The Hon Barnaby Joyce MP
Chairperson
Standing Committee on Industry, Innovation, Science, and Resources
Parliament of Australia

Dear Mr Joyce,

The Space Industry Association of Australia (SIAA) is the national peak body for Australia's space industry. For nearly 30 years SIAA has empowered our members to build a professional, sovereign, and sustainable space economy for Australia. SIAA led the bid for and successfully delivered the 2017 International Astronautical Congress in Adelaide which brought 4,000 global space experts to Australia and catalysed the establishment of the Australian Space Agency in 2018. Today we represent 662 members including space start-ups, SMEs, academic and research organisations, prime contractors, and listed space companies. We are focussed on facilitating greater opportunities for our members to grow the Australian space industry, providing a representative voice for member interests in Australia and internationally, and building the next generation workforce for Australian space.

The establishment of the Australian Space Agency and the commitment of federal, state, and territory governments to grow our industry has lifted business confidence, spurred our members to invest more in developing Australia's space capabilities, and attracted significant international interest in Australian space companies. The Australian space industry is growing. Where before Australian space professionals had no choice but to seek opportunities in overseas markets now there is a vibrant space economy in Australia and a growing number of high technology jobs to attract them home. The new head of the Australian Space Agency typifies this trend.

Our submission reviews the effectiveness of progressing Australia's space aspirations since 2018, highlights the achievements of the space industry to date, outlines strategic risks that could limit achievement of the government's 2030 space industry goals, and makes 15 recommendations to the committee which will facilitate the continued growth of the Australian space industry. We look forward to further assisting your work.

Yours sincerely,

[redacted]

James Brown
Chief Executive Officer

Building Australia's 2030 Space Industry Capability: full-spectrum, strategic, and sovereign

Space Industry Association of Australia's submission to the Standing Committee on Industry, Innovation, Science and Resources Inquiry into Developing Australia's Space Industry (February 2021)

Our **key recommendations** are that the committee should:

1. Note that the Australian government's space budget is ranked 18th amongst the G20 nations and recommend that government enhance investment in national civilian space programs to a level at least comparable to Indonesia and South Africa.
2. Acknowledge the success of the Australian Space Agency and industry in catalysing the Australian space sector and promoting Australia's space expertise globally.
3. Commend federal government initiatives to foster space industry development through initiatives which include CSIRO, the Square Kilometre Array, the Satellite Based Augmentation System, the International Space Investment Initiative, the Moon to Mars Initiative, Modern Manufacturing Strategy, defence space acquisitions, and the Space Infrastructure Fund.
4. Recommend that government permanently establish the Australian Space Agency as an independent statutory body with the appropriate technical capabilities, staff, and budget to procure and manage long-term national civilian space missions.
5. Acknowledge that the space industry is critical to Australia's strategic future and ensure government closely coordinates its development through the creation of a National Space Strategy, a parliamentary Joint Standing Committee on Space, a National Space Adviser position in the Department of Prime Minister and Cabinet, and a dedicated space researcher in the Parliamentary library.
6. Recommend that the Department of Defence publish an unclassified Defence Space Strategy to guide industry development and ensure that Australia's civil and defence space programs are efficient, coordinated, and where possible mutually reinforcing.
7. Recommend that the Department of Defence designate access to space and the design, manufacture, test, launch, and operation of satellites as Sovereign Industrial Capability priorities.
8. Recommend that the Department of Defence include Australian Industry Content requirements in space-related projects.

9. Recommend that the Australian Bureau of Statistics develop a Standard Industrial Classification and Occupational Classification Standards relevant to the space industry in order to track growth.

10. Recommend that the Australian Space Agency review space activities regulation and regulatory guidance (including CASA liaison and sub-orbital launch regulation) to ensure that there are no impediments to Australia developing launch activities and spaceflight heritage, whilst ensuring a safe and sustainable launch sector in Australia.

11. Recommend that the Australian Space Agency absorb the costs of conducting risk hazard analysis for launch applications for at least two years in order to catalyse Australian access to space.

12. Recommend that the Department of Education designate space as a national research and education priority and prioritise funding to space science and related key learning areas, including business, policy and law.

13. Recommend that the Department of Foreign Affairs and Trade maintain Australia's strong space diplomacy and successful trade development, and consider how space-related overseas development assistance might further Australia's interests in the Pacific and South East Asia. DFAT should consider approaching Indonesia to jointly host the 2022 G20 Space Economy Leaders meeting.

