2022 ASTRA WHITE PAPER - BANKSIA

INNOVATION IN THE AUSTRALIAN SPACE INDUSTRY

A trajectory for success.

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Abstract

Interest in space as a critical emerging sector of the Australian economy has spurred a surge in space-related activities in both the public and private sectors. Despite the invigoration of a domestic space industry, our research suggests that more should be done to ensure continued growth of our sovereign capability.

We want to show that our space sector is confident. Consultation and coordination between government and business is critical to garner confidence from stakeholders, to identify and act upon industry barriers.

We want to show that our space sector is resilient. By making entry into the sector accessible, and encouraging the implementation of a circular economy, we can ensure that our space sector employs cutting-edge sustainable practices.

We want to show that our space sector will inspire. Reviewing and developing new pathways into the sector across the nation's education systems is essential to inspire and retain more talent in the space sector.

Introduction

Dialogue with industry leaders and our own research has indicated that Australia needs a stronger cohesive partnership between the public and private sectors. Whilst ground-breaking work is already being achieved in the industry - such as Boeing's continued collaboration with the CSIRO - we believe it is important to have a unified approach to developing our sovereign capability.[1] Comparison with established international space sectors indicates how critical it is to ensure that targeted action is taken to further invigorate the growth of our space sector in line with the national civil space strategy.

This white paper explores how we can better leverage our nation's unique capabilities to foster space growth and innovation in the space sector. These recommendations are categorised by three key topics: Industry and Economic Growth, Sustainability and Diversity, and Public Engagement and Education.

Methodology

Over the past twelve weeks, the Astra 'Banksia' team has worked to develop key recommendations addressing identified gaps, challenges, and potential oversights found in Australia's growing space industry. Through analysis of the current industry and government practice, the following recommendations cover economic growth, sustainability, public engagement, and education.

To analyse and interpret these components, team members were assigned profiles, encouraging them to explore the industry through the lens of these professionals directly impacting the space industry. Team members attended a total of eight workshops dedicated to identifying and unpacking their ideas. Six recommendations - two for each component arose from these three months of deliberation, which were refined and amended after being presented to a panel of industry experts.

The team was split into three groups and assigned one of the three components Through discussion, personal contemplation and extensive research, the team was able to highlight some key deficiencies within the current industry and construct six preliminary recommendations.

Once the basis of these recommendations had been formed, the groups then presented to an audience comprising industry experts, from KPMG, Azimuth Advisory, The Andy Thomas Space Foundation, and Stone & Chalk, who gave valuable constructive feedback. After this, the recommendations were refined, and the targeted organisations were further clarified to produce the final recommendations in this whitepaper.

Assumptions & Limitations

It is assumed the Australian government's allocation of funds to the space sector would not increase dramatically over the next decade, nor would rules and regulations regarding space in Australia and internationally change significantly. The team makes acknowledgment of the current political climate, and it should be noted that these recommendations were devised before conflict arose in Eastern Europe. While this does not directly affect the recommendations posed in this white paper, the team believes it is responsible and respectful to make this acknowledgment regardless.

It should be addressed that these recommendations were conceived by tertiary students and young professionals with little experience in the space industry.

Topic 1: Innovation and Economic Growth

Australia possesses its own unique history and capabilities that place the country in a competitively advantageous position to grow its space industry and strengthen international collaboration.[2] Given the infancy of the industry, there are several barriers that hinder progression.[3] We recognise two potential recommendations: (1) encouragement of a Strategic Statements of intent & Cooperation (SSI) and, (2) an annual report which benefits several areas of interest.

Recommendation 1: The Australian Space Agency should encourage the use of Strategic Statements of Intent & Cooperation (SSI) to improve collaboration with domestic commercial organisations.

