

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

ARA INSIGHTS

WELCOME TO THE OFFICIAL ONLINE LAUNCH OF THE ARA'S LATEST MAJOR RESEARCH REPORT



AUSTRALASIAN RAILWAY ASSOCIATION **L.E.K.**

Finding the fast track for innovation in the Australasian rail industry

OCTOBER 2020

WWW.ARA.NET.AU

'Virtuous circle' exists in local rail R&D and innovative railways

It requires significant cost to develop, commercialise, deliver at scale, bringing the hurdles to success the value chain.

Links between a country's rail operators and rail managers with stronger rail innovation to have more innovative.

As that while Australian railways widely from the global are several important links link, between rail managers innovation system, comprising institutes, manufacturers

Relationships between Australian Railways and the Rail Innovation System

Local manufacturing drives heavily on local relationships and plans for local product development and procurement

Commercialisation → **Manufacturing**

Research & development → **Rail managers & operators**

A virtuous cycle between innovation and rail

Rail operators often will prefer local manufacturer good where there are better selling times, and more responsive service and maintenance relationships.

Rail planners and managers identify problems and opportunities that require innovative partnerships

- Rail operators want access to local suppliers. Passenger rail operators prefer to buy locally, reducing risk times for equipment, or relying on existing relationships for ongoing servicing, maintenance and repairs.
- A strong pipeline of operator investment supports growth in local manufacturing. A steady pipeline of investment sustains local manufacturing capability and its supply chain, and enables knowledge and skills to be transferred to new clients.
- Local manufacturers benefit from the commercialisation of local research. A major factor for advanced manufacturing is the 'feeder' system of local research and commercialisation.
- Researchers benefit when rail operators need new solutions and fund research. Examples of partnerships between rail operators and researchers include the development of condition monitoring between the Monash Institute of Rail Technology (MIRT) and the Australian Rail and Track Corporation (ARTC), and the ARTC's partnership with Lockheed Martin to develop the Advanced Train Management System (ATMS).

Technologies identified here are indicative of readiness to adopt new technology, rather than a broader spectrum of assets than these, from innovations in construction, management, resourcing, in digitisation and data management. Ongoing innovations have broad applicability across the rail industry and the early promotion of these (where it is not too competitive advantage) is important.

MECHANISMS THAT SUPPORT INNOVATION AND TECHNOLOGY ADOPTION

- Simplifying standards and ensuring they are consistent between jurisdictions where appropriate can drive uptake of new rail innovation.
- Strong links between (i) safety and technology adoption, and (ii) productivity and technology adoption.

16. Major rail technologies adoption timeline



LEK Analysis

INNOVATION AND THE AUSTRALIAN RAIL INDUSTRY

There are many cases of innovation driving efficiency, reducing costs and improving customer outcomes in Australian rail. But more needs to be done to realise the industry's full potential.

LEADING
Rio Tinto and its commodity innovation and results, with their

Automation Driving Better Returns
The new Sydney Metro project has used automation to deliver greater efficiency and return on investment. The project already recovers 20 cents of every dollar in operational spending, compared to 20 cents recovered by Sydney Trains. By 2021, Sydney Metro is expected to recover 60 cents in every dollar - a 300% improvement on the traditional network.

EXPORTING
The Manahs Institute works. They deliver railroads in real time efficiency, safety and of rail infrastructure.

Technology used

FACT SHEET: FAST TRACKING RAIL INNOVATION

Australia is on the cusp of a new wave of rail investment, with injected into the industry over the next 15 years. But the industry must urgently build a culture of rail innovation to make and harness new opportunities in the global rail technology.

RAIL INNOVATION AND THE POST PANDEMIC OPPORTUNITY

The impact of COVID-19 has highlighted the importance of a strong Australian rail innovation and technology culture. The pandemic impacted global supply chains and continues to affect the rail industry. There is an opportunity now to strengthen our focus on innovation to support more resilient supply chains in the future.

This global market opportunity is growing, with a rise in

\$362 billion PER YEAR GENERATED BY THE RAIL TECHNOLOGY MARKET

Increasing innovation WITH THE RATE OF NEW PATENTS RISING

Australia is lagging behind its global counterparts, and are

NO GOVERNMENT FUNDING
for rail cooperative research centres or research programs

LOWER PRIVATE INVESTMENT
due to lack of R&D funding certainty.

HIGHER SPEND PER KM
and lower rate of cost recovery exacerbated by lack of rail innovation.

PRIVATE INVESTMENT FOR EVERY DOLLAR OF PUBLIC FUNDING

Country	Investment Ratio
Australia	0.3 cents
UK	\$2
JAPAN	\$20

Disruptions
66 per cent of rail businesses experienced international supply chain disruptions

Delays
Rail organisations have reported the delivery of equipment from international suppliers has been delayed

Rising costs
Rail businesses expect higher prices for critical equipment to extend into 2021

A more productive rail network
Innovation and technology investment could boost local supply chain efficiency and rail freight productivity

Creating value
Australia's strengths would support the development of a high value, high tech local rail manufacturing sector

Supporting local demand
Rail businesses will need to hold more inventory in a post-pandemic world, which is likely to lead to higher demand for local and reliable content

Resilient freight networks, all the time
More efficient supply chains supported by technology and innovation will help the rail freight sector respond to future climate change events

Technology to drive confidence in public transport
During COVID-19, new technology was used to monitor passenger numbers on Sydney train carriages in real time to support social distancing. Investment in innovations like this help keep services operating and support a faster return of passengers to the network.

