



ACT
Government

ACT SPACE UPDATE

2023

2023

AUSTRALIA'S SPACE GATEWAY





ACKNOWLEDGEMENT OF COUNTRY

The ACT Government acknowledges the Ngunnawal people as traditional custodians of the ACT and recognises any other people or families with connection to the lands of the ACT and region. We wish to acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region as we acknowledge that these lands are Aboriginal lands.

We also acknowledge that many other Aboriginal and Torres Strait Islander people from across Australia have now made Canberra their home, and we pay respect and celebrate their cultures, diversity, and contributions to the ACT.

We support Aboriginal and Torres Strait Islander people's right to self-determination and acknowledge the valuable contribution they make to our social, economic, and cultural life.

FRONT COVER ARTWORK

Creation Story of Ngunnawal Country (Aquila Star) by Artist: Bradley Mapiva Brown

At the first sunrise from the beginning of time, the great rainbow serpent fell from the sky in shape of a snake and landed on Earth. This spiritual being is known to the Ngunnawal people as Biamie. He slithered through the landscape creating pristine rivers and creeks. After a long day, he realised there was something missing from the landscape, so he closed his eyes and dreamed of a large brown bird flying over the countryside with magic dust flowing from her wings. He woke from his dream and went to the centre of country and with his magic he created the large bird that appeared in his dream.

He called this bird Maliyan. As Maliyan grew bigger and stronger, she rose from the countryside flapping her wings wide and far. Maliyan's wings are full of magic which spread through the landscape creating the beautiful mountain peaks on Ngunnawal Country today. After Maliyan and Biamie created the landscape, they both ascended into the dreamtime known as the Aquila and Orion star constellation where they are both still seen today guiding and protecting Ngunnawal country.

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MESSAGE FROM THE CHIEF MINISTER

It is hard today to imagine life without GPS, weather forecasting, climate change measurements or the cameras in our smartphones – all technologies that had their beginnings in space.

Even the WiFi technology you might be using to read this document was invented here in Canberra by radioastronomy researchers.

The ACT has had a long and direct involvement with some of the biggest events in international space exploration, providing critical support from the first moon landing in 1969, to the Artemis mission currently underway.

Canberra is home to commercially successful space companies, award-winning researchers, academics and a professional community in international policy, legal, regulatory and ethical aspects of space activities.

Canberra's knowledge-based economy, space governance leadership, enabling space infrastructure and innovative networks are internationally renowned. Consistently, Canberra space companies are recognised nationally and internationally for their exceptional solutions. Our continual recognition at the Australian Space Awards highlights the excellence found in our region.

These attributes combine to form a natural commercial and intellectual space hub: a gateway for the space sector between Australia and the world.

In *CBR Switched On: ACT's Economic Development Priorities 2022-2025* the delivery of a Space Hub for the ACT is identified as a transformative project under 'Mission 3: Knowledge-based economic growth'.

The *ACT Space Update 2023* will inform the development of the Space Hub based on Canberra's strengths. Using the tools and data that space-based technologies provide, we will make a meaningful contribution to solving real-world problems.

Our aspirations focus on how we can work together to realise our potential. This includes working in partnership at a local, national, and global level to deliver sustainable, knowledge based economic growth through job creation, skills development, workforce diversity and investment.

Central to this ambition is promoting the breadth of space-related capabilities across the ACT and clarifying the education pathways to space-related careers.

In this way, this Update articulates our ambition for the ACT to be Australia's economic and cultural gateway to space.

We look forward to working with our industry, educational and institutional partners to implement the *ACT Space Update 2023*.

Andrew Barr MLA

Chief Minister



Andrew Barr MLA, Chief Minister

WHY SPACE MATTERS



SAFETY AND DEFENCE

Disaster response

The ability to predict, monitor and respond to bushfires is thanks to Earth-observation satellites, which also assist search and rescue operations during fires, floods or out at sea.

Personal locator beacons

Mountain climbers, sailors, and even the elderly can now benefit from emergency locator beacons – activated in moments of personal distress – to transmit their exact location via satellites.



EVERYDAY LIFE

Online security

With more and more people shopping online, verification codes for online accounts or transactions are being used every day. Quantum mechanics guarantees these numbers are random, helping to protect our data and our bank accounts.

Navigating made easy

Satellite navigation (GPS) is based on a global network of satellites that transmit radio signals from medium earth orbit. It's never been easier to find a location or get live traffic updates.

The market size of Australia's space industry is estimated to grow by more than...

\$8Bn
by the year 2030



The Australian space sector is growing at an annual rate of 7.1%, outpacing GDP.

7.1%
Australian space sector growth rate



2.2%
Australian GDP growth rate

HEALTH



Safer surgery

Technology invented to carefully measure imperfections in the mirrors of the James Webb Telescope is now used to precisely map defects in the cornea curvature of laser-eye surgery patients.

Paramedic equipment

The anti-gravity suits worn by astronauts have been modified to help treat women suffering from postpartum haemorrhages arising from complications during birth.

ENVIRONMENT



Measuring air pollution

The Space Canary air pollutant sensor, originally designed to monitor the air quality of lunar modules, is now used on Earth to measure air pollutants including pollen and methane.

Monitoring Climate Change

Sea level changes can be accurately measured from space thanks to satellites equipped with radar altimeters. These can measure the distance between the satellite and the ocean surface with great precision, allowing scientists to track changes in sea levels over time.



High school student Alexandra Reunos with the McNamara-Saunders Astronomical Teaching Telescope at the ANU's Mt Stromlo Campus.

Photo by: Pewpew Studios

EXECUTIVE SUMMARY

Space technologies, including satellites and instrumentation products and the downstream data and geospatial services, are essential for providing services that contribute to our day to day lives.

Satellite navigation, weather forecasting, access to the internet, online banking and emergency management used by billions of people worldwide are just some of the growing list of essential functions that are enabled through satellites, their instrumentation and sensors as well as the ground station networks. As a result, the space-related economy has accelerated rapidly, offering significant career, investment, and export opportunities.

The ACT Government values the development of the full range of space-related products and services that are environmentally sustainable, internationally responsible, and mindful of opportunities to advance Australia's national interests through international cooperation.

The ACT Government's \$60 million capital investment in early-stage commercialisation has, over time, contributed \$382 million in economic output for the ACT. The ACT Government continues to invest in advanced technologies and job creating industries, including the space sector, through its Future Jobs Fund.

Canberra's size and scale, and co-location with national government institutions creates the right environment for meaningful partnerships to thrive, helping established businesses to grow and export, and new companies to identify and understand the problems that need solving.

Sovereign advanced technology manufacturing and service industries established in Canberra, like the space industry, thrive because of our highly educated workforce and our proximity to research institutions, policy makers, government customers and each other.

This interconnectedness means adjacent sectors, such as quantum, cyber and AI benefit from, and contribute to, the local space sector, making Canberra's space ecosystem dynamic and future-oriented.

