The Future of Transportation Work: A Summary Report

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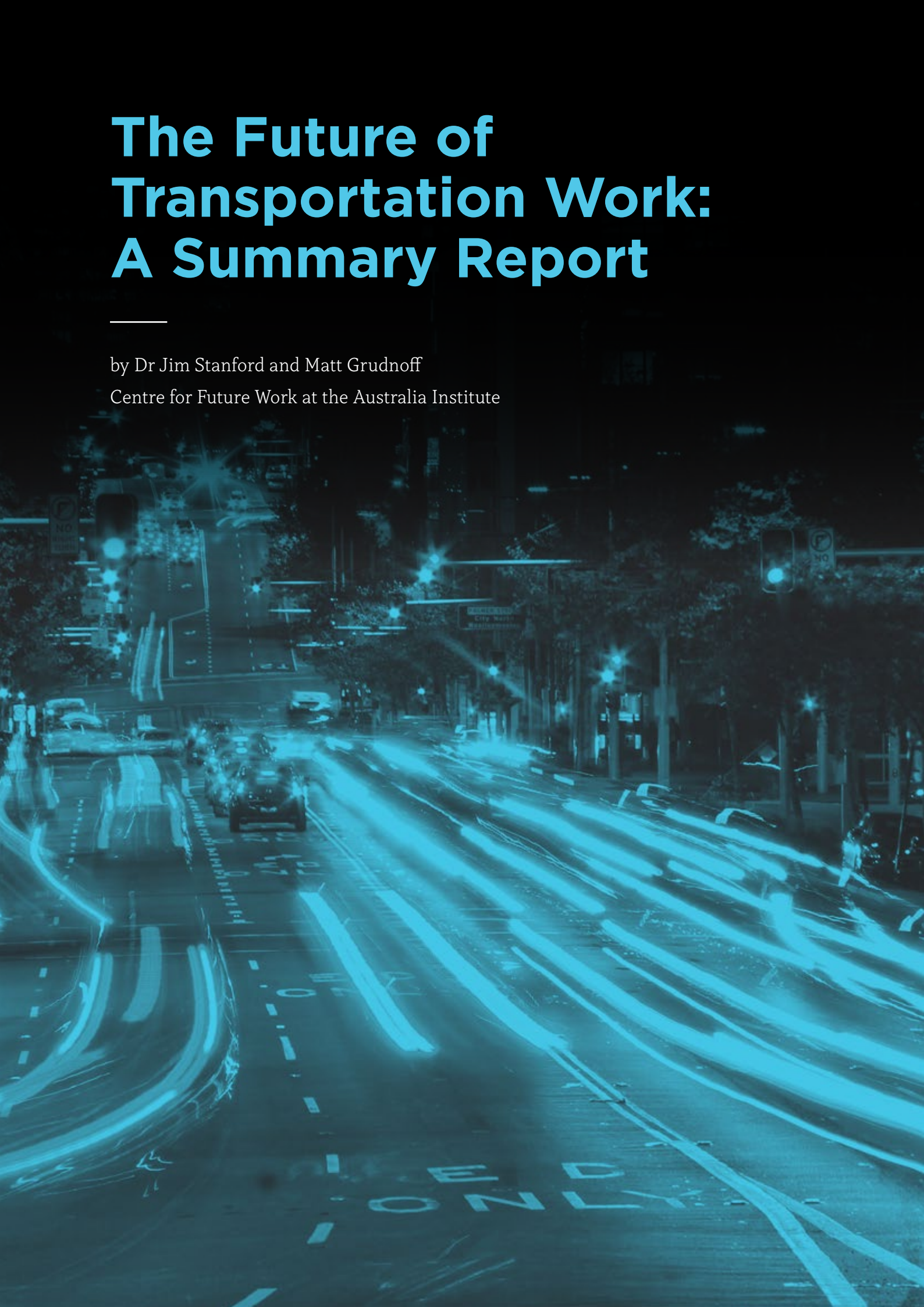

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Introduction

Transportation is a crucial part of the Australian economy, generating significant benefits that are shared across all sectors and regions. Transportation is also an important employer: occupying 625,000 Australians and generating above-average earnings. However, work in this sector is poised for dramatic change in the years ahead – partly because of technology, but also because of other factors (such as rapid evolution in the organisation of work and the nature of employment relationships). It is the responsibility of all stakeholders in transportation to prepare for that change – to manage it, minimise its costs, and maximise its benefits.

Recognising both the inevitability of change in the industry, but also the importance of preparing for it (rather than simply reacting to it), TWUSUPER recently engaged the Centre for Future Work at the Australia Institute to prepare a composite research report on the implications of technological and workplace changes for the future of work in transportation. This summary highlights the key themes and findings of that larger work. For more details and references, please consult the full report, The Future of Transportation Work: Technology, Work Organisation, and the Quality of Jobs, available from TWUSUPER.

EMPLOYS

625,000

AUSTRALIANS

MORE THAN

40%

WORK IN ROAD TRANSPORTATION

The Economic Importance of Transportation

Australia is a vast land, rich in resources, with a relatively small population concentrated disproportionately in a few cities and regions. It is not surprising, then, that transportation plays a vital role in Australia's economic and social development. Today transportation services, broadly defined, contribute over $80 billion per year to national GDP (or around 5 percent of total national value-added), constitute a major and essential input to other industries and sectors, purchase another $80 billion worth of inputs and supplies from other sectors, and constitute Australia's ninth-largest employer. Table 1 summarises the overall economic importance of transportation to Australia's economy.

