Australia and New Zealand Roads Capability Analysis 2017-2027

6 September 2018

Austroads

Today’s moderator

Eliz Esteban
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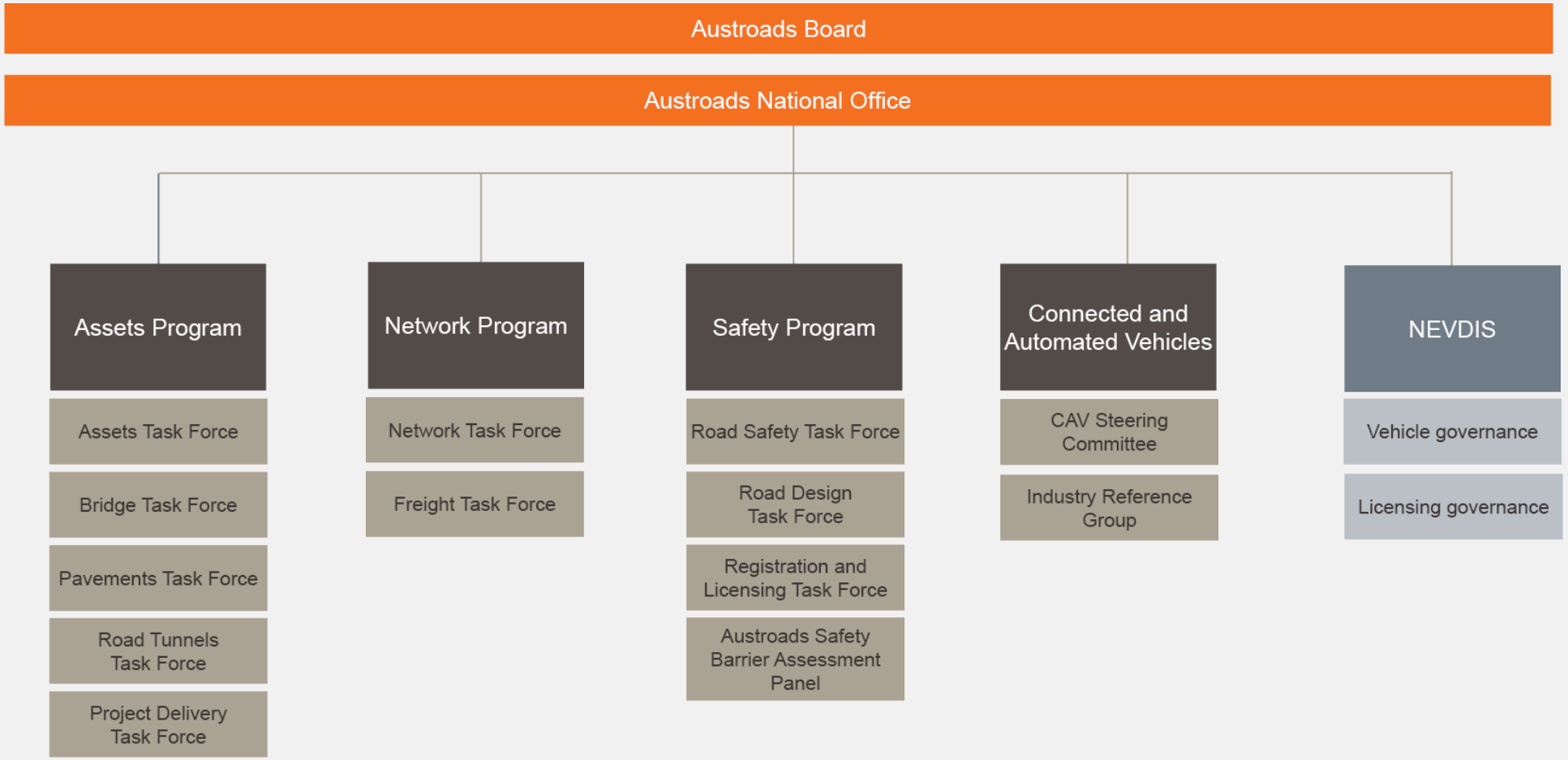
About Austroads

The peak organisation of Australasian road transport and traffic agencies

- Roads and Maritime Services New South Wales
- Roads Corporation Victoria
- Department of Transport and Main Roads Queensland
- Main Roads Western Australia
- Department of Planning, Transport and Infrastructure South Australia
- Department of State Growth Tasmania
- Department of Infrastructure, Planning and Logistics Northern Territory
- Transport Canberra and City Services Directorate, Australian Capital Territory
- Department of Infrastructure, Regional Development and Cities
- Australian Local Government Association
- New Zealand Transport Agency

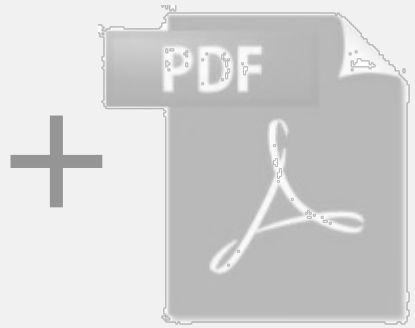
Our structure



Housekeeping

Presentation = 35 mins

Question time = 15 mins



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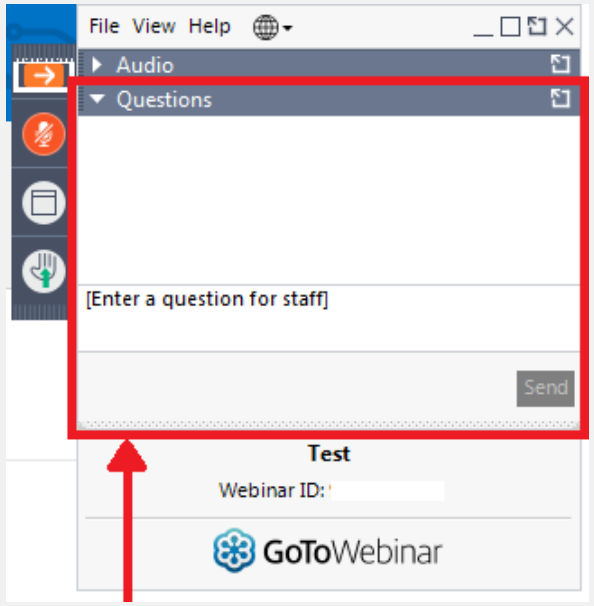

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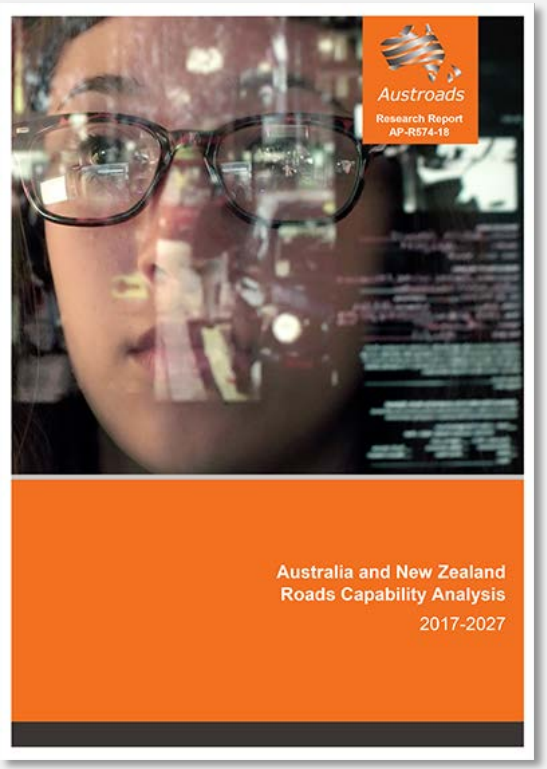
Austroads report



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Today’s presenters

Adrian Hart

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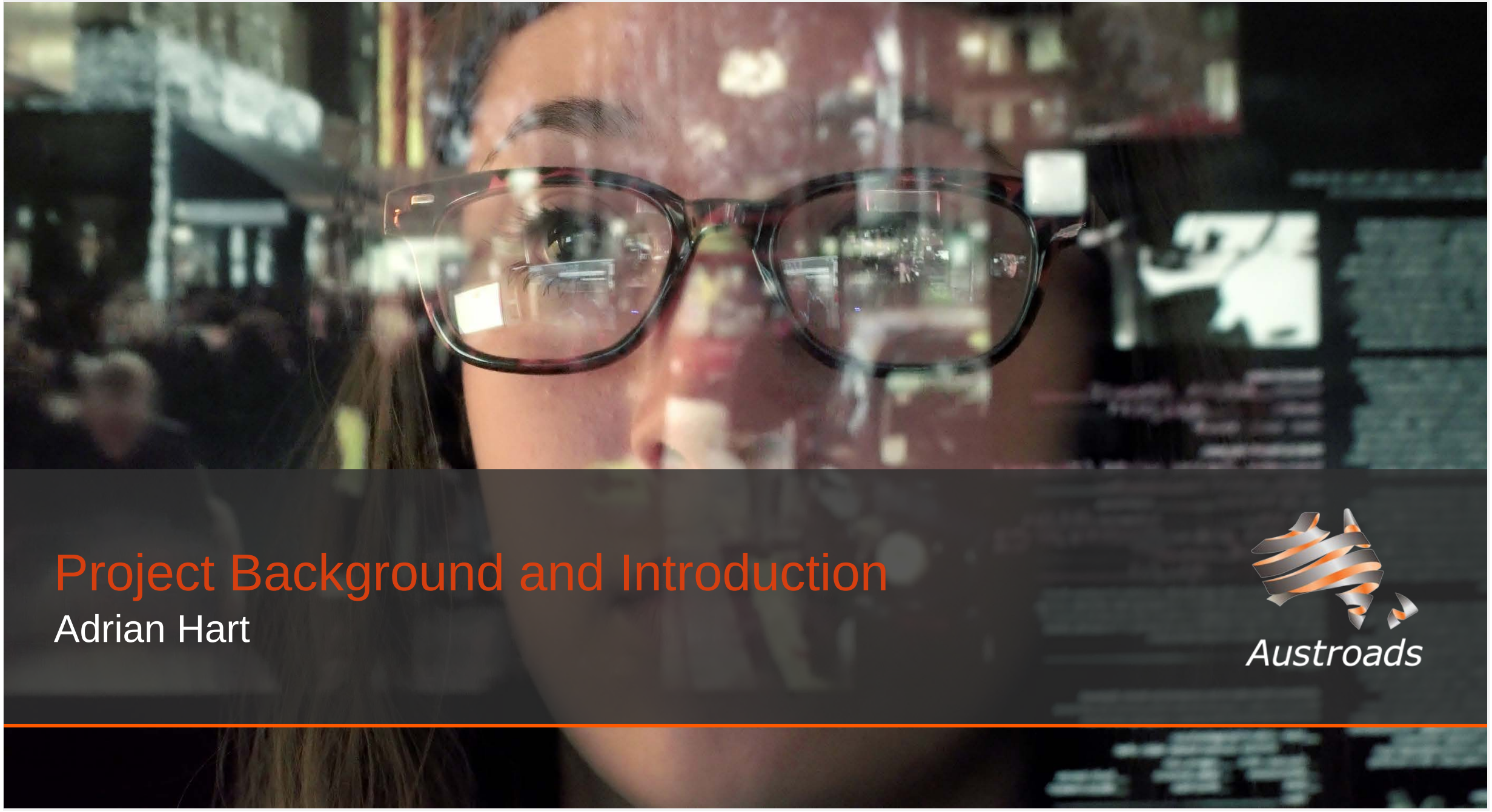
Agenda

Topic	Presenter
Project Background and Introduction	Adrian Hart
State of Play and Outlook for Roads Activity	
Quantitative Modelling Results for Roads Skills	
Industry Perspectives and Challenges	
Report Recommendations	
Q&A	Adrian Hart & Rachael Logie



Project Background and Introduction

Adrian Hart

Austroads

Introduction to team

Project Team

Tracy Jenkinson
Austroads
Project Manager

Adrian Hart
BIS Oxford Economics

Rachael Logie
BIS Oxford Economics

Review Team

Austroads Working Group Group

Stakeholders- Road and Traffic Authorities

Austroads Board

The Project Team

Austroads

Austroads Working Group

Research Goals

- Workforce capability analysis – 10 years
- Engineering and non-engineering skills

- Quantitative modelling
- Qualitative insights from industry

- Challenges and Risks
- Recommendations

Roads Workforce Capability

- 2006 – Initial workforce capability analysis by BIS Shrapnel
- 2009 – Updated study by BIS Shrapnel
- 2013 – Updated study by BIS Shrapnel
- 2017-18 – This expanded study by BIS Oxford Economics

- 2016 – Intelligent Mobility Skills Strategy by Transport Systems Catapult (UK)
- 2017 – Highways Skills Shortage; the Ticking Time Bomb by Highways UK
- 2017 – Construction Delivery Assessment by BIS Oxford Economics for iNSW
- 2017 – Transport Skills Forecast by Transport and Logistics IRC

Our Approach in the 2017-18 Study

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- Need to think beyond traditional engineering skills
- Need to consider technological trends over the next 20 years
- Implications for the role and function of existing roads agencies
- Quantitative analysis to estimate the potential size of the challenge
- Qualitative analysis to pinpoint:
  - Where skills gap may already exist
  - Where the risks to capability will likely arise
  - Future skills that may be required
  - Impact of new technologies on skills demand and requirements

Key Findings

- Roads agencies facing ‘triple threat’ to workforce capability
    1. A record program of infrastructure spending forecast
    2. Maturing technologies will impact on type of skills demanded – and funding
    3. The role and function of roads agencies is likely to change
- Agencies are already facing skills shortages
- Agencies face stiff competition for traditional and non-traditional skills
- Agencies will have time to adapt to some technological developments BUT
- Much needs to be done now to put capability on a sustainable path