The *ACT Space Update 2023* was developed in consultation with the space sector and is focused on achieving the ambition for Canberra to be recognised as Australia's gateway to space.

The Update gives expression to this ambition through four focussed missions for action, including a proposed Canberra Space Hub.

The ACT's innovative space sector continues to thrive. This continued resilience has seen new entrants start up and grow, and the continued expansion of research capability in Canberra.

The Update articulates the ACT values, future priorities and explores the development of the Canberra Space Hub.

The *ACT Space Update 2023* focuses on industry, institutional and research partners, building education and skills pathways, expanding deep research pipelines, attracting capital investment, driving job creation and supporting exports through four missions.

MISSIONS

- 1 BUILD** a fit-for-purpose and diverse workforce through inclusive education and training pathways across education and tertiary institutions.
- 2 EXPAND** scientific research capability by building partnerships with industry as well as connecting industry with customers to facilitate commercialisation.
- 3 UNLOCK** investment and global markets by accelerating small and medium enterprise (SME) capability to both attract capital investment and increase participation in global markets.
- 4 PROMOTE** ACT space-based technology and the downstream services sector using advocacy, marketing and 'Team Canberra' promotional support.

ACT SPACE UPDATE 2023 MISSION OVERVIEW

CANBERRA TO BE AUSTRALIA'S GATEWAY TO SPACE



BUILD

Skilled and Diverse Workforce

BUILD a fit-for-purpose and diverse workforce through inclusive education and training pathways across education and tertiary institutions.

Mission Drivers

Local, national, and international talent shortages exist across the space sector with increasing demand for new skill sets.

Address the gender imbalance and increase the diversity of the space workforce.

Education and transitional pathways that are easily identifiable and meet student and sector needs now and into the future.

Attract young people to career opportunities in the space and spatial technology sector.

Priorities

Collaborate with industry, universities, the Canberra Institute of Technology (CIT) and government agencies to understand future workforce need.

Generate clear career pathways into the space industry including for women and First Nations people.

Foster excitement and participation in science, technology, engineering and mathematics (STEM) through strategic sponsorships.

Space careers marketing that highlights opportunities for young people to join the space industry.

Outcomes

A fit-for-purpose and diverse workforce through vocational and tertiary education pathways and programs that support space sector employment demand.

Improved diversity and gender balance of the space workforce.

The ACT attracts talented and committed people who are leaders in their field.

First Nations voices, knowledge, and peoples are included and valued in the ACT space ecosystem.



EXPAND

Partnerships and Commercialisation

EXPAND scientific research capability by building partnerships with industry as well as connecting industry with customers to facilitate commercialisation.

Mission Drivers

Support the space sector to scale and grow to strengthen the ACT's knowledge economy.

Stimulate research and bilateral partnerships to create new companies, and expand existing ones, and support start-ups in the early commercialisation process.

Priorities

Facilitate mutually beneficial relationships and partnerships for research translation and commercialisation.

Effectively utilise the Canberra Innovation Network (CBRIN) to support start-ups.

Facilitate interactions between researchers, companies and potential customers to explore market gaps and opportunities.

Promote the ACT's commitment to values-based economic development, sustainability and the environment to strengthen the ACT's leadership credentials in the space sector.

Outcomes

Ongoing excellence in Canberra's world-class research capabilities, facilities, and collaborative networks.

Canberra's research community remains a global leader in delivering mission-driven research aligned with industry, government, and community priorities.

ACT Government programs assist the space sector to access co-funding for collaborative projects which lead to commercial outcomes.



UNLOCK

Capital Investment and Global Markets

UNLOCK investment and global markets by accelerating small and medium enterprise (SME) capability to both attract capital investment and increase participation in global markets.

Mission Drivers

Increase private and public investment in local space-related companies.

Attract capital investment to start-ups and companies in the ACT space sector.

Increase global export of space industry services and products from the ACT.

Facilitate connections between companies and customers of space-related services and products.

Priorities

Ensure the investment community has visibility of, and connections with, the ACT space sector.

Support local companies and First Nations businesses to mature their governance and become export ready.

Strengthen ties with Austrade to support access to strategic export markets through tailored export promotion and support.

Support the ACT space sector to establish a footprint within the global supply chain that generates commercialisation opportunities.

Optimise participation in export-promoting activities of Austrade and Team Defence Australia.

Progress initiatives under the Memorandum of Understanding with Singapore Space Technology Limited.

Outcomes

The local space sector participates effectively in the 2025 International Astronautical Congress in Sydney.

The breadth and strength of the ACT space and spatial sector are visible and easily accessed.

Increased investment opportunities, including through hosting an annual ACT sovereign space and spatial sector investor showcase event.

Growth in the ACT space and spatial sector export market.



PROMOTE

ACT Space Capability

PROMOTE ACT space-based technology and the downstream services sector, through advocacy, marketing and 'Team Canberra' promotional support.

Mission Drivers

Promote the values and strengths of the ACT space sector.

Expand the ACT's reputation and role as a recognised gateway within the global space economy.

Promote the ACT's education, technical and research capability links with local industry and customers.

Priorities

Promoting and showcasing Canberra's space sector capabilities to build recognition and attract investors.

SMEs and researchers will be supported to showcase their stories, products, and services to existing and new networks.

Lead collaborative projects for local and national programs with a co-funding requirement.

Generate awareness of the accessibility to research capacity and capability for industry and ensure effective participation in the SmartSat Cooperative Research Centre.

Promote and showcase ACT space sector capability through curated participation in space and spatial conferences and trade shows.

Outcomes

Space Hub concept is developed to achieve the ambition of building Canberra's reputation and status as 'Australia's Gateway to Space'.

Space capabilities in the ACT are easily found and recognisable.

Canberra's identity as a world-leading incubator and accelerator for space capabilities is showcased.

Researchers and industry in the ACT have a clear understanding of the problems their customers face that can be solved by space-related technologies and services.



CANBERRA'S COMPETITIVE ADVANTAGES

KNOWLEDGE-BASED ECONOMY

Canberra is Australia's knowledge capital. ACT research and tertiary institutions are integral to skilling the future workforce, attracting talent from across the globe and leading ground-breaking research into space sector technologies.

Canberra's research capabilities have incubated several space sector SMEs, commercialising technologies and processes developed at and with these institutions.

Canberra's end-to-end capability for research, design, manufacture, test, verification, delivery and operation of space products and services demonstrates Canberra's skills and experience.

Supporting Australia's sovereign capability

Canberra is home to Australia's only end-to-end facilities for designing, building and testing spacecraft.

The Advanced Instrumentation and Technology Centre at ANU's Mount Stromlo complex and the Australian National Concurrent Design Facility at UNSW Canberra offer Australia's most sophisticated unparalleled space testing facilities and engineering expertise.

