Department of Industry

NSW advanced manufacturing industry development strategy

2018
As I write this foreword, a plant in Bankstown is making parts for the Joint Strike Fighter, a firm in Griffith is revolutionising how flavours and aromas are captured in food manufacturing, and a state-of-the-art facility in Eastern Creek is manufacturing pharmaceuticals for export to rapidly expanding markets across Asia.

Our manufacturers touch the lives of almost every person in NSW every day. They keep the economy turning, provide vital products, and most importantly, create employment opportunities across the state.

To achieve success in a rapidly evolving world, manufacturing firms need to be outstanding in their field. What matters most is not so much what a firm makes, but how they make it—that is what defines advanced manufacturing. Firms need to use cutting-edge technology and have robust business models that deliver now and well into the future. They need to stand out in global markets.

The NSW Government believes NSW needs a strong manufacturing sector to unlock the opportunities the future holds. We have worked with industry to develop this strategy because we want to support industry in their efforts to be the best in the business.

We want to encourage NSW manufacturing firms to excel on the competitive world stage.

We want NSW firms to build on their strengths and seize new opportunities for success.

We want NSW manufacturing firms to be running ahead of change.

If we support our sector in achieving these goals, it will ensure our economy remains the most dynamic in Australia and that the sector continues its role supporting jobs, families and communities across the state.

The Hon. Niall Blair MLC
Minister for Primary Industries
Minister for Regional Water
Minister for Trade and Industry
EXECUTIVE SUMMARY

New South Wales (NSW) is home to highly innovative, competitive and world-leading manufacturers that are vital to the diversity and strength of the Australian economy. NSW manufacturers produce almost 30% of the country’s total manufacturing output, generating around $33 billion in industry value. They also directly employ around 253,000 people, accounting for almost one-third of jobs in the sector countrywide.

The NSW Government recognises that manufacturing is undergoing a transformation across the industrialised world. Manufacturing companies in NSW increasingly focus on high-value and high-skill services, particularly in pre- and post-production processes, such as research and development (R&D) and design. Recognising this shift, the NSW Government has assessed the factors driving the competitiveness of NSW-based manufacturers.

As the sector is changing, manufacturing businesses that use new technology or advanced business models are increasingly being termed ‘advanced manufacturers’. The definition relates to the sophistication of a business’s processes rather than the products it makes. It signals a shift away from competing on cost to emphasising value creation. Embracing advanced manufacturing, regardless of the end product, will be vital to the ongoing profitability of the industry in NSW.

It is in this context that the NSW Department of Industry has developed the NSW advanced manufacturing industry development strategy (the strategy). It realigns the theoretical concepts guiding decision makers in NSW manufacturing with the sector’s changed reality. It aims to provide a better understanding of the metrics that define global manufacturing success in an advanced economy such as NSW. It also sets out targeted, practical initiatives to grow the sector, build the capability of businesses and continue to foster a supportive external business environment in the state.

The strategy builds on the collective efforts of the NSW Government and the Commonwealth Government, such as the NSW Manufacturing Industry Action Plan (2012). It also builds on the Commonwealth Government’s Advanced Manufacturing Growth Centre (AMGC).

The NSW Government will lead collaboration with all levels of government and key partners, such as the AMGC, to drive sustainable economic growth, job creation, skills development and investment in the advanced manufacturing sector in NSW.

It will position the NSW sector to tackle the challenges posed by rapid digitisation and automation; take advantage of the opportunities presented by Industry 4.0; and position NSW as a place where manufacturing businesses choose to invest and grow.


2  AMGC defines Industry 4.0 as the suite of digital technologies augmenting industrial processes, including the rise of data volumes, computational power and connectivity; emergence of business intelligence capabilities; new forms of human-machine interactions; improvements in transferring digital instructions to the physical world, e.g. 3D printing.
In developing this strategy, the NSW Government held extensive consultations with industry and key stakeholders. Key insights gained included:

- NSW manufacturers can gain a competitive advantage by focusing on value creation.
- Advanced manufacturing is no longer about what you make, but how you make it.
- NSW manufacturers can take advantage of largely untapped opportunities to become more advanced, and every NSW manufacturer has the potential to be ‘advanced’.
- To create value, NSW manufacturers can access the state’s large, highly skilled, cost-competitive labour force.

Significant advanced manufacturing opportunities are available in NSW and elsewhere in Australia. These could increase the industry’s national value-added by 25–35%, equivalent to $25.3 billion to $34.6 billion, by 2026.3

To pursue the opportunities advanced manufacturing presents, the strategy is designed to:

- increase collaboration and research within the manufacturing industry and with research institutions by facilitating the development of advanced knowledge
- support skills development in the industry by driving the adoption of advanced processes
- support the implementation of advanced service-oriented business models that lead to high-value manufacturing solutions and create high-value products that reach untapped markets and segments. This would assist and promote NSW manufacturing firms as they expand into new global value chains and attract international investment
- grow export and attract investment.

Coordinating industry, government and research institutions will position NSW to prosper by allowing industry to take advantage of the opportunities presented by the next manufacturing revolution. The NSW Government recognises that innovation and technical leadership are vital to the long-term productivity and competitiveness of manufacturing in NSW, as is leveraging our longstanding reputation for producing high-quality products and standards. The large and diverse base of small and medium-sized enterprises (SME) that have the potential to quickly engage with technology will also play an important role in driving the adoption of advanced manufacturing processes across the industry.

This strategy focuses on laying the foundations for a manufacturing industry that remains a source of economic strength and innovation in NSW.