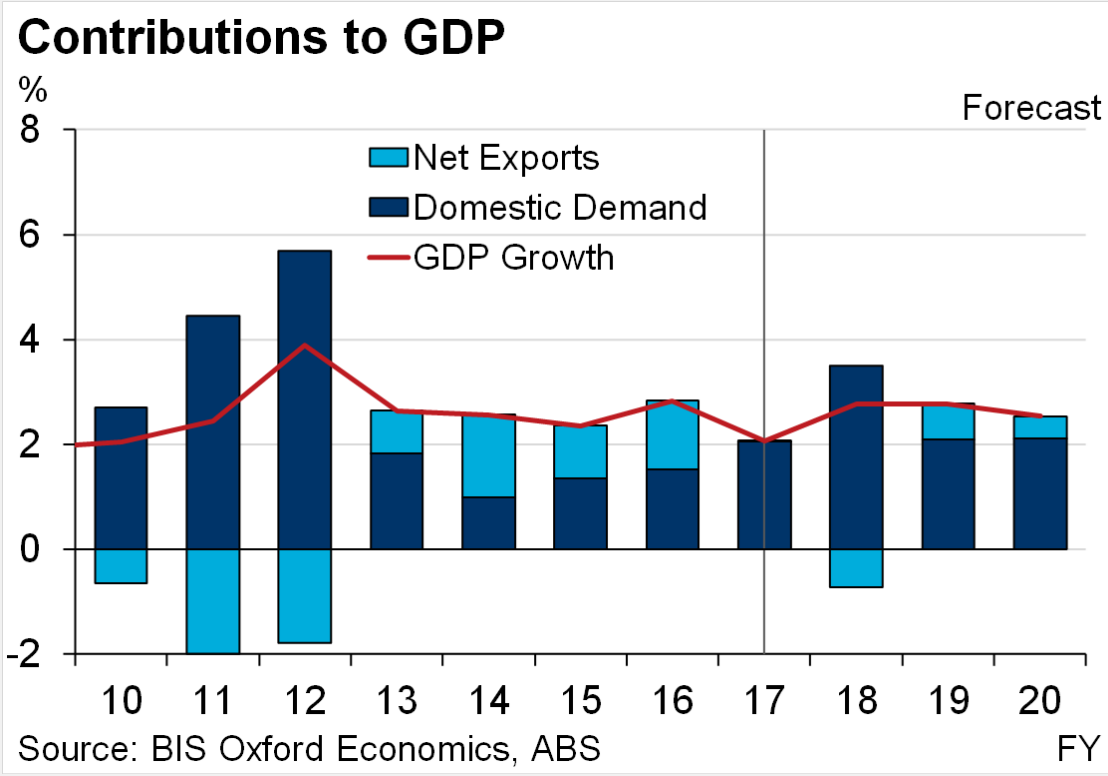
State of Play and Outlook for Roads Activity

Adrian Hart

Austroads

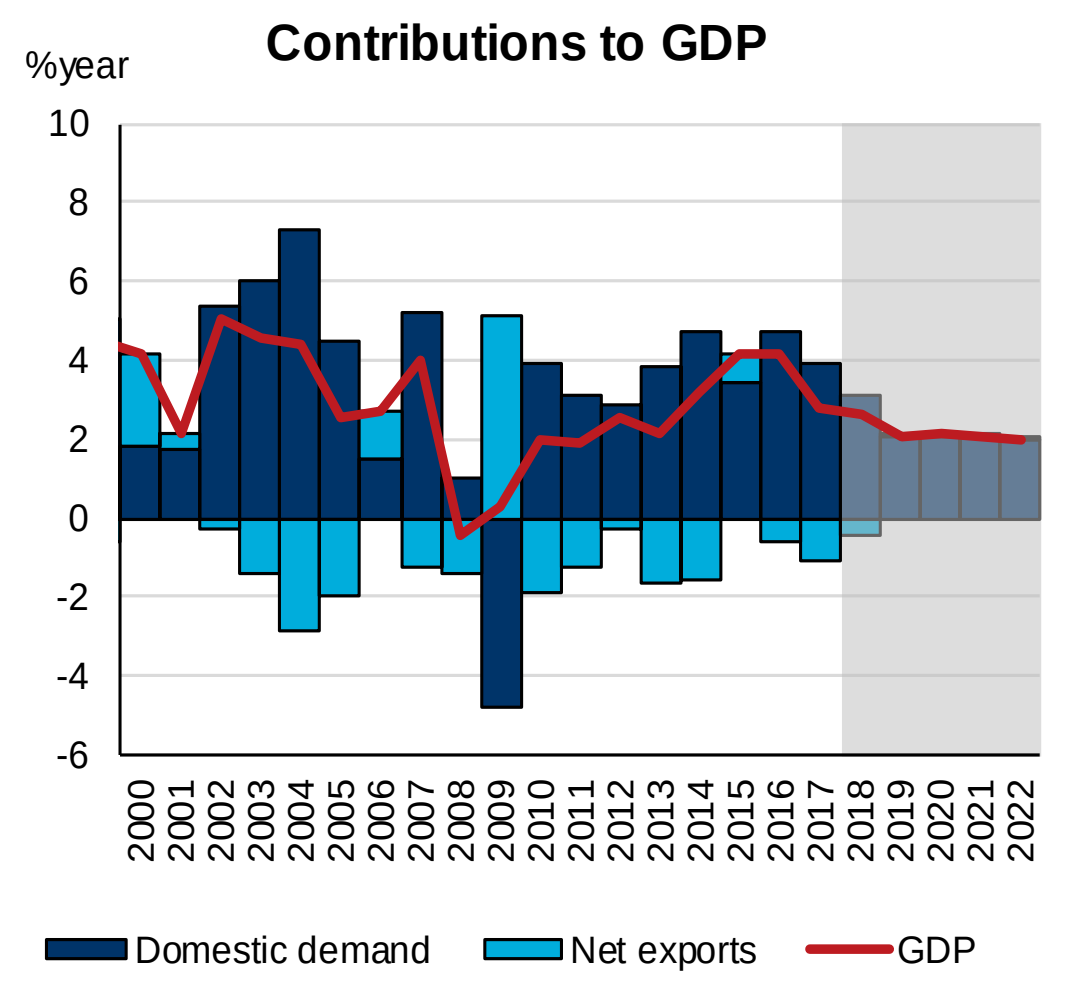
Economic Environment – Australia

- Australian economy has picked up in FY18 with domestic demand growth the key driver
- Demand fuelled by strong growth in investment and construction, particularly in housing, transport, tourism and commercial building
- Strong population growth will support demand in future, but cycles will play out by sector and state

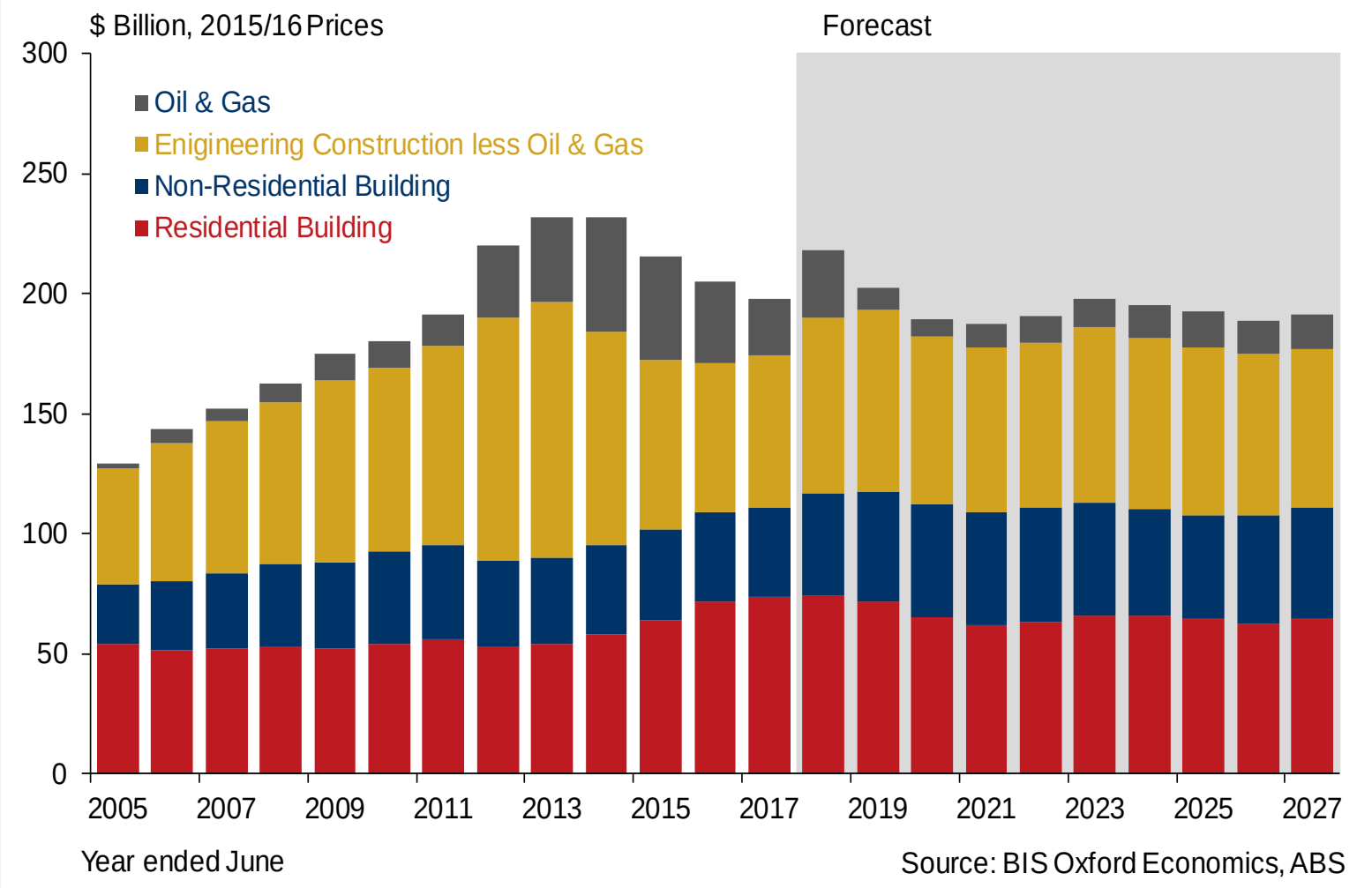


Economic Environment – New Zealand

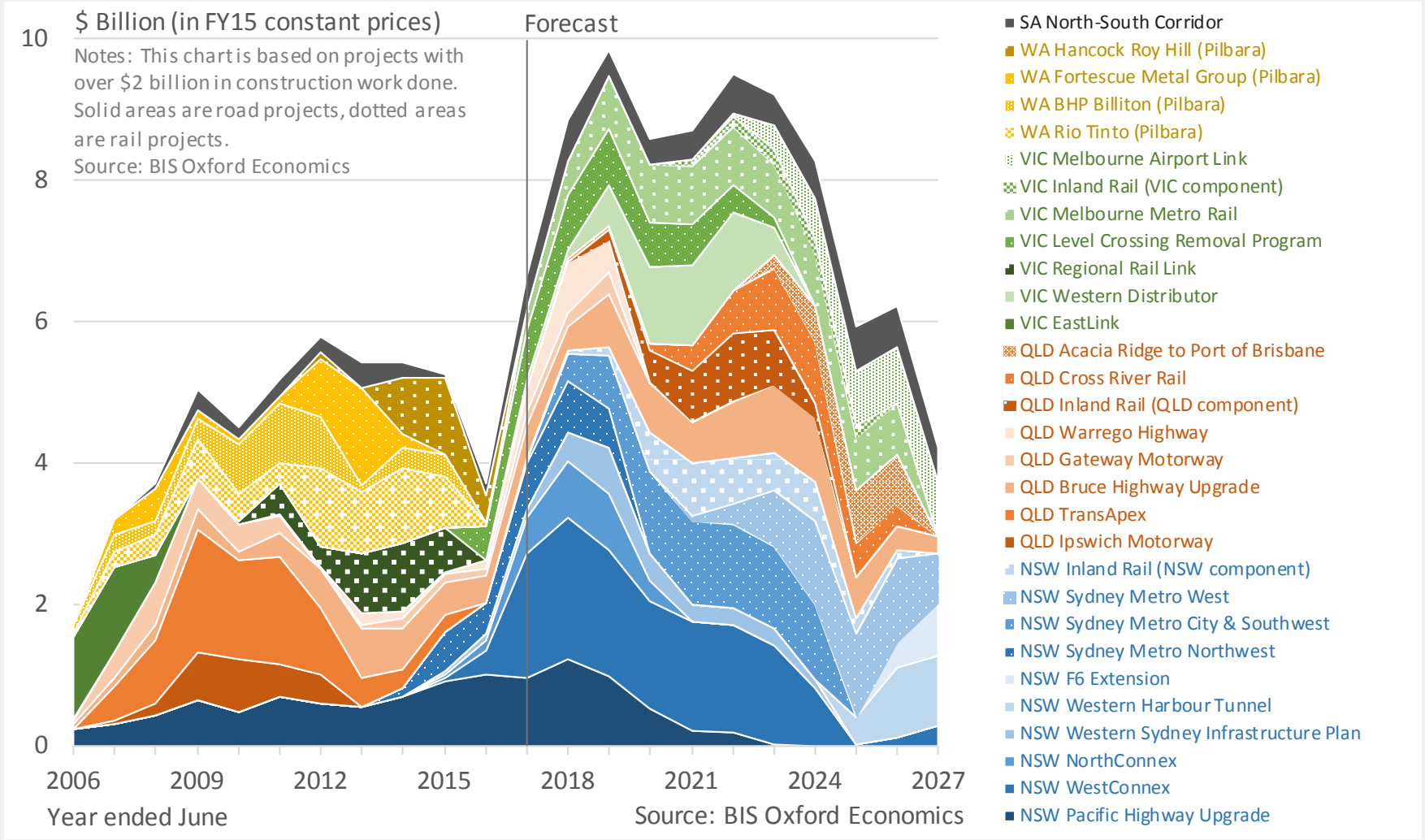
- Economic growth moderating in New Zealand in FY18 due to weakening investment , impacting on domestic demand
- Transport investment likely to rise based on road and rail programs and projects
- Weakening population growth to impact on demand for building activity in coming years