However, this direct footprint does not constitute the full extent of the economic importance of transportation. We must also consider the indirect impacts of transportation for other sectors of the economy. Two broad categories of inter-sectoral linkages must be considered:

1. "Upstream" Linkages: The transportation industry purchases many goods and services from other sectors, as inputs to its own activity. In aggregate, transportation providers buy over $80 billion of Australian-made goods, materials, machinery, and services from other sectors every year: equipment and vehicles, fuel, construction, research and professional inputs, and a myriad of services. In sum, transportation supports more than one dollar of Australian-made goods or services produced in other sectors, for every dollar worth of value-added production undertaken by the sector itself. These purchases provide an important source of demand that spreads throughout the broader economy – to all sectors, and all states.
2. "Downstream" Linkages: The importance of transportation services to other parts of the economy also extends "downstream," to the myriad of other industries which use transportation as an input to their own production. Without reliable, quality transportation those other industries would suffer considerable losses of production, value-added, efficiency, and reputation. The provision of high-quality, reliable transportation services is thus essential to ensuring continued productivity, profitability, and employment in all parts of the economy.

A final aspect of the economic importance of transportation is the flow-through effect of personal spending by transportation workers (whose incomes equal over $45 billion per year), and reinvestment by transportation firms in new equipment and facilities. This re-expenditure of incomes from transportation work provides an important source of purchasing power in the national economy.

Table 1. The Economic Footprint of the Transportation Sector (2016 or most recent year)

Indicator	Value
GDP (value-added)	$80 billion
Total sales	$175 billion
Employment	625,000
Wages and salaries paid	$45 billion+
Average earnings	$75,000/yr.
Exports	$7.3 billion
Taxes paid	$25 billion+

Source: Authors' calculations from ABS Catalogues 5206.0, 5368.0, 6291.0.55.003, 6306.0, 6202.0.

PURCHASES

$80B

IN GOODS AND SERVICES

Transportation Work Today

In total, 625,000 Australians work in transportation; Figure 1 provides a breakdown of this total into its various sub-sectors. Of these, road transportation is the largest single source of transportation work, accounting for close to 270,000 positions, or over 40 percent of all transportation work. Employment in other direct transport modes is smaller: 100,000 jobs in total across the rail, air, and marine modes. Ancillary and support service functions are increasingly important in total transportation work, reflecting the outsourcing of various functions to independent service providers (and the corresponding fragmentation of the overall supply chain). For example, postal and courier services now account for close to 100,000 jobs, with another 80,000 jobs in transportation support services, and close to 60,000 in warehousing.

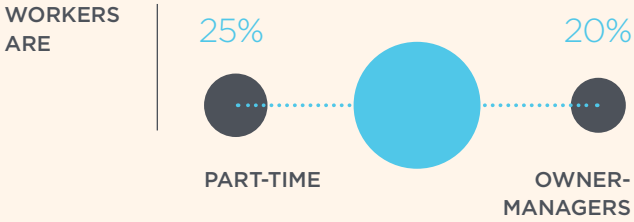
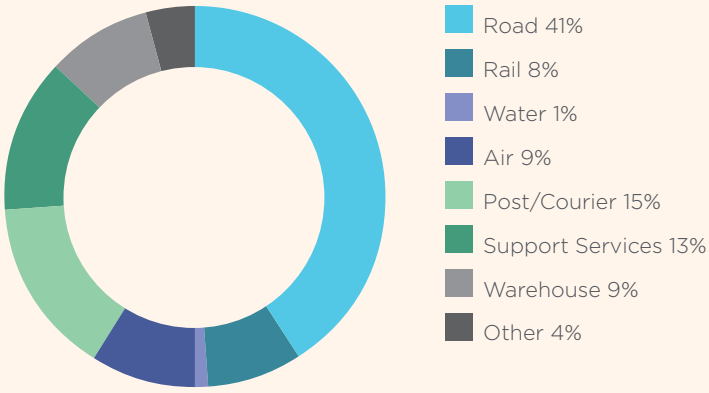
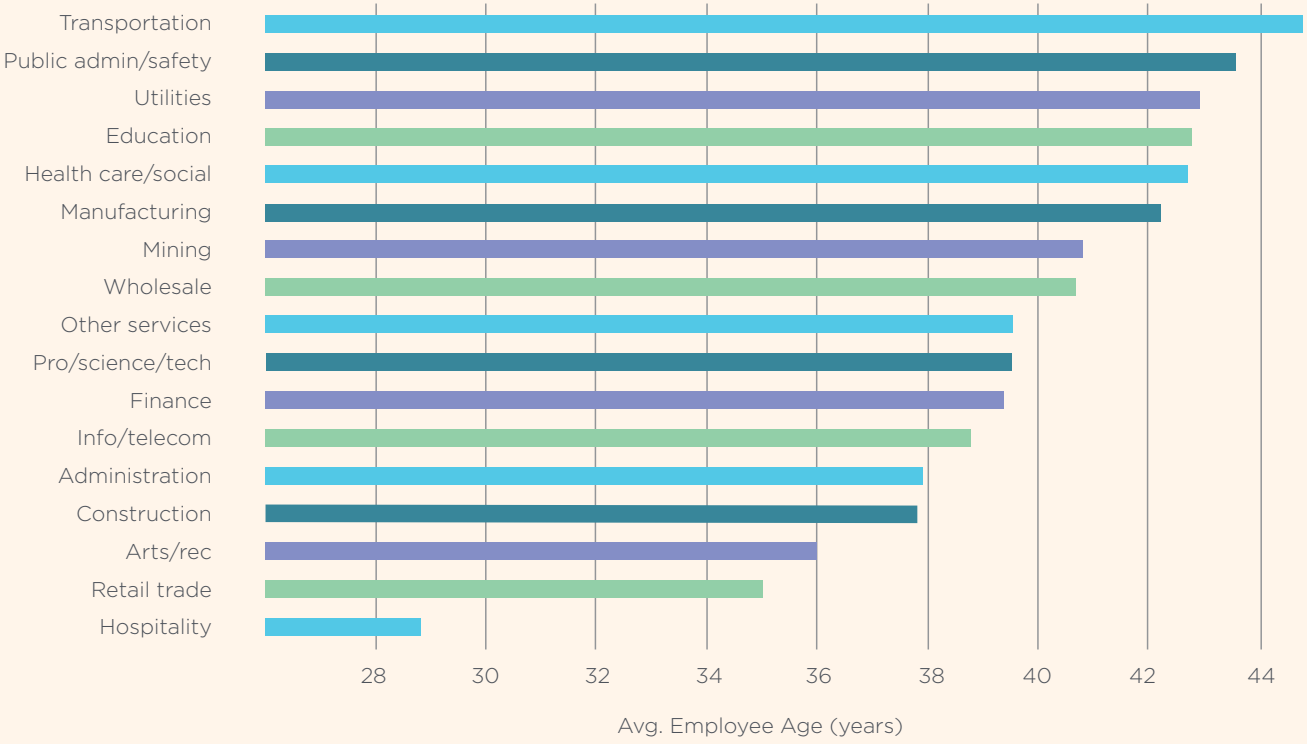