## Key Strategic Themes and Initiatives

### Table 1. Summary of key themes

<table>
<thead>
<tr>
<th>Strategic theme</th>
<th>Objective or challenge</th>
<th>Initiatives</th>
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</thead>
</table>
| **1** Facilitate the development of advanced knowledge to foster collaboration and research within the industry and with research institutions | Many NSW manufacturing businesses have significant scope to shift to more advanced business features to create unique and innovative products. There are opportunities to increase the number of SMEs pursuing R&D and collaborations across the industry to advance the knowledge and practices of the sector | 1.1 Strengthen the capacity for industry, government and research institutions to engage and collaborate  
1.2 Support NSW advanced manufacturers’ access to existing NSW Government and Commonwealth Government programs and funding initiatives |
| **2** Drive the adoption of advanced processes to support and facilitate skills development in the NSW manufacturing industry | The manufacturing industry has skills gaps that limit innovation and product development | 2.1 Assess and address the skills gap in the NSW advanced manufacturing industry  
2.2 Promote advanced manufacturing as a career path  
2.3 Promote and support the creation of traineeships, internships and apprenticeships with SMEs  
2.4 Map and showcase NSW advanced manufacturing industry skills and capabilities |
| **3** Support the implementation of advanced business models that lead to high-value manufacturing solutions and create products that fulfil previously unmet needs | Industry 4.0 business models offer opportunities to lower production costs while delivering high-value manufacturing solutions | 3.1 Accelerate NSW manufacturers’ adoption of Industry 4.0 business models  
3.2 Support startups and SMEs to be globally competitive |
| **4** Grow exports and attract investment into the NSW advanced manufacturing industry | More than 80% of Australian manufacturers do not export their products and services. Existing trade networks can be used more effectively to attract foreign direct investment (FDI) in NSW’s advanced manufacturing industry | 4.1 Promote NSW’s advanced manufacturing capabilities internationally  
4.2 Develop export capabilities in advanced manufacturing businesses  
4.3 Attract foreign direct investment  
4.4 Support the establishment of the Western Sydney Aerospace and Defence Industries Precinct |
ECONOMIC VALUE AND SECTOR OVERVIEW

Manufacturing in NSW has evolved with the new reality challenging the stereotype of an industry driven by basic factory work. Today, NSW is home to a broad range of industry sectors such as food and beverages, aerospace, medical technology and creative industries. Many of the companies in these sectors are using state-of-the-art technology and highly skilled staff to manufacture their products.

NSW has the largest number of manufacturing businesses of any state or territory in Australia. These businesses collectively generate $33 billion in industry valued added* and employ more than 253,000 people in a range of industries, as summarised in Table 2.

Manufacturing in NSW also has a large positive ‘spillover effect’ on employment elsewhere in the economy. In addition to the 253,000 people it directly employs, it is estimated manufacturing indirectly supports another 109,000 workers. They include farm workers, freight handlers and call centre staff as well as professional services providers such as patent lawyers, freelance designers and brand consultants, all selling goods and services to manufacturing companies in NSW. It is estimated that the NSW sector spends more than $4 billion annually on professional services, supporting around 16,000 jobs.

Table 2. Manufacturing industry statistics summary

<table>
<thead>
<tr>
<th>Indicator</th>
<th>NSW</th>
<th>Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of businesses</td>
<td>26,127</td>
<td>NSW manufacturers make up 31% of the Australian sector, more than any other state or territory</td>
</tr>
<tr>
<td>Industry value-added</td>
<td>$33 billion</td>
<td>NSW manufacturers contribute almost 30% of Australia’s total manufacturing output and employ nearly 30% of Australia’s direct manufacturing labour force</td>
</tr>
<tr>
<td>Employment</td>
<td>253,000</td>
<td>7% of NSW’s total workforce have jobs in manufacturing</td>
</tr>
<tr>
<td>Research and development</td>
<td>$6.76 billion (2013)</td>
<td>NSW manufacturers account for 27% of national direct expenditure on R&amp;D. They contributed 1.32% to gross state product (GSP) in 2013. R&amp;D and design roles make up 15% of all direct manufacturing jobs in NSW</td>
</tr>
<tr>
<td>Exports</td>
<td>$2.4 billion (for 2017 calendar year)</td>
<td>NSW contributes around 16% of Australian manufacturing exports</td>
</tr>
</tbody>
</table>


*Industry gross value-added (IGVA) measures the value of goods produced in an industry. It is used to measure the contribution of individual industries to the gross product of a state or territory.
Figure 1. Number of manufacturing firms by size

<table>
<thead>
<tr>
<th>State</th>
<th>Fewer than 19 employees</th>
<th>20–199 employees</th>
<th>More than 200 employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>1,663</td>
<td>164</td>
<td>24,319</td>
</tr>
<tr>
<td>Victoria</td>
<td>1,792</td>
<td>165</td>
<td>21,450</td>
</tr>
<tr>
<td>Queensland</td>
<td>1,025</td>
<td>87</td>
<td>15,240</td>
</tr>
<tr>
<td>Western Australia</td>
<td>628</td>
<td>48</td>
<td>8,120</td>
</tr>
<tr>
<td>South Australia</td>
<td>441</td>
<td>43</td>
<td>5,768</td>
</tr>
<tr>
<td>Tasmania</td>
<td>144</td>
<td>6</td>
<td>1,497</td>
</tr>
</tbody>
</table>


Figure 2. Number of workers employed in manufacturing in NSW by subindustry (‘000s)

- Food
- Fabricated metal products
- Other machinery
- Printing
- Wood products
- Chemicals
- Non-metallic mineral products
- Primary metals
- Beverages and tobacco
- Plastic and rubber products
- Automotive
- Computer equipment
- Appliances/furniture
- Apparel
- Textile and leather products
- Paper
- Pharmaceuticals
- Other
- Medical equipment
- Aerospace
- Ship and boat building
- Petroleum and coal products
- Fabricated metal products

Emerging industry sectors in NSW with advanced manufacturing capabilities include:

- Construction technologies
- Defence industries
- Aerospace
- Medical technologies
- Food and beverage manufacturing
- Transport and mobility
- Energy technology
- Creative industries
Industry breakdown

The direct manufacturing value chain has three stages:

- pre-production (R&D and design)
- production
- post-production (logistics, sales and service).