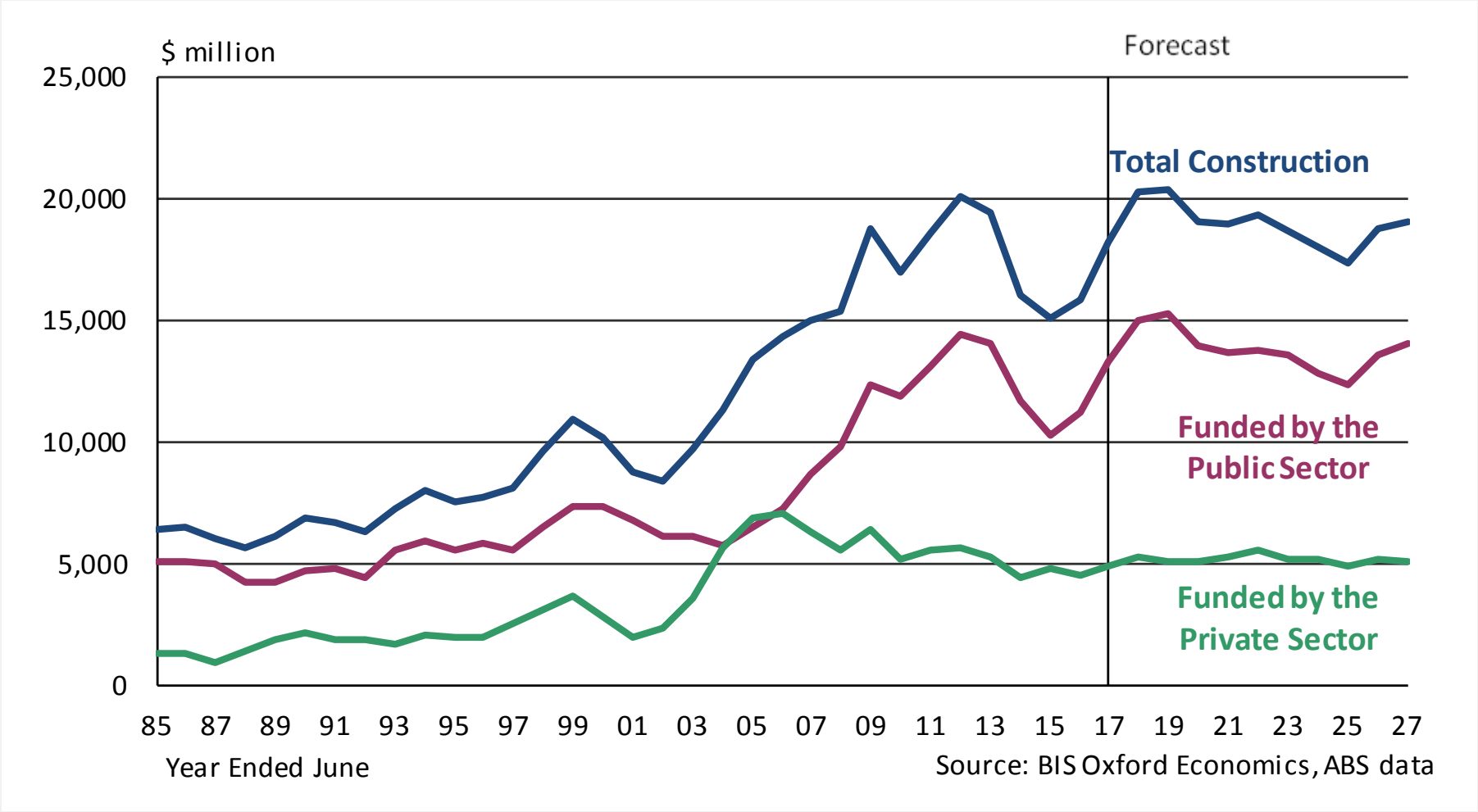
Total Construction – Australia



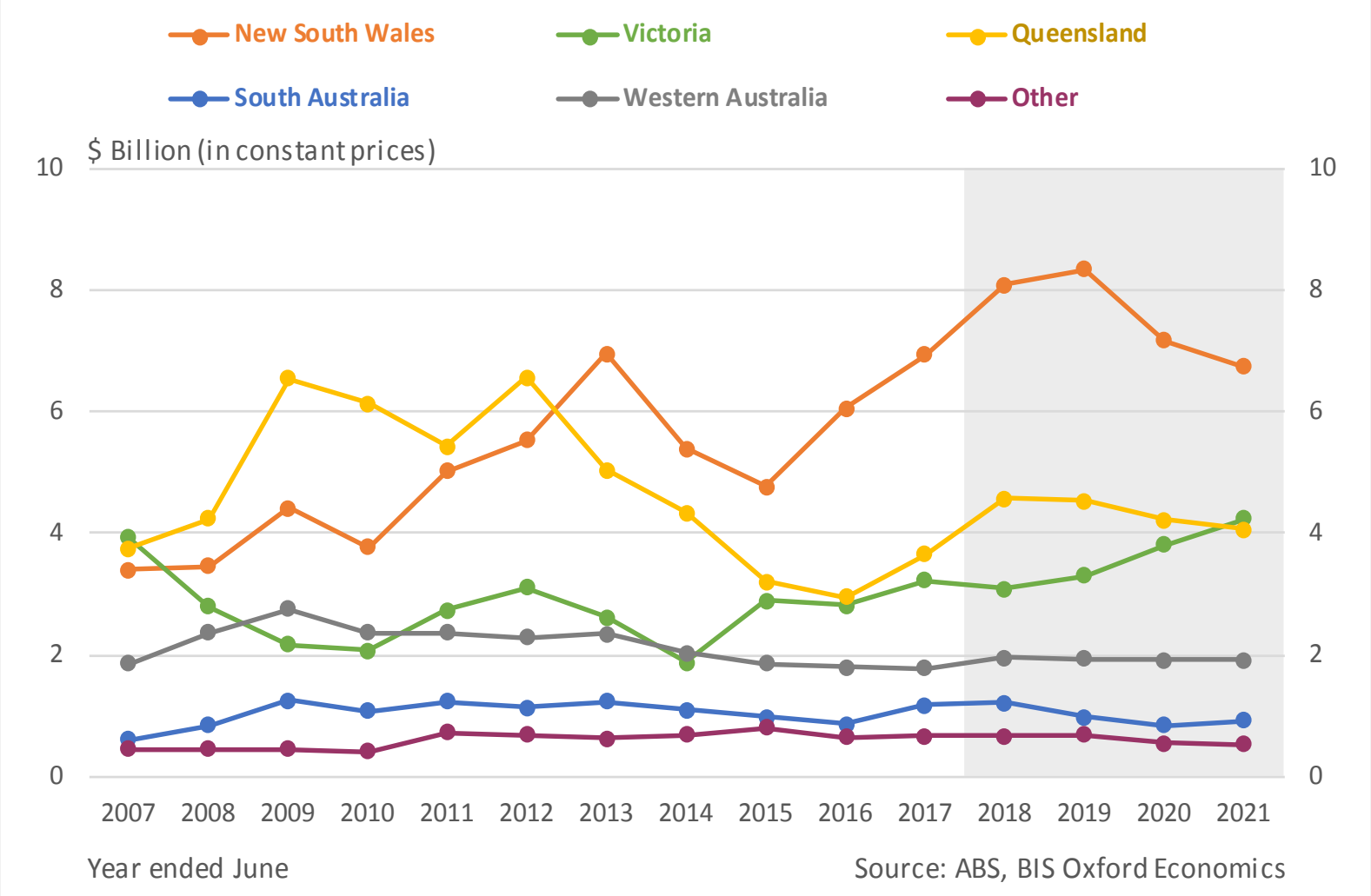
Major Transport Projects > $2bn, Australia



