



# ASTRA PROGRAM 2025 WHITE PAPER SERIES

# Produced by the Astra Program

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# Executive Summary

The benefits of accessing space and utilising it for the progression of society has become more apparent in recent years due to the rapid technological advancements made. Although Australia is not recognised as a major competitor in the current landscape, investment in space may provide opportunities for a change in perspective amongst the general public; Such an interest is pivotal in ensuring space is recognised as part of the Australian culture and identity.

The following paper outlines an overview of the current Australian public opinions on space, highlighting the current disconnect between space and the everyday Australian. Challenges and limitations surrounding education, media and cultural responsibility provide an overview of the current landscape of space perception, offering insight into initiatives that aim to mitigate the negative effects of the aforementioned disconnect. Research is consolidated via a survey produced and distributed by Team Acacia, which provides a unique, up to date insight on public views as it relates to space. A case study of Katherine Bennell-Pegg explores the concept of utilising a national figure to invoke national pride via effective media and marketing strategies. Recommendations pertaining to the public opinion, target a holistic approach to media and how effective collaboration between the space industry and social media can be utilised to educate and inform the public on Australia's space capabilities.

The paper also outlines an overview of Australia's history in space, and how it has developed through the years. It highlights the minimal government involvement after the 1960s space race until recently as the commercial space sector has started to grow with the reduction of costs. The facts of Australia's current involvement in the Space Industry are then compared to public opinions about the industry, emphasising the difference between current space activities and current public knowledge. This then provides information which can be used by governments and companies to counter public perception of space being too expensive. Additionally, using a case study comparison of India and Brazil's space program diverging development inform a list of recommendations for the government as a method of creating a more defined and high interest space policy to combat stagnation in the industry and generate public interest in Australian space projects both domestically and abroad to attract international partnerships.

# COMMUNICATING SPACE TO AUSTRALIA

## OUR OPPORTUNITIES, ASPIRATIONS, AND CHALLENGES

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## Acknowledgment of Country

Team Acacia, alongside the Astra Program and the Australian Youth Aerospace Association, would like to acknowledge the Traditional Custodians of Country throughout Australia. The Acacia Team is based across Australia; Gadigal, Dharug, Turrbul, Boonwurrung, Woiwurrung and Cammeraygal Land.

We pay our respects to Elders, past, present and emerging, and extend our respects to all Aboriginal and Torres Strait Islander peoples. We recognise the First Nations Peoples of Australia as the world's first astronomers, and their enduring knowledge in cultures and customs, which have nurtured and continue to nurture terrestrial, and astronomical knowledge.

## Introduction

Australia has had a long and varied history in space starting back in the 1940s as a rocketry test range and becoming the third nation to launch a satellite from its own borders in 1967. Ever since, the Australian Space Industry has been slowly growing, with recent increases in the number of start-up businesses now becoming a main contributor to the burgeoning industry.

However, Australia's history and current involvement in space have been underrepresented to the general public, with many believing space is not in the Australian repertoire. Public perception has instead focused on Australia's specialties to be mining, agriculture, and other natural resource extraction which has given Australia the title of being a "lucky country".

With this lack of public perception of the current industry, misinformation can spread about cost effectiveness and importance of space. The subsequent misguided public opinion about an industry seriously impacts the political will of a government to define a clear policy direction and invest in industrial growth. With governments being an essential early market for space industries, a lack of Australian government investment will prevent the domestic space industry from reaching its potential.

It is critical to address the Australian public opinion for the national space industry to prosper and become internationally significant and competitive. This paper aims to outline an in-depth view of current Australian public opinions of the national space industry, how the Australian Space Industry is currently developing, and where the public opinion does not match current





facts. Further exploring how public opinion can be informed by education and media; and provide recommendations for how the challenge of shifting public opinion can be addressed to provide public awareness of the Australian Space Industry and its benefits, with the goal of increasing political alignment towards informed space policy decisions and funding opportunities to grow the industry into the future.

## **Methodology and Limitations**

The content presented results from a 3-month program where members of the Astra 'Acacia' Team conducted extensive research on the specified topic matter of 'Communicating Space to Australia', guided by industry and Subject Matter Experts (SMEs), to develop recommendations for how to bolster the Space Industry's communication efforts. A preliminary yet detailed literature review of the topic was conducted by analysing a plethora of articles, scientific journals, policy papers, and research papers which the Astra committee then reviewed. The aim of this was to develop an understanding of Australia's history in space, current advancements, and industry potential while identifying gaps, challenges, and potential oversights. In conjunction with this research, the Team produced and distributed a survey to over 400 respondents to provide insight concerning the general public's view on the growing Australian space industry.

Care was taken to ensure that the sample was representative of the Australian population by distributing the survey through various online platforms. The potential for bias from the survey was recognised, thus demographic information was collected in addition to information regarding respondents' general interest in space. However, it is to be noted that approximately half of the respondents possessed a vested interest in space, a factor thoroughly considered throughout this analysis. Further biases could have arisen due to methods in the distribution of surveys. Sources from the literature review were utilised to provide context and references for the ideas proposed. The survey data was cleaned through coding, and comparisons between various factors were established to better understand public opinion and guide recommendations.

The white paper ultimately examined the Australian public's opinion on space and the various factors shaping it, including cultural and social responsibilities, space legislation, and commercial and government initiatives. By demonstrating their impact, the paper laid the foundation for well-informed recommendations.

## **Public Opinion Overview**

The current public opinion on space in Australia is a significant area to be explored. Public support can lead to industry growth, increase funding and policy initiatives which enables continued growth in the industry. Identifying gaps in the understanding of the space sector amongst Australians will serve to improve citizens' space knowledge. This gives leverage to greater public engagement in space activities and policies, thus strengthening the connection and relevancy of space exploration.



Recent surveys indicate that Australians are interested in space and space exploration, however, they lack comprehensive awareness of the country's contributions and participation in space activities<sup>1</sup>. A study conducted by the Australian Centre for Space Governance (ACSG) revealed the potential for an optimistic view in regard to the amount of funding for space technologies. 31% of people thought the amount was just right, while 20% thought it was too little. However, 36% were unaware<sup>2</sup>. It has been consistently found that there is a percentage of the population who are unaware of space or are not interested. Despite the major contributions of Australia to past space exploration, Australians do not engage with the space sector. From the survey conducted by Team Acacia, just over 61.6% of non-space vested respondents do not believe that space is part of the Australian identity. In fact, many survey respondents expressed belief that money could be better spent in other areas, such as terrestrial research. In our survey, one respondent wrote "There's no point trying to get to space if the world we leave behind is falling apart in the meantime." Additionally, a segment of respondents indicated that they perceived space as a domain for the wealthy, thus reinforcing the stigmas and tropes surrounding the industry.

Australian public opinion is grounded by the way space is portrayed in daily lives, education, media, and culture. Education and media are crucial in influencing, raising awareness and knowledge of those topics among Australians. Educating Australians on space and the role Australia has previously played will help foster the growing space industry by encouraging funding allocation, and careers in Science, Technology, Engineering, and Maths (STEM). In addition, there is a cultural and social responsibility to ensure that this growth is done ethically and sustainably. Many future concerns need to be considered in the present as the sector develops, to ensure its longevity, and continuous support from the public.