WANT TO KNOW MORE?
For further information, please contact ARA General Manager Supply Chain Natalie Currey at ncurrey@ara.net.au

FAST TRACKING RAIL INNOVATION

FACT SHEETS

POLICY BRIEF: FAST TRACKING RAIL INNOVATION

1. CHALLENGES OF RAIL INNOVATION

When Australia's first railways were developed in the mid-nineteenth century, they catalysed economic and social development and connected distant settlements. However, the political arrangements in the colonial era and the tyranny of distance meant that the railways developed separately, with different standards and gauges.

This also resulted in vertically integrated state-owned enterprises that largely built and maintained their own rolling stock and infrastructure, which included in-house technical innovation capability.

Nearly two centuries later, successive reforms and investment have modernised and electrified these railways, and established a standard interstate rail network and a single national rail safety regime. But the original state-based fragmentation remains, and continues to thwart optimal rail development in Australia, with the innovation legacy of the past being lost.

There remains no national agreement on the signalling, automation or smart rail standards needed for a modern rail system in the 21st century. While technology offers network-scale interoperability benefits, Australia continues to develop different systems in different jurisdictions. Significantly the sustainability credentials for rail are not being used as a key driver for meeting environmental targets and reducing energy use.

The closure in June 2020 of the Rail Manufacturing Co-operative Research Centre (RM CRC) has left a funding and leadership gap in the national landscape for local collaboratively developed manufacturing solutions and products. In light of COVID-19, many advanced manufacturers are recalibrating global supply chains to ensure resilient and efficient local supply.

2. HOW DOES AUSTRALIA COMPARE?

The ARA commissioned L.E.K. Consulting to undertake international benchmarking in rail innovation. The research found Australia lags behind global comparators in research and development (R&D) in commercialisation, and in rates of technology adoption. In addition to the lack of funding available in Australia, some of the key drivers include:

- Multiple rail operators, track owners, rules and type approvals make Australia a challenging market for technology developers and suppliers
- Weak linkages across the value chain will see the continuation of a small pool of local commercialisation
- State-based local content requirements that inhibit the achievement of scaled rail manufacturing in Australia
- Rail planning, investment and procurement is risk-averse and does not incentivise innovation well

International research found an unequivocal link between well-funded national rail research and productive and efficient railways. The implication is that rail innovation in Australia needs a focus both on driving collaborative research and on building a culture that demands innovation and continuous improvement.

01 FAST TRACKING RAIL INNOVATION

POLICY BRIEF

For more information on the report and available fact sheets please visit:
<https://ara.net.au/key-issues/technology-and-innovation>

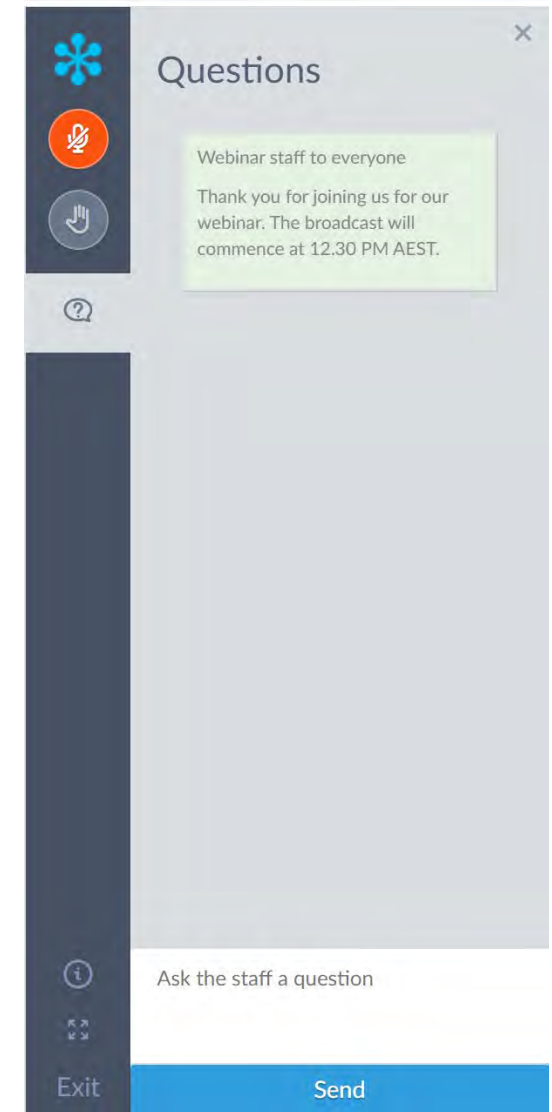
MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

ARA INSIGHTS



You can submit questions via the Questions pane. 

The webinar team will be monitoring your questions during the webinar and the facilitator will address them during the Q&A session following the presentation.



MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION



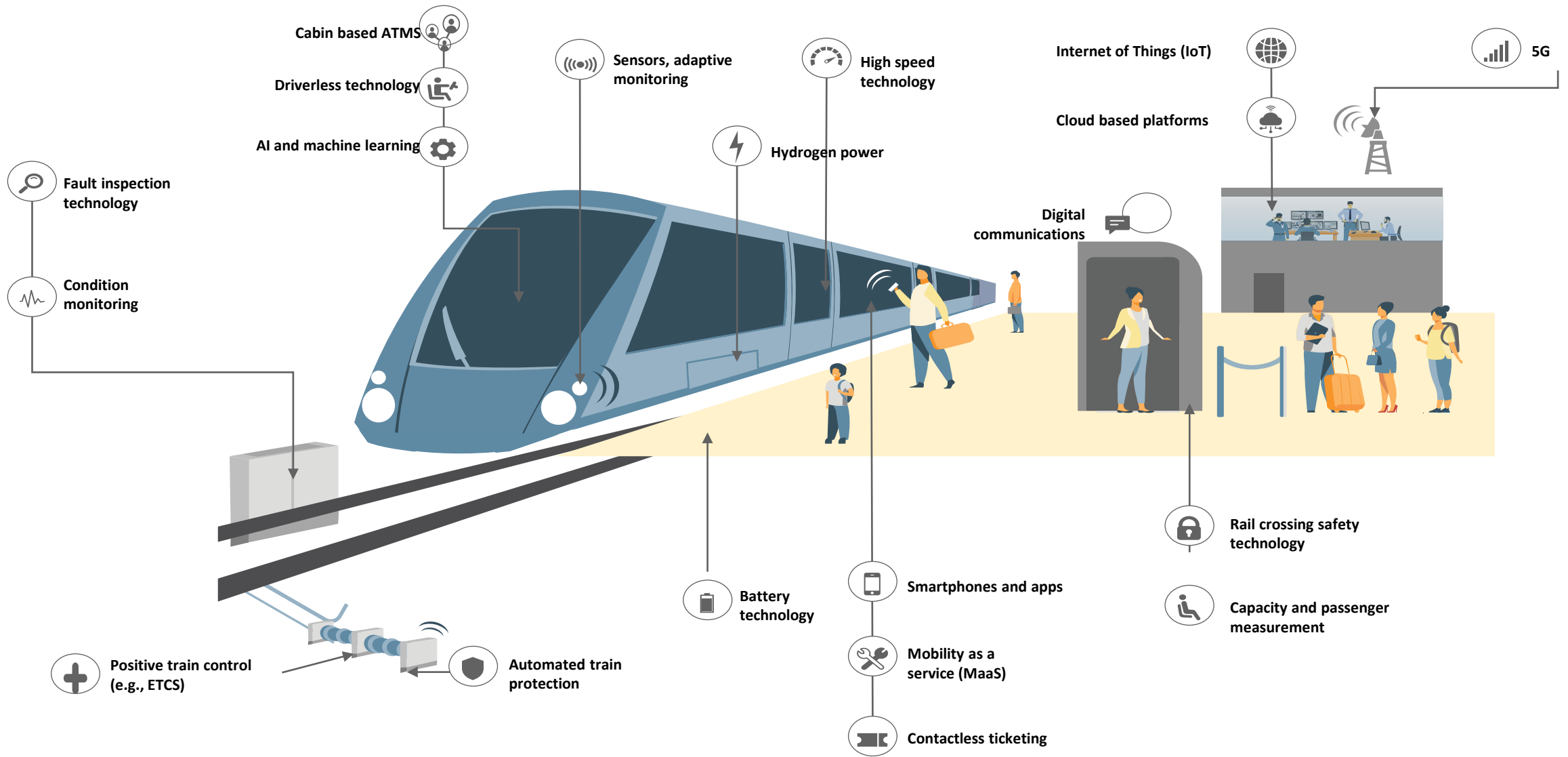
ARA INSIGHTS

ABOUT THE STUDY

This research paper was developed using:

- Research and analysis of available rail and innovation literature
- Review of patents databases
- Development of case studies and research by L.E.K. analysts in other countries
- In-depth interviews with ARA members
- Consultation with industry advisory groups





WE HAVE TAKEN A BROAD VIEW OF RAIL TECHNOLOGY

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION



ARA INSIGHTS

THERE IS A SIGNIFICANT OPPORTUNITY FOR THE RAIL INDUSTRY



Global market for railway technology is estimated to be worth **\$362b AUD**



The Australian rail construction pipeline is worth **\$155b AUD** over 15 years in passenger and freight rail



Despite upfront high deployment costs and complexity, innovation can deliver relatively higher benefits



COVID-19 is driving a review of local supply chain strategies, and Australian innovation can play a greater role



