



Investment in the Australian Space Sector

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Introduction

Australia has a long history in the space sector. In the 1950s and 1960s, it provided space tracking support for the Apollo missions and was an early sovereign satellite launcher. These initiatives meant that our space sector was poised to be a market leader.

Despite this, a number of false starts in creating a space agency meant the sector lacked coordination at a federal and international level and had a heavy reliance on northern hemisphere allies for intelligence and other space related services.

However Australia's inherent geographic advantages, strong education and research infrastructure and growing start-up community meant that momentum was built, leading to the establishment of the Australian Space Agency in July 2018.

Now, over a year into operations, funding has been allocated, a ten-year strategy defined and a series of commercial and inter-agency agreements signed, with the ambition of tripling the sector's revenue and employee numbers in the coming decade.

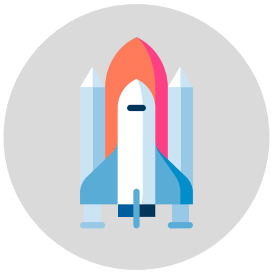
A space start-up ecosystem has been nurtured in Adelaide (Adelaide innovation neighbourhood), South Australia, through the Lot Fourteen development and a number of local space focussed companies are emerging as globally recognised brands.

KPMG's research highlights that Australia's space start-up companies can procure over 80 per cent of their products and services domestically. A number of local companies have recently formed partnerships with each other as their capabilities develop and the space industry supply chain in Australia becomes more integrated – enabling companies to positively influence the growth of other businesses with their own success.

A number of key challenges and opportunities must be addressed to take advantage of global growth while ensuring local growth remains profitable and sustainable. These include:

- Leveraging Australia's space capabilities in its world-leading industries: agriculture, natural resources, logistics and medicine, to solve the sector's challenges through space applications and conversely exploring opportunities to leverage innovations back into the space sector.
- Creating an ecosystem of space supply chain capabilities by improving communication and awareness between the various market actors and commercialising research.
- Supporting the underpinning workforce needs of the space industry through a supply of graduates with key skills and retention of the workforce between major projects.
- Ensuring funding allocated to government programs (including Defence) for space-related projects is geared towards local spend, including the development of local capabilities.
- Attracting business from other Asia-Pacific spacefaring nations that have to rely heavily on other markets for products and services.





Australia's Space Economy

Australia's space sector has continued its long and gradual trajectory of growth since the creation of the Agency, with industry revenue estimated to have grown by over 5 per cent in 2018-19. The sector achieved an estimated AUD\$5.1b in revenues in that year, up from AUD\$1.4b in 2009-10 (Figure 1).

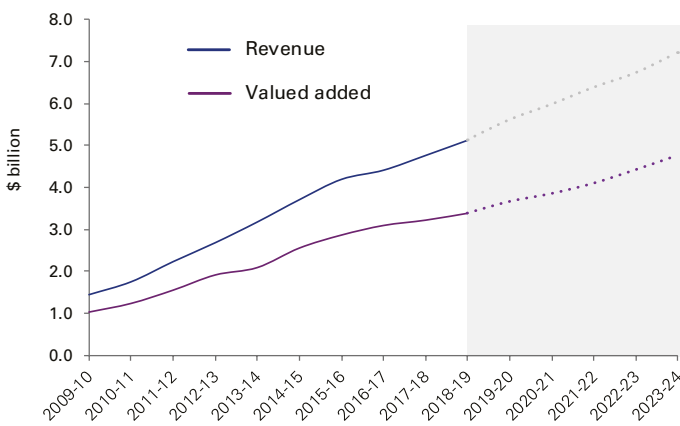


Figure 1: Revenue and value added in Australia's space industry.
Source: IBIS World 2018

