

14th Australian Space Forum

Tuesday 25 October 2022

Adelaide, South Australia



The
Andy
Thomas
Space
Foundation



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Progressus Est Humanitatis*

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The Foundation is committed to promoting and supporting the highest quality space activities in Australia, driving progress in education, research and innovation to ensure that the space sector is a key contributor to Australia's economic transformation.



For more information on the Andy Thomas Space Foundation, scan the QR code below:



For more information please contact us by email contactus@andythomas.foundation

Contents

14th Australian Space Forum

Tuesday, 25th October 2022
Adelaide, South Australia

Adelaide Convention Centre,
North Terrace, Adelaide,
South Australia

Forum Sessions: Halls C & D

Exhibition: Hall H

1	Welcome <ul style="list-style-type: none">• Chair of The Andy Thomas Space Foundation• Head of Australian Space Agency
4	Message from the CEO
8	Forum Schedule
10	Forum Sponsors
12	Venue Map
14	Exhibition Floorplan
17	Opinion: Industry Experts
37	Opinion: Education
57	Speaker Profiles
75	Company Profiles
136	Foundation Supporters, Sponsors & Partners

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-  The Andy Thomas Space Foundation
-  @theandythomasspacefoundation
-  @andythomas_space_foundation

Welcome from the Chair of The Andy Thomas Space Foundation

The Andy Thomas Space Foundation is delighted to welcome you to the 14th Australian Space Forum.



The Australian Space Forum plays an increasingly important role in the nation's eco-system. For over six years this national meeting has brought together a diverse range of space industry participants and enthusiasts. We welcome all of you to the 14th Forum - whether you are a regular attendee and supporter or a new sponsor, exhibitor, presenter or audience member.

The Forum is an important element of the space education and outreach mission of the Andy Thomas Space Foundation. Part of our goal as a not-for-profit organisation is to offer affordable participation fees and also to expand the reach of our national space activities to young people and also individuals who face additional social or physical challenges. We are proud of our record in this regard, and we continue to acknowledge and express our gratitude for the generous sponsorship of industry organisations and the generous donations of individuals. The decision in 2021 of the Australian Parliament to confer Deductible Gift Recipient status on the Foundation has also been of great assistance.

Because of this support and thanks also to surpluses from the Australian Space Forum, in the last two years we have raised over \$550,00 for scholarships, awards and prizes to support the on-going development in Australia of students at all levels of their education and professional development. In particular this funding will:

- advance the skills of primary school teachers in STEM learning and design thinking
- support space-related science research projects at high school level
- provide internship opportunities to tertiary students with some of Australia's leading space technology companies
- financially support undergraduate study in space-related fields and
- provide financial incentives to some of Australia's leading PhD researchers for their work on advanced space science topics

We are also a key supporter of the important national outreach work of the Australian Space Agency including the educational operations of the Australian Space Discovery Centre.

Thank you for registering for the 14th Australian Space Forum. Whatever your area of space interest is, we are confident that you will enjoy and benefit from the experience.

Michael Davis AO
Chair, The Andy Thomas Space Foundation

Our boldest adventure yet.

G'DAY
MOON

Welcome from the Head of the Australian Space Agency



As our world transitions into something resembling the “before times” of COVID, it’s been motivating to personally reconnect with colleagues and our partners across the world to celebrate our space achievements and explore new opportunities for collaboration. So far this year, we have met with our counterparts in the United States, India, Japan and Europe to name but a few. The opportunity to connect in person with the international space community has further advanced Australia’s place within the global space sector and has reinforced what our unique space capabilities can offer the world. And now, it’s fantastic to be back to celebrate our industry here at home for the 14th Australian Space Forum. Since we last met, we have seen some important milestones that have further signalled to the global space community – and to everyday Australians – that Australia is back as a space-faring nation. Watching three NASA sounding rockets soar into the sky across the storied red dirt of Arnhem Land signalled a new era for the Australian space sector. It was our nation’s first commercial space launch, and NASA’s first from a commercial facility outside of the United States. It represented Australia’s re-entry into the launch market after decades of being Earth-bound. More than that, it represented years of hard work – particularly from the launch provider Equatorial Launch Australia (ELA), the Australian Government and the sector more broadly. This is an important statement that Australia is more than just an attractive geographic location for launch – we have the home-grown expertise to handle sophisticated missions in partnership with the largest space agencies in the world. But it’s not just the headline-grabbing side of space that we’re tackling at the Australian Space Agency – we are also addressing some of the biggest systemic problems facing our industry. That includes workforce development. We’ve been collaborating with SmartSat CRC to analyse the Australian space workforce and its future requirements – finding both current skill shortages and future skills that are needed to support our industry. In August, the

Agency held a National Forum on Space Workforce, which brought together around 120 key stakeholders from industry, the education sector, governments, research organisations, student groups and others. Our forum was timed to feed into the Australian Government’s Jobs and Skills Summit, which provided tangible outcomes that will have positive impacts on Australia’s space industry – including an emphasis on growing tech and digital skills, and supporting more skilled migration to address critical skills shortages. What that emphasises is that these challenges are universal – across borders and across sectors. We can only achieve success for the space industry if we consider what we need in a broader context – and we can then also contribute to the Government’s bold ambition of creating 1.2 million tech-related jobs in Australia by 2030. Space has the opportunity to lead the way here, already setting the example of bringing back some of the best and brightest expats to help drive the growth of our industry at home. An exciting and rewarding career in space in Australia is more than possible, it’s desirable – an opportunity to help shape the future of a budding sector. The Agency is developing a National Plan for Space, a very large piece of work to shape the Australian space sector for the next two decades and beyond, and build on phase 3 of our Civil Space Strategy. The plan will provide a long look at required space capabilities, across government, so that industry and investors can plan better for the future. It will also sketch out an ambition for what space will look like in Australia in the 2040’s, by which time, the enabling technologies we are starting to see tested today will be common place, and space will be an even more fundamental part of our everyday lives than it is now in enhancing the economic complexity of our nation. Couple all of this with the extensive other work we’re doing, across the spectrum of space – from Earth Observation to Space Situational Awareness and Debris Mitigation – and it’s an exciting sign of how far we’ve come and opportunities to go further. We have a lot of hard work ahead of us in the coming years to continue accelerating the growth of our sector and expanding our contribution globally, but the hard work is matched by reward on the horizon. We have achieved a significant amount of success in a short time that we should all be proud of but there is clearly more to do. By collaborating and unifying our sector across government, industry and academia, as well as with our international partners, we can take those successes to a new level.

Enrico Palermo
Head, Australian Space Agency





Message from the CEO of The Andy Thomas Space Foundation

Over the last seven years the Australian Space Forum has grown to become the largest Space Industry event in the Southern Hemisphere.

For seven years, the Australian Space Forum (ASF) has been a leader in the field of space exhibitions and conferences in Australia and today, with more than 1000 attendees and 100 exhibitors, represents the largest and most engaging space industry event in the Southern Hemisphere.

According to the US Space Foundation, the space economy is expected to grow at a Compound annual growth rate of 6.84% during the forecasted period of 2022-2026 achieving US\$540.75 billion by 2026. The recorded growth rate could be considered higher in Australia, compared to international counterparts, as for many years this sector was not considered a priority among the various sectors of the Australian knowledge economy. Announcements, tenders and the establishment of new organisations happens frequently and quickly in this country. The importance of a national industry event every six months to maintain a sustainable growth of the Australian space ecosystem is clear.

The ASF is considered Australia's premier space conference & exhibition, connecting private and public sectors, enabling new opportunities and advancing space industry technologies and projects. This Forum celebrates the 14th edition of this biannual event, first started in April 2016 where the foundations of what has grown into the innovative and thriving current Australian space ecosystem were laid.

In the last seven years the ASF has united space leaders from around the world to discuss, address and plan for the future of the industry. Attendees at the first ASF totalled barely 80 space enthusiasts. Since then, the Andy Thomas Space Foundation team has welcomed more than 1,000 experts plus students per Forum from across the globe, including distinguished speakers, delegates, exhibitors,

volunteers, educators and students. It is estimated that the economic value for the local community is around \$10 million per year including supporting space events organised during the week of the Forum.

The ASF is proudly supported by the Australian Space Agency and the South Australian Government and consists of three interconnected segments, including: the symposium, exhibition area and outreach/education. As we believe that space should be accessible to all, we also recommend the Forum to any individuals with a keen interest in the evolving space sector, including students who have an opportunity to attend at the cost of a cinema ticket. The cost of registration fees and for renting a booth are very accessible for everybody including start-ups and SMEs as well as primes and universities, allowing for biannual attendance and increased collaboration opportunities. The surplus from the Forum is directed to fund the 'ATSF Education Fund'.

The 14th Australian Space Forum also continues the editorial section within this booklet **'What will the space sector look like in five years'**, curating several contributions from prominent experts about the growth of the Australian space ecosystem. This time we invited prominent leaders from global primes involved in the Australian space economy to discuss their strategies and how they contribute to the growth of the Australian space ecosystem. Moreover, for the first time we have also included an additional section of articles relating to space education in Australia. We have invited education leaders to highlight efficient and accessible strategies they have successfully implemented or hope to implement to improve space education across the nation.

These two editorial sections aim to encourage a

constructive and ongoing national dialogue on the above mentioned topics. I strongly encourage you to review these opinions and strategies for an insight into Australia's developing space future. These editorials are available following the Forum schedule.

The 14th ASF's symposium including presentations of programs and strategies from the Australian and French Space Agencies, as well as three panels in which national and international speakers will discuss their activities and best practices. In parallel with the conference, the Forum is offering a showcase area which represents the largest space exhibition in this country with more than 100 organisations.

The following three panels will discuss topics that pose imminent challenges to the space sector in Australia.

Optical Communications – A quantum leap in Australia's secure and high bandwidth communications to connect the world and beyond. How exactly do we benefit from optical communications? What exactly does this mean and how does it differ from RF? Does dual technology (combined RF and optical) mean anything? And if so, when will we see the rewards?

Foundation Services Rover - Exploring remote operations and autonomous systems building on Australian expertise in the resources and mining sectors for the collection of lunar soil (regolith). What would the successful extraction of materials

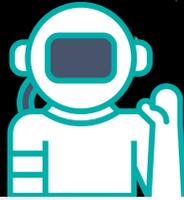
for In-Situ resource utilisation (ISRU) mean for future Australian and international space missions? How could technologies developed through this project contribute to on-Earth resource sustainability?

Earth Observation - The National Space Mission for Earth Observation - a major investment that will expand Australia's capability in designing, manufacturing and operating space and ground based systems. Starting with the EO roadmap and priorities on there (e.g. AquaWatch, SCR, OzFuel,...) to ground side support with in-situ sensing, cal/val and data fusion, to sensors and imagers, or even into the government vs commercial enterprise provided data.

Thank you to all of you, colleagues, speakers, attendees and volunteers for being a part of this vibrant event.

Nicola Sasanelli AM
Chief Executive Officer, The Andy Thomas Space Foundation





* Please note that attendees must be signed into the app to view messages.

Download the Australian Space Forum App

We encourage all face-to-face delegates to download the Forum app.

You can connect to the app through your relevant app store. Please scan the QR Code or search for **The Event App by EventsAIR** and download.



Once downloaded, open the app and enter the event code **14ASF**.

Please sign in using your email address and your pin number to access all features. Your pin number can be found in the email that was sent to you on 18 October 2022. Alternatively, please see the staff at the registration desk for assistance.

Use the app to:

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Forum Schedule

Facilitated by Adjunct Professor Nicola Sasanelli AM,
Chief Executive Officer of The Andy Thomas Space Foundation.

Time	Session	Room
8.00	Registrations Open Tea and coffee on arrival	Hall H
8.45	Opening Session Including a welcome from the Premier of South Australia – The Hon Peter Malinauskus MP and the Hon Ed Husic MP, Minister for Industry and Science (TBC)	Halls C & D
9.00	National and International Space Trends <ul style="list-style-type: none"> • Enrico Palermo, Head of the Australian Space Agency • Jean-Marc Astorg, Strategy Director, Centre National D'etudes Spatiales 	Halls C & D
9.50	Morning Tea	Hall H
10.30	R&D: Optical Communications – A quantum leap in Australia's secure and high bandwidth communications to connect the world and beyond. Keynote Rabindra (Rob) Singh, Chief Technology Officer, SpaceLink Corporation Facilitator Aude Vignelles, Chief Technology Officer, Australian Space Agency Panelists <ul style="list-style-type: none"> • Dr.Craig Smith, Principal Scientist and Director, Smith Optical Systems • Associate Professor Sascha Schediwy, International Space Centre Node Leader, University of Western Australia • Professor Anna Moore, Director, Australian National University, Institute For Space • LTCOL Clifford White, Director SATCOM, Defence Space Command • Ian Jones, Chief Executive Officer, Goonhilly Earth Station Ltd 	Halls C & D
11.50	Lunch	Hall H

Time	Session	Room
13.30	R&D: Foundation Services Rover – Exploring remote operations and autonomous systems building on Australian expertise in the resources and mining sectors for the collection of lunar soil (regolith). Keynote Walter (Walt) C. Engelund, Deputy Associate Administrator for Programs Space Technology Mission Directorate, NASA Headquarters Facilitator Nick Larcombe, Access to Space and Human Spaceflight, Office of the CTO, Australian Space Agency Panelists <ul style="list-style-type: none"> • Dr. Jonathon Ralston, Senior Principal Research Scientist, CSIRO • Leanne Cunnold, Chief Executive Officer, AROSE • Associate Professor John Culton, Director, Andy Thomas Centre for Space Resources, University of Adelaide • Dawn McIntosh, Space Systems Director, Fugro / SpAARC • Professor Salah Sukkarieh, Professor of Robotics and Intelligent Systems, Australian Centre for Field Robotics, University of Sydney 	Halls C & D
14.50	Afternoon Tea	Hall H
15.30	R&D: Earth Observation – The National Space Mission for Earth Observation – a major investment that will expand Australia's capability in designing, manufacturing and operating space and ground based systems. Keynote Dr. Simonetta Cheli, Director of Earth Observation Programmes and Head of ESRIN, European Space Agency Facilitator Dr. Carl Seubert, Chief Researcher, SmartSat CRC Panelists <ul style="list-style-type: none"> • Reece Biddiscombe, National Mission Director, Australian Space Agency • Dr. James Johnson, Chief Executive Officer, Geoscience Australia • Dr. Andrew Johnson, Chief Executive Officer and Director of Meteorology, Bureau of Meteorology • Dr. Alex Held, Director, Earth Observation Infrastructure, CSIRO • Dr. Geraldine Baca Triveno, Specialist Senior Manager, Deloitte Space 	Halls C & D
16.50	14th Australian Space Forum Conclusion Adjunct Professor Nicola Sasanelli AM, Chief Executive Officer, The Andy Thomas Space Foundation together with Michael Davis AO, Chair, The Andy Thomas Space Foundation	Halls C & D
17.00	Networking Hour	Hall H



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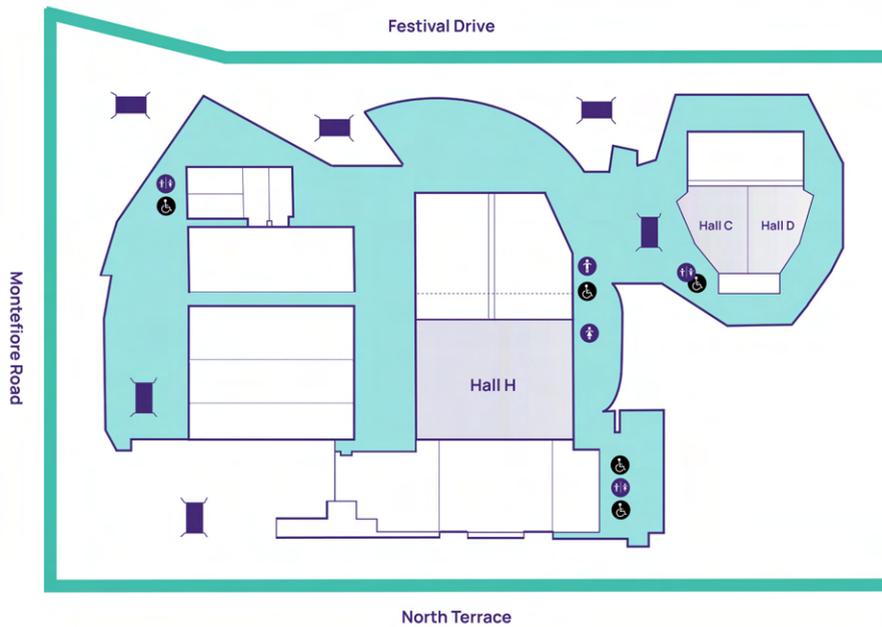


MEDIA PARTNER



Venue Map

Adelaide Convention Centre
Ground Level, Halls C & D and H



Forum Sessions: Hall C & D
Exhibition: Hall H

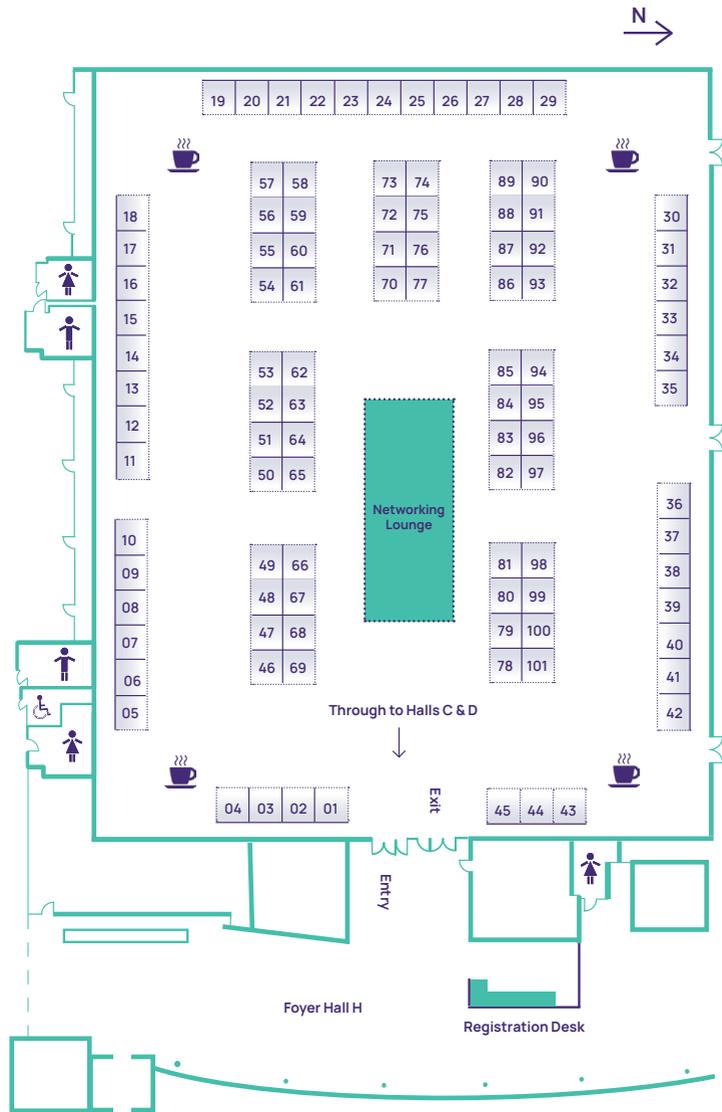
Exhibition Floorplan



Exhibition Floorplan

Adelaide Convention Centre

Ground Level, Hall H



Exhibitors

- | | | | |
|---------|---|---------|---|
| 01 | South Australian Space Industry Centre | 56 | Black Art Technologies |
| 02 | SmartSatCRC | 57 | Av-Comm |
| 03 | Aurora Space Cluster | 58 | Clearbox Systems |
| 04 | Makers Empire Pty Ltd | 59 | Frazer-Nash Consultancy Ltd |
| 05 | Hamilton Secondary College | 60 | Blacktree Technology Pty Ltd |
| 06 | Joseph Banks Secondary College | 61 | Quantx Labs |
| 08 | Adelaide University Space Society | 62 | Geospatial Intelligence Pty Ltd |
| 09 | Venture Catalyst Space - UniSA | 63 | Department of Jobs, Tourism, Science and Innovation |
| 10 | ANT61, Blue Dwarf Space & ESpy Ocean | 64 | Geoscience Australia |
| 11 | Dedicated Systems Australia | 65 | Defence Space Command |
| 12 | AICRAFT Pty Ltd | 66 | Bureau of Meteorology |
| 13 | Space Machines Company | 67 | Department of Foreign Affairs and Trade / Department of Home Affairs |
| 14 | Norseld Pty Ltd | 68 | The Andy Thomas Centre for Space Resources |
| 15 | QL Space | 69 | Australian Space Agency |
| 16 | SABRN Group of Companies | 70 - 73 | CSIRO, Australia's national science agency |
| 17 | Valiant Space | 74 | Business France - Trade Commission of the French Embassy |
| 18 | Starke-AMG | 75 | FuturifAI Pty Ltd |
| 19 | Fortifiedge | 76 - 77 | ITA - Italian Trade Agency |
| 20 | AIAA Adelaide | 78 | AVALON 2023 - Australian International Airshow and Aerospace & Defence Exposition |
| 21 - 25 | AWS | 79 | Deloitte |
| 26 - 29 | Fleet Space Technology | 80 | Investment Territory |
| 30 | Australia in Space | 81 | Saber Astronautics |
| 31 | HEX20 Pty Ltd | 82 | EY |
| 32 | Spire Global | 83 | Airbus Defence and Space |
| 33 | Nano Vacuum Pty Ltd | 84 | Braemac |
| 34 | APC Technology | 85 | LeoLabs Pty Ltd |
| 35 | At Space Pty Ltd | 86 | Silentium Defence |
| 36 | Surrey Satellite Technology Ltd | 87 | Saab Australia Pty Ltd |
| 37 | Thermo Fisher Scientific | 88 | SLM Solutions |
| 38 | Space BD Inc. | 89 | Boeing Defence Australia Ltd |
| 39 | Industrial Sciences Group | 90 | Nova Systems |
| 40 | MEMKO | 91 | CyberOps Pty Ltd |
| 41 | Asension | 92 | Inovor Technologies |
| 42 | Southern Launch | 93 | Neumann Space |
| 43 | Flinders University | 94 | entX Limited |
| 44 | ANU InSpace | 95 | Boc Limited |
| 45 | UNSW Canberra Space | 96 | 3D Plus |
| 46 | Australian Space Discovery Centre | 97 | Caelera Pty Ltd |
| 47 | The Andy Thomas Space Foundation | 98 | Kongsberg Satellite Services As |
| 48 | Monash Nova Rover | 99 | DUG Technology (Australia) Pty Ltd |
| 49 | Locate Conferences Australia | 100 | Cicada Innovations |
| 50 | Capricorn Space | 101 | Scitek Australia Pty Ltd |
| 51 | Infinity Avionics | | |
| 52 | Spiral Blue | | |
| 53 | Praxis Aerospace Pty Ltd | | |
| 54 | Beings Systems | | |
| 55 | River Murray International Dark Sky Reserve | | |



FROM LEO TO LUNAR

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real-time event notifications



complements a growing multi-
technology, multi-sensor Space
Domain Awareness capability



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developing Australian space products
for the world

Opinion

Industry Experts

"What do you think
the space sector
will look like in
five years? "

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"How is your company supporting the development of an enduring Australian sovereign industry base? To what extent will your company participate in the establishment of a local/global supply chain to further support the Australian Government's Civil Space Strategy of tripling the sector's contribution to GDP to \$12 billion and creating an additional 20,000 direct jobs by 2030?"

