



Transport, Defence and Construction Technology Fact Pack

27 February 2015

THE BOSTON CONSULTING GROUP

Note to the reader

This material is one of seven fact packs produced by BCG across priority industry sectors in the space of a short, 4 week engagement

In compiling these fact packs, we have drawn on a range of existing sources

- Research and information held within the Department
- Publicly available information and reports
- BCG research and experience
- Discussions within the Department, with a number of BCG experts and with select individuals within the relevant industries
- However, within the available time, we were not able to undertake broad engagement within the industries

Data availability was highly variable across the seven industries covered

- In some cases good public information (e.g. ABS data) was available
- In others we needed to draw on a variety of different (and sometimes inconsistent) sources of varying depth and quality, and to use proxies and other indicators where data was unavailable
- We have made our best efforts within the available time to synthesise the data available and to develop a consistent basis of comparison across industries, however, data gaps remain in a number of areas
- We have made an attempt across all industries to provide an indicative estimate of the potential opportunity by 2025. Some of these estimates are necessarily rough. The intention is to provide some basis for high level comparison of the relative opportunity rather than to provide an accurate forecast of growth by industry

The objective is that these will form the starting point for further work by the taskforces within each industry

- We have attempted to highlight gaps and questions for further investigation
- We have not had the time to model the potential impact of exchange rate movements on these sectors and that should also be the subject of future work
- We expect that details, and particularly industry forecasts, will be refined by the taskforces

Executive summary

Transport, defence and construction technology

Technology and advanced process are increasingly important elements within three traditional industries: transport, construction and manufacturing

- Victoria's transport, manufacturing (including defence manufacturing) and construction industries account for ~18% of GSP and ~23% of total workforce
- The advanced technology and manufacturing segment of these industries (including electrical systems, chemical manufacturing and machinery and equipment) is estimated to contribute ~3% to GSP and ~2% of total workforce
- Victoria has strong capabilities in advanced industries including defence, engineering and specialist design, but challenges

Adoption and growth of advanced technologies will be critical to ensure Victoria's future competitiveness in these major industry sectors

- Advanced technologies are resulting in a fundamental shift in the way firms in this sector have traditionally done business
- Fragmentation of the supply chain means that competitiveness is no longer concentrated in a single region or country
- Advanced industries generally have much wider economic benefits than just GVA or direct employment; as 'learning industries' they have positive innovation and skills spill-over effects on other industries, and tend to drive research and development

Victoria has the opportunity to build competitive advantage in this space, despite a relatively high cost position

- Capable defence and aerospace sector, with expected growth in Commonwealth Government defence contracts
- Significant investment in advanced manufacturing research and technologies through world-class universities and dedicated research centres; Victorian businesses account for 49% of Australian R&D spend in advanced manufacturing
- Sizeable base of architectural and engineering design firms, and a growing number of Victorian construction, transport & defence SMEs that are increasingly innovative, collaborative & globally-oriented

In a low-growth scenario, maintaining historical growth, transport, defence and construction technology could add an additional \$480m to the economy by 2025, but employment would decline by 36,000. However, in a high growth scenario which assumes the sector matches the historical growth of the broader construction sector, the sector could add an incremental \$1.3b and 42,000 jobs.

There are a number of ways in which Government can support growth in this sector

- Ensuring appropriate regulation and systems are in place for emerging technologies; supporting SMEs to access the global supply chain; and facilitating and encouraging better application of R&D and technology across industries

Industry snapshot

Transport, defence and construction technology

Definition

Not one existing industry grouping, but rather a group of firms whose commonality is developing and/or applying technology as equipment, machinery, materials, software and systems used in or by the transport, defence or construction industries

Note: There is limited data on the technology subsectors so proxies have been used in many instances

Current status (2012-13)

Metric	Size	Growth (08-13)	Comments/assumptions
GVA	~\$9.3b	-2.6%	Estimate only; includes manufacturing only. Proxy used of subsector sales and service income as % of Aus manufacturing sales and service income; proportional to overall Vic manufacturing GVA;
Employment	~92K	-3.5%	Estimate based on ABS Labour Force Survey four quarter average; 5 Year CAGR (2008-13); manufacturing only

Industry incremental opportunity (2025)

Metric	Size	Growth	Comments/assumptions
GVA	\$480m (low) \$1.3b (high)	0.4% (low) 1.1% (high)	Low scenarios assume historical growth (decline) in manufacturing is maintained for both GVA and employment across proxy subsectors. High scenario assumes subsectors match broader construction industry GVA and employment growth.
Employment	-36K (low) 42K (high)	-3.4% (low) 3.2% (high)	

Competitiveness



Access to resources



Infrastructure and regulatory costs



Scale



Market position



Innovation

Key

- ++** Significant strength
- +** Advantaged
- ~** On par globally
- Disadvantaged
- Significant barrier or risk

1. Proxies used include transport equip manufacturing and machinery equipment manufacturing

Transport, Defence and Construction are separate industries with commonality in the use of advanced technologies

Definition

Not one existing industry grouping, but rather a group of subsectors (and firms) whose commonality is increasingly the development and/or application of technology as equipment, machinery, materials, electronics, software and systems used in or by the transport, defence or construction industries.

Advanced manufacturing and design are relevant cross-cutting inputs in this space. Combined, they span design, composite materials, material handling, software development, additive processes, automated systems and advanced electronics and machinery

Excludes food manufacturing and medical/biotech technologies that are captured in other industry overviews

Subsectors

Production and manufacturing

- Advanced materials
- Electronics & electrical equipment
- Aerospace
- Prefabricated building
- Machinery & equipment

Systems and specialist technical inputs

- Design, modelling, engineering and other technical services

Application of advanced technologies

- Services (e.g. defence, construction)
- Operators and distribution centres
- Facilitates management

 Priority area

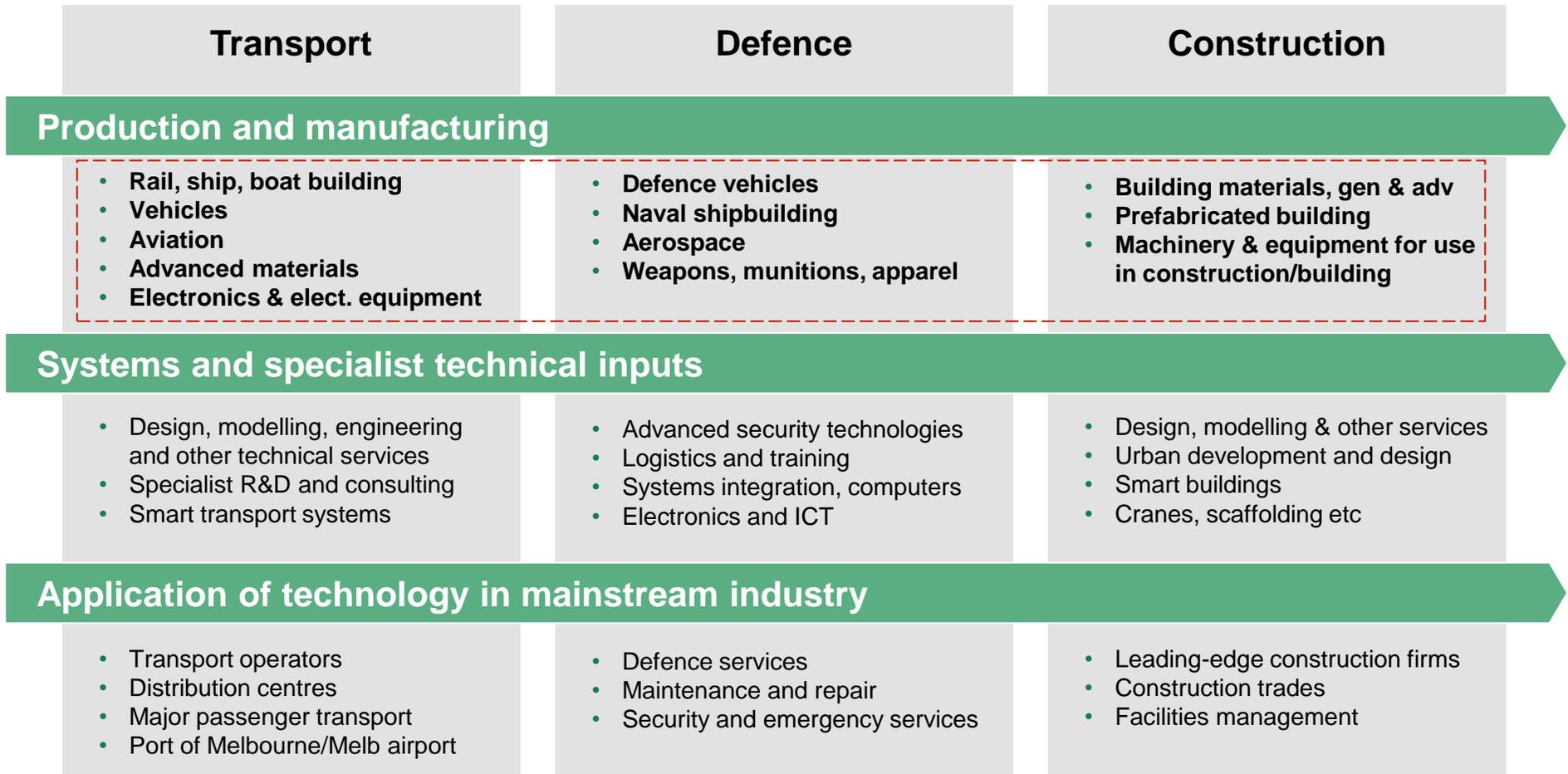
Data availability is limited; we have used a mix of available data and proxy indicators with gaps remaining in some areas

Note: Priority areas assessed primarily on four factors, including: size/growth, data availability, diversity, client focus

Source: Green & Roos 'Australia's Manufacturing Future: Discussion paper prepared for the Prime Minister's Manufacturing Taskforce' (2012); Invest Victoria (2014); ABS Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006

