AUSTRALASIAN
RAILWAY
ASSOCIATION

Building Australian Rail Skills for the Future

March 2022

About the Australasian Railway Association

The Australasian Railway Association (ARA) is the peak body for the rail industry throughout Australasia. The ARA represents an array of rail organisations: private and public, passenger and freight operators, track owners and managers, manufacturers of rolling stock, construction companies and all other organisations supplying and contributing to the Australasian rail sector. Our members operate in urban, regional and rural areas of Australia.

The association provides a coordinated and unified voice on relevant issues of national importance. It engages political leaders at both the state and federal level in forward-looking discussions around industry potential.

The ARA brings about key policy reform to effectively enhance Australia's productivity and economic and social prosperity, as well as its international competitiveness.

The ARA creates an avenue for industry to connect, knowledge-share and work together to achieve greater results for rail. As Australasia's leading voice for rail, the ARA facilitates, coordinates, promotes and communicates on behalf of the industry.

Acknowledgements

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1. Executive summary

The skills crisis in the Australian rail industry, predicted in the 2018 ARA Skills Capability Study, is upon us. By 2023, workforce gaps of up to 70,000 skilled workers across all skill levels are predicted. What wasn't predicted was a global pandemic. Governments across the country have fast- tracked infrastructure delivery to support the economic re-bound, placing further pressure on skills availability. With international borders already closed for 18 months, inward skilled migration has effectively ceased, placing greater pressure on rail skills supply.

At the same time, digitalisation and other new technologies are resulting in new types of jobs and higher level skills. Different types of skills require the industry to attract a new and different workforce, competing with other industries seeking similar talent.

The perfect storm is here. The need to grow Australian rail skills capacity and capability has never been greater.

The aim of this report is to provide recommendations, based on research, industry feedback and comparisons from overseas, that offer tangible strategies and solutions to increase rail workforce capacity and capability.

Findings and recommendations resulting from the report will support the rail industry's collaboration with governments and the education sector to respond and plan for future rail skills needs through a range of immediate, mid- and longer-term strategies, whilst at the same time aligning and contributing ot the national skills reform agenda. This will assist governments and industry to improve the cost, productivity, quality and safety of rail infrastructure delivery, and the manufacturing and operation of rail assets.

Key findings and recommendations

This report provides strategies to alleviate the growing shortage of skills facing the industry, through a coordinated approach for the future attraction, recruitment, skills development and retention of the workforce. Key focus areas include:

- developing a nationally coordinated approach to rail skills and training strategies

- anticipation and determination of rail skills demand

- promotion and development of rail career pathways and entry points into the industry, and

- provision of ongoing skills development to ensure there is an effective supply chain to deliver skilled people through an accredited network of providers

- A comprehensive set of findings and recommendations are set out in this report, including the following key directions.

Leadership collaboration and partnership

Work together to deliver an Australian rail training system that provides consistent, accessible, high quality provision across all our jurisdictions

There is a need to achieve greater collaboration and partnership between the rail industry, governments and the education sector to optimise the value of their individual contributions to achieve capability uplifts and better overall outcomes.

The industry is currently fractured by jurisdictional differences across standards, systems and products. In the absence of a nationally coordinated approach to rail skills and training, there is no 'big picture' view of current and future skills needs and career pathways.

As a result of siloed project planning within jurisdictions, skills shortages are further impacting costs, productivity and the quality of project delivery.

There are examples where a more coordinated approach has achieved results.

For example, collaborative partnerships between the Victorian Government and state transport agencies such as Metro Trains Melbourne and the Level Crossings Removal Project have been key in supplying skills and training, while also delivering social outcomes on infrastructure projects.

Strategic workforce planning

Understand and plan for future workforce needs, ensuring skills supply meets industry demand

The growth in rail investment is having a fundamental impact on rail's ability to deliver new projects due to existing skills shortages, an issue that has been exacerbated by the pandemic through fast-tracked projects and reduced international skills supply. Siloed Infrastructure project planning within jurisdictions, together with a lack of centralised forecasting on rail skills demand, has seen inadequate attention given to the 'bigger picture'.

The industry must plan for and manage its immediate and longer-term skills demand and supply, including the numbers, levels and types of skills and competencies required.

Attracting, recruiting and retaining our workforce

Attract and retain a diverse workforce, as leading employers and an industry of choice

The rail industry is experiencing critical skills shortages. It has an aging workforce, with many employees reaching retirement age at the same time as demand is increasing. Digitalisation and other new technologies are also driving demand for new jobs or expanded skills in the rail industry. Skill levels are increasing, and a different composition of skills will see a greater emphasis on problem solving, critical thinking, intellectual autonomy and self-management.

This means the industry will need to attract a new and different workforce, competing with other industries seeking similar talent. Improved promotion of careers available in rail, and of the industry itself, will be key to

achieving this goal. This also provides the industry with an unprecedented opportunity to attract a workforce that better reflects the composition of Australian society.

Skilling our workforce

Build and future-proof industry capability and support individual career progression through transferable skills development

The current arrangements for training, skills development and assessment across Australia can be quite different by jurisdiction, presenting challenges to ensuring comparable standards of knowledge and competencies, and equitable access to high quality programs and training resources. Greater standardisation and improved collaboration across industry, governments and the education sector must be established to optimise workforce skills development and deliver more consistent outcomes.

A key action from the National Rail Action Plan is to audit existing training programs and facilities, as well as government policies and levers and other factors that will determine whether critical rail skills needs are met.

At the moment, 78 per cent of enrolments for rail training are made through private training providers. Enterprise training provides account for 17 per cent of enrolments, which TAFEs attract just five per cent. Most rail-related qualifications have very low enrolment numbers (less than 1000 from 2014-2019) and trainers are scarce. Opportunities exist for greater collaboration between industry and education to co-design and deliver high-quality workforce development programs.

2. Introduction

The rail sector is vital to Australian business, carrying people and commodities on over 33,000km of track across the country. The Australian rail industry employs more than 165,000 people directly and indirectly, across more than 900 companies. These comprise private and public operators, passenger and freight operators, track owners and managers, manufacturers and suppliers that operate in urban, regional, and rural areas of Australia. It is the sixth largest network in the world and contributes almost $30 billion to the national economy[1].

Rail is a modern, technologically advanced industry that has an important and growing role. Demand for both passenger and freight services is increasing as a result of growing populations, technological advancement, development in the resources sector and increased customer expectations, including customer service standards and reliability. Rail is also an efficient, environmentally and socially beneficial mode of transport. Rail has lower emissions than road transport, is safer and can help reduce congestion in our cities.

Significant investments are being made into Australia's rail infrastructure, with projects such as Inland Rail and metro operations in Sydney, Perth and Melbourne. Light rail has been established in Canberra, the Gold Coast, Sydney and Newcastle. Planning is underway for faster rail between Melbourne and Geelong, with further business cases for faster rail to connect regional centres either completed or in development. The availability of new technologies is resulting in wide-scale investments in new systems, software and levels of train automation.

Key rail facts include:

- **More than 962 million passenger journeys in 2018**

- **Passenger rail patronage rose two per cent per year from 2010-2018**

- **Rail was the fastest growing mode of freight transport from 2011-2016**

- **Rail met 56 per cent of the national freight task in 2019**

- **Rail manufacturing, rollingstock and supply generates $2.4 billion per year**

The Australian rail pipeline

Australia's total infrastructure pipeline is in the region of $400 billion. Most infrastructure projects across Australia are rail and road projects, with the greatest investments on the Eastern seaboard (**see Figure 4.2**).

Figure 4.2 The Australian infrastructure pipeline by jurisdiction – Infrastructure Partnerships Australia
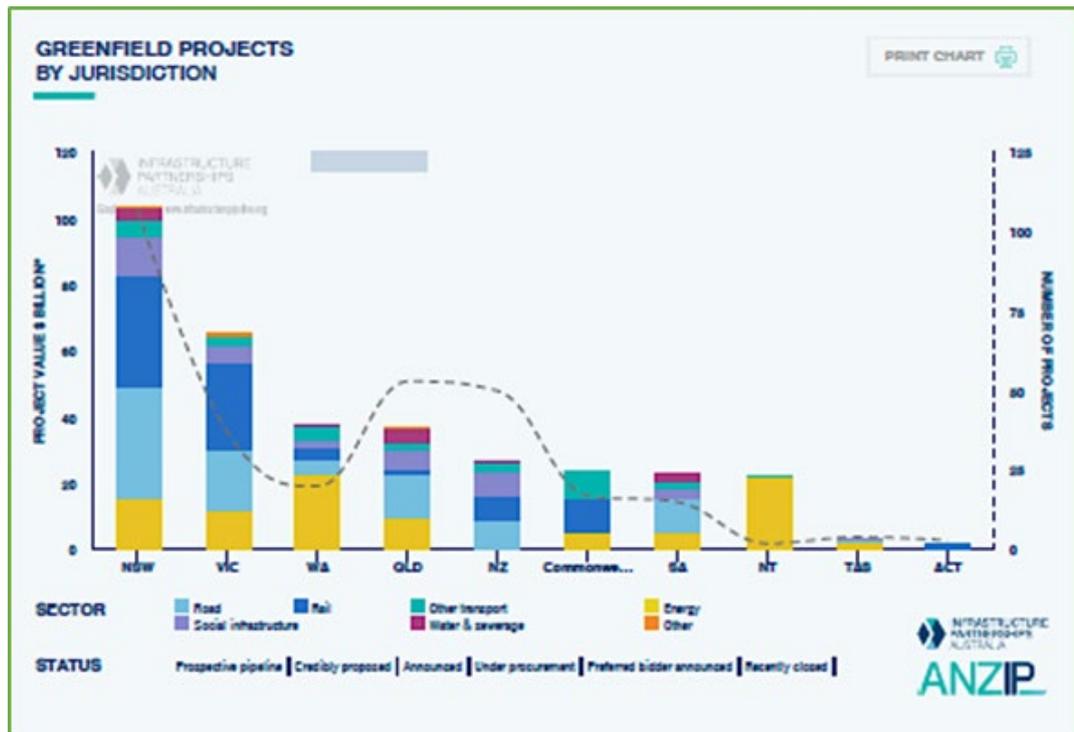
NSW and Victoria continue to drive Australia's infrastructure pipeline, collectively accounting for 68 per cent of total government infrastructure spending. Transport infrastructure accounts for the majority of the states' spending.

Rail infrastructure development is booming across Australia, from expansions and new metros to rail linking suburbs and new stations. Mega-projects exist across jurisdictions, funded by state and federal governments. These include:

· Inland Rail – QLD, NSW and VIC

· Sydney Metro – NSW

· Melbourne Metro – VIC

· Cross River Rail – QLD

· Metronet – WA

· Melbourne Airport Rail Link – VIC

The 2020-21 budgets delivered by Australia's federal, state and territory governments allocated $225 billion for government sector infrastructure funding over the four years to FY2023-24. This is nearly a $46 billion or 26 per cent increase on the previous year's budgets. The recent 2021-22 Federal budget committed a further $15.2 billion for projects including the Melbourne Intermodal Terminal, Metronet and Canberra Light Rail Stage 2.

The increase in infrastructure expenditure accounts for 29 per cent of the increase in total general government expenditure nationally, with governments looking to infrastructure to underpin the economic recovery from COVID-19.

In the short-term, governments have focused their new expenditure on smaller-scale projects that can be deployed over the near-term, while planning has been progressed for larger projects, providing a robust pipeline of work over the next decade.

Figure 4.3 The Australian rail pipeline by jurisdiction – Infrastructure Partnerships Australia
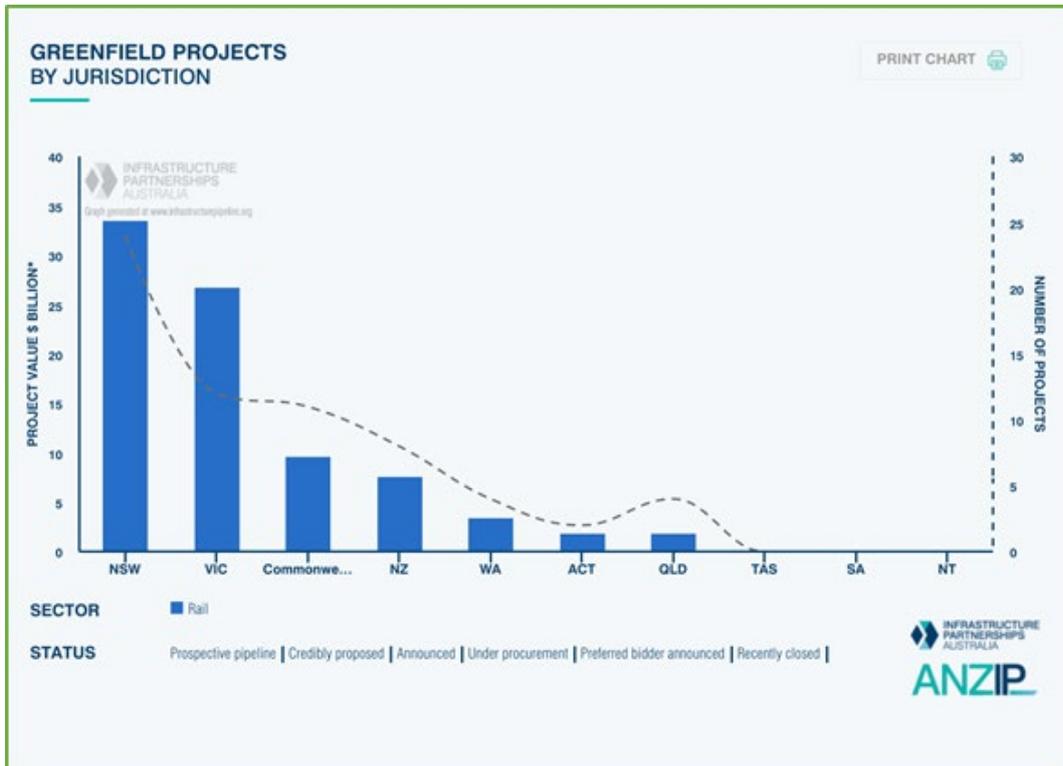
Australia's rail workforce

The Australian rail industry directly employs more than 71,000 people across infrastructure delivery, operations, maintenance and manufacturing, and more than 93,000 people indirectly.

Passenger rail employed about 37,000 FTE workers in 2019, a 35 per cent increase from 2016. Most passenger rail jobs are clustered around major state capitals, particularly in Brisbane, Sydney and Melbourne. Freight rail employed about 21,000 FTE workers in 2019, a 50 per cent rise since 2016. More than half of these roles are located outside of capital city regions, with significant clusters in Rockhampton, Newcastle, Mackay and Gladstone. The rollingstock manufacturing sector accounts for about 11 per cent of

rail employment in Australia and is largely concentrated in Sydney and Melbourne, particularly in outer metropolitan areas. The increasing number of major rail projects underway or planned has also driven increased employment, with key projects located across the country .

While the full impact of COVID-19 on short to medium term employment in the industry remains to be seen, the industry continued to operate as an essential service through the pandemic. The ARA's 2020 Value of Rail report confirmed that longer term employment growth projections for the industry were expected to resume post pandemic, event if short term impacts were experienced by sections of the industry.

While the majority of rail businesses are located in NSW, Victoria and Queensland, rail is a truly national employer of people across a range of roles. The ARA's 2021 report on the Australian Rail Supply Chain found about a third of rail businesses employ 20 people or less, highlighting the diversity of organisations that contribute to the industry.