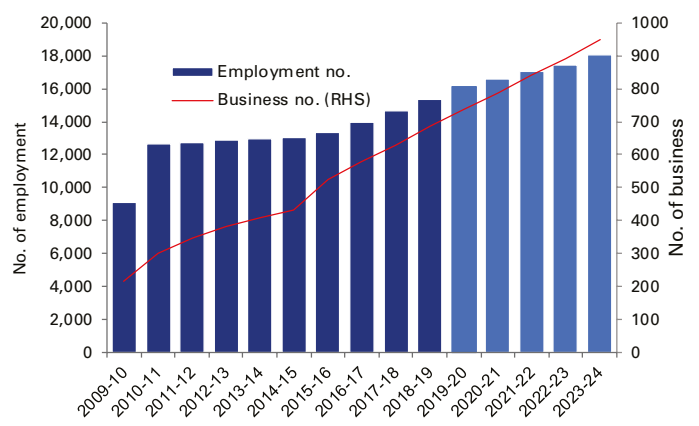


Figure 2: Employment and business numbers.
Source: IBIS World 2018

With technological innovation and growing consumer telecommunications services providing new opportunities, business and employment numbers in the Australian sector also continued to rise, reaching an estimated 14,000 employees and 770 businesses in 2018-19 (Figure 2). This represents a solid 3.4 per cent per annum average growth in business numbers and a significant 10.9 per cent per annum average growth in employment in the sector over the past five years. Over the same period, growth in value added in the sector outpaced GDP growth, achieving an average of over 10 per cent per annum over the past five years. It is estimated that industry value added in 2018-19 was around AUD\$3.4b. Value added is expected to continue to grow strongly – estimated at an average of 8.6 per cent per annum through to 2023.

Sources of industry revenue and funding

While industry revenue is growing strongly (Figure 1), and remains dominated by satellite communication and broadcasting services (particularly Telstra and Foxtel), the reliance on these two players is decreasing. Instead there's been an increase in direct-to-home TV and satellite communications competition, growing Australian capabilities in manufacturing and broader satellite service offerings, such as earth observation (Figure 3).

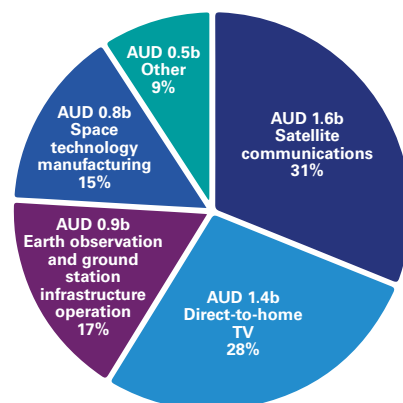
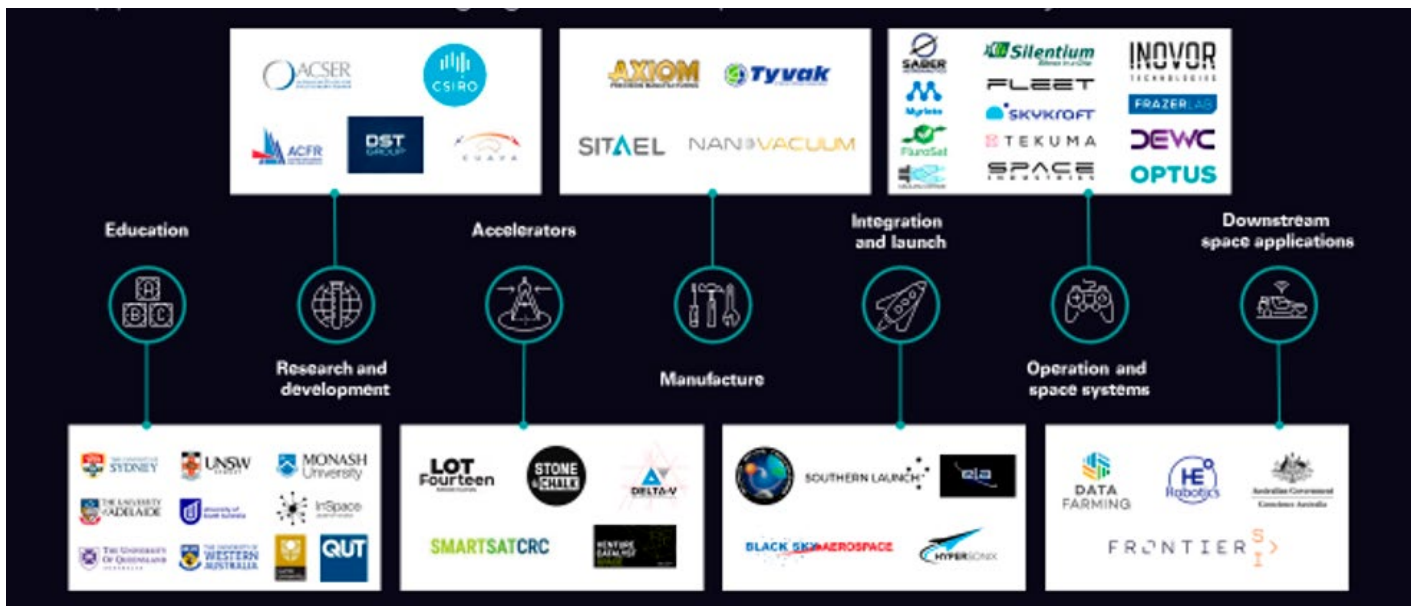