A number of subsectors exist within these three industries

Limited data exists at the subsector and functional level



 Priority area and/or data available

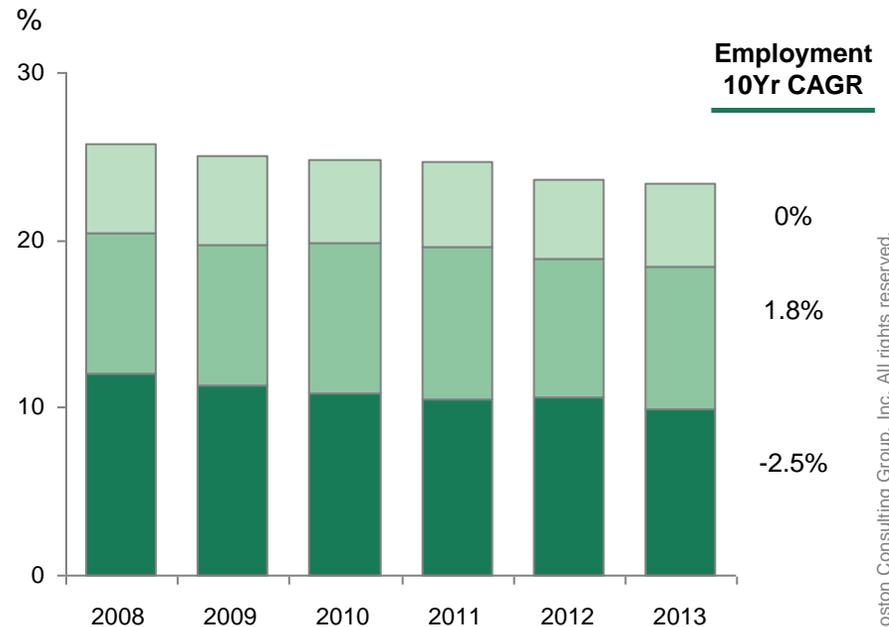
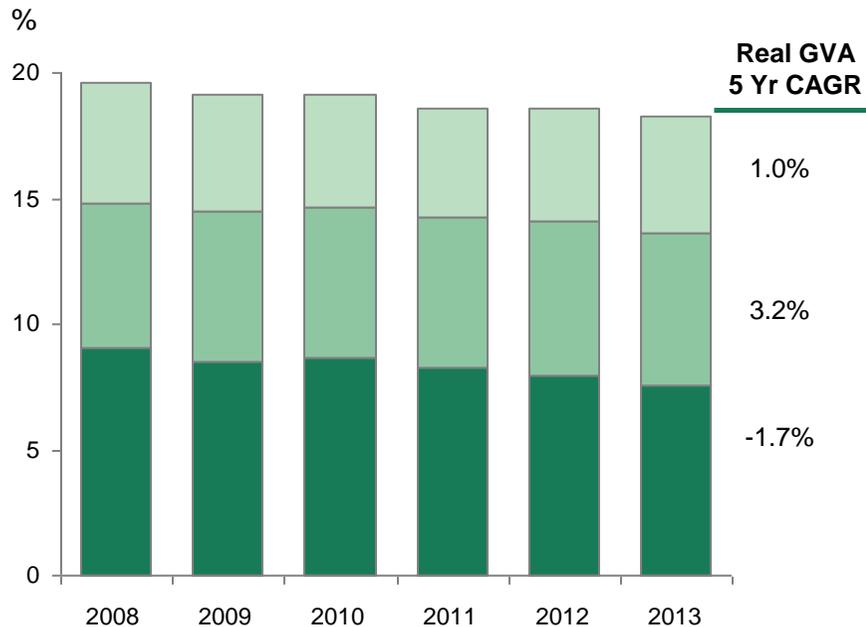
Transport, construction and manufacturing are significant contributors to GSP and employment in Victoria

**Industries contribute ~18% to GSP;
manufacturing contribution has declined**

**Industries employ a sizeable 23% of
the total Victorian workforce**

Industry contribution to Gross State Product, Vic

Share of total employment, Vic



- Transport
- Construction
- Manufacturing

Advanced technologies run across, and are important components of, all three industries

Note: GVA excludes taxes. ABS categories included in this analysis are 'Manufacturing', 'Construction', and 'Transport, postal and warehousing' – most of 'Defence' is captured in 'Manufacturing'. Source: ABS Cat No. 5220 Australian National Accounts: State Accounts 2013-14; ABS Cat No. 6291 Labour Force, Australia, Detailed, Quarterly (Employed persons by State and Industry) 2014

Victoria's advanced industries are relatively small but important to wider economic infrastructure

Categories used as proxy for this sector

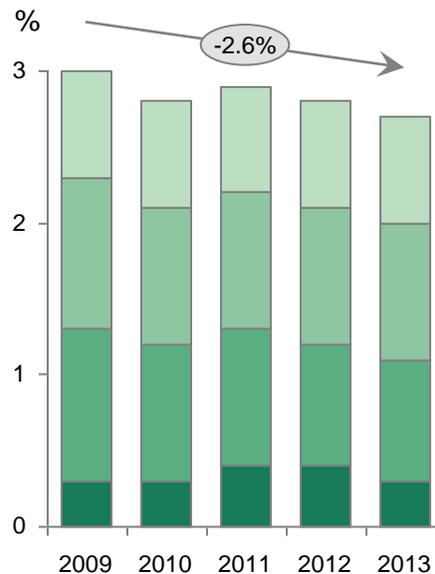
The manufacturing sector covers a majority of the 'technology' and advanced industry activity in this space, including within defence

Limited data is available at the appropriate subsector level, so proxy categories have been used:

- Transport equipment manufacturing
- Machinery and equipment manufacturing
- Fabricated metal product manufacturing
- Basic chemical and chemical product manufacturing

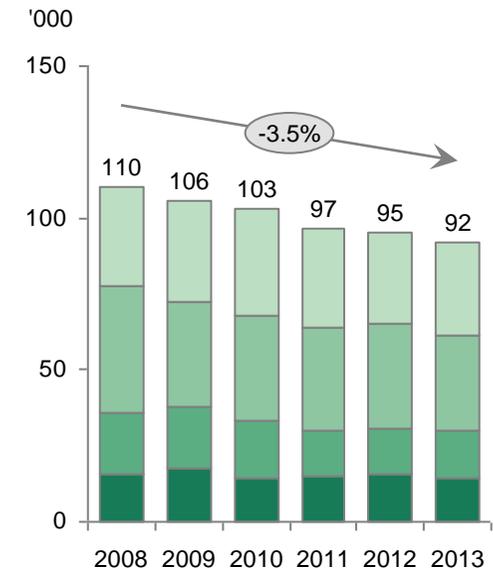
Estimated contribution of ~2.7% to GSP

Estimated subsector contribution to GSP, Vic¹



Sector encompasses ~92,000 people

Estimated subsector total employment, Vic²



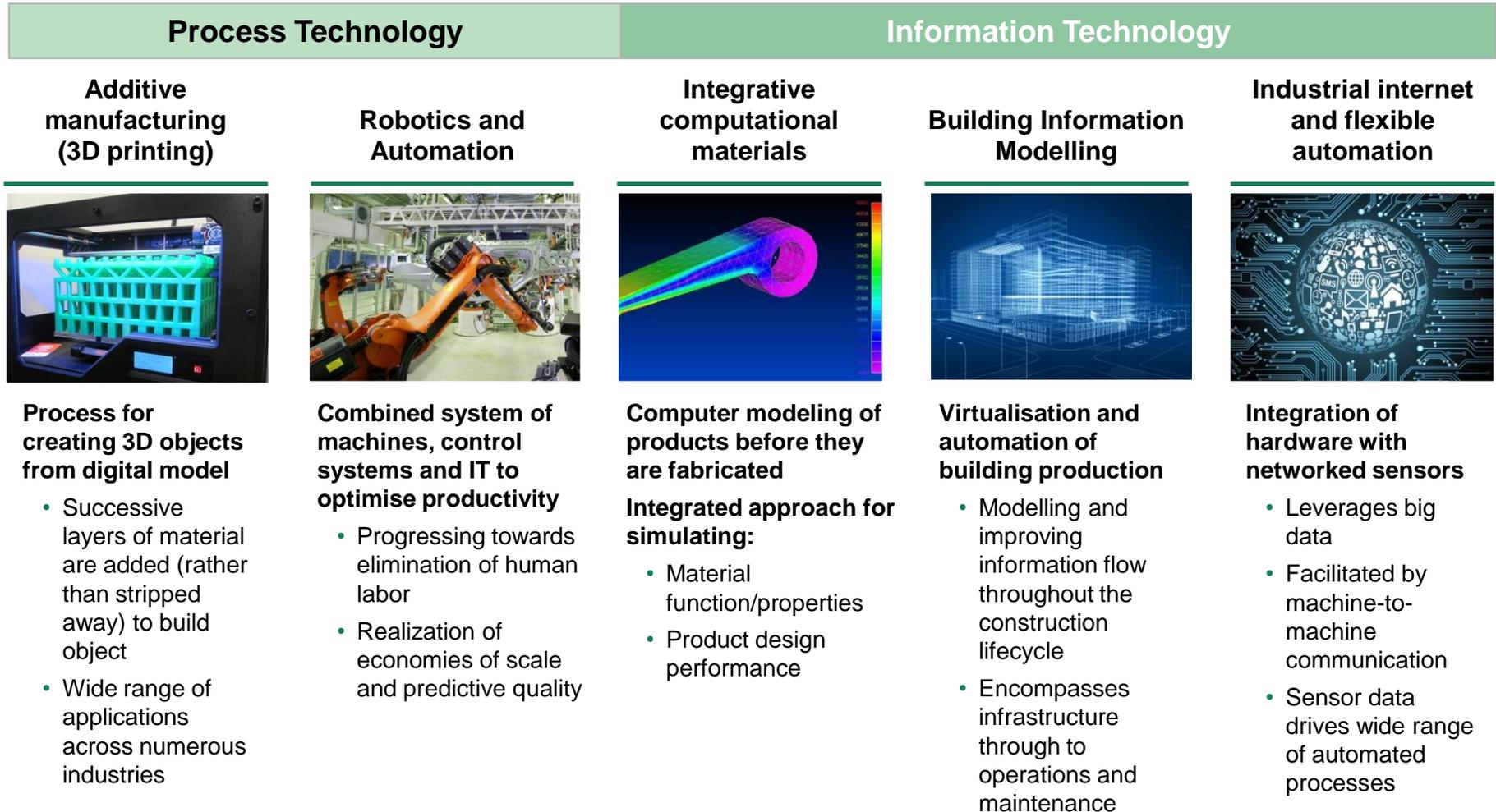
- Transport equipment
- Machinery and other
- Fabricated metal product
- Basic chemical & chemical product

These subsectors are critical inputs to transport, defence, construction and wider economic infrastructure

1. Subsector industry value add as a proportion of Victoria's manufacturing sales and service income is used as a proxy for subsector GVA 2. Please note that labour estimates are based on small ABS survey samples and should be interpreted with caution at this level of disaggregation

Source: ABS Cat No. 5220 Australian National Accounts: State Accounts 2013-14; ABS Cat No. 6291 Labour Force, Australia, Detailed, Quarterly (Employed persons by State and Industry) 2014

Advanced technologies are changing industry landscapes...