Foreword



Nicola Sasanelli

Chief Executive Officer
The Andy Thomas Space Foundation

In growing the capability of the space industry across Australia, the role of global primes involved in the Australian space ecosystem is quite crucial. It is my opinion that we have, in Australia a pool of international primes interested in the Australian market and opportunities representing an important asset for our sustainable growth. These multinational companies, which have played a key role since the dawn of the space age after WWII, are committed to involving Australian companies (mainly start-ups and SMEs) in their supply chains. Australian research organisations and universities will participate in R&D programs alongside primes, aiming to support the growth of Australia's space

industry as well as in supporting educational initiatives to inspire the next generation of Australians to choose STEM subjects in their curricula. Thanks to this commitment, our 'young' space sector can develop according to the endogenous growth theory, which considers that investment in human capital, innovation, and knowledge are significant contributors to economic growth.

We are all confident that the space sector economy is enormous, not only involving the up-stream sector (building satellites, payloads, ground stations, etc) but of the downstream services this enables. Space based technologies can be used to improve

our life on earth as well as to make our traditional industry (agriculture, mining, construction etc.) more productive and competitive. For Australia, the next five years will be crucial to develop a sovereign capability and a sustainable industrial growth.

Our Space sector needs to emulate international best practices, examples of companies in Europe, and North America started as spin-offs from universities with smart leadership/talents and today are well-known companies in niche sectors. We need international companies interested in the Australian civil and defence markets, we need talent interested in our companies and research organisations, we need to build skills of our workforce as well as needing a sustainable government annual budget that activates a vibrant ecosystem.

This editorial section explores the future of the Australian space sector with relevant leaders of some international primes involved in the Australian space ecosystem. I have asked them to provide a short contribution about their vision and their strategies. The question they have been asked is: 'How is your company supporting the development of an enduring Australian sovereign industry base? To what extent will your company participate in the establishment of a local/ global supply chain to further support the Australian Government's Civil Space Strategy of tripling the sector's contribution to GDP to \$12 billion and creating an additional 20,000 direct jobs by 2030.

These articles represent a contribution to the ongoing dialogue in our country.

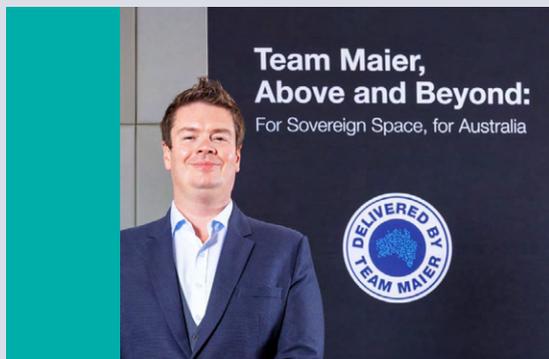
I sincerely thank:

- Airbus – Martin Rowse
- BAE System – Mat Jones
- Boeing – Kathryn Burr
- Lockheed Martin – David Ball
- Microsoft Azure Space – Lynn McDonald
- Northrop Grumman – Benjamin Nankivell
- SAAB – Andy Keough
- Thales – Michael Clark

Enjoy reading,
Nicola Sasanelli



"In the next five years a sustainable Space industry will drive Australian assembly and integration of an increasing level of sovereign payload."



Martin Rowse

Director
Space Australia at Airbus Defence and Space

Airbus is the largest aerospace company in the world, with the Space business being the second largest globally and the leader in the UK and Europe. This growth has been delivered by a continuous drive to globalise – once European, Airbus operates around the world with industrial presence continuing to spread. The Space business now has an industrial presence in seven countries, including a growing manufacturing base in the US. This growth also represents global opportunities for the supply chain, with thousands of companies supporting Airbus through capability delivery but also collaborative development of research and innovation to generate a continuous drive for more.

Australia is one of the most exciting Space economies in the world; with the next five years being absolutely crucial to the sustainability and growth of the domestic industry.

As a founding partner of SmartSat CRC, Airbus has been involved in the Australian space industry for years. This includes a true focus on collaboration, leading and supporting a wide-range of projects with Australian companies and universities, with

a growing focus on development of sovereign capability in multiple unique ways.

With the Team Maier partnership, Airbus has created a unique approach to Australia for the JP9102 Military SatCom capability. Taking lessons from two decades of operating Skynet for the UK MOD and Allies (including Australia and the US) and a decade of developing a sovereign capability for the UAE, this approach was developed with sovereignty as a guiding principle. Team Maier is not only focused on delivering as much as possible in Australia, but crucially for ensuring that the skills, capability and experience are retained in-country long after the initial program has been delivered. Companies like Penten, UGL and Wilyama will have skills and knowledge for future domestic programs and the export market.

The award of the Resilient Multi-Mission STaR Shot program to Airbus and Australian partners represents another near-term opportunity for a step-change in capability. Supporting DST and Space Command, Airbus is the strategic partner in developing an ever-increasing sovereign capability.

This will provide companies like Inovor, Shoal and universities like UniMelb and ANU with a platform to design, develop and demonstrate new Australian capability. Starting as experimentation and proof of concept, it will drive Space Command with true Operational capability to support the Warfighter.

A trickle-down supply chain where Foreign Primes provide work packages for delivery will not provide Australia with a sustainable Space industry – a more considered and robust approach is needed which considers the economic benefit to Australia.

In the next five years this will drive Australian assembly and integration of an increasing level of sovereign payload; made in Australia by Australians and being operated as part of the Australian Defence Force Space Command. It will enable sovereign operational capability, with Australia able to contribute to global exercise and operations without any foreign interference.

Surrey Satellite Technology Limited (SSTL) is a wholly owned subsidiary of Airbus, and a pioneer in SmallSat capability, launching the first satellite as part of a PhD over thirty five years ago. SSTL is renowned as a company which supports countries and companies in driving sovereign capability – supporting over twenty countries since spinning out from the University of Surrey. This hands-on, knowledge-transfer based approach enables countries to enter the Space domain or take a step-change approach. Providing mentoring, coaching, training and sharing intellectual property provides a true boost to countries driving their sovereign industry.

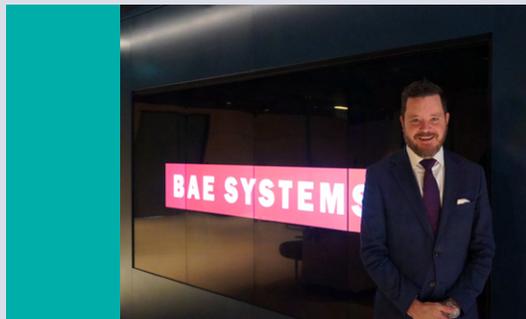
For Australia, SSTL represents an opportunity to drive further and faster – benefiting from decades of experience while maintaining sovereign ownership and control.

In the next five years, credibility, early demonstration and growing heritage will become key. It will be a challenging time, with consolidation around sustainable Space companies increasing in pace. This will drive competitiveness, innovation and commercialisation; enabling Australian companies to compete on the global stage and continue to punch above its weight across a wide range of unique capabilities.

Airbus and SSTL are ready to deliver for Australia, with a keen focus on supporting sovereignty.



"BAE Systems commitment to innovation establishes foundation for sovereign Space capability."



Mat Jones

Head of Future Business
BAE Systems Australia

BAE Systems Australia's commitment to the Civil Space Strategy draws on a deep lineage in local and international Space development, an emerging global capability and the six decades we've invested in Australian innovation and market development of complex technologies that today keep our nation secure.

As Australia's largest Defence prime contractor, our work spans air, maritime, land, space and cyber domains and our customer is the Australian Defence Force. We are a trusted partner of choice to the Commonwealth and other major Defence primes, as well as an ecosystem of industry partners across the Australian SME community.

Our history in the international Space industry runs across the delivery of products in waveforms, electronics, antenna and digital signal processing and analytics, with twenty years of experience in ground-based signal processing for various space agencies.

Our recent acquisition of UK-based In-Space Missions adds to BAE Systems' portfolio the ability to create, launch and operate complete satellites, helping to enable sovereign, secure and resilient data sharing between different platforms in sea, air, land and space.

In-Space has as an innovative approach to combining satellites into a payload rideshare, allowing multiple payloads to be launched and operated together as one satellite in space. In short, the company brings a range of space capabilities that help deliver information advantage, multi-domain operations and networking for our civilian customers.

BAE Systems' investment in adjacent sectors also provides relevant line of sight for future growth in Space Domain Awareness (SDA). A good example is our longstanding work in technologies such as the High Frequency (HF) radar capability we are delivering for the Commonwealth and exporting to like-minded nations for their Over The Horizon Radar (OTHR) networks.

OTHR and Space are underpinned by complementary capabilities and technologies. The depth of our investment in HF technology and breadth of our supply chain brings into focus applications that are pertinent for the development of future sovereign industry opportunities that can contribute to the broader SDA enterprise.

Yet, it is our commitment to local innovation, at the frontier end of the Space life-cycle, which enables us to stand apart from other companies across Australia's Defence industry.

Our work with the SmartSat CRC and many of Australia's space missions enables our research and development teams to work alongside industry and academia to develop new technologies and a future sovereign Space capability. This includes partnerships with the University of Adelaide and the University of New South Wales (UNSW), where we are currently developing a Space Analytics Engine.

This body of work enables the Space industry to draw on expertise across advanced sensor and effector development, artificial intelligence, data fusion, autonomy, aero structures, materials, advanced manufacturing and modelling.

This chain of technology research, development and transfer is one of the great benefits that a company like BAE Systems sees in participating in the SmartSat CRC. Some examples of current work include:

- Anomaly Detection using blockchain;
- Trusted AI in Intelligence, Surveillance and Reconnaissance;
- GNSS-R for Maritime Surveillance
- Physical Layer Security for Satellite-based Internet of Things and Deep Reinforcement Learning for Energy Efficiency;
- Satellite security using blockchain; and
- Measuring satellite control system resilience to cyber-physical threats.

The recent recognition of Space as a Sovereign Industrial Capability Priority (SICP) has fortified a shared national goal to become a contributor to Space-based technology that must include

businesses across industry, both large and small.

Critical to fostering upcoming innovation is the need to identify and nurture the skill resources of the future, and establish a network of industry partners. BAE Systems Australia has a symbiotic relationship with the Australian companies that contribute to our supply chain.

Moreover, our programs rely on the support of these companies. In 2021, we acquired more than \$505m of goods and services from local industry, including more than \$182m sourced directly from SMEs.

BAE Systems has also invested in, is developing and sponsoring STEM programs, training and education opportunities across institutions around Australia, as well as providing market assistance, training, mentoring and support to SMEs.

As Australia's most versatile defence and security company, BAE Systems Australia is proud to support the development of an enduring sovereign Australian space industry base where innovative programs such as these remain key to building a competitive advantage.



"We're committed to developing Australian space capability, investing more than \$5 million in a 18-month development program, to train, qualify, and transfer proprietary intellectual property and knowledge to our Australian manufacturing partners."



Kathryn Burr

Program Director
Boeing Defence Australia Space
Programs

The Future of Space Is Built Here

Advancing R&D, and partnering and investing in Australian companies that have the drive, innovation and capacity to participate in the space sector is critically important to how Boeing Australia's views its role in building sovereign space capability. In March 2019, Boeing and the Australian Space Agency (ASA) signed a Statement of Strategic Intent and Cooperation to enhance the capability and competitiveness of Australian industry, and promote investment in space capabilities and high-tech jobs of the future for Australians.

We are uniquely positioned to accelerate space capability locally, with a strong Australian base of more than 4,000+ employees, including our space-focused R&D arm and backed by 60 years' global space experience from The Boeing Company. An industry leader for next-generation satellite

technology and manufacturing practices, the company brings with it experience in designing and building advanced space and communications systems for military, commercial and scientific uses.

It is through this mix of global space know-how, combined with a commitment to transfer knowledge and expertise to local industry that Boeing intends to create local jobs, and establishing export opportunities for Australian small businesses as part of its solution for Australia's Defence Satellite Communications System – or JP9102.

Boeing is gathering a strong Australian supply chain to build an Australian Advanced Ground Architecture that supports multiple space missions and aligns to the needs of the Australian Defence Force for JP9102. This includes building an Australian space manufacturing and production capability as part of our \$5 million-dollar investment

in Australian suppliers and we are now actively evaluating Australian suppliers for their compatibility to support satellite production for Boeing's operation in El Segundo, California. This investment is being made ahead of the JP9102 down-select decision with a view to building Australia's broader space manufacturing capability and potentially open doors to Boeing's global supply chain.

Additionally, we are looking to Australian industry for collaboration and development opportunities across JP9102's space, ground, control and operations and support functions. To date we have announced the following collaborations with local suppliers including Saber Astronautics, Clearbox Systems, Leidos Australia, Viasat and the Indigenous Defence and Infrastructure Consortium.

In addition to these supplier partnerships, Boeing's commitment to building an enduring Australian space sector can be seen in the research work being undertaken through Boeing Research & Technology – Australia (BR&T-A). The team is experienced in the development of artificial reality training for the CST-100 Starliner, anti-microbial coating research, weather servers and remote testing technology.

The team provides a focal point for collaboration with research and development organisations including universities, private sector providers, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Defence Science and Technology Organisation. Through its relationships with NASA and Boeing Houston, BR&T-A has created several fully interactive simulation environments for R&D and training. They use local Australian technical and human factor expertise

and are primarily focused on solving problems in ground-based simulation training, training in orbit, and digital spacecraft design, circumventing the need for physical mock-ups.

Perhaps one of our most enduring local partnerships, the Boeing-CSIRO partnership spanning 32 years has contributed to space R&D, and we recently renewed a Joint Research Agreement committing to a combined investment of US\$35 million for R&D over five years. It includes research programs in the areas of Space Situational Awareness (SSA), Space Manufacturing and Materials, and On-Orbit Image Processing and Analytics.

Boeing Australia is deeply proud of our relationships and investments that support Australia's efforts to expand its space-based and space-enabled capabilities. We're committed to investing in today's space capabilities and importantly growing space careers for the future, and keenly supported the development of a STEM space curriculum for schools called Future U. The 14th Space Forum is yet another opportunity to be part of and support the growing Australian space community, and inspire the next generation of students to take part.



"Supporting an enduring sovereign space industry."



David Ball

Regional Director Australia New Zealand
Lockheed Martin Space

In July, NASA's James Webb Space Telescope beamed back to earth the sharpest images ever taken of the distant universe. The photos, depicting 13 billion year-old light, were taken by NIRCcam, a first-of-its-kind instrument built by Lockheed Martin in Palo Alto, California.

NIRCcam is just the latest contribution by Lockheed Martin to a technical heritage dating to the dawn of the space age. For more than 70 years, Lockheed Martin rockets, satellites, ground systems, scientific instruments, and payloads have broadened our understanding of the universe, enhanced our security and prosperity, and inspired generations to participate in the progress of humankind.

At Lockheed Martin Australia, Space is among our fastest growing areas. This growth reflects and reinforces the central role of space in our daily lives, the growing demand for space systems and services, and the emergence of a sovereign space industry in Australia that is quite literally 'taking off.' A vibrant sovereign space sector, enmeshed in local and global supply chains, is vital to the advancement of Australia's economic and national security interests.

So how does Lockheed Martin Australia support an enduring sovereign space industry?

Programs and Pursuits

Lockheed Martin Australia's space journey began almost 25 years ago with the establishment of a telemetry tracking, and command centre in Uralla, in regional NSW. The facility supports the commercial launch of satellites into their correct orbits and ensures their electronic payloads are fit for operation when they get there. Uralla also serves as a host site for our FireOPAL Space Domain Awareness (SDA) testbed. Jointly developed with Curtin University, FireOPAL cost effectively tracks satellites and space debris from LEO to GEO.

Beyond Uralla, Lockheed Martin Australia's space programs and pursuits encompass everything from military satellite communications, precision navigation systems, earth observation, hypersonics, advanced R&D, and operation and sustainment of geospatial intelligence applications.

Supply Chains

Each of these areas of focus includes a significant Australian supply chain component that leverages

Small and Medium Enterprises (SMEs), academic institutions, and veteran- and indigenous-owned businesses.

Nowhere has this been more pronounced than in our proposal for JP9102, which will deliver a sovereign military satellite communication system to Defence. From manufacturing satellite components and installing and sustaining ground stations, to systems engineering and control segment integration, our JP9102 team both showcases the best of Australia's space industry and facilitates the transfer to Australia of skills, knowledge and technology.

Our JP9102 supply chain includes: Av-Comm, Blacktree Technology, Calytrix Technologies, Clearbox Systems, Conscia, DXC Australia, EM Solutions, Inovor Technologies, Linfox, Ronson Gears and Shoal Group. Other Australian businesses are under active consideration to extend this group.

Workforce Development

Supply chains are just one element in our commitment to supporting the growth of Australia's space industry. Another involves supporting educational initiatives to inspire the next generation space workforce. We do this through investments in Science, Technology, Engineering and Maths (STEM) education and other initiatives, including internships and sponsorships of the National Youth Science Forum, One Giant Leap Foundation, and Questacon.

Under JP9102, for example, STEM Punks will develop and implement a 10-year space-focused curriculum that encompasses high-school, university, and early-career level activities. This will educate, up-skill, and inspire Australia's next generation technical workforce to support the nation's growing suite of space programs and capabilities.

The program will employ a hybrid delivery model with both immersive online modules and face-to-face workshops, classes, and activities. Over its life, the program will be rolled out to 80 schools across Australia with at least a quarter representing regional and Indigenous communities.

Supporting Australian Space Organisations

Lockheed Martin Australia is an active supporter of the organisations that make up Australia's space eco-system. We work collaboratively with the Australian Space Agency and Department of Defence, and our executives play active roles on the Space Industry Association of Australia and Australian Defence Information and Electronic Systems Association.

One of the lesser known aspects of Lockheed Martin's support for the Australian space industry are our venture capital initiatives. Through Main Sequence Ventures, the CSIRO's innovation fund, Lockheed Martin has invested in a diverse range of Australian space technology start-ups providing capital and support on their journey towards commercialisation. The Main Sequence Ventures portfolio includes Myriota, Flurosat and Gilmour Space.

Thought Leadership

Finally, a robust space industry needs strong intellectual foundations, and that in turn depends on collaboration, communication and a vibrant marketplace of ideas. It is this philosophy that underpins Lockheed Martin Australia's longstanding support for the Australian Strategic Policy Institute (ASPI) and Williams Foundation, and more recently our sponsorship and active involvement – through direct sponsorship, workshops, speeches and panel discussions – in the ADM Space Summit, the SIAA Southern Space Symposium, the Australasian Satellite Forum, MILCIS, the ADM congress, and the upcoming ADM STEM in Defence conference.

With our infrastructure and dedicated space capabilities, as well as our relationships and investments in Australian industry and research institutions, LMA represents a significant part of Australia's growing sovereign space industry and is playing a critical role in its ongoing growth.



"Microsoft Azure Space takes a partner-first approach in supporting Australia's sovereign space industry."



Lynn McDonald

Azure Space Lead
Microsoft ANZ

Microsoft Azure Space is firmly committed to helping develop an enduring Australian sovereign industry base, as well as participating and investing in the local supply chain, to support the space sector's contribution to GDP and job growth. Our strategy in Australia is focused on three main areas: integrating the Azure cloud with an ecosystem of partners, fostering technology innovation in the space industry, and supporting the industry through investments in technology and skilling. To support the development of Australia's sovereign space industry capability, we have taken a partner-first approach in our technology and product development. Azure Space is a partner-led and ecosystem-focused platform designed to make cloud connectivity and computing increasingly attainable across diverse industries, such as agriculture, energy, telecommunications, and government. Our approach to space is multi-band, multi-vendor and multi-orbit, and our thriving ecosystem of space partners enables the most comprehensive and innovative offerings for our joint customers and the future of space computing. Our partners include space operators, manufacturers, systems integrators, data and analytics service providers, and artificial intelligence independent software vendors. They cover a breadth of capabilities like

virtualisation, data processing and insights, and ground infrastructure. We have also taken a differentiated approach to investing in the Australian space industry as it continues to rapidly evolve. Two key investment areas are in our commitment to supporting new businesses and developing new talent. We have done this through two innovative programs designed to meet the unique needs of the Australian market:

- The Microsoft for Space Startups Australia program is centred around three key areas: unlocking innovation for all, technology benefits that lead to growth, and access to mentorship and guidance from a team of experts, including space industry veterans with deep expertise. Every space innovator is welcome to apply for this tailored startup program. It launched in August 2021 and was developed as part of the Microsoft for Startups program, which has seen close to 7,000 startups graduate and achieve over A\$1 billion worth of sales.
- Microsoft and Modis (soon to be renamed Akkodis) partnered to launch the Tech Start program in February 2022, which is focused on investing in and growing a diverse talent

pipeline in Australia. With numerous local information technology (IT) and space company partners, the Tech Start program helps Australian women gain industry recognised microcredentials, professional mentoring, and career development support. These efforts provide women with the skills, connections, and pathways to pursue a career in Australia's fastgrowing space, defence and IT industries. Microsoft is also committed to the growth of deep technology development in Australia.

As recently announced, we are proud to be the first 'Constellation Partner' at the National Space Industry Hub (NSIH) delivered by Cicada Innovations. The Constellation Partners Program is designed to engage industry and foster investment in the local space sector. This will enable the NSIH to expand its national programs and become sustainable over the long term, following initial funding from the NSW Government. Microsoft will be the exclusive Constellation Partner in the 'cloud technology' category. We will invest our time, capabilities and resources in the innovators, entrepreneurs and researchers who form the NSIH community.

Finally, Microsoft is one of the only global hyper-scale cloud providers to operate cloud regions in

Canberra specifically designed and secured to meet the strict security compliance requirements of the Australian government and national critical infrastructure. This includes datacentre capabilities specialised for government and national critical infrastructure that meet stringent ownership controls required by the Australian government's hosting policy and unmatched flexibility for colocation of critical systems in the same facilities as Microsoft Azure in Canberra. Microsoft's purpose is to empower Australians to achieve more, and we seek to actively improve the economic and social wellbeing of all Australians. We have done this locally, globally, and in all areas of our business and technology development, including space.



"Legacy and Leadership | Northrop Grumman is Defining Possible in Space."



Benjamin Nankivell

Head of Space Industry Engagement
Northrop Grumman Australia

Since the dawn of the space age, Northrop Grumman has put innovative products and ideas into orbit, on the Moon, and beyond. From designing and building the Lunar Module and pioneering America's first satellites, to the development of the James Webb Space Telescope, Northrop Grumman is an industry leading provider of end-to-end space capability. With a legacy company presence in Australia of over 60 years, we are committed to playing our part in realising Australia's aspiration to be a space nation.

As one of the largest space companies in the world, Northrop Grumman boasts an enviable space pedigree and mission heritage. We are a trusted partner in space exploration and space-based operations that support national security, commercial, and civil missions. We maintain leading capabilities in systems engineering, spacecraft manufacturing, precision sensors and instrumentation, to name a few, and we develop ground systems and solutions for command and control.

Northrop Grumman led the industry team that constructed NASA's James Webb Space Telescope; the largest, most complex and powerful space telescope ever built. At 100 times more powerful

than its Hubble Telescope predecessor, 'Webb' is fundamentally altering our understanding of the evolution of the universe by allowing us to penetrate dust clouds to see new galaxies and the birthplaces of stars and planets.