Figure 3: Products and services breakdown.
Source: IBIS World 2018

Funding from the Australian Government has also grown incrementally with over AUD\$200m committed over the next five years, including:

- AUD\$41m to establish the Agency;
- AUD\$19.5m for the Space Infrastructure fund (including an advanced manufacturing facility in New South Wales and Mission Control Centre in South Australia);

- AUD\$6m for the Space Discovery Centre; and
- AUD\$150m to support Australia’s participation in NASA’s Artemis and Lunar Gateway missions.



Other key funding in the sector includes:

- AUD\$260m to Geoscience Australia to develop SBAS and Ground Station capabilities and fund Digital Earth Australia ;
- AUD\$8bn to AUD\$11.75bn for Defence Space programs in the coming 20 years focused on SSA and Satellite Communications;
- AUD\$16m to CSIRO for Future Science Platforms;
- AUD\$55m to the Smartsat CRC; and
- AUD\$400m to Lot Fourteen innovation precinct (not dedicated to space).

While this is a substantial increase in funding to the sector, it’s small by comparison to other OECD nations. This means funding will need to be complemented by innovative partnerships with local industry and foreign investment to achieve the Agency’s growth ambitions.

The current investment landscape

Australia is heavily reliant on start-up companies for its growing space economy. These businesses make up 87 per cent of the Australian Space Market, while global companies including Airbus, Boeing, Northrop Grumman and ViaSat also make significant contributions to the local space economy.

For Australian space companies to grow and develop sustainable revenue – a range of investment sources is required, as well as a strong customer base.

There has been growth in venture-backed investment as well as government grants to Australian space companies in the past two years. Venture financing in Australia hit a record high in 2018. While this was dominated by software and technology companies, a number of space companies had successful raises, including Gilmour Space Technologies and Myriota, placing them firmly in the global market. While venture financing softened in 2019, both Fleet Space and Flurosat completed successful funding rounds. Nine Australian space companies were recently listed in the top 250 most admired space companies globally, indicating the diversity and strength of the local space sector

The majority of investment in Australian space companies originates from venture capital, grant funding and some public offering funding. Acquisition and private equity, often seen in the United States, is yet to feature significantly in the Australian market. Eighteen venture capital funds have invested in Australian space companies in the past two years, however this represents fewer than three per cent of the 587 venture capital funds that have invested in

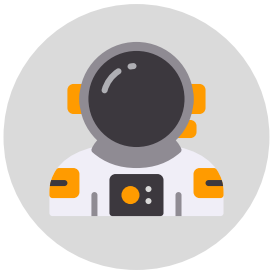
space sector start-ups. Government grants, self-funding and angel investment remain the key enabler for Australian start-ups, particularly at the seed stage.

Both federal and state government grant programs with a space focus are either on line or in design. In addition, various incubator organisations and programs, including Delta-V, and the University of South Australia's Venture Catalyst Space program, exist to support founders to start and lead hypergrowth space ventures.