The pre- and post-production stages represent higher value-add than production activities, as indicated in Figure 3. Nearly half (48%) of direct manufacturing jobs in NSW are found outside production, as shown in Table 3. The expansion of these higher value-add activities in NSW will support manufacturing businesses to become more profitable and competitive.

Figure 3: Stages in manufacturing value chain

Table 3: Proportion of jobs along value chain of manufacturing industry

<table>
<thead>
<tr>
<th></th>
<th>R&amp;D and design</th>
<th>Production</th>
<th>Logistics</th>
<th>Sales and service</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 (%)</td>
<td>15</td>
<td>52</td>
<td>18</td>
<td>15</td>
</tr>
</tbody>
</table>

The evolution of NSW manufacturing away from traditional factory production towards a more diversified manufacturing model is consistent with a trend that is unfolding across the industrialised world.4

NSW is fast becoming a base for the most valuable and skill-intensive parts of the production process. This includes high-tech design and development, innovative research, product customisation, and client-focused support and repair services.

Interviews with international industry experts and purchasing managers reveal that customers are more likely to buy from Australian companies if these firms or their products offer compelling value in areas such as technical leadership, brand reputation, innovative design, flexible production and delivery, and attractive service support.5

By expanding business operations beyond production, NSW manufacturers are becoming increasingly competitive in globalised markets and unlocking new revenue streams. Some of the state’s leading industrial manufacturing firms offer clients a range of pre-production services, from concept design to modelling and prototyping. Others offer design services and after-sales advice on product maintenance.

Research has demonstrated that the world’s most profitable and competitive manufacturing firms pursue similar strategies to ‘advance’ their operations and become smarter in the way they employ workers and machines.6

The world’s most competitive and profitable manufacturers typically excel in one or all of the characteristics listed in Figure 4, regardless of which sub-industry they belong to or the goods they produce.


5 To understand the sources of value to customers beyond product cost, a panel of approximately 30 industry experts and international purchasing managers were interviewed and tasked to identify and weigh other factors that influenced the selection or procurement of a final good or intermediate component from Australia. For aerospace, relevant experts were the international purchasing managers of original equipment manufacturers. For medical technology, relevant experts were final customers and exporters. Sector Competitiveness Plan, Advanced Manufacturing Growth Centre, 2017.

Figure 4. Business characteristics of successful manufacturing firms

Advanced Processes
- Capital intensity
- Equipment age
- Level of automation
- Inventory management
- Energy intensity
- Water consumption
- Recycling rate

Advanced Knowledge
- R&D expenditure
- ICT intensity
- Patent portfolio
- Collaboration with other firms
- Collaboration with research institutions
- Wage levels
- Employee qualifications
- STEM skill intensity

Advanced Business Knowledge
- Product value density
- Marketing spend
- Trade intensity
- Degree of backwards linkages
- Geographical reach
- Share of services in total revenues

Australian manufacturers that have exhibited the greatest number of ‘advanced’ characteristics have delivered the highest increase in growth rates in margins.

Western Sydney

Western Sydney is fast becoming a major focal point for investment and is seen as an important source of growth and innovation in NSW. The region is home to a large number of SMEs that produce highly innovative products, export globally and are keen to transform their business processes. Many of the disruptive technologies of Industry 4.0 are driven by small innovative companies such as those in Western Sydney.

Aerospace and Defence Industries Precinct

As part of the Western Sydney City Deal, the NSW Government, in partnership with the Commonwealth Government, will develop a high-tech, state-of-the-art Aerospace and Defence Industries Precinct adjacent to the new Western Sydney Airport.

Figure 6 describes the key initial focus capabilities of the precinct.

Figure 6. Initial capabilities of the Aerospace and Defence Industries Precinct

Agribusiness precinct

The Western Sydney Aerotropolis will provide advanced food and beverage manufacturers the opportunity to be part of establishing an agribusiness precinct. The new precinct will encourage combining ground-breaking research programs with the latest technologies and systems in food and beverage processing to grow agricultural productivity and the export of premium products from Western Sydney.

Building and construction

Changes in technology and processes are transforming the building and construction industry. The billions of dollars of public investment in infrastructure planned for Western Sydney is supporting the development of a modern construction industry and facilitating the adoption of new advanced manufacturing processes and business models across the industry.
Regional NSW

Leading international manufacturers have also been thriving in regional NSW, attracted by its skilled workforce, low-cost environment, access to markets and world-class R&D centres.

Regional NSW is a base for valuable and skill-intensive production processes, including high-tech design and development, innovative research, product customisation, and client-focused support and repair services.

It offers advanced manufacturing strengths and opportunities in industry sectors such as aerospace, aviation, energy, electronics, information and communications technology, marine, health and medical, agribusiness, renewable energy and defence.