## **Education**

Education plays a vital role in communicating space to the public and inspiring future generations to integrate space within the Australian Identity. Furthermore, its effective application and widespread outreach are imperative in achieving the goals highlighted in the Australian Civil Space Strategy (2019-2028)<sup>3</sup>, which aims to introduce 20,000 jobs within the space sector by 2030.

Space education is often viewed as interesting to students with 84% of respondents finding space an exciting and fun topic to learn and a further 90% of students believe space science should be an integral part of a university's curriculum<sup>4</sup>. Additionally, a survey conducted in 2009 deduced that 89% of respondents agreed that human spaceflight inspires younger generations to study science<sup>5</sup>. Although such a statement does not consider other key factors such as the institutions the students attend and the environment they are brought up in, exploring space is clearly of interest. Thus, investing in the interest of space research and space education is crucial in achieving the ambitions of increasing Australia's space capabilities.

However, the current landscape of space education is subject to limitations which diminish not only its ability to attract the youth but also the general public. A report from 2021 highlighted that out of the 319 skills utilised in the space industry, all but 9 were experiencing some level of shortage<sup>6</sup>. Addressing these shortages is crucial in ensuring that significant growth in the industry



is sustained. Challenges also present themselves in the form of outreach, where a lack of space education in regional, underrepresented, and Indigenous communities hinders the progression of embedding space as part of the Australian identity and impacts diversity within the industry leading to its own issues. Gaps in STEM education amongst Aboriginal and Torres Strait Islander students have remained a consistent issue over the past 20 years, where Aboriginal and Torres Strait Islander students perform worse in STEM education than their non-Aboriginal peers, and often express less interest in pursuing a STEM-related career.<sup>7</sup> There is an evident need to address such issues if space is to become an integral part of Australian culture.

While these barriers exist, there are a plethora of organisations and initiatives that aim to mitigate such issues and unite the youth, academia, and the industry in pursuit of studying space. An example of this is the Victorian Space Science Education Centre (VSSEC) which introduces children to a diverse range of disciplines, including astronomy, engineering, palaeontology, biology, chemistry, information technology, history, and literature. These programs expose students to career pathways they may not have previously considered within the space industry, broadening their understanding of the diverse opportunities available<sup>8</sup>. Another prominent example is One Giant Leap (OGL) who have improved STEM literacy and engagement through a series of programs, workshops, and initiatives in collaboration with government bodies, researchers, and educational institutions. Their immersive programs such as “Space for a Day” and “Aerospace Camp”<sup>9</sup>, foster a sense of community in regional areas while equipping the youth with the necessary skills required to contribute to the space industry. Furthermore, OGL’s diverse range of programs such as space for a day, virtual experience and leadership programs, accommodates students and parents under different circumstances. This builds a strong sense of community as many students feel included and supported. OGL’s contributions are unparalleled and their dedication to improving the connection between the youth and space and its role in shaping the future is significant in embedding space as part of the Australian identity.

The continuous improvement of space education is required for those aiming to pursue a career within the industry, but educating the general public is a separate matter that must also be tackled. Therefore, it is crucial to establish a partnership between education and media to effectively communicate the benefits of space to everyday Australians. Doing so is imperative in integrating space within the Australian culture and identity as they work hand in hand to educate all demographics in Australia.

## **Media**

Throughout history, countries with successful space programs have leveraged media to generate public enthusiasm for space exploration. Famously in 1969, millions watched the Apollo 11 landing, fuelling widespread support for NASA missions. This public backing influenced subsequent policies and funding decisions, demonstrating the media’s power in shaping the trajectory of the space industry<sup>10</sup>. A study examining the influence of different types of media on public attitudes towards space exploration found that science fiction viewership significantly predicts greater support for private and government space exploration. Alongside the



exploitation of social media, organisations such as NASA and SpaceX have encouraged positive media coverage and boosted public interest<sup>11</sup>.

The ACSG and UNSW's 2023 survey found over 45% of individuals learned about space activities in Australia through Australian news media, followed by international news outlets (28.9%), non-fiction mediums (e.g., documentaries and books) (26.7%), and social media (23.4%), with work and local museums being the least cited sources.<sup>12</sup> In Australia, the media landscape continues to evolve. Public service media primarily serve an educational role, promoting art, culture, and local content while fostering a sense of national identity.<sup>13</sup> This, with commercial media and its public democratic function, shape the nation's media environment. Meanwhile, social media and user-generated content is emerging as an increasingly influential platform.<sup>14</sup> The Local & Independent News Association highlights the importance of digital platforms in amplifying diverse and regional voices, particularly in areas where newsroom closures and service syndication have limited access to public interest news.<sup>15</sup> Building on this, the survey conducted by the Acacia team further underscores the influence of media, particularly social media, in shaping public perceptions of space. The survey found over 60% of the respondents received news primarily through social media as seen in Appendix 1. This highlights that the media plays a significant role in shaping the public opinions about the space industry.

The Australian space industry currently leverages various media platforms to engage the public, promote innovation, and attract investment. Commercially, Government agencies like the Australian Space Agency (the Agency) use media to showcase national space initiatives, cutting-edge research, and international collaborations.<sup>16</sup> Private companies like Gilmour Space Technologies frequently utilise social media to share mission updates and behind-the-scenes content, creating excitement and raising awareness around their work.<sup>17</sup> Through documentaries, short reels, and interactive digital content, efforts are made to help bridge the gap between technical advancements and public understanding and making space accessible through engaging content, including memes.<sup>18</sup> In addition to traditional media, independent science communicators, podcasts, forums, newsletters and online platforms contribute to space-related discussions, fostering public interest and awareness.

Despite these efforts, challenges remain in ensuring efficient usage of media. Compared to other countries with more established space programs, like the United States, the Australian Space Industry struggles with engagement. While space exploration has captured the public attention in the U.S. and other nations, Australia's space industry is still working to generate widespread enthusiasm. This is evident as despite the Australian space industry being relatively recent, the gap in public engagement remains significant. This can be seen through the number of followers on the Agency Instagram account being equivalent to 0.056% of the Australian population, compared to the equivalent 1.6% of the Australian population following popular Australian science communicator AstroKirsten on Tik Tok. This is made clearer when compared to NASA's 96.7 million Instagram followers, equivalent to 27% of the population of the United States of America. This disparity highlights the need for more effective media strategies and increased visibility of space-related activities to engage a broader audience and not be solely restricted to those already within the industry.





## Cultural and Social Responsibility

Cultural and social responsibility is the duty of workers, government bodies, and leaders, to ensure ethical, sustainable, and evolving practices. The upcoming 2025 International Astronautical Congress themed – ‘Sustainable Space: Resilient Earth’,<sup>19</sup> highlights the importance of this topic and its impact in the industry. The space industry in Australia has made significant progress in the integration of Indigenous perspectives and values and in addressing major issues in the space industries. However, there are still key challenges that spark concern such as the unstructured regulations concerning the community, threat to sacred land and cultural preservation concerns. This highlights the need for more discussions on cultivating and maintaining a sustainable environment for Australians as supported by the Team’s survey which reveals that while a small minority of Australians are concerned about these issues, those that do have very strong feelings and opinions which need to be considered.