Australia's unique operating environment can spur innovation



Australian innovation could be better promoted locally and abroad

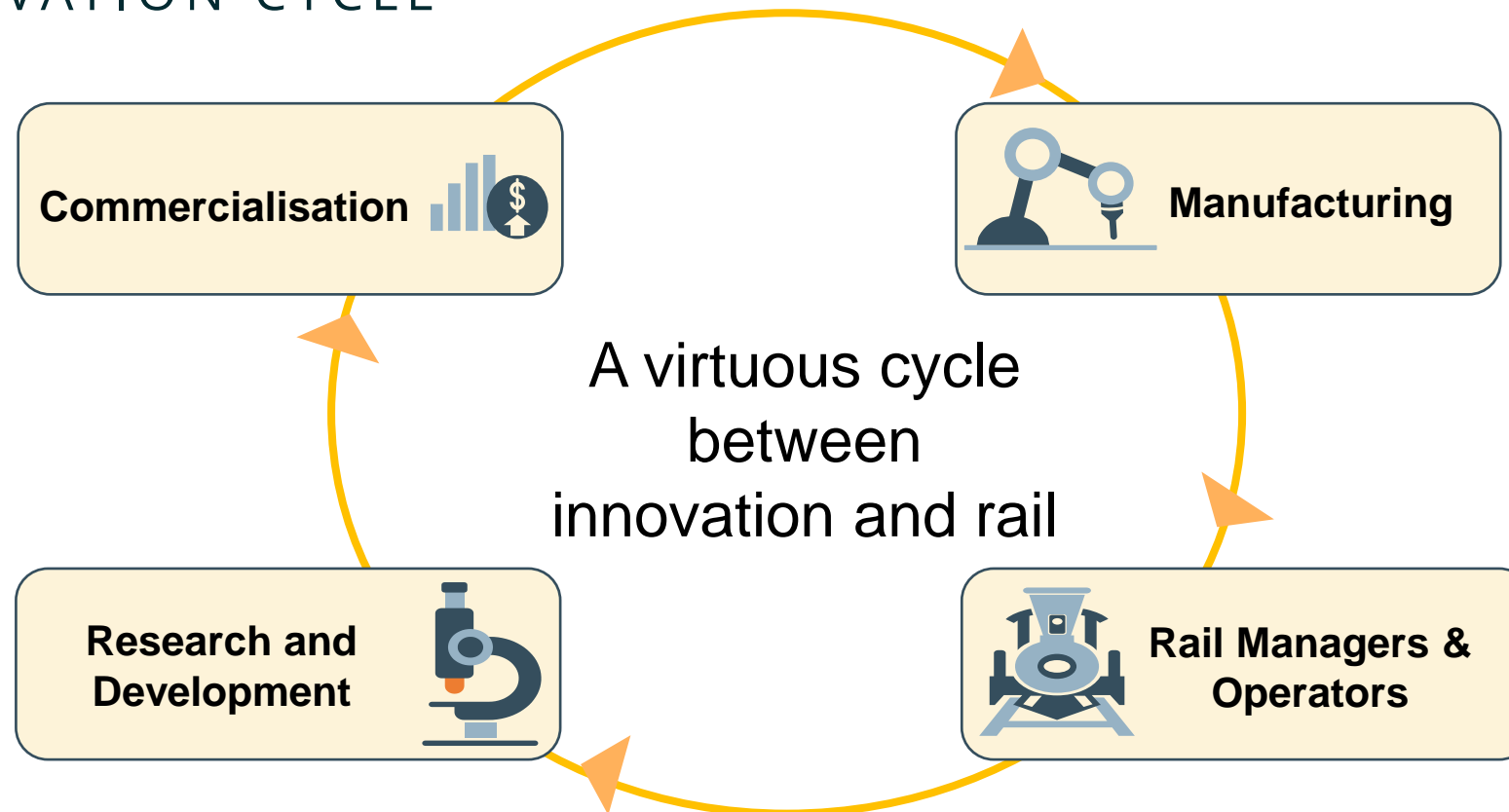


There is an overarching policy objective to be carbon neutral by 2050

MAJOR RESEARCH LAUNCH:
FAST TRACKING RAIL INNOVATION

ARA INSIGHTS

CAPITALISING ON THIS OPPORTUNITY WILL REQUIRE FOCUS ACROSS
THE INNOVATION CYCLE



MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

ARA INSIGHTS

AS WELL AS OVERCOMING A NUMBER OF BARRIERS

Barriers identified by industry participants



Australia's stop-start R&D funding is not fully aligned to industry needs



There is a support and coordination gap between innovators and industry



State-level local content requirements inhibit the scale of manufacturing in Australia