...and will deliver economic benefits to many industries

Wider economic contribution

- Advanced industries support extensive supply chains and are large buyers of goods and services from other industries (e.g. professional and technical services)
- The US Bureau of Labor Statistics has calculated that each dollar worth of manufactured goods creates another US\$1.43 of economic contribution towards other sectors, a higher multiplier than any other sector

Build skilled workforce

- Workers in these industries tend to be more productive and have higher value-add – they also tend to earn more than comparable peers in other industries

Facilitate knowledge

- Advanced industries have significant learning spill-over effects on other industries, driving innovation and skills

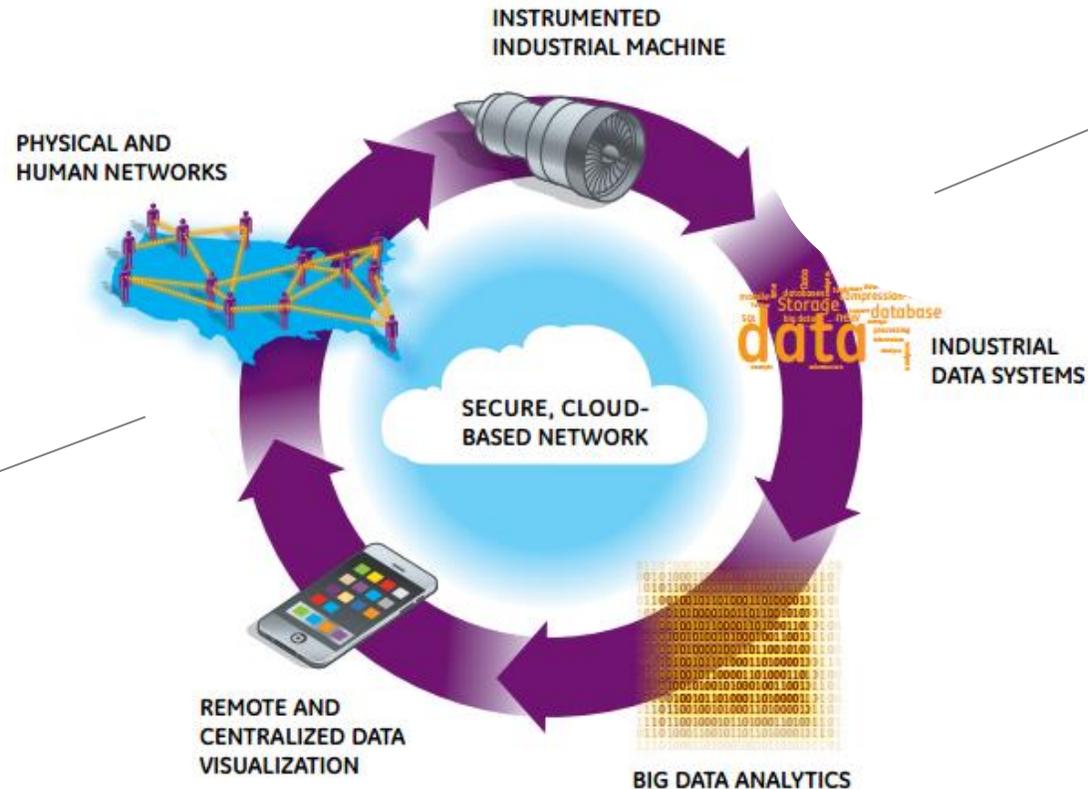
Drive innovation

- Firms in these sectors are significant drivers of research and innovation
- Firms in these sectors are generally early adopters of new technologies and processes

Connectedness

- Advanced industries are tightly linked to and influenced by globalisation and distributed global value chains, providing opportunities for firms to capture global market share in more specialised, high value add manufacturing

Backup: Industrial internet ecosystem highlights wide range of opportunities for advanced industry businesses



Transport, defence and construction products and processes are increasingly reliant on advanced ICT and electronic systems and network

Technological acceleration and globalisation of supply chains means that industrial machines and equipment becoming more reliant on digital data systems and advanced analytics

Growing Victoria's advanced industries will have flow-on effects on broader manufacturing and professional services

Victoria is home to a number of global firms and leading-edge research institutes in these sectors

Manufacturing

Many **global companies have manufacturing operations in Vic** and have established their **R&D and design facilities** there, including:

- BAE Systems
- Holden (global design studio)
- Toyota (technical centre)
- Siemens
- IBM and Microsoft

Melbourne and regional Victoria are home to a network of specialised advanced manufacturing research precincts

- RMIT Advanced Manufacturing Precinct
- Monash CSIRO Scientific Pr.
- Geelong Technology Precinct - Deakin University Waurn Ponds Campus
- Scoresby Small Technologies Cluster

Defence & Aerospace

More than 300 businesses with expertise, skills and facilities that supply products and services for domestic and international defence markets

- Thales Group
- BAE Systems
- Boeing's R&D centre
- Marand Precision Engineering
- ADA
- C4i

Melbourne is home to large cluster of research institutes including nine universities, technology parks, Australia's Defence Materials Technology Centre (which focuses on new material technologies and manufacturing processes), and the Defence Science Institute

Transport & Construction Technology

Local companies that are globally competitive in precision machining, robotic systems and ground handling equipment, e.g.

- Aerostaff Australia
- Hofmann Metaltec
- Marand Precision Engineering

Global firms with bases in Victoria

- ARB (4WD components)
- KH Equipment (Turbine starter motors)
- Bombardier (aeroplane and train manufacturing)

Leading engineering consulting firms

- Arup
- GHD

Case studies: Victorian-based firms building advantage through research and innovation



Sutton Tools

Overview

- Established in 1917, Sutton Tools has used new tech to become one of the world's largest family owned cutting tool companies
- Head office in Thomastown with three factories in Vic

Actions

- Began aggressive R&D investment in 1990s to capture advanced manufacturing opportunities in Asia and the US
- Currently operate a fully staffed R&D test centre
- Strong links with RMIT and Swinburne Universities, including shared equipment
- Member of Defence Materials Technology Centre
- Sutton Tools worked with the DMTC to establish the Advanced Surface Solutions Facility (ASSF)

Outcomes

- Employ 350 staff in Australia, with plans to expand
- 40% of Sutton Tools' product is exported, largely to Europe (Germany is their largest export market)



Rosebank Engineering

Overview

- Founded in 1977, Rosebank Engineering supplies manufacturing and engineering services to the defence and aerospace industries
- HQ and additional site in Victoria

Actions

- Established itself as a leader in additive manufacturing processes, particularly cold-spray technology in part thanks to strong research relationships and collaboration with the Defence Science & Technology Organisation; Defence Materials Technology Centre; and Monash University Centre of Expertise in Structural Mechanics

Outcomes

- ~130 employees
- Revenues of \$27m, of which ~15% are exports
- By developing and applying innovative repair technologies, Rosebank helped save the RAAF more than \$4m

How can Government help facilitate collaboration between research centres and industry?

Source: Australian Manufacturing Technology Institute Limited 'Future Manufacturing Workshop: Post-event report (2012); Sutton.com.au (visited 16 Jan 2015); ABC News 7:30 report 16 February 2012; Rosebank Engineering Company Profile; Australian Exporters Company Profile: Rosebank Engineering (<http://www.australianexporters.net/companyID5726.htm>); AMTIL 'Australian aerospace – A \$4b industry set for strong growth' (2014)

Case studies: Victorian-based firms becoming global players through advanced processes and products



Textor Technologies

Overview

Textor Technologies are a Victorian-based manufacturer of absorbent textiles for health care, hygiene and industrial products

Actions/interventions

- The firm approached the CSIRO to help enable it to compete with manufacturers in Asia by focusing on specialised absorbent textiles
- They also received benefits or concessions from one or more Australian Government business programmes to help fund this goal

Outcome

- The long-term partnership with CSIRO resulted in a reduction in Textor's production cost, growth in turnover and the launch of innovative new products
- Textor's absorbent technology enabled it to develop a relationship with Kimberly Clark Australia, thereby gaining access to Kimberley Clark's extensive global supply chain



Marand

Overview

Marand is a Melbourne based, privately owned Australian SME that supplies high-quality precision tooling, machine tools and highly engineered automated production solutions

Actions/interventions

- Marand extended and diversified its business from automotive into the defence and aerospace sectors in the early 1990s and has become a key supplier to the F-35 Joint Strike Fighter programme
- Marand received funding from the Australian Government to attend international trade shows

Outcome

- Turnover of ~\$25m per year (2012)
- Marand are recognised as having one of the largest in-country capabilities in automated facility engineering and many of their tools and equipment are unique to Australia
- Awarded Manufacturer of the Year (Large Business) at Vic Government's Manufacturing Hall of Fame awards in 2012

How can Government encourage and facilitate access to the global supply chain?