Figure 1. Transportation Employment by Sub-Sector, % of Total, 2016



Source: Authors' calculations from ABS Catalogue 6291.0.55.003, Table 6.

Figure 2. Average Age, Employees by Sector, May 2016



Source: ABS Catalogue 6306.0.

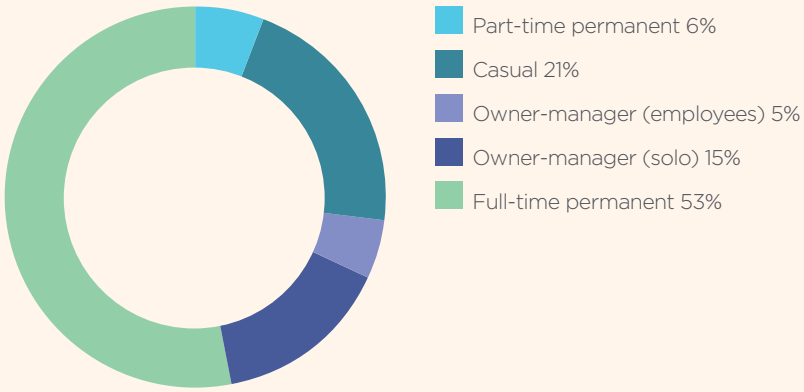
The largest single occupational group in transportation, accounting for 45 percent of all employment, is drivers and operators. Interestingly, this occupation is considered to be especially vulnerable to coming technological change, given the advent of semi-automated and automated driving and navigation systems—but there is no sign yet of any slowdown in employment levels. Clerical and sales workers account for over one-quarter of transportation jobs, while managerial and professional staff make up 17 percent. Two additional blue-collar occupational categories – labourers, and technical and trades workers – make up the remaining 10 percent of workers. Drivers, operators, and managers have experienced faster employment growth than the sector as a whole in recent years; in contrast clerical and sales jobs grew relatively slowly, while technical and trades employment declined.

One unique feature of the transportation workforce is its relatively advanced age. In fact, as illustrated in Figure 2, the average age of transportation workers is higher than any other major industry: almost 45 years old. One in four transportation workers is now over 55 years of age, a proportion that has more than doubled since the turn of the century. This poses both a challenge and an opportunity for the sector as it prepares for significant change in the decades ahead.

Other features of the transportation workforce include the high preponderance of male workers (who fill over three-quarters of all transportation jobs), and a relatively low level of formal training and qualification. Transportation work is a demanding, high-skill occupation. But the traditional method for acquiring those skills has been through on-the-job training, rather than through formal qualifications and higher education. Across all transportation jobs, half of workers have no post-school certification at all, about 30 percent possess a Certificate III or higher credential from a vocational education provider, and 15 percent possess a university degree (less than half the share as the overall economy).