The convergence of these facilities in Canberra helps focus the facilities and talent Australia needs to grow the domestic space industry.

Both UNSW Canberra and ANU have strong links with local industry and provide access to these world class research and development facilities, providing critical capability for the design, manufacture and testing of Australian satellites and space missions.

Professor Ed Kruzins at UNSW Canberra Space

Photo by: UNSW Canberra

SPACE SECTOR LEADERSHIP

The ACT fosters collaboration across the national space ecosystem. The ACT Government's commitment to values-based economic development, sustainability and the environment has established the ACT's leadership credentials within the space sector.

As Australia's meeting place, conversations start in Canberra. People come here to test ideas alongside the people who make them happen, to influence change and to work on the big challenges facing the nation and the world.

With more than 100 embassies and high commissions located in Canberra, we have strong international connections and presence in the global space economy.

Attracting researchers from around the world

InSpace connects ANU space research with society's biggest challenges to deliver positive impact. They do this by shaping and growing the Australian space ecosystem in partnership with academia, industry, government, and communities.

InSpace initiatives include the National Space Qualification Network (NSQN), Advanced Communications Infrastructure – Optical Ground Station at Mt Stromlo, iLAUNCH Trailblazer, spearheading the initiative the Australian Centre for Space Governance, Bushfire Resilience Missions as well as Space Health and Medicine and Space Education.

InSpace is a multidisciplinary, diverse team of world-leading research expertise who are members and leaders of influential groups, shaping the future of Australia's space industry.



InSpace team members Dr Cassandra Steer (Australian Centre for Space Governance), Professor Anna Moore (ANU InSpace Director) and Amit Parashar (ANU iLAUNCH program director)

Photo by: PewPew Studios

ENABLING SPACE INFRASTRUCTURE

Canberra has Australia's leading enabling space infrastructure, including satellite and instrument manufacturing and testing, mission control and space communications, radio and radar astronomy observatories, the lead agency for global positional and timing and the full range of downstream outputs, such as earth observation data.

Canberra is home to:

The Australian National Concurrent Design Facility at UNSW Canberra — Australia's first space mission concurrent engineering design facility.

The Australian National University's Institute for Space — InSpace connects and translates ANU space research.

National Space Testing Facility at ANU — some of the Asia Pacific's most advanced space industry infrastructure, these facilities enable the development of major space missions through complete space environmental testing of satellites, payloads, subsystems and components.

Advanced Instrumentation and Technology Centre (within the ANU Research School of Astronomy & Astrophysics) — provides cutting-edge, extensive capabilities in the development of high performance instrumentation for ground-based telescopes and space missions, including precision manufacturing, rapid prototyping and the test and evaluation of small spacecrafts.

The Heavy Ion Accelerator Facility — run by a world-class team that have helped researchers to unveil ancient climate records, discover evidence of nearby supernovae, develop new medical therapies and create new elements in the periodic table.

Geoscience Australia's Positioning Australia Program — incorporating Australia's Satellite-Based Augmentation System, National Positioning Infrastructure Capability, and Digital Earth Australia, is managed in Canberra and supported by the National Computational Infrastructure at ANU.

The ANU Research School of Astronomy and Astrophysics — responsible for operating research telescopes in the Mount Stromlo Observatory.

The CSIRO (including the Centre for Earth Observation) — a catalyst for engagement with Australian businesses, government agencies and research organisations.

The Canberra Deep Space Communication Complex managed on behalf of NASA by the CSIRO — one of only three NASA Deep Space Network Facilities in the world and currently supporting more than 30 deep space missions.



Supporting space mission success

To help Australian industry successfully launch their products into space requires the highest level of reliability for mission success in extreme environments.

The National Space Qualification Network (NSQN) evolved from the desire to provide a high-quality sovereign space qualification service to help grow the Australian space manufacturing industry.

A consortium of six founding partners, including ANU, the Australian Nuclear Science and Technology Organisation, Steritech, University of Wollongong Australia, Saber Astronautics and Nova Systems, came together to drive the vision of Australian-led and managed space testing facilities.

With \$1 billion of space qualification infrastructure, the NSQN offers access to mass testing, reducing the cost of access to global supply chains and increased international competitiveness for Australian technology.

The NSQN is supported by funding from the Australian Space Agency's Space Infrastructure Fund and the ACT Government.

Professor Mahananda Dasgupta in the ANU Heavy Ion Accelerator facility.

Photo by: Pewpew Studios

INSPIRATION AND LEGACY

In 2019 the world celebrated the 50th Anniversary of the Apollo Moon Landing. As a community, we reflected proudly on the role Canberra's Honeysuckle Creek Deep Space Communications Centre played. The moon landing inspired a generation's interest in careers in science, technology, engineering and mathematics: STEM, as we call it now.

ACT-based institutions and businesses continue participating in critical projects under NASA's Artemis and the Moon to Mars projects. These initiatives are truly inspirational and serve to highlight the ongoing practical, essential capabilities and benefits of space-based technologies to community, society and the economy.

These projects capture the imagination of the next generation of space science, technology engineering and mathematics students. And now, the space sector needs the humanities and arts graduates as much as it needs engineers and physicists.

The ACT Government has invested in programs that give young Canberrans visibility and tangible experiences of potential careers in the space sector through the Academy of Future Skills program.

Aspiring astronomers from across the Canberra region have access to high-quality telescopes in a unique facility at The ANU Mount Stromlo Observatory. The McNamara-Saunders Astronomical Teaching Telescope (MSATT) is designed for Years 9 to 12 and allows students to get hands-on experience doing astronomy.

ETHICAL AND INCLUSIVE CULTURE

ACT-based institutions are leaders in space governance. First Nations people of Australia were the first astronomers and have taught and provide valuable insight and lessons in caring for the land and space for millennia. Their stories and perspectives form a valuable part of the space sector in this country, and in the ACT, bringing greater understanding and knowledge of the world around and above us. The ACT Government was a proud sponsor of the Inaugural Diversity at the Frontier Conference in 2023. This conference provided the ideal opportunity to ensure that in the Australian space sector and space related services, gender equity is built from the ground up and the principles of diversity are pursued as a priority.

SOLVING REAL-WORLD PROBLEMS

Proximity to government customers is an enormous strength for businesses and researchers alike. The effort to create, innovate, and adapt through fundamental applied research, and then translate that into commercially sustainable solutions is the challenge and opportunity that exists in Canberra.

Proximity to the programs designed to capitalise on emerging opportunities across the space sector, including the full range of services derived from space-based technologies that help solve real-world problems is a significant strength.



The Mount Stromlo Satellite Laser Ranging (SLR)

Photo by: Pewpew Studios

Solving the problem of space debris

Space Domain Awareness (SDA) is the development and maintenance of a comprehensive knowledge of the location and nature of objects in Earth orbit. An increasingly important role for SDA is to identify active satellites, expired satellites and orbital debris to reduce the likelihood of collisions in orbit.