The space industry is able to fulfill its cultural responsibility better with Indigenous involvement, which improves public opinion and is able to integrate better with the Australian identity. The Indigenous Engagement framework in the industry aims to ensure that ethical decisions are made with the implementation of Indigenous perspectives, knowledge and values. Noon K.A’s paper on cosmic caretaking highlights the growing involvement of the Indigenous community in the space industry.<sup>20</sup> One example is the Centre for Appropriate Technology that engages Indigenous values and perspectives whilst also implementing satellite imagery for disaster management. Furthermore, the appropriate use of Indigenous land in Australia has always been a major challenge. However, Noon K.A’s<sup>21</sup> paper demonstrates a successful management of land through the collaboration between the Wajarri Yamatji people and the Australian Square Kilometre Array Pathfinder (ASKAP). The partnership with the radio telescope and the local Indigenous community has resulted in the Indigenous land use agreement aiding in the project construction. All these serve to maintain Indigenous interests, appropriate land use and cultural heritage. Furthermore, the National Indigenous Space Academy (NISA) program fosters job creation in the space industry for Indigenous communities. NISA helps students gain practical experience in the industry through internships at NASA’s Jet Propulsion Laboratory. By introducing their First Nation’s perspectives to Western education, the interns create avid potential for collaboration and innovation.<sup>22</sup> Additionally, Aboriginal and Torres Strait Islanders recognise the positive impact of the space sector. This was demonstrated in the outcome of the Team’s survey, where 33% of respondents identifying as Aboriginal and/or Torres Strait Islanders agreed that the Australian economy would benefit from investment in the space sector, whilst 25% disagreed, and 37.5% remained neutral. However, some limitations in the results include a small sample size of Indigenous Australians responses which may not fully represent their viewpoint on the Space industries benefits.

Despite the progress in collaboration and integration, for Aboriginal and Torres Strait Islander Australians, space activities still pose a problem. Noon K.A<sup>23</sup> highlights the overlooking of oral traditions and cultural activities (that hold significant ties to astronomy) like – Wardaman Traditional Owner ‘Bill Yidumduma Harney’, who has precise knowledge of every visible star. The paper also points out the lack of formal procedures to include Indigenous communities in space-related endeavours. This creates a gap in the industry as Indigenous Australians are



unable to fully contribute, learn and benefit from space operations in Australia.<sup>24</sup> There are growing concerns from Indigenous communities like the Bawaka country group about 'astro-colonialism'.<sup>25</sup> Many are concerned about the possibility of a parallel between Earth's long historical colonisation and the growing space activities and expansion.<sup>26</sup> Another significant challenge connected to space activities is the threat to sacred sites in Australia. Recently the Aboriginal land council in the Northern Territory claimed that Equatorial Launch Australia (ELA) had breached the condition of their agreement regarding the Arnhem Space Centre.<sup>27</sup> While there is a great opportunity for reconciliation with Indigenous communities through the development of the Australian space sector, there is a great risk that if not researched and executed properly these may come off as tokenistic. Indigenous Australians are known to be "the world's oldest astronomers",<sup>28</sup> and have been highlighted in the Agency's logo. However, the Australian government and its bodies have a known history of disregarding Indigenous consultation when there are conflicts of interest, only listening to consultation when it doesn't hinder local governments' plans and disregarding their voice when it comes into conflict.<sup>29</sup> This emphasises essential areas for improvement in the cultural and social area in the Space industry.

## **Case Study 1: Katherine Benell Pegg - A Story of National Pride and Vessel for Inspiration**

National Pride and patriotism serve as catalysts for change and inspiration, often enabling rapid progression within society. Such a notion can be translated to the Space Industry, where in recent years the stories of astronauts and space missions have served as powerful symbols of scientific ingenuity and technological advancements. Katherine Benell-Pegg is Australia's first female Astronaut, and the first Astronaut to have graduated from the European Space Agency (ESA) under the Australian flag. The following case study analyses Katherine's story as a significant milestone in Australia's space journey, and how the media leverages national pride to communicate space to the general public.

Historically, national figures in space have not only served as symbols of scientific progression but also as cultural icons that draw significant attention to the fields of science and technology. Damjanov and Crouch state that a space celebrity falls into a niche category of media-driven fame that extends beyond Earth, often embedding astronauts and space technologies within global culture.<sup>30</sup> This was evident during the Apollo era when astronauts such as Neil Armstrong and Buzz Aldrin became household names and part of American culture. A national survey conducted in 1988 revealed that 67% of Americans were in favour of space exploration,<sup>31</sup> which can be attributed to successful engagement strategies and effective media coverage. Although such a connection between national pride, astronauts and public interest infers a degree of assumptions, it is clear that prominent figures bring attention to the industry and spark interest amongst the general public.

In 2024, a strategic media and outreach campaign saw Katherine embark on a nationwide tour, promoting STEM education, inspiring students, and revealing her journey to the general public. During the tour, Katherine visited educational institutions in Western Australia, South Australia,



Queensland, and the Northern Territory interacting with high school and university students to communicate the benefits of STEM education. Collaboration with the youth inspires the younger generation and fosters a sense of community, especially in regional areas where access to technology and education is limited. Furthermore, Katherine appealed to the general public through an appearance at the Sydney Science Festival sharing her journey in becoming an Astronaut and the plethora of positive moments she experienced. Although a direct measurement of her contribution to space engagement amongst the public is yet to be found, similar female figures worldwide have boosted STEM engagement and interest in space exploration.

One of these figures is Astronaut Emily Calandrelli, a US Engineer turned successful science communicator who became the 100th woman in space after flying aboard Blue Origin's New Shepard (NS-28) in November 2024.<sup>32</sup> Emily, a host of two TV shows and an author, has amassed over 1 million followers across various social media platforms. She actively engages students in STEM education, using her platform to inspire and empower younger audiences. Although Emily was a well-established science communicator before her Astronaut journey, Katherine may implement a similar framework to reach a wider audience. Leveraging growing trends on social media, Katherine's journey can be amplified which may lead to far more impactful results in terms of engagement and outreach.

The marketing and media strategy implemented can be translated over to more recent Australian space achievements, most notably the works of Gilmour Space Technologies and the Roo-ver project. Having secured Australia's first commercial orbital launch permit,<sup>33</sup> Gilmour Space Technologies exemplifies the nation's growing capabilities in aerospace manufacturing and technological innovation, reinforcing a broader narrative of national pride. Similarly, the Roo-ver project in collaboration with NASA marks a significant milestone in Australia's space industry in which an Australian-made rover will be utilised to study the lunar surface. Historically non-human space explorers such as the Voyager probes and Mars rovers are embedded in global culture as icons and symbols of scientific progression.<sup>34</sup> As such the Roo-ver has an opportunity to capture the public's imagination and embed itself within space culture, raising awareness about the country's expanding role in space exploration. With the correct media and outreach strategy these projects like the success of Katherine Benell-Pegg can be utilised to foster a sense of community, pride, and inspiration in the pursuit of embedding space as part of the Australian identity.

## **Commercial & Government Involvement and Initiatives**

### **Australia's Space History – An Overview**

Australia's space history dates back to the late 1940s with the establishment of a launch facility in Woomera, SA, where the nation's first satellite WRESAT was launched in 1967. During this period Australia showed great potential to become a key player in the global space scene, hosting launch facilities for the European Launcher Development Organisation (ELDO) as well as managing tracking stations for NASA, leading to its role in the Apollo 11 missions. This period established the foundations for Australia's current space industry, characterised by strong



ground infrastructure capabilities. With the cooldown of the space race, Australia lacked a consolidated space policy. This indifference resulted in the industry's stagnation and the failure to capitalise on previous activities and experience – especially regarding launch capabilities.