The evolution of work organisation in transportation services will also be a major driver of change in transportation work. The share of transportation workers employed in ancillary and support service functions has grown steadily (and now accounts for almost one-quarter of all transportation jobs), as providers outsource many functions previously performed internally. At the same time (and for related reasons), the proportion of transportation workers in non-standard or contingent employment positions has also grown markedly.

Figure 3. Transportation Employment by Job Type, 2016



Source: Authors' calculations from ABS Catalogue 6291.0.55.003.

In fact, barely half of transportation workers now are employed in a traditional "standard" employment relationship: in permanent, full-time paid work with standard entitlements like holiday and sick leave (see Figure 3). Close to one-quarter work part-time (most of them in casual, irregular positions), and 20 percent are owner-managers. Among owner-managers, the vast majority are solo self-employed contractors with no employees of their own. Many of these workers perform functions similar to those of standard paid employees, but typically with lower and more variable compensation, without the same protections and entitlements (including superannuation contributions).

In summary, transportation is an important employer, and will remain one. The overall demand for transportation services has grown, relative to other parts of the economy. And even in traditional occupations (including drivers and operators), employment growth has been relatively strong. The industry's unique demographic characteristics – with a relatively older, overwhelmingly male, and less formally educated workforce – constitute both a challenge and an opportunity as the sector prepares for the changes ahead. In addition to the ageing of its workforce, the transportation sector has experienced challenges in job quality and stability, mostly associated with the expansion of non-standard employment (including part-time, casual, self-employed, and contractor positions). Despite these challenges, compensation in the industry remains modestly higher than economy-wide averages.

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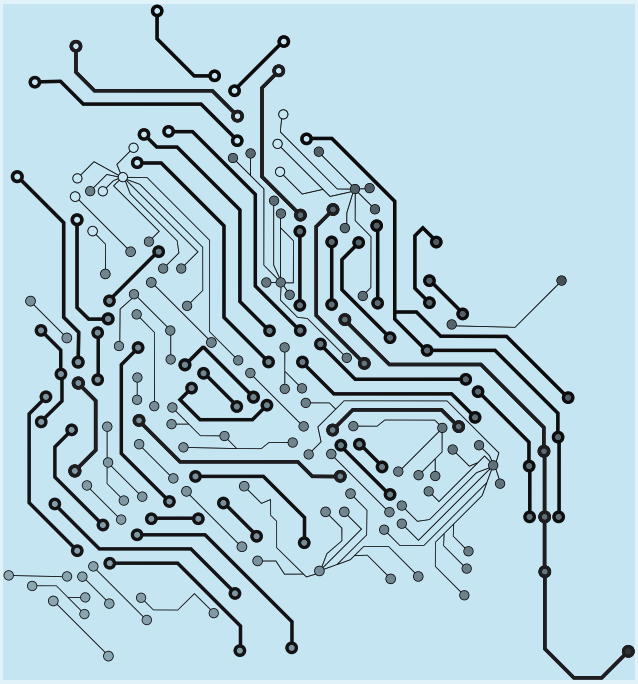
Twin Drivers of Change

Australia's transportation industry continues to grow and develop, and it will become even more important to the national economy in the decades ahead. But the sector faces enormous uncertainties and challenges that will exert a powerful but unpredictable influence on transportation services, and transportation jobs, in the future.

Of course, one crucial driving force of change is the accelerating pace of innovation in the technology of transportation: including propulsion systems, driving and navigation, logistics, and information and data management technologies. But it is not just technology that will determine the future of transportation work. Other pressures are also acting on the sector, such as environmental challenges, fiscal and governance issues, globalisation, and demographic ageing. One particularly important driver of change in transportation work is the changing nature of employment relationships. New forms of engagement and compensation (including various self-employment and contractor arrangements), and the vertical disintegration of supply chain relationships (with more work occurring in independent ancillary firms rather than being integrated within a single enterprise), are affecting transportation jobs at least as much as new technology.

Transportation stakeholders must consider both of these key drivers of change, as they position themselves to make the most of future opportunities, while minimising the negative effects of disruption.

One particularly important driver of change in transportation work is the changing nature of employment relationships.



Disruptor #1: Technology

Most analysts agree transportation will be one of the sectors most dramatically affected by coming waves of innovation and automation. The startling prospect of driverless vehicles traversing the nation's roadways has captured much public attention (and elicited much concern); but there are many other less visible, but equally important, ways in which new technology will affect transportation jobs.

This section will review new directions in technological innovation, and catalogue some of the important ways that new technology will affect the production and delivery of transportation service.

Predictions that machines will "destroy" large numbers of jobs, and impoverish the people who used to perform them, have been made for hundreds of years – dating back to the industrial revolution. It is a historical fact that past waves of innovation did not produce mass unemployment as a lasting outcome. To be sure, unemployment is a chronic concern, but it is not consistently correlated with technology. To the contrary, in some instances new technology, by sparking stronger business investment, led to stronger job-creation and lower unemployment. So we must be skeptical about pessimistic predictions that technology will displace large numbers of workers and cause widespread unemployment.

But there are also clear ways in which the current wave of technological change is indeed "different" from those that preceded it, and hence its labour market impacts may be more damaging. Current innovations in computing and automation are capable of undertaking whole new sets of tasks that in the past were not amenable to machine-aided production. Traditionally, functions being automated had to be routine and precisely described by programming code. These could be manual tasks (involving the movement of objects) or cognitive (involving the manipulation of data), but in either case automation was only possible for routine and replicable functions.