The rail industry in Australia is already experiencing skills shortages as investment grows in new rail infrastructure and

rollingstock and operations expand, with the number of train drivers, controllers, track workers, signalling engineers and technicians, maintenance workers, electrical technicians and tunnellers not keeping up with growing demand. Skills gaps are also growing, largely as a result of increasing digitalisation, with emerging technologies that require new skills in areas including rail signalling, autonomous and remotely operated rail vehicles and operating or driving rail vehicles.

The project

The *ARA Skills Capability Study*, published in 2018, found overwhelming evidence of a skills crisis in the Australian rail industry. By 2023, workforce gaps of up to 70,000 skilled workers across all skill levels are predicted.

Skills availability is also inconsistent across the country, with regional areas experiencing deeper, long-term skills shortages, particularly for trade, technical and engineering-related roles that are common to a range of industries. In addition to the construction workforce, there is a need to increase the number of skilled workers in rail manufacturing, track maintenance, electrical and signalling, train drivers and professional engineering roles.

More recently, the global COVID-19 pandemic has impacted inward skilled migration, through the closure of international borders, placing greater pressure on rail skills supply.

The key aim of this report is to provide recommendations based on research and industry feedback, including UK and other global comparisons, that offer tangible strategies and solutions to increase rail workforce capacity and capability. This will assist governments and industry to improve the cost, productivity, quality and safety of rail infrastructure delivery, and the manufacturing and operation of rail assets.

Scope and methodology

The scope and methodology for the project is outlined below:

1. Hold initial workshops between ISA and the ARA to discuss key issues and concepts, as well as refine project scope and deliverables.

2. Engage and consult with industry, skills service organisations and rail specialist and generalist education providers in Australia and the UK, through in-depth one-to-one interviews, to better understand key challenges, risks and opportunities.

3. Undertake domestic and international desktop research across a range of sources to inform key themes within the project:

   a. Leadership, collaboration and partnership
   b. Strategic workforce planning
   c. Attracting, recruiting and retaining our workforce
   d. Workforce skilling

4. Review United Kingdom rail skills development models and make recommendations on how best practices could be adopted in Australia.

5. Present draft findings and recommendations to the ARA and project stakeholders, with recommendations articulated through a strategic objectives framework and associated report.

6. Complete a final report based on feedback to the draft findings.

Unless otherwise marked, quotes included in this report have been recorded during interviews and consultation undertaken as part of this study. Findings and recommendations resulting from this report will support the rail industry's collaboration with governments and the education sector to respond and plan for future rail skills needs through a range of immediate, mid- and longer-term strategies.

Background research, studies and plans

The ARA and other stakeholders have undertaken extensive research during the last four years on the skills challenges facing the industry and the case for change. Key documents examined through the research are detailed at the end of the report.

The National Rail Action Plan

In November 2019, the National Transport Commission (NTC) published the National Rail Action Plan[2].The Plan has two main areas of focus:

- To ensure Australia has the skills and labour required to build and operate the rail network

- To improve the efficiency and safety of Australia's rail system by continuing to align or harmonise operating rules, infrastructure and operational standards and systems across the nation's rail network

In 2020, NTC established committees to deliver the Plan, co-chaired by industry and government representatives. ARA Chief Executive Officer Caroline Wilkie represents the rail industry as joint Chair of the Skills an Labour Committee.

The key focus of the Skills and Labour Committee is to:

- Improve the portability of skills across jurisdictions

- Develop strategies to ensure appropriately skilled people are available to build and operate the significant pipeline of new rail infrastructure

- Raise the importance of rail skills development as part of national skills reform

Transport and infrastructure ministers approved this initial plan with 17 actions in 2019. The foundational plan let to the current work program of national rail reform and ongoing collaboration. All short-term actions have been completed, and actions spanning beyond the two-year plan are underway.

This report outlines a number of approaches, based on existing good practice, to contribute to key skills and labour objectives and outcomes within the NRAP (see Table 5.1).

Table 5.1 NRAP skills and labour outcomes

1.a	Government and industry understand the critical rail sector skill needs.
1.b	Government and industry understand how these critical skills are established.
1.c	Government and industry work together to improve the portability of skills across jurisdictions.
1.d	Government and industry understand and have strategies to address specific skills-shortage challenges in the rail manufacturing industry.
1.e	Rail skills are considered as part of the COAG Skills Councils reform priorities and the reform roadmap it is developing.
1.f	Rail industry attracts and retains quality diverse staff.
1.g	Rail industry continues to invest in skills and workforce.

The NTC provided further recommendations to the Infrastructure and Transport Ministers' Meeting (ITMM) in November 2020, and it was agreed the NTC would continue to support the NRAP Skills and   Labour Working Group to progress:

- Formal links between centres of excellence and new rail skill precincts with industry and education to build a pool of shared expert trainers and course material

- Development of new and faster career pathways, micro-credentials and highly targeted digital courses to respond to skills shortages and address portability barriers, instead of waiting for the national qualification development system to catch up

Overseas research, studies and plans

Skills shortages and gaps in the rail industry are not unique to Australia. Countries around the world have faced similar challenges. This study has examined approaches elsewhere and identified models and approaches that are achieving success and may be replicable in an Australian context.

The project team reviewed overseas research, studies, plans and websites, mainly from the UK, which was identified as having synergies with Australia. These were supplemented by interviews with representatives from some of the participating organisations, for example, the National Skills Academy for Rail (NSAR) and National College for Advanced Transport and Infrastructure (NCATI) to expand on learnings.

The case for change

In May 2018, the ARA engaged BIS Oxford Economics to undertake a workforce capability analysis for the rail industry based on planned and forecast rail infrastructure development in Australia and New Zealand over the next 10 years, with implications for a range of rail industry skills across construction, manufacturing, operations and maintenance.

The report[3] found overwhelming evidence that there is a fast-developing skills crisis in the Australasian rail industry. Skills shortages and gaps exist across the industry within delivery, operations, maintenance and manufacturing.

The study, together more recent research and the findings of this project, underpin the case for change.

Skills shortages and gaps

Rail skills capacity and capability in Australia is insufficient to meet current or future demand. The reasons for these shortages are wide-ranging, requiring a range of different approaches and solutions across the short-, medium- and longer-term. The ARA Skills Capability Report found skills shortages were experienced across the industry:

"Even though there is a rail construction environment and separate rail 'business as usual' environment, the critical skills shortage environment is the same environment. Everyone's looking for talent in a small pool."

Priority skills

The Rail Industry Refence Committee's 2019 forecast found the industry's top priority skills were digital and safety skills, while top priority skills were in track vehicle operations, maintenance/servicing and signalling.

The Productivity Commission's *National Transport Regulatory Reform*[4] found new skills and capabilities will be required in rail to support new technology, and regulator staff may require knowledge to assess compliance of new technology with safety legislation.

Occupations in shortage

Key rail occupations are already in shortage and face greater challenges over the next 10 years.

BIS Oxford Economics forecast a 7.5 per cent workforce gap by 2027 across rail construction, operation and manufacturing, with 20 per cent of today's workforce expecting to retire by 2028.

Occupations that will experience shortages included train drivers, controllers, track workers, signalling engineers and technicians, maintenance workers, electrical technicians and tunnellers and trainers and assessors. In addition to the impending labour shortfall in skilled occupations, there is an emerging shortage of specialised skills in emerging areas including automation, data analytics and digital skills.

In the most recent employer survey by Australian Industry Standards[5], 89.7 per cent of rail sector employers reported experiencing a skills shortage in the previous 12 months. The occupations reported as being in greatest shortage were:

- Train drivers
- Signalling technicians
- Educators
- Train controllers
- Track workers

Employers identified the following reasons for the shortage (with the most frequent response listed first):

- Ageing workforce / current staff retiring
- Competition from other organisations
- Cost / time to achieve the required qualification
- Geographic location of the vacancy
- Wages/salaries considered too low

Rail infrastructure investment

The growth in rail investment is having a fundamental impact on the industry's ability to deliver the new projects due to a skills shortage facing the industry. With every new rail project announcement, the skills crisis is intensifying, with significant potential impacts on cost, delays, productivity and safety. The majority of infrastructure investment is in road and rail delivery, which share some common skills requirements.

Workforce and skills requirements across civil and social infrastructure delivery and, to a degree, commercial and domestic construction share similar characteristics and occupations. Whilst this increases skills transferability, it also means that, where concurrent demand is high, skills shortages may occur or be exacerbated.

Domain and product differences also impact skills transferability and availability across major rail infrastructure investments.

Major infrastructure project delivery also has potential to more widely impact employers who share similar skills needs, for example, within trades and engineering. Increased demand created by major projects can draw existing workers from other industries, causing downstream displacement impacts. This is further exacerbated where there are already existing occupational shortages, or in locations where there is high demand. In October 2020, regional Australia had over 54,000 job vacancies, a 13 per cent increase on 2019 figures at the same time[6].

The global pandemic

Since the ARA Skills Capability Report was published, the global COVID-19 pandemic has further impacted skills shortages across the country. In the last two years, Australia's governments have responded collectively and decisively to the COVID-19 crisis and made infrastructure a cornerstone of their economic response. At the same time, international borders were closed for almost two years from March 2020.

Retraining or upskilling people from the sectors most impacted by the pandemic might appear to be part of the solution. However the rail industry, whether it be infrastructure delivery, operations or maintenance, is a high-risk environment that requires the highest standards of safety, and often complex skills and competencies. It is simply not possible to move people from industries such as retail, hospitality and tourism directly into most rail jobs, many of which require quite different technical skills sets, qualifications and experience, often developed over a number of years.

Some governments including Victoria, Queensland and WA have also introduced local hiring quotas from 85-90 per cent for major project delivery, presenting an additional challenge, particularly for white-collar jobs within existing skills shortage occupations.

Australia has historically relied on importing skills from overseas to mitigate shortages, including for rail-related occupations such as engineering professionals, communications and engineering technicians, trades workers and ICT specialists. Since March 2020, only 4,300 of the 76,000 foreign nationals entering the country were critically skilled workers on the Skilled Occupation List[7]. ABS data confirms that for both permanent and temporary skilled visa groups, arrivals have decreased by 94 per cent since March 2019[8].

"The distinction between blue- and white-collar jobs is an important one. You cannot train a pilot to be an engineer in two or three months. You've got limited resources."

"Skills shortages are likely to get worse over the next year or two. Many of the civil works are metro rail, and Australia has no history of building such projects".

Attraction and recruitment

The rail workforce is aging at 2.6 times the national rate. The average age within the industry is 45.7 years, five years older than the national average. The ARA Skills Capability Study indicated more than 20 per cent of the existing workforce will retire by 2028, adding substantially to existing workforce gaps across the industry.

The industry is also largely male-dominated, with 77 per cent of the workforce male and 23 per cent female. However, there is a significant range across different rail sectors, with only 11 per cent female representation in the freight sector compared to 38 per cent representation in rail consultancies.

Rail is still often perceived a traditional, male-dominated industry with limited career options. Whilst this is far from the reality, the industry's image is impacting its ability to attract and recruit a more diverse workforce. Moreover, images of a culturally homogenous, able-bodied industry could also be making rail unattractive for people who are neurodiverse, have a disability or are from diverse cultural backgrounds.

Furthermore, there might be a desire within rail organisations to increase diversity, but as the national pipeline of infrastructure projects grows exponentially, client and government demands remain the same despite organisations being short-staffed. This leaves rail companies struggling to offer more flexible work options.

Young people

The image of the rail industry needs to change in the eyes of young people considering career choices, as well as the people who influence those decisions, such as parents, teachers and careers advisors. The home and school are important places where career discussions can influence a young person's career aspirations.

"Attraction – the biggest part is getting to the influencer, schools and parents. They must be across and support rail careers. But it's not considered sexy or the right path for their child".

"Once our organisation was in an open day at a school, and the students came by to ask if we were there to help them with directions on our train network. This just goes to show how little young people know about the industry."

"If young people knew how much train drivers get paid, they might consider it more as a career. Some people go to university and get qualified, it takes them years to finish their degrees and start earning decent money… some train drivers earn $200,000."

"Rail is not an attractive/sexy industry. There is no appetite for signalling in the market."

Women

Varying representation of women across different sectors is likely a product of how diversity targets are set. Large organisations will often have diversity targets for 'whole-of-company', but no diversity targets for specific areas of the business. This means organisations might achieve their overarching targets but are not inching closer to an equal split in non-traditional roles for women. Some worksites still lack appropriate facilities for women. Additionally, the work culture in non-traditional roles was often mentioned by interviewees as a barrier to getting more women in organisations' technical and trades areas.

More generally, workplace sexual harassment is more commonplace in workplaces that are male dominated. With almost two in five women (39 per cent) reporting they have experienced sexual harassment in the workplace in the past five years, the rail industry has a responsibility to make workplaces safe for everyone. Sexual harassment and other forms of discrimination are also more common for people with multiple minority identities. This includes people with disability, Indigenous people, young people and migrants. Cultures that enable sexual harassment or discrimination could lead to the loss of diverse workers in an organisation.

Women in science, technology, engineering and mathematics (STEM) fields

Australia collects important data on women's participation in science, technology engineering and mathematics (STEM). STEM fields encompass professions (qualified through VET, higher education or mixed) in information and computational technology, engineering, technicians and trades workers. Data referencing women's participation in STEM is useful for this study as the skills gaps in the rail industry are often in professions in which women are currently underrepresented.

A national study of the barriers for women's career progression in STEM fields in Australia found workplace culture pushes women out of the STEM workforce. Only 1 in 10 women with a STEM qualification worked in a STEM industry. By comparison, just over 1 in 5 men (21 per cent) with a STEM qualification had a job in a STEM field.

Attracting and recruiting women is one part of the equation. Rail companies must also put in the work to retain them. Five years after

graduating, men with a STEM qualification are almost twice as likely (1.8 times) to be working in a STEM job compared to their women peers.

"If we want to make rail an attractive industry, we need to challenge the status quo and some of the ideas about what it means to work in rail."

"To attract more diverse people and change the image of the industry, we need to make sure job advertisements and company images [on the website, on advertisements] are consistent and inclusive."

CASE STUDY: WOMEN RETURNERS PROGRAM

Thames Tideway Project, London

From the outset, Tideway has created an inclusive workplace culture, and its commitment to gender parity is embedded in its business strategy.

Tideway's CEO has an ambition to achieve gender parity by 2023.

Tideway has been recognised for a number of initiatives, including specially designed culturally modest personal protection equipment (PPE), maternity PPE and an employee resource group for gender parity.

In April 2015, Tideway became the first company outside the financial sector in the UK to launch a 'returnships' program, aimed at helping professionals back into work after a career break.

The program, organised in partnership with Women Returners, offered 12-week paid opportunities in areas including engineering, business planning, legal, stakeholder engagement, operations management and financial modelling.

The returners received mentoring from Tideway employees, as well as support and advice to successfully make the transition back to full-time work. All women returners have now taken up positions in the company after completing the program.

The program gave access to an invaluable pool of talent that might otherwise have been overlooked. It has boosted Tideway's efforts to increase diversity on the project, where around 35 per cent of the 400-strong team is female.

Tideway is dedicated to raising the bar for diversity even further. All staff are required to undertake diversity training. Tideway's inclusivity forum, Encompass, has been set up to understand the barriers facing minority groups within the company and develop a strategy to address these.

Indigenous people

Inflexible working conditions or work locations could also be hindering candidates with, for example, Indigenous identities who might have family and cultural responsibilities tied to a certain location, or commitments that mean full-time employment is not possible. Rail projects and operations in regional areas could leverage flexibility of work location, including the opportunity to work in a regional location, in their employee value propositions. More job-share options should be offered to assist those with caring responsibilities and other commitments.