Non-traditional space companies in Australia have had targeted engagement through initiatives such as the CSIRO's Space Industry workshops and the Agency's Statements of Strategic Intent. In addition, companies within this sector are starting to interact with space-enabled services and data through companies like Myriota and Flurosat – though we are yet to see significant investment from these companies in space-related projects.







Investment Attraction Strengths

With government spending in the Australian space sector increasing, there are a number of key attractors to investment from both foreign and local sources, including geography, security, regulation, education and economic factors.

Geography

Australia is uniquely positioned globally and sparsely populated, making access to space, and the testing of space hardware alluring. Equatorial, polar and sun-synchronous orbits can all be achieved by launching from Australian soil. Australia's geographical location is ideal for space-craft operation and tracking, with coverage from all six global navigation satellite system platforms and a long heritage of supporting NASA and ESA's deep space tracking.

Security

Australia is a member of the Five Eyes intelligence sharing community, which not only makes it a trusted ally, it also opens up a range of government and defence projects from the four other members.

Education

Twenty local universities provide world-leading space-specific education, generating a pipeline of highly-skilled workers for the sector, who have, until now, often sought work abroad.

Regulation

Australia has recently released the Launches and Returns Act which is helping modernise space-specific regulation.

The general lack of complexity in local regulation has the potential to attract international space activity. Launching and operating satellites in the United States for example comes with a range of requirements, including National Oceanic and Atmospheric Administration (NOAA) clearance for launch vehicles carrying cameras and remote sensing spacecraft, and data quality and commercialisation requirements under the Land Remote Sensing Policy Act.

Economy and political environment

Finally, Australia benefits from having a stable economy that has experienced long-term growth. It is seen as a relatively low-risk market to conduct business in, with a variety of government support programs offered to foreign companies and investors, including R&D grants and incentives, and skill-specific visa programs.





Barriers to sustained investment and sector growth

While the Australian space industry has substantial momentum, survey respondents and broader sector feedback has indicated a number of challenges to ensuring growth is both profitable and sustainable and that local and international investment is attracted to enable this. These include:

A. Focus on technology development without deep understanding of customer needs can limit commerciality and customer base

Much of the technology development in Australia is done without a robust understanding of the end customer and their needs to ensure the company/technology created directly solves their problem and provides a competitive/commercial advantage to current approaches.

Australia has a number of internationally renowned sectors – agriculture, natural resources, logistics and medicine. While all of these industries have substantial potential to utilise space applications to increase efficiency or effectiveness, there is limited understanding in the space sector of how, significant variation in approaches to, and varying appetites for risk, between these sectors.

B. Difficulties attracting and retaining skilled workforce

While a number of space industry projects have been initiated in Australia in recent years (both government and commercially driven), they are often short-term and disconnected.

This makes it challenging for companies to win capital funding, recruit skilled workforces and maintain scale, requiring them to either diversify income or scale down to be sustainable. The Federal Government has achieved significant success in the Defence Industry sector, by defining a long term investment plan. A similar initiative for the space sector would dramatically increase space organisations' ability to make longer term decisions for employees and investment.

C. Unclear opportunities or 'anchor contracts' for foreign companies to establish in Australia

A significant number of foreign space companies are looking at the Australian market for opportunities to establish operations and invest. While a small number including Sitael from Italy and Tyvak Nanosatellites from USA, have sought to establish a presence in Australia, other companies and investors have found it challenging to identify opportunities.

D. Large amounts of research with minimal components commercialised

Universities acknowledge issues exist with the effectiveness of their engagement with industry for combined research and development initiatives. The combination of university inefficiency and lack of effectiveness when integrating with industry is inhibiting research and development with respect to the Australia space sector.