The current wave of automation, in contrast, allows the automation of non-routine tasks -- including those that require judgment, flexibility, and decision-making capacity, in the face of non-controllable or unpredictable environments and stimuli. These new applications include machine learning (ML), data mining, machine vision, computational statistics, artificial intelligence (AI), and mobile robotics. In every case, computers rely on large databases of past experience to make best judgments in the face of unpredictable circumstances. This allows them to undertake non-routine functions, again covering both manual and cognitive tasks.

Since machine learning and other new computing strategies allow for a wider range of tasks to be computerised, economists are now considering the impacts on employment. One approach, pioneered by economists Carl Bendict Frey and Michael Osborne, involves detailed audits of various occupations to simulate their amenability to computerisation. They analysed the specific task content of different jobs, and then judged the extent to which they could be automated on the new abilities of computers to perform non-routine functions. They came to the startling conclusion that almost half of all jobs in the U.S. economy were "highly vulnerable" to automation within a few years, on the basis of technology that already exists. Moreover, transportation was seen as one of the most-affected industries; Table 2 reports the Frey and Osborne estimates of the vulnerability of several key transportation occupations to computerisation.

Table 2. Probability of Computerisation, Transportation Occupations

Occupation	Probability	Occupation	Probability
Commercial pilots	55%	Transportation attendants	75%
Transit & railroad police	57%	Heavy truck drivers	79%
Transportation & distribution managers	59%	Railroad brake / signal / switch operators	83%
Motorboat operators	62%	Railroad conductors	83%
Bus drivers	67%	Industrial truck drivers	93%
Postal mail carriers	68%	Locomotive engineers	96%
Light truck & delivery drivers	69%	Driver sales workers	98%
Aircraft mechanics	71%	Shipping & receiving clerks	98%
Bus & truck mechanics	73%	Cargo & freight agents	99%

Source: Adapted from Frey and Osborne (2016).

Major Applications of New Technology in Transportation (Box 1)

- Position, localisation, and mapping capacities and functions.
- Monitoring and surveillance technologies to track vehicle and staff locations.
- Assisted driving, sensing, and perception supports; partial automation of driving task (SAE Tiers 0-1).
- Increasing automation of driving task (SAE Tiers 2-5).
- Connected vehicle technology allowing better coordination/communication across fleets.
- Big data analytics, deep learning, use of algorithms (in planning routes, service, and customer contacts).
- Extensive computerisation in data management, including by drivers (eg. paperless document systems).
- Advanced data systems to enhance security and privacy standards in transportation.

These results need to be interpreted very cautiously. Frey and Osborne do not suggest that half of all jobs will disappear: there are many countervailing forces that will tend to create other work, as the process of automation unfolds. But as an indicator of the number of jobs likely to fundamentally change by the new wave of automation, the Frey and Osborne results are insightful, and have sparked significant follow-up research extending and replicating their results.

The potential for driverless technology has been much discussed in the media and policy discussions, and it is certainly true that many driver and operator functions face a high degree of automation. Railroad and heavy truck drivers face the highest vulnerability in this regard, due to the enhanced controllability of the driving environment in those applications. Indeed, the implementation of driverless vehicles in carefully controlled public transit, industrial and trunk road settings is already occurring. Drivers who need to exert greater flexibility and judgment in their work (including smaller truck, delivery truck, marine and airline operators) would seem to face a less extreme, but still significant, vulnerability to automation.

Many other support and ancillary functions are also fertile ground for the application of labour-saving and labour-replacing technologies. Indeed, cargo agents, clerks, and sales workers face the highest likelihood of automation of any transportation-related occupations. So it is important not to place undue focus on the potential for automating driving; in fact, stakeholders must be cognisant of the probability of automation across all aspects of transportation work. Box 1 lists some of the various ways in which artificial intelligence and related technologies will affect transportation work.

Many other support and ancillary functions are also fertile ground for the application of labour-saving and labour-replacing technologies.

Constraints and Benefits of New Technology in Transportation (Box 2)	
Constraints	**Benefits**
• Infrastructure. • Proof of safety. • Security. • Social acceptance. • Regional impacts. • Capital investment. • Management adequacy. • Lag times to phase in new equipment. • Insurance.	• Improved safety. • Greater fuel efficiency. • Efficient traffic management. • Reduced greenhouse gas emissions. • General transportation cost reductions. • Enhanced mobility for people with disabilities. • Potential improvements in job quality.

The transition to driverless operating technologies will be incremental in nature, as firms, workers, customers and governments adapt to the potential of these systems, and make the necessary investments (in capital, skills, infrastructure, and regulation) required to implement them. The Society of Automotive Engineers (SAE) has developed a six-tier ranking of automated driving functions and capacities, which recognises the incremental adoption of these technologies. The lowest tiers include driver-assistance features already in widespread use. Steering, speed control, and signaling functions are the easiest tasks to automate – and some applications (in industrial vehicles, intercity truck fleets, and other settings) already incorporate these features. The expansion of automation to situations requiring more judgment, monitoring of an uncontrollable environment, and quick responses to changing stimuli will be more challenging. Moreover, the equipment and infrastructure required in order to organise and implement driverless vehicle systems are complex, expensive, and challenging. The viability of driverless technology will require huge investments in developing compatible roadway, communication, and control systems – investments that will certainly extend well beyond the capacities of any individual firm. In short, many hurdles will need to be overcome before these systems will be able to operate in a real-world context. Box 2 summarises the operational and financial constraints that will limit the pace of automation in driving and other transportation tasks. Box 2 also summarises some of the potential benefits of transportation automation for the sector, and for broader society.