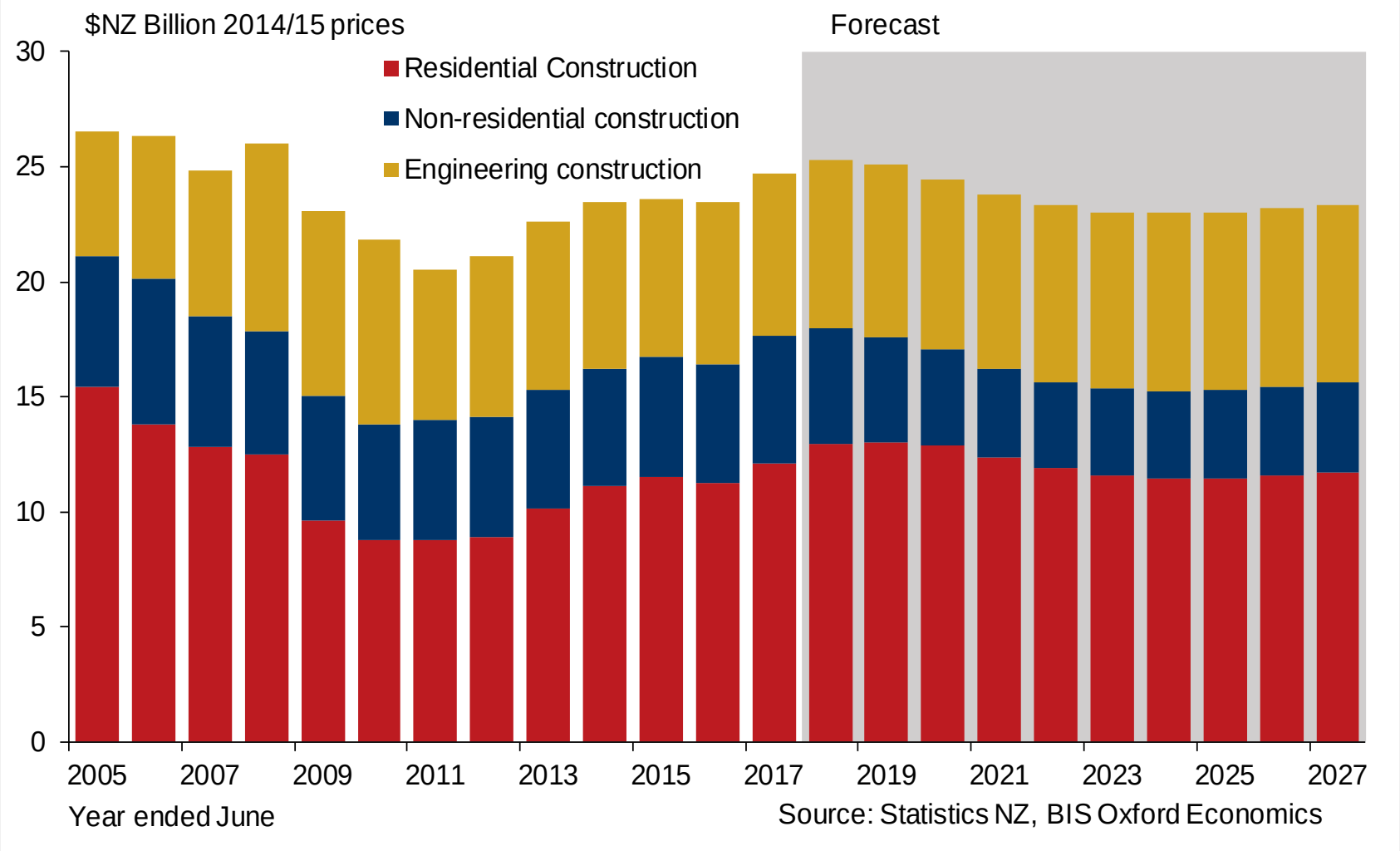
Road Construction – Australia



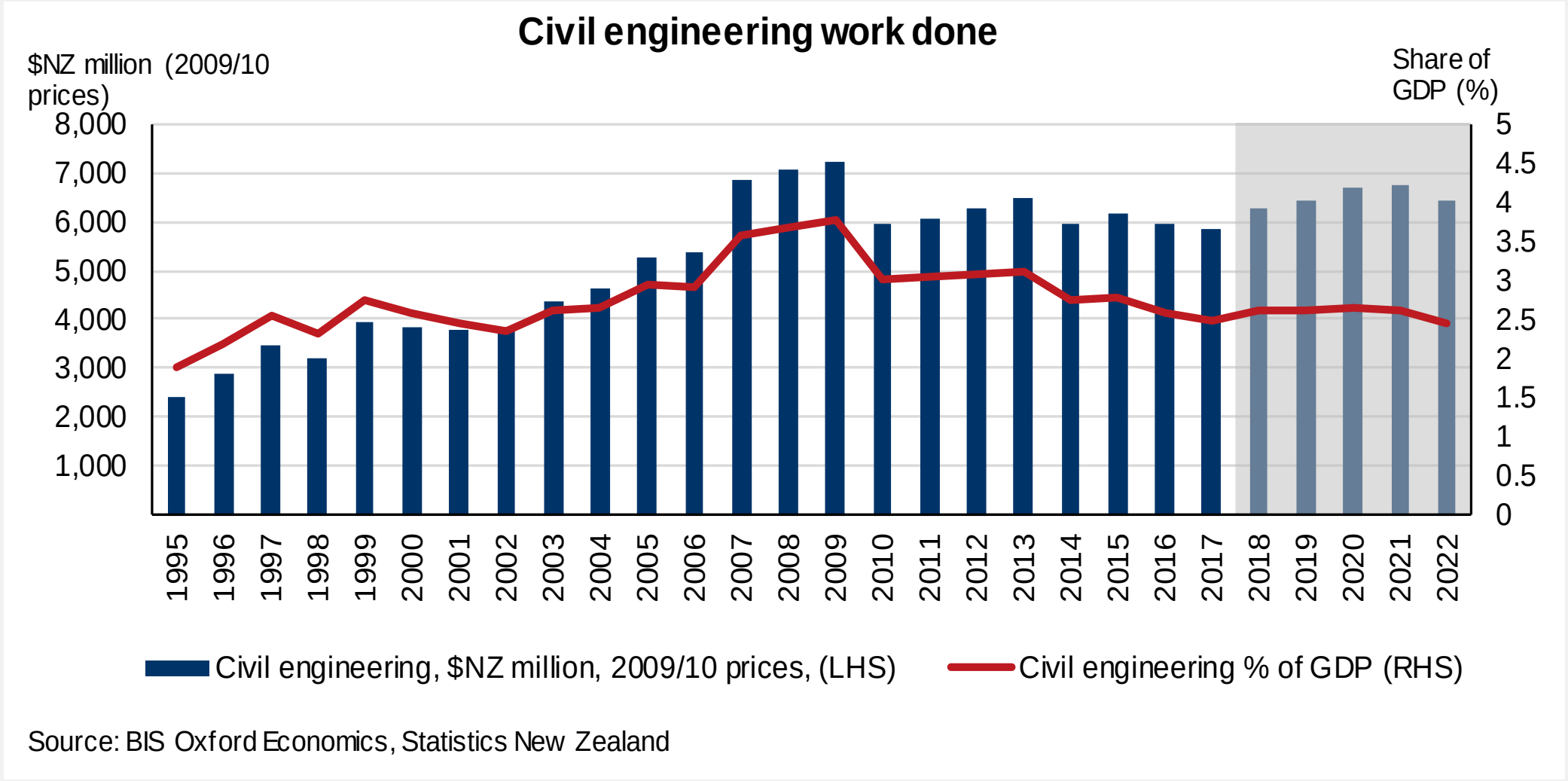
Road Construction by State – Australia



Total Construction – New Zealand

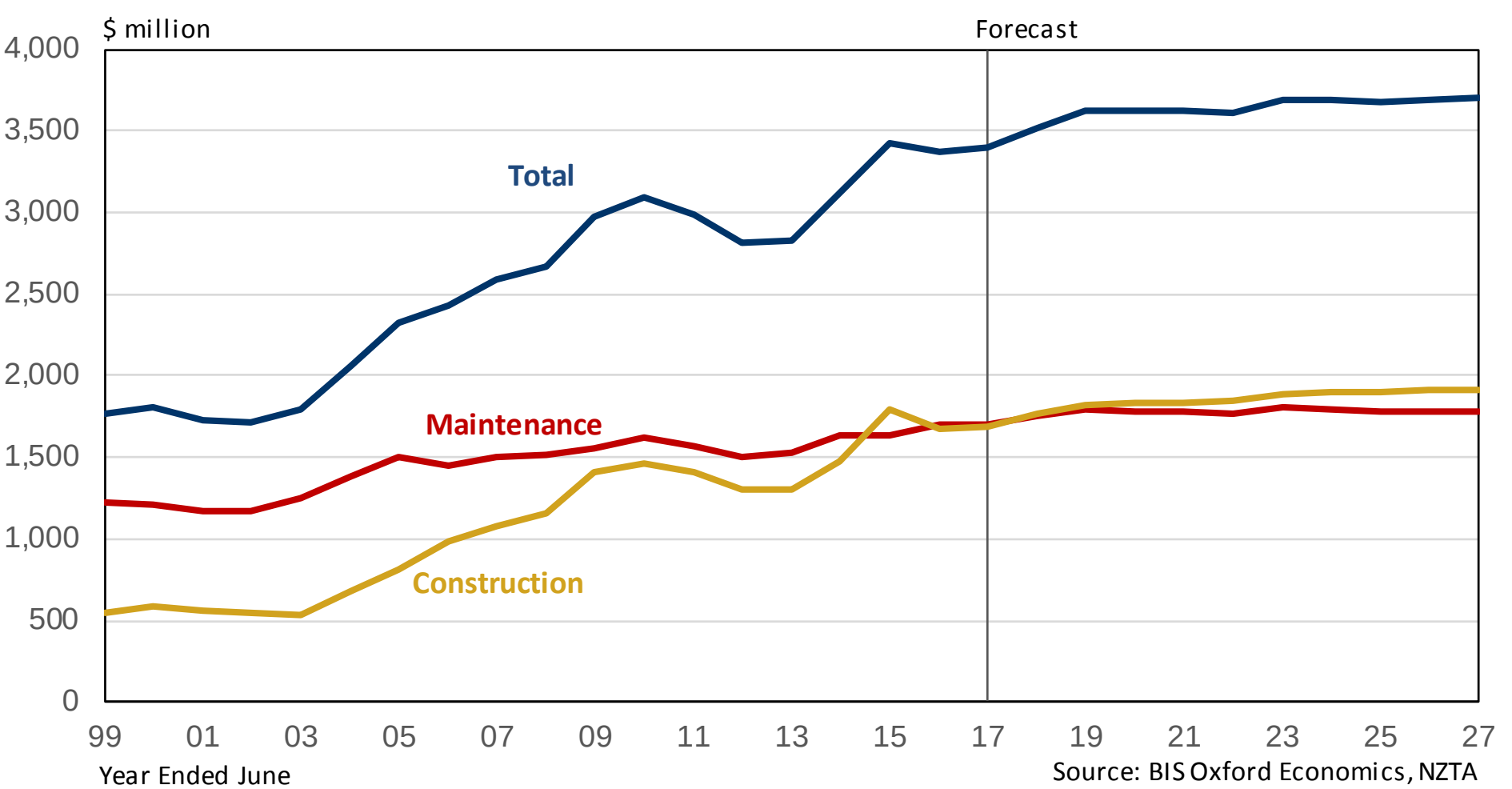


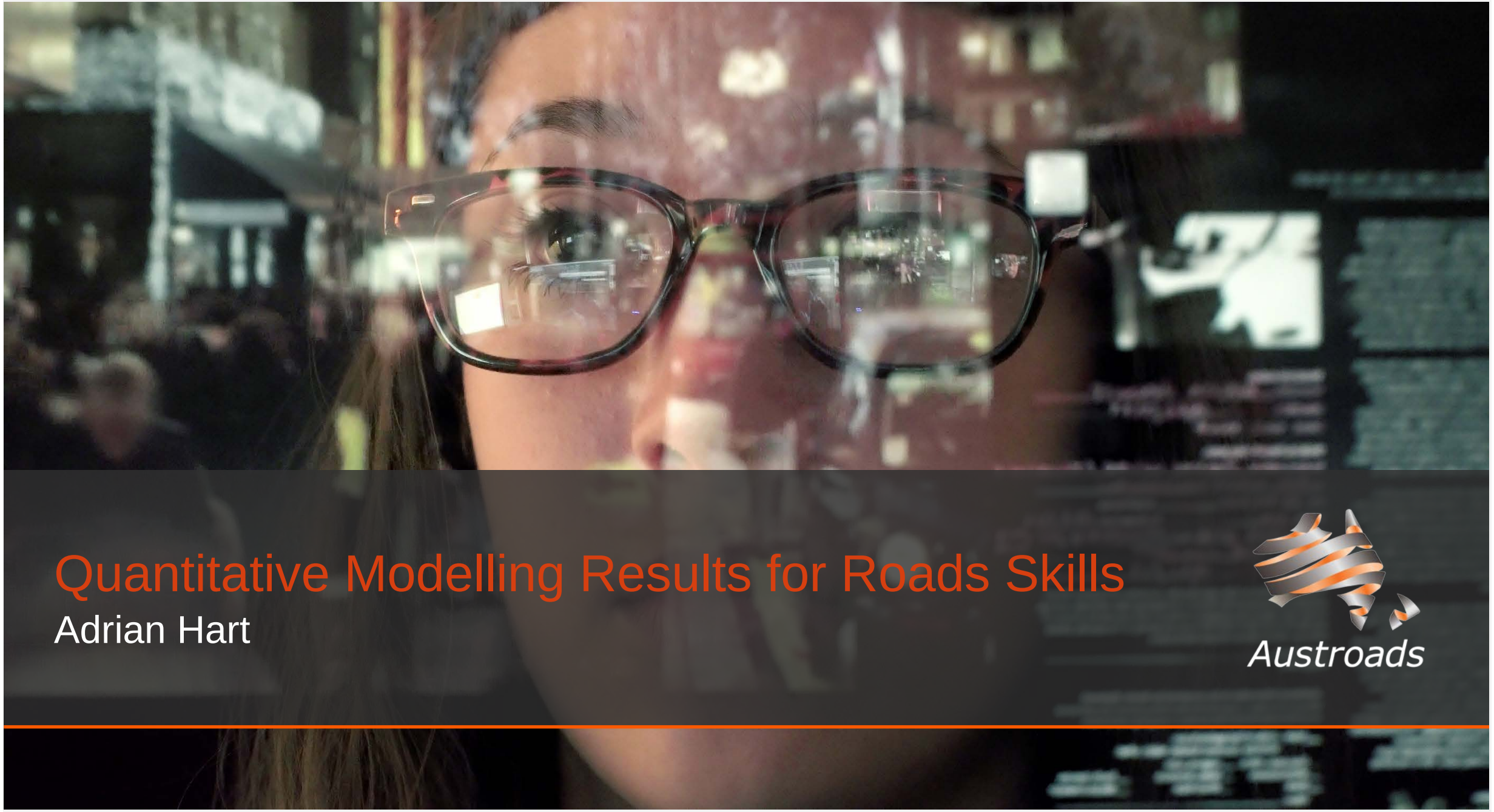
Civil Construction – New Zealand



Source: BIS Oxford Economics, Statistics New Zealand

Road Construction – New Zealand





Quantitative Modelling Results for Roads Skills

Adrian Hart

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Defining the Roads Sector

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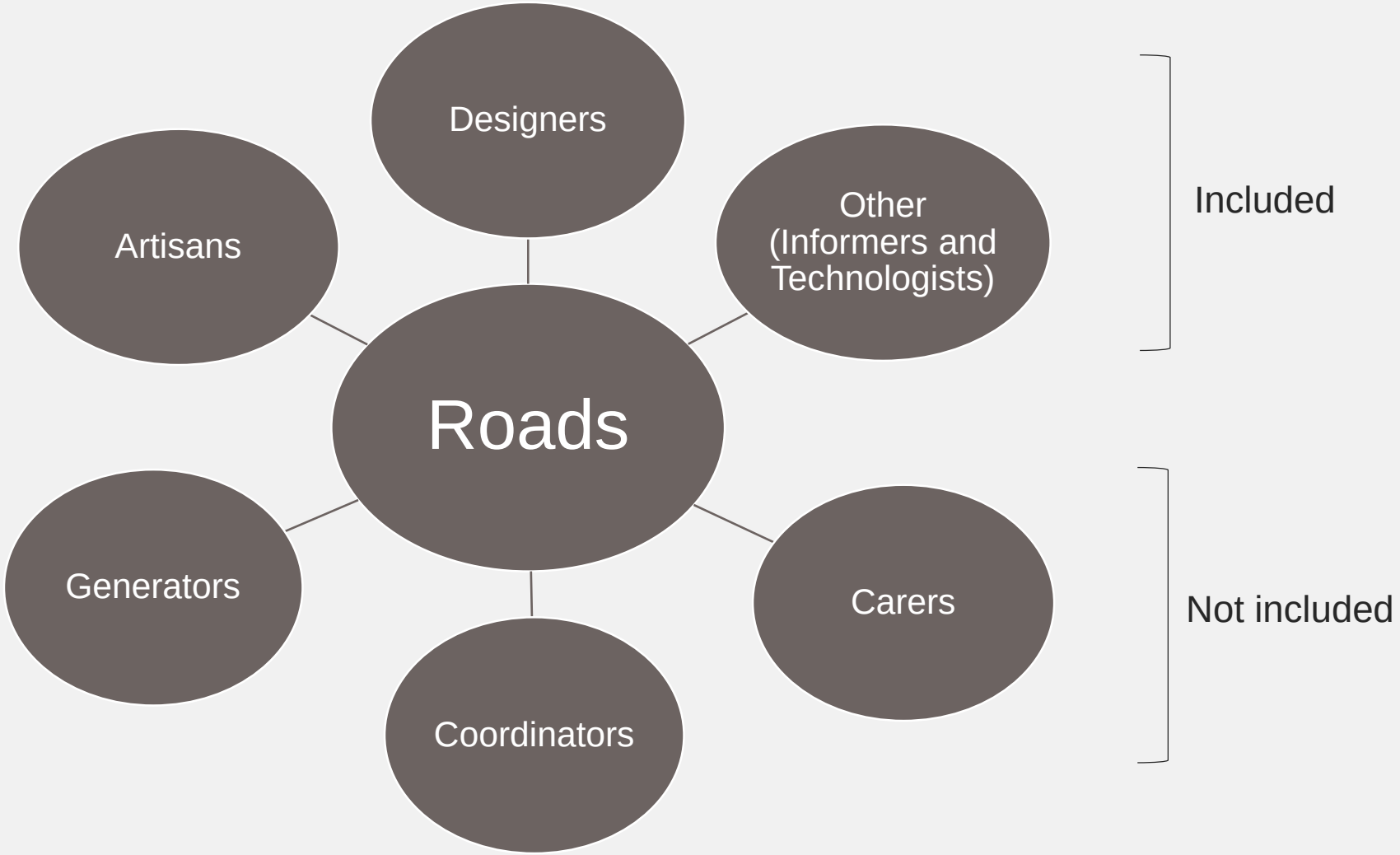
No single ‘Roads Sector’ in Census or National Accounts

Skilled labour in the roads industry comes from several sectors:

- Road and Bridge Construction
- State and Local Government
- Non-Building Construction
- Professional, Scientific and Technical Services

Defining the Roads Workforce: FYA Clusters



Defining the Roads Workforce

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Sector	Design Skills	Informer Skills	Technological Skills	Artisan Skills	Total
Total Construction	**28,865**	**923**	**671**	**90,835**	**121,294**
Building Construction	15,432	556	207	24,244	40,439
Total Non-Building Construction	5,116	119	151	6,507	11,893
Road & Bridge Construction	*2,148*	*44*	*18*	*3,152*	*5,362*
General Trade Construction	8,317	248	313	60,084	68,962
Public Administration & Safety	**14,082**	**7,025**	**3,308**	**5,350**	**29,765**
Federal Government	1,648	1,077	649	24	3,398
State Government	4,099	2,640	1,230	286	8,255
Local Government	4,830	2,006	388	2,931	10,155
Other	3,505	1,302	1,041	2,109	7,957
Professional Services	**22,860**	**10,476**	**27,224**	**2,821**	**63,381**
Other Sectors	**46,952**	**26,193**	**32,593**	**66,885**	**172,623**
Total All Sectors	**112,732**	**44,607**	**63,857**	**165,865**	**387,061**
Total Roads Workforce	**10,540**	**3,081**	**3,945**	**7,518**	**25,083**
Public Roads Workforce	**6,928**	**1,734**	**469**	**6,226**	**15,357**

