

NSW Treasury

# NSW space industry development strategy

2020







## FROM THE MINISTER

**The sky is no longer the limit. Space represents a new frontier for industry, research, employment and economic development. Technology changes now make space as relevant to a farmer or business owner in 2020 as it was to Neil Armstrong when we first set foot on the moon in 1969. Today's space industry is full of opportunities that can improve citizens lives everyday—let's embrace them together.**

Developments in space technology mean that almost every citizen walking down the street has a device in their pocket more powerful than the computers that steered Apollo 11 and helped land it on the lunar surface. In fact, mobile phones are a product of space industry technologies that can transmit voice and video calls, provide directions, look up the weather forecast and even check the cricket score!

That same technology supports precision guided agricultural equipment, real-time tracking of freight, the movement of autonomous vehicles and the many innovative ways in which we instantly connect with people, places, products and markets.

NSW is well placed to unlock the benefits provided by these opportunities. It has the largest concentration of space-related activity in the country, with more than 40% of the nation's space businesses and more than a third of space startups.

We are home to world-leading space research and development and the most diverse space industry ecosystem in Australia. NSW is also home to the broadest range of customers of space technology—from agriculture to defence to finance.

With nearly every industry looking to increase its output and improve its efficiency through space-enabled technologies, the value of the global space sector is forecast to reach more than US\$1 trillion by 2040.

That is why the NSW Government has developed this strategy—to work with industry to ensure that NSW is at the forefront of this innovative and rapidly growing sector.

A handwritten signature in black ink, appearing to read 'Stuart Ayres'.

**The Hon. Stuart Ayres MP**

Minister for Jobs, Investment, Tourism and Western Sydney

# EXECUTIVE SUMMARY

**The global space industry is expanding by more than 9% annually<sup>1</sup> and NSW is well positioned to benefit. The state is home to a highly innovative, competitive and technically sophisticated space sector that is of growing significance to the Australian economy.**

New manufacturing, design and software technologies have reduced barriers to entry into the space sector. They have also ushered in a new era of low-cost satellites and payloads, known as Space 2.0, in which small companies and startups can play a larger role.

The NSW Government is committed to ensuring that the state's space industry is well positioned to benefit from continued rapid growth in international demand for emerging space technologies. There are also significant synergies with the defence sector. The government launched its defence and industry strategy—*New South Wales: Strong, smart and connected*—in February 2017 to leverage the growing opportunities in the sector.

This space industry development strategy (the strategy) aims to maximise opportunities for NSW businesses in space. It focuses on the potential for rapid growth in space startups and small to medium-sized enterprises (SMEs), including increasing collaboration to realise the benefits arising from advances in technology to the wider economy.

## **NSW benefits from being home to:**

- more than a third of all space startups nationally
- the largest finance sector and venture capital community in Australia
- well-established R&D infrastructure centred around its world-class universities, research organisations and centres of excellence.

NSW also has a well-established network of satellite communications and space-related ground operations. These include the Commonwealth Scientific and Industrial Research Organisation's (CSIRO's) Australian Telescope National Facility installations at Narrabri, Coonabarabran and Parkes, the Optus Earth Station at Belrose in Sydney, and the Commonwealth Government's defence satellite station in Wagga Wagga.

The strategy aligns the competitive advantages of NSW's space sector with forecasted areas of growth. It sets out targeted, practical initiatives to grow the sector, build the capability of businesses, and continue to foster a supportive business environment in NSW.

***The NSW space industry development strategy builds on the efforts of the Commonwealth and NSW governments to grow the space industry, including through their partnership under the Western Sydney City Deal.***

Under this deal, the Commonwealth Government has committed to building the Western Sydney International (Nancy-Bird Walton) Airport and will support the NSW Government in developing the Western Sydney Aerotropolis adjoining the airport. The Aerotropolis will include space, advanced manufacturing, aviation and defence industries and aerospace-focused educational institutions.

<sup>1</sup> Australian Government Department of Industry, Innovation and Science, *Review of Australia's Space Industry Capability: Issues Paper – August 2017*.

The Commonwealth Government established the Australian Space Agency in July 2018, and the NSW Government has been working collaboratively with the agency to support the growth of the space industry.

In early 2019, the Australian Space Agency and the NSW Government signed a Memorandum of Understanding (MoU) to work together to develop the space industry in NSW. This included the Commonwealth Government committing \$2 million to develop space manufacturing facilities in Western Sydney. The NSW Government has also committed to working with the space industry to develop a space industry hub in NSW.

The NSW Government's National Space Industry Hub (the Hub) will support the state's space industry ecosystem and the space testing and manufacturing facilities at the Aerotropolis. It will encourage a vibrant ecosystem of space companies in NSW, and strengthen connections with other industries, government and research institutions.

Additionally, the NSW Government is developing the Sydney Innovation and Technology Precinct to cement Sydney's reputation as the innovation capital of Australia, and transform NSW's world-leading R&D into globally successful businesses.

These developments will create focal points for industry, government, the research community, and educational and training organisations to collaborate, innovate and become more globally competitive. Close cooperation with industry and existing programs is required to realise the potential of these initiatives.

**Research and industry consultation conducted for this strategy provided the following key insights into the NSW space industry:**

- NSW is a sought-after business location due to its lifestyle offering, large, highly skilled workforce, existing and planned infrastructure, and broad complementary industry base.
- The state has set the example for collaboration between the defence industry and research sector. Increasing cooperation and knowledge-sharing with the space sector could help increase commercial opportunities.
- NSW has a highly skilled space workforce employed in a wealth of businesses producing high-quality products and providing high-value services.
- The state is home to many world-class universities that are training the next generation of space industry workers. However, more investment is needed to equip them with the skills that would allow them to take full advantage of rapid technological advancement.
- Space infrastructure will be increasingly important for all industries. NSW's strengths in satellite communications, academic centres of excellence and growing startup community mean it is ideally placed to deliver this infrastructure.

**To implement this strategy, the NSW Government will lead collaboration with all levels of government, key industry partners, research institutions, and educational and training organisations.**

The initiatives in this strategy will lay the foundations for a space industry that is a source of economic strength and innovation in NSW in the years to come. They will drive sustainable economic growth, job creation, skills development and investment in the space sector in the state.



# KEY STRATEGIC THEMES AND INITIATIVES

Table 1. Summary of key themes and initiatives

Strategic theme	Opportunity or challenge	Initiatives
<p><b>1</b></p> <p><b>Foster collaboration across the industry and with the research community</b> to increase industry competitiveness</p>	<p>Enable the industry to access knowledge of complementary capabilities and business opportunities, including through industry-specific and cross-sector workshops and networking events, with particular focus on promoting market entry for SMEs and startups</p>	<p><b>1.1</b> Promote stronger links within the industry, particularly between SMEs and primes</p> <p><b>1.2</b> Build stronger connections between industry and the research community</p> <p><b>1.3</b> Increase awareness of government support for industry collaboration</p>
<p><b>2</b></p> <p><b>Help to develop a fit-for-purpose workforce</b> that meets the needs of the industry</p>	<p>Close the science, technology, engineering and mathematics (STEM) skills gap in the workforce, aligning education and training to industry needs, facilitating pathway programs and inspiring the next generation of workers</p>	<p><b>2.1</b> Identify education and training opportunities to meet industry needs</p> <p><b>2.2</b> Increase early student interest in STEM and space</p> <p><b>2.3</b> Facilitate pathways to industry</p>
<p><b>3</b></p> <p><b>Support the growth of industry precincts</b> to foster an innovative ecosystem</p>	<p>Leverage the opportunities created through the establishment of the Western Sydney Aerotropolis and the Sydney Innovation and Technology Precinct</p>	<p><b>3.1</b> Facilitate the establishment of a thriving space industry presence at the Aerotropolis and the Sydney Innovation and Technology Precinct</p> <p><b>3.2</b> Develop a network approach to the NSW space industry</p>
<p><b>4</b></p> <p><b>Maximise NSW space industry activity</b> in the national space ecosystem</p>	<p>Advocate for the NSW space industry through a well-established relationship with the Australian Space Agency, creating new business and networking opportunities, promoting space capabilities and supporting startups</p>	<p><b>4.1</b> Work collaboratively with the Australian Space Agency to increase opportunities for NSW industry</p> <p><b>4.2</b> Facilitate connections between the NSW space sector and the wider economy</p> <p><b>4.3</b> Support the growth of space startups</p>
<p><b>5</b></p> <p><b>Grow exports and attract investment</b> into the NSW space sector</p>	<p>Access international markets and leverage investment to grow NSW space industry</p>	<p><b>5.1</b> Support NSW space companies to participate in global supply chains</p> <p><b>5.2</b> Attract investment into the NSW space sector</p>