As a part of NASA's Artemis program, Northrop Grumman's innovations will enable NASA to return humans to the moon by 2024, with the ultimate goal of human exploration of Mars. We're also providing the solid rocket boosters for the Space Launch System, the abort motor and attitude control motor for the Orion spacecraft's Launch Abort System, and we're building the Habitat and Logistics Outpost (HALO) module for NASA's lunar gateway. Northrop Grumman designs and builds mission extension and servicing vehicles (MEV, MRV, MEP), and revolutionary launch vehicles.

Closer to home, Northrop Grumman Australia is continuing to deliver space capability to the Australian Defence Force, including Satellite Ground Station-East, near Wagga Wagga in New South Wales. We also provide launch services for the Defence Science and Technology Group to support research and development. Managed by Australian engineers and backed by decades of global

expertise, we are committed to building local capability, know-how, and know-why, in this critical mission domain.

Over the four years to 2020, Northrop Grumman invested more than \$1 billion in the Australian economy, reinforcing our commitment to powering Australia's growing defence and space industries. Consistent with the Australian Space Agency's Australian Civil Space Strategy, Northrop Grumman is identifying opportunities for Australian industry to compete within our global supply chain. This will help to sustain the sovereign space industrial base. Examples of our success include our partnership with Gilmour Space, Griffith University, and Etamax Engineering, to scale the manufacturing of light-weight rocket fuel tanks to support local launch activities, and with Titomic to advance additive manufacturing for space applications.

As a global leader, Northrop Grumman embraces our obligation to build the space workforce of the future by investing in skilling and STEM programs. Our support to PFi Aerospace's 'Science of Rockets' high school STEM program, and our sponsorship of the University of Queensland 'UQ Space' entry in the Australian Rover Challenge, are two recent examples of our commitment. We've also sponsored internships at the Advanced Instrumentation Technology Centre, and the Australian National University's rocketry team. Notably, our partnership

with the University of Adelaide Exterres Laboratory, the Australian Institute for Machine Learning, and industry partner Black Sky Aerospace, is supporting vital research into hypersonic technologies.

Australia's space industry has an opportunity to exploit the synergies between the military and civil sectors to better leverage investments in infrastructure, skilling, and STEM. Our innovation and finite resources must target both civil and military applications if we are to build an economically viable space sector. The right policy settings, and commitments from Government to large scale projects, will incentivise investment in vital local industry capability and capacity.

As a global leader in the development of end-to-end space and launch systems and capabilities, Northrop Grumman stands ready to partner with both public and private sectors to build a sustainable sovereign space industrial base, and achieve Australia's vision of being recognised as a space nation.



"Ignited by Space."



Andy Keough CSC

Managing Director
SAAB Australia

Like many Australians, I grew up with the Southern Cross being a reliable fixture in the night sky; the constellation that we would look for while camping, and to say we were home when returning from a trip abroad.

For many, the stars are an introduction to space and the spark that ignites a fascination about possibilities and discovery. The benefit is that the pursuit of new knowledge results in technological advances that can be used to improve our life here on earth – in health, the environment, disaster management and recovery, resource management, and other sectors.

Saab Australia is actively pursuing opportunities within the space sector – a sector that has accelerated in development particularly over the last 10 years in Australia. In 2022, we are harnessing the benefits of Space 2.0 and actively developing products that better reflect the complex environment that combines inputs from all domains.

Historically, Australia has leant on products developed in other countries; assuming a consumer rather than a contributor role. This is something we can no longer afford to do for a myriad of reasons, including security, economic development, and future growth for the benefit and safety of our community.

Indeed, the commercialisation of space and our reliance upon space-based information for both defence and civilian usage has become undeniable. This reliance now calls for protection, not just for the information that space-based capabilities present to us, but also its physical infrastructure. A strong sovereign controlled ecosystem from space to maritime and everything in between, is essential to meet the needs of our citizens, across almost every aspect of life. In so doing, satellites, ground/communications stations, and launch facilities will need to be supported and developed to provide operational assurance, and this infrastructure will need to be supported by modern manufacturing, specialised componentry and, of course, skilled personnel to ensure that Australia has undeniable access to space. This is the segue into Saab's capabilities and harnessing what Australia does best, which is to innovate and develop novel and disruptive technologies that enable us to contribute to the global outcomes. For space, it's the Space Domain Awareness (SDA) effort, which is surveillance that will enable us to monitor and understand our capabilities in space as well as both the adverse and optimal actions and behaviours of others.

As a systems integrator with decades of experience in developing and maintaining complex combat

management systems, Saab is positioned to continue its work to develop command and control (C2) solutions that are fit for the space domain. Saab's ability to openly collaborate and enable integration of third party technology stands it in good stead to assist the Commonwealth and industry partners to deliver leading capabilities and position Australia as a nimble space system provider. The development of C2 solutions stands to deliver hundreds of millions of dollars to our economy and invaluable intellectual property while fostering the development of the space ecosystem.

Using our pedigree stemming from mission system integration, Saab Australia has opportunities to translate the solutions from land, sea, and air management to space. Using this expertise, Saab has already assisted in the development of sovereign C2 solutions for areas including space mission control, space domain awareness, and space mission planning.

Most recently, through an enduring contracted effort, Saab has supported Defence in its development program which is exploring methodologies to enhance the Australian SDA mission.

Saab is also undertaking its first contract with the SmartSat CRC to develop a mission planning capability demonstrator for enhanced surveillance of the Indo Pacific region. This mission planning, simulation, and visualisation demonstrator will enable a greater understanding of how to exploit low and medium earth orbital planes, whilst providing key information as to sensor suites and communications needs to conduct such a surveillance mission.

Space presents untold opportunities for discovery and a myriad of opportunities that are ready to be actioned right here in Australia. At Saab, we are working to ignite the industry and opportunities around space, which in turn will build the skills of our workforce and contribute to healthier economies and ecosystems.



"Supporting development of an enduring Australian sovereign Space Industry Capability."



Michael Clark

Director Technical Strategy
Tales Alenia Space

Thales Group (Thales) is a multi-national technology company with more than 80,000 employees worldwide. We deliver trusted, mission critical solutions in the Aerospace, Space, Defence, Digital Identity and Security sectors.

In Australia, Thales has 3800 skilled employees and an annual turnover of over AU\$1.7b in 2021. In 2020, Thales Australia spent \$657 million with 1,841 Australian suppliers, of which 82% are SMEs and since 2018 has spent over \$1.9 billion with local Australian businesses.

Thales Australia has a history of patient investment to build advanced in-country capability across manufacturing, critical systems and services. Close collaborative relationships with local customers, Australian SME suppliers and research institutions, combined with technology transfer from our global business, enables Thales to tailor high-quality solutions for Australian and export markets, generating revenue of \$1.6 billion in exports over the past 10 years.

Utilising our extensive reach back into the broader Thales Group, Thales Australia is working closely

with Thales Alenia Space (TAS) to establish an Australian sovereign space capability through leveraging the global TAS product portfolio and through investing in Australian research and development initiatives.

TAS combines 40 years of experience and a unique diversity of expertise, talents and cultures, to architect, design and deliver high technology space solutions for telecommunications, navigation, earth observation, environmental management, exploration, science and orbital infrastructure.

For over 30 years, technology transfer to Australia of leading technologies from the Thales Group, supported by local investment, has been the foundation of Thales Australia's success. This has established new sovereign Australian Industry Capability (AIC) and has grown new opportunities into export markets. Fundamental to this is Thales's substantial investment in Australian research and development to create local technologies and capabilities to meet the needs of our Australian customers.

Thales Australia has a similar vision for establish-

ing a Space business in Australia, and is currently pursuing several major prospects that will facilitate this. In 2019, Thales Australia signed a Strategic Statement of Intent (SSI) with the Australian Space Agency, a clear demonstration of the company's commitment to establish and develop sovereign space capability.

Using our proven ability to leverage technology transfer to Australia, we are able to bring mature low risk space systems and solutions to the areas of Position Navigation & Timing (PNT), Military Satellite Communications (MILSATCOM), Earth Observation (EO) and Surveillance. Combined with our appetite for local investment this will help accelerate the development of an Australian space industry through cutting edge new space technologies and capabilities.

Some examples of our research collaborations are:

- A SmartSat CRC project on coherent free space optical communications to enable high bandwidth communication through the earth's turbulent atmosphere.
- A SmartSat CRC scoping study with the University of Sydney, investigating innovative new processing technologies for space object detection, using existing in-orbit sensors.
- The "Astrosite" Ground Based Optical (GBO) sensor for Space Domain Awareness (SDA) using the neuromorphically inspired Event Based Video Sensor (EBVS) technology developed by Western Sydney University (WSU).
- A University of Sydney research activity to de-

velop "Integrated Photonic" technology, which combines electronic and optical processing elements on a silicon chip, to provide miniaturised low power solutions for space-based LIDAR and optical communication networks.

- Thales also offers researchers access to in-orbit space assets such as the newly developed Optel- μ optical communications terminal for LEO satellites to support incremental testing and evaluation of new communications technologies within Australian research programs.

Thales is also active in mentoring post graduate researchers. Michael Clark, Director Technical Strategy, Thales Australia, provides industry co-supervision for two PhD candidates within in the SmartSat CRC Higher Degree Research (HDR) program, and has been recognised by two Sydney based universities with Honorary Professor roles.

Thales Australia has strong credentials in the management and delivery of complex system integration projects for Defence and civilian applications, and is one of a few players with the proven ability to successfully transition the results of research into mature operational service while building enduring sovereign industry capability. Thales is an enthusiastic contributor to the Australian Government's objective to triple the space sector's GDP contribution to \$12 billion and to create an additional 20,000 jobs by 2030.



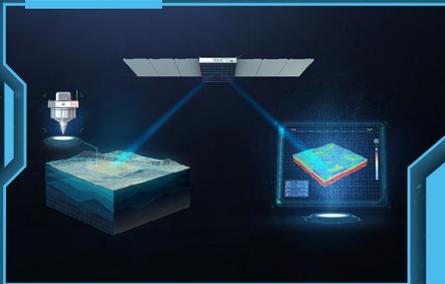
FLEET

We Are Explorers

GROWTH



TECHNOLOGY



SOLUTIONS



MANUFACTURING

"Fleet Space Technologies is proud to lead the Australian space sector. We are creating jobs, technological capabilities and lasting economic and environmental impact for Australia and the world. The inclusion of our team and manufacturing facilities in the Australian Space Park is positioning Fleet and South Australia as a true global centre of excellence in the development of space technologies. We are explorers."

Flavia Tata Nardini | CEO and Founder, Fleet Space Technologies

Opinion

Education

"What do you think
the space sector
will look like in
five years? "

"30,000 direct jobs in the space sector by 2030.... Getting today's students ready for tomorrow's workforce. How can educators bridge the gap and ensure Australia's stake in the global space race?"

Foreword



Darcey Watson

Executive Officer
The Andy Thomas Space Foundation

As the space industry across Australia continues to grow, so too do the requirements for skilled, trained and passionate employees. With 7 National Civil Space Priority Areas and an expected annualised growth rate of 7%, the Australian Space Agency's goal of achieving a workforce of 30,000 by 2030 is well known, but the question remains unanswered as to how this will be achieved and what this workforce will look like.

While members of the latest generation of the Space workforce are in the midst of their education journeys, it is crucial to have relevant and accessible opportunities available for immediate implementation alongside a well-considered, staged and inclusive plan for future curriculum development.

From the current, rapidly expanding space industry across Australia it is clear that career opportunities will be highly diverse and remain strongly focused towards multi & cross disciplinary approaches. Space industry careers are no longer represented solely by becoming an astronaut or an engineer, but now strongly support the idea that all jobs needed on Earth, will be needed in space. This exciting change in perspective opens the industry to include students and young people who have not found passion in science and maths, but in other related disciplines like game design and coding.

In catering for this industry leading approach, producing what could soon represent best education practices across the globe, it is fundamental to consider not only 'traditional' education pathways

but to also ensure adequate resources and opportunities are available for teachers, parents and students who are interested in alternative pathways such as vocational training and apprenticeships.

Ensuring that space is not only accessible to all, but that all can find passion and inspiration in this growing and dynamic industry is a major priority for not only the Andy Thomas Space Foundation, but for others in this space. Across Australia, government, corporates, education facilities, community groups and even individuals have each played their vital roles in establishing the importance of STEM and its associated disciplines in the minds of today's students. By turning space education into a national conversation, we hope that these individual efforts being made across the country can seek innovation, collaboration and opportunity with counterparts, expanding their reach and touching on the lives of all Australian students.

This editorial explores the perspectives and experiences on Space engagement and education from STEM industry professionals across Australia. Through these pages we aim to inspire and empower today's STEM educators by sparking new ideas, approaches and techniques to better engage what will be the next generation of space industry leaders. In doing so, each contributor has been asked the following question: '30,000 direct jobs in the space sector by 2030.... Getting today's

students ready for tomorrow's workforce. How can educators bridge the gap and ensure Australia's stake in the global space race?'

Making space education, a national approach.

I would like to extend my sincere thanks to the following contributors:

- Queensland – Cran Middlecoat
- Western Australian – Leon Smith
- Victoria – Michael Pakakis
- New South Wales – Scott Sleap
- South Australia – Peta Kourbelis
- Industry – Mandi Dimitriadis

**Enjoy,
Darcey Watson**



"When we see learning opportunities that may not strictly conform to the curriculum, we must be brave enough to seize them."



Cran Middlecoat

Queensland

Founder

It's Rocket Science Adventures

STEM, what is it really?

Across the ages, humans have been given a great deal of advice, emphasizing the importance of imagination and how it is a necessary ingredient to achieve success. Despite this, most of the world's governing bodies responsible for education, continue to produce curriculum documents that place extraordinarily little credence on the value of imagination. These are the very documents that their nations' teachers are duty-bound to deliver lessons from.

January 27, 1967, the crew of Apollo One was doing what was called the "plugs out test". This involved having the Saturn 1B Rocket being fully powered by its own independent systems, running the procedure right up to the point where the rocket would ignite engines and lift off. At 6:31 pm the unmistakable word "FIRE" was heard on the communications loop, followed by "We've got a bad fire – Let's get out!!!!". It took over four minutes for technicians to get the capsule hatch open, by which time astronauts Gus Grissom, Ed White & Roger Chaffee had perished. The investigation found that a spark had

jumped, igniting nylon netting under Gus's seat, turning the 100% oxygen rich crew compartment into an inferno within seconds. The crew never stood a chance.

NASA put astronaut Frank Borman in charge of the investigation. During the court inquiry, Borman was asked what caused the fire. He said: "Failure of imagination". Borman went on to say that a fire on the launch pad was never really considered a risk and that the concern was a fire happening in space 200 thousand miles away from the nearest fire station.

So, what possible relevance could this story have to STEM education? It was a "failure of imagination". This was the 1960's, decades before any kind of social media. Nowadays, because of our immediate access to social media and online resources, we are using our imagination far less. Our children don't know life without a smart device. While I acknowledge that a sound understanding of digital technology is absolutely essential for students of today, in Australia at least, the curriculum is far too heavy on the digital side. I see students that balk

at tasks that don't involve a screen, perceiving the job as almost insurmountable.

Recently I was called to assist students with building model aircraft. The task involved students using a ruler and a pencil to measure and mark three points and then draw a line. The students were each assigned a work buddy. One pair asked for help. I explained the task a second time. Instantly, the response was: "Can you do it?" They were not comfortable with using a ruler and a pencil. What was most concerning, these students were in year Ten.

So how can teachers get students to effectively exercise their imaginations, when: A- there is little specific requirement to do so if the curriculum is strictly followed, and B- teachers have little freedom to move within the curriculum? One method is Pull Learning.

Pull learning puts the learner in the driver's seat. It allows the individual to have control over what they learn and when they learn it. Pull learning is in a sense learning on-demand where the learning experience is tailored to the student's needs.

When delivering my rocket science STEM workshop, I leave questions unanswered. I allow my students the freedom to decide which variable to test. For instance, I let the kids decide how much water they want to use to fuel their rockets with and I let them choose their launch angle. I force them

into firing up the neurons of the brain, by making them imagine the possible outcome. We then launch the rockets, students observe the flight, the upper primary students use a trundle wheel to measure how far their rocket flew. We then repeat the test with a different launch angle or a different fuel quantity, and the students pull the answers themselves.

From time to time, we must allow ourselves the freedom to daydream. This exercises the imagination. When we see learning opportunities that may not strictly conform to the curriculum, we must be brave enough to seize them. We must be brave enough to step outside the box and to think outside the box. But before we can think outside the box, we need to know what the box is. How? We first must imagine 'the box'. Most important of all, we must allow ourselves to fail. It is only then that we use our imaginations to extract the lesson from the failure. After all, fail is not a word - it's an acronym meaning First Attempt In Learning.



"The more tangible the inspiration, the better we can develop our future generations curiosity and passion, essential for students venturing into STEM fields and careers in space."



Leon Smith

Western Australia

Panetarium Coordinator

Scitech

Inspired Education for the Space Age.

As Australia establishes itself in the international space community we are presented with a once in a generation opportunity in a previously largely nonexistent part of the economy.

Earth and space science sits as a major component of the Australian curriculum at every year level, and rightly so. Engaging students at every year level with space concepts allows the sequential buildup of the STEM skills required to participate in the space industry.

The Scitech Planetarium, the largest planetarium in Australia, has a visitation of about 100,000 people per year and provides Western Australians with the perfect astronomy classroom. Our unique venue is a rich learning environment where we regularly conduct educational presentations to schools and the public, but also provide an opportunity for people of all ages to seek a deeper appreciation of space.

It seems most people, without necessarily being attuned or aware of it, are inherently fascinated with the universe and their place within it, and the Scitech Planetarium gives that immersive and memorable space experience. I've seen thousands of people of all ages transform from reserved, quietly polite individuals to awestruck chatter boxes eager to know more, their eyes alight with wonder when they see the sky come to life in the planetarium.

Perhaps you're old enough to have watched the first footsteps on the moon in real time. Maybe it was the first time you saw Saturn through a telescope. For some future space professionals, seeing the recently released images from the James Webb Space Telescope or the NASA sounding rocket launches from the Arnhem Space Centre will be their inspiring moment.

As educators, we need to capture that wonder and inspiration and develop it into curiosity. Curiosity is at the heart of what we do at Scitech. Curiosity encourages students to ask questions, seek out

answers, explore new information and build their opinions. The more tangible the inspiration, the better we can develop our future generations curiosity and passion, essential for students venturing into STEM fields and careers in space.

Inspired people have something to come back to and focus on during their education. It is here where educators and the space industry must work together. It is the educator's responsibility to facilitate lessons that will inspire students, and it is the space industry's responsibility to provide educators with the resources, experiences and cooperation to do this.

From the publication of scientific data for educators to use, like the 2dF or GAMA, bringing students into contact with professionals, like the BinarX school program operated by the Space Science and Technology Centre at Curtin University, to bringing professionals into contact with the public, like the 'Meet the Scientist' events hosted by the Scitech Discovery Centre. These are examples of how educators and the space industry can together inspire students and spark that curiosity for our future space pioneers.

Another important consideration in bridging the gap is demystifying the idea of what a career in space looks like. With the space sector growing rapidly and aiming to reach the target of 30,000 by 2030, there will be high demand for multiple jobs across diverse skill sets from scientists and engineers, through to management and administration roles. Many future jobs in this industry don't even exist yet.

We have enormous influence as educators so our

responsibility in a STEM environment is to start these conversations with students early in their education and promote the value and benefits of the space industry which can ignite that curiosity. Presenting examples of how space research is benefiting life on earth, providing inspiring mentors, and close collaboration between educators and space industry leaders on clearer career pathways will become easier as Australia strengthens its role in the global space race.

Scitech plays an important role in education and having closer ties with industry would enable us to amplify our work in elevating students' knowledge, creating a bond with science that can't be replicated in the classroom. It all comes back to harnessing that inspiration, and sparking that curiosity, so important in preparing students confidence to pursue a future career where they can reach for the stars.

Every adult remembers their favourite teacher. Who are you thinking of right now, and what did they teach you?



"Imbedding meta-learning strategies to develop students' ability to learn about how their learning is crucial in a 21st century digital knowledge society."



Michael Pakakis

Victoria

Director

Victorian Space Science Education Centre

Growing a Sustainable Australian STEM Workforce.

In July 2021, the Australian Academy of Science, at the request of Australia's Chief Scientist, prepared a report on the stated purpose of the Australian Space Agency to grow the space sector in Australia by a factor of three - to be a 10-12-billion-dollar industry by 2030 and to create an additional 20,000 new jobs. The Academy report indicated that for this aim to be realised, Australia's universities would need to produce 900 engineers, 300 scientists and 800 non-STEM graduates each year, in addition to the numbers needed to support other sectors of Australian industry.

The challenges of how to grow Australia's STEM workforce, both graduates and technicians, extend well beyond the space sector and call for concerted national action by educational authorities at all levels of government. The challenges of the 21st Century are not being met by a future focused education system but a standardised system that relies on 20th Century solutions. We need to develop a future workforce that can learn and work collaboratively and independently, to think

critically and be able to transfer their knowledge onto others.

This year, the Victorian Space Science Education Centre (VSSEC) celebrates its 16th anniversary. Since it opened its doors in 2006, about 250,000 students have participated in one or more of VSSEC's programs. Very few students that we know of have moved into space-related careers in Australia and overseas. Most however, have been lost to us, in the sense that we do not know whether they entered tertiary education, and if they did, what they studied and what they are doing now. Longitudinal data on the effectiveness of what we do is impossible to gather. However, we do know from other research, that VSSEC's educational model is effective and that students who participate in its programs leave with a clearer understanding of the processes of scientific inquiry and of the importance of mathematics.

In VSSEC's experience, the growth of Australia's STEM workforce, to the benefit of all sectors of the economy, including, but not confined to space, will fundamentally depend on three factors: motivation, workplace culture, and certainty of employment.

Motivation

At the heart of motivation in an internet-enabled world, is student agency. Authority in the classroom no longer resides just with the teacher alone. There is compelling evidence that inquiry-based learning and learning by doing, works. Students become engaged and invested in the results and the outcomes of their learning. Imbedding meta-learning strategies to develop students' ability to learn about how their learning is crucial in a 21st century digital knowledge society.

Key to success in the STEM disciplines are teachers who are competent and confident in teaching mathematics from the earliest primary school years to the senior years of secondary school. There is a national shortage of teachers, especially in mathematics, that shows no sign of being alleviated. Teachers, especially in the state systems, are simply burning out and leaving the profession for more money, less stress, and more respect in other jobs. Until the teacher shortage is resolved, the number of STEM qualified people needed to sustain the economy in 2030 will simply not be met.

Workplace Culture

The STEM professions, especially engineering, are dominated by males. There is an associated culture of bullying and harassment, especially of female employees, who presently comprise only 1 in 5 of those who work in the national STEM workforce. Many secondary school students, together with their parents and other influencers, cannot envis-

age what it means to actually work as a scientist or an engineer and, for the most part, many in such jobs are hopeless at explaining what they do.

Certainty of Employment

Students are intensely rational, and the evidence suggests that many, perhaps most, make further education and career choices more often than not on the possibility of obtaining a job that will lead to career certainty and financial stability.

Implications for the Space Sector

Whether the space sector manages to attract the number of employees it will need by 2030, is more down to the behaviour of the sector itself and how it represents itself to the community, than to the education sector. We will do our best to meet the demand.