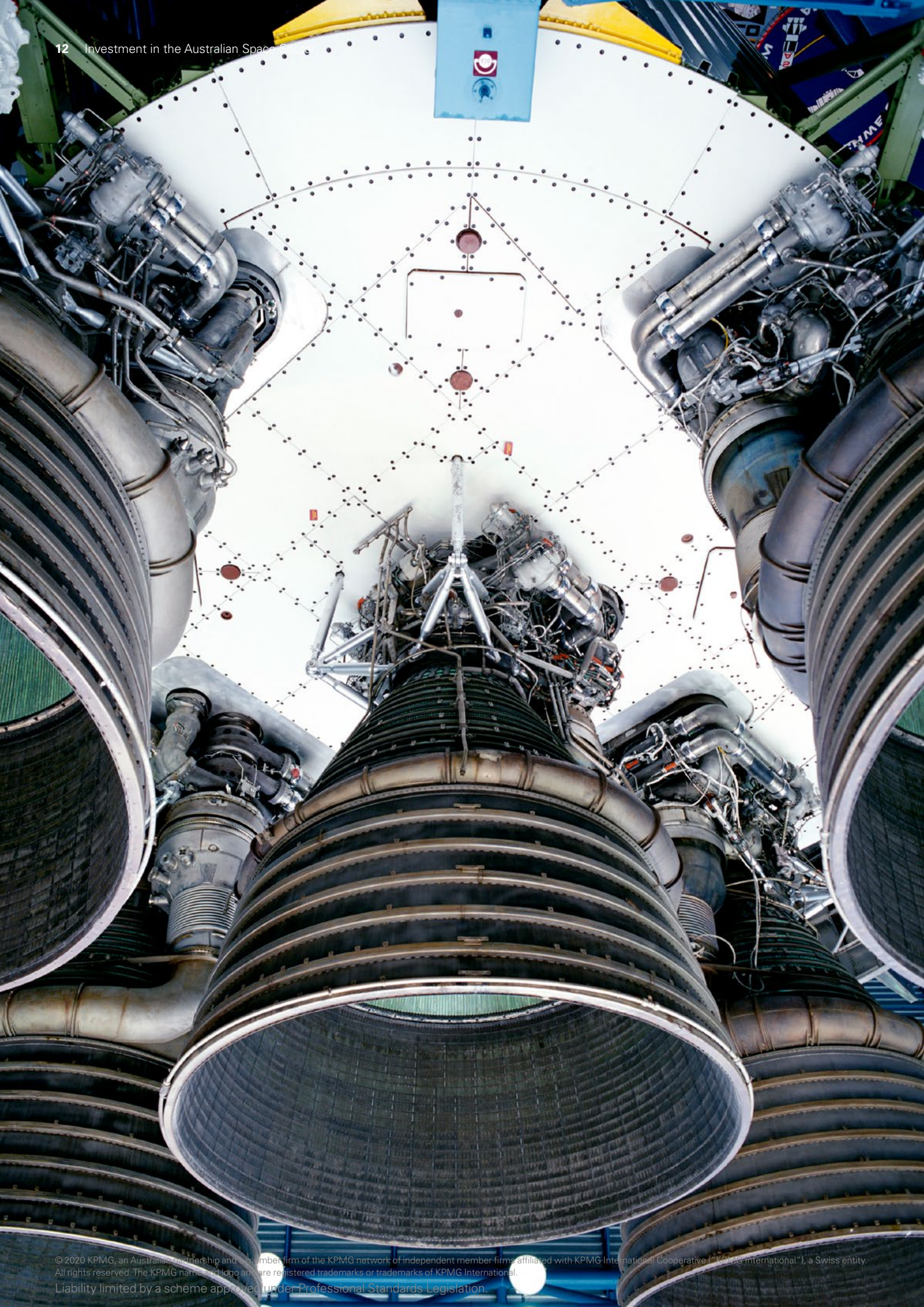
E. Government and Defence space budgets are not always preferred for local procurement and capability build

Respondents observed that the lack of a long term plan prevents planning and investment in the sector within Australia. The formalised long-term Defence Integrated Investment Program is providing a catalyst for investment in Australian Defence Industry and the space sector would benefit from a similar approach. Respondents acknowledged the success that Austrade is having with encouraging foreign investment to explore opportunities in the Australian sector.

While there are good examples of partnerships with the local industry, there is still a tendency for Defence to acquire new capability 'at the right time' resulting in procurement often going through international firms.

F. Low numbers of future Australian employees who are trained in STEM will inhibit future development of the space sector in Australia.