"We could be doing so much better on hiring women and Aboriginal people. I have no time to improve diversity and inclusion in the organisation. My workers are offered higher salaries to work elsewhere so they leave the organisation, all the while the demands from government are the same so I'm trying to deliver all these projects... it's just not possible."

Showcasing rail careers

Different rail companies have their own websites detailing rail career opportunities, reflecting their own business offerings. The ARA is currently developing a new careers website to provide a 'one-stop shop' portal showcasing the diversity of rail careers and people who work in the industry.

"The rail industry hasn't been very good at communicating rail career pathways to young people. We're not getting through to them and we need more innovative ways to show them how diverse a career in rail can be."

Generic skills shortages

The occupational profile for rail overlaps with many other industries. Rail employs large numbers of engineers, technicians and trades, and data specialists. As a result, it must compete with many other industries that may have a more 'attractive' profile.

In addition, many of the aforementioned occupations are experiencing critical skills shortages and most require a significant number of years of training and experience before they are deemed competent. Engineering is one example.

Employers[9] reported in 2019 that they had large pools of qualified applicants (16 on average per vacancy), but most (87 per cent) of the qualified applicants were unsuitable. The main reasons for unsuitability were:

- lack of experience in a particular specialisation, profession or industry
- insufficient technical skills
- poor application, interview or work history

The Australian Department of Education, Skills and Employment (DESE) reported that undergraduate engineering course commencements declined for the third consecutive year to 1,137 in 2016. This was well below the average for the previous three years (1,669) and the average for the past decade (1,413).

The University of NSW confirmed that Australia's demand for engineers far exceeds its supply of graduates:

"The country imports more than double the number of engineers that graduate from Australian universities each year and has done so for more than a decade."

Digitalisation and new technologies

Digitalisation and other new technologies are driving demand for new jobs or expanded skills in the rail industry. This process will accelerate in coming years. Conversely, new technologies will also see demand for some existing rail occupations drop away over time. In the medium-term, there will be demand for both 'old' and 'new' skills as analogue systems are gradually replaced with digital systems.

Technological change[10] – Across the world, technological innovation is rapidly changing the way industries conduct their daily operations. The rail industry is developing new innovations, which can improve operations, reduce power consumption, assist in asset management and monitor safety critical communications. New systems being developed and adopted need to be interoperable across states and territories and over different networks. The advent of these new technologies and their implementation in the industry will require new and revised skill needs throughout the workforce.

Australia is following European rail standards models and implementing automated train control systems. These new systems will require workers with specialised skills to design, implement and maintain them. Communication technology and big data are also contributing to changes in the rail workplace and job requirements, including new systems in wireless signalling and sensors, developed to capture data for use in predictive condition monitoring and maintenance.

Automation – The onset of autonomous systems and vehicles in the rail industry is also expected to have significant effects on the workforce, and the skills required. These autonomous operations are to be a key focal point across the rail industry for the foreseeable future.

Remote operations – The operation of trains bears many work, health and safety concerns, as well as many critical communication necessities. Software-based control centres are being developed which can operate hardware-based equipment remotely and monitor the location and status of trains on the network.

The impact of new technologies on skill levels

Rail skill-level requirements are rising with the introduction of new technologies, and those technologies also demand a different range of skills, with a greater emphasis on problem solving, critical thinking, intellectual autonomy and self-management.

Network control operators, for example, are vital to the smooth operation, safety, and delivery of rail-based transportation services. People within these roles communicate, diagnose, and provide information to drivers in real-time. As autonomous systems are introduced, the volume and complexity of information, data ('big data') and train telematics (diagnostics of vehicle health) will increase, changing the role of the remote operator significantly. The operators will require higher-order skills in data analysis, problem-solving, and an understanding of autonomous systems.

The CEO of the National Skills Academy for Rail (UK) stated:

"Skill levels in the rail industry have risen from an average of Level 2 to Level 2.5 in the past 5 years. We have forecast they will rise to an average of Level 3 in the next 5 years. The focus is Level 4/5 and providing higher level apprenticeships to meet the need."

The uptake of new technologies is being seen across most industries, including others in the transport sector, driving demand for new skills that are often higher-level. Where industry is competing for the same supply chain of labour, it must look beyond its own needs to anticipate and plan for future requirements.

The UK's Strategic Transport Apprenticeship Taskforce undertook a Skills Forecasting Baseline Study in 2018. It stated:

"It makes sense to look across rail and roads. Whilst both modes have their specialisms, we are essentially looking at a shared supply chain. This is especially true when it comes to infrastructure construction. In addition, wider infrastructure construction will also have an impact, and these will increase, particularly for those around skill levels 3 and 4, primarily driven by developments in technology, increasing digitalisation and by different ways of doing things, for example the move towards offsite construction and smart asset management. This means both existing roles will change and may require increased levels of competence; and new roles will emerge which require skillsets not previously needed in conventional transport roles."

In an increasingly technologically oriented world, the rail industry faces intense competition for technical skills, and will need new strategies to attract these skills into an industry still perceived as old and male dominated. However, the new technologies provide an opportunity to increase the diversity of the rail workforce, with future jobs potentially having more appeal across genders and cultures.

"If train drivers are going from direct control through to ACTS Level 1 (where the train does some of the driving), that driver needs to operate the interface, not just the train. This is where we need signal electricians/ people with electrical skills, people who know how to analyse data and troubleshoot. They are the ones who will operate line-side signals, which is where the train might make a decision on the track? They need people to be across the old and the new and keep up to date with knowledge for when they need to use it.

I see resistance to new technology in the ageing workforce. But sometimes you can't tell if the resistance is from the individual or the manager. Our organisation hides behind things like 'the way we do things', and this creates constraints. For example, our train drivers are not allowed to have mobile phones switched on in the train. While the mobile phone is a distraction, that same phone is an enormous tool for operating that train. We've got to educate workers and get them trained in the skills they need to utilise the tools, so it assists them in their role.

Some rail companies are not confident that the technology is there yet, and that there

is no cause for alarm in terms of upskilling people in the present. The technology we have now won't require higher skill levels, but it will be problematic in the future.

The pace at which we're building new networks and at which capabilities are changing… the volume of work requiring additional workers… The current learner pathway can't keep up with it. If there are no 'spare' signalling professionals in the industry we can't rely on apprentices who can take 7 years to go into work. The model is not responsive."

Skills portability

Product-specific skills present a key barrier to portability. The range of standards, regulations, definitions and systems historically developed by the different jurisdictions in Australia impact skills development and the ability to enter, exit or transfer across the industry.

The differences in safe working rules, technical maintenance plan standards and different products across individual domains restricts skills portability. Whilst national rail qualifications exist, localised approaches are also applied. These address jurisdictional standards and systems, mapping to national qualifications, and adding local domain requirements. The resultant 'in-house' or jurisdictional certifications are not recognised beyond the company or location.

The lack of uniform products across domains for rail workers means they often experience barriers when attempting to move between jurisdictions, or from overseas. Where they are able to transfer, they often have to retrain to meet local standards, which in some cases may not exceed their existing level of competency. The current situation is time consuming and often a disincentive, resulting in a failure to optimise the available labour market to fill skills shortages and gaps.

The product and domain constraints across jurisdictions also result in significant barriers to accessing skills from overseas. This is already presenting challenges to the delivery and implementation of new rail technologies and systems associated with new investments.

Many of the new technologies in rail and associated industry knowledge is generated overseas and, prior to the global pandemic, these new products and associated skills were generally imported. The impact of COVID-19 on inward immigration, together with the lack of uniform rail systems and standards across Australia, is resulting in double-disadvantage factors at a time of exponential growth in rail investment and critical skills shortages.

"There is legislation for national qualifications, so we follow that. If you've mapped it across it can still be in line with legislation.

The rail training package has highest uptake due to rail legislation. But a lot of the package is used as a standard that operators 'map to'. For example, they use the training package as a benchmark but don't employ an RTO. Legislation allows use of a 'mapping document' based on the Australian Quality Training Framework (AQTF)."

The skills and training system

The 2018 BIS Oxford Economics report indicated that industry view current education and training processes and outcomes as the single key risk to existing and future workforce capability. In particular, the following were seen as challenging rail workforce capability now and into the future:

- A chronic shortage of trainers and assessors

- An attitude in industry and government that views training as a cost rather than an investment

- The time taken to train people for key roles, and meeting domain/ product competency requirements

- Lack of scale in training courses, making them uncommercial

- Risks to the quality of training, particularly in periods of high demand

Vocational education

Current systems for the training and development of rail skills are not responsive to industry needs. There has been some criticism across different industries about the time taken to develop new qualifications and units of competency, through the current model of Industry Reference Committees (IRC). A new model of 'Skills Organisations' is being considered to strengthen the role of industry in the vocational education and training (VET) sector. Pilots[11] are currently underway across three industries, mining, human services and digital skills, to test new ways to make the VET system more responsive to the needs of employers.

There is also a lack of confidence in the quality of some training, with concerns it may affect individual competency.

The standard of delivery by rail RTOs is inconsistent and often does not meet the standards expected by industry. There can be differences in how RTOs interpret competency requirements and implement their training programs, as well as the availability of high-

quality teaching and learning resources:

"Some operators have a preferred supplier list and won't employ someone if their qualification is from an RTO not on their list, as they are concerned their training will not have been of the same standard and therefore people won't have the competence required.

We are a high-risk industry. If we get it wrong, we can kill people.

RTOs need to partner with operators to learn their systems, co-design programs and co-deliver training. Some RTOs don't do this and are not up to speed with different systems. They need familiarisation with different operators' systems. RTO in-house capability is an issue."

There are no standardised training materials and insufficient audit and moderation measures, including checking technical knowledge and understanding. This leads to students leaving the VET system with differing skill levels. The current arrangements through ASQA have been unsuccessful in solving this problem. Other challenges include the following:

- Most rail training is undertaken 'in-house''. There is a lack of entry pathways through the VET or higher education systems into rail jobs, unlike other industries.
- The rail industry has already identified a shortage of trainers and assessors. Private-sector RTOs may struggle to recruit and maintain the competence of skilled trainers and assessors.
- There are a relatively small number of RTOs delivering rail training. Many TAFEs have rail qualifications on scope but do not have the physical or human resources to deliver and assess the training. Of the small number of private RTOs, not all are recognised by employers as delivering training that meets industry standards.
- Training is often viewed as a 'cost centre' rather than a 'productivity investment'. At a time of skills shortages, enterprise-based trainers are often pulled back 'on the tools', to the 'revenue' side of the business.
- The differences in standards and systems across different jurisdictions impacts on economies of scale in the training of skills, affecting the commercial viability of training itself.
- There is a lack of diversity in the approach to rail training, as well as a need to provide a range of options, including formal and informal training, micro-credentials, apprenticeships, and full degrees.
- There are insufficient pathways from the VET system to higher education, which will become a greater need with higher skills requirements associated with new technologies.

- Ongoing learning is required for the sector to remain competitive and respond rapidly to changing technologies and changing social norms.

"The biggest challenge is getting trainers who come out of the 'technical' engineering space.

The rail training packages use a lot of imported units to enable cross skilling. This supports people moving from other industries. We can provide rail industry knowledge for people that already have technical skills, for example, from construction, mining and agriculture."

Rail training facilities

There are limited specialist rail training facilities available across Australia. In many cases, for more generic training, this is not required. Within certain occupations, such as train drivers, simulators have been used for many years with a live environment only required for the applied assessment component.

However, where access to rollingstock, track and specialised systems is required, access and costs associated with delivery of some training can be prohibitive, particularly for private RTOs. Domain and product differences across jurisdictions also mean investment in specific equipment may not be justified due to its limited application.

The industry is best placed to provide specialist resources where it is required. RTOs, approved by ASQA, the national regulator for vocational education and training, are best placed to ensure nationally approved educational standards are met, for example, that workplace training and assessment is compliant. There are opportunities for a greater level of collaboration between industry and education to achieve an improved learner experience and better overall outcomes.

In some jurisdictions, and in other countries, governments have taken a lead and established specialist facilities, or centres of excellence, to meet anticipated demand from major programs of work and future operational requirements. Whilst some have been successful in the short- and medium-term, others have struggled to be viable.

CASE STUDY: RAIL ACADEMY, NEWPORT

The Rail Academy Newport[12] was established in 2007 to offer specialist training and assessment facilities for Victoria's rail and tram sector.

The unprecedented investment in Victoria's rail network through the Level Crossing Removal Project and the Melbourne Metro Rail Project demand specialist infrastructure to support applied skills training for the rail sector.

The Rail Academy Newport provides a true working environment for the next generation of engineers, apprentices and cadets, including sections of off-network rail and tram track.

The Rail Academy Newport is located in Newport, Victoria, and is a joint initiative from the Victorian Government's Training for the Future program. Training for the Future leased the site from VicTrack in October 2016. The facility was formerly named the Rail Skills Centre – Victoria.

CASE STUDY: VICTORIAN TUNNELLING CENTRE

The new $16 million Victorian Tunnelling Centre[13] at Holmesglen Institute's Chadstone campus will train and skill local workers in underground construction and tunnelling.

It includes a replica tunnel with a full-height entrance, two multi-purpose engineering and technical workshops and training facilities including tunnel shaft and concrete lining spray simulators, as well as virtual reality experiences.

The tunnel boring machine replica tunnel will be the exact diameter of the Metro Tunnel, while the mined replica tunnel will be the equivalent width of a three-lane freeway.

Holmesglen Institute will offer both existing and new courses at the tunnelling centre, including Certificate and Diploma qualifications and safety-based training for working underground. It is estimated that up to 5,000 students will participate in training courses at the centre each year, going forward.

The centre is modelled on the successful Tunnelling and Underground Construction Academy established as part of London's Crossrail and the Tunnel Training Academy in Kuala Lumpur.

CASE STUDY: NSW INFRASTRUCTURE SKILLS CENTRE

The NSW Infrastructure Skills Centre[14] was established in 2017, primarily to address critical construction skills needs for an anticipated 20,000-strong workforce on Sydney Metro.

The Centre, owned and managed by TAFE NSW, was renovated and equipped to deliver specific training and competency requirements mandated by Sydney Metro for any workers prior to commencement on its sites. A portfolio of training programs, 'Sydney Metro Industry Curriculum', was developed by Sydney Metro and TAFE, providing nationally recognised skills sets and units of competency.

The Centre was anticipated to be a legacy outcome, providing for other future major projects and, whilst initially successful, it has failed to recruit the number of students anticipated.

The primary reason provided has been the lack of availability of suitably trained and experienced trainers and assessors to meet mandatory and optional training requirements.

A lack of ongoing industry engagement and collaboration through the planned industry board structure, to maintain engagement and interest with employers, may also have been a contributory factor to the under-utilisation of the centre.

The model, however, could be applied to the rail industry, providing entry pathways for rail delivery and operations through enhanced or new programs that legislative and industry requirements. Example programs are listed in Section 7.6.1.1.

CASE STUDY: NATIONAL COLLEGE FOR ADVANCED TRANSPORT AND INFRASTRUCTURE, UK

The National College for Advanced Transport and Infrastructure (NCATI)[15] based in two sites in Birmingham and Doncaster (formerly Highspeed 2 College) was established to address skills requirements and support new jobs on the High Speed 2 project (HS2). It was also positioned to respond to higher-level (4/5) skills as a result of new technologies and bridge the gap between vocational and higher education.