14. Recommend that DFAT and the Australian Space Agency accelerate international policy and treaties which will smooth the way for Australian space exports, particularly a Technical Safeguards Agreement with the United States of America and develop arrangements under the Missile Technology Control Regime and International Traffic in Arms Regulations to remove impediments to Australian space industry.

15. Note and support SIAA's development (in conjunction with the ASA and industry partners) of a comprehensive space industry capabilities database to track industry growth, facilitate better supply chain awareness and integration for prime contractors, and promote Australian space industry capabilities internationally.

The committee should also note the following six **strategic risks** which could block or undermine progress towards the government's 2030 targets for Australia's space industry:

1. **Workforce development**: Australia has set the goal of increasing the space industry by 20,000 jobs (from around 10,000 jobs in 2018) by 2030, requiring an annual growth rate of 9.6%. Beyond the economic growth required to create these space jobs, this target will not be achieved without careful workforce planning and development across the tertiary and vocational sectors. Australia will need to ensure it has greater skills in complex space project management. Similarly, national space internships and credentialing of space professionals will need to be developed. These initiatives will need to be closely monitored to ensure they are inclusive of groups traditionally underrepresented in engineering and technology disciplines.

2. **Industry Resilience and Sovereign Content**: Australia will need to ensure its space supply chains are resilient and that the consequences of critical dependencies on foreign space technology, services, and goods are identified and appropriately managed. Already, for example, the onset of COVID-19 and reliance on foreign launch providers have combined to see an Australian satellite deprioritised for launch with consequent impacts on the development of Australia's defence space capabilities. Building sovereign capabilities in space will help to mitigate this strategic risk.

3. **Increasingly congested and contested orbits:** satellite deployment, particularly in low earth orbits, has proliferated significantly because space is increasingly accessible. 10% of the current 2,500 satellites in low earth orbit were launched in the past 12 months and there are plans to deploy more than 10,000 additional satellites in coming years. Space domain awareness, space weather prediction, space traffic management, and international spectrum management and licensing are becoming more complex and critical for Australia's space industry. Additionally, counter-space technologies (direct ascent, co-orbital anti-satellite systems, and ground-based systems) as well as the persistent threat of cyber interference pose a growing risk to Australia's space industry growth targets.

4. **Lack of launch capability:** government ambivalence on the requirement and appropriate technologies for an Australian domestic space-launch capability has potential impacts on wider industry development and second-order commercial opportunities. Australia should either commit to developing a domestic launch capability, as the United Kingdom has, or accept the strategic and commercial risks of being dependant on foreign launch partners.

5. **Regulatory overburden**: a nascent industry requires minimal essential regulation, a forward-leaning regulator, and special measures to catch up to competitor nations. The Modern Manufacturing Strategy identifies red tape as a risk to the growth of Australia's priority manufacturing sectors, including space. The financial and labour costs of regulation on Australia's space companies needs to be closely monitored, particularly for SMEs. Critical infrastructure protection requirements, for example, have the potential to be prohibitive for Australian space SMEs.

6. **Disjointed space priorities, policy, and funding**: Space activities are occurring across nearly all government departments and agencies and there are multiple, sometimes overlapping federal and state policy and funding initiatives concerned with Australia's space activities. There is a critical need to ensure that defence space investment priorities are balanced with the development and capabilities of Australian space industry, to ensure the best chance that significant defence space funding can support Australian space companies reaching a sustainable scale.

Australia's space industry: progress since 2018

Australia's space industry has grown considerably since the development of the Australian Space Agency in 2018. SIAA's own membership evidences this with more than 220 member companies operating in Australia's space economy as well as more than 400 individual members. In 2017 we argued that Australia's space agency should be technically competent and have international credibility. In a little over two years, the Australian Space Agency has done remarkable work in raising the profile of Australian space both at home and internationally. Defence investment in space capabilities has increased, the Australian government has signed the Artemis Accords and committed Australian industry to participating in the Moon to Mars Initiative, and space industry has been identified both as a national critical infrastructure priority and a sovereign manufacturing priority. State, territory, federal, and local governments alike are thinking about how to further develop space industry as well as how to leverage the efficiencies and economies of space derived services and technology in their everyday operations.