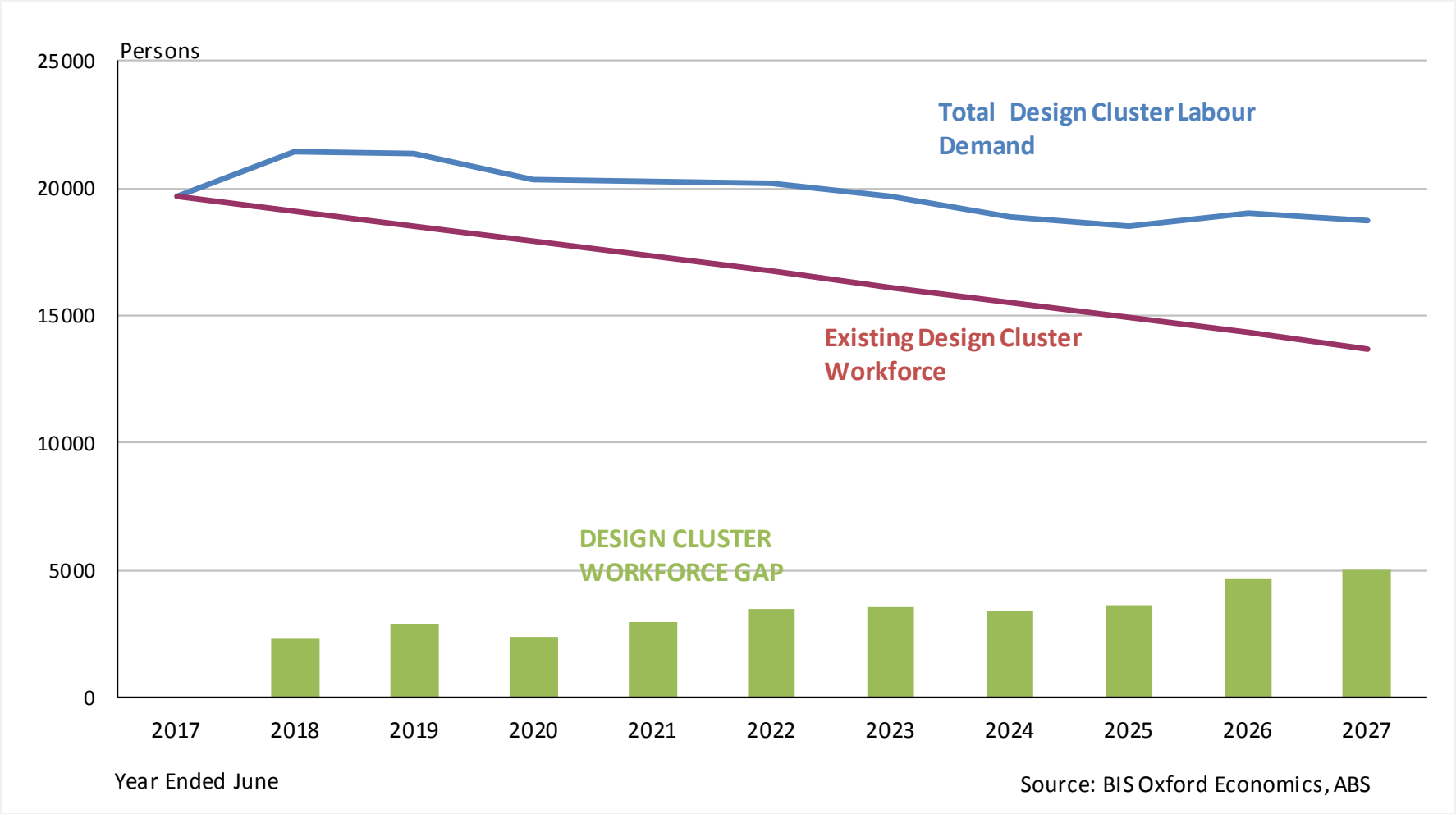
Source: BIS Oxford Economics, ABS Data

Workforce Attrition

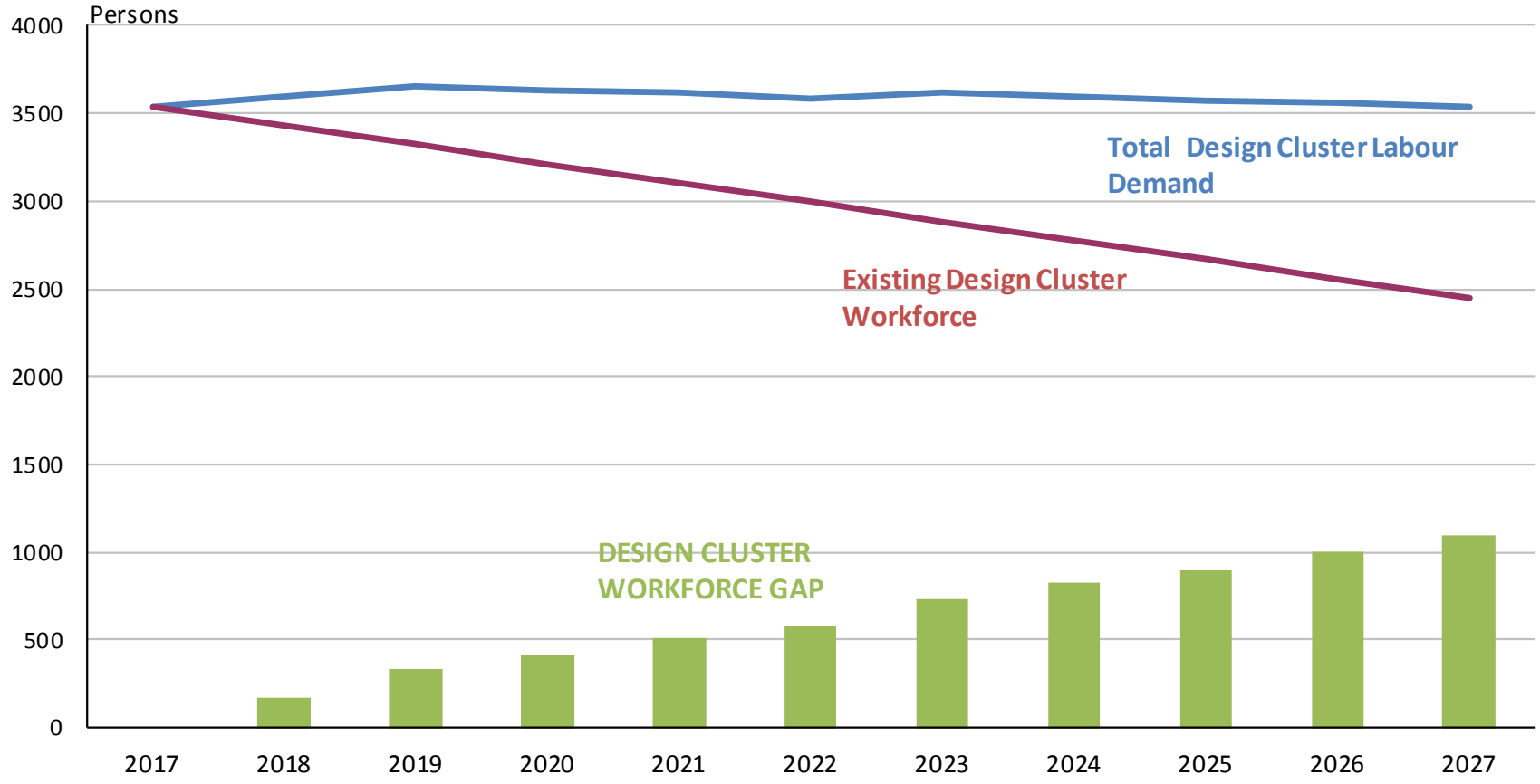
Age Bracket	Total Artisan Workforce (Australia)	Total Design Workforce (Australia)	Total Other Workforce (Australia)
15-24	16.7%	2.1%	1.2%
25-34	23.9%	22.4%	17.9%
35-44	24.0%	23.3%	33.2%
45-54	20.6%	25.4%	28.2%
55-59	7.4%	14.0%	10.8%
60-65	5.0%	9.2%	7.2%
65-69	1.8%	2.9%	1.1%
70+	0.6%	0.7%	0.3%
Total	**100%**	**100%**	**100%**

Source: BIS Oxford Economics, ABS Data

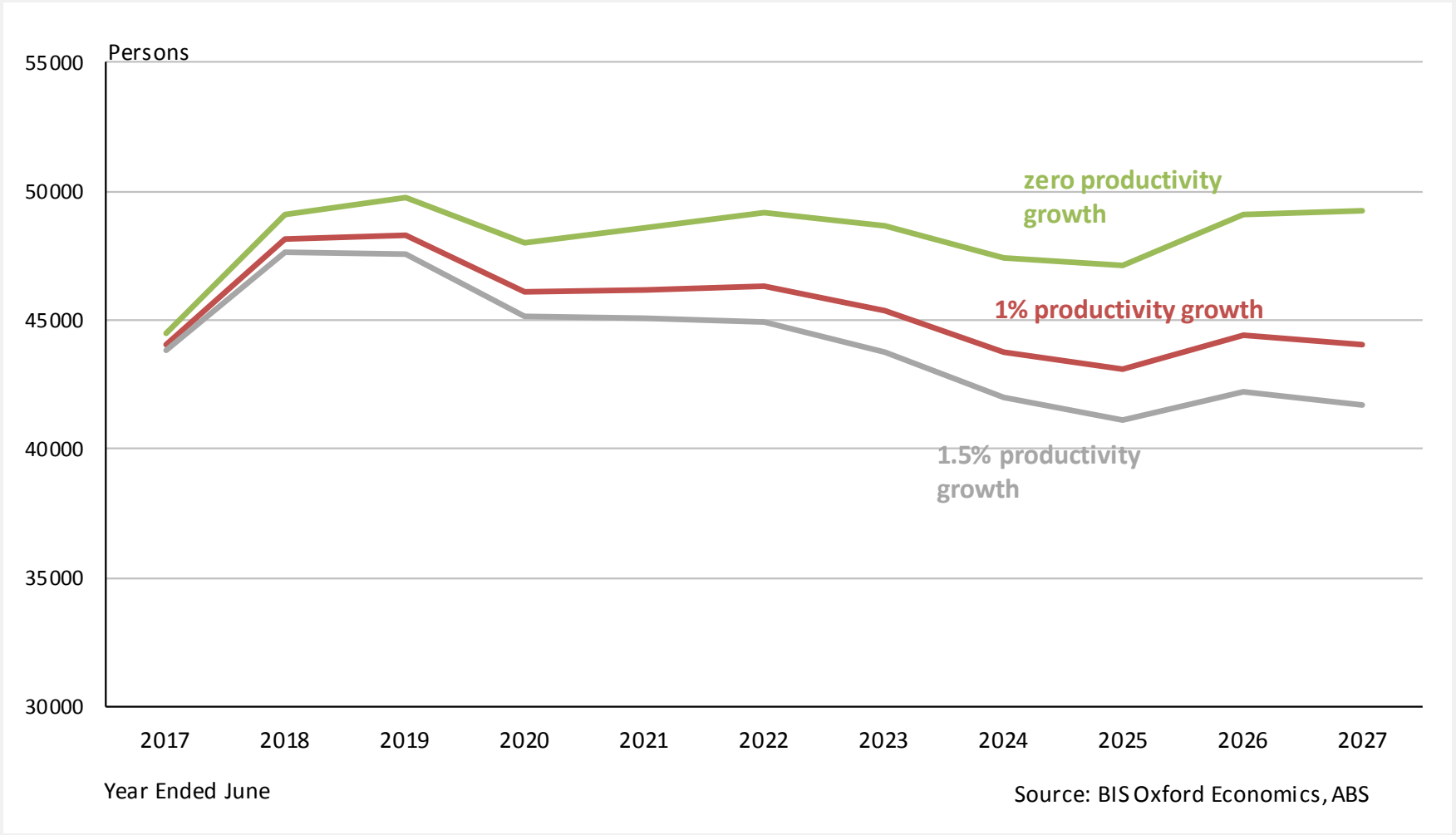
Workforce Gaps – Designer Cluster, Australia



Workforce Gaps – Designer Cluster, New Zealand



Scenarios – Australian Roads Labour Demand



Technology Scenarios

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Constrained World

- Higher technological disruption
- Constrained response from governments and agencies
- Increased road use and limited funding

Technology and Response

- Higher technological disruption
- Full policy response by governments and agencies
- More efficient use of roads and greater funding

Technology Scenarios

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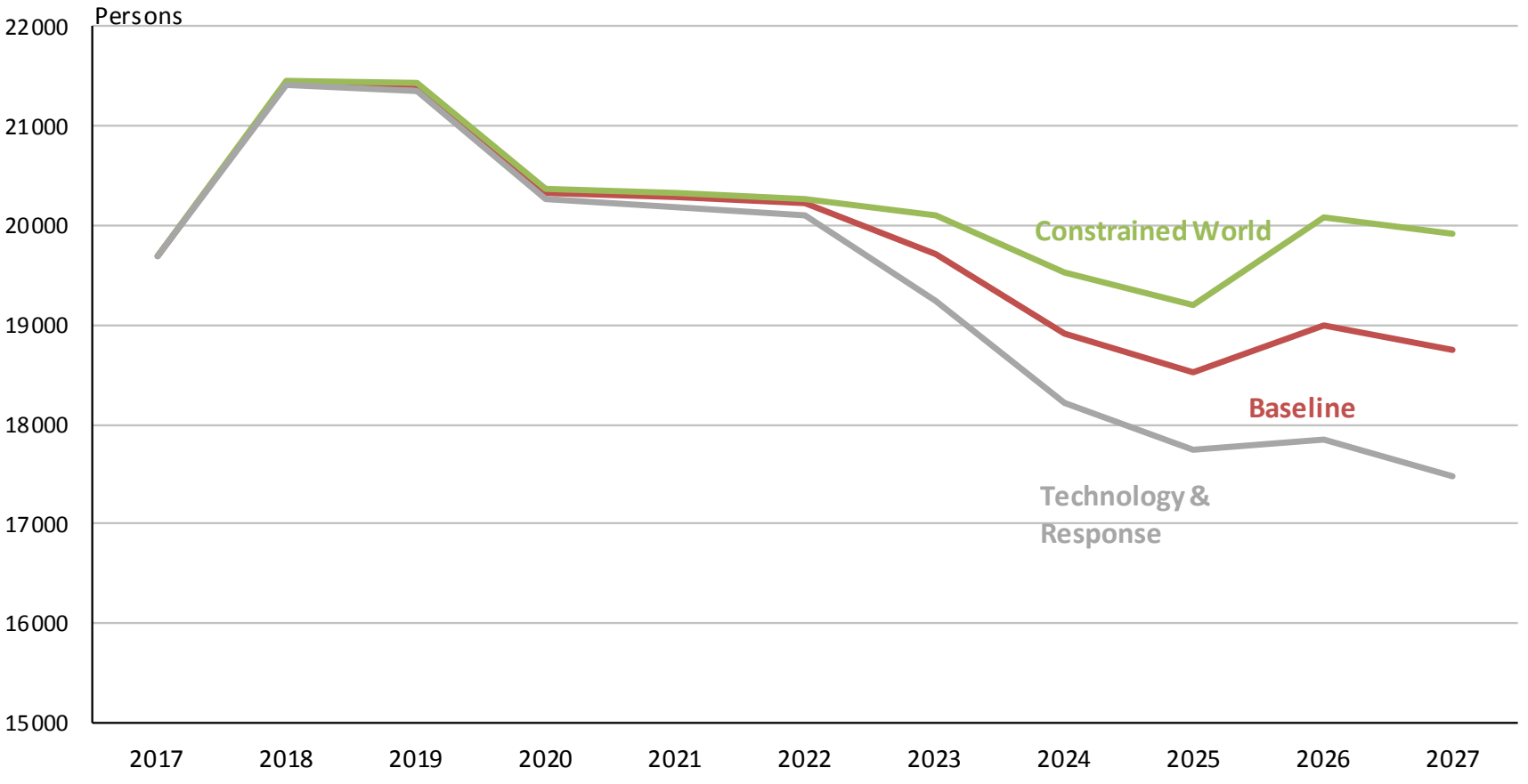
Constrained World