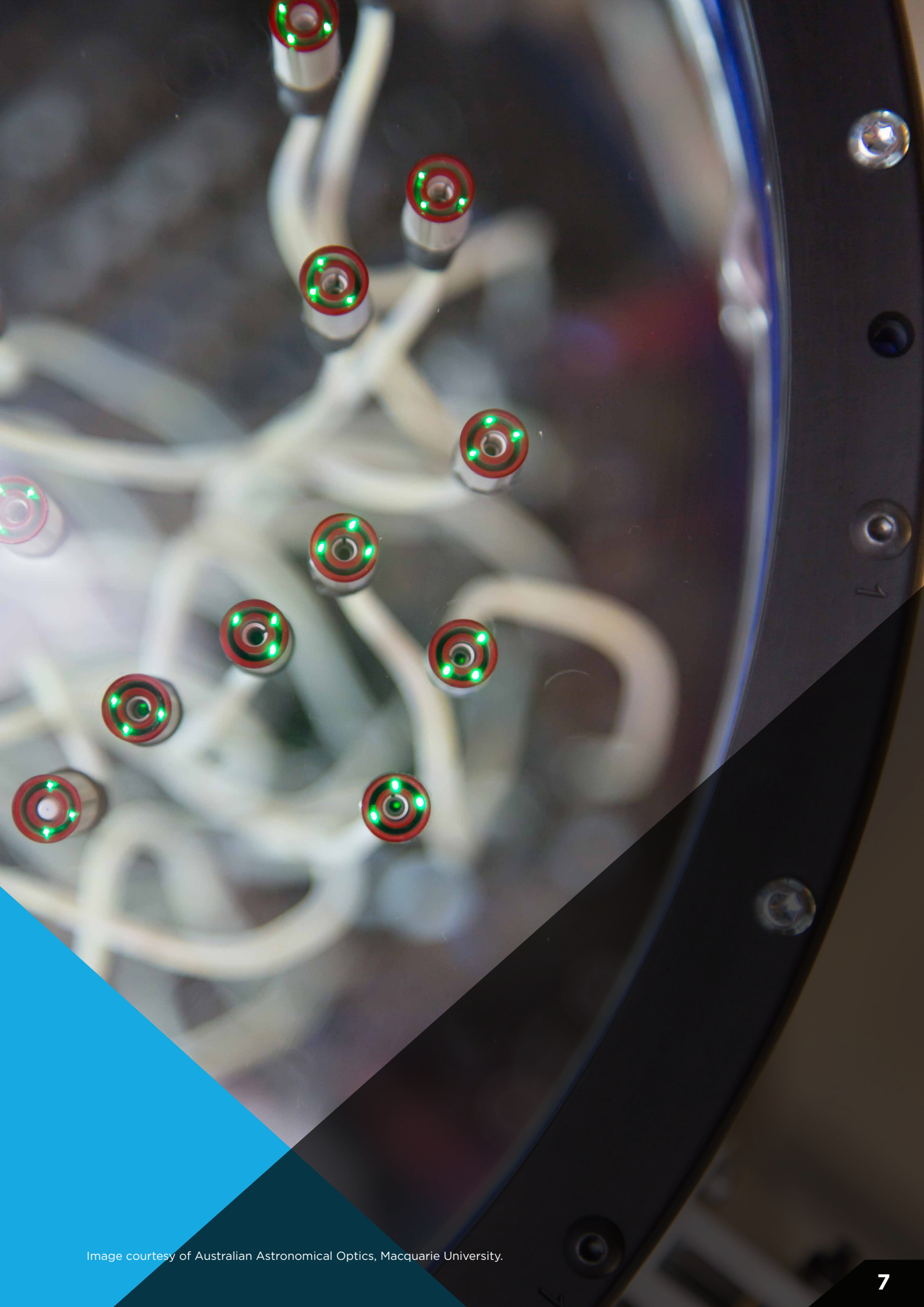


Image courtesy of Australian Astronomical Optics, Macquarie University.

# ECONOMIC VALUE AND SECTOR OVERVIEW

## Industry breakdown

The space industry in NSW is undergoing rapid and massive growth. Startups and SMEs comprise a substantial part of this sector.

### Sectors in the space industry in NSW include<sup>2</sup>:

- space systems
- launch and support services
- ground systems
- space-enabled services and applications
- R&D
- education and training.

The global space industry has undergone rapid change. Once almost entirely the domain of governments, 77% of space-related revenue is now generated by the commercial sector.

The Australian space industry employs 9,500–11,500 people and generates annual revenues of \$3–4 billion.<sup>3</sup>

NSW has the largest share of Australia's space industry, being home to 41% of Australian space-related businesses and generating around half of all revenue nationally.<sup>4</sup> NSW has the opportunity to build on its existing strengths and leverage the global and national growth in the space industry.

Space-derived products, services and applications are used by a multitude of other industries, including communications, transportation, energy, aviation, advanced manufacturing, robotics, agriculture, construction and information technology. As the financial and risk barriers to participation in the space industry decrease, the development, adoption and use of these products is set to continue.

Satellite-enabled technology and data play an enormous role in improving day-to-day activities of both industry and individuals, from the GPS on a smart phone to monitoring bushfires to supply chain tracking. The efficiencies and benefits of this technology are set to increase exponentially, and so a strong local space industry and space-enabled industries will be fundamental to ensuring NSW's economy remains competitive.

2 Asia Pacific Aerospace Consultants (2017), *Briefing Paper to the NSW Government on NSW Space Capabilities and the Review of Australia's Space Industry*.

3 Asia Pacific Aerospace Consultants (2017), *Briefing Paper to the NSW Government on NSW Space Capabilities and the Review of Australia's Space Industry*.

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**Table 2. Summary statistics for the space industry in NSW**

Indicator	NSW	Breakdown
<b>Number of organisations</b>	231 organisations	Just over 40% of businesses in Australia with space-based capabilities are based in NSW, and 38% of all space startups in Australia are based in NSW.
<b>Ground systems</b>	53 businesses	Around 35% of ground systems businesses in Australia are based in NSW. This includes designing, building, manufacturing and operating ground systems relating to space.
<b>Space-enabled services</b>	166 businesses	Almost 40% of space-enabled services businesses in Australia are based in NSW. This includes designing, building, manufacturing and operating equipment and services-related applications that require data or services from space-based systems or components.
<b>Education and R&amp;D</b>	38 organisations participating in space-related R&D	Eight universities in NSW have active space-related programs: Charles Sturt University, Macquarie University, University of New South Wales, University of Newcastle, University of Sydney, University of Technology Sydney, Western Sydney University and University of Wollongong. Across these institutes, 26 departments are actively engaged in space-related activities.
<b>Revenue</b>	\$1.8 billion to \$2.8 billion per annum	NSW space businesses generate more than 50% of national space-related revenue.
<b>Employment</b>	2,565 to 3,450 workers	Almost 30% of employment in space-related activities in Australia is based in NSW.
<b>Exports</b>	\$120 million to \$160 million	NSW companies generate 40–50% of Australia’s space-related export revenue.

Source: Asia Pacific Aerospace Consultants (2017), *Briefing Paper to the NSW Government on NSW Space Capabilities and the Review of Australia’s Space Industry*.

## Growth of the sector

NSW has a prestigious space industry heritage. The recent establishment of the Australian Space Agency and celebrations commemorating the 50th anniversary of the moon landing have renewed public interest in space. The space industry in NSW is well positioned to capitalise on this interest and the rapid growth and evolution of the global space industry. While the industry has a vibrant presence in NSW, there are considerable opportunities for it to expand.

The space industry is estimated to be worth US\$345 billion globally, with its value increasing 9.6% annually<sup>5</sup> and expected to reach US\$1 trillion by 2040. Consumer focused commercial space activities represent 77% of all space undertakings, outstripping government funded programs as the primary source of space technology and services.

The Australian Space Agency has set objectives that seek to capture some of that value locally, with a goal to triple the size of the Australian space industry by 2030.

This growth is being driven by increasingly cost-effective small satellites, and launch systems, which are providing opportunities for more startups to enter the market, and the application of satellite-enabled capabilities across other industries, such as precision agriculture and autonomous systems in transport.

In September 2019, the Commonwealth Government announced its commitment to invest \$150 million over the next five years in Australian businesses and technology that can support NASA's campaign to return to the Moon and travel to Mars. This will provide an increasing number of opportunities for the NSW space industry to participate in the global space supply chain.

Longer term, opportunities in commercial space travel and off-earth mining are moving closer to becoming reality.

Industry stakeholders consulted for this strategy identified that these developments are creating increasing demand for new skill sets across the industry. The demand ranges from niche expertise in new technologies to specialised knowledge in traditional roles such as marketing, communications and legal professions. Workforce shortages are prevalent, with increasing global and local competition for the small pool of available skilled labour.

<sup>5</sup> Bryce Space and Technology (2017), *Global Space Industry Dynamics: Research Paper for Australian Government, Department of Industry, Innovation and Science*.