Australia is facing a future shortage of skilled employees trained in Science, Technology, Engineering and Mathematics (STEM). Shortages are already apparent in the growing Defence Industry Sector, even while the technically focused resources sector is in a lull. As resources take off again there will be shortages of skilled workers with STEM qualifications. This will inhibit growth in the Australian Space sector and place upward pressure on labour costs.





Case studies

Other nations have been highly successful in accelerating the growth of their space sectors through government and industry initiatives. A number of examples, detailed below, could be leveraged in the Australian market

A. United States – SBIR / STTR grants through NASA, DoD and DARPA

Government agencies in the United States enable the acceleration of start-ups and small business through their research programs, while also filling their technology gaps. The SBIR / STTR (Small Business Innovation Research / Small Business Technology Transfer) programs are administered through agencies including NASA, DoD and DARPA.

The program moves companies from seed funding through to commercialisation with a phased funding approach, and with technology to be proven at each stage. Access to government facilities is enabled and external funding is sought at the final stage.

Made in Space is developing technology that can manufacture items in space, with their 3D printer launched to the ISS in 2014. SBIR grants supported Made in Space to develop the additive manufacturing facility as well as a plastic recycling system to produce the feedstock to enable on demand manufacturing in zero-G.

The agencies involved have noted a range of benefits in the program, including the ability to explore high risk and high impact ideas that can eventually be transitioned to agency-led technologies or commercial entities.

B. Singapore – seed funding to start-ups through public/private partnerships

The Singaporean Government have established a start-up investment scheme in partnership with 11 private investors that co-invest in capital-intensive start-ups. The government provides up to 70 per cent of the funding at seed stage followed by matched funding up to SGD\$4m.

The program has attracted international companies to establish a presence in Singapore and enabled the growth of leading space sector brands including Astroscale, Axiom and Spire.

The benefits of this program include:

- Encouragement of private sector investment.
- Attraction of international companies and founders to incorporate/establish in Singapore.
- Hands-on assistance provided to companies to help them move to commercialisation.

C. ESA, GSEW (Global Space Economics Workshop) – bringing non space sector companies together to leverage space technology

The European Space Agency has focused on opportunities to leverage space technology for terrestrial benefit, as well as using technology developments on earth for space applications. ESA have run a series of Global Space Economic Workshops to bring senior executives from companies, institutions and academia together in round-table workshops, to discuss and evaluate the needs and opportunities for these companies, share learnings and trigger innovation with disruptive solutions.

To date more than 500 companies outside of the space sector have engaged through a series of themed workshops throughout Europe. Each of these has resulted in technology being ‘spun in’ and ‘spun out’ of the space sector, including non-space companies pursuing space related projects.

D. New Zealand – Supporting new space businesses

New Zealand have set a clear agenda to support new space businesses to grow their local space economy. This includes fostering local companies as well as attracting foreign entrepreneurs and investors.

Clear messaging is given to the market regarding the initiatives New Zealand are currently pursuing, including:

- R&D incentives.
- Modern regulatory regime.
- Science infrastructure.
- Global connections for technology transfer and research collaboration.

Rocketlab has been a great success for New Zealand. The company is valued in excess of US\$1b, raising more than US\$288m to date. While Rocketlab have established as a majority US entity, it uses over 1,500 New Zealand companies in the supply chain and launch their rockets domestically.

E. United Kingdom – International Partnership Program, using aid budget to support developing economies through domestic space capabilities.

The United Kingdom supports developing nations and economies through its domestic space capabilities, via the International Partnership Programme that forms part of the UK's broader aid budget. This includes GBP£152m in funding over five years with 12 key focus areas ranging from increasing resilience to the impacts of climate change, addressing illegal fishing and improving agricultural practices.