Electro Optic Systems (EOS) has been at the forefront of satellite tracking and SDA for over 35 years.

A recent major breakthrough in laser technology will significantly advance the global effort to mitigate space debris. The innovation involves the use of a Guide Star Laser to allow high speed adaptive optics

to form laser beams that can track and move space debris at lower altitudes and faster speeds than ever previously possible.

Developed by EOS in collaboration with ANU and the former Space Environment Research Centre (SERC), this laser technology will have a number of applications including space debris mitigation and high bandwidth satellite communications.

The space debris management program, including the Guide Star Laser, is located at the EOS Space Research Centre at Mount Stromlo Observatory in Canberra. It is a critical piece of infrastructure in the global effort against space debris.

INNOVATIVE ECOSYSTEMS

Canberra is a testbed of new ideas where creativity and entrepreneurship are encouraged and celebrated.

The ACT space sector has flourished thanks to our:

- existing infrastructure
- digital mindset
- world-class tertiary education and research sector
- cooperative regulatory settings
- highly educated population.

Innovation precincts continue to attract talent and create opportunities for collaboration while driving skills development in key industries.

This culture of innovation, coupled with extensive business ecosystems and the Canberra Innovation Network (CBRIN) feeds the growth of SME entrepreneurship in the ACT.

Collaboration in action among Canberra's start-ups

Launch on Northbourne is a collaborative space created by UNSW Canberra that encourages interaction between its tenants through the use of purpose-built share zones. The space is designed to be flexible — offering a co-working environment, private offices, group suites and breakout areas.

Home to a number of innovative companies, Penten, Fifth Domain, Ascent and Skykraft are based at Launch on Northbourne. It is also a place where academics, businesses, government and the ACT community can come together to develop defence and security capability, talent and technology.

Collaboration isn't just a proposition at Launch on Northbourne. It actively happens. UNSW Canberra has established a concept that is attracting Australian businesses that are integral in the future of Australia's security.

Launch on Northbourne is a precursor to the University's planned Defence and Security Innovation Precinct to be located at the new UNSW Canberra City campus.



Launch on Northbourne

Photo by: UNSW Canberra



The Advanced Instrumentation and Technology Centre (AITC)

Photo by: Pewpew Studios

EXPRESSING THE ACT'S SPACE SECTOR AMBITION

The ambition was developed in consultation with the ACT space sector, including space interest groups, research and academia, industry, space facilities and infrastructure, Commonwealth departments and agencies, primes, multinationals and the ACT Government.

Josh Silberman working on electronics for a satellite in the Skykraft clean room.

Photo by: Pewpew Studios

The following ambitions were identified as being important for the Canberra space sector. Canberra will:

- 1** Promote sustainable and responsible actions in space and grow the reputation of the ACT as a valued contributor to the Australian and global space economy.
- 2** Facilitate the continued growth of an inclusive and diverse workforce to support space sector investment in which women, young people, and First Nations people play valued and valuable roles.
- 3** Enable First Nations people of Canberra and the broader region to have an active role in policy, industry, and advocacy; ensuring their voices, knowledge, and values are meaningfully included and respected.
- 4** Ensure the ACT's education system will foster a culture of diversity, innovation, and creativity through a range of space and STEM pathways.
- 5** Create jobs in the space sector that will be highly sought after, and the sector will confidently attract a more diverse workforce.
- 6** Assist innovative SMEs in the ACT space sector to increase their global reach through knowledge exchange and commercialisation opportunities. Adjacent sectors will also grow, benefitting the broader economy.
- 7** Facilitate strong investment to create and maintain a thriving export market of sovereign space sector capability.
- 8** Support the whole ecosystem, ensuring products and services will continue to be delivered end-to-end, from research through to operation.
- 9** Collaborate across industry and research institutions, expanding into global connections with innovators and partners around the world.
- 10** Through these connections — and the promotional efforts of local businesses, trade and export ambassadors and other leaders — achieve worldwide recognition of the ACT as Australia's gateway to space.

The ambitions for the ACT space sector, together with Canberra's competitive advantages, have informed the refreshed vision for the *ACT Space Update 2023*.



Geoscience Australia including the Geoscience Australia's Positioning Australia Program

The Australian National Concurrent Design Facility at UNSW Canberra (ANCDF)

The Canberra Deep Space Communication Complex

National Space Test Facility including the Advanced Instrumentation and Technology Centre

Heavy Ion Accelerator Facility (HIAF)

ANU Institute for Space

CSIRO

Launch on Northbourne

VISION: CANBERRA IS RECOGNISED AS AUSTRALIA'S GATEWAY TO SPACE.

Canberra is the recognised gateway to Australia's sovereign space capabilities, recognised for research and innovations in civil, commercial and defence space applications. This is supported by a responsible and values-driven approach to space and one that is a magnet for a talented and diverse workforce.

Canberra Space Hub
Building on lessons learned from the development of the Canberra Cyber Hub, the ACT Government will explore the development of a Canberra Space Hub with industry to act as the connection point between the research, industry and government sectors, delivering a coordinated work program as identified in the Missions.



MISSION 1

SKILLED AND DIVERSE WORKFORCE

BUILD a fit-for-purpose and diverse workforce through inclusive education and training pathways across education and tertiary institutions.

MISSION DRIVERS

- Local, national, and international talent shortages exist across the space sector with increasing demand for new skill sets.
- Address the gender imbalance and increase the diversity of the space workforce.
- Education and transitional pathways that are easily identifiable and meet student and sector needs now and into the future.
- Attract young people to career opportunities in the space and spatial technology sector.

PRIORITY AREAS

- Collaborate with industry, universities, CIT and government agencies to understand future workforce need.
- Generate clear career pathways into the space industry including for women and First Nations people.
- Foster excitement and participation in science, technology, engineering and mathematics (STEM) through strategic sponsorships.
- Space careers marketing that highlights opportunities for youth to join the space industry.

OUTCOMES

- A fit-for-purpose and diverse workforce through vocational and tertiary education pathways and programs that support space sector employment demand.
- Improved diversity and gender balance of the space workforce.
- The ACT attracts talented and committed people who are leaders in their field.
- First Nations voices, knowledge, and peoples are included and valued in the ACT space ecosystem.

CONTEXT

The rapid growth of the space, spatial technologies and adjacent sectors has led to workforce shortages locally, nationally and internationally.

Competitiveness in the national and global space sector requires governments and businesses to focus on attracting and growing a highly skilled local workforce. We need to grow local talent through education and update the skills of potential recruits from adjacent sectors.

Canberra is Australia's knowledge capital. Local research and tertiary institutions are integral to skilling the future workforce, attracting talent from across the globe and leading ground-breaking research into space sector technologies.