- Higher construction and maintenance requirements
- Weaker productivity growth in the long term
- Increased share of designer skills at expense of other skills

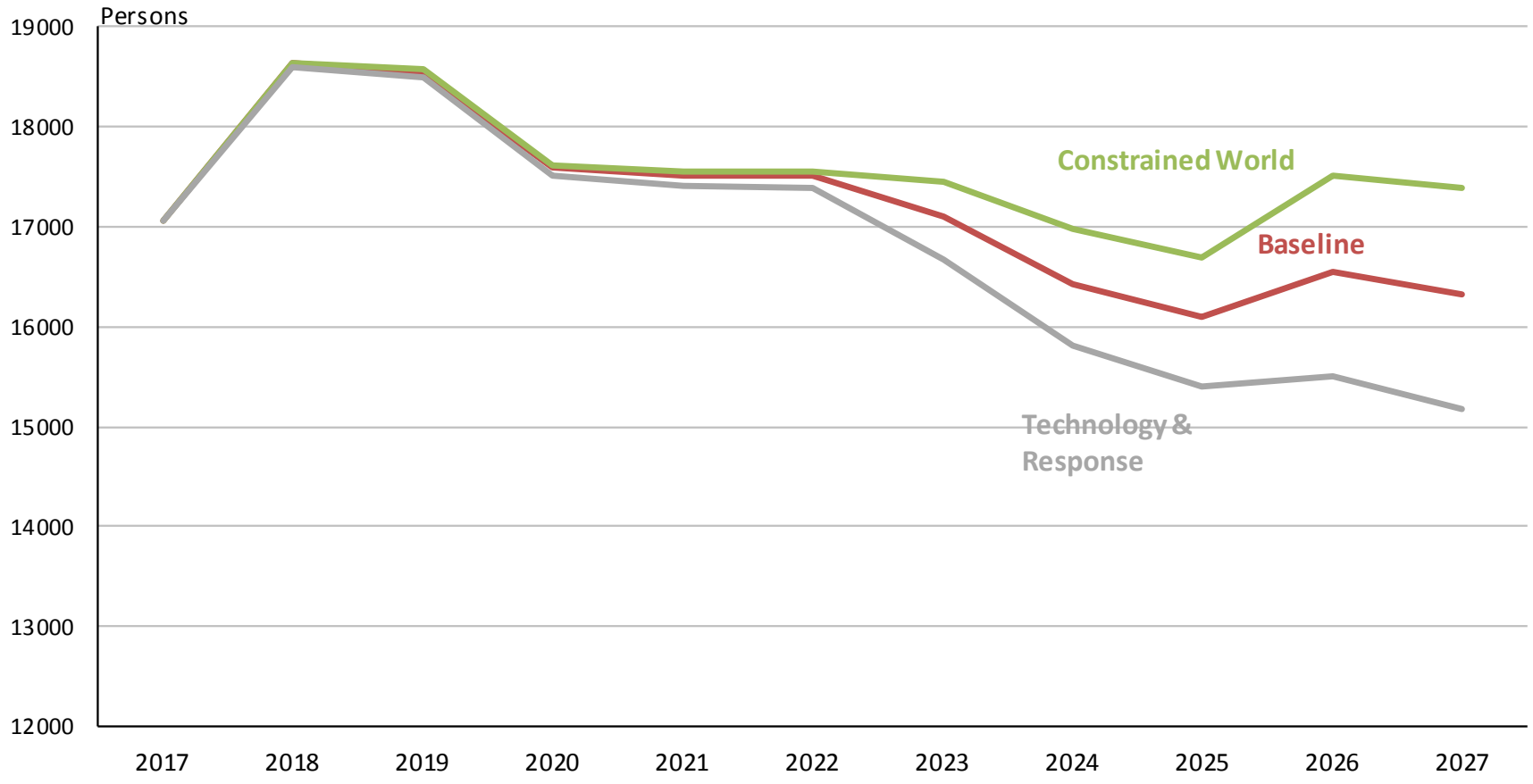
Technology and Response

- Lower construction and maintenance requirements
- Stronger productivity growth in the long term
- Reduced share of designer skills and higher share of other skills

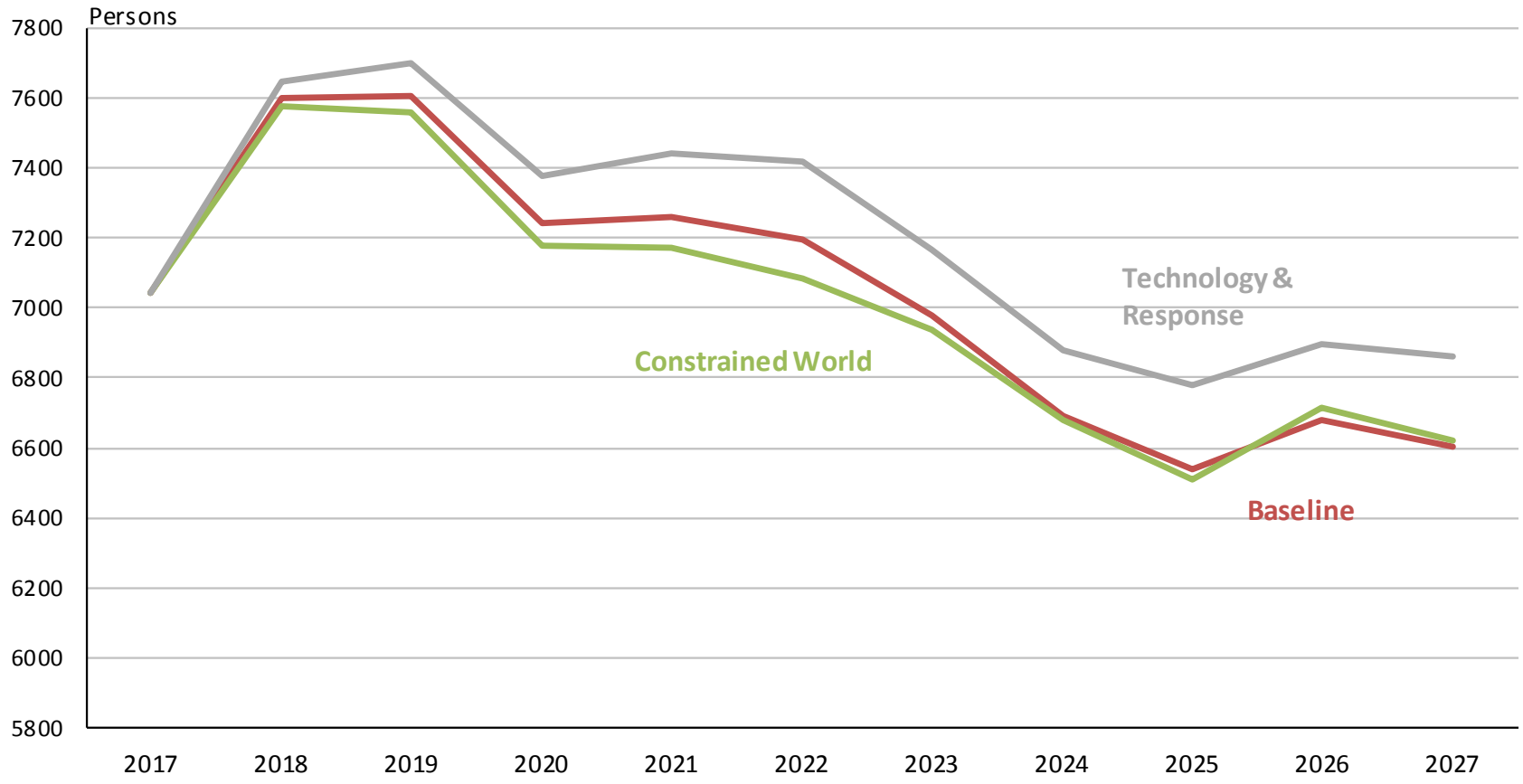
Scenarios – Design Cluster, Australia



Scenarios – Artisan Cluster, Australia



Scenarios – Other Cluster, Australia



Quantitative Modelling Results

Baseline Scenario (Business as Usual)

- Rising workforce gaps for all skills clusters, worsening long term (after FY22)

Technology and Response Scenario

- Much higher workforce gap for Informers and Technologists
- Lower workforce gaps for Designers and Artisans

Constrained World Scenario

- Lower workforce gap for Other skills initially, but higher longer term
- Higher workforce gaps for Designers and Artisans

Limitations of Modelling

Assumes ‘equilibrium’ in the base year (2016/17)

- Evidence points to skills shortages being already apparent

Does not adequately reflect the loss of highly skilled labour

- Workers with many years of experience will retire over the coming decade
- Assumes skills can be replaced by new graduates, migration or industry

May not adequately reflect pull on resources from other industries

- Risks ahead from large rail investment programme
- Other sectors (e.g. mining) may also pull labour from roads industry

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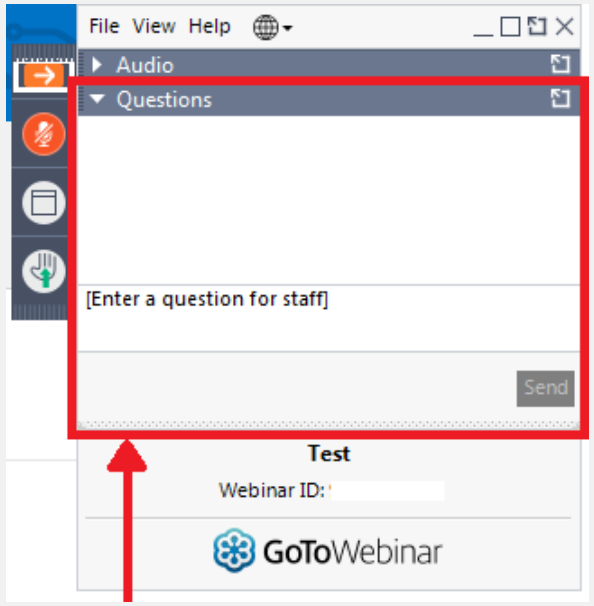

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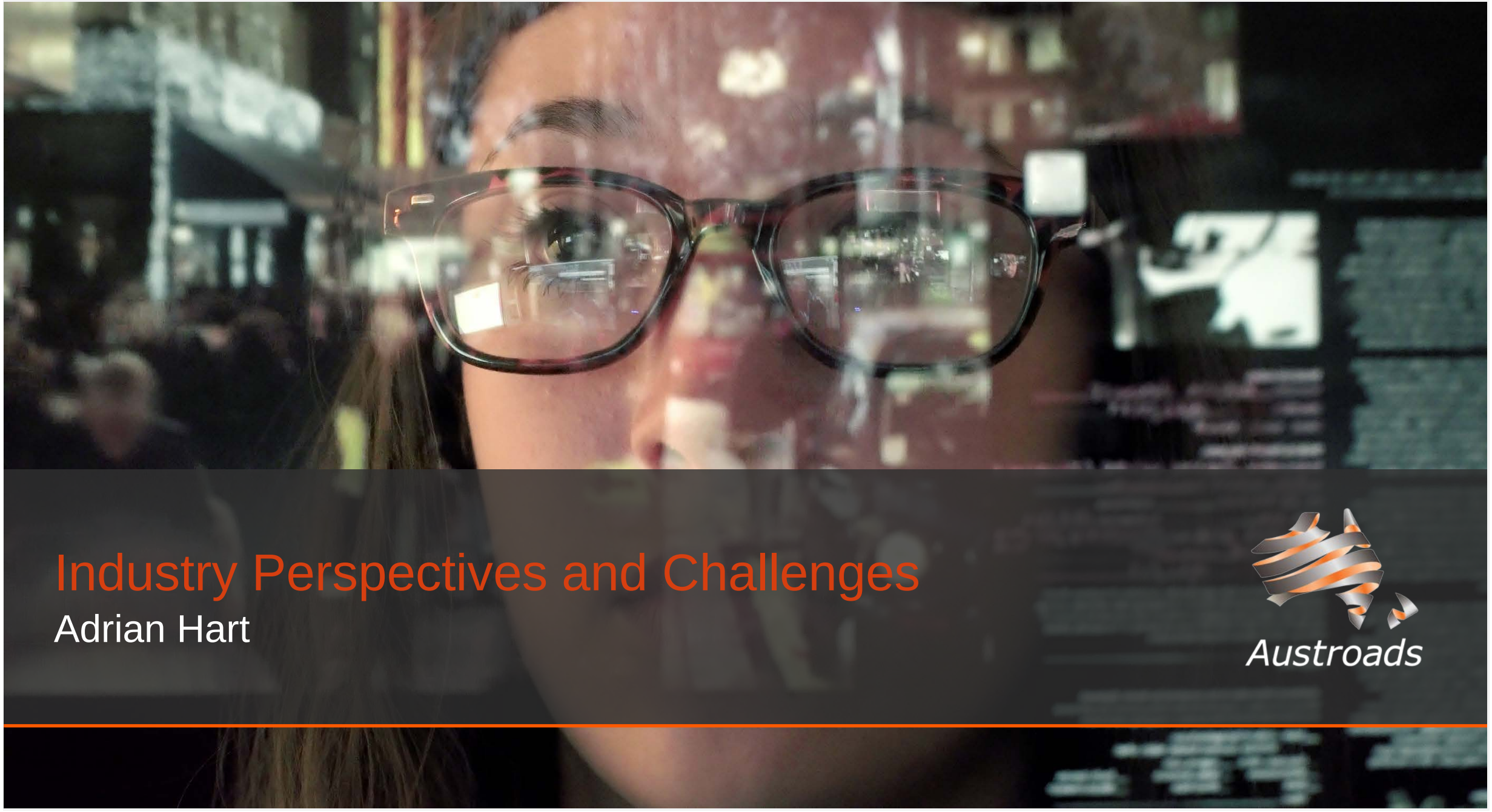