Cultural reluctance to adopt new technology



Demand for innovation is hampered by existing procurement mechanisms

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

ARA INSIGHTS

THIS IS COMPOUNDED BY A HIGHLY FRAGMENTED MARKET



Source: Company and government websites; LinkedIn

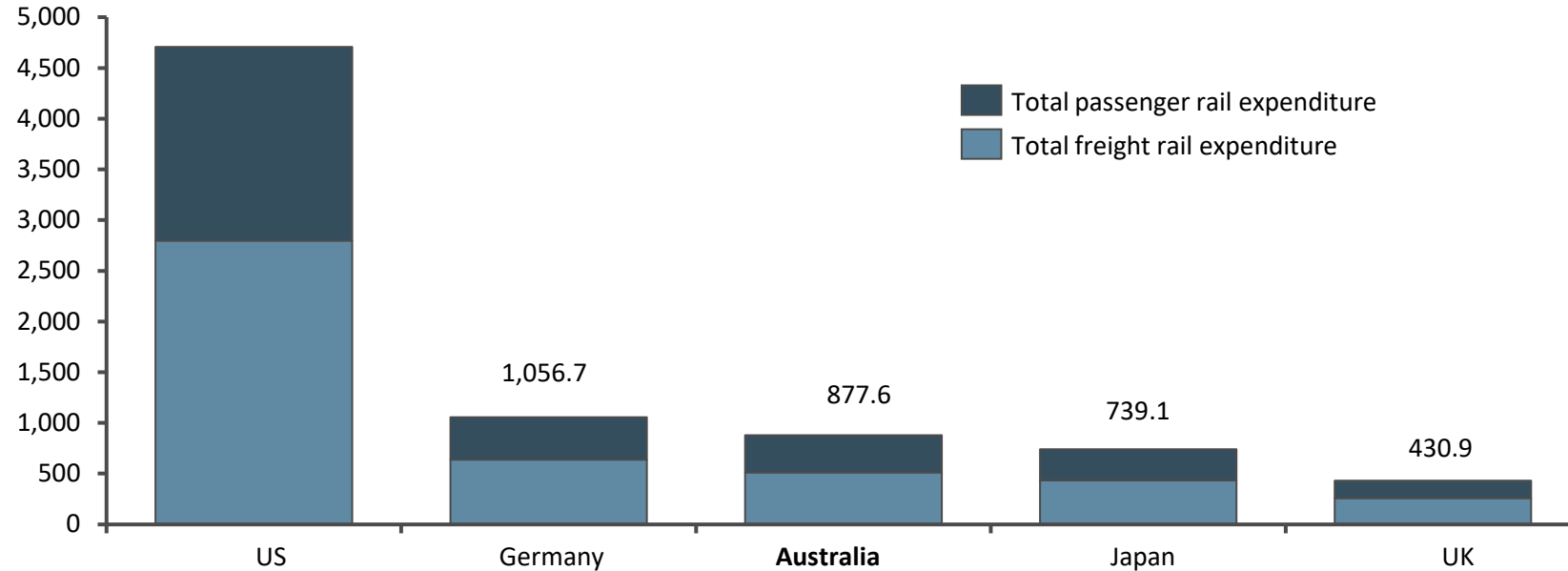
MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION



ARA INSIGHTS

WHEN IT COMES TO RAIL, AUSTRALIA IS NOT A 'SMALL' COUNTRY

Total and relative rail systems expenditure (2018)
USD per capita 4,708.6



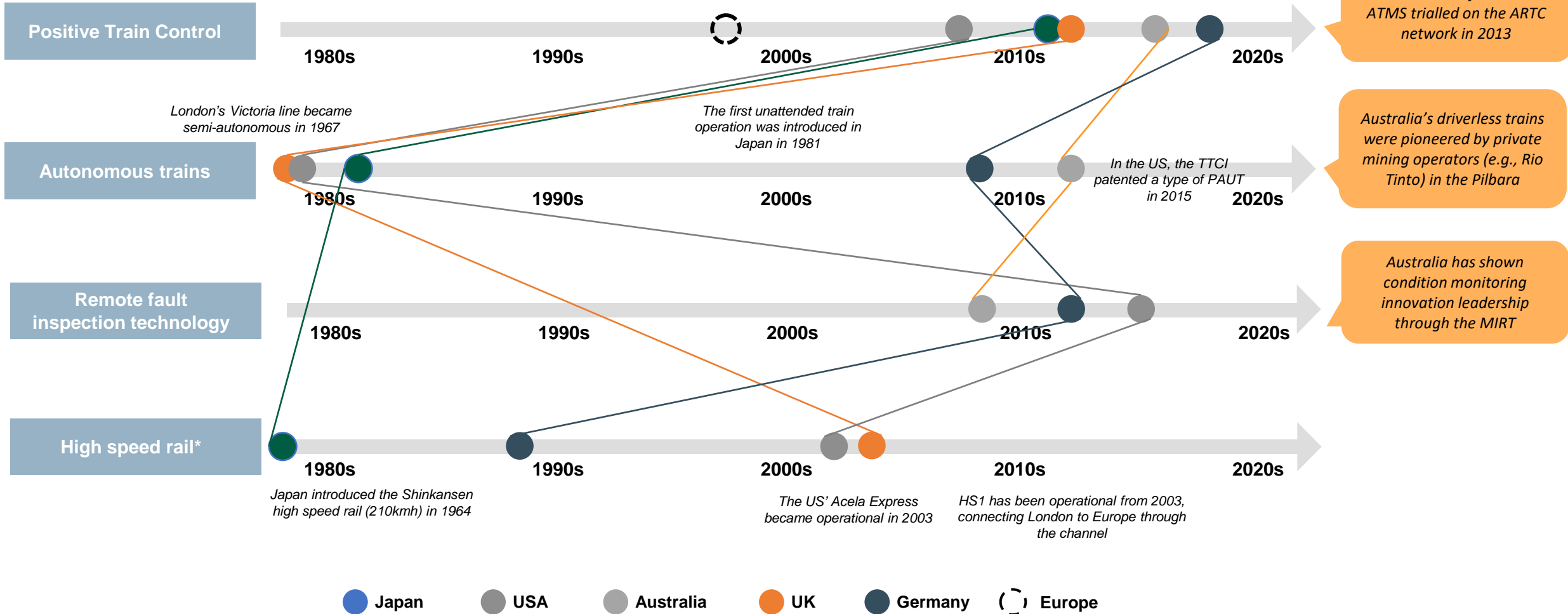
Total rail kms (000's)	323.5	39.2	32.9	25.0	16.3
Total spend per km (USD,000)	14.6	27.0	26.4	29.6	26.4

