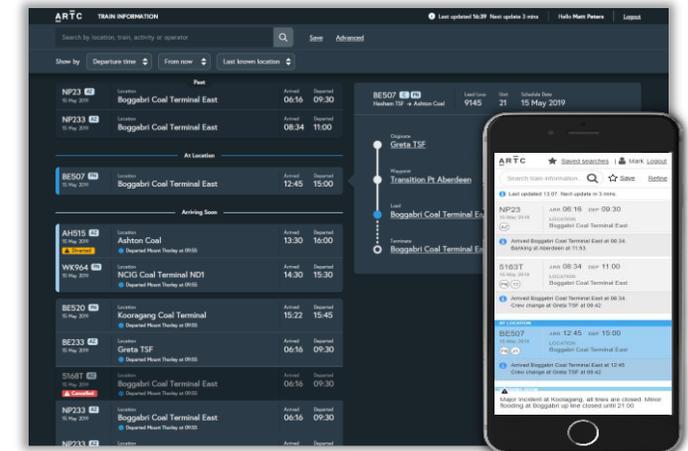


Delivering
VISABILITY
CERTAINTY
EFFICIENCY
CAPACITY

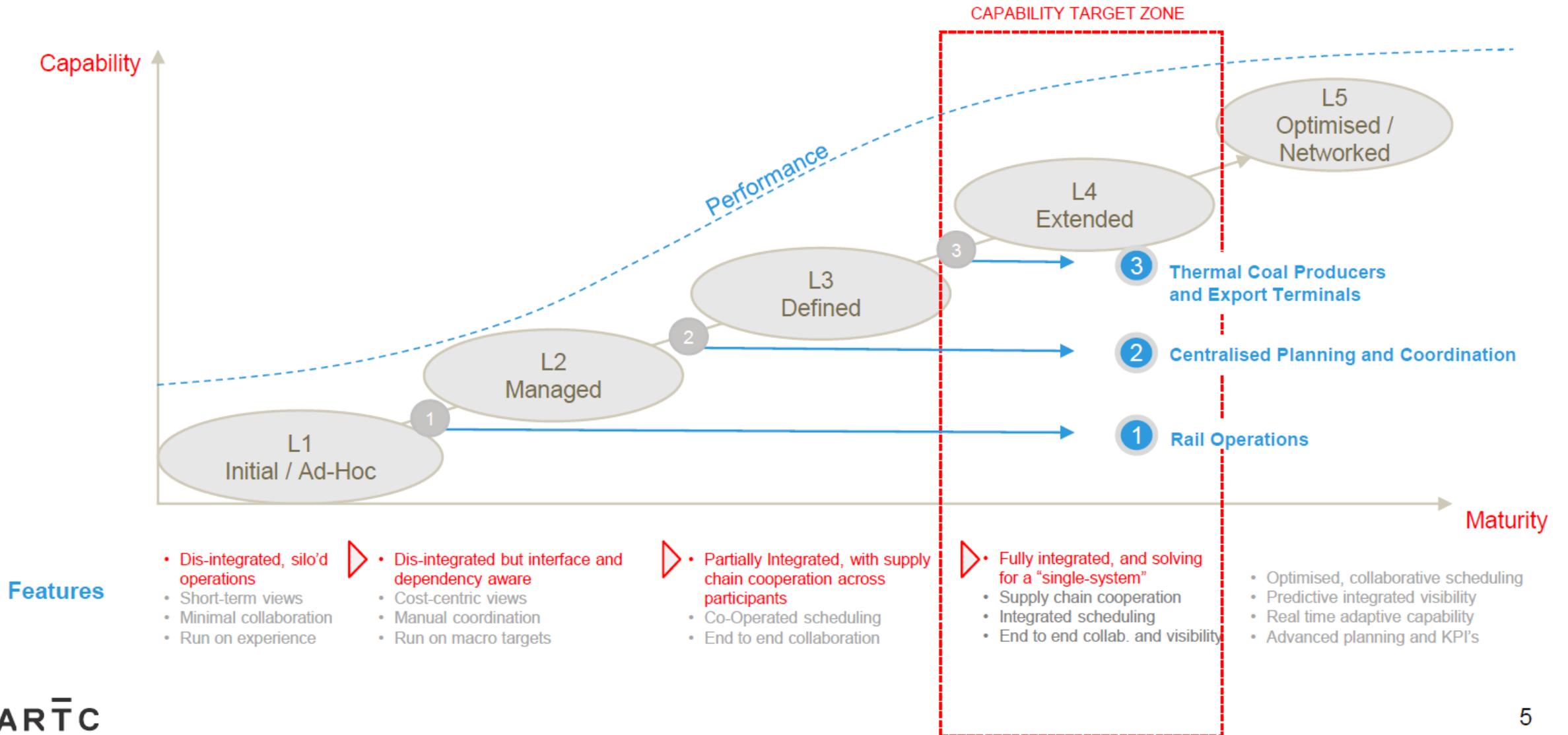
OUTPUTS



- **DYNAMIC, DE-CONFLICTED RAIL PLANS**
- **ACCURATE ARRIVAL FORECASTS**



“YOUR SYSTEM IS PERFECTLY DESIGNED TO GIVE YOU THE RESULTS YOU’RE GETTING...” *W.E. Deming*



MOVEMENT PLANNER

PATH TO DWELL REDUCTION



Strategy for Rail Network

- ✓ Run when ready
- ✓ Rail network efficiency and utilisation
- ✓ Improve visibility for logistic chain

Configuration

- ✓ Incorporate vision to Movement Planner *Business Objective Functions*
- ✓ Precise – Train, Rail Network information

Dynamic Movement Plan

- ✓ Incorporate millions of decisions across the Rail Network
- ✓ Train Performance Calculator – Physics based modelling