Figure 7. Regional NSW manufacturing activity

**Northern NSW**
- Flight training
- Fibreglass vessels and composite components
- Ship building
- Defence products

**Hunter**
- Defence systems and equipment
- Aircraft maintenance
- Crew training systems
- Mine disposal

**Greater Sydney**
- Cyber security
- Acoustic systems
- Helicopter, jet maintenance
- Space technologies

**South Coast**
- Communication systems
- High end welding and engineering
- Engineered plastics and polyurethane
- Electrical
- Medical computing devices

**Murray-Riverina**
- Specialised engineering and electronics
- Helicopter airframe structures
- Target technologies
- Remote control systems

**Capital Region**
- Mechanical and electronic systems
- Simulation and training services
- Infrastructure construction
INDUSTRY INSIGHTS: THE ECONOMIC OPPORTUNITY FOR THE NSW MANUFACTURING INDUSTRY

Analysis suggests that manufacturing companies tend to be more profitable, more productive and more competitive when they have the following characteristics:

- **Advanced knowledge**
  Australia’s most successful manufacturers tend to hire more employees with science, technology, engineering and mathematics (STEM) skills, and constantly work on product innovations. For example, the most profitable Australian manufacturers invest 1.6 times more in R&D than less profitable peers.

- **Advanced processes**
  Several of Australia’s most successful manufacturers invest in technologically advanced production systems and information technology (IT). They constantly look for ways to make their production processes and equipment more efficient. These ‘process winners’ are 1.7 times more likely to invest heavily in IT and 1.8 times more likely to improve operations than less competitive counterparts.

- **Advanced business models and creating products that fulfil previously unmet needs:**
  Some of the most productive Australian manufacturers have adopted service-oriented business models, allowing them to become more customer-focused and add new revenue streams. These companies are twice as likely to bundle their product offering with a product-specific service (customisation, design, repair, maintenance and customer support) than less productive companies. Some offer highly customised products or services in a niche or underserved market. The most productive among these ‘niche players’ are 1.4 times more likely to offer their products and services internationally. Their trade intensity is also 1.5 times higher than their peers, underpinning the exportability of their goods.

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Consultation with key industry stakeholders, as well as research and analysis, has revealed future opportunities and challenges for the industry. Table 4 outlines the strengths and opportunities for the NSW advanced manufacturing industry.

Table 4. Identified strengths and opportunities of the NSW manufacturing industry

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
</tr>
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<tbody>
<tr>
<td>Highest concentration of advanced manufacturers in Australia</td>
<td>Increase collaboration within industry (focus on SMEs) to pursue R&amp;D and commercialisation partnerships with universities and other academic institutions</td>
</tr>
<tr>
<td>Highly skilled workforce trained in global best practices</td>
<td>Continue to innovate and strengthen high-value activities by diversifying into high-value pre- and post-production processes, and produce highly customised products and services to differentiate from low-cost, high-volume manufacturers</td>
</tr>
<tr>
<td>Strong digital technology capabilities</td>
<td>Improve specialised workforce skills to meet the needs of niche, high-value product markets. NSW manufacturers should continue to build a pipeline of highly skilled workers and leverage industry capabilities in pre- and post-production activities</td>
</tr>
<tr>
<td>High-quality supporting infrastructure and clusters of excellence</td>
<td>Improve technological capabilities, making greater use of smart technology including automation and advanced IT</td>
</tr>
<tr>
<td>Well-developed freight and logistics systems</td>
<td>Deepen engagement in global trade by promoting products in niche or demand-driven markets globally and accessing more global supply chain opportunities</td>
</tr>
<tr>
<td>Highly developed professional services sector</td>
<td>Focus on driving industry partnerships with educational entities, including TAFE NSW and other vocational training providers and universities, to address skills needs identified by industry</td>
</tr>
<tr>
<td>Global hub for science infrastructure and technology, and world-leading R&amp;D in high-growth industries</td>
<td>Increase the adoption of advanced knowledge, advanced processes and advanced business models</td>
</tr>
<tr>
<td>Significant construction and infrastructure investment across the state</td>
<td>Increase value differentiation, improving market focus and reducing product costs</td>
</tr>
<tr>
<td>Base for financial institutions, financial services sector and availability of capital</td>
<td>Take advantage of NSW’s cost advantage in high-skilled workers</td>
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<tr>
<td>Willingness to invest in R&amp;D (highest expenditure on R&amp;D of all states and territories)</td>
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<tr>
<td>High number of value-added activities</td>
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<tr>
<td>Home to many strategic sub-industries</td>
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<tr>
<td>Willingness to adopt Industry 4.0 business models</td>
<td></td>
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<tr>
<td>Highly ranked universities and world-class education institutions</td>
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The NSW Government is committed to growing the state’s advanced manufacturing sector and generating jobs and economic growth in the state.

It has developed this strategy based on research and consultation with stakeholders across various NSW Government departments and in the manufacturing industry, industry associations, universities and the Commonwealth Government.

The strategy is intended to capitalise on the industry’s strengths and position NSW to leverage emerging opportunities by encouraging growth and investment in existing manufacturing businesses as well as attracting new investment. It will support NSW manufacturers to adopt the characteristics of advanced knowledge, processes and business models.

**Industry identified four key themes for the strategy.**

1. Facilitate the development of advanced knowledge to foster collaboration and research within the industry and with research institutions

2. Drive the adoption of advanced processes to support and facilitate skills development in the NSW manufacturing industry

3. Support the implementation of advanced business models that lead to high-value manufacturing solutions and create products that fulfil previously unmet needs

4. Grow exports and attract investment in the NSW advanced manufacturing industry
Collaboration within industry and with research institutions can improve capital efficiency and reduce overhead costs. There is scope for NSW manufacturing firms to increase collaboration with other businesses and research institutions. Only 16% of Australian manufacturing businesses that innovated in the last 12 months had a formal collaborative research arrangement.