In conclusion, we need a more nuanced and complex understanding of the impact of new technologies on transportation employment. To be sure, computers and other machines are becoming capable of performing a much broader range of tasks – including those involving judgment, flexibility, and responses to uncontrollable environments. And transportation seems particularly ripe for the application of those technologies. At the same time, there are many prerequisites and barriers that must be negotiated before we see the widespread use of many of those technologies in real-life applications. And there will be other sources of continuing or new demand for labour (including in transportation), that will mute or offset at least some of the displacing effects of new technologies when they are deployed. None of this gives reason for complacency: huge changes are coming in both the quantity and the nature of transportation work, and not solely because of technology. Stakeholders need to prepare to make the most of these changes.

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Disruptor #2: Work Organisation and Employment Relationships

Major changes in the organisation of work – including the nature of the relationships between workers and their employers, and relations within and between firms in the overall transportation supply chain – are also restructuring transportation jobs. These changes raise challenges for the quality and stability of work that may be as dramatic as, and are certainly more immediate than, the challenges arising from new waves of technological innovation.

The growth of the so-called "gig economy" poses fundamental challenges to the traditional model of employment, and to traditional methods for regulating work and ensuring minimum standards. It is not clear that existing labour regulations apply to independent workers (and in some cases it is explicitly clear that they do not) – let alone that those rules can be effectively enforced in a free-wheeling, digital economy. In some cases, evading traditional regulations and employment responsibilities is part of the rationale for the growth of independent-contractor-style practices in the first place.

The transportation sector has been an important site for the development of digitally-based "gig" business models. After all, the most famous (or infamous) platform business – the Uber ride-sharing service – is in the transportation business (although Uber's owners deny this, claiming instead that they provide "information services" to drivers who are their customers, not their workers). The growth of other platform-based transportation businesses (including ride share, courier and delivery services, and intercity parcel and freight delivery) has raised concerns the transportation sector could be more broadly disrupted by digital platform intermediation. Still other transportation services could be collateral victims of disruptions to the businesses of existing transportation customers: for example, on-line retailing could undermine demand for existing transportation providers (such as bulk shippers for large retail chains), at the same time as stimulating demand for others (like small courier and delivery services).

Some historical perspective is needed to better understand digital platform businesses, and to distinguish between the technical innovations they utilise and the changes in work organisation their business models introduce. In fact, the major organisational features of digital platform work are not new at all (see Box 3). "Gig" practices such as on-demand work, piece work compensation, requiring workers to supply their own tools and workplaces, and the use of labour intermediaries have been common for hundreds of years. The only key difference is that past incarnations of these practices could not use digital methods for organising, supervising, and compensating the work (since smart phones did not exist). Moreover, it is wrong to view the growth of insecure or "gig" work as solely or mostly resulting from technology. Instead, the growing precarity of jobs, including those associated with digital platforms, clearly reflects the evolution of social relationships and power balances, as much as technology per se.

The growth of other platform-based transportation businesses (including ride share, courier and delivery services, and intercity parcel and freight delivery) has raised concerns the transportation sector could be more broadly disrupted by digital platform intermediation.

What's New About "Gig" Work, Anyway? (Box 3)	
Work Practice	**Historical Antecedent**
On-Call Scheduling	Stable weekly work schedules were unusual prior to mid-20th century; contingent hiring was common (eg. Sydney's "Hungry Mile ").
Piece Work Compensation	Common in many applications in manufacturing, agriculture, resources, services; but not effective in many jobs.
Home Work / Own-Provision of Tools	"Putting out" system; cottage industry; forestry, fishing, resources; transportation; personal services.
Intermediary / Labor Hire Triangulation	Gangmasters, labour hire services have operated for hundreds of years as middleman between producers and end-users.
Method of Coordination	This is indeed new: digital platforms allow easier, less costly coordination of contingent labour and collection of payments.

As noted above, non-standard or precarious forms of employment are already very common in Australia's transportation industry. The shift to non-standard forms of work will likely continue in coming years, absent major changes in business strategy, macroeconomic conditions, and regulatory stance. After all, the development of new platform-based transportation business models is still in its early stages. There are other instances where the application of digital matching systems to transportation services will expand the preponderance of "gig" jobs – such as coordinating delivery of individual freight loads or courier deliveries through digital bid-based systems. These models would introduce a more transparent and unforgiving incarnation of competition, undoubtedly putting downward pressure on service rates, effective wages, and working conditions.