## Case study: Saber Astronautics

Saber Astronautics has come a long way since it was founded in 2008 by a couple of space engineers. The company, based in Sydney, employs six staff and has recently picked up another Australian defence contract valued at more than A\$2 million.

Saber's mission is to reduce the barriers to entry into the space sector. It builds cutting-edge technology for the emerging commercial space industry that can also be used in more traditional sectors, including agriculture, mining and defence.

Saber applies R&D in the areas of artificial intelligence, optimisation systems and technical simulation to reduce waste in systems, connect platforms with customers and solve complex challenges. It has provided a wide range of capabilities to support Army and Navy joint operations, and in the commercial space sector.

The company's signature product is the recently developed Predictive Interactive Groundstation Interface (PIGI)—mission control software designed for the modern age. This satellite operating technology can predict a satellite's performance and display it to an operator, allowing companies to monitor and control many satellites with minimal effort. This is an enabler for new Australian space companies seeking to enter the global market.

A video-game-quality interface allows users to reach any point of the spacecraft or environment, while world-class data mining enables the system to give meaning to the data.

Dr Jason Held, CEO of Saber Astronautics, highlighted the benefits of the software.

'Operators can now make decisions rapidly, with accurate information, given in the context they need.'

'As part of the PIGI project, we proved the ability to model damage to a NASA spacecraft during space weather events.' Dr Held said.

Saber has developed three different levels of licences for PIGI, catering to casual users such as students and hobbyists; small businesses gearing up for live missions; and large corporate and government users. Dr Held says that the 'democratisation' of space has opened up barriers that previously made it very difficult for small space companies to get a foothold in the market.

*'We do a lot of technical R&D and commercialise it with a view towards making space more user-friendly for the general population.'* CEO Dr Jason Held.

## Regional NSW

The space industry in NSW is built around significant technical infrastructure, including satellite ground stations and a network of world-class universities across the state.

NSW ground stations operate in areas ranging from Broken Hill to Parkes and Merimbula.

Regional aerospace industry hubs, such as those near Williamstown and Nowra, offer cohorts of regionally-based, highly-skilled workers that the space industry can draw on as it expands. NSW also benefits from high quality regional universities and research organisations. Cooperation with these will advance the space industry and provide pathways for regional students and workers to enter the industry.

NSW also has a network of regional vocational education and training providers that can be leveraged to deliver training that meets the needs of the industry. For example, the Innovative Manufacturing, Robotics and Science SkillsPoint in Hamilton focuses on skills needs in advanced manufacturing, including in the space industry.

The space industry is having a significant impact on the agriculture sector, enhancing data analysis, monitoring and precision mapping. Benefits include the monitoring of crop development and yield, and detection of crop diseases, nutrient and moisture deficiencies. The collection of accurate information and analysis provides an opportunity to predict a region's agricultural output and mitigate the negative effects of nature such as droughts.

The NSW Government is already using satellite data to assess drought impacts across NSW through Geoscience Australia's Digital Earth Australia - a digital infrastructure system that detects physical changes including water quality and changes in a region across time.

In addition, the space industry will support the delivery of lower cost and more sophisticated solutions in tele-medicine and education services to remote communities.

NSW has spacious, low-populated areas suitable for testing and trials, connected by good infrastructure and within hours of Australia's largest international airport in Sydney.



## Case study: FluroSat

FluroSat is building the future of precision agriculture, providing a software platform that enhances the monitoring and management of farms. It is working towards an agricultural industry that uses seamless data flow between remote sensing, field-based 'internet of things' and automated equipment, where systems learn more with each passing season.

FluroSat's technology is being adopted by farmers and enterprise customers who are using the company's products to gain efficiencies and accuracy in farm management.

FluroSat can help deliver savings and increase crop yield from 10-25%, helping mitigate the impact of tough seasons or to make the most out of good farming conditions. In addition to boosting harvest, the company aims to help farmers save up to 25% on water use and 30% on fertiliser use.

FluroSense, FluroSat's flagship product, uses artificial intelligence (AI) powered by the most advanced multispectral and hyperspectral imager available,

unique crop-specific machine learning, and crop models from agronomic scientists at the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Anastasia Volkova, CEO of FluroSat, is passionate about the importance of space innovations in the agriculture industry: "I have a deep love of aerospace and all things aviation, but I was constantly conscious of the environment and knew space technology had a greater purpose."

"When we first designed the product, we knew it had to be road tested with people who needed it—farmers and crop specialists in rural NSW. We worked with over 30 subject matter experts to really test it," Ms Volkova said.

Through NSW Treasury's Boosting Business Innovation Program, FluroSat received TechVouchers to support its research collaboration with the University of Sydney. The company was also the recipient of a Minimal Viable Product grant and Building Partnerships grant from the NSW Government.

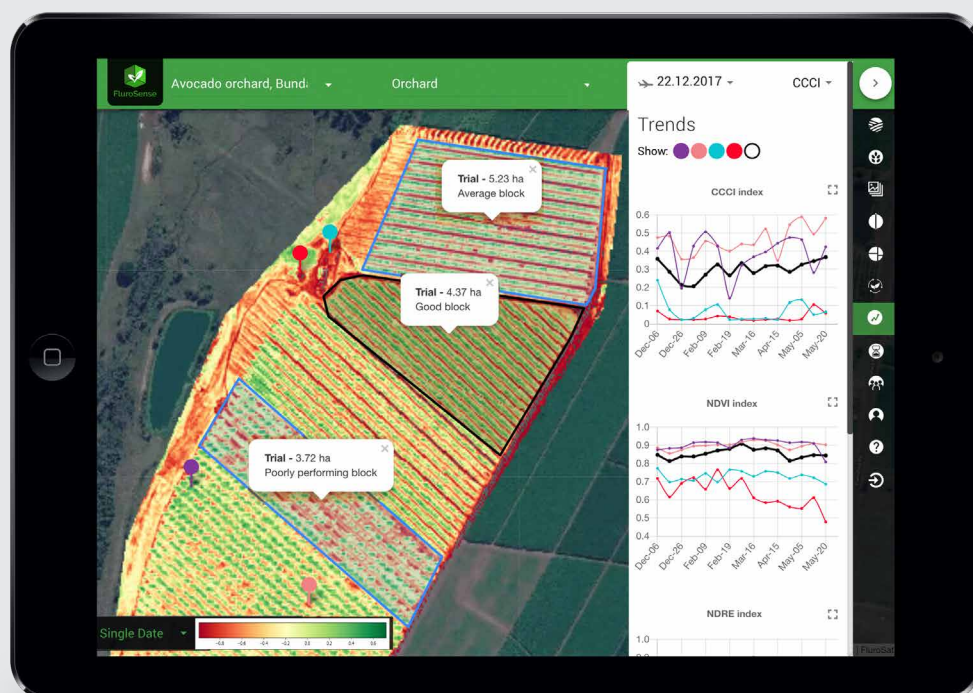


Image courtesy of FluroSat.

## Western Sydney Aerotropolis

Western Sydney is fast becoming a major focal point for investment and is seen as an important source of growth and innovation in the NSW space industry. The region is home to many SMEs that produce highly innovative products and export globally.

The Western City and Aerotropolis Authority has been established to plan the development of the Aerotropolis, and to encourage domestic and international companies to establish a presence there.

The Aerotropolis will include world-class space, aviation, defence and advanced manufacturing industries and training and research institutions. As part of the MoU signed with the Australian Space Agency, the NSW Government has committed to work collaboratively to develop a space manufacturing and testing facility at the Aerotropolis. The facility will be designed for businesses developing and manufacturing space technologies for use in orbit and space exploration.

Government investment in the Western Sydney Airport, the surrounding Aerotropolis and associated infrastructure will encourage the creation of knowledge-intensive jobs, investment by industry and development of a highly skilled workforce.

Education and training institutions will include a state-of-the-art STEM university, a high-performance secondary school and an advanced vocational education and training facility.

These integrated educational facilities will anchor the growth and development of the Aerotropolis. Government and industry investments in the facilities will connect students to the knowledge-intensive jobs of the Aerotropolis.<sup>6</sup>

<sup>6</sup> Department of Premier and Cabinet (2017), *Western Sydney City Deal*, May.

## Case study: Clearbox Systems

Established in 2007, Clearbox Systems is a technology company focused on developing new approaches and techniques for the operations and management of communications networks and the electromagnetic spectrum.

Leveraging the best of Australian local and international partners, their software and hardware solutions are deployed spanning satellite communications, television and radio broadcast, air traffic control, terrestrial networks and intelligence, surveillance, reconnaissance and electronic warfare (ISREW).

Thriving through collaboration, Clearbox Systems works with international space industry partners to provide software solutions and physical integration services to deliver real time signal processing, spectrum monitoring, network management and equipment and sensor monitoring for all terrestrial based satellite communication terminals and network control objects.

Clearbox Systems has recently entered into a strategic partnership with Kythera Space Solutions – an American software company that provides a vendor agnostic approach to reconfiguring modern satellite payloads in real time. By incorporating this capability, they can provide an end-to-end orchestration of services.