"Effective partnerships delivering proven world class STEM and space curriculum will be key to this success."



Dr Scott Sleap

New South Wales

STEM Project Advisor 7 – 12
Department of Education NSW

Getting today's students ready for tomorrow's Space workforce.

Nothing inspires and engages young people quite like space. The term 'moonshot' derived from the Apollo 11 spaceflight project, originally meant 'long shot'. Until recently, Australian students' ability to work in the space industry was seen as a 'moonshot'. In 2018, this changed with the creation of The Australian Space Agency, along with an ambitious plan to transform our sovereign space industry. This has been the catalyst for an Australian space race, leading to an additional 20,000 new jobs by 2030. For Australian students' employment in the sector is now a real possibility. In fact, the industry's future success will depend upon the capacity to develop a STEM-enabled workforce.

Australia's space sector touches virtually every part of the Australian economy and is linked to many emerging areas including digital capabilities, advanced manufacturing, Defence, cyber, and quantum technologies. These areas are predicted to drive Australian economic prosperity over the next few decades. However, not enough attention has been given to developing the skills required by the next generation. Workforce development

initiatives typically focus on, attracting overseas talent, universities and the vocational education sector. However, little attention has been given to the earlier years of education. Many Australian teachers and students currently do not understand the importance of STEM and related careers. The number of Australian students studying senior secondary STEM subjects has plateaued at around 10% or less. Industry concerns about their future workforce include skill shortages and recruitment challenges that risk Australia's future security and prosperity.

The Hunter Region of NSW is a great case study for STEM education and workforce development. Government, industry, and education collaborated to ensure the regions ability to develop a future workforce for large upcoming projects such as the F-35, joint strike fighter sustainment contract. BAE's Systems developed the 'Advancing the Next Generation' initiative, in which students were 'engaged' at primary school, 'inspired' at high school, and 'developed' with tertiary education with the overall aim to 'employ'. Its aim was to engage all key stakeholders in building a workforce development pipeline. This initiative was supported by long term funding from the Australian Department of Defence

and by the support of key state holders including industry, schools and universities.

The STEM education eco-system in the Hunter Region, led to the development of an innovative school-based curriculum known as 'iSTEM'. In 2022 the course was adopted as one of seven NSW Department of Education Approved Electives, developed as part of the state's new curriculum reforms. The success of the Hunter Region's programs was underpinned by a dramatic increase in overall STEM participation in senior secondary by 19.22%. In a 2019 OECD report the STEMship initiative, which was developed as a VET extension of the iSTEM course was recognised as world's best practice.

Based on the Hunter Region's success, the NSW Department of Education established the state-wide STEM Industry School Partnerships (SISP) program. Since its inception in 2018 it has reached over 100,000 students and 20,000 teachers. The program focuses on curriculum where students learn by doing and solve real-world problems such as those required by the space industry.

Space education programs need to be curriculum aligned, however, many are not. The space industry recently assisted in the development of a space specific iSTEM elective. Through partnerships with Australian and US organisations the 'design for space' elective was developed. The Powerhouse Museum's, Future Space program utilises the elective, which will enable a future Australian

student designed mission on the International Space Station. Also, in an Australian first the iSTEM Cyber Security elective will use satellite technologies to inspire the next generation of cyber security experts.

Through industry supported space programs students develop a range of non-technical skills including complex problem-solving, creativity and teamwork. The Australian Virtual Astronaut (AVA) Challenge is an excellent example of how this is being achieved in Australian schools. Students develop design solutions based on NASA's ARTEMIS program. They then will have the opportunity to pitch their solutions to space industry experts at the 2022 Australian Youth Space Expo.

Educators can play a crucial role in bridging the STEM skills gap, ensuring Australia can capitalise on the growth of the global space industry expected to reach US\$1.1 trillion in 2040. Effective partnerships delivering proven world class STEM and space curriculum will be key to this success.



"An intensive effort across many sectors is needed to further develop Space Education in Australia, equipping future generations with the passion, knowledge and skills to be innovative, entrepreneurial and globally competitive in the space sector workforce."



Peta Kourbelis

South Australia

Principal

Hamilton Secondary College – Space School

The Australian Space Agency has a clear objective to continue growing its space sector workforce to reach 30,000 direct jobs by 2030. Education is widely acknowledged as an integral pillar to achieving this goal and is especially powerful when it works in collaboration with other key stakeholders, including policy decision makers, space organisations, industry, and government agencies.

From an educational perspective, the primary and secondary school sectors have their own unique and important part to play in bridging the space workforce gap as they lay the foundations to growing a passionate, highly skilled and innovative workforce. It is through these years of schooling that students form beliefs, attitudes, skills and deep knowledge about the space sector that entices them to enter this workforce. It is therefore critical that a strategic investment in space-related STEM education that starts from the primary years continues to be a priority so educators can grow a sustainable, skilled pipeline of secondary school

graduates who see the space sector as their future career pathway.

There are multiple educational approaches that support the development of a strong pipeline of highly skilled students, equipped to work in the space sector. This article focuses on three essential approaches: raising student awareness of the space sector; intellectually engaging students in a rigorous space education curriculum; building the capacity of teachers.

School excursions across Australia to centres such as the Australian Space Agency, Space Discovery Centre, Victorian Space Science Education Centre and Questacon; Programs such as the Mission to Mars Initiative which operates in the VSSEC and Hamilton Space School; the Space Passport Program for students in years 2-12 are pivotal in raising students' awareness about space across the primary and secondary school sectors including those from rural and disadvantaged metropolitan

schools.

At an age when students start to form views about the world around them and dream about the work they see themselves doing, such excursions and exposure to space specific programs are vital. They successfully spark students' curiosity and promote the value of space as they assist students to make a connection with the benefits of space and how it impacts them every day. Teachers accompanying students on these 'Space excursions' are also engaged and often look for ways to introduce and embed real life 'Space Concepts' and space careers beyond 'Rockets and Astronauts' within curriculum when returning to school.

As students move to the secondary educational sector, it is essential to the future of the Space Industry workforce in Australia, that students are empowered to maintain their interest so that they are more likely to invest time in developing skills needed in the space sector. The Space Academy at Hamilton Secondary College is an example of a model and a framework that supports educators to provide a high quality, robust and specialised space related curriculum and inspires students to investigate a broader range of space careers as they plan their university and vocational pathways.

The learning experience of this initiative provides an exciting platform that uses immersive and interactive technology, including our planetarium to support students in investigating the impact of space travel on humans through topics such as Robotics, Communication, plant Biology, space Medicine and Law. This model stretches students' thinking collectively and individually. It develops creative and critical thinking and requires them to use effective communication, problem solving skills, teamwork and leadership to apply innovative ideas and reach evidence-based conclusions to these global issues. Using a learning -by-doing pedagogy, this model supports the enhancement of their science literacy and numeracy capabilities and amplifies their capabilities to apply their mathematical and scientific knowledge of space. This enables them to build individual capabilities necessary for the dynamic space workforce. Talks

from professionals, interactive workshops and further opportunities to make connections with relevant industries provide students the opportunity to explore the careers available within the sector in more depth and to plan their SACE and tertiary pathways based on their highly developed knowledge and understanding.

The introduction of professional development opportunities to support teachers as they pursue self-improvement specifically in space education is paramount. The rapidly changing nature of technology and the space-related discoveries raises the necessity for on-going comprehensive profession learning that is specifically designed to support deep learning and foster teachers' confidence to make pedagogical shifts to teach space content in inspiring and motivational ways.

The success of Hamilton Secondary College in delivering "Our Place in Space" professional learning for teachers from all sectors in 2021 and the collaboration with the Andy Thomas Space Foundation projects such as the ATSF Mars Challenge are examples of what we can achieve in educating primary and secondary students in space education in transformational ways. This year with 7 South Australian schools receiving grants through the ATSF from Space Industry to link Australian Curriculum with the Buzz Aldrin Space Foundation 'Giant Mars Map' and Space Technology, we again see high levels of engagement and interest in space education and opportunities to ignite student passion and interest in the space industry.



"We cannot be who we cannot see."



Mandi Dimitriadis

Industry

Director of Learning

Makers Empire

Preparing today's school students for the opportunities that lie ahead in the space sector.

In 2030 today's ten-year-old's will be finishing high school. They will be entering the workforce, choosing tertiary education courses, and post-school training options. Among these students are the future employees, researchers and leaders responsible for shaping Australia's contribution to the global space race. Educators play a vital role in ensuring that these young people are excited by and prepared for the challenges and opportunities that lie ahead in the rapidly developing space sector.

Children are experiencing important developmental growth at the age of ten years old. It is around this time that children develop strong values and moral stances. They cement their world views, identify with causes and issues, and solidify their sense of self-awareness and direction. Children's view of their interests, strengths, weaknesses, and potential are often locked in at this early age. This means that career education should begin in primary school where students are open to

new interests and curious about their place in the world and the future. It is vital to the future of the space sector in Australia that primary school students have opportunities to be inspired by space, become aware of possible future pathways and understand that the space sector represents genuine, attainable, and exciting opportunities that they could well be a part of.

If we want to influence the learning outcomes and experiences that students have at school, we need to start with teachers. Teachers are the most dominant influence in student learning, and the most powerful way to influence teacher practice is through professional learning. Teachers need support to develop their own awareness and understanding of the space sector in Australia if they are going to pass on this knowledge and help their students prepare for the many space-related opportunities that lie ahead. Programs such as the Andy Thomas Space Foundation Education Fund play a key role in involving teachers in space-related professional learning and helping their students be inspired by and prepared to enter the space sector.

If awareness and inspiration are the first steps in preparing Australian students for their part in the global space race, the second step must be to ensure that students are leaving school with a strong foundation in STEM education. This not only means that students need a deep understanding and competent application of the disciplinary skills, knowledge and concepts of Science, Technologies, Engineering and Mathematics. It is just as important that students know how to draw upon this strong foundation and apply their skills and knowledge in real-world, authentic contexts. They need to be equipped with a range of problem-solving, critical, and creative thinking abilities in order to be adaptable, innovative and successful drivers of change in the space sector. It is encouraging that many primary schools are already embedding design thinking and project-based, industry-connected experiences in their teaching programs as this is the type of approach that helps students develop strong skills and strategies and inspires them to solve problems, innovate, work together, and help drive the future.

Although I've highlighted the important role that teachers play in developing students' awareness and skills, they cannot do it alone. I would like to see a strong industry partnership between schools and those already working in the space sector. Industry input is essential in articulating the skills and ways of thinking that students will

need, and for keeping the education sector up to date with new developments and opportunities in space. Students also need to be inspired by role models within the space sector. We should be promoting and celebrating the achievements of diverse Australians already working within the space sector. We cannot be who we cannot see.

We cannot teach our students how to deal with every challenge or opportunity that the space sector will face in the future but we can help them to be adaptable, resilient, and equipped with the collaborative problem solving tools that will need to find a way forward when faced with situations that have never been encountered before. This is essential if we want our young people to find their place in space and contribute to Australia's success in the global space race.



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Message from the 14th Australian Space Forum Official Media Partner

We are very proud to be the Official Media Partner to the Andy Thomas Space Foundation's 14th Space Forum and trust you will support the endeavour to engage, educate and amplify the Australian space sector.

There has been a lot to celebrate in the Australian space sector for 2022. Most notably are the three successful NASA mission launches conducted in late June and early July by Equatorial Launch Australia. Three successive launches, in 15 days, from the Arnhem Space Centre, a remote location in the Northern Territory, is a significant achievement.

The Australia space industry is clearly in an exciting period as it expands the development of launch capability, along with the alignment to STEM sectors, advanced manufacturing sector and defence sector. Australia will be challenged to have a purely sovereign space capability and partnerships with the US, UK, France, Japan, India, South Korea and Singapore will be critical and broad in scope. This is also all in an era of strategic competition and hence the defence domain in space is fundamental and underlines the need for sovereignty.

Though Australia in space is not just about rockets and satellites launching from Australian soil. Broader efforts are also needed to garner interest and attention of a much needed, future workforce. Australia is yet to develop a clear national space strategy, but it is widely recognised space is a global business and broad in its skill and science discipline reach. The Australian Space Agency's mission is to triple the size of the national civil space sector to \$12 billion and create an additional 20,000 jobs by 2030. So, it's only natural there needs to be greater effort to amplify awareness and celebrate the achievements and challenges that are unfolding and lay ahead.

Crewed flights to the Moon and Mars, including the establishment of permanent human bases are a core global objective but major technological advances and governance solutions are needed to overcome the myriad of challenges that confront human survival in outer space. These challenges provide valuable opportunities for Australia's multidisciplinary research to engage with new space endeavours.

We have seen continued, world leading academic research in the space domain from Australia. This includes a new mathematical model developed by space medicine experts from the Australian National University (ANU) which can be used to predict whether an astronaut can safely travel to Mars and fulfil their mission duties upon stepping foot on the Red Planet. The ANU team simulated the impact of prolonged exposure to zero gravity on the cardiovascular system and whether the human body can tolerate Mars' gravitational forces without fainting or suffering a medical emergency when stepping out of a spacecraft.

The Australian Space Agency released the Earth Observation (EO) from Space Roadmap, the second in a series of 7 roadmaps which outlines a 10-year plan. In support of the Australian space sector roadmaps, engagement with industry and the broader community is required to ensure sustainable societal support of space operations, as well as to attract the next, emerging generation of Australians who will work and, hopefully, be in space.

We are very proud to be the Official Media Partner to the Andy Thomas Space Foundation's 14th Space Forum and trust you will support our own endeavour to engage, educate and entertain the Australian space sector and its interdependent sectors, such as robotics and advanced manufacturing. Across our channels we keep abreast with the latest developments and look forward to sharing these in the Australia in Space Magazine,

Enjoy the 14th Space Forum and the reading, watching and listening.

Chris Cubbage CISA, GAICD
Director and Executive Editor, MySecurity Media

AVALON 2023

AUSTRALIAN INTERNATIONAL AIRSHOW AEROSPACE AND DEFENCE EXPOSITION

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The Australian Government has formed the Defence Space Command and has committed to investing around A\$7 billion this decade in the space domain.

The Australian Space Agency is working to triple the size of the Australian commercial space sector by 2030.

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38,952 accredited
trade visitor
attendances



698

companies from
30 countries



161

delegations from
28 countries
41 International
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Jean-Marc Astorg
Strategy Director, Centre National D'etudes Spatiales

After been graduated from the Ecole Centrale des Arts et Manufactures in 1985, Jean-Marc Astorg joined the CNES Launch Vehicles Directorate to work on the space plane HERMES project. Since 1991, he has been deeply involved in the Ariane launcher family, taking increasing responsibilities in the development of the European launcher. In particular, he was the project manager of the Ariane 5 new upper stage ESC-A development from 1997 to 2003, which is still operational today. He then directed the 'Soyuz in French Guiana' project, from 2003 to the first launch in 2011 consisting to build a launch pad in French Guiana for the Russian Soyouz rocket. In 2012 after the first flight of Soyouz in French Guiana, he became the CNES Director

of Procurement, Sales and Legal Affairs also in charge of Intellectual Property. In 2015, he was nominated the CNES director of Launch Vehicle, managing a team of 300 engineers in charge of the CNES support to Ariane 5 exploitation, the construction of the Ariane 6 launch pad and the preparation of future launchers through demonstrators like Prometheus, Callisto and Themis. In 2022, he was nominated the CNES director of Strategy which includes in the new CNES organisation the strategy but also prospective, future studies & technology maturation, preparation of new programs, industrial policy and interfaces with private and public partners.



Dr. Geraldine Baca Triveno
Specialist Senior Manager, Deloitte Space

Dr. Geraldine is a PhD qualified research scientist and engineer working as a specialist senior manager in Deloitte Space. Geraldine's scientific career was focused on the research, manufacturing and testing of advanced materials the nanoscale with applications spanning a range of industries, including aerospace, biotechnology, energy and

resources. Geraldine is helping drive Deloitte's national space-industry innovation agenda and engagements. Her expertise includes business, technology, scientific and engineering advisory for the space sector and its value chain.



Reece Biddiscombe
National Mission Director, Australian Space Agency

As National Mission Director, Reece is responsible for the delivery of national missions. In 2020, he led delivery of the Australian Earth Observation from Space Roadmap through close engagement with the Australian and international Earth observation communities. Reece also led the Bushfire Earth Observation Taskforce that explored how Earth observation can make a greater contribution to bushfire risk management in Australia. Reece was seconded to the Australian Space Agency in 2020 and transitioned from Defence to a substantive

role at the Agency in late 2021. In Defence he had a long career as a geospatial intelligence analysis team leader and, since 2013, led space capability development and directed Defence minor and major projects including DEF799 Phase 1 and DEF799 Phase 2. Reece has bachelor degrees in surveying and data management and has nearly completed a Master of Space Operations with a focus on space program delivery.



Associate Professor John Culton
Director, Andy Thomas Centre for Space Resources, University of Adelaide

Associate Professor of Off-Earth Resources and Director of the University of Adelaide's new Centre formed to deliver cutting-edge research and development of technologies necessary to support extended human presence in deep space. Previously, A/Prof Culton served as a pilot and diplomat while an officer in the U.S. Air Force. As such, A/Prof Culton's experience at the crossroads of space

policy, law, regulation, engineering, and defence gives him insight into the broader sector and the rapidly developing ecosystem that will enable the real-world application of the Centre's research, providing critical technology solutions enabling multiple crewed deep space missions to the surface of the Moon, Mars, and beyond.



Dr Simonetta Cheli
Director of Earth Observation Programmes and Head of ESRIN, European Space Agency

Simonetta Cheli took up duty as Director of Earth Observation Programmes and Head of ESRIN (D/EOP) on 1 January 2022. Born in Siena, Italy, she studied law and economics at Yale University in the United States, before gaining a degree in political sciences with a thesis on international satellite telecommunication law at the University 'Cesare Alfieri' in Florence, Italy. She also holds a diploma of advanced studies (DEA) from the Centre d'Etudes Diplomatiques et Stratégiques (CEDS) in Paris. She has worked at ESA for over three decades, both at Headquarters in Paris and at ESRIN, including 15 years of working within the Directorate of Earth Observation Programmes. She joined ESA in 1988, working in International Relations, Programme

and Strategy, then moved to ESRIN in 1999 as Head of Public and Institutional Relations covering Italy, Spain and Portugal. In 2008, she returned to Paris as Head of the Coordination Office for Earth Observation. Before her selection as Director of Earth Observation, Simonetta Cheli was Head of the Strategy, Programme and Coordination Office for Earth Observation, coordinating relations with international partners in the field of environment and climate, and with ESA Member States and the European Union, managing the Programme Board of Earth Observation, and relations with European Partners such as Eumetsat and ECMWF. She also teaches Master courses on space, is a member of numerous international committees and has received various awards.



Leanne Cunnold
Chief Executive Officer, AROSE

Leanne Cunnold has more than 25 years' experience in the advanced technology sector focused on business transformation, strategy, mergers and acquisitions, business development and marketing. Leanne is currently the CEO of AROSE, a Perth-based organisation focused on enhancing Australia's remote operations capability, on Earth and in Space. In this role Leanne is responsible

for the day-to-day management of AROSE and its projects, cross-industry collaboration, and ecosystem development. Previously Leanne held senior executive roles at Schneider Electric and APC with postings in Tokyo, Sydney, Singapore, Boston, and Hong Kong.





Walter (Walt) C. Engelund

Deputy Associate Administrator for Programs Space Technology Mission Directorate, NASA Headquarters

Walt Engelund serves as the Deputy Associate Administrator for Programs in the Space Technology Mission Directorate (STMD) at NASA Headquarters, and provides executive leadership and execution for a portfolio of 10 space technology programs with an annual investment value of over \$1Billion. STMD invests in technologies for NASA and commercial space needs that span the full range of technology readiness levels (TRLs), from fundamental laboratory experiments to full scale space flight demonstrations. Prior to his appointment with STMD in 2019, Mr. Engelund spent 30 years at NASA's Langley Research Center in Hampton, VA, most recently as the Director of the Space Technology and Exploration Directorate, where he led an organization that was responsible for developing

technologies for human spaceflight and robotic exploration. He also previously served as the Chief Engineer at NASA Langley, and was responsible for technical oversight for Langley's diverse research and development portfolio, spanning aeronautics, human and robotic space technologies, and Earth science and remote sensing systems. He is a recognized expert, reviewer, and consultant for hypersonic flight and planetary entry systems for NASA and other government agencies. He is a Fellow in the American Institute of Aeronautics and Astronautics, and the recipient of numerous NASA Achievement Awards including NASA's Exceptional Engineering Achievement and the Exceptional Achievement Medals, and the Meritorious Presidential Executive Award.



Dr Alex Held

Director, Earth Observation Infrastructure, CSIRO

Alex is one of Australia's leading Earth Observation experts. Under his stewardship as Director of the CSIRO Centre for Earth Observation, Alex has overseen the establishment of the new radar satellite NovaSAR-1 as one of Australia's newest national research facility; leads the development of innovative science in remote sensing and drives the development of spatial technology and data analytics to support sustained Earth observation and measurement of our planets eco-systems. Alex is the Director, Earth Observation Infrastructure and also leads the newly formed CSIRO AquaWatch Australia Mission – a mission in development - which aims to establish an integrated ground-to-space national water quality monitoring system using data from bespoke Earth observation satellites and aquatic based sensors. This Mission seeks to improve the management of

our precious water resources using purpose-built space technology – and support growth across Australia's high-tech space sector. In early 2021, and in global recognition of his work, Alex recently received the COSPAR Harrie Massey Award for "outstanding contributions to the development of space research in which a leadership role is of particular importance", being the first winner of this award from the southern hemisphere. Among Alex's other distinguished work in steering national and international science policy, he served as Co-Chair of the international Committee on Earth Observation Satellites Strategic Implementation Team (CEOS SIT) for 2 years (2020-2021) and spearheaded the award-winning delivery of the Sentinel Hotspots program (2002-2006), which is still used to support bushfire response activities in Australia.



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Dr Andrew Johnson

Chief Executive Officer and Director of Meteorology, Bureau of Meteorology

Andrew is CEO and Director of Meteorology at the Australian Bureau of Meteorology. He joined the Bureau in late 2016 and was reappointed for a further five-year term in 2021. He is also Australia's permanent representative to the World Meteorological Organisation in Geneva. Andrew has held several non-executive directorships across a range of domains in the private, government owned

corporation and not-for-profit sectors, both in Australia and internationally. He has a PhD from the University of Queensland and a Masters from the Kennedy School at Harvard University where he was a Rotary Foundation scholar. Andrew is a Fellow of the Australian Academy of Technology & Engineering and the Australian Institute of Company Directors.



Dr James Johnson
Chief Executive Officer, Geoscience Australia

Dr Johnson has been the Chief Executive Officer since April 2017. Dr Johnson is a geologist with over 35 years' experience, including private sector mining and mineral exploration. He has led teams of geoscientists for over 20 years with a number of diverse achievements. These range from discovery of over two million ounces of gold reserves in industry, to national scale pre-competitive geoscience programs that have attracted exploration investment to Australia. Dr Johnson first joined Geoscience Australia in 2006 and in that time has been head of various divisions with diverse duties including carriage of energy and mineral programs. He has also been a member of the Board of the National Computational Infrastructure (NCI) at the Australian National University since 2017, and a

member of the Australian Antarctic Science Council since 2018. Dr Johnson is also a fellow of the Australian Academy of Technology and Engineering. Dr Johnson has a Bachelor of Science majoring in Geology from the University of Sydney and a PhD from the Australian National University. Dr Johnson's vision for Geoscience Australia is one of deploying integrative geoscience for the economic, social and environmental benefit of Australians. He is driving a strong agenda of inclusiveness, is a member of the Champions of Change Coalition in STEM, has led Geoscience Australia towards Bronze accreditation in the Science in Australia Gender Equity (SAGE) initiative and is driving Geoscience Australia's engagement with Aboriginal and Torres Strait Islander peoples.