Numerous universities and research institutions are dedicated to manufacturing in NSW, yet less than 5% of Australian small and medium-sized manufacturers actively pursue R&D partnerships with them.

Collaboration between industry, universities and government brings many benefits, including improved knowledge sharing about market trends and business opportunities. Living labs, workshops and networking events provide a platform for different industry participants to interact and take advantage of the opportunities provided by cooperation.


WHAT SUCCESS WILL LOOK LIKE

Increased collaboration across the advanced manufacturing ecosystem. Government, industry and research institutions operating in a highly collaborative environment, undertaking more joint research projects and exchanging insights. Improved sharing about market trends and business opportunities across the sector.
**Initiative 1.1  Strengthen the capacity for industry, government and research institutions to engage and collaborate**

The NSW Government will launch the Advanced Manufacturing Connect program to strengthen engagement and collaboration across the sector.

<table>
<thead>
<tr>
<th>What we will do</th>
<th>Who</th>
<th>When</th>
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<tbody>
<tr>
<td>Through the Advanced Manufacturing Connect program:</td>
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<tr>
<td>• conduct cross-sectional regional and metropolitan networking events and facilitate the co-delivery of collaborative projects, including leveraging the NSW Knowledge Hub and Boosting Business and Innovation programs</td>
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<tr>
<td>• create a platform and dialogue for Industry 4.0, including a series of capability building workshops</td>
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<tr>
<td>• facilitate connection and collaboration across sectors, such as aerospace, the defence industry, medical technology, cyber security, and food and beverage manufacturing</td>
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<td></td>
</tr>
<tr>
<td>• in partnership with the AMGC, academia and industry, explore the opportunity to establish an advanced manufacturing hub in Western Sydney</td>
<td></td>
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<tr>
<td>• facilitate a keynote speaker series and seminars on global best practice featuring national and international manufacturing experts</td>
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<tr>
<td><strong>Lead</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• NSW Department of Industry</td>
<td></td>
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<tr>
<td><strong>Supported by</strong></td>
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<td></td>
</tr>
<tr>
<td>• AMGC</td>
<td></td>
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<tr>
<td>• Universities</td>
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<tr>
<td>• Research institutions</td>
<td></td>
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<tr>
<td>• Industry partners</td>
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<tr>
<td><strong>Short term</strong></td>
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<tr>
<td>(commencing within 12 months)</td>
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Initiative 1.2  Support NSW advanced manufacturers’ access to existing NSW Government and Commonwealth Government programs and funding initiatives

A range of existing policies and programs are available to the advanced manufacturing industry. In some instances, these are underused because businesses are not aware of them.

<table>
<thead>
<tr>
<th>What we will do</th>
<th>Who</th>
<th>When</th>
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</thead>
<tbody>
<tr>
<td>Promote the following programs and initiatives:</td>
<td>Lead</td>
<td>Short term (commencing within 12 months)</td>
</tr>
<tr>
<td>• the TechVouchers program</td>
<td>NSW Department of Industry</td>
<td></td>
</tr>
<tr>
<td>• the Boosting Business Innovation Program</td>
<td>Supported by</td>
<td></td>
</tr>
<tr>
<td>• Jobs for NSW, a job creation fund</td>
<td>AusIndustry</td>
<td></td>
</tr>
<tr>
<td>• Launch Pad – Technology Business Incubator</td>
<td>Commonwealth Department of Industry, Innovation and Science</td>
<td></td>
</tr>
<tr>
<td>• NSW-Israel R&amp;D and Technological Innovation Program</td>
<td>AMGC</td>
<td></td>
</tr>
<tr>
<td>• NSW Agility Program and Manufacturing Innovation Awards Program</td>
<td>Innovative Manufacturing Cooperative Research Centre (CRC)</td>
<td></td>
</tr>
<tr>
<td>• Commonwealth Government programs, including:</td>
<td></td>
<td></td>
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<tr>
<td>• Innovation Connections</td>
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<tr>
<td>• Global Innovation Linkages</td>
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<tr>
<td>• the Business Research and Innovation Initiative</td>
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<tr>
<td>• the Entrepreneurs’ Programme</td>
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<tr>
<td>• the Manufacturing Transition Programme</td>
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<tr>
<td>• CSIRO Kick Start</td>
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<tr>
<td>• AMGC Advanced Manufacturing Early Stage Research Fund</td>
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</table>
Drive the adoption of advanced processes to support and facilitate skills development in the NSW manufacturing industry

A key source of value differentiation in the advanced manufacturing sector is the employment of high-skilled workers. There is scope to increase the utilisation of highly skilled workers as part of the focus on creating value. A comparison with the US shows that many NSW manufacturing sub-industries suffer from a skills gap and could do more to boost the skills and capabilities of their workforce.