Clearbox Systems continues to partner with space businesses, including commercial entities, universities and the Australian Defence Science and Technology agency to better research, develop and implement cutting edge, novel solutions to new challenges arising from satellite communication and space situational awareness initiatives.



## **Sydney Innovation and Technology Precinct**

The NSW Government is developing the Sydney Innovation and Technology Precinct to be a leader in innovation within the region. To be located in Central-Eveleigh, south of the Sydney central business district, it sits within a vibrant ecosystem of technology, innovation and creative businesses. The precinct will link with innovation precincts located within Greater Sydney and rural and regional NSW.

The precinct will be globally connected and underpinned by high-quality physical and digital infrastructure. It will drive the creation of new technology and commercialisation of new products and services. The development will be based on global best-practice placemaking principles and focus on the sustainable, accessible and affordable creation of workplaces for the future.

The precinct will be home to the National Space Industry Hub as well as attract space-related applications and technology businesses that don't require large scale manufacturing facilities.

## **National Space Industry Hub**

In December 2018, the NSW Premier announced the NSW Government's intention to establish the National Space Industry Hub. The Hub will grow the space ecosystem in NSW and beyond by providing opportunities to residents and non-residents to collaborate with researchers, government, academia and wider industry.

The Hub will complement Commonwealth Government efforts to develop the space industry in Australia. This includes collaborative activities, shared projects and initiatives with the Australian Space Agency, the Advanced Manufacturing Centre, the Australian Research Council (ARC) and Cooperative Research Centres (CRCs), including the SmartSat CRC.

The Hub will accelerate industry growth by forming a space industry cluster, and encouraging connections with other industries and partnerships with large corporations. This will support the development of a mature space sector capable of being a key industry in the Sydney Innovation and Technology Precinct and the Western Sydney Aerotropolis.



## Industry insights

Extensive research and analysis, as well as consultation with key industry stakeholders has identified the strengths and opportunities for the space industry in NSW. Table 3 outlines these strengths and opportunities.

**Table 3. The NSW space industry’s strengths and opportunities**

Strengths	Opportunities
<ul style="list-style-type: none"> <li>■ Deep technology, research and vocational education and training talent at NSW universities, research organisations and other training bodies, including 13 CSIRO sites</li> <li>■ Significant commercial, educational and training aerospace capabilities in regional areas, such as Shoalhaven and the Hunter</li> <li>■ Safe, multicultural and economically prosperous communities that benefit from a developed economy and high standard of living</li> <li>■ Year-on-year economic growth, aided by strong domestic growth and good access to emerging markets in South-East Asia</li> <li>■ A geographic position that offers natural strengths in communications and satellite-positioning technology</li> <li>■ Sector strengths in high-tech instrumentation, smart payloads development, space and intra-space communications, and commercialisation of space data</li> <li>■ A thriving and innovative startup community</li> <li>■ Advanced industry capabilities in quantum science, GPS, transport, robotics and advanced structures</li> <li>■ The largest information and communications technology (ICT) industry in Australia, producing 58% of the nation’s ICT services exports in 2015–16<sup>7</sup></li> <li>■ A large agricultural industry that exports goods and is adopting agricultural technology (agtech) applications, such as satellites for agricultural land surveys and tracking, and sensors enabled by the Internet of Things (IoT)</li> </ul>	<ul style="list-style-type: none"> <li>■ Encourage closer collaboration between industry, government and the research community to allow them to act on opportunities and promote growth</li> <li>■ Adapt current skills in the workforce and promote STEM-related disciplines to encourage students to pursue careers in space</li> <li>■ Encourage women to pursue STEM-related disciplines</li> <li>■ Promote the competitive advantages NSW offers the space industry, including access to Sydney’s financial hub, a desirable location for living and deep research capabilities</li> <li>■ Support NSW SMEs and startups to assist the growth of the sector</li> <li>■ Develop the National Space Industry Hub to boost space industry collaboration with researchers and the wider industry</li> <li>■ Support the space sector by closely aligning with the Australian Space Agency and assisting space startups to establish in NSW</li> <li>■ Expand space-based applications such as satellite communications in the financial technology industry, built on NSW’s 44% share of the national financial services sector<sup>8</sup></li> <li>■ Commercialise cross-over opportunities with the defence industry, which contributes \$5.4 billion annually to the NSW economy<sup>9</sup></li> </ul>

Source: Stakeholder consultations and research as indicated.

7 NSW Department of Industry (2017), *Information and Communication Technology—Fostering business opportunity*.

8 NSW Government (2014), *Financial Services—New South Wales*.

9 NSW Department of Industry (2017), *Economic opportunities*.

# KEY STRATEGIC THEMES

The NSW Government is committed to growing NSW's space industry to drive job creation and economic growth in the state.

It has developed this strategy based on research and consultation with stakeholders from space businesses; with industry associations, research institutions and educators; and with the Commonwealth Government, local governments and stakeholders from across NSW Government departments.

The key themes and initiatives in this strategy centre on the benefits available to startups and SMEs in the burgeoning space industry. These businesses are potential key enablers of technological advancements across NSW's wider economy and operate in a sector undergoing rapid growth and change.

**Industry identified five key themes:**

**1 Foster collaboration across the industry and with the research community** to increase industry competitiveness

**2 Help to develop a fit-for-purpose workforce** that meets the needs of the industry

**3 Support the growth of industry precincts** to foster an innovative ecosystem

**4 Maximise NSW space industry activity** in the national space ecosystem

**5 Grow exports and attract investment** into the NSW space sector

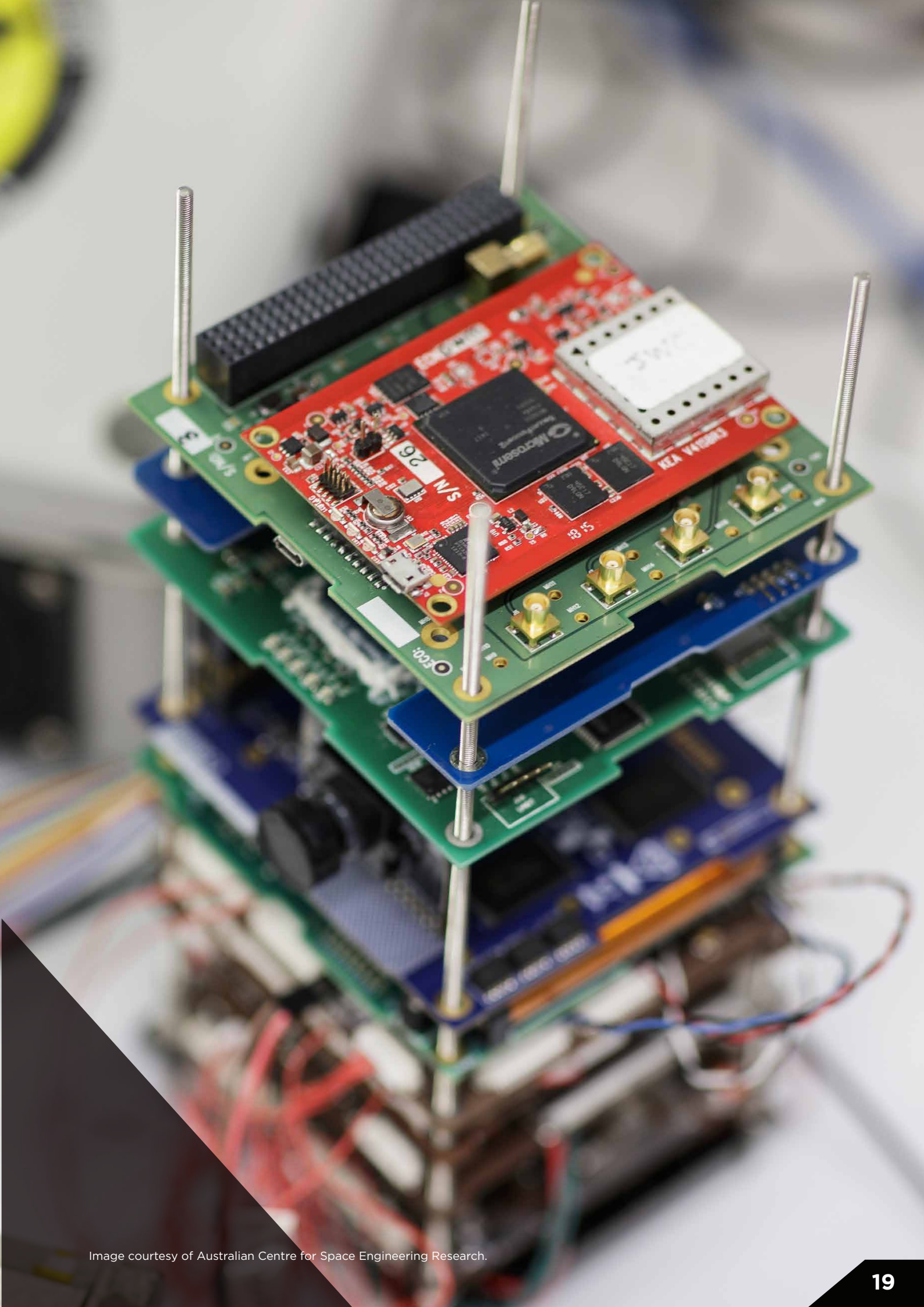


Image courtesy of Australian Centre for Space Engineering Research.