Ian Jones
Chief Executive Officer, Goonhilly Earth Station Ltd

Ian Jones is the founder, CEO and significant shareholder of Goonhilly Earth Station Ltd. He is an entrepreneur and electronics engineer who has spent his career in the space communications industry. Having graduated from Leeds University, Ian worked for British Telecom Research Labs and Communication Systems Research Ltd where he was a modem design engineer working on the development of digital signal processing-based radios for Inmarsat ground stations. When CSRL was acquired by Ferranti International, Ian was promoted to Head of Space Hardware and Head of Business Development of Ferranti Computer Systems Ltd - a specialist satellite communications design consultancy. Here he was responsible for develop-

ing, building, selling and installing a number of new products for control and monitoring of advanced communication systems. These were sold to major space industry organisations globally. In 2008, Ian became aware of the impending closure of Goonhilly and set about creating a new company to transform and re-build the business. He agreed a lease of the antennas with BT in 2011 and acquired the Goonhilly site and assets in 2014. He has led 2 successful finance rounds, built a growing and ground communications capability serving many of the world's major spacecraft operators including NASA, ESA, Intelsat, SES, Hughes/Echostar, Inmarsat/Viasat and Eutelsat, and has established Goonhilly as the world's first private participant in NASA and ESA's deep space networks.

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Nick Larcombe
Access to Space and Human Spaceflight, Office of the CTO, Australian Space Agency

Nick Larcombe is the Access to Space Roadmap map lead with the Australian Space Agency. He has recently completed the Agency's Robotics and Automation on Earth and in Space roadmap. He supports both of these Space Priority Areas from the Access to Space and Human Space Flight

team within the CTO. Before joining the Agency Nick Co-founded a start-up that endeavoured to design and develop a family of oceanic launch rockets. He lives in Adelaide with his partner Mallory.



Dawn McIntosh
Space Systems Director, Fugro / SpAARC

Dawn McIntosh is the Space Systems Director at Fugro Australia, responsible for ensuring the SpAARC (Space Automation, AI and Robotics Control Complex) initiative meets the challenging operations needs of space missions. She is extremely excited about focusing on space infrastructure and providing Operations as a Service with SpAARC. Prior to moving to Australia, Dawn spent over 20 years at NASA Ames Research Center where she spent the last decade leading small spacecraft missions. Her most recent spacecraft mission, BioSentinel, is one of the ten cubesats on the

SLS Artemis I mission. Dawn was BioSentinel's Project Manager. She was also the Deputy Project Manager for the LADEE mission, a lunar orbiter in 2013-2014. And the Project Manager for the early phases of the Starling 1.0 swarm spacecraft technology demonstration mission (hopefully) launching later this year. She is also a member of the AROSE International Space Council. Dawn enjoys discussing all aspects of space missions and the supporting infrastructure - especially the vision of SpAARC - and is happy to be a part of the maturation of Australia's growing space ecosystem.



Professor Anna Moore
Director, Australian National University, Institute For Space

Professor Anna Moore is at the forefront of the expansion of Australia's space industry. She is director of The Australian National University (ANU) Institute for Space (InSpace). Professor Moore was instrumental in the formation of the Australian Space Agency, as part of the Australian Government's expert reference group. She is a distinguished researcher, a world-leading expert in astronomical instrumentation and a global leader in the emerging field of transient infrared astronomy. Her expertise is critical to the space industry in Australia, NASA, the Scientific Committee on Antarctic Research, and many other global space industry partners.

Anna is an inspirational role model to many women and is ensuring women thrive in the traditionally male-dominated STEM workforce. While 16 per cent of Australia's STEM-qualified workforce are women, the InSpace team is more than 50 per cent female. Over her career, Professor Moore has raised over \$150 million in funding across 23 manufacturing projects. She was awarded Female Leader of the Year at the 2021 Australian Space Awards, and ANU InSpace was named Research Organisation of the Year at the 2022 Australian Space Awards.

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Enrico Palermo
Head, Australian Space Agency

Enrico has led the Australian Space Agency since January 2021 from its headquarters in Adelaide. Since his commencement, Enrico has overseen a number of major milestones. Under his leadership the Agency has reached agreements with NASA for an Australian designed, built and operated rover to be included in a future mission to the Moon and for collaboration on earth science as part of the landmark National Space Program for Earth Observation. The first launch permits and launch facility licenses under the Australian Space (Launches and Returns) Act have been issued, and there has been the first commercial spaceflights from Australia. Before joining the Agency, Enrico

spent 14 years in various roles at Virgin Galactic, including establishing and leading a vertically integrated aerospace manufacturing and testing operation for the build and testing of a fleet of Mach 3, crewed commercial spaceships. From there Enrico was part of the team that launched the New York Stock Exchange listed public company and was appointed Chief Operating Officer. A Perth native, Enrico graduated from the University of Western Australia with a Bachelor of Engineering in Mechanical Engineering and Bachelor of Science in Physics and Applied Mathematics. He also studied at the International Space University in Strasbourg.



Dr Jonathon Ralston
Senior Principal Research Scientist, CSIRO

Jonathon is a Senior Principal Research Scientist in CSIRO who leads strategic research to provide solutions that address complex operational challenges in the mining and resource sector. For over 25 years, he has delivered R&D solutions in areas such as remote operations, mining automation, robotics systems and integrated architectures. A highlight includes LASC Longwall Automation, where he was awarded two CSIRO medals in 2015 and 2016 for his seminal contributions to the success of the project. His research agenda has delivered industry impacts which not only solve current operational challenges but also influence industry leaders to adopt new, disruptive technologies.

He is Chair of the New Mining Frontiers theme for the World Mining Congress 2023, was seconded to the Australian Space Agency (ASA) to develop the space robotics and automation roadmap and is actively involved in international Agency working groups such as ISECG and IMEWG. He also initiated activity within CSIRO to establish new In-Situ Resource Utilisation (ISRU) science and engineering capability through the Space Future Science Platform to advance Australia's capability in Space Resources technology.



Adjunct Professor Nicola Sasanelli AM
Chief Executive Officer, The Andy Thomas Space Foundation

Adjunct Professor Nicola Sasanelli AM graduated from the University of Bari, Italy with a degree in Electronic Engineering. He went on to work as a researcher in microelectronics components before being appointed as Scientific Attaché at the Embassy of Italy in Canberra from 2001 to 2008. In 2009, Nicola joined the South Australian Government as Director for International R&D Collaborations. From 2003 to 2013 he was appointed as Adjunct Professor of Science and Technology at the University of Canberra, Australia, and in 2007 he became an Honorary Member of the Order of Australia. In September 2017 the South Australian Space Industry Centre was created with Nicola as Director.

In 2018 Nicola was appointed Adjunct Professor at the University of South Australia and he was appointed on the board of the Space Industry Association of Australia. In the same year he was also appointed to the Order of Merit of the Italian Republic by the Italian Government. In 2019 Nicola joined SmartSat CRC as Director of Communication and Outreach. In 2020 Nicola founded the Andy Thomas Space Foundation, of which he is now CEO. Nicola's main passion, outside of his interest in space, is painting.

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Associate Professor Sascha Schediwy
International Space Centre Node Leader, University of Western Australia

Associate Professor Schediwy is an internationally recognised research leader in the fields of high-precision space and astronomy instrumentation. He was named the 2021 Australian Space Awards Academic of the Year and won the Excellence Award (the highest individual award). He leads the Astrophotonics research group at the University of Western Australia, as well as a four-year SmartSat CRC research project on coherent free-space optical communications and an Australian Space Agency Moon to Mars optical communications demonstrator project. Associate

Professor Schediwy is the lead designer of the Mid-Frequency Square Kilometre Array telescope's Phase Synchronisation System, and he has previously worked on radio-frequency phased arrays for the SKA telescope, laser technologies for advanced gravitational wave detectors, and the analysis of Apollo rock samples to learn about the early evolution of the solar system. He has authored 62 peer-reviewed publications across space and astronomy, including 15 as first author and 20 as group leader.



Dr. Carl Seubert
Chief Researcher, SmartSat CRC

Dr. Carl Seubert is Chief Research Officer at SmartSat CRC, Australia's largest space research organisation. At SmartSat he guides the research portfolio and technology developments to build industry capabilities and enable Australia's future space missions. He coordinates space research endeavours with the 100+ industry and academic partners of SmartSat as well as the national and international collaborators. He obtained graduate degrees in the USA with research in small satellite propulsion and spacecraft formation flight. He

recently returned to Australia after nearly a decade at NASA JPL as a senior engineer in Guidance and Control, where he managed the Spacecraft Formation Control Testbed. He led research and technology development campaigns for future Earth observation missions using spacecraft formations and terrestrially demonstrated precision planetary landing for future NASA missions. His spacecraft pointing control algorithms are headed to Jupiter on the Europa Clipper mission.



Rabindra (Rob) Singh
Chief Technology Officer, SpaceLink Corporation

As CTO at SpaceLink, Rob provides executive leadership in implementing the company's technology strategy and vision. He leads a multi-disciplined team with expertise in leveraging innovation for the development and implementation of an end-to-end space communications system. Under his leadership, SpaceLink is developing an end-to-end transport relay solution leveraging innovation in software defined relay satellite constellation in MEO, ground network with RF V/Q band gateways, client optical user terminals, and cloud-based network management data distribution systems.

Rob was previously VP of Strategy Initiatives and Chief Architect at Maxar Technologies, where he developed business strategy and technology roadmaps for disruptive solutions across the communication and earth imaging domains. He holds bachelors and masters engineering degrees from the University of Waterloo, Canada and a Corporate Innovation Certificate from Stanford University Graduate School.

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Professor Salah Sukkarieh
Professor of Robotics and Intelligent Systems, Australian Centre for Field Robotics, University of Sydney

Salah Sukkarieh is the Professor of Robotics and Intelligent Systems at the University of Sydney. He was awarded the NSW Science and Engineering Award for Excellence in Engineering and Information and Communications Technologies in 2014; one of Australia's Most Innovative Engineers by Engineers Australia in 2016; in 2017 the CSIRO Eureka Prize for Leadership in Innovation and Science, one of 11 Launch Food Innovators worldwide, and the AFR True Leaders Game Changer; and in 2019 was nominated as one of the 2019 NSW Australian of the Year, as well as being recognised by Engineers Australia's as one of their Centenary Heroes. Salah is a Fellow of Australian Academy of Technological Sciences and Engineering (ATSE), and has over 500 academic and industry publications in robotics and intelligent systems. From 2019-2022 he was the CEO of Agerris, an Agtech startup company spun out of the ACFR, where he

led the manufacturing and commercialisation of on-farm robotic solutions to improve agricultural productivity and environmental sustainability. He was the Director Research and Innovation at the Australian Centre for Field Robotics from 2007-2018, where he led the strategic research and industry engagement program in the world's largest field robotics institute. Salah has received over \$70m in university-industry-government research grants in the last ten years, and is recognised as an international expert in the research, development and commercialisation of field robotic systems. He has led a number of robotics and intelligent systems R&D projects in logistics (Patrick Stevedores), commercial aviation (Qantas), aerospace (various national and international agencies), education (Australian Government), environment monitoring (Australian Government), agriculture (horticulture, grains, meat and livestock) and mining (Rio Tinto).



Dr. Craig Smith
Principal Scientist and Director of Smith Optical Systems

Dr Craig Smith is currently the Principal Scientist and Director of Smith Optical Systems. Prior to forming Smith Optical Systems Dr Smith spent 24 years with Electro Optic Systems (EOS). At EOS, Dr Smith held the positions of Chief Technology Officer, CEO of Space Systems, CEO of Defence Systems, CEO of EOS Technologies USA and Head of Research and Development. Before joining EOS he was a Senior Research Fellow at the Australian

Defence Force Academy, UNSW, where he developed novel techniques for imaging-polarimetry and spectro-polarimetry at thermal IR wavelengths. Dr Craig Smith has lectured in Physics, Astronomy, Electronics and Military Ballistics and he obtained Bachelors and PhD degrees from the University of Melbourne.



Aude Vignelles
Chief Technology Officer, Australian Space Agency

Aude Vignelles is the Chief Technology Officer of the Australian Space Agency. As part of the senior executive team, Aude supports the Australian Space Agency with strategic technology advice and program delivery to grow a trusted and respected Australian space capability, using advanced insight and engagement with the Australian and international space sector. Her office sets strategic priorities by developing and updating technology roadmaps across the Agency seven priority areas; identifies and develops domestic and international space programs, and support their deliveries; represents the Agency at international technology forums; maintains awareness of the state of the art for the space sector as the Technology Authority for the Agency and sustains strong engagement with the local industry and scientific community. Prior to this role, Aude was the Executive Manager, Satellite & Fixed Wireless Operations at nbn. Aude is a space and aeronautics engineer who started her career

at the European Space Agency (ESA) in the Netherlands. She became a source of expertise for the test campaign of all scientific programmes run by ESA from their early phase, such as Rosetta. She was appointed Test Manager for the X-ray Multi Mirror mission (XMM), then the largest scientific space program ever carried out by ESA. She then moved to London where she started a career in the broadcast industry and successfully integrated the first digital terrestrial broadcast centre in the world. She continued this career in broadcast and media here in Australia with Foxtel and Austar. She later was appointed Vice President of Technicolor covering all programs in the APAC region. Aude has been living in Australia for the past 22 years and has contributed to the Australian space community through White Papers, events at conferences with the growing start up community in Australia, and promotion for Women in Space and Engineering at universities.



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Research & Exploration



LTCOL Clifford White
Director SATCOM, Defence Space Command

LTCOL White is a senior satellite engineer serving with the Australia Military for over 20 years and Commercial Satellite Industry. He has deployed on several operations and recently returned with the last Australian contingent in Afghanistan. LTCOL White recently joined the newly formed Defence Space Command being selected to lead the Australian Defence Force SATCOM capabilities. LTCOL White is a soldier at heart and understands the war fighter. His passion is to reshape the Australia Defence Force with the most modern telecommunications systems to increase the already effective

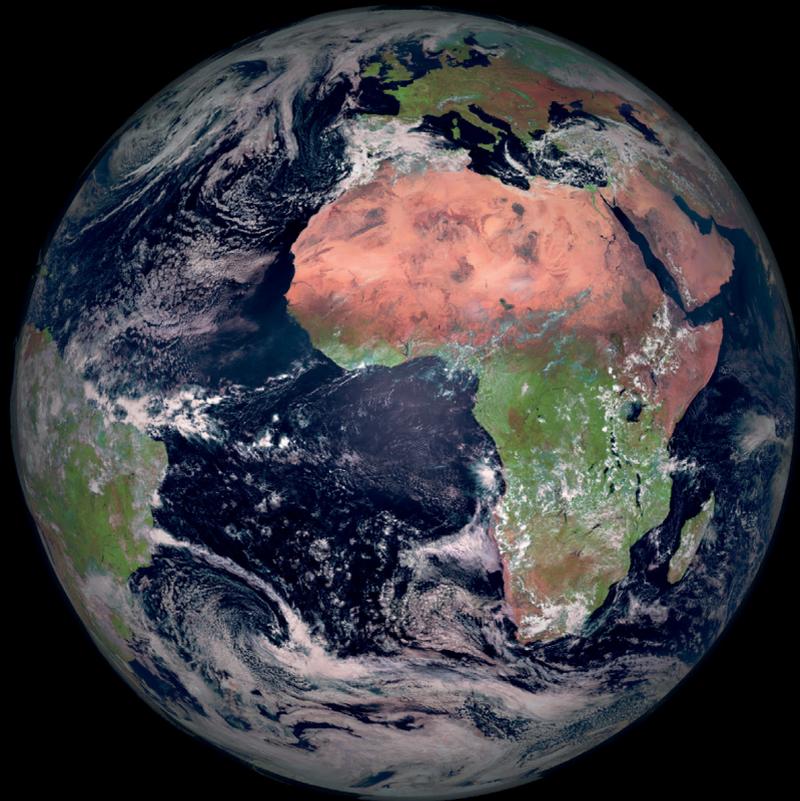
Australian war fighter. He has successfully delivered several major telecommunications projects including Joint Project 2072 2B, ahead of schedule and budget delivering a fully integrated software defined network for the tactical environment. He has also delivered Australia's first satellite on move capability integrated with the Bushmaster PMV. He is an avid surfer and basketball nut who is a big fan of the Brooklyn Nets who his Australian hero, Patty Mills, plays with.

For more information <https://tinyurl.com/AWS4space>



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Company Profiles





Adelaide University Space Society

Exhibitor

linktr.ee/au_space_society
Contact: Isabella Mcculloch
space@clubs.auu.org.au
+61 422 362 723

The Adelaide University Space Society (AUSS) is a student-led club for all things related to space! With a rapidly growing space industry happening right here in South Australia, the club aims to connect students with other like-minded individuals and industry professionals in this sector, as well as provide a place to collectively share one's love for astronomy. The AUSS has run a multitude of events including a Galaxy Ball, stargazing and planetarium visits, tours with the Australian Space Discovery Centre, networking nights Hackathons and more! Students of any discipline, year level and institution are welcome to join and be involved in our exciting opportunities available to help their career lift-off! Also, we are offering an opportunity for you to support us in our future endeavors and partner with us! If you would like to get involved in helping growing the future of space, look no further than here!



AIAA Adelaide

Exhibitor

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aicraft.com.au
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ANU InSpace

Exhibitor

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The Australian National University (ANU) Institute for Space (InSpace) is a unique national and cross-disciplinary organisation designed to create opportunities for ANU innovators to supercharge Australia's space capability with technology that helps all Australians.



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ANT61, Blue Dwarf Space & ESpy Ocean

Exhibitor
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ANT61, Blue Dwarf Space and ESpy Ocean are 2022 participants of UniSA's space accelerator program Venture Catalyst Space. With humans too fragile

to perform the construction and assembly needed to create vital infrastructure in space, ANT61 is working on the next generation robotic brain, taking advantage of recent breakthroughs in artificial intelligence. The current system for obtaining a permit to perform space activities in Australia is convoluted and complex. Blue Dwarf Space uses machine intelligence and usability design to help clients reach their goals faster by providing an automated permit application system for space activities. ESpy Ocean is a satellite data intelligence company using a novel system to provide high level data analysis for the detection of Illegal, Unreported & Unregulated (IUU) marine vessels. ESpy also work in the field of environmental monitoring including oceanic habitats, crop health and greenhouse gases (methane). Visit them in the exhibition hall to meet the teams and see ANT61's robot prototype.

bluedwarf.space
ant61.com
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ANT61, Blue Dwarf Space and ESpy Ocean are 2022 participants of UniSA's space accelerator program Venture Catalyst Space. With humans too fragile

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APC Technology

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At Space Pty Ltd

Exhibitor
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+61 423 705 910



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Asension (Formerly DEWC Systems)

Exhibitor
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Contact: Graham Priestnall
innovations@asension.com.au
+61 8 8396 1636



Inspired by the energy, grit and determination of our space tech entrepreneurs, the Aurora Space Cluster aims to provide a framework for startups to grow together in commercial collaborations with one another, with research organisations, with local and international primes, and customers worldwide. Founded and supported by SmartSat CRC, Aurora aims to create opportunities for its members via participation in SmartSat R&D programs and challenges, exposure to SmartSat's partners and their global networks, and via creative collaboration with other members. Our aim is to create platforms – personal, corporate, technical, strategic, collaborative – for winning business opportunities, commercialising leap-frog R&D, and building scalable, world-class companies and space capabilities in ways that would otherwise be difficult for startup founders by themselves.

Aurora Space Cluster

Exhibitor
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Australia in Space is the official media partner for the Andy Thomas Space Forum. Along with our magazine Australia in Space we also produce interviews and content via our Australia in Space TV channel and Space & Defence news site.

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14th Australian Space Forum Media Partner**

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The Australian Space Agency's purpose is to transform and grow a globally respected space industry to lift the broader economy, inspire and improve the lives of Australians. As Australia's national space agency, it coordinates civil space matters across government and supports the growth of the Australian space sector. The Agency is responsible for delivering key space programs that develop national space capability and infrastructure, unlock international space collaboration, and inspire and build a future space workforce. It is also the regulator of Australian space related activities and a facilitator for collaboration across industry, government and academia.

Australian Space Agency

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Australian Space Discovery Centre

Exhibitor

industry.gov.au/australian-space-discovery-centre
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Contact: Matt Grech
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AVALON 2023 Australian International Airshow and Aerospace & Defence Exposition, to be held 28 February - 5 March, is a global business, defence and public event, attracting senior civil aviation, air transport, aerospace and defence industry, military and government decision-makers from around the world. AVALON is a platform for industry to promote to customers, partners and suppliers, providing unrivalled access to the region's aviation, aerospace, defence and space community. AVALON is organised by AMDA Foundation Limited, an Australian not-for-profit corporation established to promote the development of Australia's industrial, manufacturing and IT resources in the fields of aviation, aerospace, maritime, defence and security. It achieves these goals by delivering Australia's most prominent and respected world-class biennial industry expositions as platforms for interaction between industry, defence, government and academia.

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AV-COMM

Exhibitor

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+61 432 747 715





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Beings Systems
Exhibitor

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+61 415 798 382

Beings Systems was founded in 2019 by Kieran



Black Art Technologies is dedicated to the design and production of specialised, high-end antennas, arrays and passive circuit design for a wide variety of industries and applications. We believe in equal opportunities and have a highly experienced, passionate, culturally and gender diverse team. Our office and workshop is located in Lonsdale, South Australia. Black Art Technologies' Vision is to be The Centre of Excellence for antenna and RF-related design and consulting services in Australia, serving the Defence, Space, and IoT markets as focal points.

Black Art Technologies

Exhibitor
blackarttechnologies.com
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david@blackarttechnologies.com
+61 423 478 702



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- Terrestrial Communications
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- Data Networks
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Blacktree Technology

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Blacktree is a strong sponsor of the sovereign manufacturing initiative through the utilisation of Australian based local supply chains in the production of hardware. Blacktree is the prime support partner for the ADF's UHF SATCOM Control System and is a key player in bidding for the next generation Australian Defence Satellite Communication System (ADSS) program JP9102. Blacktree has offices located in Perth and Canberra and a satellite presence in Brisbane and Darwin.





BRAEMAC is Australia's largest Australian owned electronics and embedded distributor. We provide full support for customer requirements, from concept through to production. BRAEMAC is able to provide components, technical support and manufacturing support (cable assembly, testing, turnkey solutions etc) through our sales, engineering and production teams. BRAEMAC has been supporting customers since 1984, with offices established in the major cities of Australia and New Zealand. We also have overseas offices in the US, UK and APAC. We represent thousands of electronic components vendors including Intel, Renesas, Microchip and ST Microelectronics. In each region of ANZ, we have locally based account managers and field application engineers to support our customers. We are a long-established supplier to Defence, offering catered services around compliance, certification and traceability.