NCATI has struggled since its inception to achieve its objectives. Established in 2017, it was judged inadequate in its first inspection by OFSTED, the national inspection service for vocational education and other education sectors in the UK. It also failed to recruit sufficient students to be financially viable. Its interim CEO noted that key challenges included:

- Over-reliance on single source of students – delays to the HS2 project resulted in a shortfall of anticipated student numbers. A minimum of 1,000 were required per annum, of which around only 25% was achieved

- An imbalance of industry and educational representation on the board, resulting in decisions that impacted educational outcomes

An interim CEO was appointed to NCATI, and the college has been rebased and restructured with a more balanced board representation and strong support from industry. In 2020, the University of Birmingham, in partnership with Network Rail, City & Guilds and NSAR, were announced as the preferred bidder to lead NCATI in the future. The partnership would appear to demonstrate a strong representation of education and industry, with the added benefits of a qualification body (City and Guilds) and the national industry-led rail skills organisation (NSAR).

A recent monitoring inspection by OFSTED has reported the college has made significant progress, evidenced by recent results, which include 100% of apprentices passing their end-point assessment, with 83% gaining higher grades.

CASE STUDY: TUNNELLING AND UNDERGROUND CONSTRUCTION ACADEMY, UK

The Tunnelling and Underground Construction Academy (TUCA)[16] was established in London by Crossrail to support the development of specialist tunnelling skills for Crossrail and other major tunnelling projects. The Academy, which cost around $26 million to build, was jointly funded by government through its education and transport portfolios, with further inward investment and sponsorship by industry through the provision of state-of-the-art equipment. It had significant success in its first five years, providing new-entrant through to Level 5 programs, as well as specialist provision and the development of new apprenticeship frameworks.

The availability of high-quality equipment and specialist training facilities were strong draw cards and encouraged new initiatives, including the establishment of an industry concrete testing laboratory and purchase of a virtual reality tunnelling simulator. Around 17,000 individuals undertook training during this time. The role of industry in the design of the facility, as well as the programs it offered, meant a high level of support and utilisation, as well as the provision of technical knowledge into training and the development of new qualifications and apprenticeships.

The Tunnel Training Academy in Kuala Lumpur and Victoria Tunnelling Centre were both modelled on TUCA.

A key challenge was the availability of experienced and technically qualified trainers and assessors. TUCA was assisted by industry, who enabled trainers to undertake work experience on their sites to meet legislative requirements for minimum hours whilst building skills, for which they were then assessed and qualified. Another strategy was team teaching, with industry personnel engaged to teach and assess alongside qualified trainers and assessors. All parties noted the benefits of increased technical or educational knowledge through this process.

The original concept for TUCA was for 'hub and spoke' provision, with TUCA providing a 'Centre of Excellence', high-level skilling and research opportunities, and a network of providers of entry programs and local workforce development for sites across the London east-west alignment. This network, planned to be delivered through local further education colleges, did not eventuate, which undoubtedly impacted the ability of individuals outside the East London environs of TUCA to access training and potentially jobs on Crossrail.

In more recent times, TUCA has struggled to position itself to meet current and future needs. It has provided training services for the fire service, emergency medical services and the mining industry, utilising its specialist facilities to simulate rescues in confined spaces and challenging conditions. It has also been utilised by Crossrail for train crew training in more recent times. However, long-term sustainability beyond peak demand for tunnelling by Crossrail and other projects was not adequately addressed.

The TUCA governance framework included an Industry Advisory Group. This kept industry needs front-and-centre during the tunnelling peak, but a better balance of industry and education representatives may have supported longer-term utilisation and future planning.

TUCA is now part of the Department of Transport 'Centres of Excellence' network, aimed at improving quality of training and efficiency in the industry.

Higher education

Within the higher education sector, there are currently no rail-related undergraduate courses offered throughout Australia (as of January 2021). Generic programs, including engineering disciplines, have limited focus on rail.

Advanced rail-specific courses and degrees are offered from time to time at universities around Australia. These include the courses outlined below.

Civil infrastructure courses

•   The Engineering Institute of Technology (EIT) in Perth provides practical engineering and technology education from Diplomas through to Masters Degrees. EIT is offering a Master of Engineering (Civil: Railway Infrastructure) via online delivery.

- Transport for NSW has partnered with Engineers Australia to launch a Diploma of Rail Track Engineering. This has now resulted in the University of Tasmania (Darlinghurst, NSW Campus) offering a Diploma of Engineering Infrastructure (Rail). Graduates will have levels of knowledge of track engineering, legislation and regulation, such that they can operate under professional supervision in designing, constructing, commissioning, monitoring, maintaining and managing a section of track and have skills to communicate and interact with stakeholders in ensuring the track meets the operational performance standards of the railway business.

- As part of its Master of Engineering (Civil Engineering), RMIT offers an elective in Rail Infrastructure (CIVE1257 at RMIT, Melbourne). This course investigates components of railway infrastructure and the design and construction of different railway systems. It encompasses a wide range of engineering disciplines, including civil, electrical and mechanical engineering.

- Deakin University offers a postgraduate course in Railway Infrastructure Design and Management (SEN729) at Waurn Ponds, Geelong and online). This is a core course for the Master of Infrastructure Engineering and Management (Professional). This course provides specific knowledge for designing and maintaining railway infrastructure systems through real-world case studies. Using Australian railway industry standards and guidelines, students learn about design and maintenance procedures for both light and heavy railway systems. In addition to the engineering design of railway infrastructure systems, technological solutions for their efficient and safe operation are addressed.

Rollingstock engineering courses

Rollingstock engineering courses are specifically designed to meet industry needs by delivering the knowledge and experience that are difficult to gain through workplace training programs only. The courses are built on a problem-based approach to learning and focused on the technologies and challenges faced by rolling stock engineers working across all sectors of the railway industry.

The University of Wollongong offers a postgraduate course in Railway and Rolling Stock Environment. This course covers rail within a transport industry context, historical perspective on railways development, business structures for rail organisations, rolling stock interfaces, safety considerations, design drivers, system design specification, rolling stock system (operations, servicing, maintenance), component interfaces, train types and applications, rolling stock operation and asset management, railway cost perspectives and technological development trends in rolling stock.

Rail operations courses

The University of Sydney Business School offers a Certificate of Railway Planning and Operations. The course introduces students to the key elements of railway planning and operations.

The lack of any rail-related undergraduate courses across Australia effectively means there are no rail-specific academic new-entrant pathways. This is a major deterrent to future talent entering the rail industry.

For graduates undertaking broader programs, such as civil engineering, the rail sector is in competition with many other industries. There is also an insufficient pool of graduates to meet demand. The lack of exposure to rail and the opportunities it might afford through their courses means it is more unlikely that graduates will choose a rail career pathway. For those graduates that do chose a rail career, the lack of rail-specific content in university courses means they are ill-prepared when they join the sector.

Ongoing continuing professional development at an advanced level is also limited due to the small number of programs and ad-hoc nature of delivery.

Overseas courses

A wide range of rail-related undergraduate and advanced courses are available in the UK and USA, across multiple higher education institutes. A full list of UK courses is available through the Permanent Way Institute,[17] including:

- **Manchester Metropolitan University**
  - Rail Engineering | Level: MSc | Accredited level: CEng | 1 years full-time/2 years part-time

- **University of London – University College London – UCL**
  - Rail Integrated Design Management | Level: MSc | Accredited level: CEng | 3 years part-time

- **Sheffield Hallam University**
  - Railway Engineering | Level: BEng(Hons) | Accredited level: IEng | 1 years full-time/2 years part-time
  - Railway Engineering | Level: FdEng | Accredited level: IEng partial | 2 years full-time/3 years part-time

- **University of Birmingham**
  - Civil and Railway Engineering | Level: MEng | Accredited level: CEng | 4 years full-time
  - Civil and Railway Engineering with Industrial Year | Level: MEng | Accredited level: CEng | 5 years full-time
  - Civil and Railway Engineering | Level: BEng(Hons) | Accredited level: IEng | 3 years full-time
  - Civil and Railway Engineering with Industrial Year | Level: BEng(Hons) | Accredited level: IEng | 4 years full-time
  - Electronic and Railway Engineering | Level: MEng(Hons) | Accredited level: CEng | 4 years full-time
  - Electronic and Railway Engineering with Industrial Year | Level: MEng(Hons) | Accredited level: CEng | 5 years sandwich
  - Electronic and Railway Engineering | Level: BEng(Hons) | Accredited level: IEng | 3 years full-time
  - Electronic and Railway Engineering with Industrial Year | Level: BEng(Hons) | Accredited level: CEng partial | 4 years sandwich

- Railway Systems Engineering and Integration | Level: MSc | Accredited level: CEng | 1 years full-time/2 or 3 years part-time
- Railway Risk and Safety Management | Level: MSc | Accredited level: CEng | 1 years full-time/2 years part-time

Other related courses, such as 'Civil and Infrastructure Engineering', are available across the UK and include rail related content.

The lack of any new-entrant pathway for the rail industry through higher education, combined with similar issues in the vocational education sector, sets the sector apart from most other major industries in Australia. The failure to provide entry-level pathways is a major contributor to the current level of critical skills shortages in the industry. The level of risk for the industry is further exacerbated by closed borders, which means alternative supply options, including buying in skills from overseas, is severely limited in the short- and medium-term.

"It's really hard to find engineers, or even project managers, with rail experience in the market. Without any specific degrees in Australia, we rely on finding people with the right number of years of experience in rail and sometimes it's really hard, because you can't give a job to someone in rail without that experience, but there's nowhere for them to get that knowledge or that experience... It's a vicious cycle."

"Higher skill levels are required, and not just because of new technologies. A lot of workers come in with a Certificate III level, they do the technical work and basically the next step is becoming an engineer, but there is poor linking between this pathway all the way through. AQA 5, diploma level, doesn't exist. There are skills and there are capabilities, and our organisation needs more 'pure skill'."

The role of government

Australian governments are responsible for legislating and regulating rail safety across the nation, together with domain-based requirements in different jurisdictions.

Governments have a role to play in harmonisation and standardisation of rail networks to move towards a system that operates seamlessly across Australia. This includes rollingstock and components, operating rules for rail infrastructure and communications and control systems. This approach would positively impact skills capacity and capability and allow for greater transferability of skills across different domains.

Governments can also leverage their investments in rail to contribute to wider social and economic priorities, including jobs, skills development, increased participation of under-represented groups, and local supply chain content.

Governments, as the largest investors in new rail infrastructure, also have responsibility for the most sizeable proportion of the future infrastructure pipeline and its impact on skills capacity.

Judicious use of these drivers can positively impact the rail industry's workforce capacity and capability alongside other benefits, including new innovation, global competitiveness and supply-chain opportunities.

There is a lack of coordination within and across governments currently, leading to skills shortages, internal competition, increased costs and a failure to optimise broader and longer-term socio-economic outcomes.

The Rail Safety National Law

The Rail Safety National Law (RSNL) aims for a seamless and coordinated national approach to rail safety regulation in Australia. The RSNL was first enacted in South Australia in 2012. All other states and territories have either adopted the RSNL or passed legislation that models it.

The Office of the National Rail Safety Regulator (ONRSR) is the independent body corporate established under the RSNL (South Australia) Act 2012. The primary objectives of the ONRSR are to encourage and enforce safe railway operations and promote and improve national rail safety. ONRSR has responsibility for regulatory oversight of rail safety in every Australian state and territory.

The RNSL necessarily underpins and drives much of the approach to employment and skills development for the rail workforce.

Infrastructure pipeline

As previously referenced, the value of Australia's current infrastructure pipeline is in the region of $400 billion, with additional new investments to the support post-COVID economic rebound. With the majority of investments rail and road projects, often across concurrent projects in the same or adjacent jurisdictions, competition for skills is significant.

The current approach to government infrastructure investment is largely uncoordinated, either within or across governments. This lack of coordination is impacting the market's ability to respond and the availability of a sufficiently skilled workforce to meet demand. Governments are effectively creating their own skills shortages, with likely impacts across cost, productivity, quality and safety.
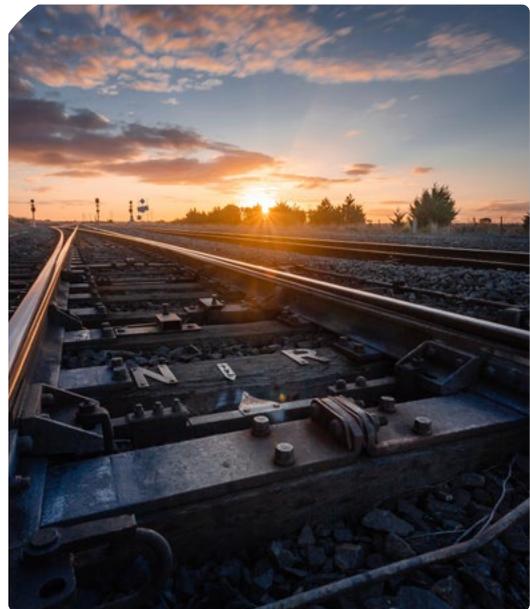
Increasing workforce capacity through infrastructure investment

Governments across Australia have identified opportunities to use procurement mechanisms to deliver wider priorities, including jobs, skills development, Indigenous participation, increased gender equality and local supply-chain content. Where appropriately applied, they also support the development of greater industry capacity and capability, including within the rail sector. These objectives are embodied in policy and procurement directives across jurisdictions, including:

- Victoria's Social Procurement Framework[18]
- Local Jobs First – Victoria[19]
- Queensland Indigenous Procurement Policy[20]
- Queensland Procurement Policy[21]
- Queensland Government Building and Construction Training Policy[22]
- NSW Procurement-PBD-2020-03 Skills, training and diversity in Construction[23]
- NSW Aboriginal Procurement Policy[24]
- ACT Local Industry Participation Plan and Labour Relations, Training and Workplace Equity Plan[25]
- Australian Jobs Act 2013[26]
- Australian Indigenous Procurement Policy[27]

There have been some strong success stories from various jurisdictions as a result of these directives, including Sydney Metro's Workforce Development and Industry Participation program and Victoria's Big Build Employment and Training Programs. However, outcomes are varied due to a number of factors:

- Inadequate early research and planning to determine appropriate jobs, skills, diversity and local content objectives that are relevant to the project scope, align to industry requirements and reflect the locality and demographics
- Jurisdictions' focus on local content can lead to a fragmented buyer market, meaning that individual rail operators do not benefit from scale efficiencies and suppliers have higher costs for reaching individual buyers, with small orders each requiring some modification
- Employers may be deterred from taking on apprentices and trainees where the training and qualification period exceeds the length of the project
- Variable levels of resourcing and coordination by government to support markets that are still relatively immature in this area
- Lack of cross-agency collaboration within government to ensure availability of supply-side support, for example, employment and skills programs
- Inconsistent application of contractual obligations across delivery projects
- Limited application of contractual skills and jobs obligations within operations and maintenance contracts, which provide longer term opportunities

There are opportunities to do far more through government procurement mechanisms to increase skills availability and capability in the rail sector. However, it requires earlier planning and greater collaboration across government, industry and the education sector to optimise relevant and timely outcomes for the sector.

3. Findings and recommendations

This report provides strategies to alleviate the growing shortage of skills facing the industry, through a coordinated approach for the future attraction, recruitment, skills development and retention of the workforce. Key focus areas include:

- developing a nationally coordinated approach to rail skills and training strategies

- anticipation and determination of rail skills demand

- promotion and development of rail career pathways and entry points into the industry, and

- provision of ongoing skills development to ensure there is an effective supply chain to deliver skilled people through an accredited network of providers

- The NTC Skills and Labour Committee has recently proposed the establishment of a National Rail Skills Hub (NRSH) to coordinate current industry and government initiatives and activities to address skills shortages in the industry. The findings and recommendations of this report seek to inform that process and contribute to national skills reform priorities.