# 1

## Foster collaboration across the industry and with the research community to increase industry competitiveness

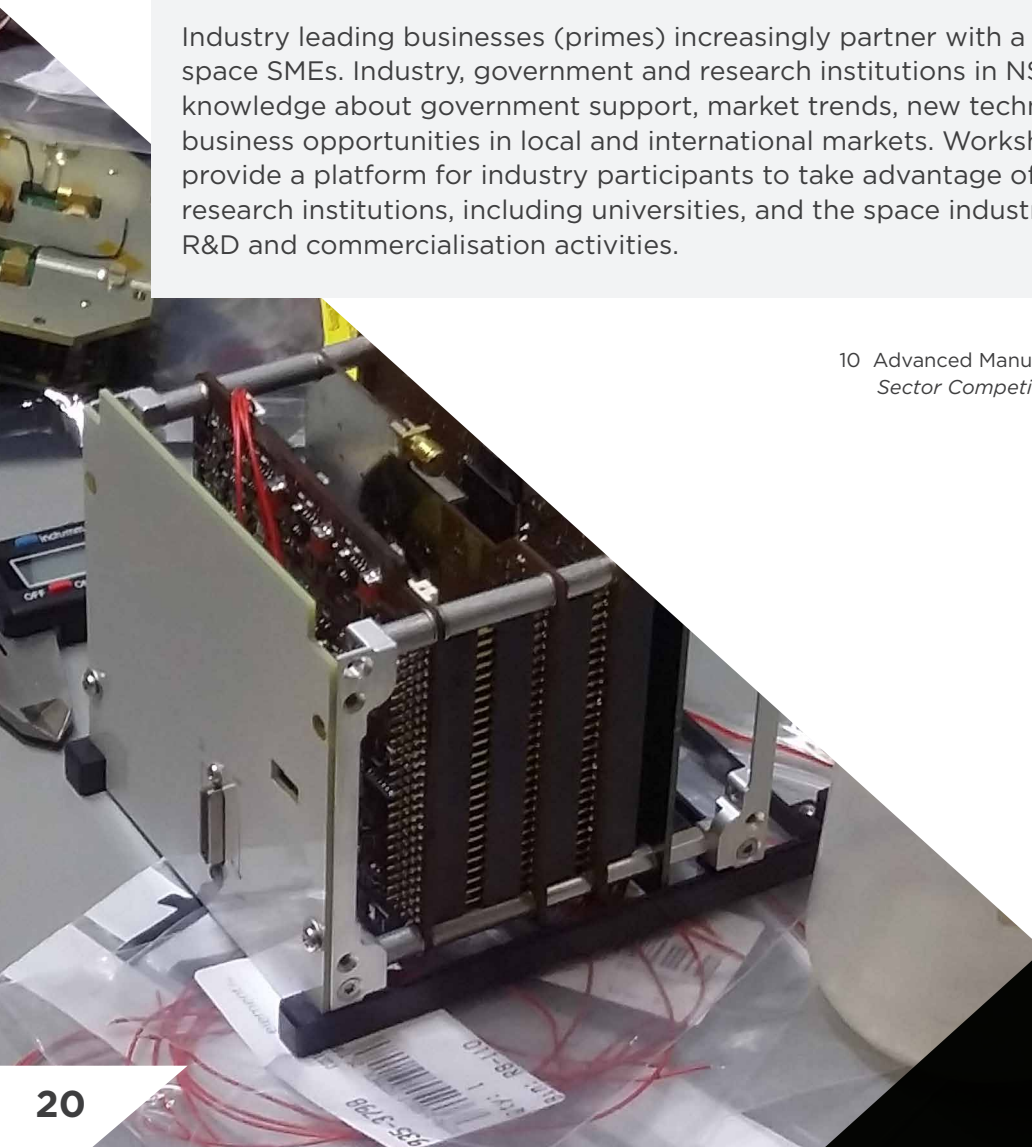
Collaboration within industry and with research institutions can improve capital efficiency and reduce overhead costs.<sup>10</sup> Cutting-edge research has the potential to generate direct economic benefits if it can be effectively commercialised and adopted by industry.

NSW space businesses have the scope to increase their collaboration with other businesses and research institutions. The NSW Government will encourage partnerships and knowledge sharing between industry, government and research institutions relating to technological advances, market trends and business opportunities.

### WHAT SUCCESS WILL LOOK LIKE

Industry leading businesses (primes) increasingly partner with a growing number of space SMEs. Industry, government and research institutions in NSW collaborate to share knowledge about government support, market trends, new technologies and processes, and business opportunities in local and international markets. Workshops and networking events provide a platform for industry participants to take advantage of these benefits. NSW research institutions, including universities, and the space industry regularly engage in joint R&D and commercialisation activities.

<sup>10</sup> Advanced Manufacturing Growth Centre (2017), *Sector Competitiveness Plan*.





## Initiative 1.1 Promote stronger links within the industry, particularly between SMEs and primes

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Establish a dedicated NSW space industry communication channel to provide information about regular workshops, networking opportunities and events for industry</li> <li>■ Support the development of NSW space industry capability maps by drawing on existing databases and identifying information gaps to be filled. Based on this understanding, promote the capabilities of NSW space-related SMEs</li> <li>■ Encourage leading firms to market their product and service needs to NSW SMEs and startups; for example, through roadshows, events and the space industry communication channel</li> <li>■ Facilitate networking within the local space sector and with primes through the National Space Industry Hub</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ Industry associations</li> <li>■ NSW Small Business Commissioner</li> <li>■ NSW Department of Planning, Industry and Environment</li> <li>■ Local governments and their agencies</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>

## Initiative 1.2 Build stronger connections between industry and the research community

The NSW Government will foster stronger working relationships between industry and the research community by using events and the dedicated digital platform to help the NSW space industry raise awareness of current research and provide opportunities for networking.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Facilitate statewide and region-specific connections between research organisations and industry to grow local capabilities through programs such as CRCs and the Boosting Business Innovation Program, as well as the space industry communication channel</li> <li>■ Work with the NSW Office of the Chief Scientist and Engineer to make collaboration a priority when considering government investment in space-related research projects</li> <li>■ Support collaboration between the industry and the research community to work on joint research projects through programs such as the SmartSat CRC</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ Industry associations</li> <li>■ NSW Department of Planning, Industry and Environment</li> <li>■ Office of the Chief Scientist and Engineer</li> <li>■ Commonwealth Government and its agencies</li> <li>■ Local governments and their agencies</li> </ul>	<p><b>Medium term (commencing within two years)</b></p>

## Initiative 1.3 Increase awareness of government support for industry collaboration

The NSW Government will promote state and Commonwealth programs that foster collaboration. A range of government support is already available for space industry participants looking to collaborate. The NSW Government will maximise the resources available to the space industry, particularly to SMEs.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Continue to facilitate connections between industry and research institutions through existing NSW Government programs such as TechVouchers, the Boosting Business Innovation Program and the Regional Investment Attraction Package</li> <li>■ Promote Commonwealth Government incentives for collaboration, including programs such as the Industry Growth Centres and Cooperative Research Centres Projects that can be harnessed for space projects</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ Industry associations</li> <li>■ NSW Department of Planning, Industry and Environment</li> <li>■ Commonwealth Government and its agencies</li> <li>■ Local governments and their agencies</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>



Image courtesy of Australian Astronomical Optics, Macquarie University.



# 2

## Help to develop a fit-for-purpose workforce that meets the needs of industry

Skills requirements in the space industry are evolving as new technologies emerge such as quantum technology and artificial intelligence (AI). These rapid technological advances require an equally rapid evolution in industry workforce skills. Capabilities will continue to change, making it necessary to maintain an agile education system in close collaboration with employers.

There is competition for talent, with local businesses struggling to retain experienced employees who are attracted by overseas opportunities. The pipeline of skilled STEM graduates cannot meet demand, particularly with the growing range of highly skilled roles required across the industry. The NSW Government will work with industry to identify the skills required for future growth and help industry address current skills gaps.

### WHAT SUCCESS WILL LOOK LIKE

A reliable supply of skilled labour and an increasingly diverse workforce underpins a growing space industry. The education sector—including universities and vocational education and training providers—and employers cooperate to ensure the availability of a skilled workforce, and to provide pathways from study to employment in the space industry.