BRAEMAC
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Boc Limited
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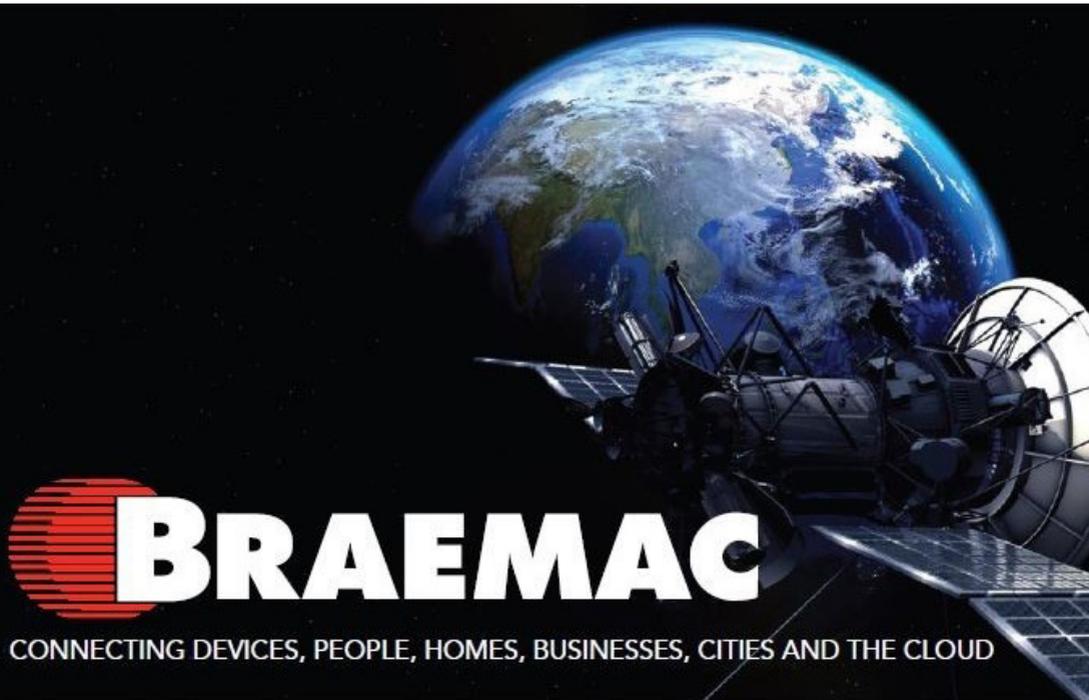
BOC supplies compressed and bulk gases, chemicals and equipment around the world. BOC devel-

ops safe, sustainable and innovative solutions for customers across a variety of applications from traditional manufacturing, mining and specialty sectors to heavy industry, medical applications and aerospace. For more than a century, BOC's gases and expertise have contributed to advances in industry and everyday life, including steelmaking, refining, chemical processing, environmental protection, wastewater treatment, welding and cutting, food processing and distribution, glass production, electronics, healthcare and space. BOC and the wider Linde group have a rich history within the Space industry having supported many major milestones. Here in Australia, we have utilised this global expertise to support the growth of the industry by working closely with universities, research start-ups and testing facilities through to large space ports for launch activity. We are driving positive industry change through partnerships with Space organisations in Australia to ensure the success of the Space Economy in Australia. Want to know more? Contact our dedicated Space working group – space@boc.com



Boeing Defence Australia Ltd
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The Future of Space Is Built Here. For more than 90 years, Boeing and its heritage companies have been part of the fabric of Australia's aerospace industry. Today, Boeing Defence Australia (BDA) is integral to the region's defence industry, working alongside the Australian Defence Force (ADF) and the Commonwealth of Australia to develop best-for-capability defence solutions. The dedication, determination and performance of our people, in partnership with our extensive Australian industry supply chain, has firmly established BDA as the partner of choice for some of Defence's most challenging and complex sustainment and development programs. We are uniquely positioned to accelerate space capability locally, with a strong Australian base of more than 4,000+ employees, including our space-focused R&D arm and backed by 60 years' global space experience from The Boeing Company. An industry leader for next-generation satellite technology and manufacturing practices, the company brings with it experience in designing and building advanced space and communications systems for military, commercial and scientific uses.



BRAEMAC
CONNECTING DEVICES, PEOPLE, HOMES, BUSINESSES, CITIES AND THE CLOUD



Business France is the national agency supporting the international development of the economy of France, responsible for fostering export growth by French businesses, as well as promoting and facilitating international investment in France. Our team has the knowledge and the experience to facilitate BtoB trade relations between Australia and France. Business France Australia has a dedicated team of experienced advisors providing trade advisory services to various industries.

Business France - Trade Commission of the French Embassy

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Australian Government
Bureau of Meteorology

The Bureau of Meteorology provides trusted, reliable and responsive weather, water, climate, ocean and space weather services for the Australian region. The Bureau assimilates Earth observation data from over 30 satellites into weather prediction and visualisation systems daily. This is crucial for the provision of weather forecasts and warnings across Australia and beyond, to support national commitments for safety and security including the support of Australia's emerging spaceflight sector. Using space weather data, we produce forecasts, alerts, warnings, and products to help mitigate the impacts of space weather for our customers. This information increases the resilience and operational effectiveness of key industries like aviation, defence, energy and resources and the space sector. The Bureau is identifying future opportunities where it can further support the space industry, improve access to space technologies that enhance the Bureau's services and strengthen Australia's sovereign capabilities.

Bureau of Meteorology
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France at the 14th Australian Space Forum

Building connections with Australia

Business France is delighted to announce the 2022 French Space Tour in Australia. The delegation features 15 leading and emerging players in the sector to build collaborative relationships between France and the flourishing Australian Space Ecosystem.

✉ fernando.alves@businessfrance.fr
Please don't hesitate to contact us with any enquiries

VISIT US AT OUR STAND



Caelera

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Caelera Pty Ltd is a specialised supplier of semi-conductors and semiconductor-based module products to electronics manufacturers and designers throughout Australia and New Zealand. Caelera supports space start-ups, including Universities through to existing space incumbents with COTS products through to full Radiation Tolerant devices from 3D-Plus and Microchip. Microchip and 3D Plus have long flight heritage. These include FPGAs, Memory, PoL, Interfaces, Camera's, Peripherals, Motor Control & IP. Caelera is the authorised representative and distributor for a number of major global IC and module manufacturers including 3D PLUS, CML Microcircuits, Finisar Optics, II-VI (Finisar), Indie Semiconductor, Microchip, Microsemi, Macom & Pyramid Semiconductor. With extensive experience and local expertise built over 20 plus years operating throughout Australia and New Zealand, Caelera offers engineering and sales support for all the high-technology manufacturers we represent. We provide design-in assistance from evaluation through to production, with applications engineering knowledge and full logistics support worldwide.



Capricorn Space

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Capricorn Space is a proudly Australian owned and operated company providing ground segment services to the satellite and space markets. Our initial site near Geraldton in Western Australia possesses many unique aspects not found elsewhere in Australia: including the ability to readily secure ACMA licences, redundant power, diverse high speed communications, on-site support and a pristine atmosphere for supporting higher frequency and optical based services. We offer three service models to support all aspects of the market: Retail (use our antennas and modems to communicate with your satellite), Hybrid (connect your customised indoor equipment rack to our antennas) and Landlord (establish your own capability by placing your antennas and indoor equipment at our site). If always-on service availability and long-term investment certainty are important to you then please come and talk to us.



Cicada Innovations

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The National Space Industry Hub is founded on world-class research, innovation, collaboration, and commercialisation. Delivered by Cicada Innovations and supported by the NSW Government, the National Space Industry Hub offers a physical space, resources, mentoring, coaching and connections for emerging space ventures in Australia. We are also offering commercialisation training programs nationally to share essential knowledge for anyone on the path of creating a space tech venture. The NSW Space Research Network (SRN) is a university-led initiative of the NSW Government designed to enhance NSW space industry capability through collaboration with government and academic research institutions. The SRN builds and supports collaboration and coordination between government, industry and research organisations to deliver space research and research translation to industry. This is achieved by supporting collaborative R&D projects, knowledge exchange, educational opportunities and community outreach.



Cibolabs

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Cibo Labs Pty Ltd is an agricultural data analytics company based in Queensland. The company was established in 2018 to bring an entirely new approach to monitoring Australia's grazing lands, bringing satellite estimates of pasture productivity and land condition to every farm, paddock and field in Australia and is now expanding globally. Using world-leading science in remote sensing and machine learning combined with on-farm knowledge, we help farmers build profitable farms and sustainable landscapes by making decisions less complicated, more profitable, lower risk and more environmentally sustainable. Collaboration is central to getting the most out of the recent technological explosion. Cibo Labs maintains close ties with data providers, world-leading research institutions and leading farm management software companies. Most importantly, it directly involves farm managers in product and service development.



Clearbox Systems

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Clearbox Systems is a technology company that develops better solutions for the Operations and Management of Communications Networks and the Electromagnetic Spectrum. To develop innovative solutions, Clearbox Systems specialises in:

- Equipment and Sensor Monitoring and Con-

trol (M&C) which consolidates operations of equipment and sensors into a single integrated user interface.

- Spectrum Monitoring and Management which provides automatic monitoring and surveillance of spectrum with advanced measurement techniques.
- Network Management and Operational Support Systems which provide operational context to equipment and spectrum resources to enable service delivery.
- Heterogeneous Signal Processing Systems which reduces the reliance on proprietary hardware and increases the flexibility of signal processing.
- Systems Integration and Support Services to provide turn-key delivery of systems using best-of-breed components and considering total cost of ownership. In space, we apply these capabilities to Satellite Communications (Control Segment and Ground Segment) and Space Domain Awareness (Passive RF Sensing Technology).





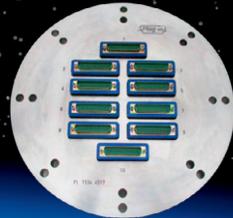
Payload Test Solutions



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1800 560 820
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Making every step count

We are a leading systems and engineering technology consultancy. Part of the KBR Group, Frazer-Nash is renowned in the defence, transport, energy, resources, government, industry, and space sectors worldwide.

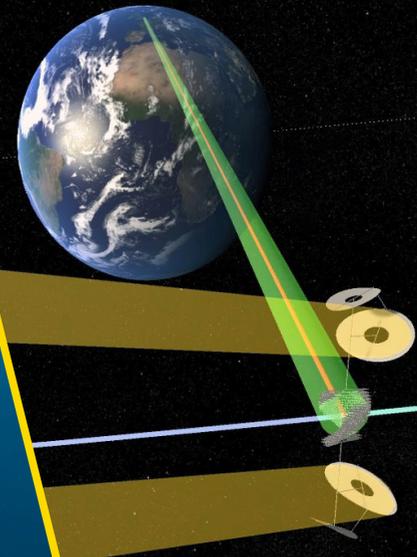
Are you looking to improve efficiency, safety and productivity? Our systems approach responds to your challenges. We have the insight and expertise to support your technical needs, to deliver business, and to add value to your organisation.

Whether you need support in the very early stages in adoption; to refining the specification and development of systems that meets your precise requirements, the opportunities for collaboration are endless.

Please get in touch by email at defence@fncaustralia.com.au to find out how we can help you bridge the gap between ideas and outcomes, one step at a time.

www.fncaustralia.com.au

SYSTEMS • ENGINEERING • TECHNOLOGY





CSIRO – Australia's national science agency
Technology Sponsor
csiro.au/space
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1300 363 400

CSIRO, Australia's national science agency has a long and accomplished heritage across the space sector with our leading-edge capabilities in advanced manufacturing and space technologies. We're experts in developing remote sensing technologies for Earth observation as well as our work in data modelling, analytics and development of applications such as Data Cubes. Our capabilities in mineral resources, robotics and autonomous operations are helping solve the big challenges and opportunities in space exploration. Industry and academia are using our lunar testbed to evaluate rovers and related equipment. We have significant expertise in managing complex facilities, and work with NASA, ESA and JAXA as well as other international space agencies - providing mission support activities for exploration across our Solar System and beyond. Come and talk to us about our range of technical expertise and national facilities that help businesses - both large and small - overcome barriers to innovation.



CyberOps
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CyberOps is a specialist products and services company operating in the Defence, Space and Cybersecurity industries within Australia and internationally. We provide services to assist organisations navigate through today's security, regulatory and operational challenges, by providing governance, risk and business operations and technical advice. This includes defence readiness reviews supporting businesses working with defence, undertaking cyber/business resilience assessments, developing virtual operational cyber ranges and satellite tracking networks. CyberOps has established the Australian Space Cyber Framework (SCF) which provides common space industry security practices and standards. It will enable participants in the space ecosystem to assess its security practices against established standards, thereby strengthening the ecosystem's cyber security posture. CyberOps has also developed a Space Domain Awareness (SDA) solution "SpacelQ" that tasks and manages a national network of Passive RF sensors. SpacelQ has been trialled in local and international SDA events, demonstrating the benefits of Passive RF to mission system operators.



Dedicated Systems Australia
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Dedicated Systems have been a supplier to the Space Industry in Australia and NZ since 2014. Our products were designed from the ground up to address the challenges of space and include:

- Ruggedised compute platforms
- Software to ensure reliable operation of critical components
- Cost effective data acquisition solutions



Defence Space Command
Exhibitor
airforce.gov.au/our-mission/defence-space-command
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13 28 46

To achieve our strategic space ambitions and lead the effort to assure Australia's access to space, Defence Space Command was established on 18 January 2022. Defence Space Command brings members of Air Force, Army, Navy and the Australian Public Service together under an integrated headquarters reporting to the Chief of Air Force, as the Space Domain Lead. Defence Space Command will develop and advocate for space specific priorities and establish an organisation to create, train and sustain people and space specialists when needed. They will conduct strategic space planning and assist in the development of refinement of space policy, guide scientific and technological space priorities and define a resilient and effective space architecture in close collaboration with our allies. Finally, Defence Space Command will ensure the design, construction, maintenance and operation of Defence space capabilities are in accordance with Defence standards and limitations.



Deloitte.

Deloitte

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deloitte.space

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Invested in Australia's space ecosystem Deloitte is committed to proactively supporting the growth of Australia's space economy. Our vision is to see the Australian space ecosystem recognised globally as a leader in delivering value to the world's key industry sectors and society through new disruptive space-enabled capabilities, business models and by the way we collaborate and create connections across business and government. Our global space innovation program, GRAVITY Challenge further drives collaboration and innovation while solving problems on earth using space. Leveraging our breadth and depth of sector expertise across domains such as New Space, Defence and Government we are working closely with multiple businesses and government agencies on a variety of exciting new initiatives that will help to develop Australia's space sector capability and build strategic space assets to benefit future generations.



Australian Government
Department of Foreign Affairs and Trade



Australian Government
Department of Home Affairs

Department of Foreign Affairs and Trade / Department of Home Affairs
Exhibitor

DFAT's primary role is to make Australia stronger, safer and more prosperous, to provide timely and responsive consular and passport services and to ensure a secure Australian Government presence overseas. In the Space sector, as innovation flourishes, DFAT collaborates with federal and state government agencies to pursue economic opportunities, whilst developing international cooperation on the peaceful uses of outer space. Australia aims to ensure the benefits of long-term sustainability, safety and security in space are shared internationally. Space is also an increasingly contested domain which brings both opportunities and risks for Australia. Nurturing and protecting our interests in space is core business for the Australian Government, so DFAT works to shape rules and norms on responsible behaviour in space within the United Nations and other forums.



GOVERNMENT OF
WESTERN AUSTRALIA

Department of Jobs, Tourism, Science and Innovation Western Australian Government
Exhibitor

JTSI

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Western Australia - The southern hemisphere's global hub for space operations and exploration. Western Australia has more than 60 years' experience in the space industry, most notably providing vital communication support to NASA's Mercury, Gemini and Apollo missions from 1961 to 1975. Today, Western Australia is home to more than 100 international and Australian space organisations and provides space mission, communication and situational awareness services; deep space and planetary insight; end-to-end Earth observation and space data analytics solutions; and technology transfer across space and terrestrial sectors. We are heavily involved in a wide range of space activities - from providing critical support for NASA, ESA and private sector space missions, building the world's largest radio telescope to explore the universe and transferring our world-leading remote operations capability and technology to space. Building on Western Australia's significant space infrastructure, leading space science and research, vibrant space ecosystem and geographical advantages for the global coverage of space assets and launch, Western Australia is the southern hemisphere's global hub for space operations and exploration.



DUG Technology (Australia) Pty Ltd

Exhibitor

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DUG is a technology company at the forefront of high-performance computing (HPC) with a strong foundation in applied physics. DUG's innovative hardware and software solutions for the global technology and resource sectors enable clients to leverage large and complex data sets. The Company provides cloud-based high-performance computing as a service (HPCaaS), multi-tiered support for technology onboarding and code optimisation, and integrated services. DUG has offices in Perth, London, Houston and Kuala Lumpur. The Company designs, owns and operates some of the largest and greenest supercomputers on Earth. To learn more please visit www.dug.com.





EOS Space Systems is a full-spectrum space and communications company that provides world-leading space domain awareness services, precision optical equipment, and high-specification satellite and optical communications products. Our advanced technologies – including lasers, telescopes and beam directors – are used for applications such as the tracking, characterisation and identification of space debris; satellite communications; remote manoeuvring; and missile defence.

Electro Optic Systems

Foundation Sponsor

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entX Limited is a nimble South Australian technology company that incubates, builds development partnerships for and commercialises breakthrough clean energy technologies. We leverage strong relationships with academic and industry partners for rapid commercialisation. Our business will have positive lasting environmental, social and financial impacts on global industry. In a space context entX has developed unique energy generation technologies that will overcome many of the limitations related to power management in challenging lunar and deep space environments. The GenX Betavoltaic devices will provide up to decades of constant power to operate electronics as a primary or secondary source, with impressive power density performance. The Radioisotope Heating Unit provides heat to critical electronics enabling them to survive and operate throughout multiple lunar nights. entX is currently evaluating other technology concepts to enable future lunar occupation and deep space exploration. These include carbon capture and utilisation, along with hydrogen production.

entX Limited

Exhibitor

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Exci

Exhibitor

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With the increasing number, intensity and frequency of bushfires, there is an urgent need to detect bushfires as quickly as possible following ignition to rapidly attack, contain and extinguish fires before they get out of control and have far-reaching and catastrophic consequences on the environment. exci offers an unequalled, innovative solution to this global problem. exci is the “smoke alarm for the bush”. exci’s technology is powered by deep machine learning algorithms (AI) that detect fires within minutes after ignition by analysing satellite and ground-based sensor data for the presence of smoke and heat. Even small fires are automatically detected within minutes after ignition, with a near-zero rate of false positives. exci is the only early wildfire detection system that has been proven in large-scale deployments with more than 800 cameras in California (over 125 million acres) and commercial deployments in Australia (over 2 million ha of forestry and plantations).



EY

Lunch and Tea Break Sponsor

ey.com/au/space-tech

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EY is a global professional services firm that delivers insights and quality services to help our clients improve their business and make an impact in the world in which they operate. We work with diverse technical, business, assurance and consulting teams to deliver on our promises to make a difference. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities. Our EY Space Tech team is helping Space Industry clients to optimise their performance and take advantage of the high growth opportunities that the industry will present over the coming years. By leveraging Space data, the EY Space Tech Lab, comprised of astrophysicists, machine learning engineers and data scientists in partnership with the Swinburne University of Technology, is helping solve community and asset resilience issues, drive decarbonisation initiatives, and aid in reducing the impact of natural disasters on communities.



FLEET

Fleet Space Technologies is Australia's leading space company, headquartered at a state-of-the-art facility in Adelaide, South Australia. At Fleet, we are Explorers with a mission to connect Earth, Moon and Mars. The team has rapidly grown to over 80 employees in the last 6 months. Fleet designs, builds and operates a constellation of micro satellites which deliver universal connectivity across the globe. Recently, Fleet launched ExoSphere, a solution for the exploration industry providing lightning fast, highly scalable 3D mapping solutions to pinpoint minerals and increase accuracy in drilling targets. This cutting-edge technology is already helping the world's transition to clean-air mobility technologies by creating a faster, more sustainable and less expensive route to finding critical mineral deposits.

Fleet Space Technologies

Dinner Sponsor

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The College of Business, Government, & Law at Flinders University is home to the greatest concentration of experts in space law and policy in Australia (and the Southern Hemisphere). Our group, Space@Flinders, is a future-focussed, human-centred approach to space education and research. Given the need for both the STEM and non-STEM space workforce to develop a greater understanding of the space governance environment, we are developing a suite of opportunities for students and professionals to upskill or retrain for the space sector in this area. The College is also home to the Jeff Bleich Centre for the US Alliance in Digital Technology, Security & Governance and the Space Power and Policy Applied Research Consortium (SPPARC).

Flinders University

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Fortifyedge

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Frazer-Nash Consultancy

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Fortifyedge is developing Advanced Neural Network Software for the Space Edge. Our edge first TinyML is optimized for performance & efficiency so you can have real-time onboard processing even while disconnected, disrupted or intermittent. We are a Microsoft Azure.Space Startup partner and a recent ASA Moon to Mars Grant Award Winner adapting our TinyMLOps platform for use cases such as Astronaut/Asset Identity, Status & Safety utilizing next generation IoT, wearables powered by microNPU's that only use milliwatt's of power designed for the tactical space edge.

Frazer-Nash is a leading systems, engineering and technology company. Part of the KBR Group, we help organisations deliver innovative engineering and technology solutions to make lives safe, secure, sustainable, and affordable. We apply our expertise to develop, enhance, and protect our clients' critical assets, systems, and processes. We use our skills and talents to ensure a sustainable future for society. Our work helps deliver a safe and secure world, conserving natural resources, with clean energy available to all. We focus on actions that reduce climate change; supporting rapid and far-reaching transformations in the delivery of energy, security, industry, and transport. At the heart of our business are our core values. We're committed to upholding them within the Frazer-Nash family; in the way we work with our customers; and when we engage with the wider world.

- We care.
- We are trusted.
- We deliver success.
- We want to do things that matter.





FuturifAI Pty Ltd
Silver Sponsor
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Our mission is to make "AI for Space" simple and bring actionable insights from space faster by putting trusted machine intelligence onboard. We achieve that by providing an end-to-end Space Machine Learning Operations (SpaceMLOps) software suite to NewSpace companies. Our SpaceMLOps suite is empowered by a no-code rapid AI development platform (NeuralDarwin) and a digital twin for spacecraft (NeuralField) to operate seamlessly with confidence at the edge. We believe that space missions can be simpler, safer, and more efficient by making spacecraft smarter. Our vision is to become a world leader in delivering trusted machine intelligence to NewSpace companies for their demanding space missions.



Australian Government
Geoscience Australia

Geoscience Australia
Silver Sponsor
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Geoscience Australia is a leader in providing Earth sciences for Australia's future. We have a long history of bringing the benefits of space down to Earth. By providing Australian industries, governments, researchers and the public with better access to space data, we drive economic and high-tech job growth, support disaster responses and recovery, and help facilitate sustainable use of our land and marine environments. As a key member of the National Space Program for Earth Observation (NSPEO), we combine our Earth science expertise to deliver more comprehensive and connected data. We build world-leading, freely accessible Earth observations platforms and develop world-class positioning infrastructure for Australia and the Indo-Pacific, including the Southern Positioning Augmentation Network (SouthPAN). We partner with local and international organisations to share knowledge and foster global networks of collaboration and innovation. We support informed decision-making by providing access to satellite land imaging data and precise, real-time positioning information.