WHAT SUCCESS WILL LOOK LIKE

The NSW Government and the manufacturing industry collaborate to identify and address the skills gap to meet the future needs of advanced manufacturing in the state. Skills improved to meet market demand, and more students encouraged to choose careers in advanced manufacturing. SME businesses have advanced capabilities, increasing commercial success.
Initiative 2.1  Assess and address the skills gap in the NSW advanced manufacturing industry

Comparison with the US reveals that higher-skilled workers are particularly under-represented in NSW in industries such as computer and electronics manufacturing (45% higher in the US), aerospace manufacturing (32% higher in the US), and pharmaceutical and medical equipment manufacturing (30% higher in the US).\(^\text{13}\)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Use the ME Program in the NSW Hunter region as a model for expanding training of the advanced manufacturing workforce to more locations in the state</td>
<td>Lead</td>
<td>Short term (commencing within 12 months)</td>
</tr>
<tr>
<td>Use the Advanced Manufacturing Connect program to:</td>
<td>Supported by</td>
<td></td>
</tr>
<tr>
<td>• facilitate engagement between industry, government, universities, TAFE NSW and vocational training providers to support industry in understanding Industry 4.0 and how it will require workforce transition activities and the development of new skill sets</td>
<td>NSW Department of Industry</td>
<td></td>
</tr>
<tr>
<td>• coordinate the aggregated demand for skills (‘skills clustering’), in partnership with the Commonwealth Government and industry</td>
<td>TAFE NSW</td>
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<tr>
<td>• promote and link opportunities for STEM graduates and higher-skill professionals within manufacturing, in partnership with education providers and industry organisations</td>
<td>AMGC</td>
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<tr>
<td>• support the AMGC to build advanced manufacturers’ commercialisation and business skills</td>
<td>Industry partners</td>
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<td></td>
<td>Universities</td>
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</tbody>
</table>

Initiative 2.2  Promote advanced manufacturing as a career path

The advanced manufacturing sector’s ability to build up an employment pipeline and attract strong candidates is constrained by limited awareness of the industry as a career option. Increasing awareness among high school and university students will promote the advanced manufacturing industry as a potential career pathway.

<table>
<thead>
<tr>
<th>What we will do</th>
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<tbody>
<tr>
<td>Collaborate with the AMGC, universities, vocational training providers and industry partners to promote and showcase the advanced manufacturing industry as a career path</td>
<td><strong>Lead</strong></td>
<td>Short term (commencing within 12 months)</td>
</tr>
<tr>
<td>Work with industry to identify and promote the skills and aptitude required for a career in advanced manufacturing</td>
<td><strong>Supported by</strong></td>
<td></td>
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<tr>
<td>Leverage existing engagement programs between schools and industry to provide information packs about the advanced manufacturing industry to school careers advisers</td>
<td>• NSW Department of Industry</td>
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<td></td>
<td>• TAFE NSW</td>
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<td></td>
<td>• Universities</td>
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<td></td>
<td>• AMGC</td>
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<tr>
<td></td>
<td>• Industry partners</td>
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</tbody>
</table>
Initiative 2.3  Promote and support the creation of traineeships, internships and apprenticeships with SMEs

Internships, traineeships and apprenticeships will encourage the practical and applied experience necessary for graduates to succeed in the advanced manufacturing industry. However, the creation of these programs can be costly for SMEs, which have limited resources for recruiting students and understanding their needs.

**What we will do**

- Promote and coordinate support for advanced manufacturing SMEs to establish apprenticeship, internship and traineeship programs through the TAFE NSW Innovative Manufacturing, Robotics and Science SkillsPoint
- Connect industry and educational institutions to promote the merits of traineeships, internships and apprenticeships
- Create and share resources to encourage SMEs to better understand the regulations and processes for hiring interns, trainees and apprentices

**Who**

- **Lead**
  - NSW Department of Industry
- **Supported by**
  - TAFE NSW
  - Universities
  - NSW Small Business Commissioner
  - AMGC

**When**

Short term (commencing within 12 months)

Initiative 2.4  Map and showcase NSW advanced manufacturing industry skills and capabilities

Collaborative innovation and mutually beneficial transfer of knowledge, skills, assets and infrastructure can take place when businesses within the advanced manufacturing sector have visibility of the capabilities and capacities within the sector.

It is difficult and costly for industry participants, especially SMEs with weak industry networks, to identify the available skills and capabilities across the industry. This initiative aims to increase awareness of skills and capabilities to facilitate industry partnerships and joint projects that will increase product development and commercialisation.

**What we will do**

- Map advanced manufacturing skills capabilities to make the information easily accessible in local and international markets
- Partner with universities, TAFE NSW and other vocational providers to create a talent pool for SMEs to access skilled workers across the state

**Who**

- **Lead**
  - NSW Department of Industry
- **Supported by**
  - AMGC
  - Industry partners
  - TAFE NSW

**When**

Short term (commencing within 12 months)
Support the implementation of advanced business models that lead to high-value manufacturing solutions and create products that fulfil previously unmet needs.

Manufacturing firms using traditional processes, products and business models will increasingly be unable to compete on cost as value chains are globalised. To remain relevant, many NSW manufacturers need to embrace new production methods and business models that allow them to compete on value. This means adopting the latest advances in Industry 4.0 technologies.

Global best practice analysis and interviews with global manufacturing experts show that manufacturing companies typically pursue three broad strategies to improve business models and succeed in today’s globalised world. They can sharpen their value proposition (innovation leaders) or offer more product-related services (servitised firms); increase their market focus to tap into under-served niches (market finders); or reduce their product costs by making their processes more efficient (process winners).

NSW businesses have a significant opportunity to improve their competitiveness and increase productivity by shifting a larger proportion of workers into non-production roles such as services.

14 The AMGC conducted interviews with around 20 global manufacturing experts, including former executives of large manufacturing companies, thought leaders and academics. See Sector Competitiveness Plan, Advanced Manufacturing Growth Centre, 2017.