Image courtesy of



## Initiative 2.1 Identify education and training opportunities to meet industry needs

The NSW Government will determine whether current education pathways meet the needs of the space industry. This will begin with identifying where training meets or falls short of industry needs. Identifying skills gaps and promoting capabilities to fill those gaps will be key to ensuring the workforce is appropriately skilled for the future.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Work with industry to increase engagement with universities and vocational education and training providers to determine the currency of space education and training pathways, and opportunities to enhance them</li> <li>■ Facilitate ongoing assessment of industry developments, including emerging technologies, to attract new workers to in-demand and emerging roles</li> <li>■ Build awareness of and support skilling, upskilling and reskilling programs, such as the ARC Training Centre for Cubesats, UAVs and Their Applications (CUAVA), to meet industry-identified needs</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ NSW Department of Education</li> <li>■ Industry associations</li> <li>■ Schools, universities and vocational education and training organisations (including TAFE NSW)</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>

## Initiative 2.2 Increase early student interest in STEM and space

The NSW Government will encourage the next generation of workers to pursue space careers and ensure that the future industry has the workforce required to achieve growth. It will act to increase the exposure of primary and high school students, particularly young girls and women, to career paths in the space sector.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Profile diverse industry businesses through the National Space Industry Hub and industry, university, vocational education and training, and school events</li> <li>■ Identify opportunities to leverage renewed interest in space to generate enthusiasm in young people</li> <li>■ Work with industry to make more low-cost, high-impact programs available, such as school excursions to industry sites</li> <li>■ Identify opportunities to promote STEM uptake and connect students, including drawing on existing programs such as Generation STEM and the Regional Industry Education Partnerships initiative</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ NSW Department of Education</li> <li>■ Schools, universities vocational education and training organisations (including TAFE NSW)</li> <li>■ Aerospace firms</li> <li>■ Commonwealth Government and its agencies</li> <li>■ Local governments and their agencies</li> </ul>	<p><b>Medium term (commencing within two years)</b></p>



Image courtesy of One Giant Leap Australia.

## Initiative 2.3 Facilitate pathways to industry

The NSW Government will increase awareness of avenues to enter the space industry and support more students to embrace a space career path.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Encourage space businesses to take on more apprentices, interns and recent graduates by helping to connect them to universities and vocational education and training providers, and by identifying associated support programs</li> <li>■ Assess the current offering and support for masters and PhD students, and explore opportunities to facilitate their exposure to and integration into the industry</li> <li>■ Engage schools, universities and vocational education and training providers in metropolitan and regional NSW to increase opportunities for participating in industry events and raise awareness of future career pathways</li> <li>■ Participate in conferences and events, such as Aerospace Futures that facilitate connections between the future workforce and industry</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ NSW Department of Education</li> <li>■ Schools, universities, vocational education and training organisations (including TAFE NSW)</li> <li>■ Commonwealth Government and its agencies</li> <li>■ Local governments</li> </ul>	<p><b>Medium term (commencing within two years)</b></p>

# 3

## Support the growth of industry precincts to foster an innovative ecosystem

The commitment by the Commonwealth and NSW governments to focus on the space sector in the Aerotropolis presents a significant opportunity for the NSW space industry to expand. Additionally, the NSW Government is developing the Sydney Innovation and Technology Precinct to be a place where ambitious startups, world-class universities and research institutions, high-tech giants and the community collaborate to solve problems, socialise and spark ideas that change the world and support the jobs of the future.

### WHAT SUCCESS WILL LOOK LIKE

The Aerotropolis contributes to the development of a thriving space industry ecosystem, with a critical mass of infrastructure and skills to support the growing industry.

The Sydney Innovation and Technology Precinct is a regional leader in space-enabled services, innovation, entrepreneurship and collaboration, and this translates into globally successful businesses.

NSW is known globally for its space expertise. The Aerotropolis and the Sydney Innovation and Technology Precinct collaborate and complement each other, benefitting the entire industry.

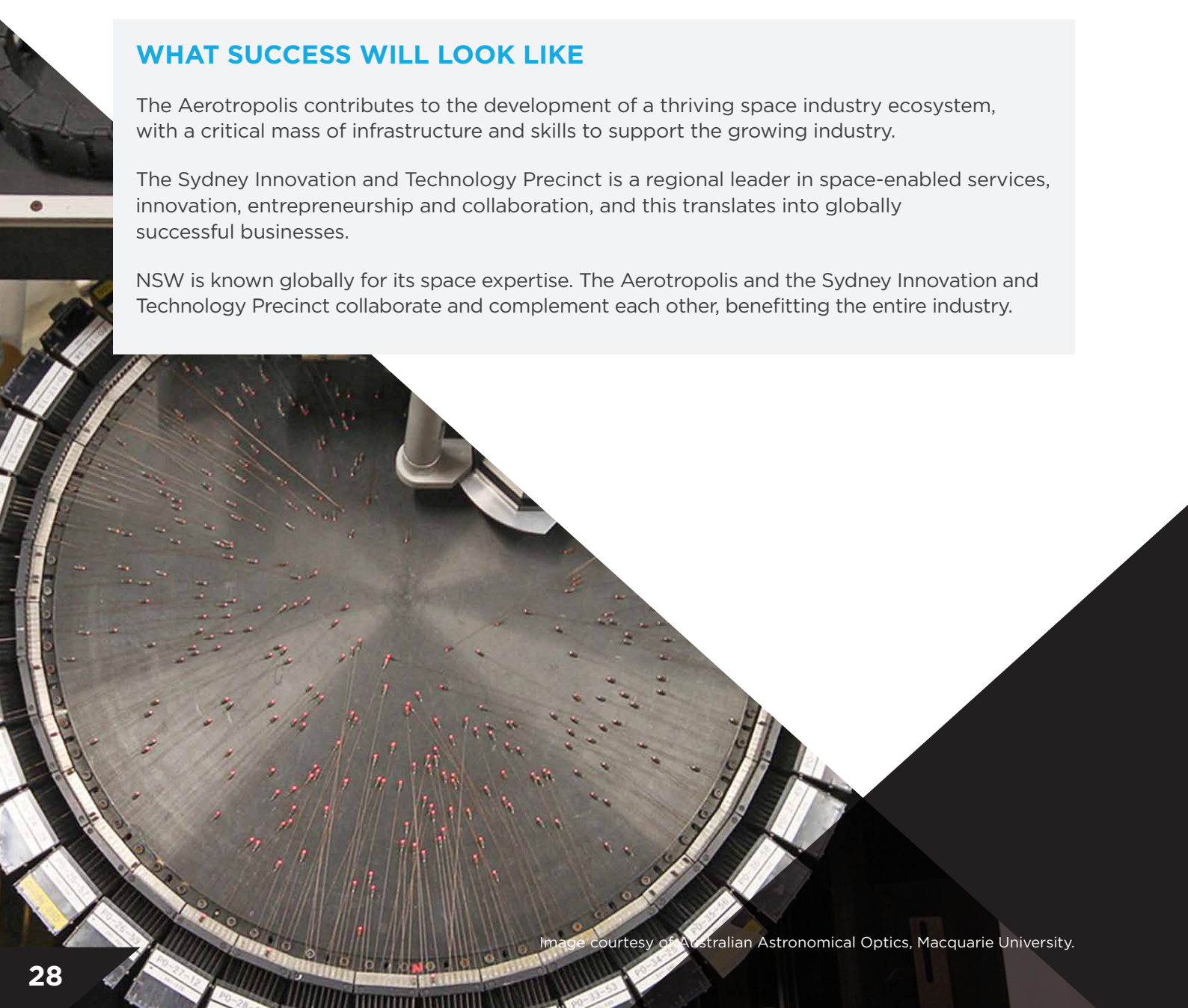


Image courtesy of Australian Astronomical Optics, Macquarie University.