Source: Allied Market Research, BITRE, L.E.K. Research and Analysis, BITRE, Statista, Ministry of Land, Infrastructure, Transport and Tourism

Source: Allied Market Research, BITRE, L.E.K. Research and Analysis, BITRE, Statista, Ministry of Land, Infrastructure, Transport and Tourism



NOT EXHAUSTIVE



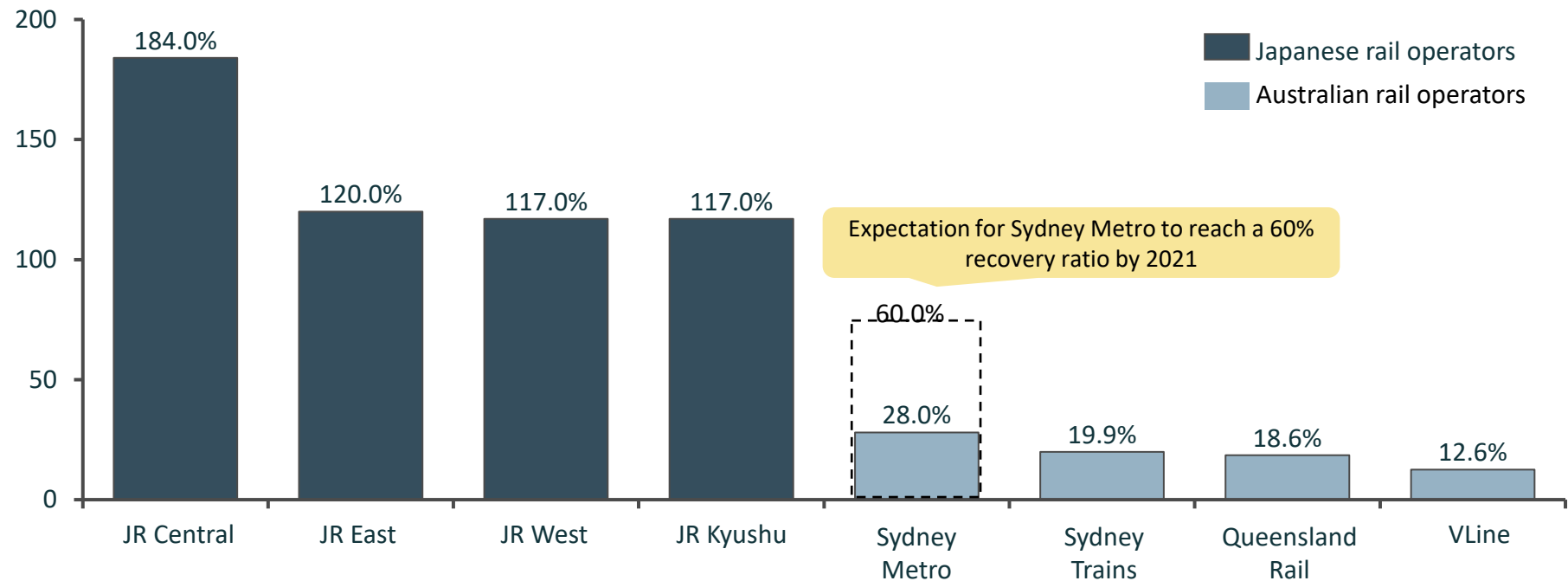
AUSTRALIA'S ADOPTION OF RAIL INNOVATION LAGS - AND GLOBAL EXPERIENCE INDICATES THAT NATIONAL GOVERNMENTS ARE KEY

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

ARA INSIGHTS

WITH RAIL IN AUSTRALIA COSTING MORE TO RUN, INNOVATION IS CRITICAL TO IMPROVE EFFICIENCY

Recovery ratio of major
passenger rail operators
in Japan and Australia*
(2019)
Per cent



Note: *Japanese recovery ratios are calculated as operating revenue from passenger tickets, divided by operating expenses, Australia's recovery ratios exclude D&A from operating expense
Source: Company annual reports

Note: *Recovery ratios are calculated as operating revenue from passenger tickets, divided by operating expenses
Source: Company annual reports