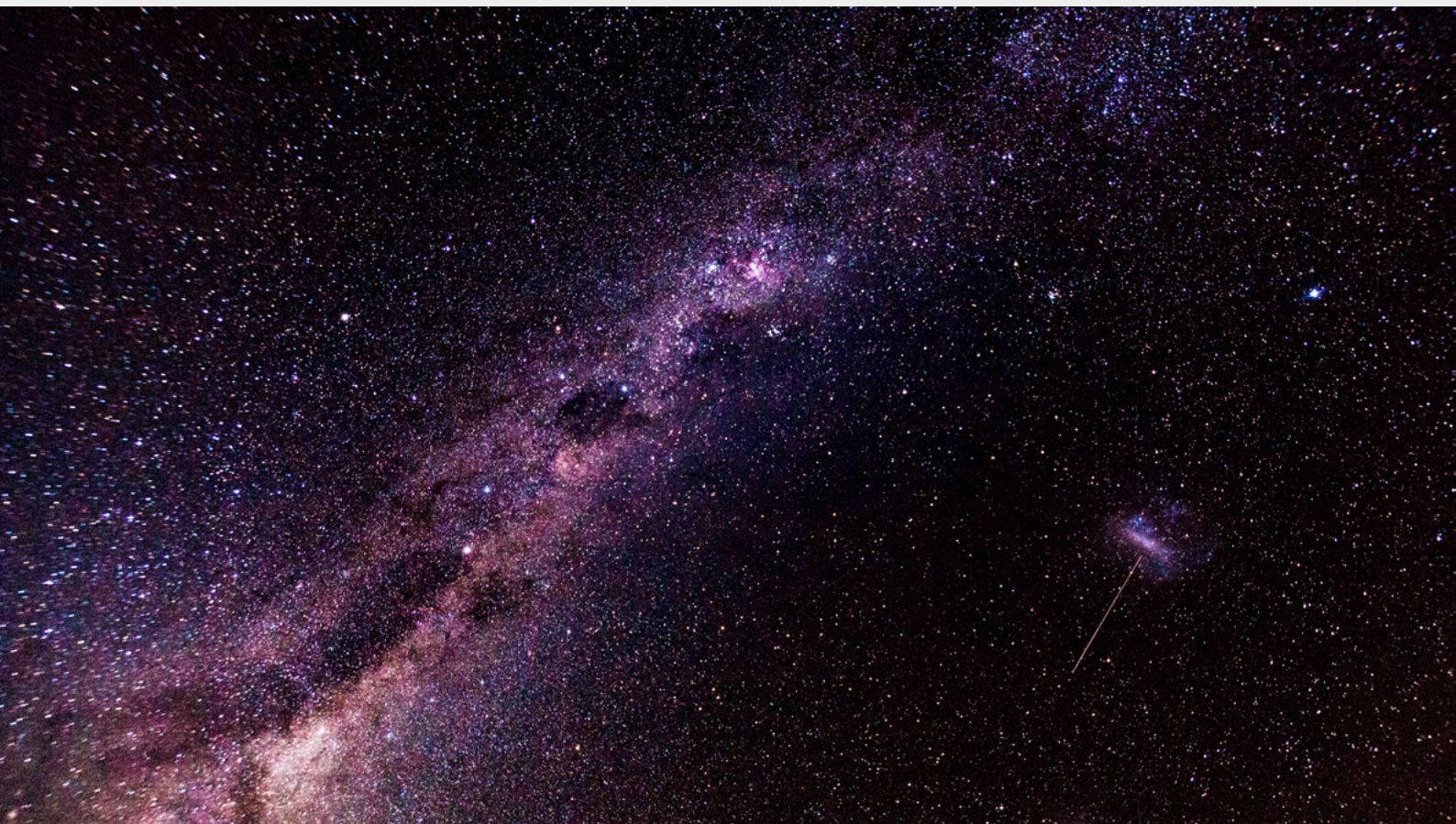
Two examples of the 33 projects funded to date include:

Clyde Space – Firesat (South Africa, Kenya, Namibia)

Firesat helps with early detection of fires in Africa where 75 per cent of the world's fires occur. A cubesat has been launched as a test bed with the full constellation scheduled to be launched this year to help with early intervention of fires.