### Initiative 3.1 Facilitate the establishment of a strong space industry presence at the Aerotropolis and Sydney Innovation and Technology Precinct

The NSW Government will facilitate the development of vibrant space industry presences at the Aerotropolis and the Sydney Innovation and Technology Precinct. These will contribute to bringing thousands of jobs and record levels of investment to Greater Sydney.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Establish a space industry working group to provide advice during the development of the Aerotropolis and the Sydney Innovation and Technology Precinct</li> <li>■ In consultation with the working group, ensure the developing precincts complement each other</li> <li>■ Analyse the growth of precincts globally to apply lessons in world-class precinct development, drawing on the work of the NSW Innovation and Productivity Council</li> <li>■ Provide regular updates on the development of the precincts to industry through newsletters and NSW Government websites</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ NSW Innovation and Productivity Council</li> <li>■ Industry bodies</li> <li>■ Research institutions</li> <li>■ Training organisations</li> <li>■ Commonwealth Government and its agencies</li> <li>■ Local governments and their agencies</li> <li>■ Western City and Aerotropolis Authority</li> </ul>	<p><b>Long term</b></p>

### Initiative 3.2 Develop a network approach to the NSW space industry

The NSW Government will map the capabilities of the network of NSW space businesses and other industry participants such as universities. The mapping of the industry participants in regional NSW, Western Sydney and Sydney will focus on identifying their specific strengths and the complementary services and products they offer the industry. Understanding the existing infrastructure and capabilities of the industry will ensure its ongoing viability and be key to growing the space industry in NSW.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Work with the industry to identify and map areas of strength, and promote these capabilities to potential investors and workers nationally and globally</li> <li>■ Ensure a collaborative approach to developing space industry clusters, including the National Space Industry Hub, the Sydney Innovation and Technology Precinct and the Aerotropolis.</li> <li>■ Support regionally based space industry businesses to network with other NSW-based space businesses through events and the dedicated digital platform for NSW space businesses</li> <li>■ Promote to the local and global space industry NSW regional assets such as existing highly-skilled workforce clusters and suitable locations for testing and trials</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ NSW Department of Planning, Industry and Environment</li> <li>■ Industry bodies</li> <li>■ Regional clusters</li> <li>■ Commonwealth Government and its agencies</li> <li>■ Western City and Aerotropolis Authority</li> </ul>	<p><b>Medium term (commencing within two years)</b></p>

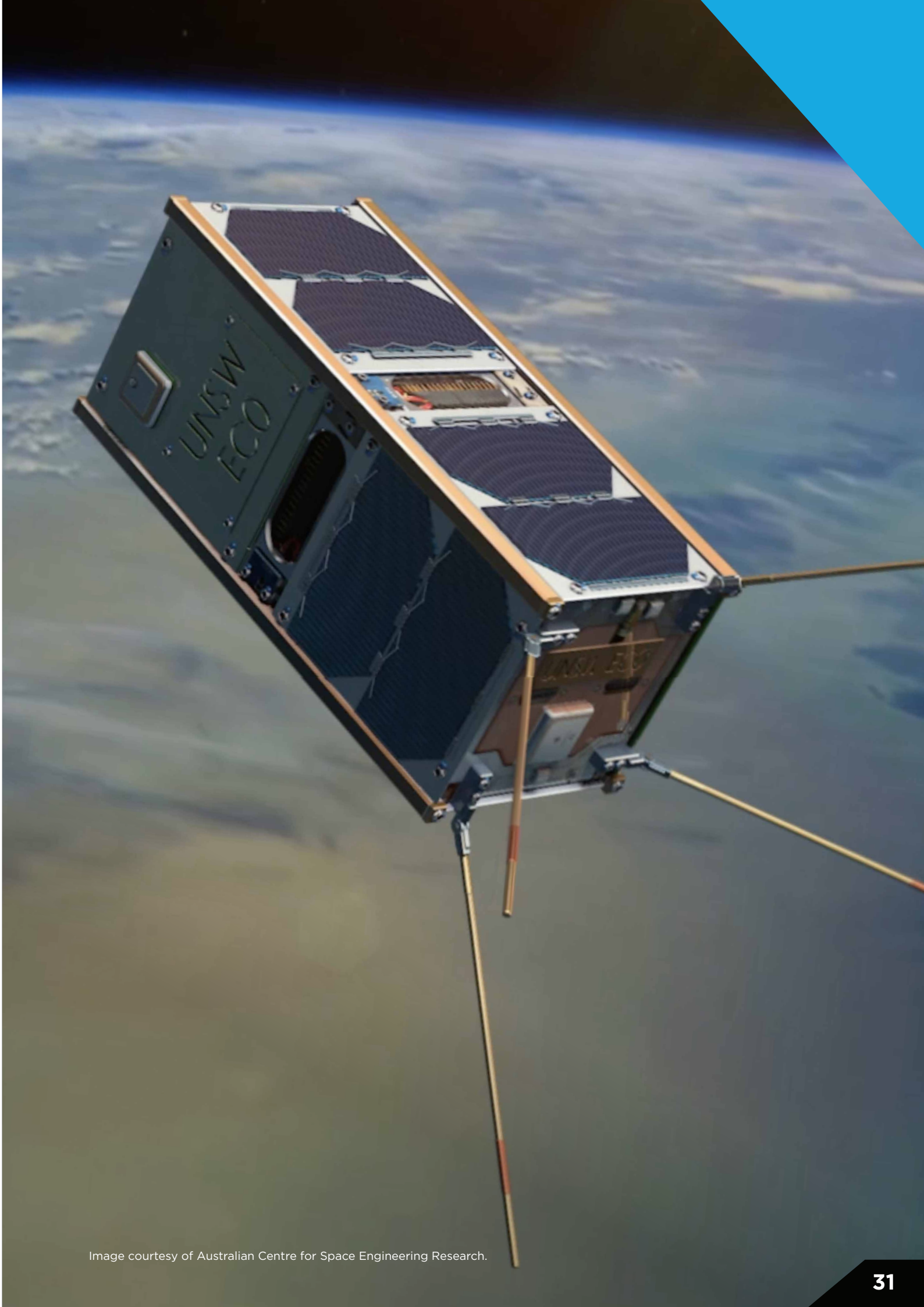


Image courtesy of Australian Centre for Space Engineering Research.

# 4

## Maximise NSW space industry activity in the national space ecosystem

NSW is home to the largest proportion of Australia's space sector participants, satellite communications and venture capitalists, and a significant proportion of Australia's space research expertise.

The NSW Government will leverage these strengths to ensure NSW plays a leading role in the growth of the Australian space sector, including by developing a National Space Industry Hub. The government will work with the Hub to deliver many elements of the following strategy initiatives.

Commonwealth Government commitments to the Australian space sector will have a significant impact on the nation's space industry ecosystem. The Australian Space Agency has committed to triple the size of the space industry in Australia by 2030. The Department of Defence will invest nearly \$10 billion in space-related projects to 2025-26. The Commonwealth Government is also investing \$150 million towards supporting Australian businesses to participate in NASA missions to the Moon and Mars. The NSW Government will work to maximise the engagement of NSW space industry businesses in these investments.

### WHAT SUCCESS WILL LOOK LIKE

The space sector in NSW drives innovation, jobs and commercial opportunities across the Australian economy, facilitated by the National Space Industry Hub. NSW is known throughout Australia and internationally as a world-leading centre of space innovation. The National Space Industry Hub is the first port of call for industries and businesses looking to partner with space-technology companies and researchers. Half of Australia's space businesses call NSW 'home'.



Image courtesy of HEO Robotics.



## Initiative 4.1 Work collaboratively with the Australian Space Agency to increase opportunities for NSW industry

The NSW Government will increase opportunities for the state by working closely with the Australian Space Agency.

What we will do	Who	When
<ul style="list-style-type: none"> <li>Through the MoU signed with the Australian Space Agency, work to further develop the space industry in NSW</li> <li>Act as a conduit for NSW industry seeking to access Commonwealth Government assistance</li> <li>Advocate for Australian Space Agency participation in NSW industry activity, to encourage a strong relationship between it and NSW industry</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>NSW universities</li> <li>Australian Space Agency</li> <li>Commonwealth Government agencies and departments</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>

## Initiative 4.2 Facilitate connections between the NSW space sector and the wider economy

The NSW Government will leverage NSW's position as the most diverse economy in Australia to explore potential connections between the Australian space industry and the wider economy.

What we will do	Who	When
<ul style="list-style-type: none"> <li>Increase awareness of the economic benefits and efficiencies that can be driven by businesses, government and not-for-profits adopting space-enabled technology</li> <li>Through the National Space Industry Hub, assist space technology businesses and space sector service providers to understand their potential end-customers and markets</li> <li>Raise awareness within the space industry of opportunities arising from projects and the needs of other sectors, such as transport, agriculture and resources</li> <li>Hold workshops and networking events at the National Space Industry Hub to connect space businesses and researchers with other industries and the wider community</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>Austrade</li> <li>Export Council of Australia</li> <li>TradeStart</li> <li>Australian Space Agency</li> <li>Business Events Sydney</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>

## Initiative 4.3 Support the growth of space startups

Space startups typically face barriers due to the high costs of market entry. The NSW Government will support innovative startups to assist the space industry to realise its growth potential.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Support startups to achieve flight heritage by establishing a Space Qualification Mission</li> <li>■ Identify opportunities to access testing and manufacturing facilities for startups and SMEs</li> <li>■ Provide programs to help startups commercialise and collaborate through the National Space Industry Hub</li> <li>■ Promote existing government assistance and opportunities for startups such as TechVouchers, the Boosting Business Innovation Program, the Sydney School of Entrepreneurship and other funding programs, as well as new opportunities such as the National Space Industry Hub</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ Universities and other research organisations</li> <li>■ Australian Space Agency</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>