Transport: Many challenges facing the auto parts sector, although there are some export opportunities

Context

The Victorian motor vehicle and motor vehicle parts manufacturing sector employs approximately 24,000 people¹

The sector has faced many recent challenges, however there has been some growth in the Motor Vehicle and Parts Wholesaling sector, which added an additional 5,750 people to its workforce, nationally, in 2012-13

One of the drivers of this growth has been the **expansion of global players** in the automotive auction marketplace (e.g. Manheim)

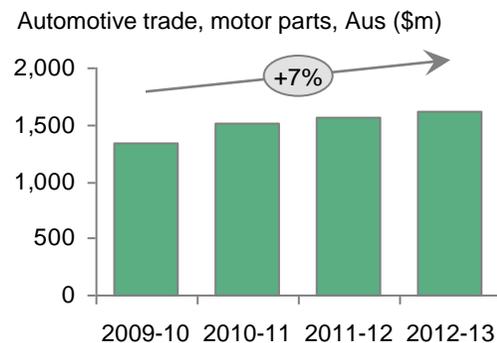
Businesses who remain in this industry are **increasingly adopting new business models focused on innovation and technology**

Opportunity

Globalisation and fragmentation of the supply chain brings opportunities for Victorian firms to grow their exports

- Recent surveys of the Victorian auto parts industry indicated that ~64% of companies already export their products, with a further 14% indicated they were interested in exporting

Exports of motor parts have increased by 7% p.a.



Challenges

Rationalisation and consolidation

- Particularly a challenge for sole proprietors and SMEs

Scale

- Australia's production is low compared to other players, unlikely to gain comparable scale

Competitiveness

- Local costs are high
- Import competition is strong
- Exports are still low

Export barriers

- Cost of entry
- Trade barriers
- Access to key markets
- Nature of business

1. Please note the ABS Labour Force Survey statistics are based off a small sample, and disaggregations at the State and industry division should be interpreted with caution
Source: ABS Cat No. Employed persons (ST E06) by Industry (ANZSIC group), State and Territory, Status in employment and Sex; Auto Skills Australia 'Automotive Environmental Scan 2014'; Victorian Department of Economic Development, Jobs, Transport and Resources unpublished data (2014)

Transport: Trains and rolling stock production increasingly offshored

Context

Approximately 1,000 people are employed directly by major rail rolling stock manufacturers in Vic

- Another 5,000 to 10,000 employed in supply chains

Large companies with a major presence in Victoria include Bombardier and UGL Rail, with smaller firms such as ARM Group and Alstom providing equipment and component parts to these larger entities

Rail rolling stock manufacturing is **directly influenced** by State Government procurement policy and purchasing decisions

Opportunity

The Victorian Government's Project 10,000 outlined new infrastructure commitments, including

- Melbourne Metro Rail (\$300m)
- Mernda rail extension (\$400-600m)
- Rolling stock - 30 new metro trains and 20 new V/Line carriages, with 50% local content requirement

Major projects also present an opportunity for train systems (e.g. lights, signals) and technology

Growth is expected in emerging markets such as Middle East, ASEAN, Mongolia, Kazakhstan, India, Latin America, Eastern Europe

Challenges

Uncertain market environment

- Inconsistent application of local content rules
- Fluctuating demand for workers

Scale

- Australia's production is low compared to other players, unlikely to gain comparable scale
- Australian rolling stock orders over past 10 years suggests that economies of scale is reached when the order size is ~200 cars

Workforce skills

- Specialised field where workers with existing engineering or trades qualifications typically require significant additional training

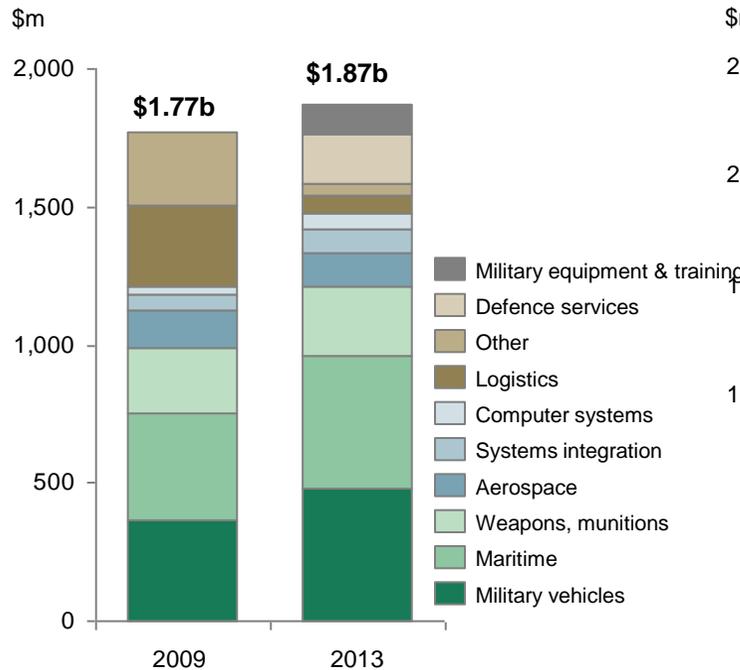
Is there sufficient scale in Victoria to produce rolling stock competitively?

Defence: Victorian industry worth \$1.9b and 5,230 workers

Exports appear to have declined significantly, but data should be interpreted with caution

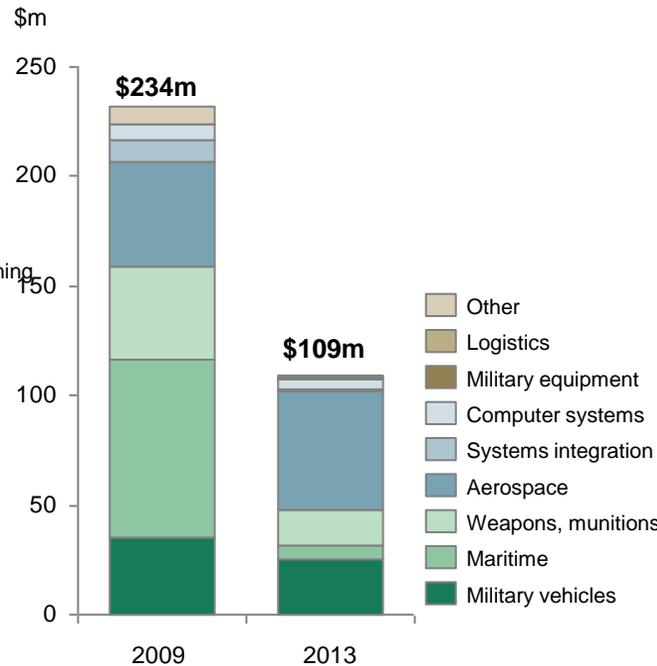
Victoria's domestic defence industry worth ~\$1.9b

Defence related turnover, domestic business, Vic



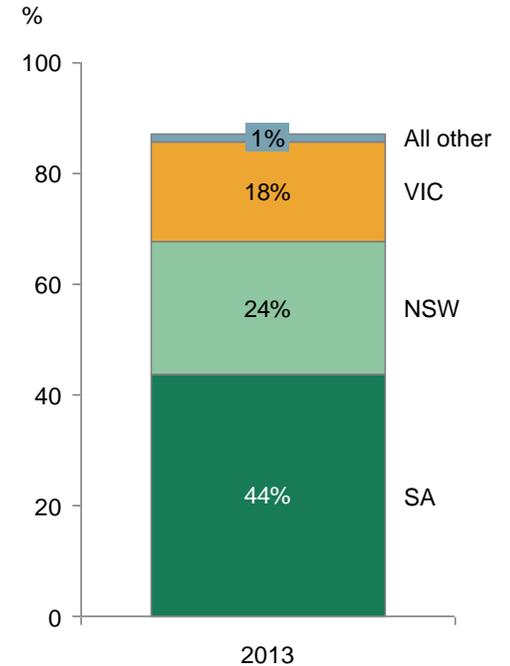
Exports appear to have declined significantly

Defence related turnover, exports, Vic



Vic accounts for only ~18% of industry employment

Estimated Australia defence industry employment, Aus¹



Victoria appears to have lost ground as South Australia has positioned itself as the 'Defence State'

1. Estimates only – taken from NSW, Victorian and South Australian estimates of 'direct' defence industry employment
 Source: NSW Government 'NSW Position Paper on Defence' (September 2013); South Australian Government 'Major Developments 2013/14'; Victorian Department of Business and Innovation 'Defence Industry Victoria, Australia' (2014); Victorian Department of Business and Innovation 'Summary of Defence Industry Victoria' (2009); Invest Victoria (2011)

Case study: South Australia's strategy to become Australia's 'Defence State'

Background

Starting situation

For a number of years, Defence has been a core element of South Australia's economic development plan

'Defence SA' was established in 2008-09 with the mandate to help support and grow the SA defence sector. The Government has made significant investment in becoming Australia's prime 'Defence State'

Intervention

Strong focus on developing the State's defence capabilities

- Defence SA agency (\$30m budget)
- Dedicated Minister for Defence Industries

Specific defence targets are embedded in SA's Strategic Plan

- Increase defence sector employment to 37,000
- Deliver a \$2.5 billion annual contribution to South Australia's economy by 2020

The Government has supported the development of defence clusters

- Techport Australia
- Technology Park Adelaide
- Edinburgh Defence Precinct

The SA Government plans to seek that the Australian Government relocate activities of the Defence Material Organisation from Victoria to South Australia

Outcomes

In 2010–11, the State's defence industry directly employed 5,189 FTE, representing an overall employment growth rate ~5%