The ACT is well placed to address skill and workforce shortages by building STEM capability, vocational and tertiary education pathways and programs to meet local and national employment needs, now and into the future.

This includes initiatives to improve access for more women, young people and First Nations people to learn, work and engage in STEM.

The ACT Government will support the demand for space sector employment by closing skills gaps and developing a fit-for-purpose workforce through vocational and tertiary education pathways and programs.

The culture of Australia's First Nations people is the oldest continuing culture in the world. Aboriginal and Torres Strait Islanders are considered the world's first astronomers, long before the Babylonian and Ancient Greek traditions.

Aboriginal and Torres Strait Islander people are currently under-represented in many areas within the space sector. The ACT Government will work to promote First Nations' voices and improve the representation of First Nation people in the sector. The Update seeks to harness First Nations' voices and knowledge to ensure our approach to space is culturally and scientifically sound.

Women bring a diversity of experience to sectors such as space, however only around one in five space industry workers are women. The ACT Government will partner with industry and tertiary education providers to sponsor and therefore encourage more women and girls to choose STEM studies and continually monitor the space sector for diversity challenges and opportunities.

The ACT Government will work with industry, education institutions and experienced providers to develop programs to further foster young people's awareness of and interest in space.

UNSW Canberra Space
Australian Concurrent Design Facility

Photo by: Pewpew Studios

Promoting diversity within the space industry

The ANU gateway to domestic and international space capability is the ANU Institute for Space (InSpace), a multidisciplinary institute founded in 2018.

The depth and breadth of space research at the ANU includes space communication, exploration, building sovereign capability, and translating space innovation back to Earth to benefit all Australians.

InSpace combines those disciplines with space law, economics, medicine, and the humanities to create strong, sustainable, holistic outcomes for Australia and the world.

As an organisation where women hold the majority of key roles, InSpace is a fierce advocate for diversity within the sector.

InSpace Director, Professor Anna Moore, says diversity and inclusion isn't just possible, it's for the best. "Every day we strive to champion people from diverse backgrounds to enter and excel in the Australian space industry. We want to be the change that our industry needs, and excelling at our work is another example of the benefits a diverse team brings."

The proof is in the accolades, with ANU InSpace awarded Academic Institute of the Year at the Australian Space Awards in 2023, while Associate Professor Marta Yebra, an ANU InSpace Mission Specialist based at the Fenner School of Environment and Society was awarded Academic of the Year.



MISSION 2

PARTNERSHIPS AND COMMERCIALISATION

EXPAND scientific research capability by building partnerships with industry as well as connecting industry with customers to facilitate commercialisation.

ACT SPACE UPDATE 2023



Skykraft staff in their office in Canberra
Photo by: Pewpew Studios

Australia's largest ever satellite constellation

On 3rd January 2023, Canberra-based space services company Skykraft launched five satellites from Florida's Cape Canaveral.

This was the largest ever Australian-made payload sent into space, and the first of over 200 satellites that will be launched into space over the next two years. The satellites will assist in global air traffic management, improving the efficiency and safety of air travel.

Skykraft employs approximately 40 people, and their satellites are designed, developed and assembled in their Canberra manufacturing facility using suppliers from across regional Australia.

In 2019, Skykraft was awarded \$1 million as part of the ACT Government's Priority Investment Program to conceptualise and design the air traffic management satellite constellation.

This is a great example of Canberra's growing space industry capability and what can be achieved with timely government support.

"We're taking giant leaps forward into a whole new era in space and creating a global industry from our nation's capital. We're creating a capable and robust space economy, starting with designing and manufacturing satellites, giving young aerospace engineers the opportunity to run space missions. We're making a career in the space industry a reality in Australia."
- AVM (Retd) Mark Skidmore AM, Chairman of Skykraft.

MISSION DRIVERS

- Support the space sector to scale and grow to strengthen the ACT's knowledge economy.
- Stimulate research and bilateral partnerships to create new companies, and expand existing ones, and support start-ups in the early commercialisation process.

- Canberra's research community remains a global leader in delivering mission-driven research aligned with industry, government, and community priorities.
- ACT Government programs will assist the space sector to access co-funding for collaborative projects which lead to commercial outcomes.

attract talent from across the globe. This creates a cycle of strengthening the appeal of world-class researchers choosing Canberra to do their work.

Fostering mutually beneficial partnerships for research translation and commercialisation at scale, driving innovation with a positive impact on community, the environment and the economy.

Facilitating strategic partnerships between industry and universities to maximise the use of national and private space assets will increase the commercialisation of research and grow supply chain opportunities.

The ACT Government will continue work with the Australian Government, universities and the sector to grow Canberra's end-to-end capability in research, design, manufacture, test, verification, delivery and operation of space products and services.

The ACT is an innovation incubator where creativity and entrepreneurship are encouraged and celebrated. The Canberra Innovation Network continues to play a central role in supporting incubation and acceleration of new companies, as well as delivering a strong program for existing small and medium sized business, keeping them up to date with trends and issues.

PRIORITY AREAS

- Facilitate mutually beneficial relationships and partnerships for research translation and commercialisation.
- Effectively utilise the Canberra Innovation Network (CBRIN) to support start-ups
- Facilitate interactions between companies and potential customers so researchers and companies know the problems they need to solve.
- Promoting the ACT's commitment to values-based economic development, sustainability and the environment will strengthen the ACT's leadership credentials within the space sector.

CONTEXT

Canberra is home to established education research institutions in ANU and UNSW Canberra. These institutions collectively provide a concentration of world-leading research capability in space related science, technology, humanities and engineering. These same institutions have strengths in adjacent sectors including cyber and quantum, amplifying the appeal where these sectors converge.

Proximity and access to world-class research is a key part of attracting capital investment and industry presence to the Canberra region.

High-quality research and development is a core enabler of the space sector value chain. Australia's space science reputation is world-leading, and the ACT is globally recognised as providing innovative and technical capabilities through its education and research institutions to support space sector development.