WHAT SUCCESS WILL LOOK LIKE

NSW manufacturers are more aware of, and more likely to adopt, the latest advances in Industry 4.0, including innovative, cost-saving best practices. Advanced manufacturing SMEs access increased opportunities through the global supply chain.
### Initiative 3.1  Accelerate NSW manufacturers’ adoption of Industry 4.0 business models

The NSW Government is committed to driving the adoption of smart technology that will facilitate continued development in NSW’s advanced manufacturing industry. The first step is building an awareness of key priority areas, including machine learning, big data technology, artificial intelligence, 3D printing and the Internet of Things (IoT).

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<thead>
<tr>
<th>What we will do</th>
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</table>
| Partner with the AMGC to:  
  - co-design and co-deliver projects under the key strategy areas of advanced knowledge, advanced processes and advanced business models  
  - develop an online tool offering NSW manufacturing businesses an Industry 4.0 readiness checklist  
  - deliver statewide Industry 4.0 workshops focused on key priority areas including big data, artificial intelligence, augmented reality, digital supply chains, IoT and cyber security. These workshops will include using the AMGC survey and online tool to map the capabilities of manufacturing businesses in market positioning, leadership, strategy and change management, innovation and use of technology, and digital manufacturing  
  - increase awareness in the need for technical leadership and value-adding services within advanced manufacturing businesses to improve value differentiation  
  - support the development of identified R&D priorities, including in robotics and automated production processes; advanced materials and composites; digital design and rapid prototyping; sensors and data analytics; sustainable manufacturing and life-cycle engineering; augmented or virtual reality systems; nano-manufacturing; precision manufacturing; bio-manufacturing and biological integration | **Lead**  
  - NSW Department of Industry  
  **Supported by**  
  - AMGC  
  - Research institutions  
  - Universities  
  - Industry partners  
  - TAFE NSW | **Short term (commencing within 12 months)** |
## Initiative 3.2  Support startups and SMEs to be globally competitive

Generating startup activity is critical to ensuring the industry can continue to develop and thrive. A strong support network and environment are required to maximise the existing support available through NSW Government and Commonwealth Government programs.

The NSW Government will work to create an attractive environment for entrepreneurs, supporting startups to establish and scale up, and develop new products and services.

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<thead>
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<tbody>
<tr>
<td>Use the Advanced Manufacturing Connect program to:</td>
<td><strong>Lead</strong>&lt;br&gt;NSW Department of Industry</td>
<td><strong>Short term</strong> (commencing within 12 months)</td>
</tr>
<tr>
<td>• promote the Sydney Startup Hub to the advanced manufacturing sector</td>
<td><strong>Supported by</strong>&lt;br&gt;NSW Small Business Commissioner&lt;br&gt;NSW Government and Commonwealth Government partners&lt;br&gt;Industry partners&lt;br&gt;TAFE NSW</td>
<td></td>
</tr>
<tr>
<td>• support improved access to capital for starting and scaling up advanced manufacturing businesses</td>
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<td></td>
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<tr>
<td>• promote Jobs for NSW funding initiatives</td>
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<tr>
<td>• facilitate business matching and connecting to investors and contractors through networking events</td>
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<tr>
<td>• promote the TechVouchers initiative and the Boosting Business Innovation Program</td>
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<tr>
<td>• develop an annual schedule of capability workshops, networking and educational events for the NSW startup and SME sector</td>
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<tr>
<td>• deliver supply chain capability and government procurement development workshops</td>
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<tr>
<td>• increase awareness of the practical and job-ready advanced manufacturing training options offered by TAFE NSW and the availability of cross-sector training as well as soft skills training to assist workers in undertaking diverse roles</td>
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</tbody>
</table>
Grow exports and attract investment into the NSW advanced manufacturing industry

NSW is home to 30% of Australia’s manufacturing businesses, the largest share of any state or territory, but it only accounts for 16% of exports by value. Overseas markets represent an opportunity to expand the customer base of NSW manufacturers, providing another avenue for industry growth.

15 ABS cat. no. 8155.0, ABS cat. no. 5368.0

**WHAT SUCCESS WILL LOOK LIKE**

Greater international awareness of NSW’s advanced manufacturing capabilities. More NSW businesses successfully export to international markets. An increased number of international advanced manufacturing businesses choosing NSW as their Asia-Pacific base and investing in NSW. A thriving Aerospace and Defence Industries Precinct in Western Sydney, closely engaged with the advanced manufacturing industry.
### Initiative 4.1  Promote NSW’s advanced manufacturing capabilities internationally

Greater international promotion of NSW’s manufacturing capabilities will increase exports and international business partnerships, particularly for SMEs.

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<tr>
<th>What we will do</th>
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<tbody>
<tr>
<td>Support and promote Austrade’s organised trade events, exhibitions, seminars and missions</td>
<td>Lead</td>
<td>Short term (commencing within 12 months)</td>
</tr>
<tr>
<td>Provide coordination support for NSW-based companies to attend these events</td>
<td>Supported by</td>
<td></td>
</tr>
<tr>
<td>Develop and showcase a NSW advanced manufacturing capability prospectus</td>
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<tr>
<td>Leverage an international network of NSW alumni to promote NSW’s advanced manufacturing capabilities</td>
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<tr>
<td>Partner with Business Events Sydney to attract world-leading advanced manufacturing events and conferences to NSW</td>
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<tr>
<td>Deliver workshops to support manufacturers’ capability building, including in exporting and securing global supply chain opportunities</td>
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</table>

### Initiative 4.2  Develop export capabilities in advanced manufacturing businesses

The NSW Government will encourage manufacturers to export their goods and services, increasing revenue for the industry.