Leadership, collaboration and partnership

There is a need to achieve greater collaboration and partnership between the rail industry, governments and the education sector to optimise the value of their individual contributions to achieve capability uplifts and better overall outcomes.

The industry is currently fractured by jurisdictional differences across standards, systems and products. In the absence of a nationally coordinated approach to rail skills and training, there is no 'big picture' view of current and future skills needs and career pathways.

As a result of siloed project planning within jurisdictions, skills shortages are further impacting costs, productivity and the quality of project delivery.

There are examples where a more coordinated approach has achieved results. For example, collaborative partnerships between the Victorian Government and state transport agencies such as Metro Trains Melbourne and the Level Crossings Removal Project have been key in supplying skills and training, while also delivering social outcomes on infrastructure projects.

National Rail Skills Hub

Recommended action: Establish the National Rail Skills Hub (NRSH) to lead a coordinated approach between governments, industry and education that promotes rail careers and builds workforce capacity and capacity through accessible entry pathways and high quality skills providers and programs

There is currently no overarching entity that has responsibility to lead and coordinate strategies to ensure rail skills supply meets demand in Australia. This includes understanding current and future workforce demand and coordinating supply-side strategies in response. Such strategies include promoting rail careers and attracting future talent, providing academic and vocational entry pathways and ensuring the delivery of high-quality, consistent training and upskilling programs that have the confidence of industry.

The Infrastructure and Transport Ministers' Meeting supported the creation of a National Rail Skills Hub (NRSH) in May 2021. This 'virtual hub' will facilitate and coordinate government, industry and education activities and initiatives in rail skills and training. It will be a transitionary unit that supports states and industry to build a national base for future rail skills to strengthen the sector. Its focus will be organised around three activity areas:

- Training centres and activities, including establishing linkages between industry, governments and education providers; collaboratively developing solutions to trainers and assessors

- Courses and materials, including working through the Rail Industry Reference Committee in updating training packages, skills sets, micro credentials for national competencies; digitalising course materials for national competencies

- Skills and careers pathways, including establishing national career pathways and entry points for job seekers; develop a Skills Intelligence Model to audit existing skills and forecast future skills

Governance structure

The governance structure of the NRSH will include the following features:

- Stakeholder Reference Group (SRG) of industry, government and education stakeholders, transitioned from the existing NRAP Skills and Labour Committee
- A small (virtually located) team of people to coordinate, support activities and procure and build linkages to specific expertise in industry, government and education and training
- Working groups to inform and guide activities and delivery of specific tasks

The hub would be founded on the basis it is transitional, with the resources and functions ultimately transferring to existing entities and new national skills reform bodies.

Comparative model (UK)

A comparative model for the NRSH already exists in the UK, which has experienced similar challenges regarding rail skills capacity and capability.

In 2006, the UK government established the National Skills Academy (NSA) model across a range of industry sectors. NSAs are employer-led centres of excellence, delivering the skills required by each sector of the economy. They work with industry bodies to drive change and achieve priorities identified by employers in their sector.

Whilst individual NSAs have taken individual approaches, they are for the most part 'virtual' Academies that work with a network for approved providers to achieve their objectives.

The National Skills Academy for Rail (NSAR)28 is seen as being one of the most successful NSAs, having developed a range of tools and services that not only support the rail sector, but are now provided to other industries.

NSAR works with education, training providers and industry-leading companies to ensure there is an effective supply chain to deliver skilled people for the rail industry. It occupies a unique position, sitting between the key stakeholder groups, employers, academia and training providers in the sector, with strong links to each. NSAR also enjoys a high level of trust within government, enabling it to represent the sector and influence the development of skills policy on behalf of the industry. It has developed a service offering that supports industry needs and government objectives that will also ensure its long-term commercial viability:

- Leadership and coordination of the UK National Rail Skills Implementation Plan
- Facilitation of a modern qualification framework and apprentice programme to increase competency across the sector
- •The Skills Intelligence Model (SIM) and SkillsID tools to support strategic workforce planning and competency management in the sector. This knowledge and intelligence help the rail sector and members make informed decisions and target investment in resource planning. The SIM is also widely used by government to support and inform its infrastructure planning and cost-benefit analysis for business cases through the delivery of jobs and skills from major infrastructure investments.
- Provision of careers advice and access to jobs vacancies through its Routes into Rail and Skills Live platforms, offering a centralised source of consistent information about rail occupations and opportunities across the sector
- NSAR ensure the quality of training provision is of a high standard and support training providers through the accreditation and ongoing quality assurance of a National Network of Colleges and Training Providers. Quality assurance is managed through its SkillsBackbone platform, for both training providers and accredited trainers and assessors. Its Training Directory provides public information about accredited

providers and programs available across the UK. This brokerage role enables the industry to increase its competitiveness through matching skills and workforce demand to training and education supply for both up-skilling and apprentices.

- NSAR is the responsible body for rail apprenticeship standards, ensuring high quality delivery that provides the skills, knowledge and behaviours that employers need.
- Collaboration with employers to create and standardise course curriculum, develop training facilities and training plans, and assess and assure the quality of training provision
- NSAR conduct and publish research into the impact of skills on productivity and costs, adoption of technology, social mobility and workforce diversity for government and industry. Much of its research and studies are publicly available through its online knowledge centre.
- NSAR acts as a coordinated voice, on behalf of the sector, to influence government policy and planning, safeguarding the rail sector's interests.

Potential complementary activities

Other complementary activities to support developing Australian rail skills for the future that could be consideredinclude:

- Accreditation and quality assurance services for training providers, trainers and assessors

- Provision of research and advisory services to governments and projects to inform infrastructure pipeline planning, cost-benefit analysis for business cases, risk analysis and project and workforce planning

- Provision of research and advisory services to industry to support project planning and strategic workforce development

- Provision of research and advisory services to education, employment and careers agencies and providers to inform service planning and delivery

The additional activities described above increase the interest and appetite of such entities, as income-generating services would contribute to overall commercial viability.

National Rail Skills Implementation Plan

Recommended action: Facilitate collaborative partnerships across government, industry and education to deliver key rail skills objectives

Recommended action: Develop a National Rail Skills Implementation Plan (NRSIP) to deliver NRAP skills and labour objectives, building workforce capacity to meet current and future demand

The establishment of the NRSH provides a unique opportunity to facilitate and coordinate workstreams and activities across key stakeholders, including governments, industry representatives and education.

It is anticipated these could include the development of the following tools, systems and programs:

- Skills intelligence model providing demand and supply forecasting to support strategic workforce and infrastructure project planning
- Rail worker competency management system, building on the existing Rail Industry Worker program (RIW), providing a database of individual competencies across the industry, supporting legislative compliancy, workforce upskilling and planning
- Rail skills careers framework articulating skills requirements and standardised minimum levels of competency for defined occupations
- Centralised rail careers and job vacancy portal and associated social media and communication channels
- Rail equality, diversity and inclusion program to increase attraction, recruitment and retention of a diverse workforce to the industry
- Rail skills program portfolio of entry programs, micro-credentials and short/long courses with standardised industry-approved teaching materials and resources

- National network of accredited RTOs with associated accreditation and quality assurance services
- Register of accredited trainers and assessors assured within agreed industry and educational standards
- Higher Education working group supporting the development of a rail curriculum across partner universities
- Rail future talent programs, including school partnerships, try-a-trade, STEM, work placement and teacher/lecturer professional development programs
- Skills and Innovation Centre, undertaking research, publishing reports and guidance material, and providing advisory services that offer information and best practice to industry and governments
- Facilitate collaborative partnerships leading dialogue and collaboration across government, industry and education to deliver key rail-skills objectives

These activities directly contribute to 'Meeting rail's critical skills and labour needs' outcomes within the NRAP. They also underpin other key NRAP objectives, including rail worker training resulting from the introduction of common rules for safe work

A National Rail Skills Implementation Plan (NRSIP) would articulate and detail activities, key stakeholders and delivery approaches.

Comparative model (UK)

A precedent for this approach already exists in the UK where the National Skills Academy for Rail leads and coordinates the Rail Sector Skills Delivery Plan on behalf of the industry. The plan, established in 2016, is the rail sector's response to the national Transport Industry Skills Strategy. It conveys how the UK rail industry will collaborate to deliver a highly skilled, diverse and flexible workforce, support the creation of apprenticeships and promote rail as a high-tech, dynamic industry. The delivery plan was developed by the industry for the industry, with input from over 60 businesses.

The plan incorporates a number of workstreams with associated actions, deliverables, outcomes, owners and industry champions for each area:

- Leadership
- Intelligence
- Promotion and attraction
- Recruitment and retention
- Standards and qualifications
- Training and assurance

A similar approach in Australia would ensure holistic, industry-led delivery of key rail skills objectives, through consistent, managed methodology.

A national network of accredited rail training providers

Recommended action: Establish and maintain accredited National Network of Rail RTOs measured and assured through agreed industry criteria and meeting ASQA (or Victoria and WA equivalent) standards and conditions.

Industry confidence in the quality of some training is low, with concerns it may affect individual competency. Within the national training system, there can be wide differences in how RTOs interpret standards and implement their training programs. TAFEs and other private RTOs may lack access to high-quality teaching and learning resources, including simulated and live rail environments.

Greater collaboration between the rail industry and the education sector will ensure training programs reflect the needs of industry and are delivered to an agreed standard. There is an onus on the rail industry to work collaboratively and partner with rail training providers to support the development of industry-responsive rail training programs and support industry currency across the training workforce.

The UK has developed a model through the National Skills Academy model to provide industry accreditation to education providers within a wide range of sectors. This model does not replace educational accreditation and quality assurance requirements, managed in Australia by ASQA. Rather, it complements and wraps around educational assurance by providing industry recognition and support to RTOs that provide high quality, industry-responsive training.

The establishment of a national network of accredited rail training providers, measured and assured through agreed industry criteria and meeting ASQA (or Victoria and WA equivalent) standards and conditions, would:

- Provide network accreditation and quality assurance systems and services
- Develop and maintain network online directory of providers and courses

The network would be managed by the NRSH, who would also be responsible for coordinating the development of accreditation and quality assurance frameworks with industry and education partners. Delivery and ongoing provision of accreditation and quality assurance services for NRSH-accredited RTOs would provide an additional income source to the NRSH and ensure maintenance of standards across the network.

CASE STUDY: TRAINING PROVIDER QUALITY ASSURANCE

National Skills Academy for Rail (NSAR), UK

National skills academies are employer-led centres of excellence, delivering the skills required by each sector of the economy. National Skills Academies work with industry bodies to drive change and achieve priorities identified by employers in their sector.

NSAR is a 'virtual' centre of excellence, with a multi-functional role supporting rail skills delivery in the UK. NSAR is not a training provider; rather, it accredits and quality-assures a network of private- and public-sector 'Assured Providers'. Its quality assurance services include:

- Directory of national NSAR-assured training providers
- Audit and inspection of training provision
- Quality assurance of training providers
- Quality improvement and learning-assurance services
- Register of approved trainers and assessors

Prior to the establishment of NSAR, the quality of rail training within the UK was extremely variable, with 40 per cent of private providers deemed 'poor'.

The de-nationalisation of the UK's railways led to the proliferation of a large number of private training providers that, in some cases, were largely unregulated. There was significant competition in the market, with providers undercutting prices, pushing quality providers out of the market and lowering standards of delivery.

Whilst the UK has a national inspection service, 'OFSTED', responsible for the inspection of schools, academies, early years and further education providers, this does not extend to private providers that only provide `fee for service' training delivery and do not source government funding to subsidise training.

NSAR's assurance model has ensured that only providers that meet and maintain agreed standards are able to register as an Assured Provider. Assured Provider status is recognised by the UK rail industry as a quality standard for rail training delivery.

NSAR's 'Skills Backbone' quality assurance system manages training-provider records, as well as individual trainers and assessors who are also registered through the system with records of individual continuous professional development and teaching/assessment observations.

There is now less than five per cent of rail training provision that is deemed poor.

Importantly, high-quality providers have now moved into the market with pricing stability resulting in viable delivery. The supply of trainers and assessors has also increased as individuals have more confidence to move from industry into a robust, quality-assured skills sector.

Rail training facilities and delivery models

Recommended action: Work with governments to research and provide recommendations for a sustainable hub and spoke rail training network including centres of excellence and local provision, supporting jurisdictional and national rail skills needs

Hub and spoke rail training network

The small number of rail training facilities across Australia limits access and availability for rail skills acquisition, dependent on location and employment status. Whilst a small number of specialist facilities do exist, some are owned by industry employers and are only accessible to their own workforces.

Rail skills development needs are broad and specialist facilities are not always required, or are required only for some components of the training. For example, for more generic training, many TAFEs and RTOs would have suitable facilities. In other cases, a range of delivery and assessment methodologies could be applied. One example is train drivers, where simulators have been used for many years for much of the training delivery, with a live environment only required for the applied assessment component.

Where access to rollingstock, track and specialised systems is required, access and costs associated with the delivery of some training can be prohibitive, particularly for private RTOs. Domain and product differences across jurisdictions also mean investment in specific equipment may not be justified due to its limited application.

There are many examples of specialist facilities and centres of excellence established both in Australia and overseas that are frequently linked to major project delivery or future pipelines of work. There is often a significant level of capital investment, but there are many examples of under-utilisation or longer-term viability issues once immediate needs are met. Such centres may also be geographically inaccessible for many potential users.

The rail industry should work with governments and the education sector to research and provide recommendations to establish a sustainable hub-and-spoke rail training network, including centres of excellence and local provision, that can support jurisdictional and national rail skills needs. The NRSH could lead such a project, bringing together key stakeholders and undertaking much of the research.

A national holistic approach would be required, forecasting future skills demands and potential geographic hot spots across the country, and mapping these demands to locations for physical training facilities. It would also need to reflect 'travel-to-learn' considerations, particularly for new entrants or those seeking future employment in the rail industry, to ensure availability of more localised provision.

In some cases, suitable training centres may already exist, but it is likely the research will identify a need for increased numbers of facilities, training resources and providers. In this regard, consideration will need to be given to how to attract new rail training providers and what industry and governments can do to assist.

Such a network could also be supplemented by 'pop-up' training hubs that are co-located with major projects to meet immediate local needs, but only exist for as long as required. These hubs can provide new-entrant pathways, with the delivery of common competences for construction and rail, which could be a source of new talent into the industry.

Many of these types of hubs have already been established on different projects, but a more coordinated approach that falls under the umbrella of the NRSH network of providers, would provide support to employers and enable access to existing accredited providers and trainers if required.

Where major investments in specialist facilities are being contemplated, they need to be underpinned with strategies for their long-term utilisation with a clear understanding of learner numbers and additional commercial activities that can be undertaken to ensure their ongoing financial viability.

One model may be to establish a 'Centre of Excellence' in several of the larger jurisdictions. These Centres of Excellence 'Hubs' could then link to a number of 'Spokes" that provide more generic, localised rail training programs that offer access for new entrants and lower skill - level programs. Other options could be specialist Centres of Excellence that would service a specific market across several jurisdictions. This may also provide opportunities for 'platform-based' skillset delivery, where training could be provided to other industries with common needs. For example, diesel engines are common to rail and other industries, such as defence, which could be targeted and provide another market segment for specialist.

Training delivery models

The availability of physical training facilities is only one aspect of training delivery. The rail workforce is scattered across a wide range of environments and sub-sectors, from construction sites to operational rail, or manufacturing facilities, all of which demand different training solutions.