- ✓ Optimise Resource utilisation (Track, Locomotives, Time, People)
- ✓ Optimise Meet/Pass locations

Optimised Live Run

Visibility

- Accurate Estimated Time of Arrival
- ↑ confidence of crew planning
- Highlights areas of congestion

Efficiency

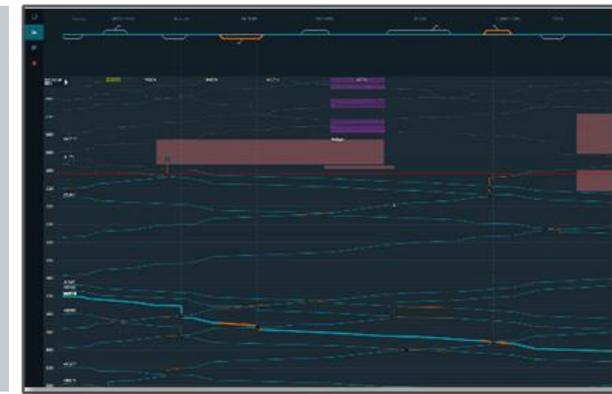
- ↑ Port/Mine occupancy
- Aggressive train planning to optimal pass locations
- ↑ Network Velocity and ↓ Dwell

Analyse

- ✓ Data rich reporting
- ✓ Plan metrics for entire network
- ✓ Review Rail network performance

Movement Planner

- New Plan every 2 mins
- TPC – physics based run-time for **each** train
- Incorporates real time rail network status
- **Dynamic** conflict resolution
- Forecast 12 hour lookahead
- Est. Train arrival accuracy +/- 5 mins