- Growth was experienced across all defence industry areas in 2010-11. The shipbuilding and repair sector demonstrated the strongest growth (21%), driven by major projects

SA has won a number of major defence and security projects

- \$8 billion Air Warfare Destroyers, the largest defence project in Aus
- \$1 billion Orion aircraft maintenance and upgrade contract
- multi-billion dollar Collins class submarine maintenance contract
- \$1 billion Project Sentinel program – the world's largest aerial civil maritime surveillance operation
- Commitment from Commonwealth Government that the future submarines program will be centred in Adelaide

Construction: Innovative technologies and processes present both an opportunity and challenge for construction industry

Context

In order to reduce costs and increase productivity, construction companies are developing innovative products and processes

- Prefabricated roof trusses, modular high rise buildings, modular bathrooms, light weight concrete, improved strength pre-cast concrete panels etc.
- Building Information Modelling (BIM) and Computer Aided Design (CAD) throughout project lifecycle

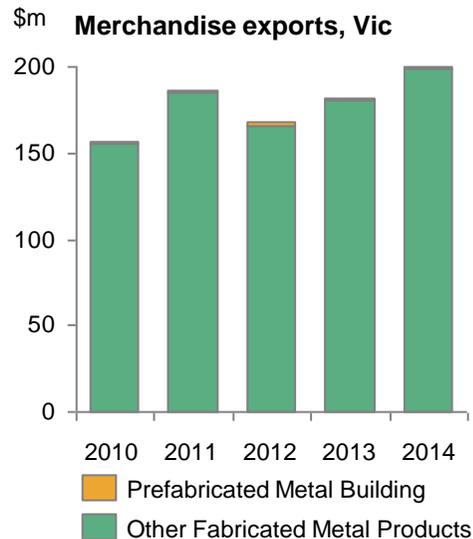
Early local adopters of these products and processes include AG Coombs (modular heating/air-conditioning risers) and Hickory (modular high rise buildings)

Opportunity

Asia-Pacific prefabricated buildings market valued US\$44.4b in 2012

- Australia's share is ~6.8%

Victoria has seen 6% compound annual growth in exports of 'other fabricated metal products'



Challenges

Significant upfront investment is usually required for companies to innovate with building materials

- e.g. Hickory estimates it has invested \$60m into developing its modular building system

Companies moving from traditional construction into modular require new skills

- Digital and analytical capabilities
- Engineering and technical skills

Government tender processes can be opaque and lengthy

Building and construction codes and planning requirements are often not up to date with new developments or technologies

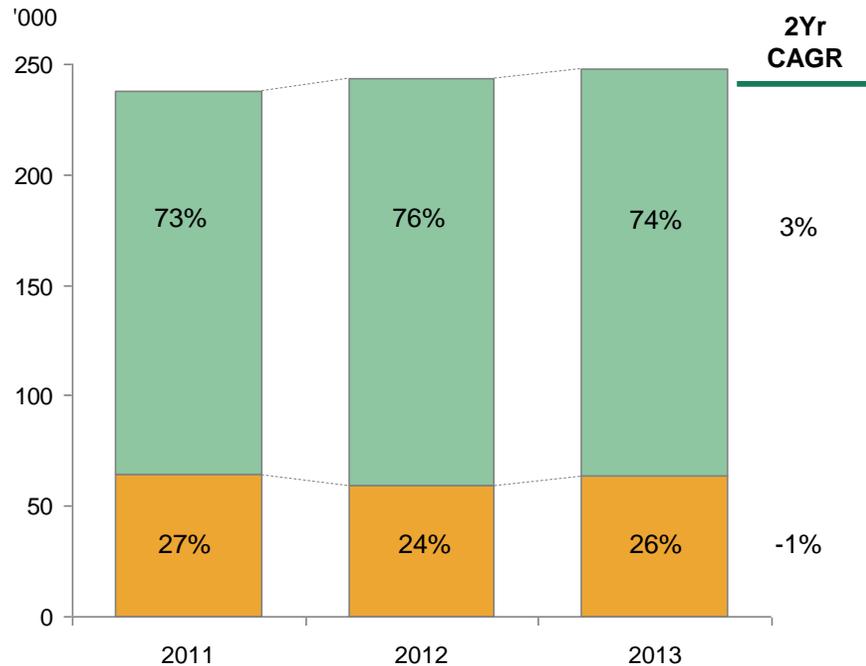
1. Research and Markets 'The Global Prefabricated Buildings Market - Key Trends and Opportunities to 2017' (2013)
Source: Department of State Development, Business and Innovation unpublished data (2014); ABS Cat. No. 5368.0 (2014); Architecture and Design 'Global competition in prefabricated housing must be met by Australian Architects' (2014)

Design: Architectural and engineering services are key inputs

Victoria has a strong position in these professional services sectors

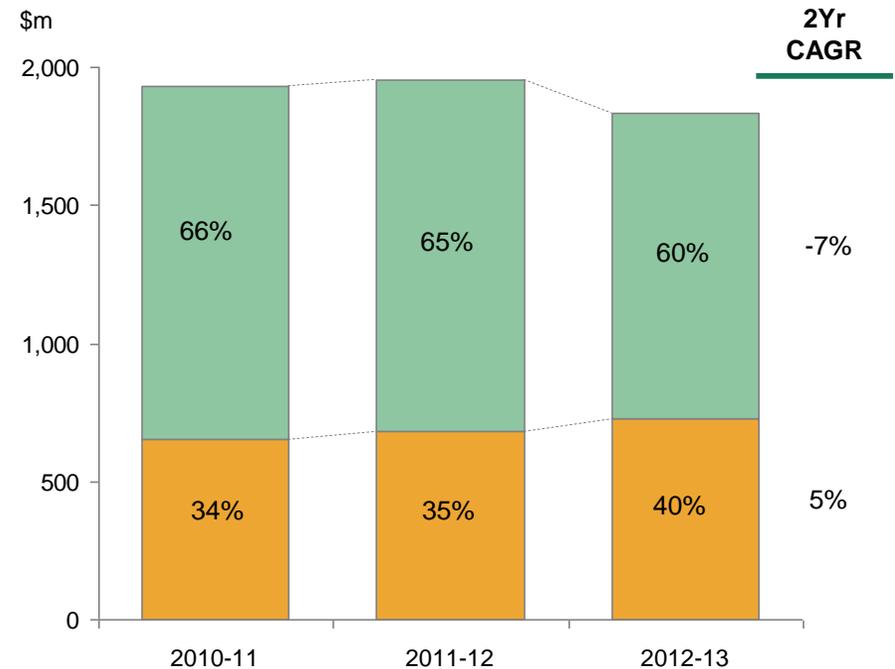
Vic accounts for 26% of architecture and engineering services employment...

Total employed by sector, Architectural, Engineering and Technical Services, Aus



...and 40% of Australia's architecture and engineering services exports

Exports of services by Activity, Architectural, Engineering and Technical Services, Aus



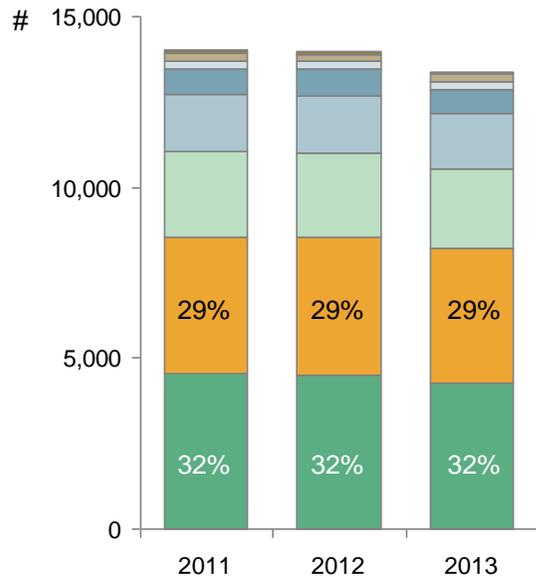
Rest of Australia
Victoria

Transport, defence and construction industries are strong drivers of specialised professional services growth

Design: Victoria has second highest number of architectural and engineering design businesses in Australia

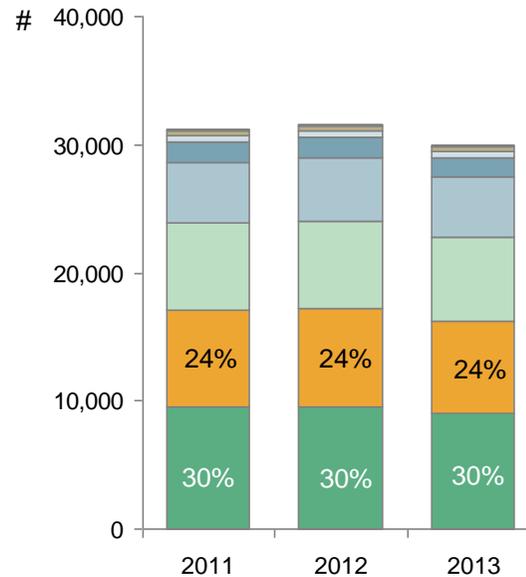
Victoria has 29% of all architectural services firms...

Total number of Architectural Services businesses, Aus



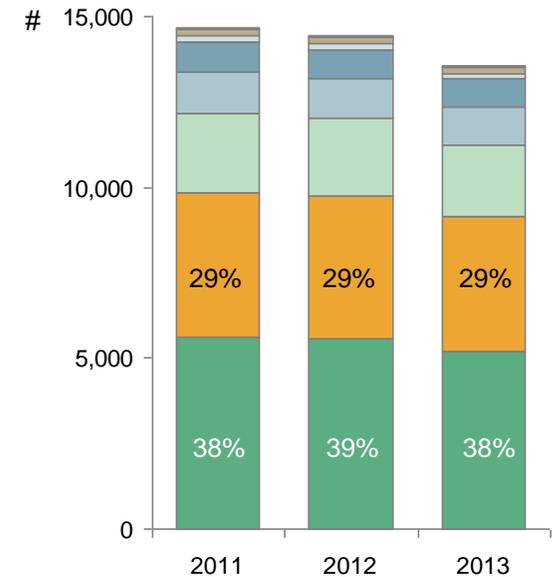
...24% of all engineering design and consulting firms..