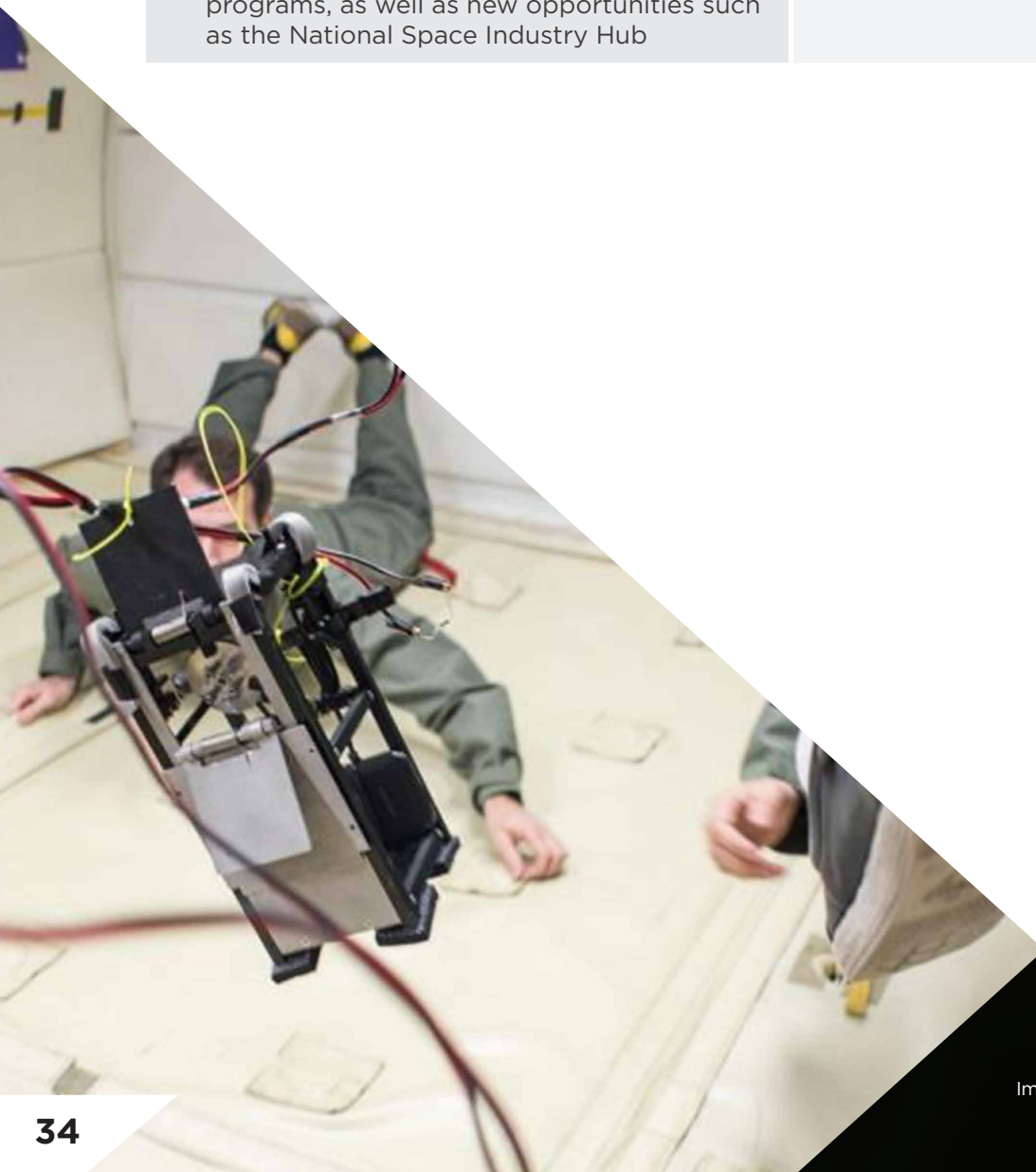


Image courtesy of Saber Astronautics.





Image courtesy of Australian Centre for Space Engineering Research.



# 5

## Grow exports and attract investment into the NSW space sector

Renewed interest in space from governments around the world and growth in the global space industry make this a critical time to strengthen NSW's space capabilities and secure its position in the global supply chain. The NSW Government has a role to play in expanding the state's space capabilities by attracting international space-related companies to NSW, as well as supporting NSW space businesses to develop their export capabilities.

The nascent qualities of the NSW space industry means that local sources of investment are limited or not available, making foreign direct investment (FDI) critical for the development of the space industry in NSW. FDI can include establishment of new facilities by an international space company, capital funding into NSW enterprises that results in new job creation or commercial growth, partnerships with NSW space entities, or shared R&D. The NSW Government will undertake activities to attract space primes to engage with the NSW space supply chain, including for significant national opportunities such as Defence procurement projects.

### WHAT SUCCESS WILL LOOK LIKE

NSW is the preferred destination for space-related investment into Australia. NSW companies leverage their relationships with international space primes to competitively participate in global space supply chains and contribute to international space programs.



## Initiative 5.1 Support NSW space companies to participate in global supply chains

Building on NSW's space industry strengths and opportunities, the NSW Government will assist industry and researchers to further develop niche capabilities of value to the global space supply chain, assist businesses to become export ready and facilitate exposure and access to the global market.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Seed fund a space qualification mission to help NSW companies gain the necessary technology readiness level to participate in supply chains</li> <li>■ Work with Austrade and TradeStart to deliver a series of export capability workshops for the space sector</li> <li>■ Support and promote trade events, exhibitions, seminars and missions including those organised by Austrade and NSW Trade &amp; Investment offices</li> <li>■ Showcase NSW space companies and capabilities at international events, exhibitions and conferences</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ Australian Space Agency</li> <li>■ Austrade</li> <li>■ TradeStart</li> <li>■ Industry associations such as the Space Industry Association of Australia</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>



## Initiative 5.2 Attract investment into the NSW space sector

Attracting overseas and interstate businesses to locate in NSW and partner with local space businesses will build and strengthen NSW capabilities and the space ecosystem. The NSW Government will pursue national and international space businesses to establish or increase their commercial activity within the state, focusing on companies that complement the state’s competitive strengths.

A critical pillar of the NSW Government’s economic development framework is the activation of sector-focused, place-based precincts. Precincts in NSW that align with the government’s space industry development objectives include:

- Western Sydney Aerotropolis
- Sydney Innovation and Technology Precinct in Eveleigh
- Williamstown defence precinct
- special activation precincts in regional NSW.

To facilitate the development and growth of innovation precincts, the NSW Government will target international space companies to be “anchor tenants” in the precincts that best match their capabilities.

What we will do	Who	When
<ul style="list-style-type: none"> <li>■ Promote NSW as the premier destination in Australia in areas where the state has a competitive advantage</li> <li>■ Proactively pursue and attract space primes to NSW</li> <li>■ Deploy NSW and Austrade’s international network to identify leads, develop market intelligence and raise the profile of NSW space aligned precincts</li> <li>■ Use the National Space Industry Hub to showcase local capabilities to international investors and businesses</li> <li>■ Support Australian space companies to establish and expand their presence in NSW</li> <li>■ Partner with Business Events Sydney to attract international space industry events and conferences to NSW</li> </ul>	<p><b>Lead</b></p> <ul style="list-style-type: none"> <li>■ NSW Treasury</li> </ul> <p><b>Supported by</b></p> <ul style="list-style-type: none"> <li>■ Austrade</li> <li>■ TradeStart</li> <li>■ Australian Space Agency</li> <li>■ Business Events Sydney</li> </ul>	<p><b>Short term (commencing within 12 months)</b></p>

## Acknowledgements

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### Industry

- Arlula
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- Intelsat
- JAR Aerospace
- Lockheed Martin
- Moonshot Space
- Northrop Grumman
- One Giant Leap
- Optus
- Purdey Investment
- Saber Astronautics
- Seaskip Systems
- Silanna Semiconductor
- Spacedaily.com
- Space Ops Australia
- Spiral Blue
- Stacked Venture Builder
- Symbios Communications
- TCG Group of Companies
- Telstra
- THE BLUEPRINT LAB

### Industry associations

- Aerospace Maritime and Defence Foundation
- Ai Group
- Communications Alliance
- Spatial Industries Business Association
- Sydney Aerospace and Defence Interest Group

### Government

- Australian Nuclear Science and Technology Organisation
- Austrade
- Australian Space Agency
- Business Connect
- Defence NSW
- NSW Department of Customer Service
- NSW Department of Planning, Industry and Environment
- NSW Department of Premier and Cabinet
- NSW Small Business Commissioner
- Office of the NSW Chief Scientist and Engineer
- Western City and Aerotropolis Authority

### Research organisations

- Australian National University
- CSIRO
- Cooperative Research Centre for Smart Satellite Technologies and Analytics (SmartSat CRC)
- Macquarie University
- The Space Environment Research Centre
- ARC Training Centre for CubeSats, UAVs, and their Applications (CUAVA)
- University of New South Wales
- University of Sydney
- University of Technology Sydney
- University of Wollongong
- Western Sydney University



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