Industry too has lifted its activity and aspirations. Several launch and launch vehicle companies are emerging and building their capacity to provide Australia with assured access to space. Industry has launched two conglomerated initiatives (Lunar Ascent and Seven Sisters) aspiring to launch Australian space vehicles towards the moon. Australian space professional services companies are leading global conversations on the trends and trajectories of the global space economy. SME and prime space companies in Australia are leading industry collaborations on major satellite constellations for Australia and international customers. In short, the industry has evolved significantly thanks to declared government targets and a supportive framework to underpin investment and future growth.

Australia's international competitiveness and government space investment

There have been significant advances in private space industry in the past two decades but the continuing reality is that the space market is a special one in which government investment still plays a decisive role, especially in the initial growth phase.

Despite the considerable efforts of government and industry to kick start Australia's new space industry, Australia remains a late and lagging participant in the global space economy from the government investment perspective. An OECD analysis compiled for the October 2020 G20 Space Leaders Meeting[1] shows that Australia ranks 18th amongst the G20 countries for government investment in space as a percentage of GDP. The only G20 country that has lower space investment than Australia is Mexico. At 0.003% of GDP, Australia's government space investment is considerably less than Indonesia (0.005%) and five times smaller than five-eyes ally Canada (0.016%). The same paper contrasts Australia's leadership in space-related research and development, noting that Australia ranks 8th amongst G20 nations for its share of top ranked space academic publications by citation. This indicator of relative government space investment also contrasts with the importance of space and space-based assets to

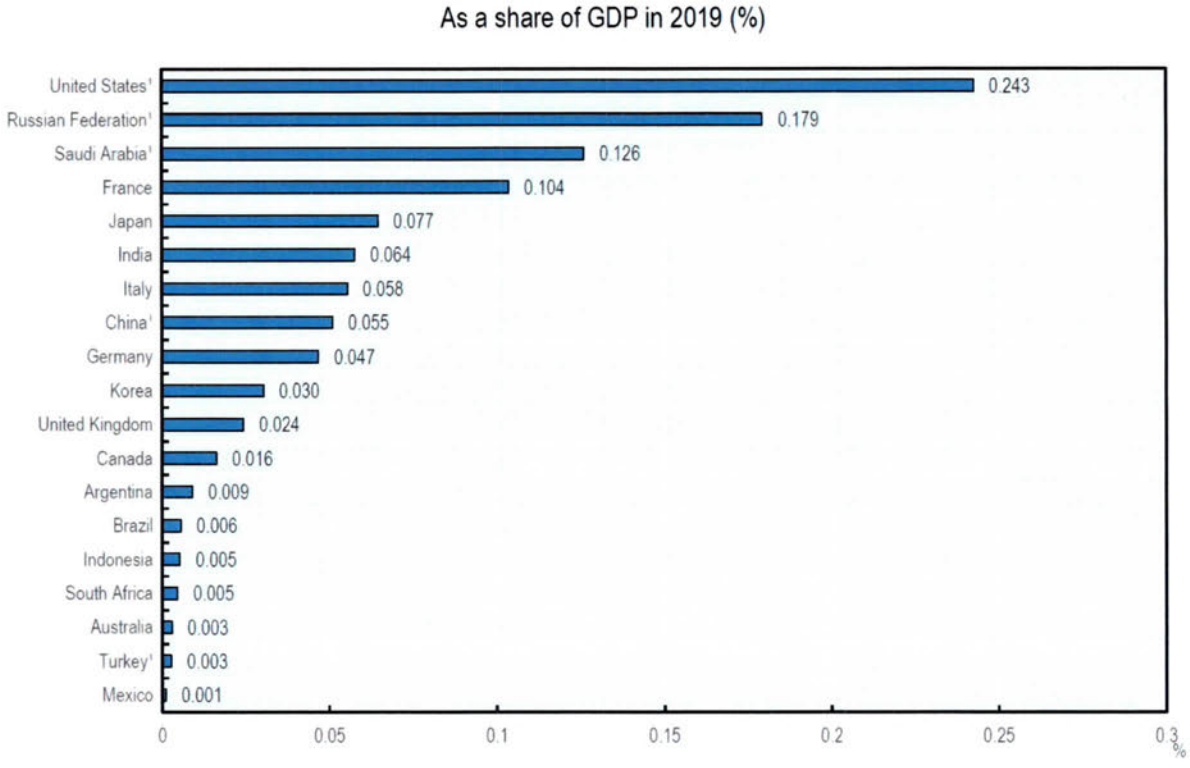
[1] OECD, 7 October 2020, *Measuring the economic impact of the space sector: Key Indicators and options to improve data*, https://www.oecd.org/innovation/inno/measuring-economic-impact-space-sector.pdf,

Australia's geography, economy, and strategic future. Australia's declared space ambitions are incongruous with the fact that it's government investment in space capabilities falls well below Indonesia on a relative GDP basis.