Total number of Engineering Design & Consulting Services businesses, Aus



...and 29% of all other specialist design firms

Total number of Other specialist design businesses, Aus



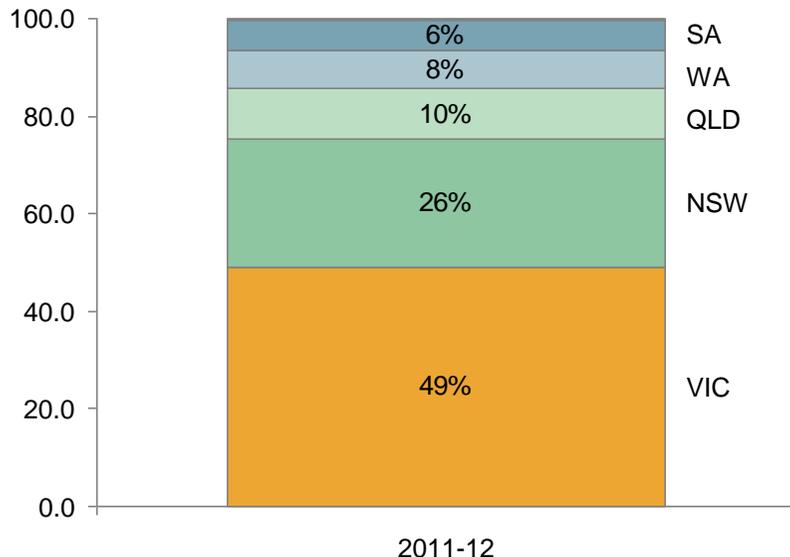
NSW has a dominant position but Victoria is well-placed to capture demand for these types of services

Advanced manufacturing: Victoria building R&D capacity

Victorian businesses account for almost half of Aus R&D spend

Victorian firms spend the most in the areas of Basic Chemical and Chemical Product Manufacturing, Transport Equipment Manufacturing and Machinery and Equipment Manufacturing¹, although a large part of this would be in the automotive subsector

% Share of total R&D spend, 2011-12



Victoria is home to a number of emerging research hubs

Victoria's world-class universities have significant capabilities in advanced industries

- Monash Centre for Electron Microscopy
- Australian Synchrotron (Monash)
- Melbourne Centre for Nanofabrication (Monash)
- Melbourne University's School of Engineering
- CSIRO Manufacturing Flagship

Centres are making significant investments in new technologies

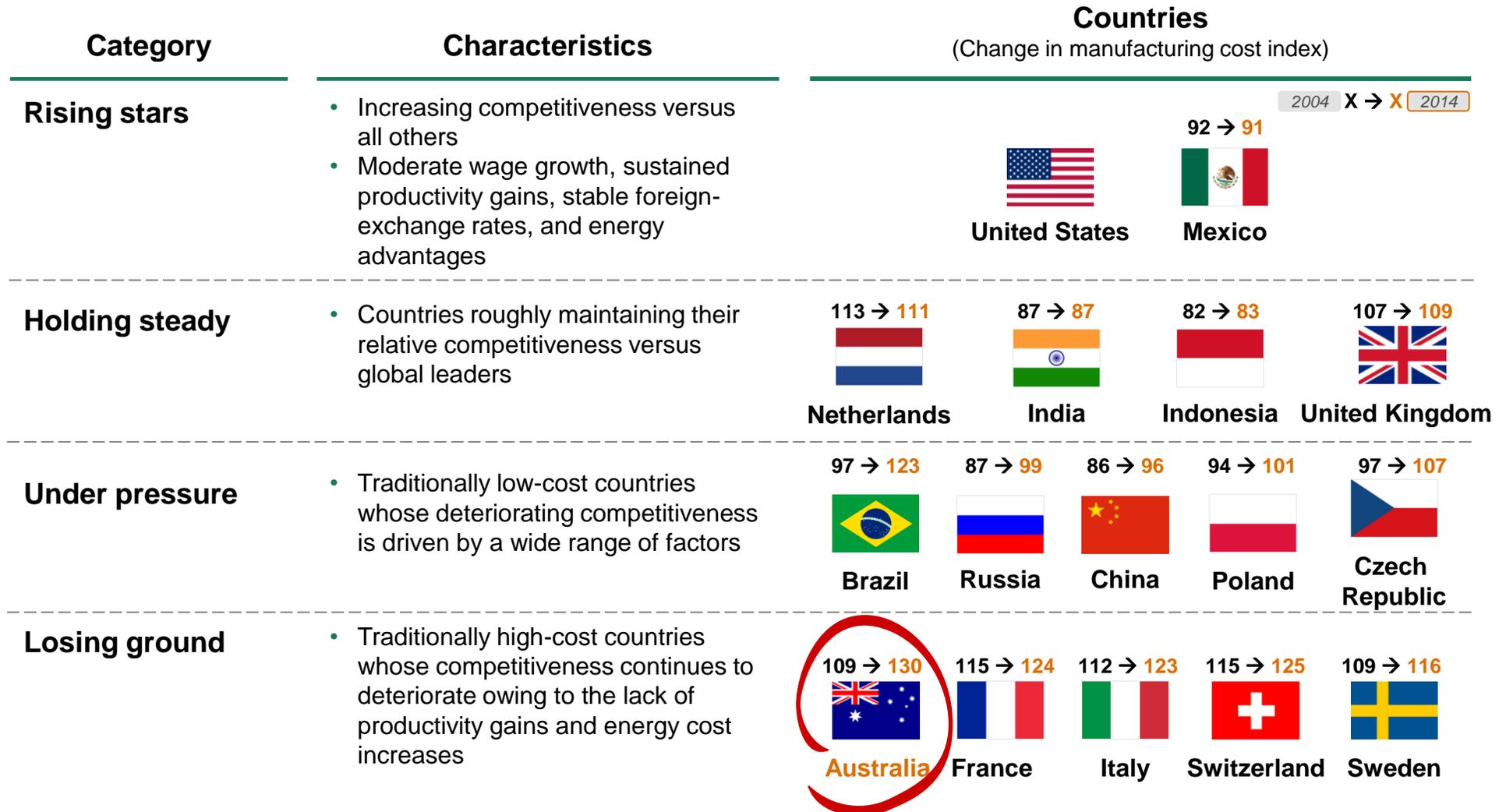
- CSIRO established 'Arcam' in 2010, an additive manufacturing facility to provide industry access to advanced tech for 3D materials printing
- In 2014, RMIT opened a \$30 million MicroNano Research Facility with the world's first rapid 3D nanoscale printer

1. These three ABS categories were used as proxies for advanced manufacturing in the Australian Department of Industry's Australian Industry Report 2014

Source: Australian Government Department of Industry, Office of the Chief Economist, 'Australian Industry Report' (2014); Austrade Investor Updates 2014; CSIRO; Monash University;

Australia has lost manufacturing competitiveness

Analysis from 2004-13 shows Australia has lost ground compared to other countries



Note: Index covers four direct costs only. No difference assumed in "other" costs (for example, raw-material inputs, machine and tool depreciation); cost structure calculated as a weighted average across all industries

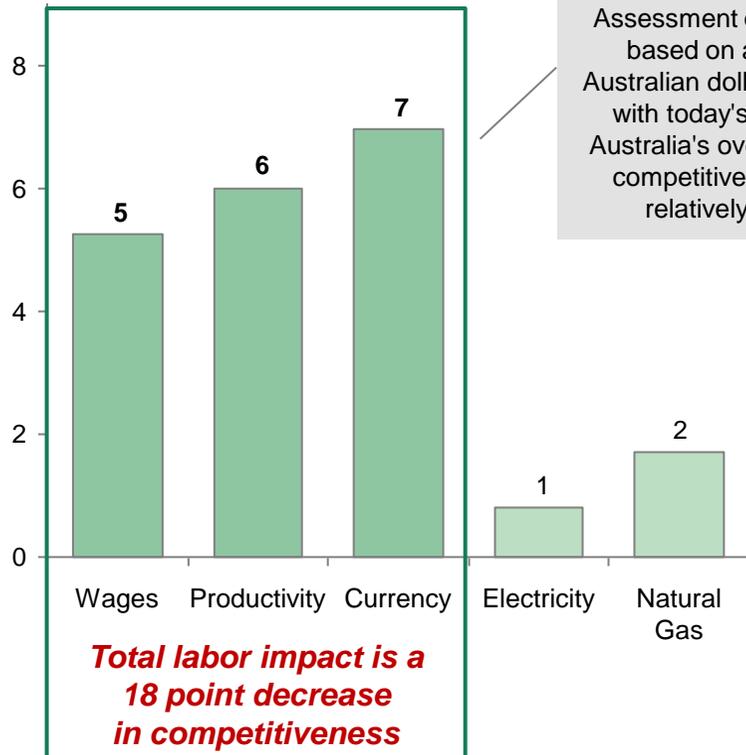
Sources: U.S. Economic Census; BLS; BEA; ILO; Euromonitor; EIU; BCG Analysis

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...driven largely by labour costs, productivity and currency

Drivers for cost competitiveness

Cost index (in percentage points)



Assessment originally based on a high Australian dollar – even with today's dollar, Australia's overall cost competitiveness is relatively low

Background on Australia

10 years ago Australia was 19th on the manufacturing cost index

In the past decade, manufacturing competitiveness declined while the economy grew strongly on the back of the resources boom

- Wages have grown by 48%
- Labor productivity has been flat to declining
- The exchange rate has appreciated 21% versus the US dollar
- Industrial electricity costs rose by 116%
- Natural gas costs rose by 76%