Other changes in the corporate structure of transportation services could arise from new forms of partnership between transporters, shippers, intermediary firms (including digital or data services), and possibly even manufacturers of transportation equipment – who could partner with the developers of new digital apps to "lock in" a market for their specific brand of transportation equipment. Nascent examples of these business models are visible in emerging partnerships between automobile manufacturers, ride-sharing services, and early adopters of driverless vehicle services. New production technologies (such as driverless systems, drone-based delivery, and other automated forms of transportation) will overlap with new business models, to generate a multi-dimensional disruption in existing practices that will challenge existing transportation suppliers – as well as challenging traditional models for supporting incomes and working conditions.

Once again, technology is not the only force driving this continuing shift toward a more fragmented and competitive industrial structure, and a more contingent and unstable organisation of work. Weak labour market conditions facilitate the process, too: by ratifying firms' adoption of contingent staffing strategies, and undermining workers' ability to demand greater stability in their employment relationships. Similarly, the ambivalent stance of regulators to the recognition and enforcement of minimum standards in new business models has also allowed "gig" models to proliferate.

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Possible Scenarios

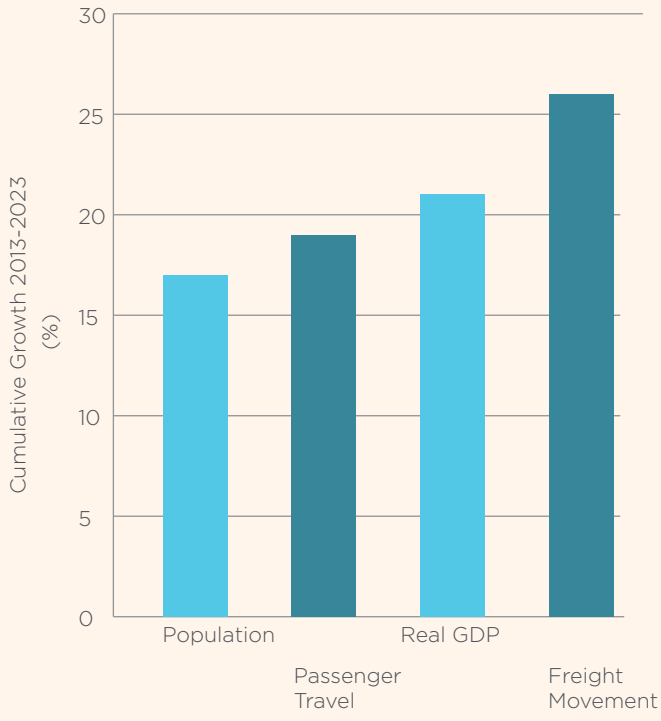
There is no disagreement that technological change will dramatically affect transportation work in coming years, albeit the direction and pace of that change cannot be predicted. However, one aspect of the future of transportation is relatively certain: there is little doubt that Australians' general demand for transportation services will continue to grow, and likely at a faster pace than the economy as a whole.

Consumers tend to demand more transportation services as their income grows – for both business and personal purposes.

They demand a greater range of consumer goods (including those which must be delivered from far away), and they demand greater quantities of personal travel (including tourism). The increasing length and complexity of industrial supply chains (including global supply chains) also fosters demand for transportation as a business input. This stable, ongoing growth in demand for transportation will help to buffer the disruptive impact of technology and work organisation on employment patterns: it is certainly easier to adapt to change in the context of a growing industry, than one that is shrinking.

The National Transport Commission has developed forecasts of overall transportation demand, based on economic inputs, demographic projections, and other fundamental drivers. These forecasts anticipate growth in domestic passenger travel of 19 percent over the coming decade (exceeding population growth), and 26 percent over the same period in domestic freight transportation (exceeding economic growth; see Figure 4). So the overall volume of transportation services production will certainly continue to expand in the years ahead.

Figure 4. Forecast Growth in Transportation Demand, 2013-2023



Source: National Transport Commission forecast.

Scenarios of Change (Box 4)			
Scenario	**Steady implementation**	**Faster implementation of change**	**Deferred change**
Approx. Likelihood	50%	35%	15%
Elements	Widespread, balanced adoption of labour-saving and labour-replacing technologies. Driverless road transport reaches widespread Tier 3 and 4 automation within 15 years. Major investments in infrastructure, capital, and skills required. Significant changes in allocation of specific jobs, but overall employment across transportation not dramatically affected (may continue growing). Impacts of change manageable with appropriate attention and planning.	Large but uneven outbursts of technological change and business disruption within a shorter time period: as quickly as 5 years. Driverless technology sees far-reaching applications of Tier 4 or higher automation within a decade. Impacts on existing transportation workforce more immediate and difficult to manage through attrition and demographics. Technological unemployment likely, requiring active adjustment measures.	Change implemented more slowly than expected, due to technological, regulatory, and social barriers. Slower phase-in and more gradual impacts on transportation workers. Will take 25 years or more for widespread adoption of Tier 3 or 4 driverless systems. Even under this more gradual trajectory, sector still faces significant requirements for training and retraining, workforce adjustment, and regulatory adaptation.

In terms of projecting future changes in transportation employment associated with this robust demand, the task becomes considerably more complicated – given the fundamental uncertainty that exists regarding the pace and direction of technology, and the associated changes in business models and employment relationships. Point estimates of future employment levels are not credible, given the far-reaching and structural changes that are coming. Instead, we have developed a set of three broad composite scenarios. Each reflects a possible combination of technological and organisational changes in the sector; each is then ascribed a broad probability. This "scenario" approach is preferred in management strategy, planning, and other forward-looking applications, where the inherent uncertainty of point estimates provides little confidence for the users of forecasts.