Australia's government has invested cautiously and prudently in the early stages of reinvigorating the Australian space economy. Both the Australian Space Agency grants program and Modern Manufacturing Initiative schemes, for example, are non-recurrent programs which require industry to provide matching funds. This is sub-optimal for industry development.

For Australia's space industry to become globally competitive, government will need to play a more active and recurrent role as a client and funder of space industry alongside its role regulating and coordinating space development. It has been clearly established that government space investment pays significant economic dividends. Economic meta-analysis provided to the UK government shows that for every dollar invested in space industry development, the direct public returns and indirect economic benefits are a significant multiple. Earth observation investment returns $2-4 (direct) and $4-12 (indirect), space telecoms $6-7 (direct) and $7-16 (indirect), and space navigation $4-5 (direct) and $4-10 (indirect)[2] [3].

Figure 1. Government space budget estimates for G20 countries



[2] Figures adapted from analysis in London Economics, 2015, *Return from Public Space Investments: an initial analysis of evidence on the returns from public space investments*, ppviii-vix, https://londoneconomics.co.uk/wp-content/uploads/2015/11/LE-UKSA-Return-from-Public-Space-Investments-FINAL-PUBLIC.pdf

[3] Graph from OECD, 7 October 2020, *Measuring the economic impact of the space sector: Key Indicators and options to improve data*, https://www.oecd.org/innovation/inno/measuring-economic-impact-space-sector.pdf,

Only national governments have the scale, mandate, and heft necessary to catalyse the development of a national space industry[4]. This is for several reasons: governments are bound by international treaty to regulate and bear liability for all space objects launched from their territory; the complex scale and lengthy timeframes for space programs; the traditional role of governments as a major client for space services; and the fact that much of space industry has dual-use national security capabilities which are properly the realm of government. The Australian government's current bias towards small scale, non-recurrent civilian space grants requiring matching funding is not consistent with this reality and creates a competitive barrier for Australian space industry when compared with international peers.

Australian governments need to take a bolder and more predictable role as clients of Australia's space industry. A commitment to procure national civilian space missions in the next ten years, and to include sovereign content requirements in major defence projects, would provide the certainty that investors and companies need to back their technology and commit to growth.

The Australian Space Agency

The Australian Space Agency's introduction has been a success and their continued work is unanimously supported by SIAA's members. SIAA believes that the importance and growth prospects of the Australian space industry will, in time, require the Space Agency to be a statutory agency with additional powers and funding. The Space Agency's staff engage cooperatively and closely with SIAA and our members and have professionally navigated the challenges of building a new agency amidst a rapidly evolving industry. The appointment of a new Space Agency head with deep experience in industry is a welcome development and provides a suitable point at which to refocus the Agency's efforts.

First and foremost, the Agency must perform its regulatory function in a manner which is more permissive to industry growth in a safe and sustainable manner. Our members have raised concerns with the administration of the Space (Launches and Returns) Act 2018 and specifically the development of regulatory guidance and processes. The legislation is difficult, and more akin to regulating the space industry of the 1970s than the industry of today. That said, there is significant scope to smooth the regulatory processes which will enable more Australian companies to conduct launch activities and build spaceflight heritage for Australia. The Space Agency has recognised the need to better educate both Agency staff and industry licence applicants on regulatory processes so that respective priorities and expectations can be managed. SIAA's view is that the Agency should prioritise the development of regulatory guidelines, delay of cost recovery measures, and engagement with industry on regulatory processes. Further, the Agency should endeavour to streamline its regulatory processes (including with respect to costs, especially for small launch vehicles) to make Australia an attractive destination from which to conduct launch activities. As a late entrant to the global launch market, Australia needs a forward leaning, industry-friendly regulator willing to work actively and closely with space companies to evolve Australia's space capability. A hands-off,

[4] For an analysis of the unique need for government investment in space industry development see London Economics, 2015, *The Case for Space*, https://londoneconomics.co.uk/blog/publication/the-case-for-space-2015/

risk adverse approach will not work. For this reason, SIAA supports a review of the regulatory process for launch by the Australian Space Agency.