Hard for Victoria to compete on cost – must find alternative ways to drive value

Signs of growth in this segment over next 10-20 years

Government spending and access to global market critical to growth

Transport: Rail, bus and aircraft demand

Continued State Government investment in transport infrastructure (rail, bus etc.) is expected over coming years

- Melbourne's population predicted to take over Sydney's by 2060

Growth is expected in emerging markets such as Middle East, ASEAN, Mongolia, Kazakhstan, India, Latin America, Eastern Europe

Over the next 20 years, 13,000 new aircraft will be required in the Asia Pacific region, and nearly 36,000 globally

Defence: DMO expected to undertake four mega-projects

The Commonwealth Government is the primary buyer and driver of growth for the defence industry

Recent indications of approved project portfolio costs for DMO shows that the **Federal Government will undertake four mega-projects in the near future, worth over \$150b**

- SEA1000 Collins replacement
- AIR6000 Joint Strike Fighter
- SEA5000 Future Frigates
- LAND400 Future Army Vehicles

Historically, **more than half of Defence procurement expenditure has gone to Australian suppliers**, although this proportion has declined since 2008

Construction: Prefabricated market showing growth

The global prefabricated buildings market has shown compound annual growth of ~2% from 2008-2012

The global market is expected to grow rapidly, with compound annual growth of ~8.6% expected until 2017

- Growth largely due to construction industry growth, residential development in emerging economies and easing of the financial crisis in Europe

...and new technologies will continue impacting this space

Sign point to increasing importance of automation and global supply chains

Globally, all signs point to an increasingly automated world that will rely even less on labour-intensive mechanical processes and more on sophisticated information-technology-intensive processes

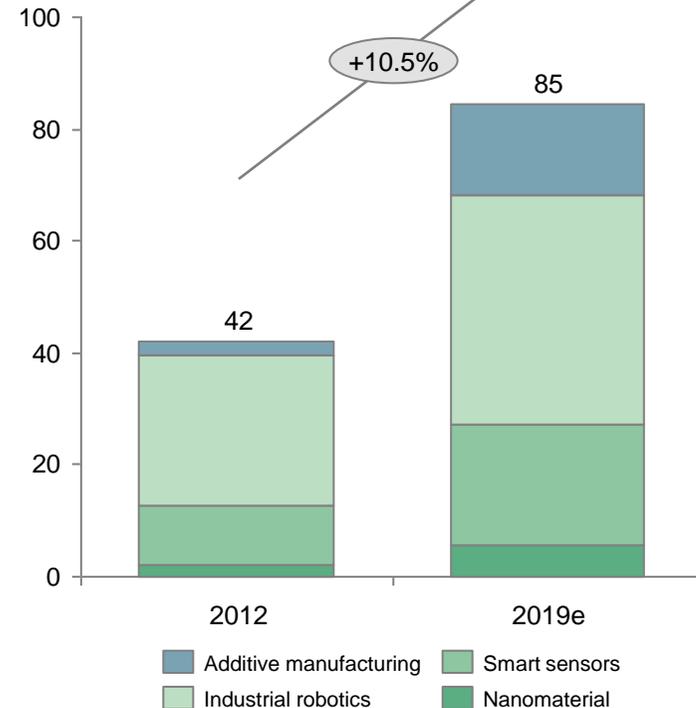
- This trend will likely accelerate as advances in manufacturing are implemented

Advanced manufacturing will become increasingly linked through global and digital supply chains

Advanced manufacturing processes will likely be more energy and resource efficient in the future, with companies striving to integrate sustainable manufacturing techniques into their business practices to reduce costs, to decrease supply-chain risks, and to enhance product appeal to some customers

Advanced technologies and robotics will become a US\$85b market by 2019

Projected global growth in advanced manufacturing, 2012 US\$b

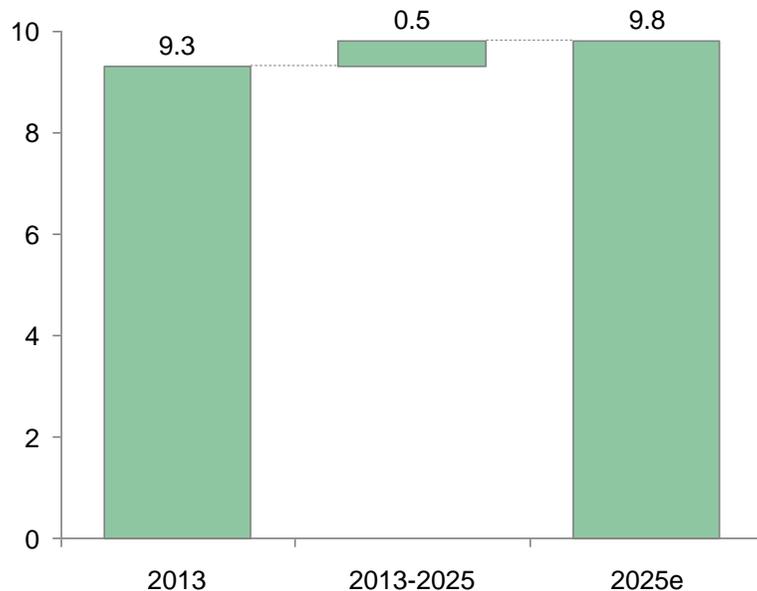


If historical growth continues, transport, defence and construction tech employment could decline 36,000 by 2025

Transport, defence and construction tech could add \$500m by 2025...

Transport, defence and construction technology sector, estimated industry GVA by 2025¹

Real GVA in 2013 terms
\$b

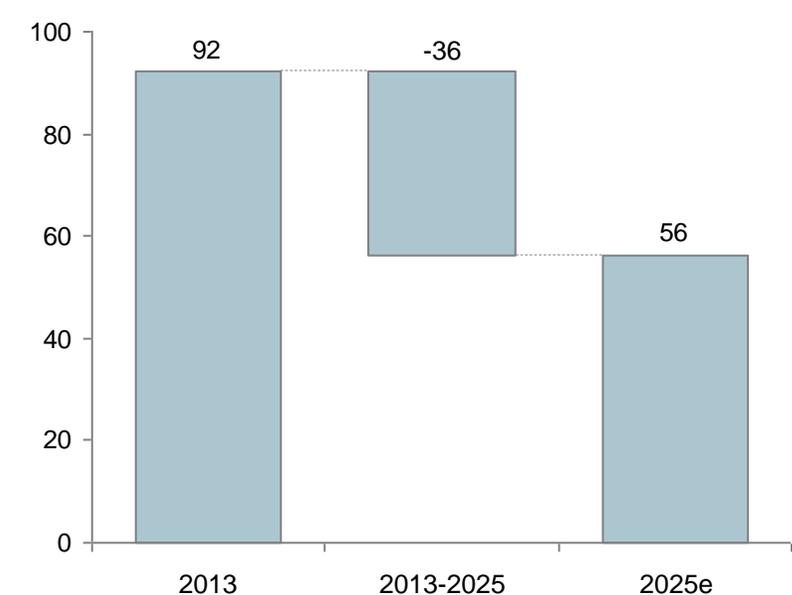


Transport, defence construction tech proxy

...But employment would decrease by almost 36,000 jobs

Transport, defence and construction technology sector, estimated employment by 2025²

Total employment
000's



Estimates influenced by historical declining trends in manufacturing sector more broadly

Note: Scenario uses the categories of 'transport equipment manufacturing', 'machinery equipment manufacturing' as proxies for this technology subsector.

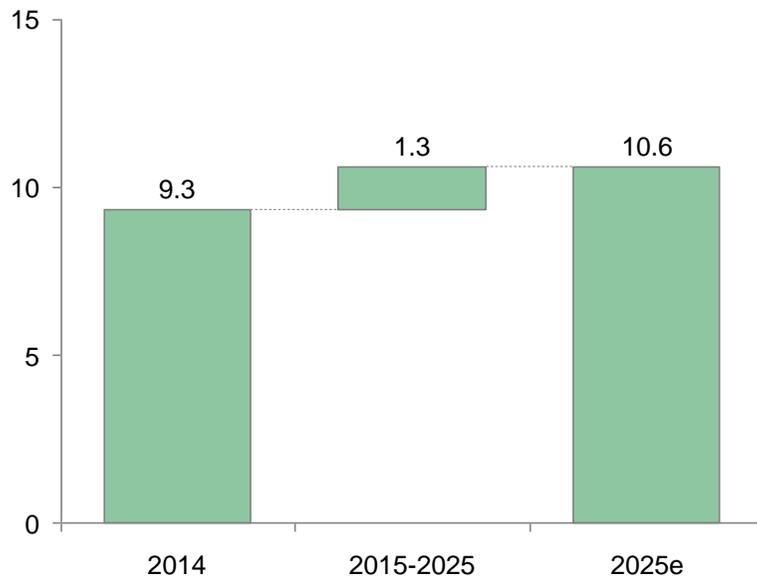
1. Assumptions based on historical national growth in transport equipment (-2% CAGR 2008-13) and machinery and other equipment (2.1% CAGR 2008-13). 2. Assumption based on historical national employment growth for transport equipment (-2.9% CAGR 2008-13) and machinery and other equipment (-2.5% CAGR 2008-13)

However, in a high growth scenario, transport, defence and construction technology could add \$1.3b and 42,000 jobs

Transport, defence and construction tech could deliver additional ~\$1.3b by 2025

Transport, defence and construction technology sector, estimated industry GVA by 2025¹

Real GVA in 2013 terms
\$b



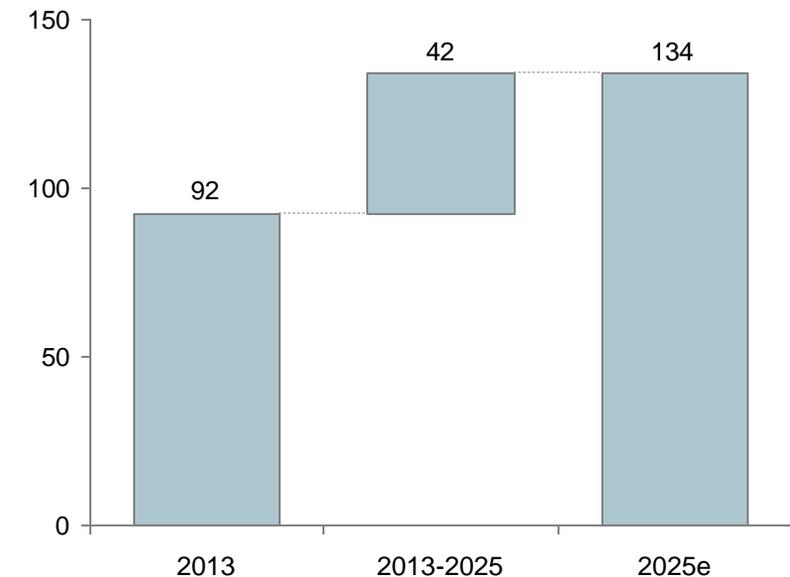
Transport, defence construction tech proxy

Assumes that subsectors could grow in line with broader construction industry growth

Sector could add ~42,000 jobs by 2025

Transport, defence and construction technology sector, estimated employment by 2025²

Total employment
000's



Note: Scenario uses the categories of 'transport equipment manufacturing', 'machinery equipment manufacturing' as proxies for this technology subsector.