Inmarsat – Satellites for sustainable fishing (Indonesia)

Illegal fishing is having a significant impact on the sustainability of the industry. Inmarsat is supporting the tracking and communication with vessels through equipment that is installed on the vessel and their satellite fleet, with the aim of saving lives during emergencies and reducing illegal and unreported fishing.





Recommendations and Initiatives

A number of initiatives can be pursued by stakeholders throughout the sector to address the challenges currently being faced to enable sustained growth. These include:

Government

- Seek opportunities to address the challenges of other government departments through space applications, such as the management of the Murray Darling Basin. This will enable the allocation of funding which will encourage international brands to establish in Australia and new, local space companies to grow with them.
- Encourage all jurisdictions to contribute to the Agency's vision of market growth, based on each one's unique strengths.
- Generate a long term plan to allow all stakeholders to understand prioritisation and future long term requirements. This will facilitate access to funding, greater integration and longer term investment in Australian space sector organisations.
- Act as a broker to connect small to medium enterprises with global space primes and down-stream industry, supporting supply chain development (e.g. European Space Agency).
- Create a cost advantage through state (business) and federal (income) tax reform, including tax holidays and grants, ensuring IP and revenue stays onshore.
- Be a market builder by supporting local contractors for government procurement, and enabling small to medium enterprises to grow by partnering with larger primes.
- Support underpinning skills through education curriculum, and promote space careers, possibly through a National Mission (similar to Australia 2030 recommendations).
- Act as a catalyst for existing precincts with industry clusters, to attract further network benefits.

Industry and Academia

- Engage deeply with the potential national and international client base to understand their needs and think outside the box to identify cross-industry complementarities.
- Industry associations and networks should consider how space capabilities may affect their members, and communicate the opportunities.

- Standards organisations (often industry-driven) should focus on new industry standards and protocols to enable industry diffusion and prevent interoperability issues, maintaining alignment with international trends and standards.
- Invest in relationships – there is a significant amount of expertise in universities focused on international space missions, which could be leveraged for domestic firms if the right settings are in place.
- Shared capital investment between academia and industry. Facilities and equipment are specialised but can be shared across multiple stakeholders, reducing the barriers to entry into the sector.
- Diversify talent to bring employees with deep customer and commercial knowledge into companies as opposed to pure space sector trained employees.

These initiatives will help facilitate local and foreign business through incentives and reduced regulatory complexity and enable Australia to develop an Asia-Pacific hub for the space sector.

Substantial opportunity exists for Australia within the Asia-Pacific region. While countries like India, Japan, Korea and China have some of the largest global space budgets, they also have high competition and market congestion. A number of other countries in the region also have emerging space sectors, including Vietnam, Thailand, Singapore and the Philippines, all of which have growing government budgets and industry activity.

Australia has already seen a keen interest from companies in the region, with Perigee Aerospace, a Korean rocket company, announcing they will launch their first rocket through Southern Launch's facility at Whaler's Way, and SpaceBD, a Japanese satellite launch and deployment provider working with CUAVA at Sydney University to launch their cubesats.

For this initiative to be successful, Australia will have to encourage both foreign companies and customers through favourable visa programs, access to grants and government facilities, and regulation to simplify local launch and operation.

Conclusions:

Australia is making strong advances in the space sector. While its space agency may be young it is making an impact on the global stage; signing agreements with the world's leading space agencies and companies and attracting additional funding to the local sector. The industry is growing revenue at a greater rate than the global economy with regular investment announced from local and foreign sources.

Compared to Australia's peers, there is still significant catching up to do. In order to move quickly and sustain the growth the sector is currently enjoying, government, industry and academia will have to work collaboratively and focus on key initiatives to grow the economy further.

How are KPMG involved?

- Growing the space sector through accelerators and incubators.
- Unlocking space data for downstream industries.
- Supporting government space strategy, policy and investment.
- Supporting traditional market activity internationally, such as M&A, procurement and supply chain, systems and financial management, engineering, risk management services to space sector-facing companies.





This paper has been developed through qualitative and quantitative analysis of a number of data sources, including IBIS World, OECD, ABS the Space Report and KPMG surveys and interviews involving a broad cross section of Australian space sector stakeholders.

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