It was not until the 90s, with decreasing costs for space technologies, that the government took interest<sup>35</sup> in a burgeoning commercial space sector. This led to the introduction of the *Space Activities Act (1998)* and *Space Activities Regulations (2001)* acts. Following over a decade of further advancements, a mandate for the Agency was given, and the *Launches and Returns Act (2018)* was instated. Currently, Australia is also a party to the five UN space treaties which focus on promoting collaboration between nations. These treaties are overseen by the United Nations Committee on the Peaceful uses of Outer Space<sup>36</sup> of which Australia is also a member. In 2020, Australia announced it was signing the NASA Artemis Accords, supporting space communications, earth observation and space medicine<sup>37</sup> – all national strongpoints. Currently, the Australian federal government has several schemes to support both civil and military space. Major developments include: the 2024-25 budget allocated \$207.4 million over four years to Geoscience Australia,<sup>38</sup> and financing through the Moon to Mars Initiative.<sup>39</sup> Further, the Australian Defence Force is receiving approximately \$7 billion in the decade from 2020 to 2030 to advance Australian military-space endeavours.<sup>40</sup>

## **Assessment of Australian Government and Commercial Involvement**

From our public opinion survey data, when asked whether a government-funded space industry would benefit Australia more than it costs, more Australians without a vested interest in the space industry agreed, with a significant portion who were either neutral or unsure. When also asked if a government-funded space industry would cost more than it generates, more participants agreed than disagreed, although the number of unsure responses increased as seen in Figure 1.

This is an interesting disparity, as it shows the average opinion for those not invested in the space industry believe that while a government space industry would be of overall benefit to Australia, it would not be worth the cost. Each year, the Australian space industry generates approximately \$3-4 billion in revenue. This compares to the approximately \$800 million in investment per year since 2018.<sup>41</sup> With the majority opinion believing the government-funded space industry is too expensive, despite showing a clear return on investment even in its current form,<sup>42</sup> the key issue emerges. While on the whole, Australians like the idea of funding a space industry, they are ill-informed about the costs and subsequently believe there are more important things for the government to focus on. This is not a particularly surprising result and helps support previous research which has reached the same conclusion. However, this can cause a distinct issue, as the space industry in Australia is predicted to grow to \$10-12 billion with 30,000 jobs by 2030.<sup>43</sup> This growth could be actively hindered if the public believes it is too expensive and that other areas are losing funding because of it. While funding distribution can be of concern, the lack of understanding as to how the space industry is not only financially beneficial but can also boost other areas of the economy could sway public opinion. This can then influence politicians who are focused on re-election, possibly leading to project cancellations and funding redistribution.





This would prevent the industry from meeting or exceeding the established growth goals. Therefore, it is essential in public messaging to address this issue with the real facts.

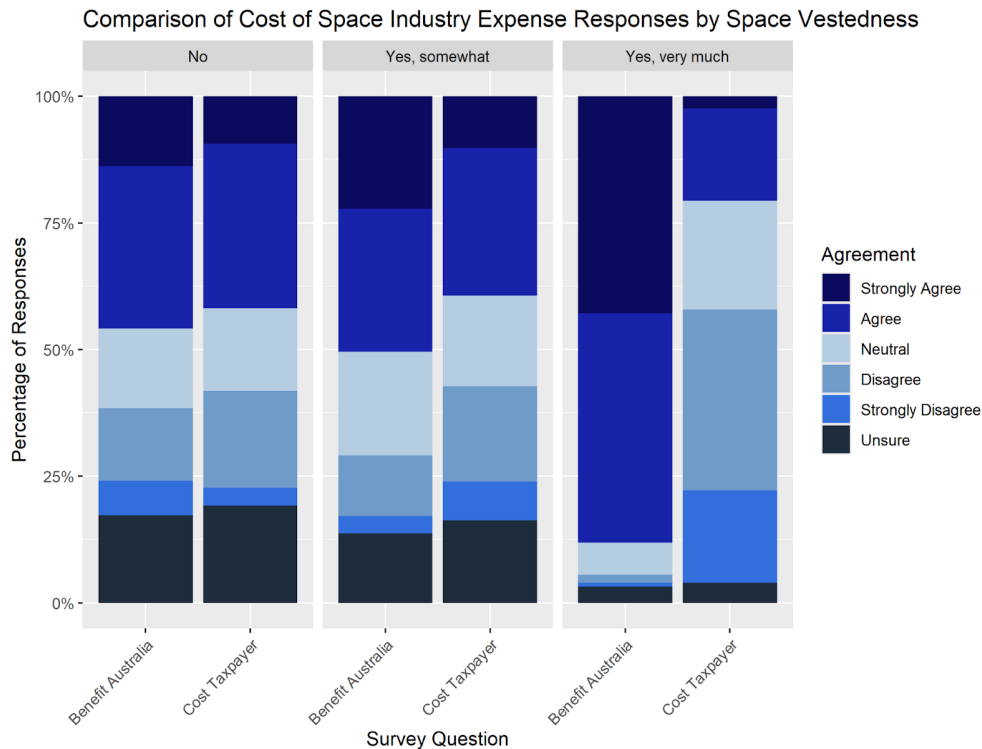


Figure I: Percentage of survey participants agreeing with statements on whether *Government Investment in Space Benefits Australia More Than it Costs* or *Costs More Than it Generates*, categorised by level of personal investment and interest in the space industry.

Based on Australia's funding framework, there is a clear alignment of public opinion compared to the actions of the government. In 2024, less than 0.1% of the federal budget was spent on civil space investment, while the civil space industry made up approximately 0.36% share of Australia's GDP.<sup>44</sup> While this is comparable to other growing space economies, it is still below both Canada and New Zealand.<sup>45</sup> In addition, over 1 billion in funding was cut from various space development projects in 2023 as a federal budget savings measure.<sup>46</sup> This indicates a lack of direct political will in regard to funding space projects and will pose a significant challenge in building a strong national space sector. An area of strength, however, is Australia's international agreements. As a signatory to the Artemis accords, the Australian Government is currently providing grants to many private companies to develop technologies for supporting the Artemis missions.<sup>47</sup>

Additionally, Australia's expertise in mining and agriculture can provide it with a competitive advantage in space and has drawn international attention for partnerships in sharing expertise to develop future space mining capabilities for the growing space economy.<sup>48</sup> These advantages extend to other existing Australian niches, including quantum computing, encryption; sensors and precision instruments; communications; simulations; computing and networks; medicine,



space situational awareness; as well as existing downlinking capabilities,<sup>49</sup> which will be vital for future mission management systems.

While these advantages do help bring in foreign investment to support organisations such as AROSE, which fuels growth in specific niches, it does have the potential to keep Australia in its position as a niche economy. Based on public opinion from the survey, respondents overwhelmingly agree the Australian economy is not sufficiently diverse as seen in Figure 2, meaning that an avenue to sway public opinion is to focus on how further domestic investment in the space industry can support wider economic growth and diversification.