Geospatial Intelligence Pty Ltd
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Geospatial Intelligence Pty Ltd, an Australian company, has been providing geospatial solutions to public and private sector customers since its inception in 2002. Location is accepted as strategically important information for policy and operational decisions. We collaborate with our clients and data partners to make sense of disparate data sets and complex location data, facilitating strategic and operational decision making. Geospatial Intelligence supplies clients with an integrated set of geospatial solutions across geospatial information systems (GIS), satellite imagery and analysis, satellite AIS, consulting, training and knowledge transfer services.



Student Pathways

Hamilton Secondary College (Department for Education)
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Hamilton Secondary College is an innovative year 7-12 school with a vision and strategic plan focused on space and astronomy, founded on two pillars, educating students about space across years 5-12 and linking education to the space industry. Our Space Academy, space education curriculum and newly built planetarium equip students with the necessary STEM and emerging technology skills to be innovative, entrepreneurial and become globally competitive. The academic teachings are then 'put into practice' through Hamilton's Mike Roach Space Education Centre. It is here that students obtain practical and unique skills by experiencing real-life Martian explorations while being challenged to reach evidence-based conclusions about Mars habitability. From 2022, we will also run the Space Passport Program supported by the SA Commonwealth School Pathways Program and Department for Education 'Student Pathways and Careers' Division which can be registered as a 'World of Work Challenge' activity at <https://studentpathways.sa.edu.au/>.





HEO Robotics was founded under the belief that space should be transparent. Today, we are pioneering software and hardware technologies to make this possible, with the ultimate mission to image anything within the Solar System on demand. HEO Robotics is the world's first commercial in-orbit satellite inspection company. We help defence, governments, and commercial operators to visually monitor their satellites and other space objects they care about. Our proprietary software transforms Earth observation satellites into in-orbit inspection cameras. We generate valuable and unprecedented insights through computer vision techniques. Space-based sensors allow us to get close to space objects and collect data at a resolution superior to Earth-based space domain awareness (SDA) solutions. HEO Robotics inspection services are currently available for LEO. Plans are in place to extend the operations to GEO and Lunar orbits.

HEO Robotics
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Hub & Spoke

Hub & Spoke is a leading multidisciplinary consulting and design company. We help organisations across the private, public and social sectors develop solutions that define businesses, improve governments and allow communities to flourish. We bring together the best strategic thinkers, advisors, architects, designers, polymaths, digital, leadership, marketing, media and indigenous experts to transform great ideas into world class experiences, buildings, spaces, products and services that create value and achieve positive social impact. Collectively we provide the space sector and a diverse range of clients with flexibility and choice to find more ways to innovate and do business. If you have a bold agenda, want to achieve the extraordinary and would like a visionary partner we are ready to collaborate with you.

Hub & Spoke
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Hex20 was one of nine global space startups chosen to participate in the third cohort of Australia's first space incubator program delivered by the University of South Australia's Innovation & Collaboration Centre (ICC), Venture Catalyst Space. Hex20 aims to provide commercial space weather data for geospace customers. Through its core competencies in miniaturized instrumentation, micro and nano-satellite platform developments, Hex20 aims to provide small satellite systems platforms, systems, and services. We specialize in researching, designing, and developing cutting-edge, scalable nano and microsatellite platforms and subsystems for small satellites, provide launch services, mission operations, and data services to clients. Hex20's goal is to deliver solutions to the LEO, GEO and cislunar market with a strong focus on making these qualified hardware platforms more intelligent, cost-effective, reliable, and easily accessible for commercial, defense, and academic applications. Hex20's products are derived from flight heritage programs and have a proven assurance for successful mission completion.

HEX20 Pty Ltd
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and statistics for complex engineering projects. We have 15 years' project experience in astronautics, space missions, geodesy, transport, mineral processing, plant control systems and energy in Australia, the USA, and Israel. ISG's work in the space sector includes projects with NASA Goddard (CARA Group); The Beresheet Lunar Mission; The Australian Space Agency; Space Exploration Engineering (contractors to NASA CLPS Missions); Space Environment Research Centre/EOS Space Systems; Geoscience Australia; AGI and the University of Colorado (Boulder). ISG offers a multi-disciplinary approach to analytics as well as undertaking the commercial implementation of state-of-the-art research. Our key products include:

Industrial Sciences Group
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TRACER (Tools for Risk Assessment & Uncertainty Quantification)

TASKER (A toolkit for optimizing, scheduling and tasking of multiple sensors for tracking space debris)

The Industrial Sciences Group (ISG) is an applied research company specializing in industrial math

MDSS (A Manoeuvre Decision Support System developed with NASA Goddard's CARA Group)





Infinity Avionics (IA) is a Canberra based SME specialised in sensors and processors for space applications. IA provides reliable and proven sensors and processors to support many space applications such as earth observation, space asset monitoring, space-based surveillance, and robotics. Our high-resolution camera series Lynx4MP comes with a range of TRL9 optical assemblies making it suitable for monitor camera applications, robotics, and earth observation.

IA's latest camera development Leo, partially funded through the Australian Space Agency, is a modular camera product which will enable low-cost customisation to meet a wide range of customer requirements with unique sensors and fast data communication interfaces. IA has provided its sensors and processors to many Australian space organisations to facilitate their space mission. In addition, we have been exporting our products to multiple customers in the EU, Japan, and the United States.

Infinity Avionics

Exhibitor

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Inovor Technologies

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Inovor designs, manufactures, integrates, tests and operates small satellites to fly our customers' payloads. We have developed a family of completely Australian made small satellite buses, in both the cubesat (Apogee Bus) and smallsat (Australis Bus) classes. This technology can be used to build satellites for customers across a range of sizes, and for most mission types, including space domain awareness, Earth imaging, communications, climate science, AgTech, scientific experimentation, and more. We also have two missions of our own.

Hyperion: Delivery of space-based space traffic management and risk/threat detection services for Defence, Government, and commercial customers.

Skyris: Delivery of "smart" Earth imaging services to perform real time applications on board like object detection and damage assessment for Defence, Government, and commercial customers.



Investment Territory

Exhibitor

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The Northern Territory is ideally placed to host key infrastructure and services for the global space industry, with competitive advantages in:

- (1) launch services of space vehicles to all orbits
 - (2) ground stations
 - (3) the launch and recovery of high altitude pseudo satellites (HAPS) vehicles.
- Why the Territory? The Territory's geographic location and climatic conditions provides significant advantages for launch, ground stations and HAPS including: (1) proximity to the equator creating cost efficiencies for equatorial launch from the Arnhem Space Centre for launch operators and their customers (2) clear skies for much of the year, with low light pollution and limited noise interference (3) ideal wind conditions for stratospheric balloon launch. With established logistics and construction industries, the Territory is capable of supporting the development of space infrastructure projects, including in remote locations. A number of major space organisations have recognised the Territory's competitive advantages, including Equatorial Launch Australia, NASA, HAPS Alliance, JAXA, CNES, Viasat, ArianeGroup, OneWeb and LeoLabs. The Northern Territory Government, provides high level investment facilitation services and support that can help your company's next space project become a reality.



ITA - Italian Trade Agency is the governmental agency that promotes Made in Italy throughout the world, supporting the growth of Italian companies abroad and contributing to the attraction of foreign investments to Italy. On the occasion of the Australian Space Forum, ITA is partnering with the Embassy of Italy in Canberra, the Italian Chamber of Commerce in Sydney, and ASI - Italian Space Agency to showcase key Italian space sector players and foster collaboration between Australia and the well-established Italian space ecosystem. ASI established itself as one of the most important global stakeholders of space science and satellite technologies, playing a leading role both at a European level, where Italy is the third major contributor to the European Space Agency, and at a global level.

Italian Trade Agency

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Joseph Banks Secondary College

Exhibitor

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Joseph Banks Secondary College is a Year 7-12 Secondary School in Western Australia, currently in mid preparation for the opening of the Western Australian Space Science Education Centre in July 2023. The Space Science Education Centre will focus on the engagement of students in learning and concepts linked to the Space Sciences. The Western Australian Space Science Centre will provide a range of learning opportunities for students at Joseph Banks Secondary College and for students across the state. Learning opportunities will link to the WA Curriculum. Opportunities for Senior School students will include relevant enterprise skills and learning as identified by both industry and tertiary representatives, in order to support the establishment of a future ready and sustainable workforce pipeline.

Jones Harley Toole

Jones Harley Toole is a leading Defence and Space law firm. We partner with clients to develop and manage projects utilising our specialist services and advice including finance, corporate structuring, employment, contract preparation and management, IP and dispute resolution. We identify and mitigate project risks with pragmatic solutions. We collaborate with local, national and international defence and space industry participants to ensure up to date industry engagement and knowledge. We have the relevant experience and expertise to undertake diverse challenges. We work with emerging SME's through to large established businesses to develop effective strategies for success. We will reduce your risks and strive to minimise future challenges with our knowledge and understanding of your industry.

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Kongsberg Satellite Services As

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AKongsberg Satellite Services (KSAT) is a world leading provider of communication services for spacecraft and launch vehicles from our uniquely located global ground network, and provides advanced monitoring services with rapid delivery based on multiple satellite missions. KSAT owns and operates a truly global cost-effective multi-mission Ground Station Network of both polar and mid-latitude stations. The three polar ground stations are located in Tromsø at 69°N, Svalbard Satellite Station (SvalSat) at 78°N and the Antarctic station (TrollSat) at 72°S. KSAT has established ground stations in Svalbard, Tromsø, Vardø, Antarctica, Punta Arenas, Hawaii, Los Angeles, Panama, Awarua, Tokyo, Puertollano, Athens, Singapore, Dubai, Mauritius, Hartebeesthoek, Bangalore, Inuvik, Fairbanks and Nuuk. We also have partner stations in Cordoba, Azores, Tolhuin and Bangalore.





World's only commercial supplier of highly reliable and highly precise tracking of objects in space using ground based active radar technology. Our networked phased array space radars provide operational and commercial sustainability to the space industry. Companies like SpaceX, Maxar, Planet, and OneWeb depend on LeoLabs' collision avoidance services in their daily operations. The company also provides powerful mission control tools such as tracking, monitoring, fleet management, conformance monitoring, proximity monitoring, launch and early orbit phase (LEOP), and collision avoidance.

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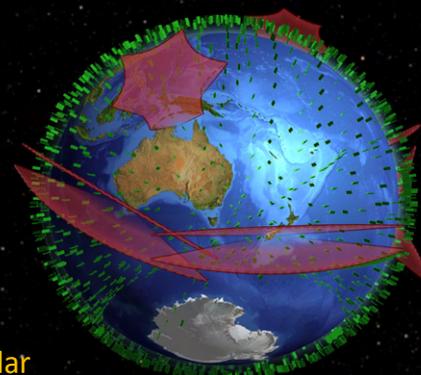
Locate Conferences Australia Pty Ltd is jointly owned by the Surveying & Spatial Sciences Institute (SSSI), and SIBA/GITA – the Spatial Industries Business Association (SIBA) and the Geospatial Information & Technology Association ANZ (GITA) – and encompasses inputs from a wide range of stakeholders. Each year, the Locate conference attracts national and international delegates from within and outside the spatial & surveying industry. As Australia's premier geospatial conference, Locate provides guests with a unique opportunity to learn about the latest trends and applications in geospatial technologies. The 2023 Locate Conference is being held in Adelaide from the 10 – 12 May.



TRANSFORMING AUSTRALIA'S SPACE DOMAIN AWARENESS

solving the space object 'data deficit' in low Earth Orbit

..... by the end of 2022
West Australian Space Radar



and then
North Australian Space Discrimination Radar



Makers Empire
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Makers Empire is a market-leading, gamified 3D design software that helps develop children's spatial reasoning and design thinking skills. Primary, elementary and middle school teachers use Makers Empire to improve student learning outcomes and student engagement in STEM. Makers Empire is the only program worldwide that has been shown by university research to improve students' spatial reasoning skills, a known predictor of future STEM success. University research also reveals that using Makers Empire helps develop children's creativity, critical thinking, design thinking and digital skills, whilst also improving students' attitudes towards STEM. Moreover, Makers Empire is certified by Education Alliance Finland for pedagogical quality. At Makers Empire, we want to help children become creators, innovators and problem solvers so that they can make their world better. Launched in 2014 in Adelaide, Australia, today Makers Empire is proud to empower three million student users in over 50 countries.



MEMKO offers industry specific products, technology, training and engineering solutions to assist and support customers in advanced and highly regulated industries. MEMKO's primary focus is to bring sustainable and measurable performance improvements to businesses through the integration of technology, training, engineering and process improvements. With its origins in Aerospace, MEMKO's services are focused on the business processes covering strategy, design and engineering, digital mock-up, product development, virtual process planning and simulation, and digital manufacturing. Additionally, MEMKO is committed to building the workforce of the future, proudly supporting many research and university clients with a combination of industry and market knowledge. Over the years, MEMKO has delivered a range of successful projects in Aerospace & Defence, for various clients, from small and medium enterprises to large complex and highly regulated businesses. Whatever your needs, MEMKO is committed to providing quality service to improve your business' performance.

MEMKO

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Founded in 2017, Monash Nova Rover is a team of technology pioneers based at Monash University. Our team designs, fabricates and tests the next generation of Mars and Lunar rovers, developing systems for remote operations, robotics and automation. As leaders of student representation, we are building the next generation workforce of highly skilled graduates for Australia's expanding space sector. Partnering with space industry organisations to work on projects, research, and technology demonstrations. Working towards the objectives outlined in the 'Australian Space Agency Civil Space Strategy 2019-2028', we are seeking to create more connections with participants of Australia's space industry to accelerate innovation as we work towards our collective goals. Nova Rover aims to foster engagement in STEM with younger generations through outreach with schools and the community. Our team values diversity and creativity in our members and an inclusive environment for everyone to work in.

Monash Nova Rover

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Microsoft enables digital transformation for the era of intelligent cloud and intelligent edge. Its mission is to empower every person and every organization on the planet to achieve more. Through the combination of cloud and space technology, Microsoft and our partners are equipping businesses and organizations around the world to re-imagine solutions to some of the world's most challenging problems. Azure space brings together renowned space industry veterans, scientists and world-class product engineers to build cloud capabilities that meet the unique needs of the space community. Our innovation areas include simulating space missions, discovering insights from satellite data, and fueling innovation both on the ground and in orbit. By partnering with leaders in the space community, we are extending the utility of our Azure capabilities with worldwide satellite connectivity, unblocking cloud computing in more scenarios, and empowering our partners and customers to achieve more.

**Microsoft Azure Space
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Nano Vacuum has over 25 years' experience within the nanofabrication industry, servicing customers through a network of global trusted manufacturers and suppliers. Our aim is to provide the best service and advice to our Australian, New Zealand and global customer base, offering you cutting-edge nanofabrication tools to support your research. Our range of deposition, etching, plasma modification, clean/inert environments, packaging and lithography tools offer nanofabrication resources to ensure you stay at the forefront of the highly competitive research space. Our goal is to empower you with the best resources, application knowledge and tools to succeed, with a service and value to exceed your expectations. We look forward to working with you on your next exciting project!

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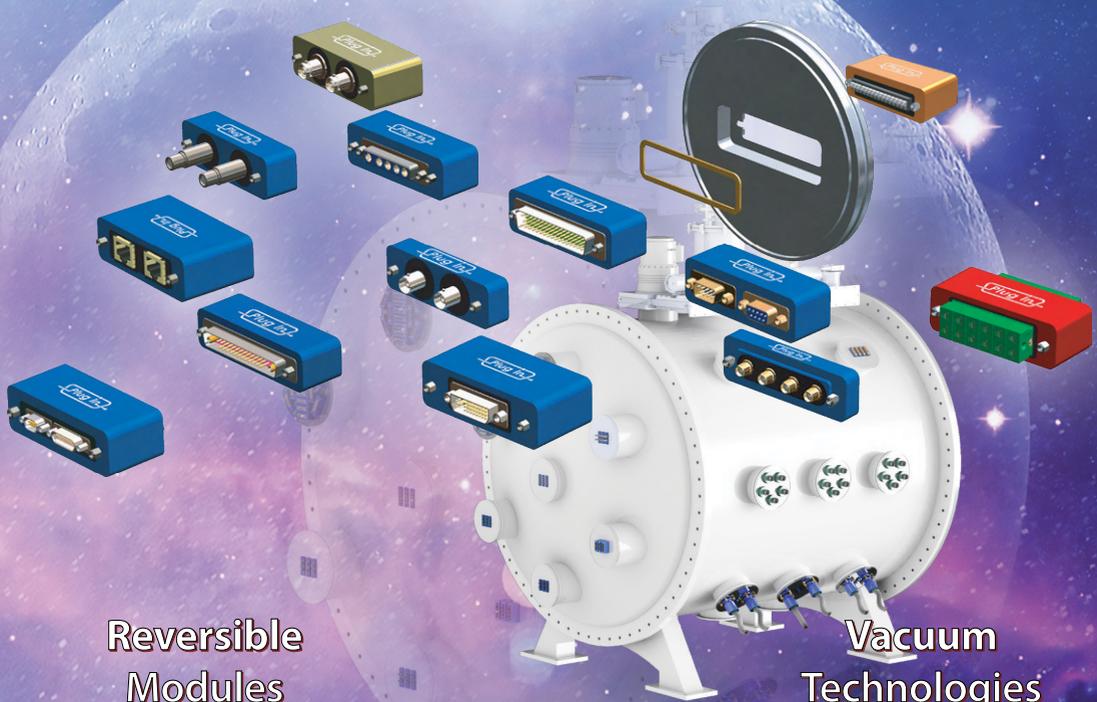
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Neumann Space is a South Australian company offering an efficient and scalable in-space electric propulsion system for satellites. The Neumann Drive™ marks a revolution in the field of satellite propulsion. Our lightweight products use our patented Centre-Triggered Pulsed Cathodic Arc Thruster (CT-PCAT) technology to convert solid conductive propellants (including from recycled space debris) into plasma and produce thrust. Our product range creates value for our customers in all space operations and travel. For example, our thruster can fulfill all requirements for Low Earth Orbit (LEO) mission profiles such as extending mission lifetimes, station keeping, orbit raising, constellation phasing, inclination changes, de-orbiting and more. Neumann Space is the only Australian company able to provide a sovereign in-space electric propulsion system capability ready to fly in early 2023.

Neumann Space

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Nova Systems

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Nova Systems is a 100% Australian owned and operated engineering services and technology solutions company. We deliver specialist systems engineering advisory and management services, alongside advanced digital technology, software and systems integration solutions. Our space portfolio includes Ground Station as a Service (GSaaS) with full and partial ground station hosting, Satellite and Spacecraft Assembly Integration and Support (AIT), Space Mission and Project Delivery, Space Systems Engineering and Mission Assurance, Space Domain Awareness, Launch/Return and on-orbit operations, regulatory design advice and compliance assessment, Flight Safety Analysis modelling and assessment, EM Spectrum analysis and planning, ITU filings, local licencing, space training and education. We partner with our clients to solve complex challenges and keep our nations and people safe and secure.



Norseld has a world leading specialty coating capability referred to as Diamond-Like Carbon (DLC) called CoolDiamond DLC. DLC application is wide and varied e.g. infra-red optics, thermal imaging, light weight head gear (e.g. night vision goggles, HUD), engine parts (tribology), sensors and components. The Norseld process is unique in its superior quality and speed as well as being performed at room temperature. Our unique coating process enables us to coat on every surface including plastics, alloys and composites.

Norseld Pty Ltd

Exhibitor

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Optus Satellite and Space

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Optus is Australia's largest and most experienced satellite owner and operator, with five→ satellites currently in orbit providing satellite services across Australia and New Zealand and to McMurdo Sound in the Antarctic. Optus provide critical national infrastructure across mobile, fixed and satellite networks which service over 10 million customers every day and Optus is the only operator in Australia to provide 100% network coverage through our terrestrial mobile network and satellite services. For more than 35 years Optus has been Australia's preeminent satellite provider, launching 10 satellites, operating 13 spacecraft, and providing support to over 100 international space programs. Currently, Optus is planning to launch its 11th spacecraft and the Asia-Pacific's first software-defined Ku-band satellite, named OPTUS 11, and soon we will utilise the world's first Mission Robotic Vehicle and Mission Extension Pod to extend the life of our Optus D3 spacecraft.





Ozius Biome® is an environmental intelligence platform that rapidly identifies opportunities and risks across the landscape. Ozius Biome fuses on-ground data with earth observation data including NASA's GEDI and ESA's Sentinel 1 and 2 satellites. The result is Australia's most advanced environmental intelligence platform that provides a comprehensive 3-dimensional overview of the environment at a 20m pixel resolution. Ozius Biome creates impact for environmental professionals with its high-fidelity datasets that accurately and consistently reconstruct biophysical and structural vegetation characteristics across the entire Australian continent. Launched in July 2022, Ozius Biome is already providing new intelligence to environment and sustainability professionals across multiple markets. To date, Ozius Biome has been used by bushfire risk modelers to determine environmental risk, energy and utility providers to determine the influence of vegetation on their networks, and carbon market advisors to scout and compare investment options.

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PKF Adelaide has an integral role in the innovation and business patchwork that defines South Australia. We know this state is a thriving hub for new ideas, progress and big thinkers, and we take our role in supporting those decision makers across various industries very seriously. We understand what makes businesses successful in South Australia – we live and breathe the state. We also support businesses to expand nationally and globally. Our local expertise is matched by PKF offices based nationwide and a network of experts across the world. Think of us as your business and wealthbuilding partner – PKF Adelaide will turn opportunities into real outcomes for your business and personal wealth.

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Praxis Aerospace is a professional services company providing engineering and project management services in support of aerospace and space programs within Australia. Experienced and trusted staff support a range of aerospace engineering and project management disciplines supporting new aircraft acquisitions, aircraft in service support programs including upgrades and space launch licence applications. Praxis Aerospace is Australia's leading Suitably Qualified Expert (SQE) conducting Risk Hazard Analysis's (RHA) for Space Launches in Australia. We have proven experience conducting RHAs within Australia for both High Powered Rockets and Space Launch vehicles.

QL Space
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QL Space is a Perth-based space company that specializes in high-resolution imaging payloads and AI-based satellite solutions. At QL Space, we develop solutions for various industries such as mining, agriculture, disaster response and management, defence and surveillance, and more. We are also testing the High-Resolution imaging payload that will have special applications in mineral exploration and other life cycles of mining (Reduce CAPEX and OPEX, Improve ESG Compliance), agriculture monitoring, disaster response and management (bushfire, flood), and high-resolution data for defence and surveillance. Our long-term goal is to develop a tech to map Near-Earth Objects (NEOs) for future exploration. Since its establishment in 2021, QL Space has been part of ICC's Venture Catalyst Space program and won the Unearthed Critical Thinking South Australia Challenge, among others. Our vision is to create value-based innovation that will have a greater impact on the industry.





QuantX Labs is the premier, sovereign provider of high precision timing and sensor products used in defence, space and critical infrastructure. Our production and test facility, based in Adelaide, is providing a unique industrial capability to support Australian Defence and Space programs. Our current focus is on three programs:

- Precision clocks and oscillators - Our flagship product - Cryoclock - is the world's most precise clock - and is being developed for deployment into the ADF's JORN Defence Radar.
- Optical Atomic Clocks - a ground-breaking development of a next generation space atomic clock based on optical technology.
- Quantum magnetometers - developed to sense extremely small changes in magnetic field due to ferrous material.

These leading-edge technologies are just the beginning of the innovative solutions being designed for a range of sovereign and global applications including resilient position, navigation and timing services.