Industry Perspectives and Challenges

Adrian Hart

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Qualitative Methodology

Industry liaison to address limitations to quantitative approaches

- Includes other industries, education, local government, agencies

Industry Survey

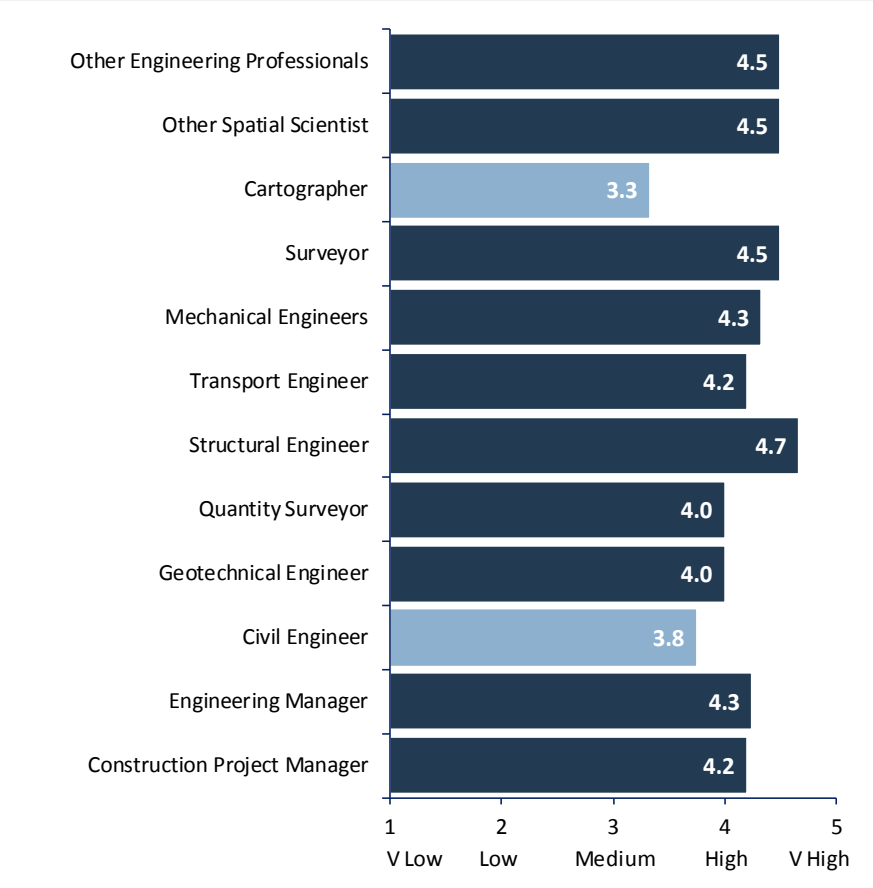
- Quantitative feedback on industry issues, risks and potential solutions
- Use of Likert scales to rank results

Deeper Dive Interviews

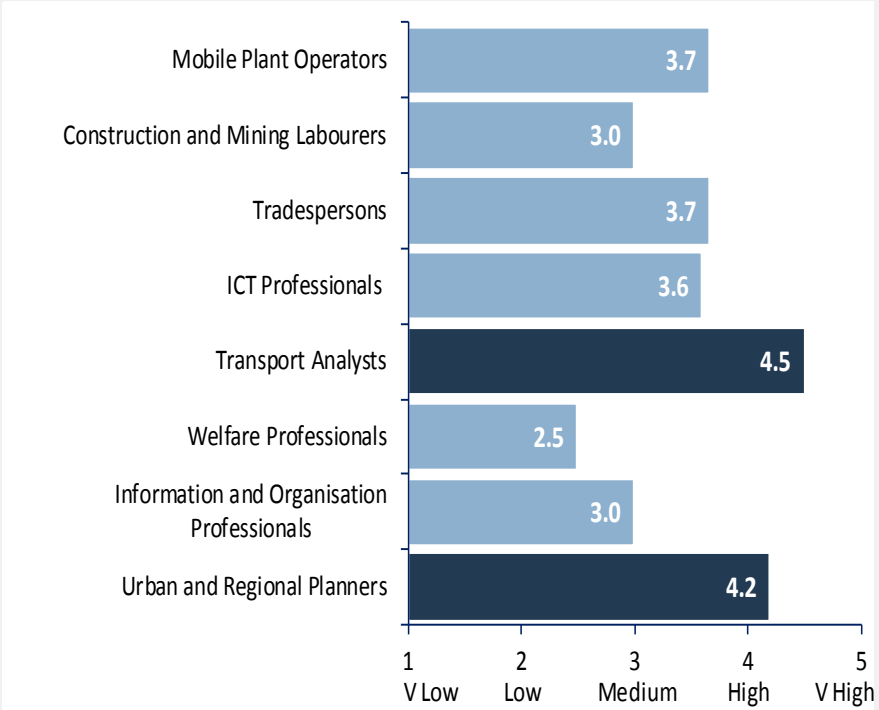
- 32 interviews conducted through September - November 2017
- Key themes developed
- Confidentialised responses directly included into report

Survey Results – Level of Recruiting Difficulty

Design skills – University trained

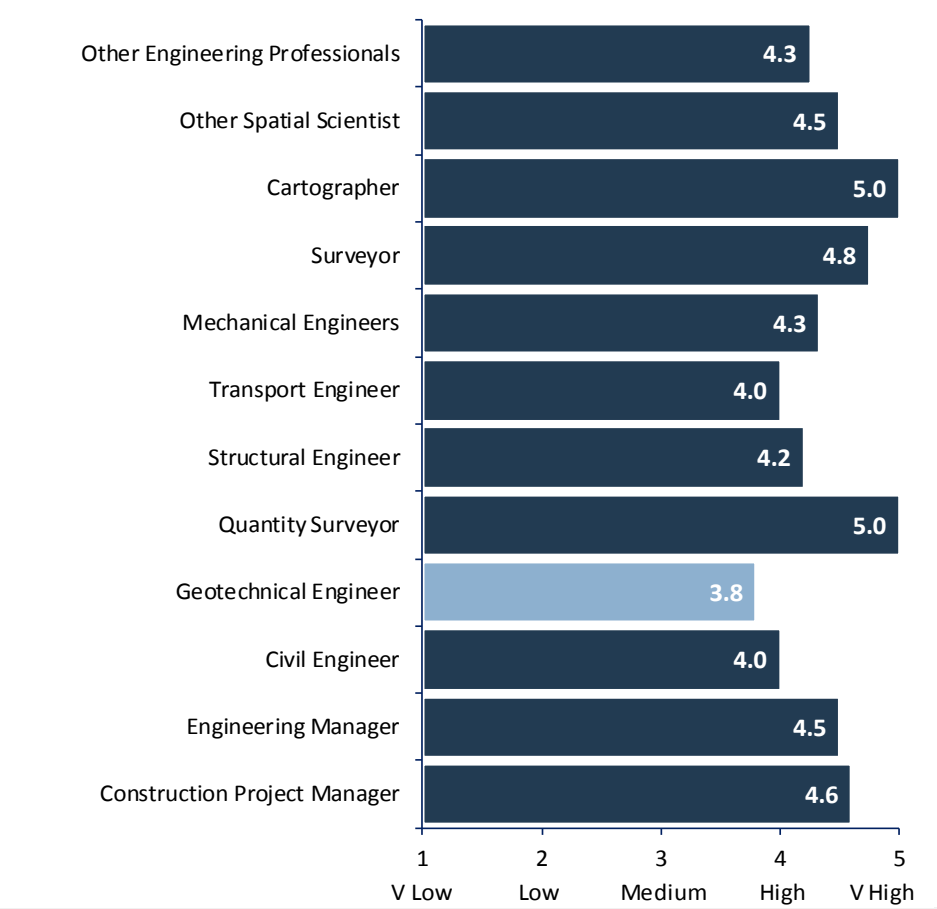


Inform, Technological and Artisan skills

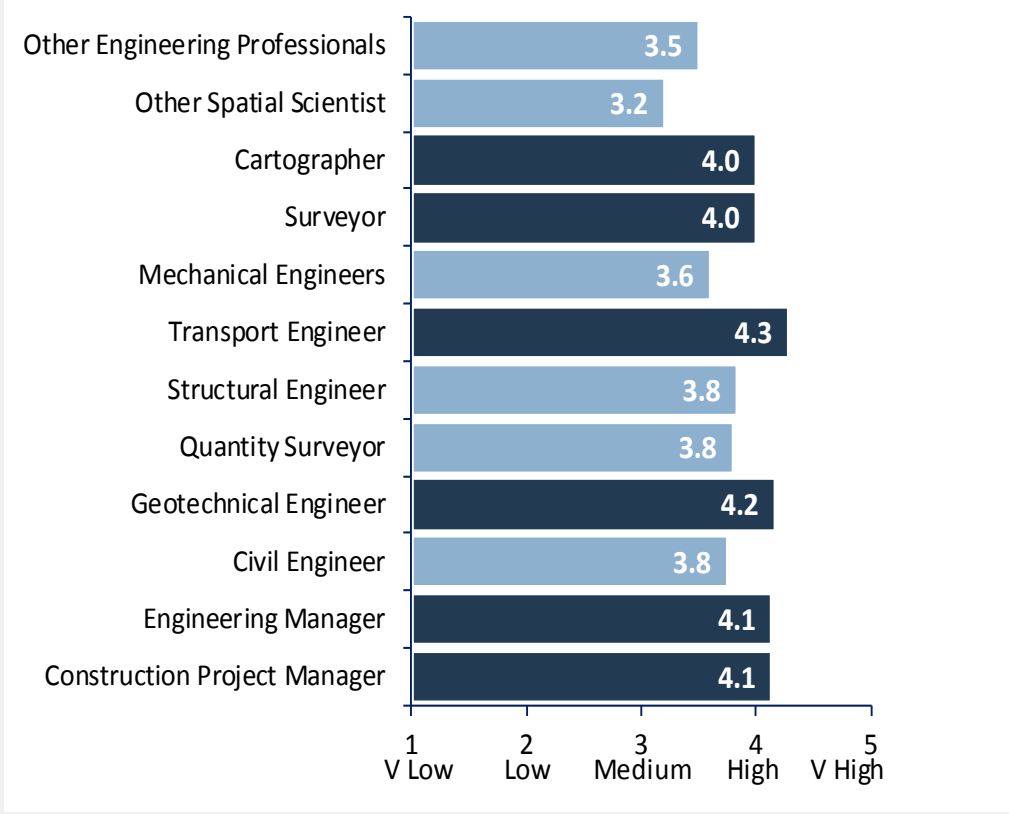


Survey Results – Where Will Shortages Arise?

Roads Agencies



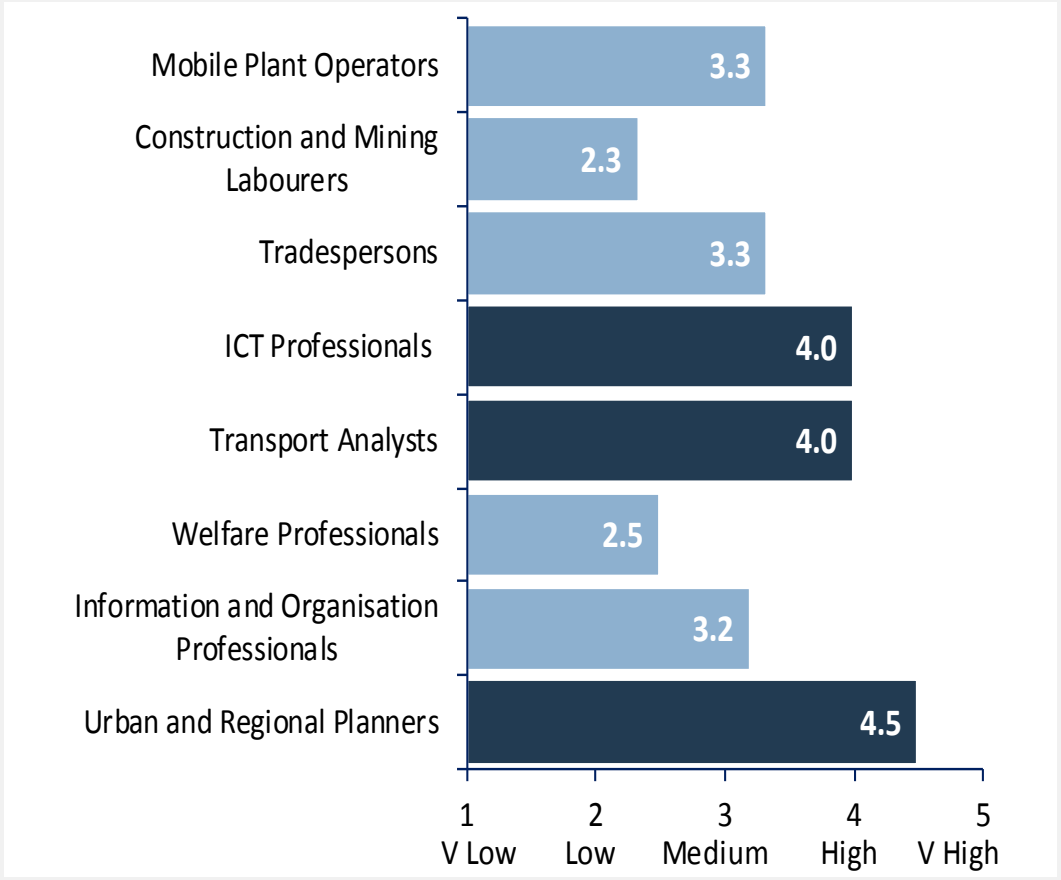
Other Industries



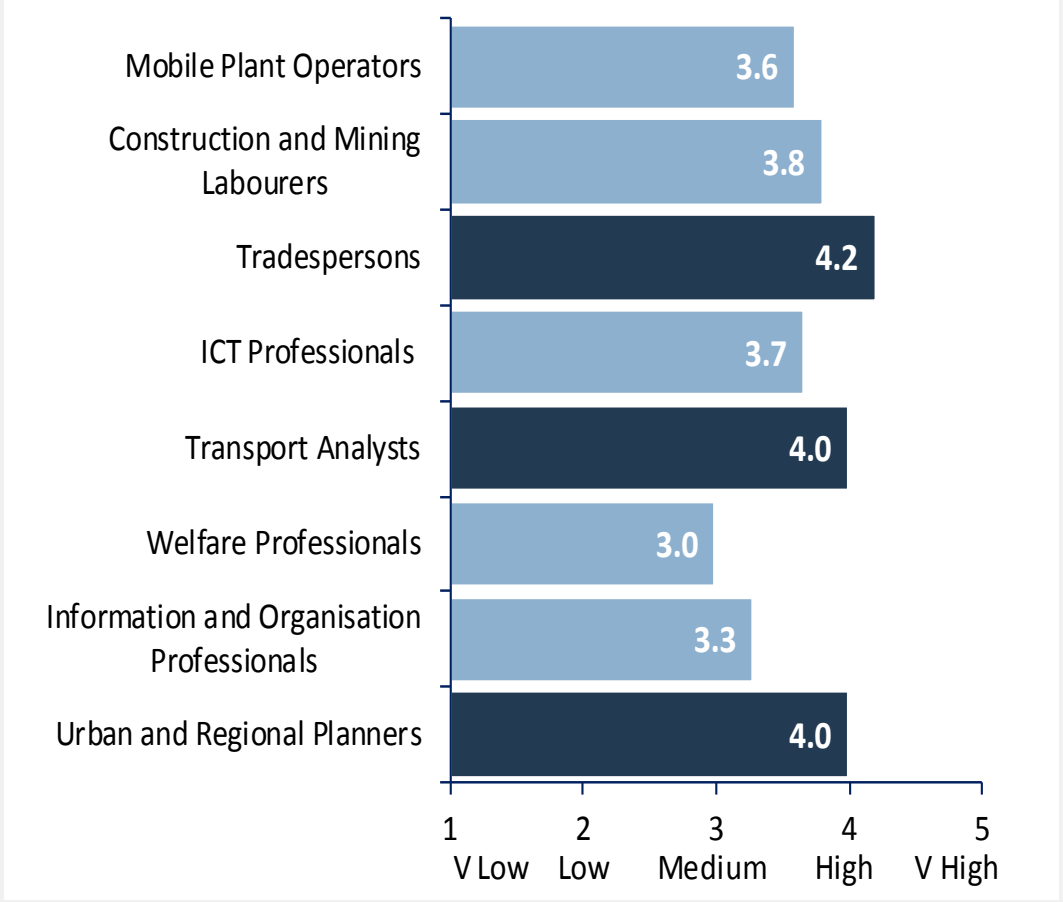
Survey Results – Where Will Shortages Arise?