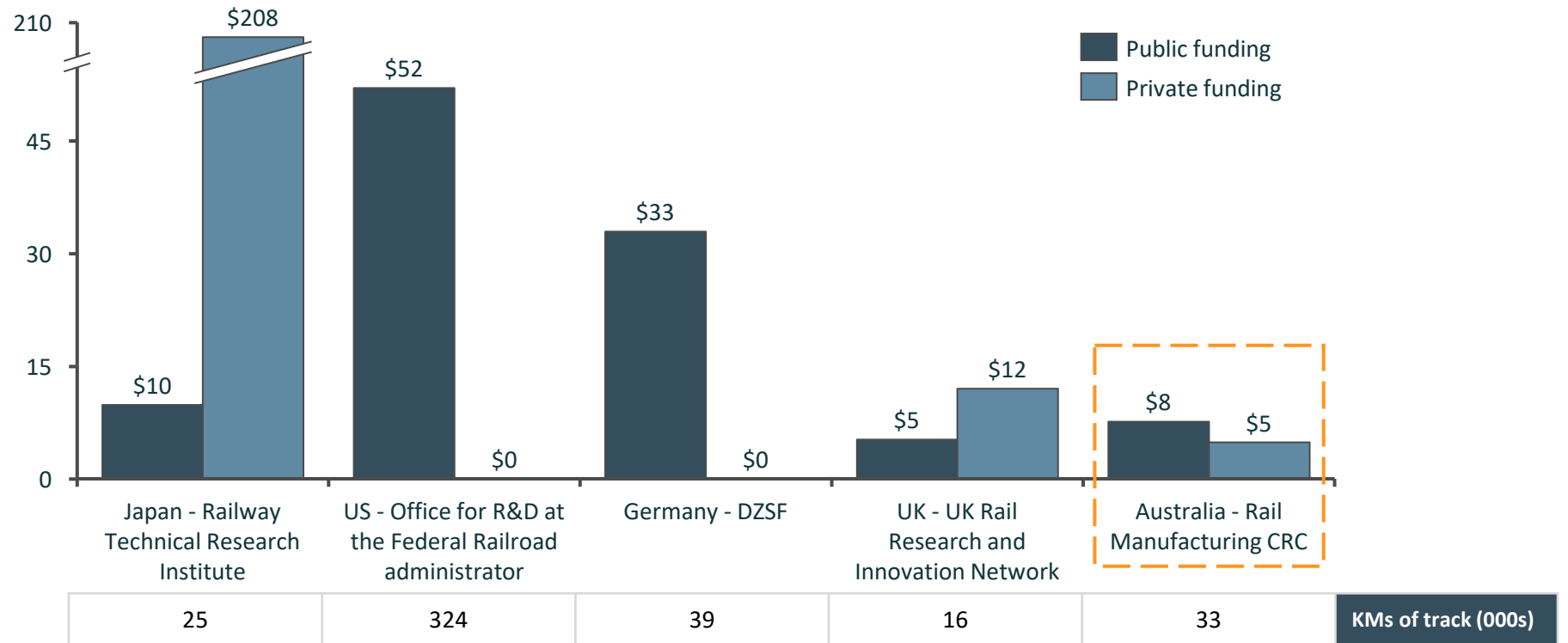
MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION



ARA INSIGHTS

SUSTAINED PUBLIC FUNDING THAT FOSTERS COLLABORATION IS NEEDED

Major national research institute annual funding
Millions of AUD



Note: The funding period varies between institutes – DZSF funding is for FY20, RTRI funding period refers to FY18, RMCRC funding is calculated as the six year average, UKRRIN funding is calculated as a 10 year average, Office for R&D at the FRA funding is 2019 calendar year figure; Publicly funded research institutes also receive funding from private organisations
Source: FRA, UKRRIN, RTRI long term plan 2020, RMCRC annual reports, RBA Exchange Rate Data, BITRE, Statista, Ministry of Land, Infrastructure, Transport and Tourism, L.E.K. Research and Analysis



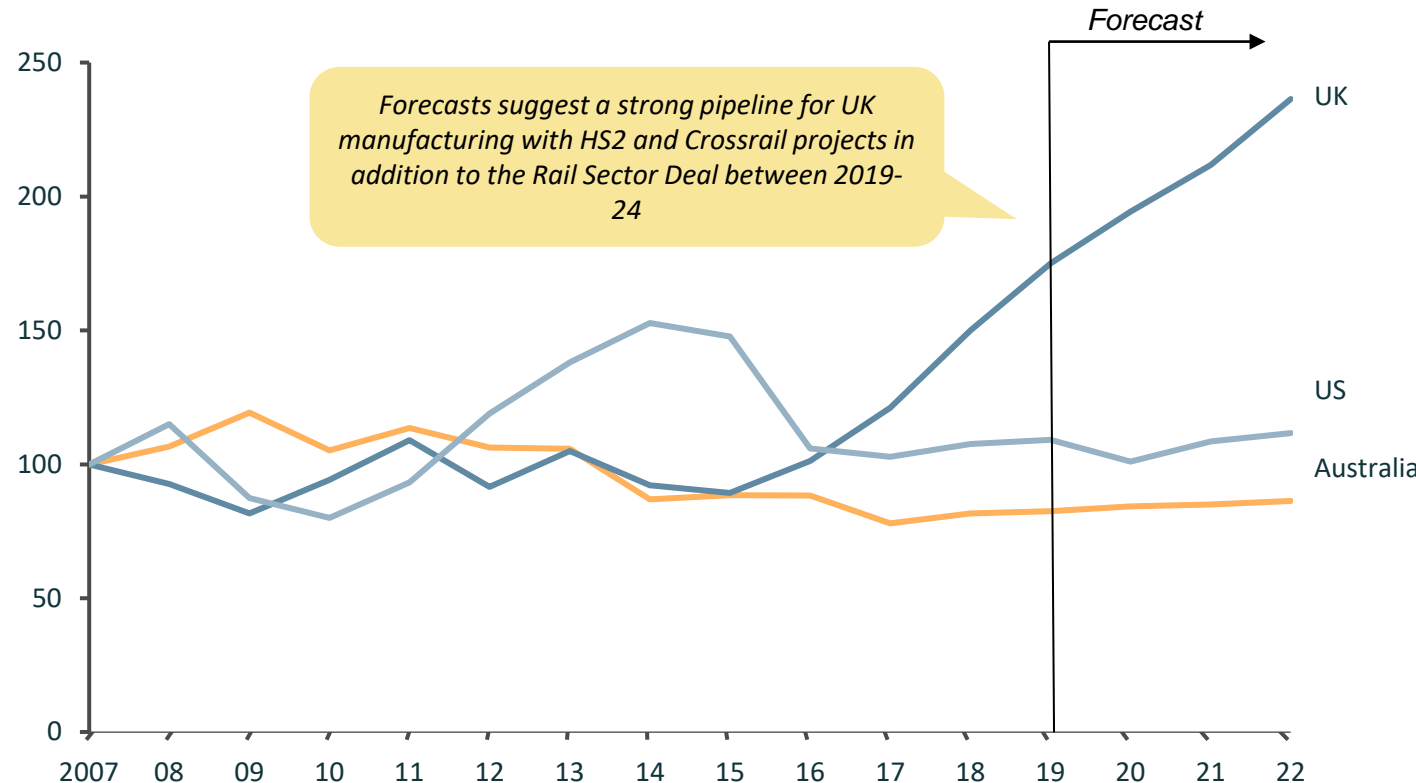
MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION



ARA INSIGHTS

A PIPELINE OF INVESTMENT CAN DRIVE INCREASES IN RAIL MANUFACTURING

Railway manufacturing revenue, by country (2007-19)
Indexed to 2007 values



	CAGR (%) (2007-19)	CAGR (%) (2019-22)	Total 2019 revenue (billions of AUD)
UK	4.8	10.5	5.2
US	0.7	0.8	25.8
Australia	(1.6)	1.5	2.5

Source: Ibisworld, L.E.K. Research and Analysis



MAJOR RESEARCH LAUNCH:
FAST TRACKING RAIL INNOVATION

ARA INSIGHTS

A NEW COMPACT FOR AUSTRALIAN RAIL INNOVATION

Make Innovation a National Priority

1. Establish a new national public body for rail innovation
2. Establish an investment program to initiate and commercialise rail R&D
3. Develop a national rail innovation and capability strategy
4. Develop an exports strategy for Australian rail innovation

Develop a single market for rail technology

5. Develop common standards, linked to nationally accredited testing
6. Advocate for the replacement of state local content policies with a national policy
7. Develop industry-standardised training for new rail systems

To build a culture for rail innovation

8. Focus on best practice procurement and contracting
9. Develop states' smart rail strategies to build the planning pipeline for digital technology
10. Build the brand for Australian rail innovators at global trade shows

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION



ARA INSIGHTS

ABOUT L.E.K.



Natasha Santha
Partner
L.E.K. Consulting
P: +61 2 9323 0700
N.Santha@lek.com



Janice Lee
Head of Government
Practice
L.E.K. Consulting
P: +61 2 9323 0700
JC.Lee@lek.com



Established - 1983



20 Offices



118 Partners



~1200 Staff

L.E.K.

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

PANEL DISCUSSION

Facilitator:

- **Caroline Wilkie** | Chief Executive Officer | ARA

Panellists:

- **Cam Rose** | Chief Executive Officer | VicTrack
- **Dale Coleman** | Managing Director | TTG
- **Rob Moffat** | Chief Executive Officer |
Australasian Centre for Rail Innovation
- **Michael McClelland** | Managing Director |
Knorr Bremse
- **Janice Lee** | Head of Government Practice
| L.E.K. Consulting

MAJOR RESEARCH LAUNCH: FAST TRACKING RAIL INNOVATION

For a copy of the report and available fact sheets please visit:
<https://ara.net.au/key-issues/technology-and-innovation>



Australasian Railway Association **LEK**

Finding the fast track for innovation in the Australasian rail industry
OCTOBER 2020

WWW.ARA.NET.AU

Relationships between Australian Railways and the Rail Innovation System

Local manufacturing draws heavily on local relationships and plans for local product development and procurement

Commercialisation → **Manufacturing**

Research & development → **Rail managers & operators**

A virtuous cycle between innovation and rail

Rail operators often will prefer local manufactured goods where there are better testing sites, and more responsive service and maintenance relationships

Rail planners and managers identify problems and opportunities that require innovative partnerships

Major rail technologies adoption timeline

Technologies identified here are indicative of local readiness to adopt new technology. However, there is a broader spectrum of options than these, from innovations in construction, management, resourcing, digitisation and data management. Ongoing innovations have broad applicability across the rail industry and the speed of adoption of these (where it is not a competitive advantage) is important.

MECHANISMS THAT SUPPORT INNOVATION AND TECHNOLOGY ADOPTION

- Simplifying standards and ensuring they are consistent between jurisdictions where appropriate can drive uptake of new rail innovations.
- Strong links between (i) safety and technology adoption, and (ii) productivity and technology adoption.

LEK Analysis