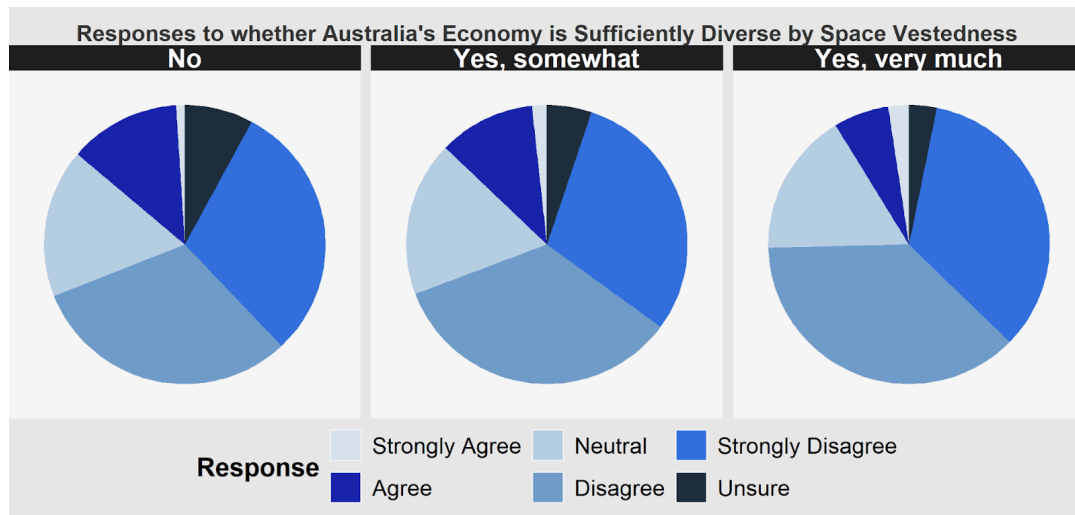


Figure 2: Percentage of Australians who agree that Australia's economy is sufficiently diverse, separated by whether the participant had a vested interest in the Australian Space Industry.

Australia currently operates several collaborations in the industry involving partnerships between the state and federal governments, research institutes and private companies. This model can result in advantages such as lowering the cost of space activities, the acceleration of innovations related to space activities and a decrease in the share of Gross Domestic Products allocated to space activities.<sup>50</sup> This also has the benefit of positively contributing to other industries like agriculture in the near future. In 2024 the Queensland Government estimates the generation of \$1.1–\$1.7 billion per year by 2036 in the agriculture and mining industry from space-related activities alone.<sup>51</sup>

With additional funding and political will, the Agency and the space sector would develop better technology and improved infrastructure, increasing not only Australia's space capabilities but also global standing and desire for collaboration from international partners. This infrastructure improvement will also create more jobs, allowing Australia to prevent brain drain, and boost the economy overall.



## **Case Study 2: Comparing Brazil and India's Space Development and Lessons Australia Can Learn**

The development of India and Brazil's space sectors exemplifies how an independent space department/portfolio underpins the development of national space industries. With aspirations to alleviate poverty and other national issues, both nations' space programs began in the 1960s, but their development has diverged greatly – due to how each respective nation has regarded the priority and status of space.

India's program began intending to establish itself as self-sufficient in space, aiding Jawaharlal Nehru's vision of advancing India's social and economic position. Through the decades, India maintained an independent Department of Space, directly overseen by the Prime Minister. This precluded the program from competing for funding, with areas such as education and science. Additionally, India's long-term planning concerning space has transformed it into one of the few nations that doesn't require foreign launch capability. This has resulted in India reaching several milestones in space, such as the Mangalyaan and Chandrayaan exploration missions.<sup>52</sup>

Like India, in the 1960s Brazil was one of the first developing countries to promote space activities through the Organising Group of the National Commission of Space Activities (GONCAE). In the 70s and 80s, Brazil focused on obtaining independent civilian and military access to space, alongside remote sensing, mapping, and communication capabilities. However, economic troubles resulting in a reduced budget, alongside Missile Technology Controls Regime boycotts undercut this. In 1999, the government demoted the space agency from being a direct advisor to the president, placing it under the auspices of the Ministry of Science, Technology, Innovation, and Telecommunications (MCTIC). Likewise, the 2003 Alcântara disaster dampened public interest in developing indigenous launch capabilities. Ultimately, this belies Brazil's failure to develop sovereign space capabilities regarding launch, becoming a launch hub, and satellite manufacturing<sup>53</sup>, resulting in Brazil being reliant on foreign partnerships for accessing space. Thus, the Brazilian case underlines the importance of consolidating space funding, through independent bodies.<sup>54</sup>

The comparison between India's and Brazil's space industries is a stark reminder that building a nation's space industry requires a strong long-term vision, and guaranteed financing/resources. The Australian space industry would strongly benefit from such a development. Historically, a lack of solidified policy has precluded capitalising in the many different space niches. If a long-term vision or a strengthened commitment to space isn't formalised, Australia risks lagging behind other nations in space, and further disengaging public interest.



## Recommendations

### **Recommendation 1: The Agency should collaborate with a broader range of departments in the government to facilitate a holistic public engagement campaign.**

The general public awareness and interaction with the space industry are imperative to ensure that it one day becomes part of Australian culture and identity. Given the lack of understanding of sovereign space capabilities as evidenced by the Team survey, this recommendation aims to educate the general public while providing a means of interacting with the space industry through various “pop-up” events and activities at the heart of major cities throughout Australia. Such an initiative is directly aligned with the “Inspire” implementation as highlighted in the Australian Civil Space Strategy.<sup>55</sup>

The Agency should collaborate with the Department of Industry, Science and Resources (DISR) and the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) to construct and plan weekend-long events across Australia centred around communicating space to Australia. The initiative is dependent on industry involvement and organisations, such as the Space Industry Association of Australia (SIAA), to foster innovation and collaboration between various stakeholders and industry leaders. Leveraging these partnerships will allow for the proposed events to effectively communicate the importance of Space to Australians. Examples of this may include an exhibition showcasing the achievements of Australian startups, which provides the public with an in-depth understanding of Australia's sovereign space capabilities, and workshops that offer interactive activities such as virtual reality experiences.

Beyond highlighting the advancements made in space technology, these events will also underscore the vital role of space in societal progress. Exhibits will demonstrate how space is used for monitoring climate change, natural disaster management, and global communications. Furthermore, the events will display the diversity and evolution of the space sector by emphasising other industries that exist within the space industry such as space law, human health and performance in space, space psychology, and space entrepreneurship. This broader and holistic approach to space effectively communicates space to Australia and can be beneficial in attracting the general public to get involved with the space sector. The involvement of the National Indigenous Australians Agency (NIAA) is crucial to the success of this large-scale initiative, as Indigenous peoples' deep cultural connection to the land and their recognition as the world's first astronomers is central to the narrative of space in Australia. The NIAA will maintain a strong and fruitful relationship between the Indigenous community and the space industry, ensuring their perspectives and interests are aligned. Such a collaboration emphasises the significance of the Indigenous culture in space and is vital in embedding space within the Australian culture and identity.





## **Recommendation 2: Incorporating Science Communication into Media**

Australia's space industry is inherently different to other countries as Australia was not a large part of the Space Race and is spear-headed by small start-ups rather than government involvement. In order to gain public support, space achievements must feel Australian rather than done by a particular company in order to integrate space into Australian culture.