Austroads

Roads Agencies



Other Industries



Insights from Industry Interviews

Existing skills shortages

- ‘On site’ engineering and construction skills – contractors & local government
- Estimators and project controls
- Pavement engineering – local government
- Procurement (informed purchaser) – agencies and local government
- Data management and tactical / real time network operations
- Transport economists
- Asset management

Insights from Industry Interviews

Austroads

Future Skills Required

- Asset management skills to provide holistic approach to custodianship
- Network operations skills – both tactical and in real time
- Technological skills to develop and secure data systems
- Analytical skills to interpret large volumes of data and make decisions
- Economics skills to develop robust business cases and funding methods
- Behavioural skills to anticipate human reactions to new technologies
- ‘Soft skills’ to communicate ideas & solve problems in midst of disruption
- Asset management

Insights from Industry Interviews

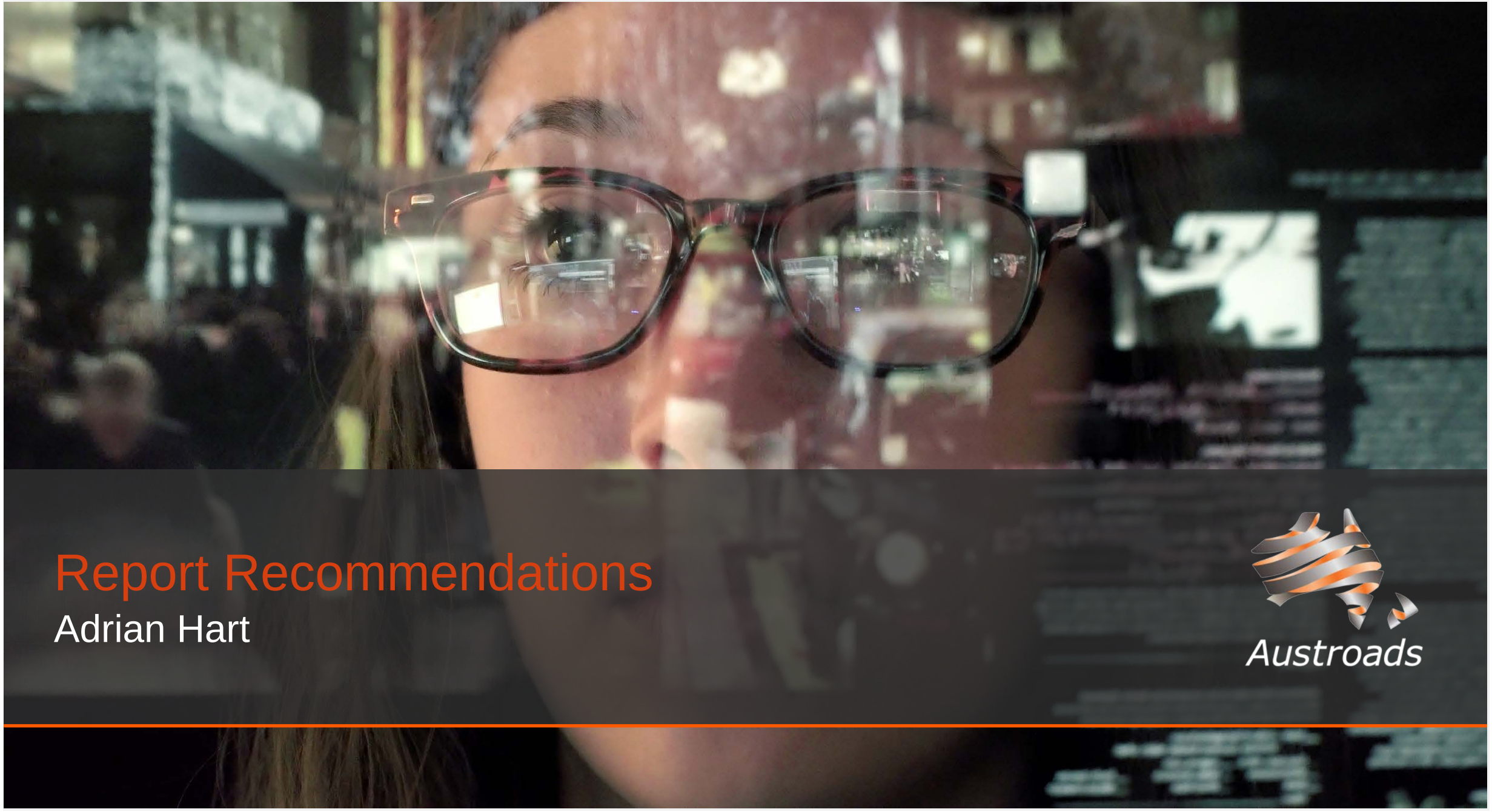
Impact of New Technologies

- CAV ranked biggest threat – engineering, legal, commercial skills
- CAV also to change regulatory environment – prescriptive vs outcomes based
- CAV impact on funding
- Transition period to CAV – long period of mixed use
- Impact of C-ITS, MaaS and electric vehicles
- Moving data and services online

Insights from Industry Interviews

Other Risks to Workforce Capability Identified

- Inability to attract skills due to pay or regional differences
- Demographic and cultural challenges
- Insufficient or mismatched skills from the education sector
- Institutional roadblocks
- Need to develop partnering culture



Report Recommendations

Adrian Hart

Austroads

Potential Timing of Capability Threats

0-5 years (to 2022)	5-10 years (to 2027)	10-20 years (to 2037)
Demand / supply pressures		
Rising level of roads activity	Sustained high roads activity	Rising maintenance tasks
Competing industry demands	Competing industry demands	Unknown
Rapidly ageing workforce	Rapidly ageing workforce	Ageing workforce
Falling rates of migration	Stabilising rates of migration	Unknown
Falling STEM study in schools	Unknown	Unknown
Vehicle technologies (C.A.S.E.)		
ITS only	Emerging C-ITS	C-ITS
Mostly semi-autonomous vehicles	Emerging Level 4 and 5 CAV	Increasing share of Level 4 and 5 CAV
Ride sharing services (e.g. Uber)	Emerging MaaS systems	Advanced MaaS systems
Mostly non-electric vehicles (EVs)	Increasing share of EVs	Majority of new vehicles sold are EVs
Other technologies		
Big data and BIM	Big data and BIM / systems	Machine learning and AI
Agency role and function		
Roads and Transport	Increasing Transport integration	Transport and Liveable Cities
Highly prescriptive regulation	Increasing outcomes approaches	Non-prescriptive regulation
Engineering & network operations	Increasing ops & asset mgment	Optimising transport networks and use
Funding / road user charging		
Licencing and fuel taxes	Introducing heavy vehicle RUC	Introducing broad-based RUC

Challenges and Potential Solutions

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Meeting ‘traditional’ skills challenges

- Maximising industry skills base – pipelines, procurement, education & training
- Using procurement as a skills strategy
- Targeting skills in regional areas – pooling, cadetships, network opportunities
- Strengthening workforce retention – at all life cycle stages

Challenges and Potential Solutions

Meeting ‘non-traditional’ skills challenges

- Stronger engagement with the education sector
- Partnering with industry

“*the answer may be… to identify ways we can bring in others to solve problems. We can be a good broker, rather than trying to do it all.*”

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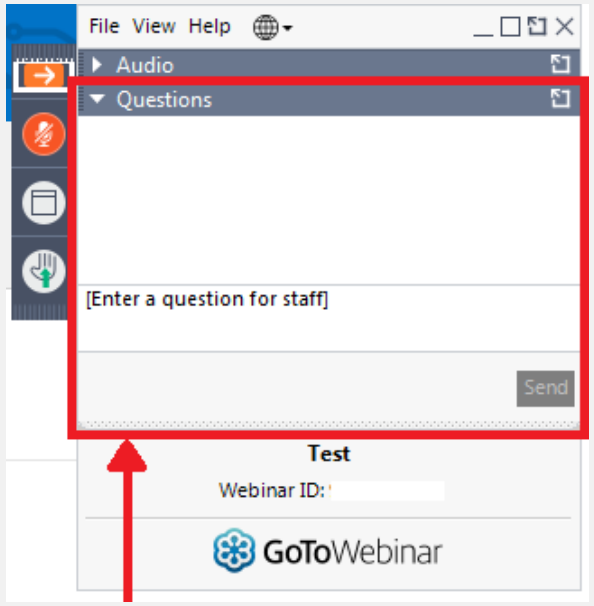

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Questions?

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Upcoming Austroads webinars

Topic	Date
Minimum Levels of Componentisation for Road Infrastructure Assets	11 September
Guide to Project Delivery Part 5: Road Construction Quality Assurance	20 September
Operations of Automated Heavy Vehicles in Remote and Regional Areas	25 September

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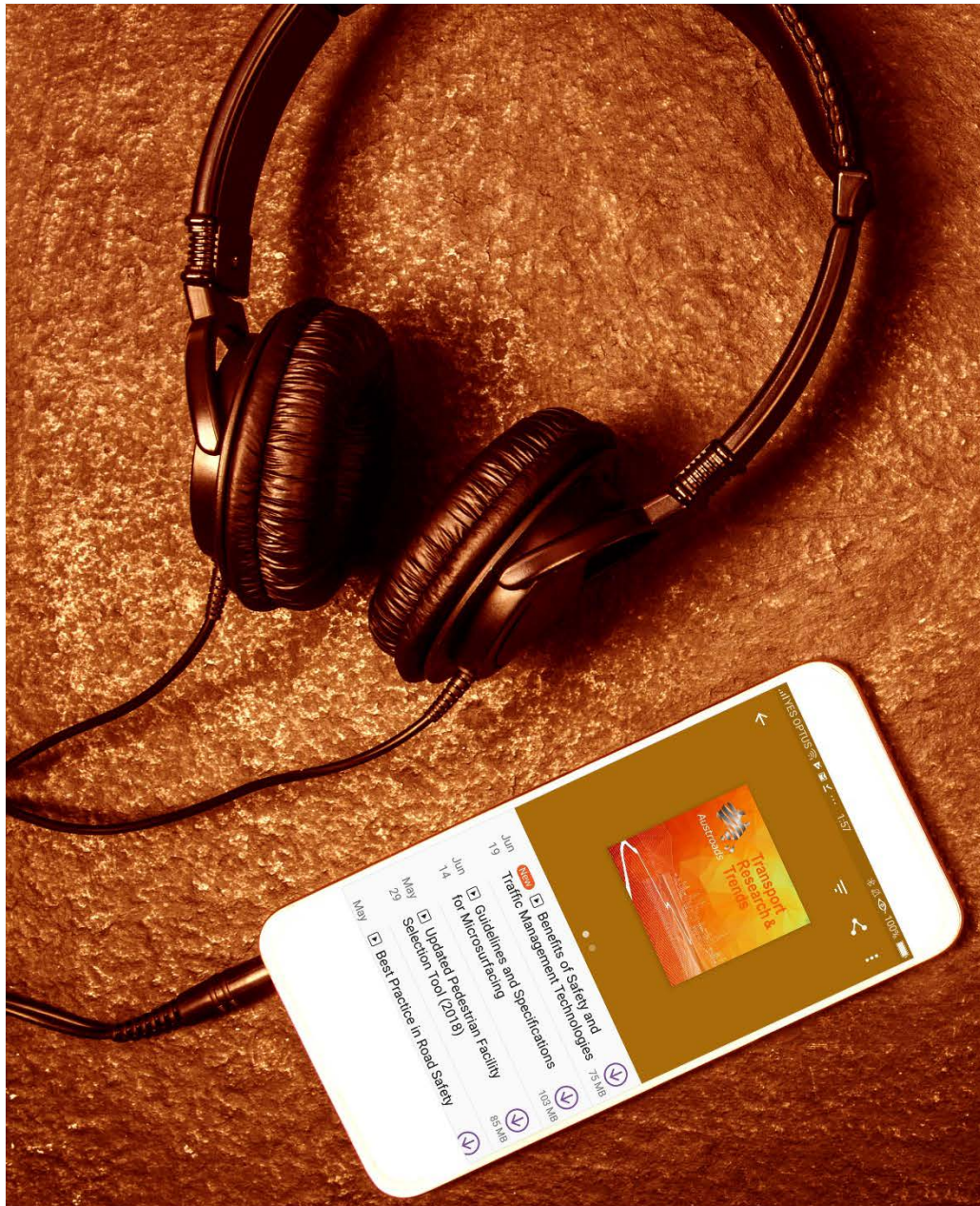

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