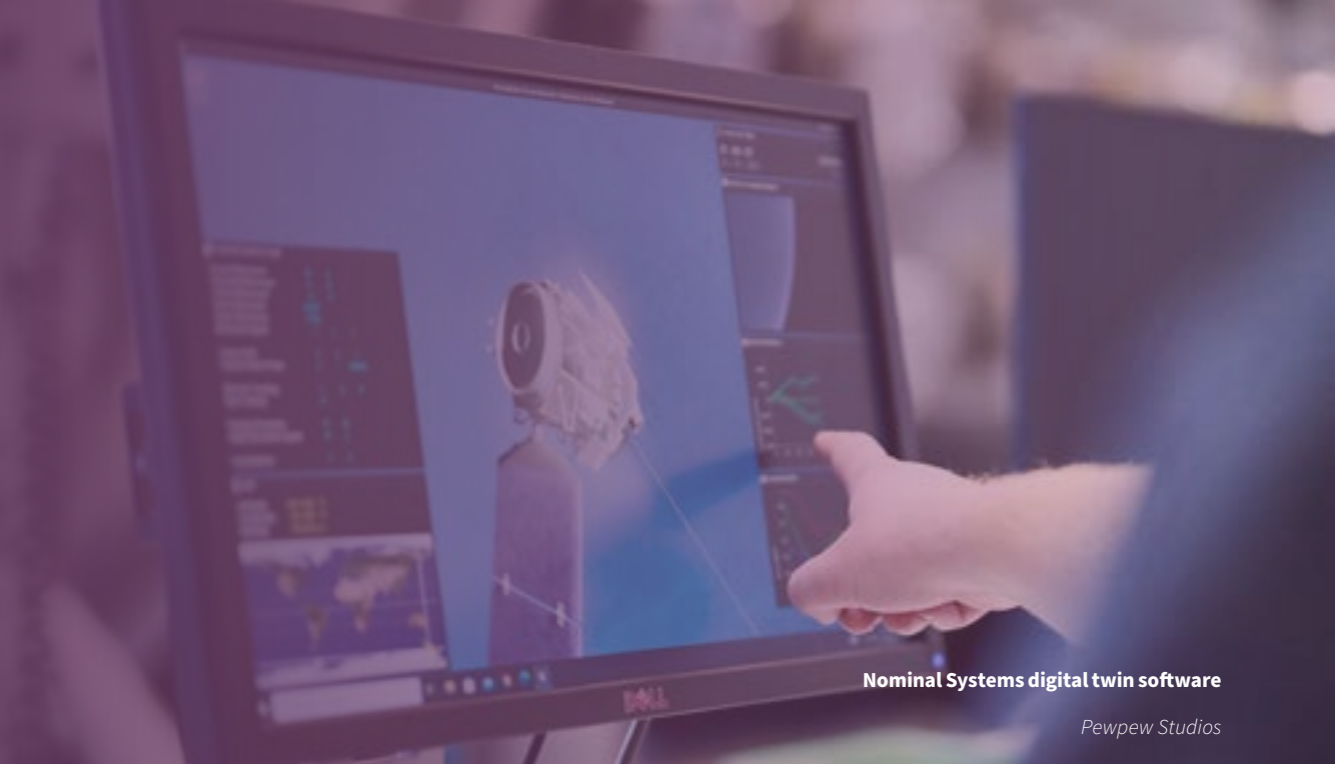
Local research and tertiary institutions offer research opportunities through their technical infrastructure and academic community that



MISSION 3

CAPITAL INVESTMENT AND GLOBAL MARKETS

UNLOCK investment and global markets by accelerating small and medium enterprise (SME) capability to both attract capital investment and increase participation in global markets.



Nominal Systems digital twin software

Pewpew Studios

MISSION DRIVERS

- Increase private and public investment in local space-related companies.
- Attract capital investment to start-ups and companies in the ACT space sector.
- Increase global export of space industry services and products from the ACT.
- Facilitate connections between companies and customers of space-related services and products.

PRIORITY AREAS

- Ensure the investment community has visibility of, and connections with, the ACT space sector.
- Support local companies and First Nations businesses to mature their governance and become export ready.
- Strengthen ties with Austrade to support access to strategic export markets through tailored export promotion and support.
- Support the ACT space sector to establish a footprint within the global supply chain that generates commercialisation opportunities.
- Optimise participation in the export-promoting activities of Austrade and Team Defence Australia.
- Progress initiatives under the MOU with Singapore Space Technology Limited.

OUTCOMES

- The local space sector participates effectively in the 2025 International Astronautical Congress in Sydney.
- The breadth and strength of the ACT space and spatial sector are visible and easily accessed.
- Increased investment opportunities, including through hosting an annual ACT sovereign space and spatial sector investor showcase event.
- Growth in the ACT space and spatial sector export market.

CONTEXT

Growth of the global space sector offers an opportunity to attract significant investment. Enhancing trade connections will assist space sector export growth and help grow the ACT economy.

Effective engagement with customers and investors can lead to greater opportunities in the global space sector. In creating new connections between ACT-based businesses and overseas investors and agencies, the reputation of the ACT as a valued contributor to the Australian and global space economy is solidified and enhanced.

A 'Team Canberra' presence at national and international space conferences will strengthen Canberra's reputation and generate commercial opportunities. A Canberra industry presence at events

and trade shows can be augmented by online material showcasing Canberra's sovereign companies and their capabilities and the ACT space ecosystem.

MilCIS, a Canberra-based conference covering satellite communications and the full range of space technology-derived services, represents an annual opportunity for Team Canberra. This event can also support networking events, creating the opportunity for relationship building across key stakeholders such as customers, investors and graduates.

Planning for full and effective participation for ACT-based businesses at the International Astronautical Congress in Sydney in 2025 will showcase ACT space attributes to a global audience. This will include curating and delivering a side program to Canberra as part of this event.

Being able to measure the impact of these activities is essential to assess their effectiveness and to inform future iterations of the measures.

Team Canberra supporting local industry

The ACT Government's Team Canberra approach offers a central contact point for local industry to access opportunities through initiatives such as industry networking events, information sessions and Team Canberra activities.

Team Canberra works to assist SMEs and the research institutions in advocating and showcasing their capability to national and international defence decision-makers.



MISSION 4 ACT SPACE CAPABILITY

PROMOTE ACT space-based technology and the downstream services sector through the Canberra Space Hub, using advocacy, marketing and ‘Team Canberra’ promotional support.



Mady Hall, Harry Wetherill, Hayden Broomby at ANU Institute of Space

Pewpew Studios

MISSION DRIVERS

- Promote the values and strengths of the ACT space sector.
- Expand the ACT’s reputation and role as a recognised gateway within the global space economy.
- Promote the ACT’s education, technical and research capabilities and their links with local industry and customers.

PRIORITY AREAS

- Promoting and showcasing Canberra’s space sector capabilities to build recognition and attract investors.
- SMEs and researchers will be supported to showcase their stories, products, and services to existing and new networks.
- Lead collaborative projects for local and national programs with a co-funding requirement.
- Generate awareness of the accessibility to research capacity and capability for industry and ensure effective participation in the SmartSat Cooperative Research Centre.
- Promote and showcase ACT space sector capability through curated participation in space and spatial conferences and trade shows.

OUTCOMES

- Space Hub concept is developed with the ambition of building Canberra’s reputation and status as ‘Australia’s Gateway to Space’.
- Space capabilities in the ACT are easily found and recognisable.
- Canberra’s identity as a world-leading incubator and accelerator for space capabilities is showcased.
- Researchers and industry in the ACT have a clear understanding of the problems their customers face that can be solved by space-related technologies and services.

CONTEXT

The ACT will create opportunities to ensure that researchers and industry understand the range of problems faced by society for which the solutions are intrinsically linked to space-based technologies or space-related science. Only through gaining these insights can local researchers and industry help solve real-world problems and accelerate commercial, cutting-edge solutions.