The biggest barrier in scientific knowledge and education is the perceived difficulty and inaccessibility of scientific subjects. Many people believe that they are "not smart enough" to be involved in the space sector. This is reinforced by the common phrase "It's not rocket science." In doing so, the public places space industry workers on a pedestal<sup>56</sup> and loses motivation to understand the work done in space.

In order to make science knowledge accessible, educators must meet the public where they are, both metaphorically and physically. This means integrating space and STEM-related media into existing media and entertainment, as well as improving science education in regional areas by increasing teacher pay and providing incentives to move to regional areas.

STEM and space-related media has already become popular on social media sites such as YouTube and TikTok. The YouTube channel 'Kurzgesagt – In a Nutshell' is a German design company that makes videos, usually between five and fifteen minutes in length, discussing and educating viewers on science and philosophy. They use a flat 3D animation style with bright colours to illustrate and explain complex ideas simply, without demeaning the viewer. Short-form content based on scientific communication has become popular on TikTok, with Australian Wiradjuri Astrophysicist Dr Kirsten Banks gaining over four hundred thousand followers, and American science communicator Hank Green gaining over eight million followers. These creators are helping to break down this perceived barrier because their videos are accessible to anyone with the internet and can be understood by the average person. They are interesting and encourage the viewer to learn more about science and think critically.

Space-related content should also be promoted by non-STEM influencers and related to other non-STEM industries. The Space LEGO sets are accessible and expand the audience as they provide information sheets about the items or images of the set. While targeting younger people is ideal to build a bigger space industry, adults must also be educated in Australia's space activities for the government to consider investing more money. This should be done by utilising existing Australian media, such as TV shows, news broadcasts, films, and music. For a younger audience, this could be a special episode of Bluey featuring a child's parent who works in satellite communications. Young adults may be interested in Australian influencers visiting the Australian Space Agency and launch sites. Older adults may watch documentaries, news investigations, and films such as "The Dish."

Using Australian culture and media ensures that space achievements feel distinctly Australian and encourage public support. This utilises the persuasive technique 'ethos' to build on already existing trust and emotion. By creating representation in the media, children can dream of space and adults can encourage them accurately.



### **Recommendation 3: The Agency should define a more precise Space Policy**

A national policy is critical to clarifying what Australia seeks to achieve in space. With the large capital required, especially for the complex downstream sector,<sup>57</sup> a visionless approach to space will lead to the stagnation seen in Australia's space sector historically. To prevent the perception of Australia's industry as "some PowerPoints [concerning its future and merits]" as mentioned by a survey response, it is vital that Australia lays out an actionable vision for contributing to the global space sector. The recommendations for this include:

1. *Consolidate space funding and projects across government departments by establishing an independent department/portfolio.* Through this, the Agency won't need to compete directly with other scientific government agencies for funding from a higher department.<sup>58</sup> This can also provide a strong framework for Australia to create and promote national space missions. Providing a strong signifier to the public and international partners that Australia is taking space development seriously.
2. *Focus space policy on developing Australian space niches.* This, paired with the alignment of military and civilian-space spending will lay the foundations for a domestic manufacturing base. With this, Australia can integrate into global supply chains, creating more local jobs and economic growth, which can be used to counter arguments that space is not directly beneficial.
3. *The Federal Government should appoint an Australian Ambassador for Space, and/or special attachés* to countries with strong potential for both international government and business partnerships. By doing this, Australia can have significant involvement in international partnerships, alongside identity, which creates opportunities to develop and showcase our space capabilities to the public as a counter to the pervasive idea that the Australian sector is inactive and nonviable.

The growth of these commercial and government activities, alongside strong international partnerships, will present Australian space capabilities as globally innovative, further piquing public interest in the space industry.

## **Conclusion**

The public's perception of space determines and is determined by the progression and profitability of Australia's space industry; as influenced by education and the media. Recommendations have been given to drive responsible change, as demonstrated by social and cultural responsibilities, and to adhere to the goals of the Australian Civil Space Strategy. These recommendations take a holistic approach to marketing space, using both online and in-person events to maximise outreach, as well as asking policymakers to consider updates to institutions for the space industry. Comprehensive case studies were carried out on Katherine Benell Pegg, and the space programs of India and Brazil. These showed real world applications of our recommendations, how they could be applied to Australian projects, and the importance of prioritisation of space and clear goals. The stars have called out to humanity since the beginning, with First Australians recognising this call for thousands of years. It is time for Australians to call back.



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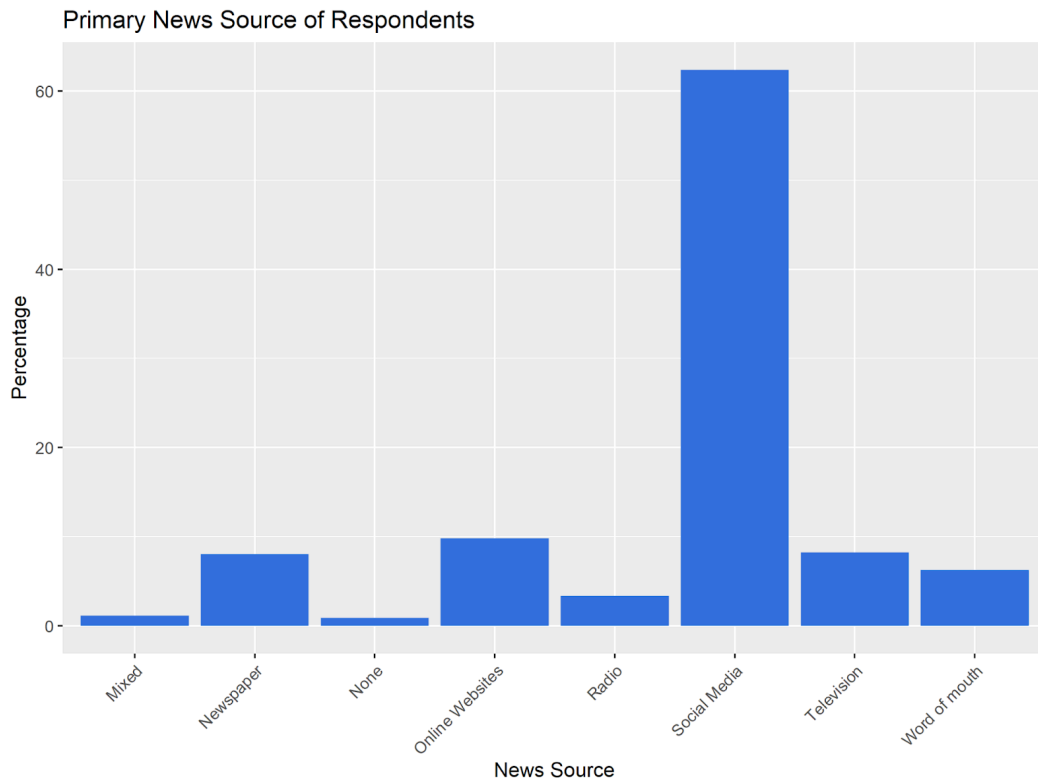
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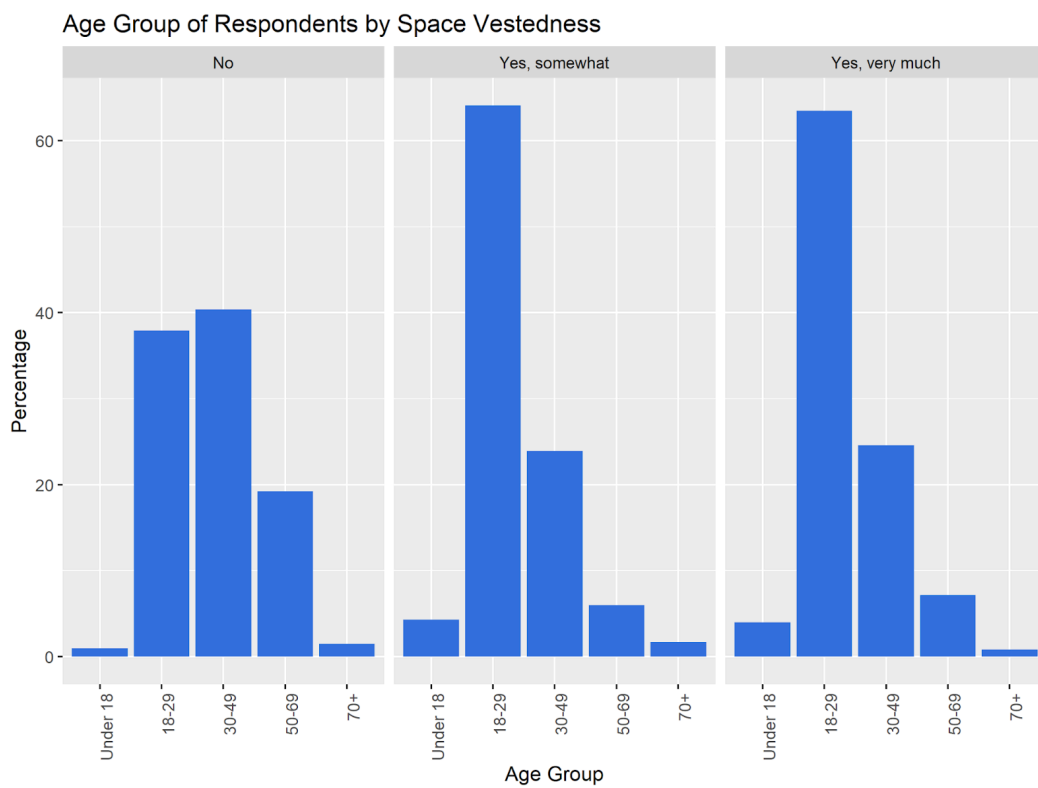