The Australian Space Agency (the Agency) has collaborated with international partnerships, Australian States and Territories, and organisations through 'Memorandum of Understanding'.[4] SSI's follow a similar approach with commercial organisations operating in Australia acting as a non-binding joint statement with the Agency. SSIs recognise the strengths and contributions of each party, creating a clearer picture to public and private entities of where the areas of focus and growth are. They provide more certainty on policy implications with respect to developing the industry.[5]

Acknowledgement and alignment to the national strategy is integral to the broader success of the space industry. However, encouraging space companies to join an SSI can be improved by promoting clearer benefits for the business. This includes confidence that the commercial organisation meets the Agency's SSI criteria and confidence in the allocation of resources, projects, and capability in line with the national strategy.[6]

To encourage engagement, we recommend the Agency consider companies with SSIs as pre-qualified when allocating funds and tendering contracts. Whilst this doesn't guarantee that the company will attain a benefit from the SSI, it does place them in a competitive position in the market without creating any legal obligations between the two parties. The outcome aims to encourage alignment to the national strategy by considering current and projected industry and regional strengths.

Recommendation 2: KPMG should develop an annual report that identifies industry opportunities, barriers and the uses of space services and technologies in Australia from the perspective of private space companies, academia, relevant industry associations, and other non-government space organisations.

KPMG is positioned as Australia's space advisor by providing insight into the current status[7] and future projections of Australia's space defence.[8] KPMG's current involvement in their own recommendations is noteworthy, actively contributing to the development of the industry of

which this recommendation report was inspired upon.[9] We propose that by developing this report, KPMG will establish themselves at the forefront of the space consultancy industry through an understanding of the sector which far exceeds that of any competitor. This may flow on to additional long-term benefits, such as future start-ups approaching KPMG for support in the industry.

This report will support the development of an action roadmap, addressing a number of challenges that have been identified within industry and academia including the mitigation of high-investment risks affecting start-ups in securing venture capital,[10] the application and impact of regulations and regulatory risk of space commercialisation,[11] talent acquisition and retention, and consistent national coordination.[12]

To create a comprehensive report on the space sector, we recommend that this report cover the perspectives of both space industry and academia. For industry, considerations may include feedback from companies of varying sizes across space industry domains and the impact of government grants. For academia, considerations may also include feedback from educational institutions and their involvement in space research and activities.[13]

This report will provide a complementary discourse to the State of Space Report, marrying the perspective of the space sector from government, agency, and regulations with industry and academia more broadly. KPMG's involvement should be authorised and supported by the Agency through the Space Industry Leaders Forum.[14] Further iterations of the report can be reviewed and authored internally or externally as required.

Topic 2: Sustainability and Diversity

As Australia strives for more industry diversity and sustainability, it is important that the Space industry contributes its fair share of initiatives. Most people have preconceived notions as to what diversity and sustainability looks like in the industry and our recommendations look to broaden these ideas.

Diversity is often seen as tackling gender and race ratios within the industry and although this is important, we wanted to look beyond these issues and acknowledge that as an academia-born industry, the space industry has failed to include people of various educations. Sustainability is often seen as environmental sustainability and whilst this is crucial in developing a viable space industry, we also want to develop industry sustainability throughout the Australian Space Industry.

These recommendations aim to contribute to the INSPIRE & NATIONAL pillars of the Australian Civil Space Strategy 2019 – 2028 to grow and diversify the next generation of the space workforce and industry. [15]

Recommendation 3: The Australian Space Agency should collaborate with the Australian Industry and Skills Committee to assess and develop the current vocational pathways into the Space Industry.

While diversity in the workforce has traditionally focused on alleviating race and gender discrimination,[16] it is also important to highlight a lack of diversity when it comes to the education level of workers within the industry.[17] Due to a lack of workforce in the Australian Space industry over the last few years, there has been no demand to broaden our workforce within the Australian Space Industry. However, with the current growth of the industry, it is now time to broaden the pathways through which workers can enter the space industry.

It is important to acknowledge that within other industries, such as mining,[18] it is not necessary to hold university degrees to work as a welder, electrician, or boilermaker. This should be a standard we look to involve in the space industry by establishing a connection between TAFE and industry and allowing apprenticeships for these jobs to be undertaken through various space related companies.

There should be a clear understanding of what space-related functions require a degree. Towards this end, clear pathways for our highly skilled non-academics (e.g., our mechanics, electricians and welders) into the Space Industry must be established. Using the current pathways of university graduates as inspiration such as a graduate program offered by the big four consulting firms[19].