Canberra’s research capabilities have incubated several space sector SMEs, commercialising technologies and processes developed at and with these institutions.

The ACT will work with CBRIN, Team Canberra, the ACT Government’s Office of International Engagement,

Austrade and the Office of Defence Industry Support to promote Canberra businesses, talent and capabilities, and to increase supply chain opportunities.

Local SMEs and researchers will be supported to showcase their stories, products, and services to existing and new customers, investors, global supply chain partners and export support networks.

The ACT will be well placed to lead collaboration opportunities for programs with a co-funding requirement and ensure the sector is well-positioned to successfully participate in the range of federal government programs such as the Industry Growth Program, the National Reconstruction Fund, Defence Science and Technology programs, Australian Space Agency grants and Defence’s new Advanced Strategic Capability Accelerator.

Researchers and industry in Canberra benefit from having a clear understanding of the problems their customers face, therefore being able to engage in the forums to access up to date information is essential. This is where proximity to the customer, such as occurs in Canberra, is a benefit.

Canberra is also a natural hub for the high-level dialogue and conversations that explore the future challenges facing society that can be solved by space-related technologies and services. Researchers and businesses that can access this dialogue can build long term strategies to address future customer needs.

New space research and development partnering program

In June 2022, the ACT Government signed an agreement with the Smart Satellite Cooperative Research Centre (SmartSat CRC) to provide funding of \$1 million matched by SmartSAT CRC to establish an ACT space research and development partnering program, and deploy funding to ACT universities and partner SME companies to strengthen Canberra’s competitiveness in small satellite supply chain opportunities.

Following a consultation process, in August 2023 SmartSAT CRC signed two agreements:

ANU Institute of Space and industry partners received \$1.3 million to contribute to the Resilience Mission Project. The Resilience Mission Project is focused on mitigating fire risks through space-based bushfire detection technology to prevent catastrophic bushfires that are increasing globally with climate change; and

UNSW Canberra and industry partners received \$700,000 to provide a space-borne intelligent cloud detection system, demonstrated in space via a hosted payload opportunity.

ACT AWARD WINNERS IN THE SPACE SECTOR

2023 AUSTRALIAN SPACE AWARDS

ACADEMIC OF THE YEAR

Marta Yebra,
The Australian National University

As an internationally recognised scientist, developing satellite and other technological solutions to shape the future of the environment is one of these winner's strengths. Through cross-disciplinary research, this winner has effectively capitalised on market opportunities and driven demonstrable growth while supporting the strengthening of Australia's space economy.

ENGINEER OF THE YEAR

James Gilbert,
The Australian National University

This winner successfully designed the world's first commercial fully additively-manufactured scramjet engine, which won two awards for the company. His commitment to excellence guides him to excel at every endeavor related to the space industry.

EXECUTIVE OF THE YEAR

Russell Boyce, UNSW Canberra

The art of inspiring teams and individuals to reach for high impact goals, develop and execute strategies to reach those goals, and grow the people into the high-performance team culture needed for success is what dominates this winner's professional efforts.

ACADEMIC INSTITUTE OF THE YEAR

The Australian National University

This institution acts as the umbrella organisation to connect all space related research across the entire university. They also foster multidisciplinary space research and encourage diversity and new areas of research for example in economics of the space sector, human studies, space ethics, corporate responsibility in the space sector, space sustainability.

ACADEMIC RESEARCH TEAM OF THE YEAR

UNSW Canberra

This organisation is Australia's most experienced in space mission, mission assurance, research, education and skills & training team. For them, "research" means the pursuit and development of disruptive technologies supported by world-class science, and their demonstration on in-orbit laboratories as well as via ground-based activities. Everything this institution does is designed to raise the bar on Australian space capability.

INNOVATOR OF THE YEAR - COMPANY

Skykraft

This organisation utilises advanced manufacturing technology, embracing automation with human skill across metal fabrication, machined parts and electronics to sustain secure well-paid jobs and build a future made in Australia. Their goal is to bring supply chain into the high-tech space industry, to help the Australian Government reach the target of 1.2 million tech-related jobs by 2030.

START-UP OF THE YEAR

Nominal Systems

This digital engineering company revolutionises the design, testing and operation of complex systems. Their NDT platform combines state-of-the-art simulation, internet-of-things (IoT), cloud and gaming technologies by providing customers with situational and design awareness from concept to constellation. Their competitive advantage lies in their ability to offer a comprehensive digital twin solution that is highly modular, customisable, and scalable.

2022 AUSTRALIAN SPACE AWARDS

BUSINESS OF THE YEAR - LARGE

Electro Optic Systems

EOS Space Systems is a global leader in the design, manufacture, delivery and operation of sensors and systems for space domain awareness (SDA) and space control. For over 35 years EOS has been directing energy beams to space objects for applications including tracking, characterisation, identification, communications, remote manoeuvre and missile defence. EOS has provided SSA infrastructure including lasers, telescopes and beam directors to allies and partners globally.

INNOVATOR OF THE YEAR - COMPANY

Shoal Group

Shoal Group have helped lead the development and growth of the Australian Space economy. Shoal became one of the earliest members of the Australian Space Agency's Support Services Panel to help manage launch risk and safety, and was a founding member of the SmartSat Cooperative Research Centre to develop technologies in advanced communications, satellite systems and Earth observation data services.

RESEARCH ORGANISATION OF THE YEAR

**The Australian National University
Institute for Space**

The Australian National University (ANU) Institute for Space 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.

ENGINEER OF THE YEAR

Dejan Stevanovic, Electro Optic Systems

Experienced engineering manager with a history of successfully delivering advanced optical instrumentation, lasers and telescope systems. Proficient in management, integration and testing of cryogenic-vacuum instrumentation, engineering analysis and training.

EXECUTIVE OF THE YEAR

Glen Tindall, Electro Optic Systems

A senior business leader in the space, defence and telecommunications industries with highly developed skills in leadership, strategy formulation, team building, commercial management, corporate governance, product development, revenue generation, business restructuring, negotiation and dispute resolution.

RESEARCHER OF THE YEAR

James Gilbert,
The Australian National University

Dr James Gilbert is a lead engineer at the ANU Research School of Astronomy and Astrophysics. He is a space instrumentation engineer with a PhD in astrophysics, and an active researcher with a background in electronics, optical systems (telescopes, cameras, infrared spectrographs) and scientific space payload design. He currently leads a team of engineers and scientists developing new astronomy and space instruments at ANU.

RISING STAR OF THE YEAR

Brenton Smith, Nominal Systems

Dr. Brenton Smith is an engineer with experience in aerospace and software engineering, research and development, project management, and business development. Brenton is leading novel satellite formation flying experiments onboard UNSW Canberra Space's in-orbit M2 satellites and is Chief Technology Officer/cofounder of the simulation and digital engineering platform developer, Nominal Systems (formerly Space Services Australia).