The nature of employment can also be a limiting factor for skills development. For example, project-based rail infrastructure delivery, where programs may run over short periods of time, means the opportunity for workers to complete apprenticeships with one employer are scarce. This demands different employment and skills development models, including host employment and more work-based training and assessment.

The growth in digitalisation and new technologies has benefited the education system, providing increased opportunities for blended learning and the use of augmented and virtual reality. These further expand training options and, through their relative portability, provide alternatives to traditional 'institute-based' delivery.

More research needs to be undertaken to assess skills demand and supply-side solutions that reflect different employment models, working environments and availability of training facilities and resources. These could include GTO employment and training models, pre-employment programs and blended learning approaches. This type of research could be led by the NRSH, working in partnership with industry and the education sector.

Skills and Innovation Centre

Recommended action: Establish a Skills and Innovation Centre, undertaking research, publishing reports and guidance material, and providing advisory services that offer information and best practice to industry and governments

Given the range of activities that are proposed within the NRSH model and potential investment into tools such as the Skills Intelligence Model and Competency Management System, the NRSH would be well-positioned to take a leading role in rail skills research and innovation. This could include publishing research and guidance materials, testing new skills delivery models and providing advisory services to industry and governments. These income generating activities would support the long-term commercial viability of the NRSH or future entities.

Comparative Model

The NSAR provides a range of research and advisory services to industry and governments in the UK and overseas. They have expertise in the following areas:

- development of apprenticeship standards and training course curriculum and plans

- skills forecasting and strategic workforce planning

- design of training facilities and the quality of training provision and has been approved to deliver the External Quality Assurance Organisation for Apprenticeships in the rail sector and for the digital industries

They also have an established Knowledge Centre[29] and publish reports, guidance materials and presentations which are internationally recognised for providing best practice in the profession. These are largely focussed on skills, workforce diversity and related matters, any of which have been commissioned by government or industry. Most of their documents re are publicly available on the website.

Strategic workforce planning

Skills demand in the rail industry is at unprecedented levels. Infrastructure investment, combined with the impact of new technologies driving change across the industry, is impacting both skills capacity and capability.

Fast-tracking construction across different infrastructure sectors, including civil, health and education, whilst simultaneously stimulating domestic construction, has a multiplier effect, where sectors have shared skills needs. At the same time, other sectors that share skill requirements, such as the resources sector, are also experiencing strong demand.

Skills supply across rail occupations does not meet current or anticipated future demand. Enrolments in engineering degrees are falling, and there are inadequate numbers participating in trade qualifications to meet cross-sector demand. The impact of the global pandemic and Australia's ongoing closed-border policy are exacerbating the existing rail skills crisis. The net impact of this crisis will be felt in cost, productivity, quality and safety.

Despite these complexities, there is no system available to accurately forecast rail skills supply and demand. This lack of data is impeding planning and affecting the industry's ability to ensure adequate supply to meet current and future needs. The pandemic has highlighted that a more holistic approach is needed to anticipate and meet future skills needs. This requires collaboration across the government, industry and education sectors.

Skills Intelligence Model

Recommended action: Develop a Skills Intelligence Model (SIM) to undertake demand / supply side modelling

The sector requires tools to undertake robust rail skills demand and supply-side modelling to better understand current and future skills shortages and enable targeted investment and strategies in order to close the gap and reduce industry costs.

Such a tool would inform skills demand for infrastructure delivery and operations and provide for informed risk analysis. It would allow governments to make decisions relating to infrastructure investment that consider skills demand and availability within a wider context than individual jurisdictions or the rail industry. It would also allow the industry to undertake strategic workforce planning, and the education sector to plan and deliver education and training responses that reflect actual demand.

The ANZIP pipeline, established by Infrastructure Partnerships Australia, which enjoys financial backing from both the Australian and NZ governments, provides an overview of infrastructure investment. However, it does not model this against skills demand or the current market supply.

A Skills Intelligence Model (SIM) would facilitate the development and maintenance of an Australian Rail Industry Pipeline of rail projects that mapped skills required across construction, manufacturing, operations and maintenance. It would also map these skills against current and future skills availability through workforce data provided by the industry.

Key steps to develop the tool and achieve workforce planning outcomes would include:

- Establishment of a skills data baseline for the sector through anonymised workforce data from the industry
- Development of a SIM tool
- Agreement on forecast assumptions
- Access to rail investment plans

- Reporting of skills shortages
- Development of a capability for varying levels of granularity, from national- to project-level
- Agreement on key performance indicators to close the gap between demand and supply
- Monitoring of progress towards meeting forecasted needs and attainment of KPIs

The SIM also provides commercial opportunities through the following activities:

- Research and advisory services to governments and projects to inform infrastructure pipeline planning, cost benefit analysis for business cases, risk analysis, project and workforce planning
- Research and advisory services to industry to support project planning and strategic workforce development
- Research and advisory services to education, employment and careers agencies and providers to inform service planning and delivery

Comparative model

NSAR's Skills Intelligence Model (SIM) is a detailed and innovative skills forecasting tool which provides a comprehensive picture of what skills are needed now and in the future by analysing investment plans and applying a series of algorithms to develop a required future workforce number. This metadata can be 'diced and sliced' in any number of ways using different variables and factors for industry, government and education purposes.

SIM is a UK Department for Transport assured statistical tool that effectively reports at an industry and company level. It is concise, yet easy, to interpret and understand.

The information collected provides a 'gap' between the future workforce required and what is currently in place in today's workforce. This allows the industry to plan ahead of time and avoid these gaps by attracting new workers, scheduling apprenticeships and workforce upskilling.

The SIM has been used to inform a number of recent strategic rail skills reports, including the Strategic Transport Apprenticeship Taskforce's Skills Forecasting Baseline Study and City and Guilds 'Back on Track' report (see case study). NSAR has also been engaged by other industries to undertake skills modelling; for example, the offshore wind industry[30]

NSAR's SIM tool could also be made available to support similar activities for the Australian rail industry.

CASE STUDY: UTILISING SKILLS FORECASTING TO PREDICT AND PLAN FOR FUTURE DEMAND

Back On Track report – City and Guild & NSAR, 2020

Utilising data from 250,000 rail workers in its database and UK infrastructure investment plans, the SIM has been used to inform a number of recent studies and reports, including the 2020 'Back on Track' report.

The new research by City & Guilds and NSAR paints a stark picture for the future of the rail workforce, with skills shortages set to escalate significantly in the sector over the next five years in the Back on Track report.

With major rail infrastructure projects due to be announced as part of the long-anticipated National Infrastructure Strategy, the report, which includes findings from research undertaken by YouGov and data from NSAR on 242,000 workers in the rail industry, reveals that there is potential for these to create a new lease of life for the UK economy through new jobs and economic growth.

Key findings include:

- Up to 120,000 additional people will be required over the next 5-10 years, with demand for skills peaking around 2025
- 7,000-10,000 additional people will be required each year until 2025
- The largest skills gaps will be at Level 3 and Level 5

- 4,000 vacancies remain unfilled
- Over 28 per cent of workers in the current rail workforce are over the age of 50 years
- Only 16 per cent of the rail workforce is female and nearly one in four women (24 per cent) would consider a career in rail
- For every £1 spent on rail training, there is a £3 return on investment
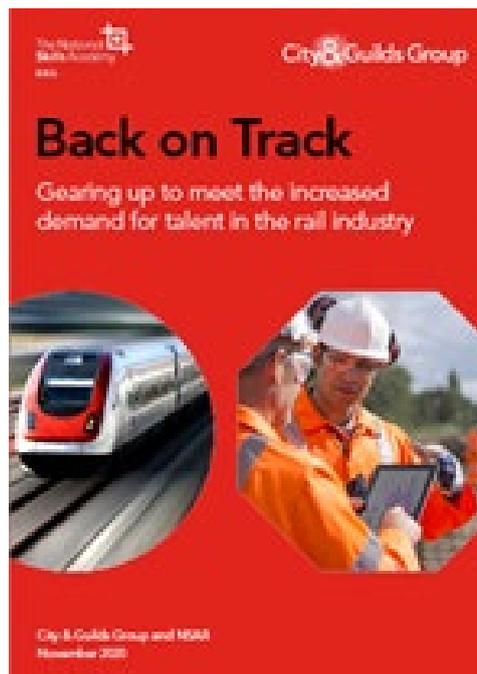
Rail Skills Competency Management System

Recommended action: Continue to support a centralised rail skills competency management system as part of the Rail Industry Worker program.

The establishment of a national (CMS) would provide a number of benefits for the industry and government. This would provide a secure, online record of individual's competencies, qualifications and training plans to support strategic workforce planning, succession planning and individual career mapping and development.

A standardised scheme would allow employers to manage and evidence the technical competency of their workforce to perform specific activities. The employer and individual workers would be able to access secure records of individuals' competencies, qualifications and training plans. It would also provide assurance to potential employers about individual capabilities and enable greater transferability for rail workers across the industry and different jurisdictions

Typically, such a system would have the following capabilities:

- Mobile access – Access records on any device, providing instant access and enabling individuals to evidence currency and competencies to meet compliance requirements
- Tailored dashboards – To view an organisation on an individual, team and department level, supporting strategic and ongoing workforce planning and development
- Alerts and notifications – Alerts employees and employers to stay on track of training
- Customisable – Add customisable levels and descriptions for different competencies. Develop bespoke training plans together with notifications for individuals

- Observation tool – Allow organisations to build bespoke, paperless assessments that can be saved and amended with compatibility on work on smart devices.
- Career planner – Provide a GAP analysis tool where an individual can see a step-by-step guide to the training courses requires to progress their career

The system would be a powerful tool that could extend the existing Rail Industry Worker program, providing a database of individual competencies across the industry, supporting legislative compliancy, workforce upskilling and planning.

For governments and the education sector, anonymised data would provide vital information regarding current capacity and capability across multiple rail industry disciplines, informing infrastructure planning and development and delivery of training responses.

"TfL Engineering has rolled out a skills and competency capture programme across our 1,400 engineers. We are using the SkillsID as our platform of choice owing to the simplicity and intuitive user interface and the number of facilities that are available to us to help deliver our capability management vision. We have started our capability and talent management journey and are planning an exciting future as we improve our understanding of and use of the data within SkillsID to support individual engineers, profession teams and business development."

- John Batchelor, Principal for Engineering Capability –
Transport for London (TfL)

National competency schemes are well established in the UK across the wider National Skills Academy Network. The Energy and Utility Skills Group has an established Competence Management System . Developed with leading waste management, recycling and water organisations across the UK, and with the Environmental Services Association, the Competence Management System[34] demonstrates technical competence in order to manage and comply with environmental permits.

Comparative model

In the UK, NSAR uses SkillsID[31], their competency management scheme with 250,000 individual records, in tandem with the SIM to forecast future skills requirements. They have undertaken studies, such as the Strategic Transport Apprenticeship Taskforce: Skills Forecasting-Baseline Study [32], which informed the National Transport Infrastructure Skills Strategy (TISS)[33] and supported the creation of 11,500 new apprenticeships to date.

As a standalone system, SkillsID is established and recognised across the industry within the public and private sector:

Government infrastructure procurement

Recommended action: Work with governments to increase workforce capacity and capability through procurement mechanisms

Governments across Australia are increasingly leveraging their rail investments to deliver broader outcomes. These include contractual obligations for their suppliers to deliver socio-economic or industry outcomes, alongside the delivery of goods, works or services.

Whilst often driven by policy or legislative frameworks, the interpretation and application of these requirements varies considerably across jurisdictions and projects. Inadequate research and planning, together with inconsistent delivery approaches and relatively little expertise in the area, can lead to poor outcomes on many projects. Often standardised requirements are 'cut-and-paste' across multiple contracts that do not reflect the project scope, industry needs or local demography. However, where it is well applied, this mechanism can have significant impact in the delivery of jobs, workforce diversity and skills uplift for the industry.

The NRSH Stakeholder Reference Group, using data gathered through the SIM and CMS, would be well positioned to work with governments to better leverage their rail investments, providing rail skills intelligence and advice that would procure and deliver specific rail skills capability. These would include:

- Industry skills profiles and forecasts to inform tailored industry requirements
- ·Delivery methodology and advice
- Access to approved rail training providers
- Access to industry professionals to support the development of new competencies, training and qualifications, reflecting new technologies and systems

CASE STUDY: DELIVERING REGIONAL JOBS AND INDUSTRY CAPABILITY THROUGH INFRASTRUCTURE PROCUREMENT

Regional Rail Project

Regional Rail is a $1.26 billion NSW Government project replacing the aging regional and intercity rail fleet. The project will also provide a new train maintenance facility located in Dubbo, in Central-West Orana. The facility will be critical to commissioning and maintaining the new fleet of 29 bi-mode trains. The project is also providing local jobs, skills development and business opportunities, contributing to economic development in regional New South Wales.

Socio-economic and industry profiling tools were used to profile different locations in regional NSW as part of the multi-criteria analysis leading to selection of Dubbo for the train maintenance facility. Dubbo was selected because it has:

- A much higher Indigenous population compared to any other regional centre in NSW
- Regional trade skills shortages
- Availability of local supply chains
- Pipeline of future projects to provide ongoing employment opportunities
- Indigenous unemployment five times higher than overall unemployment in the area
- Youth unemployment almost three times higher than overall unemployment in the area

The Jobs, Skills and Industry Participation (JSIP) Strategy articulates the priority objectives for the project and how they will be achieved through a collaborative delivery model:

JSIP objectives and priorities

Regional jobs - Valuing diversity

Provide sustainable regional jobs

Increase Aboriginal participation

Provide opportunities for young people

Developing our skills base

Help resolve regional skills shortages

Enhance regional workforce retention and career prospects

Transferable skills and qualifications

Opportunities for regional NSW businesses

Increase opportunities for regional NSW business, ANZ SMEs and Recognised Aboriginal Businesses to access the Regional Rail supply chain

Help boost and improve regional and broader NSW business capability and capacity

The project tailored NSW government procurement directives to support specific outcomes, including workforce diversity and industry skills-shortage areas in rail and civil infrastructure. Importantly, there is also a link across the delivery, final train assembly and maintenance phases to support workforce transferability into long-term maintenance roles, or into other regional projects.

Final assembly of the Spanish-built trains will take place in Dubbo, as will maintenance, which will require specific training interventions for the local workforce. This has included the development of a new accredited Train Maintainer qualification which will be available nationally in October 2021. The development of the qualification, through the Rail Industry Reference Committee, has received cross-sector and cross-jurisdictional support and provides a number of entry pathways for individual disciplines within the rail maintenance workforce. It also provides standardised competencies for rail maintenance roles, aiding transferability across the industry.

Infrastructure pipeline planning

Recommended action: Utilise the strategic cross-jurisdictional forums to promote intergovernmental approaches to major project planning and sequencing of works

Concurrent delivery of infrastructure projects across Australia is a major contributor to rail skills shortages. Where skills requirements share similar characteristics and occupations, for example, across civil and social infrastructure delivery and, to a degree, commercial and domestic construction, these skills shortages are exacerbated.

The utilisation of forecasting data based on current workforce statistics and investment plans would provide an evidence base to anticipate such shortages and inform governments to better plan and sequence works. Strategies should include a greater emphasis on 'growing our own' skills over time. In the immediate and medium-term, there needs to be greater collaboration across governments as the major purchasers of infrastructure to better pace infrastructure delivery to match skills supply .