## Appendix

Survey Respondent demographics:



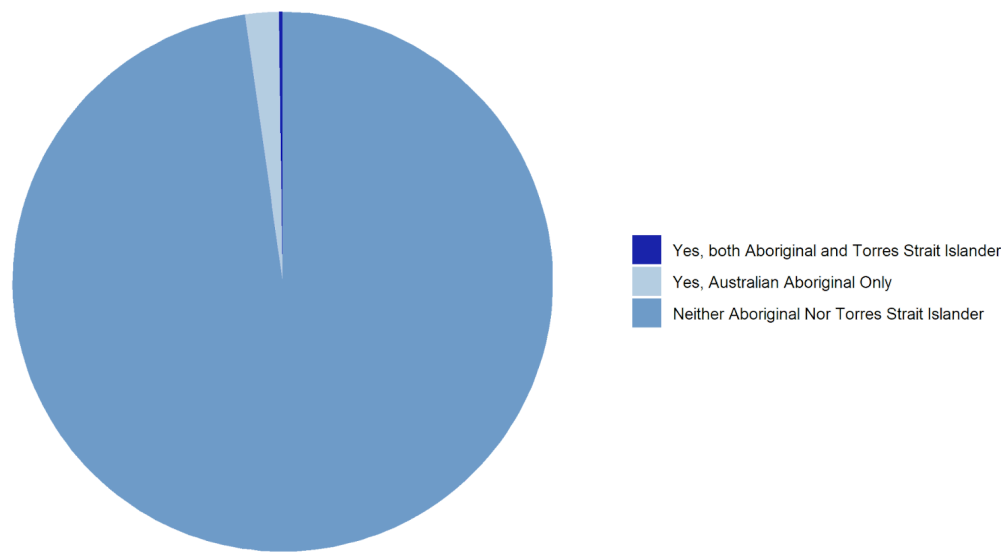
Appendix I: Primary News sources of survey participants.



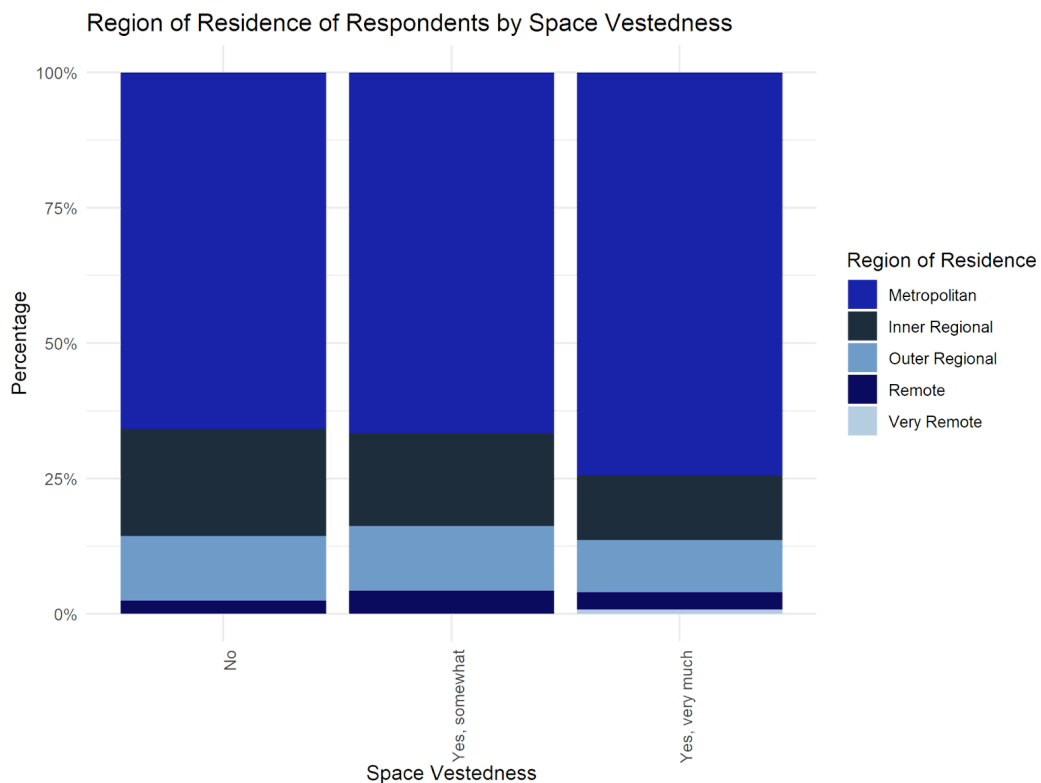
Appendix 2: Age group of survey respondents based on their vested interest in space.