As the agency's capabilities, staff, and budget grow SIAA would see merit in the Australian Space Agency being able to procure and manage national civilian space missions that align with a national space strategy. Currently, the Space Agency administers small grant programs which are largely focused on academia and early-stage industry development. It would be preferable for the Space Agency to set a predictable timeframe for procurement of Australian space capabilities to solve national problems (for example, in bushfire monitoring and response or national scale water monitoring) over the next decade. This would give private investors the confidence to provide additional funding to Australian space companies. Administering this evolved Australian Space Agency would require a larger cadre of space experts alongside secondees from across government. We have every confidence that the Space Agency can evolve with industry to ensure it balances its necessary bureaucratic functions with Australia's space aspirations.

Whole of government coordination on space

Much of Australia's critical national infrastructure relies on space-based assets. Space policy and procurement considerations extend across a majority of Commonwealth Government departments and agencies. SIAA sees a need to elevate the importance of space in government decision-making processes. Additionally, we see significant risk that there is a lack of coordination of space investment across government. A clear example of this is in the coordination of defence and civilian space policy and procurement. Defence's significant space projects will do more than any other initiative to assist the Australian space industry in reaching a sustainable scale and capability level. Whilst the Space Agency liaises extensively with defence, there is currently no formal mechanism to resolve differing space priorities between Australia's defence space program and civilian space activities. For example, a strategic appreciation might well see value in shifting the timelines for defence's Project 799 in order to maximise the potential to catalyse a sustainable strategic sovereign space industry. A significant risk to Australia's 2030 space goals is that the cadence of defence acquisition decisions may not be optimally aligned to the evolution of Australian space industry Of course, some operational requirements mean that there is little flexibility to coordinate national security space programs with domestic industry capabilities and timelines. However, already opportunities have been missed to utilise national security space investment to bolster sovereign space industry capability. The Office of National Intelligence's procurement of NICSAT, for example, represents one such missed opportunity.

There needs to be oversight of space industry development at the highest levels of government, particularly to ensure that defence and civilian space industry investment and development are coordinated and mutually reinforcing. SIAA recommends that the government develop a National Space Strategy to better coordinate whole of government efforts and priorities for space. Similarly, the government should appoint a National Space Adviser within the Department of Prime Minister and Cabinet, with responsibility for strategic space issues and international liaison on national security space matters.

There are also glaring anomalies in the government's coordination on space issues. The space sector has been wisely selected as one of six priority industries for Australia in the Modern

Manufacturing Initiative, yet space research is not one of Australia's priority areas for education and Australian Research Council funding.

Given the importance of space to all areas of government and the scale of the government's ambitions and investments in the Australian space industry, parliament should establish a Joint Standing Committee on Space. The UK Parliament's recently formed committee on space has significantly improved capabilities to monitor and develop UK space policy. Finally, as space will increasingly be of importance to parliamentary business, the parliamentary library should dedicate resources to establishing a space researcher position to assist the work of MPs and Senators.

National security space

Australia does not presently have a dedicated public Defence Space Policy or strategy. While the Force Structure Plan (2020) and the Defence Strategic Update (2020) (and before them the Defence White Paper (2016)) do acknowledge the role of space as a warfighting domain, there is not a comprehensive articulation of the government's national security interests and objectives in space, much less a detailed account of how these are to be achieved. We recommend the development and publication of unclassified space policy and doctrinal documents that provide a more comprehensive insight into the operational drivers of major space acquisitions. These publications would also assist in coordinating with Australia's allies in space, who are themselves evolving rapidly.

Australia does not presently have a consolidated bureaucratic instrument or authority, nor a unified chain of command, as it relates to the use of space for Defence purposes. Within Defence, responsibility for space is distributed relatively widely across the organisation. For example, in the Defence Capability Manual, the Chief of Air Force has responsibility for space control, while the Chief of Joint Capabilities is responsible for space services. We recommend consideration be given to the establishment of a dedicated organisational structure within Defence, with overall responsibility for space capability – facilitating better alignment within Defence on space and more seamless space industry engagement.