<table>
<thead>
<tr>
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<th>When</th>
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<tbody>
<tr>
<td>Use the Advanced Manufacturing Connect Program to:</td>
<td>Lead</td>
<td>Short term (commencing within 12 months)</td>
</tr>
<tr>
<td>• deliver supply chain capability development workshops, including in cross sectoral opportunities to connect to prime contractors with new supply chain partners</td>
<td>Supported by</td>
<td></td>
</tr>
<tr>
<td>• deliver a series of workshops in metropolitan and regional NSW for advanced manufacturing businesses interested in developing knowledge and capabilities in exporting goods and services</td>
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<td></td>
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<tr>
<td>• improve market focus by identifying underserved segments and linking them to global value chains</td>
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</tbody>
</table>
### Initiative 4.3  Attract foreign direct investment

Lack of access to capital is creating a barrier for some innovative companies seeking to scale up, and inhibiting the commercialisation of new products and services. FDI will provide an additional source of capital to invest in new and emerging technologies, particularly for SMEs and startups.

<table>
<thead>
<tr>
<th>What we will do</th>
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<th>When</th>
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<tbody>
<tr>
<td>Develop and showcase a NSW advanced manufacturing investor prospectus</td>
<td>Lead</td>
<td>Short term (commencing within 12 months)</td>
</tr>
<tr>
<td>Support inbound investor missions</td>
<td>NSW Department of Industry Supported by</td>
<td></td>
</tr>
<tr>
<td>Organise and host investor business forums and networking events</td>
<td>Austrade</td>
<td></td>
</tr>
<tr>
<td>Leverage an international network of NSW alumni to promote NSW’s advanced manufacturing capabilities</td>
<td>TAFE NSW</td>
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<tr>
<td>Leverage the Jobs for NSW fund to support multinationals to set up their headquarters in NSW</td>
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<tr>
<td>Leverage the statewide reach of TAFE NSW to contribute to workforce development across the State, meet regional skills demand and address local skill shortages</td>
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</table>
### Initiative 4.4 Support the establishment of the Western Sydney Aerospace and Defence Industries Precinct

Western Sydney is positioned as an emerging leader in the manufacturing sector, providing Industry 4.0 solutions. The NSW Government is committed to leveraging the region’s industry capabilities to secure economic benefits for the sector.

The Western Sydney Aerospace and Defence Industries Precinct will create opportunities to develop and grow industry capabilities by facilitating the physical and virtual agglomeration of aerospace, defence and related industries. This will lead to increased R&D; cutting-edge technology and innovation spillovers; new connections for NSW businesses to prime contractors in global supply chains; direct channels to bring products to market; and export opportunities in the Asia-Pacific region and beyond.

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<thead>
<tr>
<th>What we will do</th>
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<th>When</th>
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<tbody>
<tr>
<td>Drive domestic and overseas investment in the planned Western Sydney Aerospace and Defence Industries Precinct</td>
<td><strong>Lead</strong></td>
<td>Medium term (commencing within 2 years)</td>
</tr>
<tr>
<td>Integrate and drive collaboration between the NSW Government and Commonwealth Government, industry, and education and research institutions to encourage commercial outcomes</td>
<td><strong>Supported by</strong></td>
<td></td>
</tr>
<tr>
<td>Co-locate leading international and globally competitive domestic firms with startups and SMEs to foster collaboration and access to global supply chains</td>
<td>Austrade</td>
<td></td>
</tr>
<tr>
<td>Support skills-building capability (including STEM skills) to meet the precincts future high-tech workforce requirements</td>
<td>Commonwealth Government Department of Industry, Innovation and Science</td>
<td></td>
</tr>
<tr>
<td>Connect startups and SMEs with prime contractors and original equipment manufacturers to facilitate commercial opportunities in their global supply chains</td>
<td>NSW Government</td>
<td></td>
</tr>
<tr>
<td>Support the advanced manufacturing sector to leverage the billions of dollars of infrastructure investment in Western Sydney</td>
<td>Local councils</td>
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<tr>
<td></td>
<td>AMGC</td>
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<tr>
<td></td>
<td>Industry partners</td>
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</table>
Acknowledgements

The NSW Government and Department of Industry would like to acknowledge and thank the following key partners across government and the advanced manufacturing industry who gave valuable insights and feedback to enable development of the NSW advanced manufacturing industry development strategy. These organisations have not necessarily endorsed the strategy.

Companies
- AlphaBeta
- Asahi Beverages
- Baxter Healthcare
- Bisalloy Steels
- Cochlear
- Corporate Partners RTO
- GE Digital
- L&A Pressure Welding Pty Ltd
- Mars Wrigley Confectionery
- McKinsey & Co
- Milspec Manufacturing
- Omni Tanker Pty. Ltd.
- Pandrol Australia
- Silanna
- Thales Australia

Government
- Advanced Manufacturing Growth Centre
- Austrade
- Business Connect
- Commonwealth Department of Industry, Innovation and Science
- Commonwealth Department of Communications and the Arts
- Innovative Manufacturing CRC
- Jobs for NSW
- NSW Department of Planning & Environment
- NSW Department of Premier & Cabinet
- NSW Small Business Commissioner
- TAFE NSW

Industry associations
- Ai Group
- Australian Academy of Technological Sciences and Engineering
- Australian Advanced Manufacturing Council
- Business Events Sydney
- Engineers Australia
- Hunter Business Chamber
- Manufacturing Lighthouse Stakeholder Group (RDA)
- Medical Technology Association of Australia Ltd
- NSW Business Chamber
- Regional Development Australia
- Southern Strength Agile Manufacturing Network
- The Committee for Sydney

Research organisations
- CSIRO
- Macquarie University
- University of New South Wales
- University of Technology Sydney
- Western Sydney University