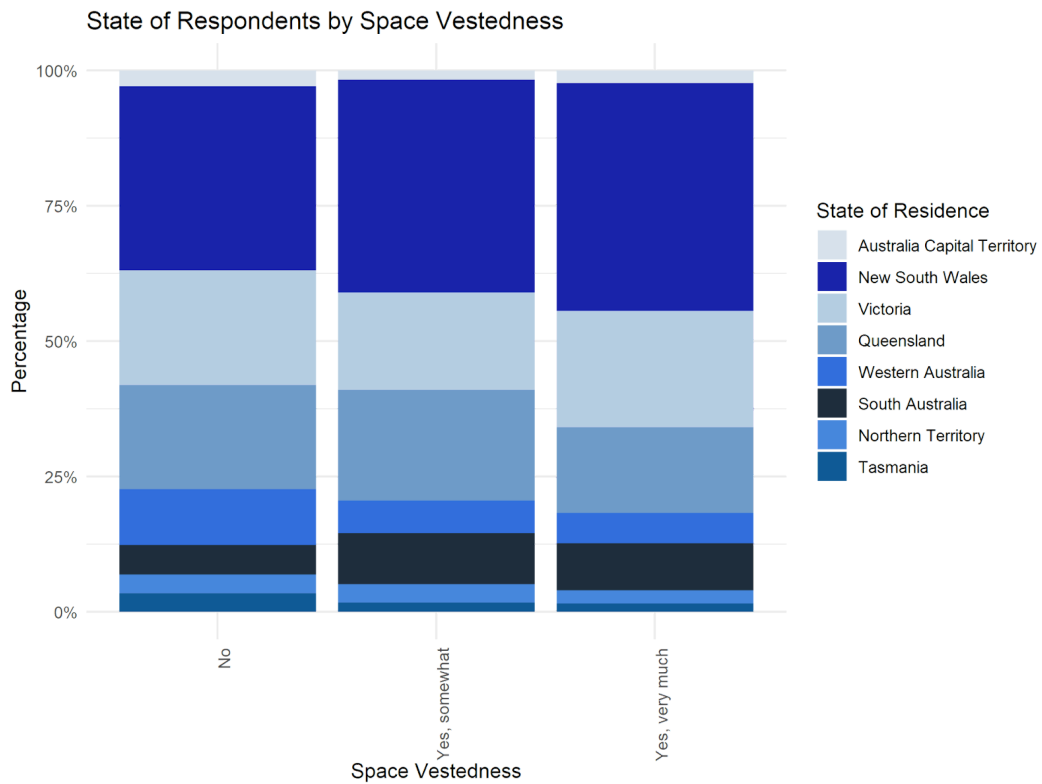
Percentage of Aboriginal or Torres Strait Islander Respondents



Appendix 3: Self-identification of Aboriginal or Torres Strait Islander status of survey participants.

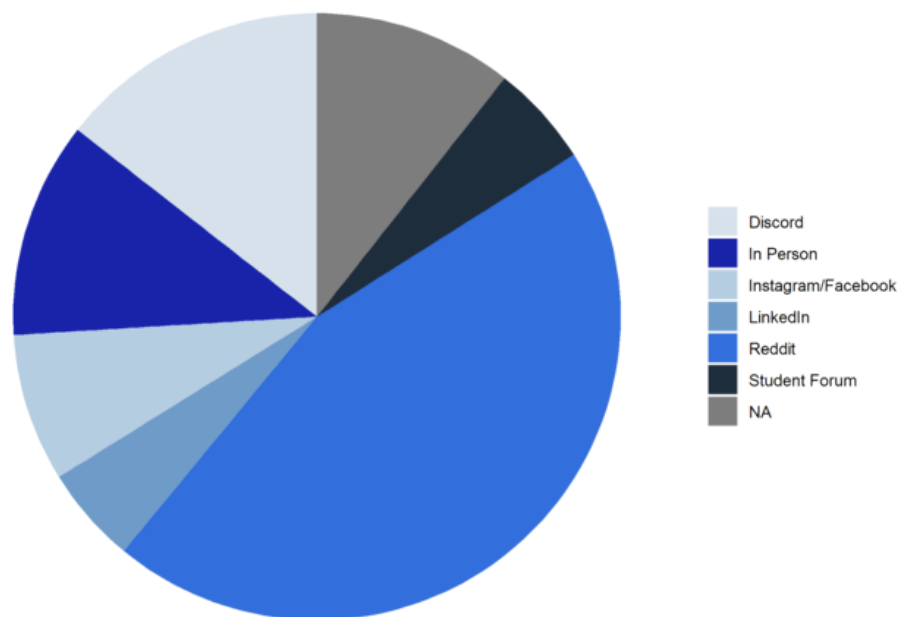


Appendix 4: Residential region of survey respondents based on vested space interest.

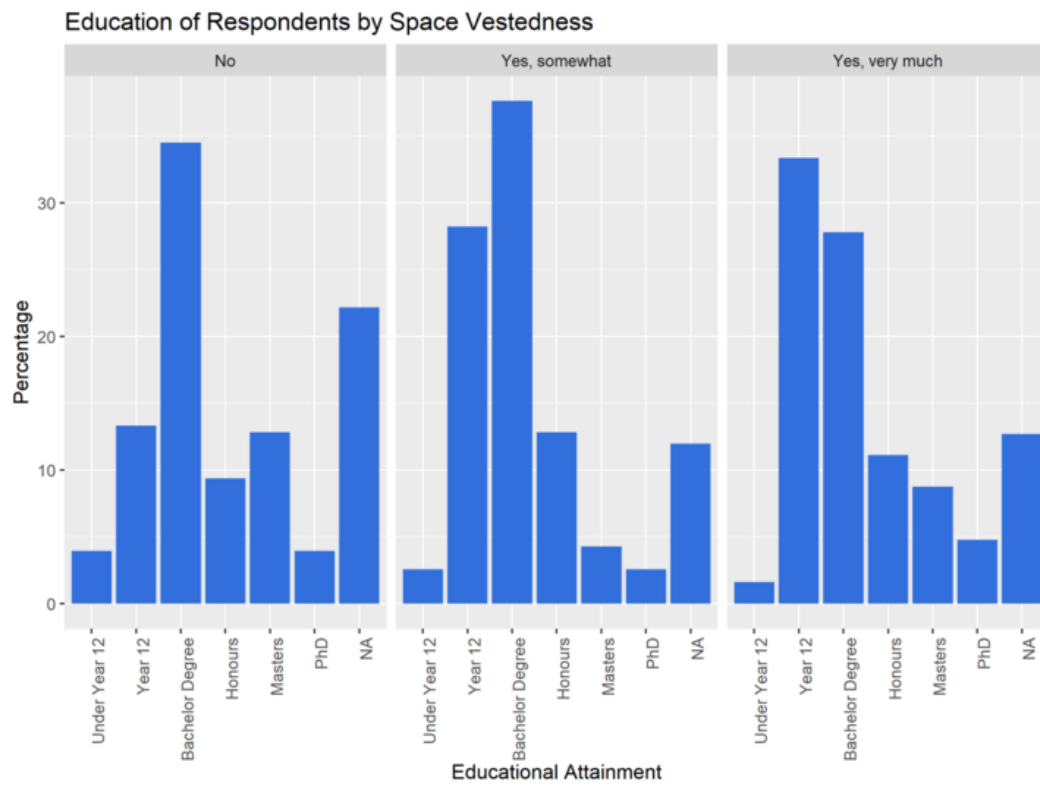


Appendix 5: Residing State or Territory of survey respondent based on vested space interest.

Source of Survey



Appendix 6: Location the survey participant received the survey.



Appendix 7: Highest achieved educational background of survey participants.



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