The industry should utilise the relevant cross jurisdictional forums such as the planned NRSH Strategic Advisory Board to promote intergovernmental approaches to major project planning and sequencing of works, based on intelligence provided through the SIM and CMS.

CASE STUDY: PUBLIC PROCUREMENT CAPABILITY ANALYSIS

UK Government

In the UK, tunnelling workforce capacity risks were identified with the potential concurrent delivery of several major projects including Crossrail, Thames Tideway and Hinckley Point Nuclear project, all requiring a significant tunnelling workforce, which was already subject to skills shortages.

Crossrail undertook an extensive skills and labour forecasting which examined the range of skills and timelines for the 33 major projects within its program. It also reviewed the workforce requirements for other major projects, and the likely supply side, for both workforce and skills development capability within the VET sector.

The conclusions of this study contributed to a government White Paper, 'Strengthening UK Supply Chains: Public Procurement – Tunnelling: A Capability Analysis' . The paper stated:

"The way in which the public sector conducts its procurements and engages with the supply base can have a significant impact on economic growth and firms' investment decisions. Impacts can occur in a number of different ways. For example, procurement decisions and processes can positively or negatively influence the degree of competition in a sector, which in turn has important implications for value for money. Our ambition is to go a step further and, using this information, to work with industry to evaluate the strengths and weaknesses of UK-based supply chains and understand how well equipped they are in their own right to compete for these future contracts. We want to understand the skills, technologies, materials and other capabilities that are needed to meet our projected future demand.

In practice, this may mean that the public sector changes what it procures or when it procures. For example, standardising aspects of procurement to realise cost

savings, procuring products which our suppliers find easier to export, or smoothing demand to avoid cycles of 'feast or famine'.

It could mean aligning other areas of government policy with procurement strategy, for example, updating our skills policy to ensure our workforce is properly equipped to meet future demand."

As a result of the White Paper, the UK Government took the decision to smooth demand by delaying some of its projects, responding to industry capacity, including the availability of skills. This approach provided the following benefits:

- Internal UK competition for skills was reduced and workforces were able to transition to future projects, providing sustainable employment.

- Specific employment and skills interventions were established to support current and forecasted skills requirements, including Crossrail's Apprenticeship program, and the Tunnelling and Underground Construction Academy

- Costs and productivity were managed through adequate availability of skilled workers

Projects that were sequenced for later delivery, such as Thames Tideway, have noted the benefit of a more experienced workforce improving productivity, quality and safety outcomes. Government has benefited through cost savings and individuals have had sustained employment through sequencing of major projects.

Attracting, recruiting and retaining our workforce

The rail industry is experiencing critical skills shortages. It has an aging workforce, with many employees reaching retirement age at the same time as demand is increasing. Digitalisation and other new technologies are also driving demand for new jobs or expanded skills in the rail industry. Skill levels are increasing, and a different composition of skills will see a greater emphasis on problem solving, critical thinking, intellectual autonomy and self-management.

This means the industry will need to attract a new and different workforce, competing with other industries seeking similar talent. Improved promotion of careers available in rail, and of the industry itself, will be key to achieving this goal. This also provides the industry with an unprecedented opportunity to attract a workforce that better reflects the composition of Australian society.

Being an industry/employer of choice

Recommended action: Establish and promote rail as an industry of choice

To be an industry of choice, individuals need to see the value proposition of working in rail. The rail industry has an opportunity to showcase exciting projects and diverse role models to highlight the appeal of a career in rail.

A national, coordinated marketing approach to promoting rail as an employer of choice is essential to bring new people into the industry. A targeted approach would identify other industries that have employees with transferable skills, working in areas such as defence, construction and manufacturing.

"We engage with the local community a lot. Our workers go to LGBTQI+ marches, we work with local refugee organisations to offer them work experience. Our company has an inclusion council, which is sponsored by our executive leadership team. We have employee representatives from LGBTIQ+, Indigenous, First Nations, women, people with disability etc in the council. The council is proactive in telling the business how to recruit".

National Rail Careers Framework

Recommended action: Develop a National Rail Careers Framework (NRCF), building on existing national skills matrixes

One of the key challenges for individuals seeking information about rail career opportunities is access to information regarding occupations, associated skills and competency requirements, and training options. There is no centralised source of information and what exists is hard to navigate. Developing a more holistic approach through a National Rail Careers Framework (NRCF) would support both new entrants and career changers who will be able to assess their skills and competences against those required in defined occupations. It would also assist existing personnel who wish to develop their careers.

Key components of the framework should include:

- Rail sector information
- Career pathways and entry points
- Standardised skills maps across rail occupations
- Training programs and providers

The Framework and Skills Maps could link directly to skills clusters, families and roles determined through the Australian Skills Classification.

Mapping and defining rail occupations and associated training and progression pathways

Rail occupations are defined differently across jurisdictions and by different employers. Creating common job roles with identified progression pathways will provide a better understanding of career opportunities for those considering entering the sector and aid transferability across employers and jurisdictions. It will also enable greater standardisation of training programs for new entrants and workforce development.

Skills maps should provide information on core functions for each role and the associated technical and generic skills and competencies for each role. NSAR's Routes into Rail[35] careers site and the Singapore Skills Framework for Public Transport provide multiple skills maps across rail occupations.

This approach may also result in the identification of new competency requirements, for example, as a response to new technologies, requiring new units of competencies, skills sets or qualifications. Given the level of technological change and increasing skill levels required in the industry, it may also identify the need for new, higher-level qualifications and pathways, including higher-level apprenticeships and diplomas.

Nationally recognised qualifications for the rail sector are currently developed through the Rail Industry Reference Committee and delivered through the TLI – Transport and Logistics Training Package. A Skills Service Organisation, incorporating transport with wider industries, will be established in the near future to take over these functions. The NRCF would utilise TLI qualifications and be supplemented with domain-based elective units to meet local requirements.

The framework would build on existing national skills matrices that are currently being developed by industry through the ARA.

CASE STUDY: NATIONAL RAIL CAREERS FRAMEWORK

Skills Framework, Singapore

The Skills Framework (SFw) is a SkillsFuture initiative developed for the Singapore workforce to promote skills mastery and lifelong learning. It is an integral component of the Land Transport Industry Transformation Map. The SFw for Public Transport contains information on trends, career pathways, occupations, job roles, skills and competencies and training programs.

Jointly developed by SkillsFuture Singapore (SSG), Workforce Singapore (WSG), and the Land Transport Authority (LTA), together with the public transport operators (PTOs), education and training providers and the National Transport Workers' Union (NTWU), the Skills Framework for Public Transport provides useful information on:

• Sector information
• Career pathways
• Occupations and job roles
• Existing and emerging skills
• Training programs for skills upgrading and mastery

The SFw is aimed at:

• Individuals who wish to join or progress within the public transport sector, to assess their career interest, identify relevant training programs to upgrade their skills and prepare for the desired job roles
• Employers who recognise these skills and invest in training their employees for career development and skills upgrading
• Training providers who wish to identify sector trends and design programs to address industry needs accordingly

Sector information on the SFw for Public Transport includes information on trends and workforce profiles in the sector.

Career pathways show the possible options for vertical and lateral progression for advancement and growth. Four tracks, Rail Engineering, Rail Operations, Bus Operations, and Bus Fleet Engineering have been identified, which encompass 87 job roles.

Skills maps cover a total of 87 job roles, critical work functions, key tasks and skills and competencies aligned to the four tracks. Skills and competencies identified for each of the job roles fall under the broad classifications of Technical Skills and Competencies, and Critical Core Skills.

Training programs provide information on skills acquisition programs available to new entrants and in-service personnel to acquire skills and competencies required for various job roles in the public transport sector

New entrant pathways

Recommended action: Establish vocational and academic entry pathways for new entrants to industry and those transferring from other industries at entry, semi-skilled and skilled worker levels

The industry lacks clear entry pathways for new entrants to the industry and those transferring from other industries at entry, semi-skilled and skilled-worker levels.

There are currently no rail-specific entry pathways through vocational or higher education for those wishing to join the industry. The lack of any clear route into the sector may deter those who might consider this as a career option. It also means that those who do enter the industry, for example graduate engineers, may bring technical knowledge but a lack of any application in a rail context. This means a longer period before new employees become effective, particularly given the regulatory framework and performance requirements across different jurisdictions.

For those considering transferring to the rail sector from other industries, it can be challenging to assess potential entry points. Many rail employers use in-house competency standards rather than assess their workforce through nationally recognised qualifications. This makes it harder for those outside the industry to gauge whether their skill levels are comparable for a specific role. There are also no 'rail familiarisation' programs available through vocational or higher education to enable individuals to build their rail knowledge either prior to or upon entry to the industry.

Strategies that would support better access for new entrants to the industry include:

- A centralised training directory for VET and HE programs
- Provision of entry-level rail pre-employment and pre-apprenticeship VET programs
- More significant rail components in existing undergraduate and advanced-level programs
- The availability of rail-specific undergraduate and advanced-level programs
- Access to rail familiarisation programs such as the ARA's 'Understanding Rail' course
- The availability of micro-credentials, for example, signalling, mechatronics and infrastructure

Rail careers and jobs portal

Recommended action: Promote rail careers and job vacancies through a centralised careers and jobs portal and associated communication channels

A centralised rail careers and jobs portal would provide dedicated information on careers options and pathways into the rail industry and support candidates' job search efforts through a centralised source. This will create a unified industry 'image' through a showcasing of diverse rail professionals and what it's like to have a job in rail.

The industry can look to other sectors in Australia for examples of 'one-stop-shop' careers portals. 'My Health Career' [36], 'Careers with STEM'[37] and 'Defence Jobs'[38] are dedicated career websites for other industries. They detail pathways into those industries, with tailored information to different cohorts, and showcase real-life examples of people working in the industry.

CASE STUDY: BEST PRACTICE IN RAIL CAREERS AND JOBS PORTAL

Routes into Rail: National Skills Academy for Rail, UK

Routes into Rail was launched in the UK in November 2020. It showcases role-models working in the sector to help change perceptions of what a career in rail looks like. It also has a jobs portal with more than 1,000 vacancies from across the sector, alongside the latest news and opportunities. Routes into Rail is jointly funded by the UK's Railway Industry Association, community organisations, Department for Business, Energy and Industrial Strategy and rail asset management agencies.

The site will support the UK's 'Rail Sector Deal' plan to promote the rail sector as a great place to work, attracting talented individuals to ensure a capable and adaptable workforce in order to achieve a workforce that is more representative of society. The web portal contributes the rail industry's objective of increasing diversity, including the percentage of women and people from minority backgrounds within rail, particularly in engineering and technical roles.

Inspiring future talent

Recommended action: Facilitate and promote rail future talent programs, including school partnerships, try-a-trade, STEM, work placement and teacher/lecturer professional development programs

Early engagement with young people and influencers such as parents, teachers and careers advisors is imperative to building a better understanding of the wide-ranging career opportunities in rail. There are many types of engagement that could be undertaken by the industry working with education sector and in other settings.

Current engagement is largely uncoordinated. More consistency would help 'sell' the opportunities that rail can offer. Much of this collateral could also be available online, widening engagement beyond direct interventions.

Schools engagement programs

Large projects often engage with local schools, particularly where there are likely to be construction impacts. These initiatives could be extended to deliver a more formalised program of education that links directly into the curriculum. NRSH could lead this work, with industry, teachers and trainers to devise and deliver content targeted at different age groups and educational programs. This co-design process would ensure content that is both engaging and in line with current practice to develop a future-focused workforce.

There is potential for rail-related learnings to be integrated into schools' STEM curriculum. The benefits would include increasing children's awareness of rail as a potential career path, and de-mystifying and normalising rail as another STEM 'discipline' in the eyes of children, educators and parents.

NRSH's network of RTOs, TAFEs and industry leading companies could also showcase the range of educational pathways into rail, through vocational or higher education. The same networks could be leveraged to provide students with opportunities to 'try a trade' and experience different areas within rail.

NRSH industry partners can provide diverse role models who could deliver 'rail careers events', focusing on the day-to-day work within their professions and exciting projects within their organisations. The 'virtual-hub' model of NRSH will improve access of training and career information to people in regional, remote and rural areas.

CASE STUDY: SCHOOLS ENGAGEMENT PROGRAM

Crossrail, UK

The 'Young Crossrail' STEM schools engagement program in the UK engaged directly with 20 schools along its alignment over an 11-year period. 'Digger the Mole' visited many primary schools and local events, providing safety and industry messages. Crossrail employees were encouraged to become part of the national STEMNET programs, and visited local high schools, delivering pre-prepared programs overlaid with the context of the Crossrail project. Twenty work experience placements were offered annually for Year 10-11 students, and a graduate scheme established, focussed on skills within major infrastructure settings. A Young Crossrail website offered information on careers, with positive role modelling and a range of teaching materials accessible nationally. Between 2013 and 2016 this program engaged with 44,000 young people, teachers and parents across 350 schools, colleges and universities reflecting a strong engagement culture.

Rail Industry Careers Officers

Whilst individual rail companies and projects often have a proactive approach to engagement with schools and universities, this is highly dependent on levels of commitment and available resources. Schools' careers teachers often lack knowledge regarding careers in rail. A more strategic approach could include the establishment of a network of Rail Industry Careers Officers attached to the NRSH and its providers or through the National Careers Institute (NCI). The purpose of these roles would be to promote and provide information about rail careers and coordinate access to programs and events.

"We need to start engaging with young people at Year 9-10 when they're making those decisions, like picking electives and deciding career pathways. We need to be in schools on careers days with a great campaign, we can offer them work experience programs related to study. Partner with universities."

Key strategies for inspiring future talent would include:

- Agree with industry and the education sector a comprehensive set of promotional and education materials for each target demographic/group, for direct and online delivery
- Recruit Rail Industry Careers Officers attached to NRSH or through NCI
- Establish a comprehensive network of cross-industry ambassadors and role models
- Develop, coordinate and provide traineeships, work experience and career talks, offering online components
- Develop rail skills networks providing entry pathways and centres of excellence

CASE STUDY: INDUSTRY-SCHOOL PARTNERSHIPS

STEM Industry School Partnerships (SISP), NSW Government, Department of Education[39]

The STEM Industry School Partnerships program is an initiative of the NSW Department of Education's Educational Standards Directorate.

The Directorate collaborates with leading Australian companies, universities, government agencies and industry to provide an educational model that engages students, inspires them to study STEM and prepares them for STEM-enabled careers. The program aims to improve teacher confidence and the capacity to deliver integrated and cross-curricula STEM education programs in rural, remote, and regional NSW.

Increasing diversity and inclusion

Recommended action: Develop and coordinate a rail equality, diversity and inclusion (ED&I) strategy and programs

The community now requires that workplaces embrace diversity and is placing greater scrutiny on organisations to ensure they do so. Organisations need to demonstrate they take gender and other equality issues seriously at all levels, responding swiftly to concerns regarding discrimination and harassment. This is not just important from a social licence perspective but also because it generates other benefits, such as greater diversity of thinking amongst employees.

To embrace diversity and inclusion, organisations will need to understand and be sensitive to candidates' and workers' cultural backgrounds, disability, sexual orientation, age and gender. Employee value propositions will need to reflect companies' commitment to inclusive workplace cultures. There is a need for an industry-wide Diversity and Inclusion strategy, especially where women and other minority groups are underrepresented in non-traditional trades. Leaders need to be actively involved in diversity and inclusion initiatives, including monitoring targets and reviewing practices.