Australia should look towards developing pathways from TAFE institutions into the Space Industry. Gilmour Space has already begun this process by actively hiring Trade Qualified personnel such as mechanics, welders, electricians, and Test Technicians and equipping them with any further knowledge.[20]

The final goal of this recommendation would be to increase employment throughout the industry of vocationally trained workers. By applying this recommendation, we diversify the Australian Space Industry Workforce.

Recommendation 4: KPMG should establish a virtual reality space known as ‘SpaceVerse’ which looks towards creating a circular space ecosystem through start-up engagement and innovative thinking.

We believe that KPMG can help promote industry sustainability by creating a circular ecosystem based on innovation. This is a system based on three main principles: experimentation, collaboration, and platformisation.[21]

KPMG is a business based on collaboration, with an in-house well-established innovation lab concentrating on experimentation. However, to further develop these practices and elevate KPMG to Industry 4.0 (a movement to transform business processes using state of the art

technologies);[22] we suggest a recommendation based on the third principle which is platformisation.

By developing a virtual reality space known as SpaceVerse, KPMG would help digitise the beginnings of the supply chain, a key step in creating a circular economy which looks to maximise the value of material resources and minimise overall resource use. SpaceVerse would foster collaboration between space industry groups (both start-ups and established) and ultimately have a space to design products virtually to allow for maximum efficiency - an option which Boeing has already utilised to improve the design of their 737 MAX 10.[23]

Creating an innovative space for collaboration and design could lead to the sharing of resources and research between Australian companies, fostering industry sustainability here in Australia. An example of this may be the possibility of recycling materials from decommission aircraft which currently sit in the Aeroplane Boneyard which is run by the Asia Pacific Aircraft Storage (APAS) in Alice Springs, Australia, and repurposing them into new space products.

The final objective of this recommendation would be to digitise the supply chain and bring the Australian Space industry up to speed with groups such as Amazon and Google. Thus reducing long-term infrastructure investment requirements and placing KPMG as a leader in the Australian and Worldwide space industry.

Topic 3: Public Engagement and Education

A strong foundation of educated and engaged professionals is integral to any successful industry. By improving education surrounding space and space-related disciplines, whilst providing greater and more diverse pathways for employment, we will be able to bolster Australia's emerging space industry. The following recommendations will aid in the development of a national highly specialised and inspired space workforce.

Recommendation 5: KPMG should conduct a review of current space-related pathways within Australia.

Countries that have strong, well-established space agencies also often have an abundance of educational programs and opportunities that provide clear pathways into space industry careers. A review into the current employment landscape by Engineers Australia showed that we are currently highly dependent on skilled migration to meet the demand that local industry requires.[24] There is a clear gap between what the Australian industry needs and what is currently available. The participation in STEM related fields in schools and tertiary institutions has slowly been dropping and without reform to encourage more participation, Australia will intensify its reliance on skilled emigration and will stifle the opportunity for sovereign innovation and growth.[25]

Other major space faring nations have robust and varied pathways into their respective industries. These include myriad internships spanning STEM and business to human resources, project management, and public education.[26] In conjunction with space awareness programs open to people and professions help increase awareness and availability of peer reviewed education activities to teach students about the available pathways into the space industry.[27]

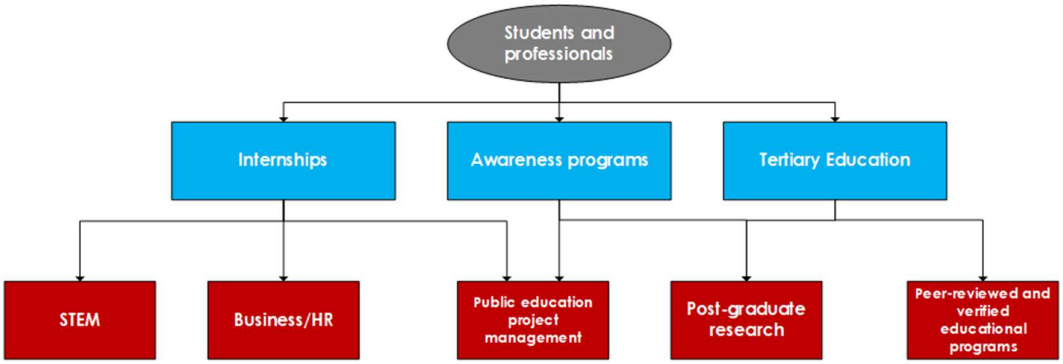

Figure 1. The interconnectivity of potential international pathways into the industry.