Quantx Labs

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Express Colour Printing and Queens Court Press are a joint venture. Some of the services we offer include: Case Bound Books, Magazines, Annual Reports, Flyers, Business Cards, Folders, in-house embellishments including Foiling, Embossing, Debossing, Duplexing, Packaging, Order Books, Stickers, Labels, POS etc. We can handle large quantity print runs and short Digital runs from our multiple Digital presses + Offset capabilities. We are a one stop shop who offer market leading quality & service.



Express Colour Printing / Queens Court Press

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River Murray International Dark Sky Reserve

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The River Murray International Dark Sky Reserve is Australia's first gold star accredited International Dark Sky Place. It offers SA's growing space industry an exceptionally dark and radio silent location just 90 minutes from Adelaide's CBD. Actively supported by the Mid Murray Council the 3,200 square kilometre Reserve is backed by dark sky friendly development and lighting policies and a supportive local community. Its wide open spaces are waiting. You can find out more by visiting our Trade Display booth on 25th October and/or attending the seminar session on Thursday morning, 27th October at the Space Discovery Centre, Lot 14, North Terrace. Further details on the Reserve can be obtained at <https://www.rivermurraydarkskyreserve.org> or by contacting Mid-Murray Council on 08 8564 6020

For over 30 years, Saab Australia (Saab) has established itself as one of Australia's most respected defence and security system integrators, specialising in command and control (C2) solutions and long-term sovereign capabilities for defence and civil sectors across maritime, underwater, land, air, and space environments. Using this C2 specialisation, Saab has applied its decades of demonstrated success in providing sovereign expertise and leading solutions in complex systems integration to adopt an open architecture paradigm, aligned with Space 2.0, which actively combines inputs from all domains operating in this multi-faceted environment. In every way, Saab's work in the space domain alongside its customers, including the Commonwealth, will result in greater Australian-designed C2 mission system solutions, ensuring Australia's undeniable access to space. Now employing over 700 people in Australia, Saab's head office is proudly based in Mawson Lakes, Adelaide, with additional offices in Melbourne, Perth, Canberra and Brisbane.





Scitek has been a vacuum technology and thermal control specialist business for over 30 years. We design, fabricate and supply space simulation chambers and related technologies for space research. Our capability includes vacuum systems down to 10E-12 pressure and a temperature range from near absolute zero (near 0° Kelvin or -273° Celsius) to 400° Celsius. This includes full turnkey systems including pumping solutions, mass spectrometry, plasma characterisation, temperature solutions and much more. We supply relevant component level technologies used in space research including applications from hall effect thruster testing to coronal mass ejection events.

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Saber Astronautics
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Saber Astronautics is a space operations company established in 2008, operating in commercial and defence capacities in Australia and the US. Offering full mission services through the Responsive Space Operations Centre (RSOC) program, Saber brings an idea from a back of the napkin sketch to flight, follow-the-sun operations, and responsible deorbiting. Saber Astronautics specializes in machine learning applied to satellite diagnostics, signal degradation and space weather predictions. From RSOCs, Saber demonstrates space operations and M.L. capabilities as the night shift for the US DoD JCO and lead of space domain awareness live fire exercises (SACT) in the Pacific region. Saber has further goals supporting Australian innovations, coordinating public, private and scientific interests to send an Australian astronaut aboard the ISS. Other notable offerings by Saber include their flagship space operations software, P.I.G.I., Space Cockpit (operations and domain awareness tool for US DoD operators) and T.A.R.O.T. (terrestrial and astronomical observation tool).



SABRN Group of Companies
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The SABRN Group are a purpose-driven group of companies with the overarching drive to better serve the people and planet by tackling its most difficult problems. SABRN Health aims to provide better healthcare to people in civilian, defence, and space (extra-terrestrial) environments. SABRN Education aims to use immersive technologies like VR to train the next generation of clinicians to save lives. SABRN Circular aims to create circular solutions to end-of-life products (such as plastics) that are harmful to society and the planet. SABRN aims to engage various 'space technologies' including Moon-to-Mars, India's Gaganyaan Program, and Earthwatch Program to create value for people and our planet.



Set on sprawling lakeside grounds, Serafino Wines, a family owned business since 1972, is located in the heart of the Fleurieu Peninsula, nestled between the sea and the hills. Serafino Wines has developed a reputation as one of Australia's most respected wineries and leading producers of Italian style red wines. Our brand portfolio – Serafino Terremoto, Serafino Sharktooth, Serafino Black label, Bellissimo and Goose Island. If the 'vines by the sea' vibe of the region hasn't already charmed, then the incredibly scenic setting for the Serafino Cellar door, Restaurant, Accommodation, Conferences facilities, Serafino major events and experiences and Function Centre surely will – swathes of gum trees, animal life, the rustic-meets-modern charm of the winery buildings and of course the all important vineyard vistas, all conspire for an outstanding visit to one of the region's major wine producers. Serafino – more than just a Winery – it's a Destination.

Serafino Wines
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Silentium Defence is a global leader in the design and deployment of passive radar systems for tactical and strategic surveillance scenarios. A disruptive technology, designed and developed in Australia, our unique situational awareness solutions enable customers to detect without compromise and act with confidence across sea, air, land, and space domains. Unlike traditional radar, passive radar does not emit, doesn't require spectrum allocation to operate and does not create a radiation hazard making it quick, safe and more cost effective to deploy. As a company we have decades of domain-specific subject matter expertise, and our growing product suite of high-performance sensor systems addresses a combined \$19bn global market opportunity.

Silentium Defence
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SLM Solutions
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SLM Solutions is a global provider of integrated metal additive manufacturing solutions. Leading the industry since its inception, it continues to drive the future of metal AM in every major industry with its customers' long-term success at its core. SLM Solutions is home to the world's fastest metal additive manufacturing machines boasting up to 12 lasers and enabling build rates of <1000ccm/h. With a portfolio of systems to suit every customer's needs, along with its team of experts closely collaborating at every stage of the process, SLM Solutions leads the way on return on investment with maximum efficiency, productivity, and profitability. SLM Solutions believes that additive manufacturing is the future of manufacturing and has the desire and capability to take its customers there – right now. SLM Solutions is a publicly-traded company headquartered in Germany, with offices in Canada, China, France, India, Italy, Japan, Singapore, South Korea, and the United States. Further information is available on www.slm-solutions.com



SmartSat CRC
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The SmartSat Cooperative Research Centre brings together over 100 national and international partners who have invested over \$190 million, along with \$55 million in Federal Government funding under its Cooperative Research Centres Program, in a \$245 million research effort over seven years. Working closely with the Australian Space Agency, SmartSat will make a strong contribution to the Australian Government's goal of tripling the size of the space sector to \$12 billion and creating up to 20,000 jobs by 2030. Priority industry sectors for SmartSat include agriculture and natural resources; mining and energy; and defence and national security.





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Space Machines Company (SMC) provides in-space transportation and logistics services. Our Optimus Orbital Transfer Vehicle (OTV) has multiple applications: deployment of payloads to desired orbits, inclination changes, orbit raising (LEO to MEO, LEO to GEO and GTO to GEO), servicing (inspection and maintenance, life extension) and exploration missions (cislunar and interplanetary). SMC provides support for missions as follows:

- Research and Science: from a nanosatellite constellation for detecting bushfires on Earth to delivering mapping satellites to the Moon.
- Commercial: constellation deployments in LEO, Transfers to GEO for Telecommunications, Life Extension, Debris Management and more.
- Government: supporting the transportation requirements for strategic asset deployments and sovereign capability missions.
- Launch Services Providers: providing in-space transport solutions to help Launchers deliver customer missions whilst providing a cost effective and robust last mile transport capability.

Space Machines Company
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South Australian Space Industry Centre
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The South Australian Space Industry Centre (SASIC) drives space industry innovation, research, and entrepreneurial growth in South Australia, with a vision to create a thriving and enduring space ecosystem. Home to the Australian Space Agency, Australian Space Discovery Centre, world-class Mission Control Centre, Australia's first two launch facility licences, first state satellite and first dedicated space manufacturing hub, the Australian Space Park, South Australia continues to add to the nation's list of space industry firsts. With more than 100 space-related companies operating in the state and growing, South Australia is a centre-of-gravity for Australian space activity and provides a whole-of-state-government focal point for local industry and international organisations to connect with the state's burgeoning space sector. Dedicated to supporting Australia's national space strategy, SASIC is committed to exploiting disruption, harnessing innovation, and unlocking NewSpace opportunities to ensure South Australia remains at the forefront of Australia's space endeavours.



project managers, specialists, and regulation experts have developed a full-service continuum catering to the key needs of rocket manufacturers and their payload customers. Southern Launch's unique offering relates to all elements of launch, including designing, building, testing, and flying the next generation of smart rocket vehicles. Our service includes the five key pillars of launch, including,

Southern Launch
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- Orbital launch: providing safe and rapid access to polar and sun-synchronous orbits for rockets and payloads
- Suborbital launch: to safely test and recover rocket technologies while protecting the natural environment
- Mission and campaign design, including rocket propulsion testing and safety analysis services

Southern Launch is a launch service provider, headquartered in Adelaide, South Australia. Our offering includes the Whalers Way Orbital Launch Complex, and the Koonibba Test Range, our sub-orbital testing facility. Our team of leading engineers,

- Rocket design and avionics hardware consulting
- Securing technology transfer, launch licensing, and launch insurance





Space BD

More than just a launch service.

Space BD offers the optimal solutions to accelerate your business from finding the launch methods, and providing the engineering support throughout the entire process.

One Stop Service



Options



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<https://space-bd.com/en>



Space BD Inc.
Exhibitor
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Space BD (Japan), since its establishment in 2017, has provided the optimal solutions to utilize space for everyone. With the variety of options, Japanese and global launch methods, we offer satellite launch, the International Space Station (ISS) utilization, and other tailor-made services regarding space, for one-stop. Our unique service started with the partnership with JAXA (the Japan Aerospace Exploration Agency) in 2018. We have been chosen as JAXA's commercial service provider for their first open project. While Space BD has developed businesses with the partnership, such as the utilization of the ISS facilities and the rideshare operations on the Japanese launch vehicles, we keep expanding our launch options. In addition to the satellite launch, we are also responding to increasingly diversifying needs regarding commercial use of space, such as technical demonstration, promotion, and education programs. With our engineers' expertise, we also take the role of project management for joint projects.

SPIRAL BLUE

Spiral Blue
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Spiral Blue is a satellite imagery analytics startup based in Sydney. Since being founded in 2018, Spiral Blue has delivered a Defence contract, an ASA grant, and has raised private funding. Spiral Blue is currently working on grant projects, and supplying satellite imagery to major customers. Our key technology is an edge computing payload that can be installed in third party satellites (Space Edge Computer). Other products that make up Spiral Blue's complete service are Cobalt - a web front end, and SkyBlu - middleware that runs on Space Edge Computers in orbit. Spiral Blue Space Edge Services make Earth observation more accessible by allowing anyone to order satellite imagery; run third party analytics, write analytics applications for public or private use on the edge, and manage and monitor geospatial teams.



Spire is a leading global provider of space-based data, analytics and space services, offering access to unique datasets and powerful insights about Earth from the ultimate vantage point so that organizations can make decisions with confidence, accuracy, and speed. A vertically integrated company, we offer space infrastructure to build LEO constellations to help companies gather new insights from Space. Spire uses one of the world's largest multipurpose satellite constellations to source hard to acquire, valuable data and enriches it with predictive solutions. Spire then provides this data as a subscription to organizations around the world so they can improve business operations, decrease their environmental footprint, deploy resources for growth and competitive advantage, and mitigate risk. Spire gives commercial and government organizations the competitive advantage they seek to innovate and solve some of the world's toughest problems with insights from space.

Spire Global

Exhibitor

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Surrey Satellite Technology Ltd

Exhibitor

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Surrey Satellite Technology Limited (SSTL) is the original New Space renegade and is at the fore-

front of space innovation delivering customisable complete mission solutions for Earth observation, science, communications, navigation, in-orbit debris removal, servicing and exploration beyond Earth infrastructure. Since 1981, SSTL has built and launched 71 satellites for international customers, as well as providing training and development programmes, consultancy services, and mission studies for ESA, NASA, international governments and commercial customers. SSTL uniquely combines innovative capability, heritage-earned engineering expertise and partner-focused Know-How and Technology Transfer programmes, and is well known for innovative missions such as the CARBONITE satellites, the NovaSAR S-band radar imaging satellite and the RemoveDEBRIS space debris removal technology demonstrator. Headquartered in Guildford, UK, SSTL has recently committed to opening an office in South Australia and aims to collaborate with the Australian Space industry by sharing knowledge, intellectual property and experience to stimulate local growth and competitiveness.



Stärke-AMG Alliance specialises in precision machined and fabricated parts and assemblies for customer industries including space, aerospace, defence, medical, electronics, mining, and renewable energy. Stärke-AMG provides AS9100D quality assured production incorporating processes for CNC machining, fabrication, welding, metal 3D printing, assembly, inspection, validation, and traceability. We specialise in exotic metals suited to space applications including Titanium and Nickel alloys, Molybdenum and much more. We also have DISP level 1 accreditation. Our metal 3D printing uses EBM (Electron Beam Melting) technology from GE. Electron Beam Melting has a significant cost advantage compared to other methods. This technology is already proven and has been used for space and aerospace applications for many years. There are components printed by this brand of EBM printers that are already on satellites in space right now.

Starke-AMG

Exhibitor

spire.com/space-services

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Terry Media Plane

Terry Plane is experienced in all streams of media, government, industry, business and had the privilege of being one of five executives who managed the creation of the Australian Formula One Grand Prix. Terry Plane is a great believer in communication – external and internal – and always aims to achieve clarity and understanding. Terry's passion is writing, which is at the heart of all journalism and communication. When it comes to the English language he is proud to be a pedant as pedantry equals precision. Currently Terry works to demystify media and assist both sides of the communication equation with accurate, engaging and concise messaging.

Terry Plane Media

Foundation Professional Partner

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The Andy Thomas Centre for Space Resources (ATCSR) is the University of Adelaide's hub for space research, creating a collaborative interdisciplinary research ecosystem with lunar simulation labs not found anywhere else in the Southern Hemisphere. Unique opportunities to make history are found here for students and industry to support long-term human presence in deep space focussing on habitation, agriculture, human health and space law. Outcomes of our research will not only benefit humans in space but will positively impact life here on Earth. The University of Adelaide is a world-class research and teaching institution, centred on discovering new knowledge, pursuing innovation and preparing the educated leaders of tomorrow. Australia's third oldest university, the University of Adelaide is proudly ranked in the top one percent of universities in the world. We attract academic staff who are global leaders in their fields, along with the best and brightest students.

The Andy Thomas Centre for Space Resources

Silver Sponsor

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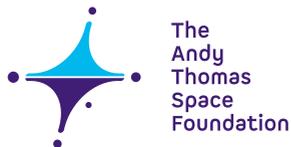


Thermo Fisher Scientific

Exhibitor

thermofisher.com/au/en/home/industrial/manufacturing-processing/test-measurement.html
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Thermo Fisher Scientific is the world leader in serving science, enabling customers to make the world healthier, cleaner and safer. Our comprehensive range includes high-end analytical and process instrumentation, laboratory equipment, a complete range of consumables, chemicals and reagents as well as the service and support to optimise your results. We've combined sales and service teams to make it easier for customers to connect with all our capabilities and leading global brands. Our local team of more than 1000 employees are working together across Australia and New Zealand to provide unparalleled industry, product and application expertise. From research to academia; diagnostics, medical and healthcare; biotechnology and pharmaceutical; food, dairy and beverage; manufacturing and utilities; heavy industry, minerals, mining & petrochemical; environmental gas, water and assessment technologies.



The Andy Thomas Space Foundation (ATSF) is an Australian Not-For-Profit dedicated to supporting the education and outreach goals of the Australian Space Agency. By identifying industry-leading strategies to enhance space industry awareness among the Australian community and driving national progress in education, research and innovation, we aim to make space accessible for all. The ATSF endeavours to inspire the next generation of space expertise through a culture rich in entrepreneurship, igniting a curiosity for space and space-related activities. Our Education Fund successfully delivered seven scholarship and prize programs to the value of \$230,000 in 2021, thanks to the support of our wonderful sponsors and donors. In 2022 we have provided over \$320,000 to students of all ages to engage in valuable education opportunities through 11 Education Fund scholarships and school programs. The ATSF relies on contributions from corporations and individuals, with capacity to accept grants and tax-deductible donations to provide these valuable experiences for students.

The Andy Thomas Space Foundation

Event Host

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Venture Catalyst Space – UniSA

Exhibitor

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Venture Catalyst Space is a globally recognised program dedicated to supporting startup founders to develop innovative, disruptive businesses in the international space sector. Delivered by the University of South Australia's Innovation & Collaboration Centre (ICC), and supported by the State Government, the program has a strong history of connecting founders with a global pool of industry experts, including stakeholders from NASA, the Australian Space Agency, Defence SA, Airbus, CSIRO, Fleet, Nova Systems, Myriota and the Smart SatCRC. Since its inception in 2018, Venture Catalyst Space has supported 29 space startups. The program has helped fast-track the cohort's market entry, accelerate their commercialisation journeys, and strengthen their connections to investors and researchers. Applications for the next cohort are open now. icc.unisa.edu.au





Canberra

UNSW Canberra Space

Exhibitor

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Established in 2015, UNSW Canberra Space at the Australian Defence Force Academy is Australia's most experienced space mission, translational research and space sector education team. Our impact includes four satellite missions and five satellites - over one third of all home-grown Australian satellites, ever. The latest mission, M2, consists of two advanced 6U cubesats that are successfully demonstrating technologies for constellation formation flying, Earth observation (particularly maritime surveillance), Space Domain Awareness, SATCOM and in-orbit artificial intelligence for Defence. We build the Australian space sector - three spin-offs, ~30 Australian organisations in our mission supply chain, and some 25 highly skilled professionals piped through to industry and government. We educate the sector, through our in-demand Master of Space Operations, Master of Space Engineering and professional short courses. And we provide critical early mission assurance for the sector, through the feasibility studies performed in our Australian National Concurrent Design Facility that underpinned the National Space Mission for Earth Observation, NICSAT and others.



Valiant Space

Exhibitor

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Valiant Space is an in-space propulsion company providing non-toxic propulsion solutions to the small satellite market. The company's first thruster, the VS-1, is a 20N bi-propellant thruster designed to provide small satellites with the capability to conduct collision avoidance, orbit raising, orbit transfer and de-orbiting manoeuvres. Valiant also offers its line of Coaxial Solenoid Valves (CSVs), which are low cost, short-lead time, high-performance valves applicable for a wide range of propellant and fluid control applications in space. With in-house design, manufacturing, and testing capabilities, Valiant can provide an end-to-end production of propulsion systems and other space hardware to suit your mission needs.



3D PLUS

Exhibitor

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3D PLUS is the world-leading supplier of advanced high-density radiation tolerant components miniaturized with our unique 3D vertical interconnect technology. With more than 190,000 modules in space, and more than 20 years of flight heritage with no reported failure, we provide the global space industry for all types of applications: telecommunications, Earth observation, navigation, launch and manned space vehicles, science missions and constellations. We offer a wide range of products including Memory and IP cores, Computer Cores, Interfaces, POL converters, Peripherals and Radiation Protection ICs, Camera heads and Custom System-In-Package (SiP) solutions. Key advantages for our customers' electronic designs:

- High performance / high density / very high speed
- High reliability / Rugged to extremely harsh environments and Space radiations
- Extreme miniaturization / very small factor
- Space qualification and very large flight heritage.

Our Flagship missions include Mars 2020, Mars Science Laboratory, Rosetta, Juno, Sentinel, Parker Solar Probe, and many more.



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Since the Foundation's commencement in July 2020, the ATSF has been focused on facilitating and increasing access to the space sector for students of all academic levels across Australia, ranging from primary school children to post-graduate and early career researchers.

Our mission is driven by the economic and social importance of contributing to and supporting the Australian Space Agency's strategy of tripling the space sector's contribution to GDP and creating an additional 20,000 direct jobs in Australia by 2030. Underlying this growth strategy is an awareness that an increasing number of skilled graduates and technicians will be the key to our future success. The Foundation believes that inspiring and encouraging students from the start of their schooling will ignite a passion for space science and technologies and will drive an ambition among the next generation of Australians to become deeply involved in our space future, both nationally and internationally.

The space sector in Australia is growing across all facets and interest groups. We have already been engaging with local, national, and international space sector individuals, communities and organisations to better connect with and promote the growth of space education and accessibility within the Australian community.

Great attention has been focused on increasing awareness of cross and multidisciplinary involvement within the industry, utilisation of unique and emerging technologies for improved education strategies as well as the importance of engaging and inspiring students, teachers and their parents, early in the academic cycle.

After an incredibly successful inaugural Education Fund program in 2021, in which we offered seven programs to a value of \$230,000. In 2022 we have seen an increased and expanded set of academic offerings with over \$300,000 worth of scholarships, prizes and awards across eleven programs.

As of 2022 the Foundation has, over two years, provided more than half a million dollars' worth of funding for educational outreach and opportunities in Australia, enabling study and research in universities, schools and private organisations across the nation.

The Education Fund has been made possible thanks to the generosity of the Foundation's sponsors and the funds generated through the bi-annual Andy Thomas Space Foundation's Australian Space Forum.

The Foundation has established itself as a crucial component of the space ecosystem in Australia, as a charity organisation supporting and promoting STEM studies for young students as well as technological pathways for graduates and young researchers, driven by the need for skilled future operators in the space industry. In parallel with our education programs, we support innovation and competitiveness amongst the Australian industry and research organisations through conducting collective and niche networking events, bringing best practice and strategies from all over the world, and generating constructive discussion.

The Andy Thomas Space Foundation Week

For the first time in the Australian Space Forum's history, during the week - 24-29 October - the ATSF has organised a number of industry leading and dynamic events, each highly relevant to promoting space technologies to flank the Forum. These events will offer something for everyone in the industry, with great promise for the promotion of STEM subjects to young students as well as knowledge and outreach amongst the Australian community. This week is known as 'The Andy Thomas Space Foundation Week'.

The Andy Thomas Space Foundation week" represents a new way to approach the organisation of technological events, as an aggregation of relevant events with different focus topics, providing a more agile, flexible and accessible approach to offering expert information in a comprehensive manner. This week has showcased its capability to aggregate different leader organisations to share specific niches, knowledge or technologies, generating discussion, understanding international best practices and achieving new skills.

For more
information and to
register for the
ATSFW events,
scan here



Monday

Space and Cloud -
Changing the World
Amazon Web Services

2nd Australian Space
Education Mixer
ATSF

The Andy Thomas Space
Foundation Networking
Dinner
ATSF

Wednesday

The Future of
ESG and Space
EY

Women in Space
Impacting the World
and Beyond
ASCA

Friday

Mercury Program:
The Andy Thomas
Space Foundation's 3D
Innovation Challenge
Final Showcase
ATSF

Mars Program: The Andy
Thomas Space Foundation's
School's Challenge,
Final Showcase
ATSF

Adelaide
Planetarium Show
**University of South
Australia**

Tuesday

14th Australian
Space Forum
ATSF

Thursday

The River Murray
International
Dark Sky
**The River Murray
International Dark
Sky Organising
Committee**

From the Australian
Outback to Mars
Mars Society

Saturday

Adelaide
Planetarium Show
**University of South
Australia**



Produced by

The Andy Thomas Space Foundation

www.andythomas.foundation

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