Finally, given the importance of space-based assets and space domain awareness to the Department of Defence and Australian Intelligence Community, SIAA recommends that the Department of Defence designate access to space and the design, testing, launch, and operations of satellites as Sovereign Industrial Capability priorities.

Australian industry content and sovereign supply resilience

Australian space industry has the potential to encompass the full spectrum of space-related activities and industries, upstream and downstream, and in the near term could be capable of supporting an end-to-end civilian space mission using sovereign goods, services, and personnel. It is strategically important for Australian industry to have the sovereign ability to, for example, design, build, test, launch and operate small satellite constellations for defence and civilian purposes. Australian space industry also has the ability to be connected to global space supply chains and Australian space professionals and expertise are being actively sought

by international space companies. There is currently intense international interest in the Australian space market.

If Australia is to develop a critical mass of space industry which can maintain sovereign strategic capabilities to monitor and utilise space, closer consideration must be given to formal government requirements for Australian industry content in major space programs. In the near term, this means formalising government requirements for the domestic industry teaming and technology transfer that is already underway in support of defence's major space projects. In the medium to long term Australian industry content will also need to be considered by other government departments as they develop greater space infrastructure and capabilities.

International policy

Australia has an excellent track record as a responsible citizen in the global space industry. DFAT and Austrade particularly are doing excellent work in space diplomacy and trade promotion respectively. However, there is a pressing need for more active diplomatic effort to support Australia's space industry. Australia has been carefully preparing the way for a Technical Safeguards Agreement with the United States for the past 18 months. This treaty would allow for the transfer of sensitive equipment between the United States and Australia, and make it easier for satellites and instrumentation to be launched in Australia. These efforts need attention at the senior leader level: the lack of a TSA severely impedes the ability of Australian companies to develop partnerships with the world's largest space export market. The Missile Technology Control Regime and International Traffic in Arms Regulations can place limitations on the ability of Australian and allied personnel to work on space projects and can be a barrier to space technology development. DFAT should continue to advocate for arrangements under these regimes that remove impediments to Australian space industry and Australian space exports.

Space is also of cross-cutting relevance to many international forums and multilateral issues. As an example, space-based services are relevant to progress towards all of the UN's Sustainable Development Goals. DFAT should consider how space-related overseas development assistance might further Australia's interests in the Pacific and Southeast Asia, noting for example the efforts of India and Japan in assisting in Vietnam's space development. Australia could be more active in establishing regional discussions on space and bringing space-based resources to bear on issues affecting the global commons (for example maritime fisheries management and maritime search and rescue). It may be appropriate to consider establishing an Australian Ambassador for Space position and developing a thicker web of second track space diplomacy. DFAT should also consider approaching Indonesia to jointly host the 2022 G20 Space Economy Leaders meeting.

Ensuring nominal trajectory for the Australian space industry

Measuring progress in the Australian space industry against the government's declared 2030 goals will be an important effort to guide the prioritisation of funding and government and industry activities. There is currently no single source of truth on the companies or individuals that are part of Australia's space industry. The Australian Bureau of Statistics does not collect data for the space industry in the way it does for other more established industries. SIAA

recommends that the ABS develop a Standard Industrial Classification and Occupational Classification Standards relevant to the space industry in order to track growth. SIAA is also engaged in discussions with the Space Agency and other authorities on the development of an enhanced space industry capability database to assist industry, government, and international partners alike. The Space Agency's annual state of space report and its forthcoming economic baseline research provide valuable insights in this regard.

Conclusion

We are at an inflection point for Australia's space industry. The pathfinding efforts of the past two years have shown that the potential for industry growth is real. The Covid-19 pandemic has re-emphasised that Australia's dependence on non-sovereign space assets and services is a strategic vulnerability. There is extraordinary consensus behind Australia's long-term project to lift our space industry capabilities and activities. The full economic impacts of this project will take some time to be apparent but already Australian companies are showing greater confidence and capabilities in a complex but vital technology industry. Our membership acknowledges the government's leadership in catalysing growth in our industry, warmly welcomes the multi-partisan commitment to growing Australia's space economy, and looks forward to working collaboratively through the next stage of the Australian space industry's evolution towards 2030.