Customer
Vision

Configure

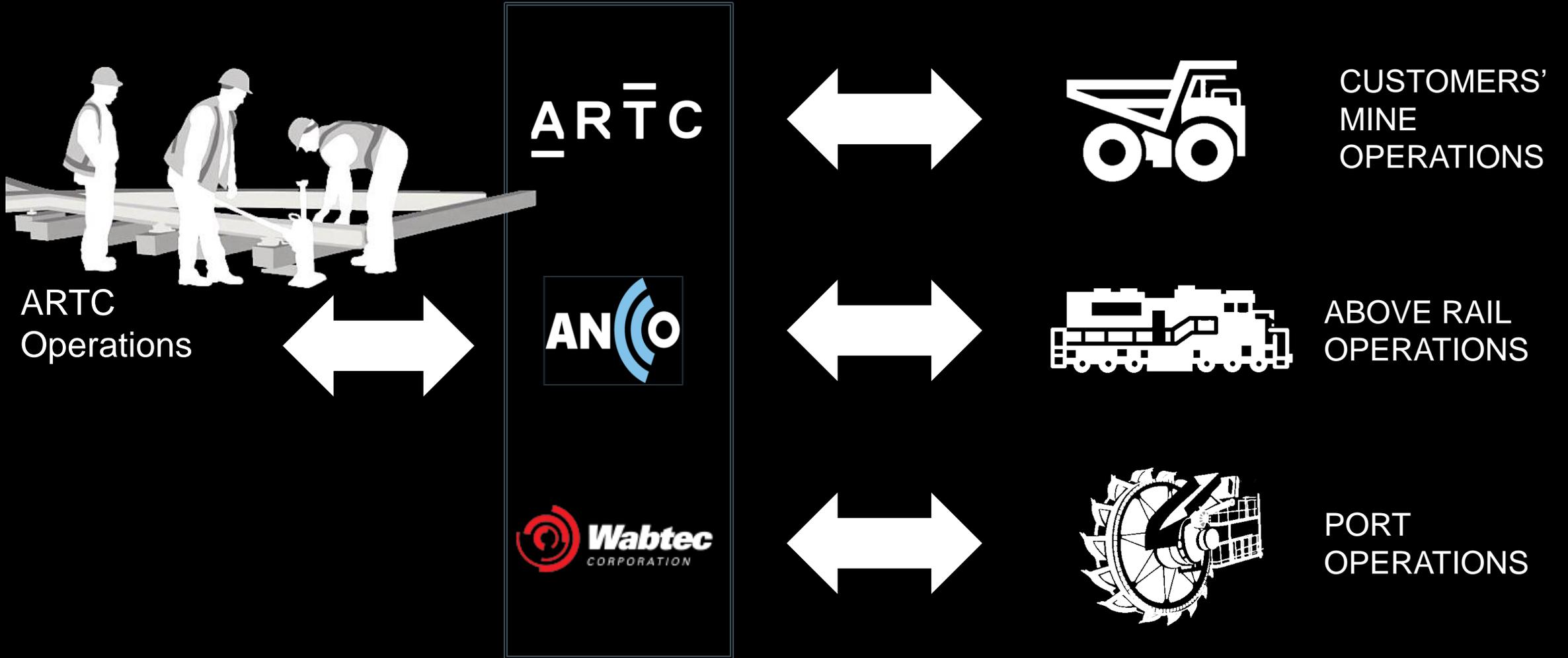
Optimize

Execute

Strategic vision to Tactical planning and execution

SYSTEM INTEGRATIONS

Creating an interconnected rail supply chain



PROJECT OUTCOMES

ENABLED CAPACITY

Following the introduction of ANCO, enabled by Movement Planner, **target volumes were able to be achieved in full, with no track constraints observed.**¹

210.5^{Mt}

Target volumes now achievable following the introduction of ANCO for day of operations, up from:

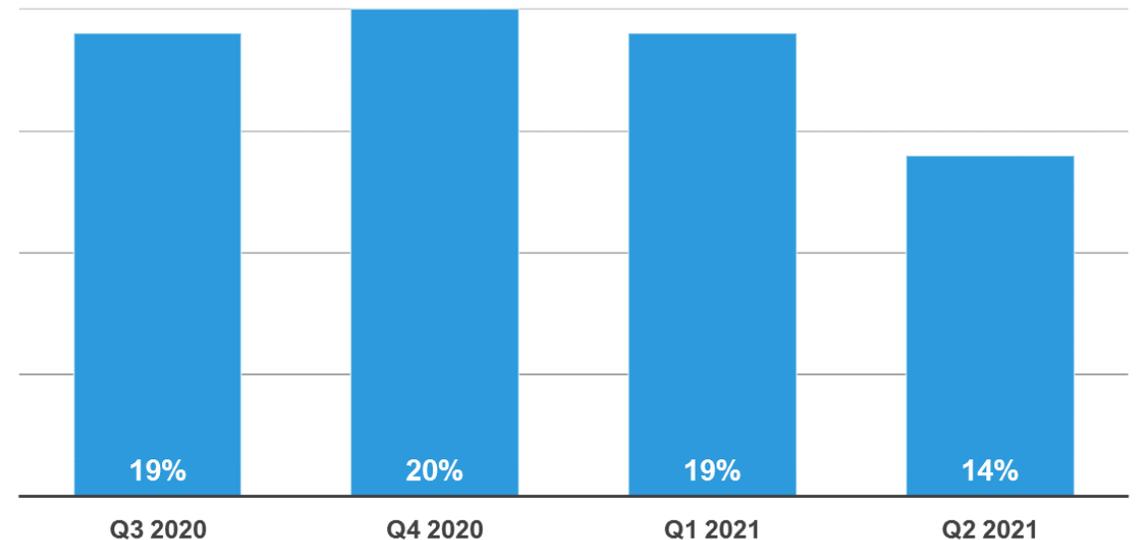
196.5^{Mt}

2021 ARTC track contracted volumes

DWELL REDUCTION



Quarterly results since the implementation of a dynamic planning capability, enabled by Movement Planner shows **dwell is consistently exceeding the target dwell reduction of 5%**



Includes reduced time in passing loops and in load-points

¹ Source: HVCCCC

FUTURE OPPORTUNITIES

- Enhanced tools extend the horizon for integrated train movements & maintenance planning to deliver greater efficiencies & capacity from our network
- Through the application of advanced analytics, we will further optimise the network
- Extend the integration of Movement Planner with our train dispatch system to increase consistency of network management activities, enabling our people to deliver an enriched service for our Customers and stakeholder across the system