ACKNOWLEDGEMENTS

The ACT Government would like to acknowledge and thank the following key partners across government and the space industry who gave valuable insights and feedback used to produce the *ACT Space Update 2023*.

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|--------------------------------|------------------------------------|--|
| Advanced Navigation | EMA Advisory | Nominal Systems |
| Airbus | Engineers Australia | Nova Systems |
| ANU | EOS Space Systems | Optus Satellites and Space System |
| ANU InSpace | Equitorial Launch Australia | QinetiQ |
| Australian Space Agency | FuturifAI | Questacon |
| AWS | Geoscience Australia | Quintessence Labs |
| Boeing | Gower Consulting | Raytheon |
| CBRIN | Infinity Avionics | Shoal Group |
| CEA Technologies | Jacobs | SIAA |
| CIT | KBR | Skykraft |
| Clearbox Systems | KPMG | University of Canberra |
| Coolamon Advisors | Liquid Instruments | UNSW Canberra |
| CSIRO - CDSCC | Lockheed Martin | UNSW Canberra - ANCDF |
| Deloitte | Microsoft | |
| Earthspace | Mt Stromlo Observatory | |

These organisations have not necessarily endorsed this Update.

CREATION STORY OF NGUNNAWAL COUNTRY

(AQUILA STAR)



The Wedgetail Eagle known as Maliyan holds a deep spiritual connection to the Ngunnawal people as she is the great creator of Ngunnawal country. In this depiction you can observe Maliyan in the Aquila constellation guiding and protecting Ngunnawal country.

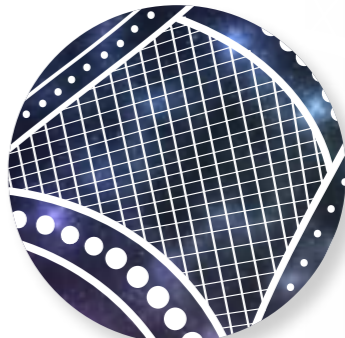
Traditional line and dot painting has held a deep spiritual connection to the Ngunnawal people for thousands of years. This technique has been used by Ngunnawal peoples to communicate lore, ceremony and dreaming. In this depiction the line and dot symbols represents creation of new life, spiritual wellbeing and pride.



Maliyan's footprints are symbol of what she has left behind in creating Ngunnawal country. In this depiction Maliyan's footprints represent strength, resilience and pride for country.

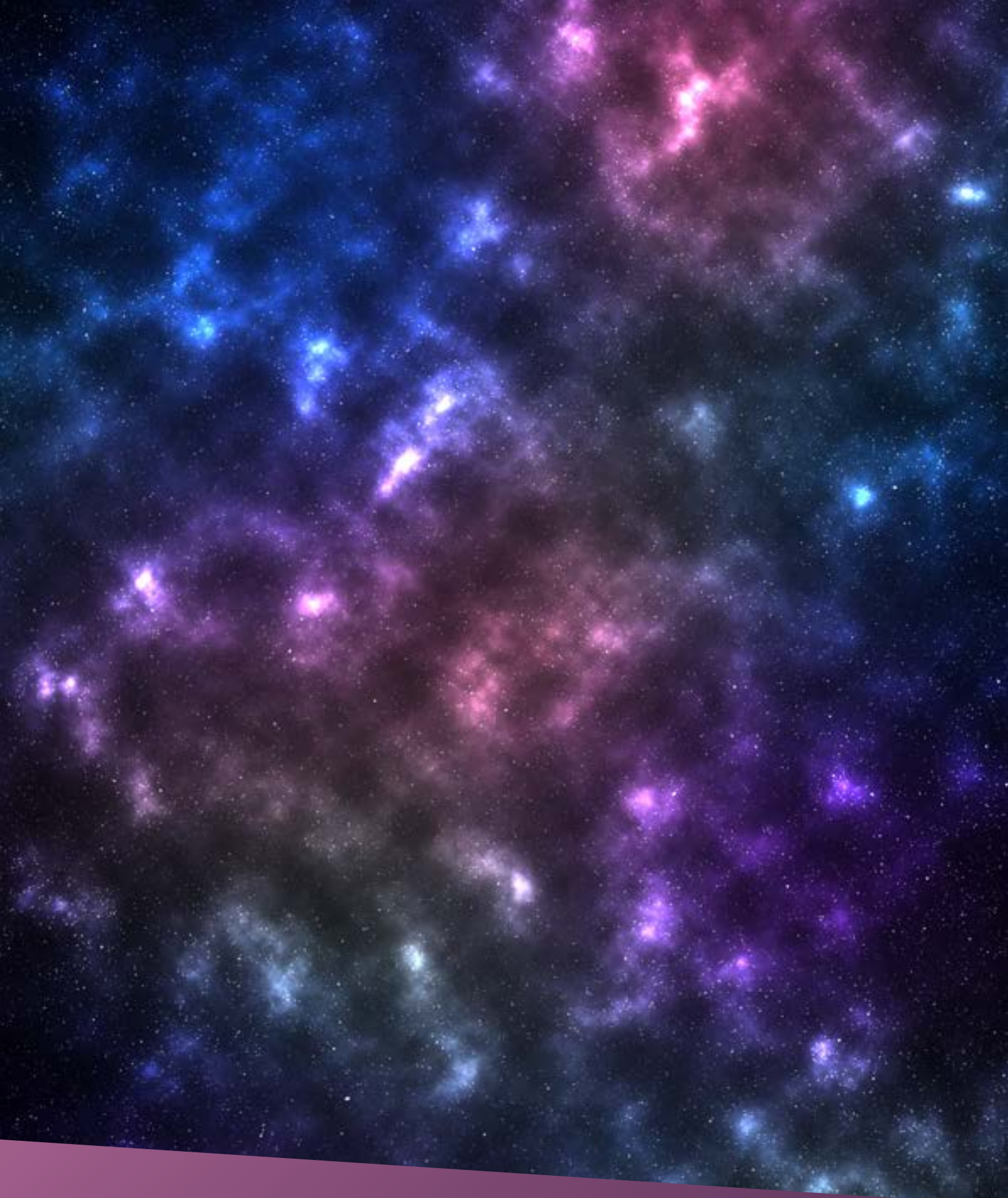


Songlines hold a deep spiritual connection to all First Nations peoples as their tracks were forged by creator spirits during the dreaming and creation of country. In this depiction these songlines have a special ancestral story attached to them.



The galaxy holds a very deep spiritual connection to all First Nations people and their ancestors who continue to use the stars and Milky Way as a seasonal compass and calendar to navigate country and find food sources. The constellations are a record of values, protocols and stories which are shared through multiple generations for thousands of years to continue the survival as living culture and peoples.





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