These three broad composite scenarios, and their underlying components, are summarised in Box 4. The scenarios differ in their specific content and timing. But there is no case among them in which thoroughgoing technological change, and equally far-reaching changes in work organisation and employment relationships, can be prevented or avoided. This reinforces the necessity for transportation stakeholders to address change, and prepare for it, instead of waiting to be overtaken by it.

Preparing for Change

Historical experience suggests that epochal shifts in technology and other dimensions of work can be managed without destroying economic value and social values. All stakeholders – including employers, workers and their unions, customers and shippers, governments and regulators, financiers and investors, and training and education institutions – have a role to play in preparing the sector to make the most of the change ahead.

To be sure, this means acknowledging that change is inevitable, but recognising equally that it will be shaped by the choices and actions of industry participants and broader social and governmental forces. Moreover, preparing to manage change will be more successful if it is done jointly by stakeholders through multi-partite processes of analysis, deliberation, and decision-making – rather than being driven solely by the individual actions and preferences of narrow interests within the sector.

We have therefore identified six sets of pro-active measures through which transportation stakeholders could prepare to minimise the costs, and maximise the benefits, of the coming disruptions. These measures are summarised in Box 5.

Planning for Change: Six Pro-active Measures (Box 5)

1

Facilitating Mobility:

There will be significant new work associated with the advent of new transportation technologies. An obvious response is to assist existing workers to fill new positions by providing notice, support, and access to training and adjustment programs. Financial support from employers and governments will be necessary. Training and adjustment programs need to take account of the advanced age of many transportation workers, and tailor offerings to fit needs of older workers with less formal qualifications.

2

Establishing Benchmarks for Skills and Qualifications:

New technology-intensive jobs will require a wide-ranging suite of new skills – including design, programming, operation, data management, and more. Specific requirements and qualifications for those skills must be formalised and regulated. Sector stakeholders should work closely with existing bodies (such as the Australian Industry Standards body, TAFEs, and others) to specify and catalogue requirements for new jobs. Transferable certifications will assist workers and employers to identify and acquire needed skill sets, and develop a ready supply of qualified, flexible workers. Strengthening high-quality apprenticeships is also critical.

3

Facilitating Decent Retirement:

The advanced age of many transportation workers is an advantage in a time of transition. Downsizing or restructuring can be managed in part by facilitating exit by workers not interested or able to undertake retraining and adjustment. Bridging benefits and early retirement incentives, with government support, ease the transition, and avoid involuntary job losses that would otherwise occur. TWUSUPER can play an important independent role in this process.

4

Negotiating Technological Change:

Adaptation is more successful when all parties have a genuine say in how it is implemented and managed. Transportation stakeholders must commit to information sharing, consultation, and negotiation over technological change. Workers and their unions should be notified of plans for new technologies. Discussions should occur regarding timing, scope, and effects of new investments. Opportunities should be provided for early input from workers regarding how change will be managed; collective bargaining should include the terms of technology and its application.

5

Building Consensus:

Sector needs a multi-partite, sector-wide approach to analysing challenges and developing inclusive sector-wide responses. Undertake social dialogue among industry participants to maximise benefits of change, reduce costs – and share both costs and benefits fairly. Multi-partite forums (engaging business, workers and their unions, government, regulators, training institutions, financial institutions, and others) will help build relationships among stakeholders, identify future needs, and imagine and implement initiatives to facilitate necessary investments and adjustments.

6

Protecting Standards and Benefits:

Changes in work organisation and employment relationships are changing transportation jobs and challenging traditional standards of security, entitlements, and compensation. The use of non-standard employment forms (like contractors and labour hire) imposes unsustainable consequences on workers who are denied stable, decent opportunity. Traditional standards and entitlements should apply to all transportation workers, including in non-standard, independent, or "gig" situations. Regulatory benchmarks and corporate accountability should apply across the supply chain.

Conclusions

This report has highlighted the daunting challenges and uncertainties facing transportation work in Australia. Accelerating technological change is one driver of that change. But other factors are also shaping and reshaping the whole sector, and the lives of the people who work in it – including the trend toward non-standard or precarious forms of employment, which has significantly affected the stability and quality of work. Other forces are at play, as well, including environmental, demographic, and fiscal pressures that will also affect the production and sale of transportation services.

However, amidst all this flux and uncertainty, there are also sources of stability and continuity which can impart confidence to stakeholders as they prepare for the coming changes. Transportation is a crucial contributor to Australia's economic performance and quality of life; that importance is experienced broadly through the whole economy, not just within the transportation sector itself, and this gives transportation providers a legitimate platform from which to demand the attention and support of broader government and society. Moreover, the overwhelming evidence is that demand for transportation services in Australia will continue to grow relatively strongly – faster than population growth and the economy as a whole. Hence the structural economic and social importance of transportation is not in question. All that is in question is how the sector is managed, in the face of coming change and disruption.

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This report is brought to you by TWUSUPER. If you are interested in further details of the full report, please contact John Cotter, National Manager Strategic Partnerships, on 0418 547 742.


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