These programs offer opportunities for professionals of all ages to gain insight into the space industry and clearer pathways for careers in the sector.

As Australia lacks programs like those internationally, it would be beneficial to investigate the pathways we offer our students and how effective they are. Being an established space industry advisory, we recommend that KPMG conduct a review of the current space related pathways and produce a report outlining where our education systems strengths and weaknesses lie. Identifying these factors allows comparisons to be made with other countries' successful pathways and can give the industry an opportunity to improve local initiatives, leading to further industry growth and solidifying KPMG as a premier consultancy firm in Australia.

This recommendation involves reviewing the current space-related pathways for students and young professionals and establishing a universal scale, much like the scale used to rank the success of tertiary education programs. Currently the pathways into the industry are convoluted and lack clear direction.

Although other countries may have different education systems and industry climates, investigating some of the effective educational policies that these other successful countries have in place may shed some light into how the current system can be reviewed and improved. Utilising a universal scale will be a simple way of explaining to stakeholders where our programs sit, where we want them to be, and how we can get them there. (i.e., increased funding, different structures).

Recommendation 6: The Department of Education, Skills and Employment should implement a post-graduate program that creates a more defined pathway into the Australian space industry.

A recent investigation on the state of the Australian space industry commissioned by the Agency and SmartSat CRC found that there is a considerable shortage of industry-critical skills. The investigation identified a current or future shortage in 310 of the 319 skills identified as critically important to the space industry.[28] 317 of these skills were considered already active in the industry, showing that much of the knowledge needed is in circulation, but is not accessible to enough people. This indicates there is an apparent need for greater accessibility to training programs and resources in order to address these skill shortages within the Australian space industry. The study also found that a considerable amount of the critical skills were only taught by a small number of institutions, with much of the burden falling to in-house training programs provided by private companies.[29]

Implementing a postgraduate program offering space-related degrees from various disciplines would not only remedy this skill shortage but also increase the number of institutions available to up-skill students. A dedicated program would ensure that graduates wanting to enter the industry have a robust set of specialised skills, reducing the need for companies to conduct in-house training, leading to an increased uptake into the industry and less outsourcing of talent internationally.

With South Australia being the home of the Agency, we recommend that the post-graduate space program operate initially as an extension of the University of South Australia. This way, it can work more closely with the Agency and other companies in the space sector. Additionally, The International Space University (ISU) runs an intensive 9-week program annually in South Australia. By having a dedicated institution where this program can be held, Australia would not only strengthen its ties with this premier space-education establishment, but also further strengthen its relationships with notable ISU industry partners. NASA (National Aeronautics and Space Administration), the ESA (European Space Agency), the JAXA (Japanese Aerospace Exploration Industry), and Boeing.[30] This would provide greater opportunities for our students to learn from industry experts and further develop their skill set.

Recommendations

Topic 1: Innovation and Economic Growth

Recommendation 1: The Australian Space Agency should encourage the use of Strategic Statements of Intent & Cooperation (SSI) to improve collaboration with domestic commercial organisations.

Recommendation 2: KPMG should develop an annual report that identifies industry opportunities, barriers and the uses of space services and technologies in Australia from the perspective of private space companies, academia, relevant industry associations and other non-government space organisations.

Topic 2: Sustainability and Diversity

Recommendation 3: The Australian Space Agency should collaborate with the Australian Industry and Skills Committee to assess and develop the current vocational pathways into the Space Industry.

Recommendation 3: KPMG should establish a virtual reality space known as SpaceVerse which looks towards creating a circular space ecosystem through start-up engagement and innovative thinking.

Topic 3: Public Engagement and Education

Recommendation 5: KPMG should conduct a review of current space-related pathways within Australia.

Recommendation 6: The Department of Education, Skills and Employment should implement a post-graduate program that creates a more defined pathway into the Australian space industry.

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