Key strategies to increase workforce diversity and inclusion would include:

- Develop an industry-wide equality, diversity and inclusion strategy that has success metrics and monitors outcomes, including:
  - Review current workforce diversity profile
  - Establish industry targets for selected groups
  - Work with selected advisors to develop ED & I services and programs for industry including ED& I measurements and scorecards, unconscious bias and cultural awareness training, mentoring programs
- Establish an engagement program with senior industry leaders to encourage embedding diversity in organisations through recruitment, procurement and the creation of supportive environments
- Increase flexible employment models and more inclusive working conditions
- Adopt inclusive marketing material promoting rail careers to underrepresented groups
- Implement unconscious bias training

CASE STUDY: SYSTEMATIC REVIEWS OF COMPANY PROMOTIONS

KPMG Australia

KPMG undertook a systematic review of its promotion process after identifying a gap in women in senior roles. The company identified a need for monitoring mechanisms and KPIs to hold executives to account.

After sessions to engage its Australian executive team and Board, KPMG launched a five-year Diversity and Inclusion Strategy, setting granular targets and laying out a disciplined process. KPMG's CEO was closely involved as the program sponsor

and, if gender balance was not being achieved, personally intervened to challenge the partners to 'go back and try again'. A 12-month development and assessment program, Path to Partner, was established, and stress-tested for gender equality at all stages.

As a result, more than 35 per cent female representation in promotions to partner were achieved.

Retaining our workforce

Recommended action: Implement a national mentoring program for rail employees in occupational shortage area and for underrepresented groups

To retain its workforce, rail needs to create opportunities for current workers to be upskilled and progress their careers. This includes training and mentoring opportunities as well as active promotion of diversity in leadership to retain diverse workers.

The current competition for skills means workers can get 'poached' by other industries that might offer better learning and career progression. Targeted skills development interventions, enabling workers to upskill and further develop in their careers will help mitigate this risk. Equipped with more portable skills, people in the industry could move between rail organisations more easily. This would improve the capacity of Australia's rail workforce and generate less dependency on importing talent.

A national mentoring program supporting identified occupational, or diversity groupings would support retention of the most 'at-risk' employees and skills areas.

Workplace culture changes will also be key to retaining our workforce. This includes systematic reviews of recruitment and promotion practices, as well as methods to prevent and respond to workplace sexual harassment and discrimination, which often pushes workers with multiple minority identities out of the workforce.

Key strategies for retaining the workforce would include:

- Review current promotion practices to improve representation of women and other underrepresented groups in senior leadership roles
- Develop micro-credentials that support the upskilling of existing workers to improve career development in rail.

- Implement a national mentoring program in rail for job areas experiencing shortages and for underrepresented groups to support workforce growth and to retain and develop skills
- Establish a Rail Skills Competency Management System to improve worker portability of skills and reduce duplication.

"We offer our employees the opportunity to rotate across our business so they can learn new skills. We also have mentoring opportunities, where more senior engineers mentor younger engineers. If we're offering workers career progression opportunities, and a chance to learn new things, they'll be less likely to leave."

Skilling our workforce

The current arrangements for training, skills development and assessment across Australia can be quite different by jurisdiction, presenting challenges to ensuring comparable standards of knowledge and competencies, and equitable access to high quality programs and training resources. Greater standardisation and improved collaboration across industry, governments and the education sector must be established to optimise workforce skills development and deliver more consistent outcomes.

The *ARA Skills Capability Study* discussed the contributions key stakeholders can offer:

- "The rail industry, who own, build, operate and maintain rail systems, infrastructure and equipment, and have access to authentic learning environments, can find innovative solutions to workforce gaps if given the right incentives to do so;
- Jurisdictional and national governments, who regulate the rail industry, set standards, enact policies and, through funding and procurement of new rail assets, can reset the ground rules for "value for money" to include innovative criteria for building rail workforce sustainability; and
- The education system, including registered training organisations (RTOs), the VET system and universities, are collectively responsible for training and developing the next generation of rail skills.

Operators are best placed to deliver hands-on training, given access to rail equipment and track, but are pressed financially to deliver training on top of their operational requirements. The VET sector has quality and rigour in their training programs but suffers from a lack of access to critical training environments and current industry knowledge and skills. Both public and private registered training organisations are challenged by a lack of scale. Governments, meanwhile, do have the scale, policy, funding and procurement power to incentivise change."

A key action from the National Rail Action Plan is to audit existing training programs and facilities, as well as government policies and levers and other factors that will determine whether critical rail skills needs are met.

At the moment, 78 per cent of enrolments for rail training are made through private training providers. Enterprise training provides account for 17 per cent of enrolments, which TAFEs attract just five per cent. Most rail-related qualifications have very low enrolment numbers (less than 1000 from 2014-2019) and trainers are scarce. Opportunities exist for greater collaboration between industry and education to co-design and deliver high-quality workforce development programs.

Rail Skills Program Portfolio

Recommended action: Develop a NRSH Rail Skills Program Portfolio (RSPP), including entry programs, micro-credentials and short courses aligned to progression pathways

The establishment of a National Rail Careers Framework with Skills Maps supporting common job roles will enable the development of a portfolio of standardised industry-approved training programs. The NRSH RSPP would support access for new entrants and workforce development for existing workers, aligned to defined progression pathways. These would be developed collaboratively by industry and the education sector and be available to NRSH-accredited rail training providers. The portfolio would include entry programs, micro-credentials, short courses and full qualification options, providing a 'skill-build' approach to provide for the range of different needs. These would include:

- pre-employment and pre-apprenticeship training for new entrants
- rail familiarisation and upskilling for those transferring from other industries at a range of entry points
- skills development for the existing workforce

The development of the program portfolio could be led by the new Industry Cluster, representing rail, with input from governments and education, facilitated by the NRSH.

The RSPP could also be driven through government-led skills development programs, such as the Sydney Metro Workforce Development program, Victoria's Training for the Future program and the Inland Rail Skills Academy, providing both consistency and scale across jurisdictions.

CASE STUDY: GOVERNMENT-LED RAIL JOBS AND SKILLS PROGRAMS

Victorian Government

Training for the Future is the Victorian Government's skills and industry capability development initiative for rail and infrastructure. It offers people from marginalised backgrounds, including refugees and asylum seekers, the skills and qualifications they need to gain employment in the Victorian rail industry. It prepares Australians to deliver an unprecedented amount of work on the Melbourne rail network over the next 10 years and beyond.

This program will result in a new generation of rail talent for Victoria. It will provide opportunities to re-skill people with relevant experience from industries in decline, as well as training people from disadvantaged communities.

The key elements of *Training for the Future* include:

- industry capability
- skills development
- diversity and social inclusion opportunities

Its programs include:

Gen44 & Gen8

Programs to build the next generation of diverse and inclusive talent ready for careers in rail and transport.

GROW program

Seeks to introduce people from marginalised or disadvantaged backgrounds, including asylum seekers, refugees and Aboriginal and Torres Strait Islander people, to training and employment opportunities in the transport and construction industries.

TRANSIT program

An initiative to showcase employment opportunities in transport to workers from declining industries, including former automotive workers.

This initiative is led by the Level Crossing Removal Project (LXRP), with input from:

- Metro Trains Melbourne
- Public Transport Victoria
- V/Line
- Transport for Victoria
- Rail Projects Victoria
- VicTrack
- Yarra Trams

Vocational education new entrant pathways

The vocational education sector does not currently offer rail entry pathways for those wishing to access jobs in the industry. Unlike other industries, such as construction, most specific rail entry-level training can only be accessed once in the workforce. Whilst training for generic skills used in the industry, such as electrical trades, can be accessed, there is no application within a rail environment.

The complexity of requirements across different jurisdictions also challenges the VET sector to deliver programs that will meet different needs. The development of a national approach to rail skills and competency will provide flow-on opportunities through standardised skills maps and training programs.

New entrant programs including a range of pre-employment and pre-apprentice training options must be established for people wishing to work in the rail industry. This would provide entry pathways into the industry that currently don't exist in the VET system.

The TLI Rail Training Package has existing, and new skills sets under development that would provide an accredited framework for the development of standardised new-entrant training programs.

- TLISS00128 Rail Infrastructure Induction Skill Set – for individuals who are new to the rail infrastructure environment.

- TLISS00224 Rail Operations Fundamentals Skill Set – for entry-level individuals who are new to rail operations environment (under development)

- TLISS00225 Rail Operations Skill Set – for individuals who are shunters and seek a pathway to the yard coordinator job role in the rail operations environment (under development)

CASE STUDY: PRE-EMPLOYMENT TRAINING

Sydney Metro

Sydney Metro developed a pre-employment training program in collaboration with industry partners to help local and long-term unemployed people find jobs on major transport infrastructure projects. The program provides tailored technical training and employability skills, instilling confidence and increasing communication and team-working skills. Training is aligned to specific job roles and existing vacancies with Sydney Metro contractors. Key partners are Jobactive Providers (sources program participants) and Registered Training Organisations (deliver the training). To date, six programs have achieved a 96 per cent completion rate. Of those who have completed the program, 77 per cent have gained employment.

Standardised training resources and materials

Recommended action: Develop and maintain standardised training materials and resources to support NRSH Rail Skills Program Portfolio, available to accredited RTOs

Currently there is no consistency in the quality of training courses delivered in rail across Australia. One reason for this is trainers and lecturers do not use any standardised industry-developed teaching materials.

Standardised rail training resources and materials have been identified as a key activity for the NRSH and will underpin the NRSH Rail Skills Program Portfolio. These materials could be made available only to the National Network of Rail RTOs and partner universities and schools supporting providers to deliver training to a standard sought by industry and reducing duplication of effort.

Higher education pathways

Recommended action: Establish a higher education working group

The lack of any rail-specific new-entrant pathway through higher education is a major contributor to the current level of critical skills shortages in the industry. The sector is also fishing in a small pool, with competition from other industries in broader disciplines such as civil engineering. The lack of rail content in these broader programs mean graduates lack knowledge about opportunities in the sector or, if they do pursue a rail career, are ill prepared when they enter the industry.

Australia is lagging behind other countries globally and must develop strategies to 'grow our own' to secure future supply chains.

The higher education sector must be encouraged and supported to create university-level programs that reflect the current and future demand of the rail industry. The rail industry can support its succession planning through increased engagement with universities and graduate programs.

A higher education working group must be established to research and support the development of:

- Rail specific undergraduate and advanced-level programs
- Rail content in existing undergraduate and advanced-level programs, for example, civil and mechanical engineering
- Extension/establishment of rail graduate programs
- Micro-credentials, for example, signalling, mechatronics, infrastructure
- Continuous professional development opportunities
- Establishment of VET/HE pathways
- Dual professionals who have both rail technical knowledge and educational expertise to deliver HE-level programs

This group would also be well positioned to promote and facilitate industry/university collaboration and partnerships that support knowledge transfer and innovation for the sector. This would improve our ability to contribute to future rail developments across the globe.

CASE STUDY – GRADUATE PROGRAMS

Victorian Government

Victoria's Big Build Graduate Program provides tailored rotations over two years across high-profile projects, including the Level Crossing Removal project. Balit Barring provides Aboriginal pathways to the graduate program.

Each year, it offers approximately 100 graduate roles across a wide range of disciplines. The program includes:

- rotations in a range of business contexts

- a structured learning and development program involving a range of professional and personal development workshops, site visits, project work, mentoring and experiential learning opportunities

- career planning to prepare for the next step in careers

4. Summary of findings and recommendations

Leadership, collaboration and partnership

Work together to deliver an Australian rail training system that provides consistent, accessible, high-quality provision across our jurisdictions

Action	Responsibility
Establish the National Rail Skills Hub (NRSH) to lead a coordinated approach between governments, industry and education that promotes rail careers and builds workforce capacity and capacity through accessible entry pathways and high quality skills providers and programs	NTC *Creation of the NRSH approved by ITMM in May 2021*
Facilitate collaborative partnerships across government, industry and education to deliver key rail skills objectives	ARA/NTC
Develop a National Rail Skills Implementation Plan (NRSIP) to deliver NRAP skills and labour objectives, building workforce capacity to meet current and future demand	NRSH
Establish and maintain accredited National Network of Rail RTOs measured and assured through agreed industry criteria and meeting ASQA (or Victoria and WA equivalent) standards and conditions • Provide accreditation and quality assurance systems and services • Develop and maintain online directory of providers and courses	Government, education and industry
Work with governments to research and provide recommendations for a sustainable hub and spoke rail training network including centres of excellence and local provision, supporting jurisdictional and national rail skills needs	Government, education and industry
Establish a Skills and Innovation Centre, undertaking research, publishing reports and guidance material, and providing advisory services that offer information and best practice to industry and governments	Government, education and industry

Strategic workforce planning

Understand and plan for future workforce needs, ensuring skills supply meets industry demand

Action	Responsibility
Develop a Skills Intelligence Model (SIM) to undertake demand / supply side modelling that supports: o Strategic workforce planning o Gap analysis o Infrastructure investment planning o Skills development strategies	ARA *Currently in development*
Continue to support a centralised rail skills competency management system as part of the Rail Industry Worker program.	ARA
Work with governments to increase workforce capacity and capability through procurement mechanisms	Government and industry
Utilise NTC Stakeholder Reference Group to promote intergovernmental approaches to major project planning and sequencing of works	NTC/NRSH

Attracting, recruiting and retaining our workforce

Attract and retain a diverse workforce, as leading employers and an industry of choice

Action	Responsibility
Establish and promote rail as an industry of choice	ARA, government and industry *Work in Rail project currently in development*
• Develop a **National Rail Careers Framework** (NRCF), building on existing national skills matrixes • Map and define rail occupations and associated training and progression pathways	Industry Cluster and governments
Establish vocational and academic entry pathways for new entrants to industry and those transferring from other industries at entry, semi -skilled and skilled worker levels	Industry Cluster and governments and industry
• Promote rail careers and job vacancies through a centralised **Careers and Jobs Portal** and associated social media and communication channels	ARA *Work in Rail project currently in development*
Facilitate and promote rail future talent programs, including school partnerships, try-a-trade, STEM, work placement and teacher/lecturer professional development programs	ARA, government, industry
Develop and coordinate a rail equality, diversity and inclusion (ED&I) strategy and programs	ARA, government, industry ARA Women in Rail Advisory Committee has a strategy in place to support gender diversity. ARA Sustainability Strategy includes defined diversity and inclusion objectives as part of its three-year plan
Implement a national mentoring program for rail employees in occupational shortage area and for underrepresented groups	ARA *Women in Rail mentoring program underway*

Skilling our workforce

Build and future-proof industry capability and support individual career progression through transferable skills development

Action	Responsibility
Develop NRSH Rail Skills Program Portfolio, including entry programs, micro-credentials and short courses aligned to progression pathways providing: • pre-employment and pre-apprenticeship training for new entrants • rail familiarisation and upskilling for those transferring from other industries • skills development for the existing workforce	Industry Clusters, governments and education
Develop and maintain standardised training materials and resources to support NRSH Rail Skills Program Portfolio, available to accredited RTOs	Industry clusters and education
Establish a higher education working group to research and support development of: • VET/HE pathways • Micro-credentials, e.g., signalling, mechatronics, infrastructure • Rail content in existing HE programs, e.g., civil and mechanical engineering • Rail-specific degree-level programs • Continuous professional development • Dual professional development • Rail graduate programs • Dual professionals	Education, industry

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35   Routes into Rail, https://routesintorail.org

36   My Health Career, www.myhealthcareer.com.au

37   Careers with STEM » STEM Careers Guides for Students, www.careerswithstem.com.au

38   Defence Jobs Australia – Find jobs in the ADF, www.defencejobs.gov.au

39   NSW Department of Education (2021), STEM Industry Schools Partnerships,
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