1. GVA high growth assumptions include 5% per annum growth for construction and 1% per annum growth for transport. 2. Employment high scenario assumes 0% per annum growth for transport and 3.2% per annum growth for construction

Competitiveness assessment

Transport, defence and construction technology

Competitive advantage



Access to resources

- Highly skilled workforce particularly within manufacturing, automotive and engineering subsectors; although this comes with high labour costs
- Strong base of specialist design and engineering firms



Infrastructure and regulatory costs

- Victoria has advantageous infrastructure (e.g. Port of Melbourne, Melbourne airport) – but no unique regulatory advantages locally or globally
- Procurement pipeline indicates commitment to growth (e.g. transport/rail investment, green buildings)



Scale

- Developing scale through local clusters and location of global leaders (e.g. Thales, BAE systems), but landscape is dominated by SMEs



Market position

- Compared to advances made in the USA, Japan and Germany, Australia and Victoria are relatively small players in this space and exports are not sizeable on a global scale



Innovation

- Automotive companies in Victoria helped establish strong base for R&D, engineering, design and innovation
- World-class universities and research centres focused on advanced industries and technology

Key



Significant strength



Advantaged



On par globally



Disadvantaged



Significant barrier or risk



Case study: Network of Government-backed research institutes have bolstered Germany's manufacturing sector

Background

Starting situation

In existence since the early 1950s, Fraunhofer-Gesellschaft (Fraunhofer Society) was a joint industry, academia and government initiative designed to foster research and innovation across Germany

Intervention

Government-industry partnership to support innovative SMEs

- The Society has significant scale; it is a \$2.75b enterprise that operates more than 60 research institutes with more than 250 business focus areas and core competencies. It has ~22,000 employees

The German Government contributes two thirds of the Society's annual budget

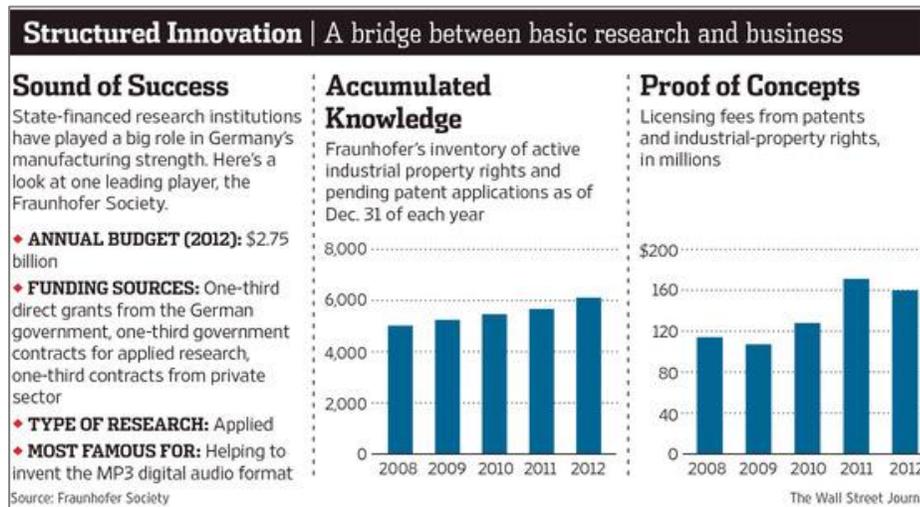
Outcomes

National outcomes

- Manufacturing accounts for nearly 21% of the German economy, compared with 13% for the United States and 12% for the United Kingdom
- German exports of manufactured goods rose 11% in 2010, to more than US\$1.3 trillion

Regional/city outcomes

- Munich and Nuremberg have been Germany's two fastest growing metropolitan regions since 2000, each bolstered by a globally competitive advanced industry sector
- Since 2000, Munich's manufacturing sector has grown faster than the regional economy as a whole
- Growth in manufacturing output outpaced overall output growth in both Munich and Nuremberg in 2013-14





Case study: Japan developed a 20-year industrial cluster plan

Background

Starting situation

In 2001 the Japanese government developed the Industrial Cluster Project

Based on an assessment of the current state of clusters in Japan and policy needs the Government earmarked approximately 20 industrial clusters to support and further develop

Intervention

The Government's developed a forward-looking 20-year plan to support the development and growth of industrial clusters

2001-2005 was the Cluster Launch Period, where Government worked in collaboration with the clusters developed autonomously by local governments, to begin forming face-to-face networks

2006-2010 was considered the Cluster Development Period which focused more specifically on individual businesses, start-ups and corporate management

2011-2020 is the Cluster Autonomous Growth Period, which is a plan for clusters to achieve financial independence and autonomous growth

Outcomes

There are currently seven distinct industrial clusters across the country

- Automobile and transport equipment
- Electronic components, devices, precision machinery
- Biotech
- Healthcare and welfare
- ICT and cloud computing
- Environment and energy
- Food and other industries

In the last stage of the Project, activities in clusters are already largely carried out at the regional level and led by industry and local governments

Potential government actions to achieve growth

Transport, defence and construction technology

Challenge	Potential actions
Business growth and market access	<p>Funding and targeted programs to assist companies overcome barriers to entry in the global supply chain; or to diversify into adjacent sectors</p> <p>Partner with business to deepen knowledge of global market opportunities and conditions</p>
Attracting investment and companies	<p>Facilitate further investment in advanced manufacturing technologies and processes</p> <p>Set the business conditions to attract major companies, contracts and investment to the State – this could include workforce and skills development, clustering, improving R&D capability</p>
International engagement	<p>Continue leveraging existing investment in research and world-leading facilities through marketing and branding of Victorian firms, research centres and innovations</p>
Regulation	<p>Ensure regulations are keeping pace with new technologies and global trends (e.g. construction standards and permits)</p>
Procurement	<p>Implementing more simplified and streamlined procurement processes (at State and Federal level)</p>

Questions to be answered

Transport, defence and construction technology

Market trends and challenges

- What are the main drivers of growth and change in these advanced industries and how can these be quantified and measured (e.g. Government spend on infrastructure, defence procurement)?
- How quickly will pre-fabrication in construction take hold, and what proportion of the construction industry will be impacted?
- What is a realistic estimate of the size of the industry now and in 10 years time?
- What component of the engineering design, systems and technology industries support transport, defence and Construction?

Workforce

- How is changing technology changing the skills requirements in these sectors?
- Is the training system sufficiently responsive to adapt to these changing needs?

Supply chain

- How can Government better support businesses in transport, defence and construction technology to gain access to the global supply chain?
- How can government procurement processes better align with the needs of businesses whilst continuing to ensure value for money for government (e.g. length of investment required for procurement, greater forward predictability of the project pipeline, smoother demand etc)?

Competition

- In which areas can Victoria establish the capability and scale to compete (e.g. can Victoria gain sufficient scale in train rolling stock to be globally competitive?)
- How do we compete against South Australia in defence?

Regulation

- To what extent are current regulations a barrier to the adoption of new technology (e.g. construction licences)?

Draft Taskforce brief

Transport, Defence and construction technology

Objective

Develop action plan with prioritised list of market opportunities for Victoria's advanced industries

- Comprehensive industry and market assessment to understand full scope and impact of advanced industries
- Undertake stakeholder engagement and consultation to undertake industry opportunities and challenges
- Develop prioritised list of actions to support growth (especially in export markets), including potential costs and benefits

Industry assessment

Develop a clearer view on the size and scale of these sectors in Victoria where current data gaps exist

- Develop an industry survey to assess the full scope and impact of advanced technologies within manufacturing, construction, transport (covering both manufacturing and services)
- Undertake industry consultation to better understand challenges facing the sector (e.g. access to global supply chains)
- Assess impact of existing advanced manufacturing research centres and precincts

Construction

Identify government actions to support industry to adapt to changing technologies and process

- Assess the scale and impact (including timing of impact) of prefabricated construction on the Victorian industry
- Analyse regulatory and other barriers (including licensing and government procurement restrictions) to adoption of new processes and techniques
- Work with industry to understand the success models for emerging businesses in this industry and options for government to accelerate capability development and adaptation across the industry

Transport

Identify options to support transport companies to gain scale and/or compete in a global market

- Assess current and planned government infrastructure commitments and impact on industry pipeline
- Work with global firms (e.g. Bombardier) and local SMEs to facilitate long-term partnerships and access to global market

Defence

Building on the existing Defence industry strategy, develop a specific set of actions to support industry growth

- Assess actions undertaken by SA and NSW in growing their Defence industries and what they could mean for Victoria
- Identify and evaluate opportunities for firms to engage with the global supply chain and at-scale companies

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