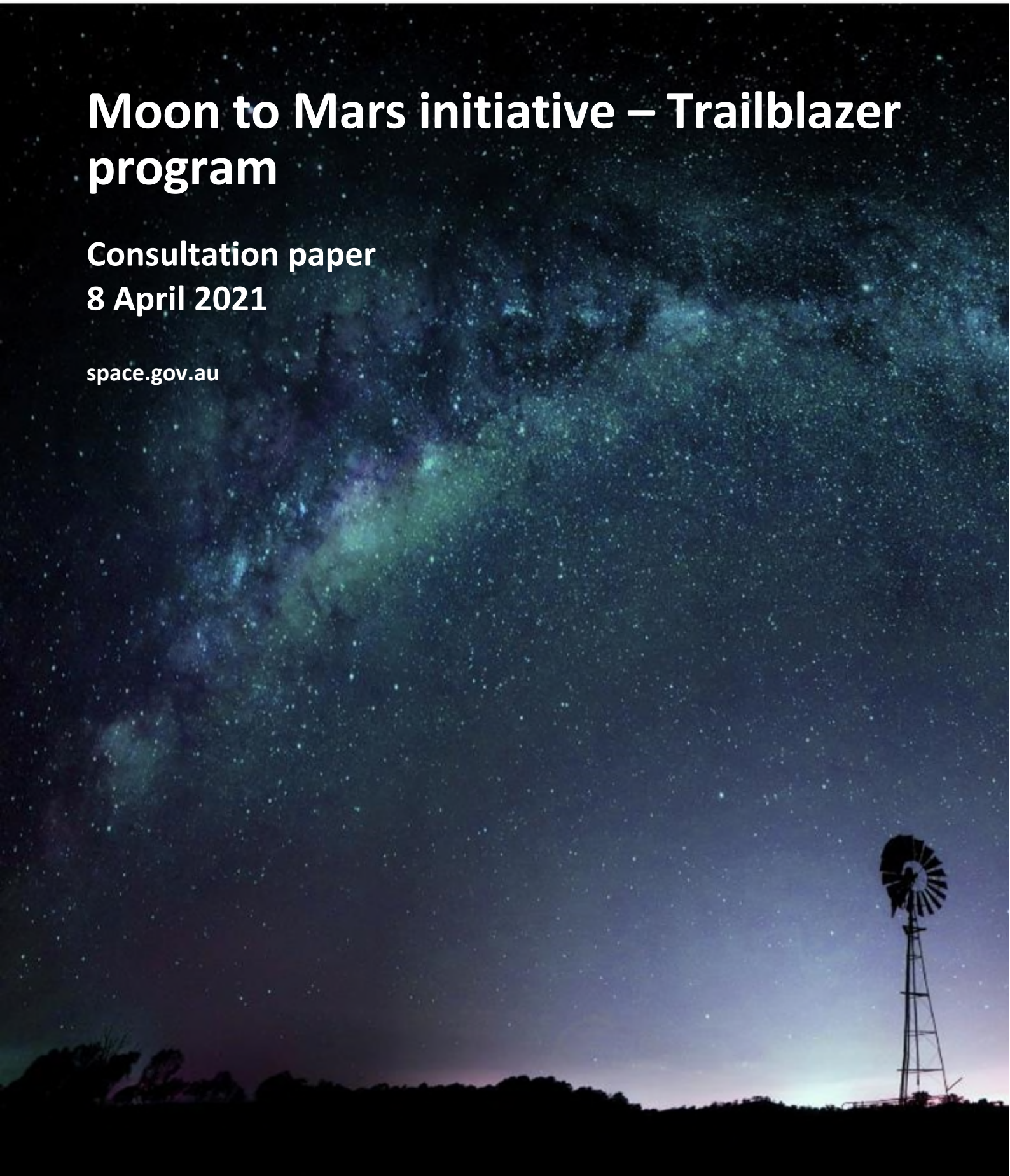
Australian Government

Australian Space Agency

Moon to Mars initiative – Trailblazer program

Consultation paper
8 April 2021

space.gov.au



Contents

Introduction	3
Moon to Mars initiative	3
The Journey	4
Purpose of Consultation	4
Trailblazer program	5
Mission Attributes	6
Australia's Exploration Services Vision and Missions	8
Program Implementation	13
Conclusion	17

Introduction

The stars in Orion are often seen as a group of men that are hunting, fishing in canoes or taking part in a corroboree.

The Three Brothers

The Australian Space Agency's (the Agency's) purpose is to transform and grow a globally responsible and respected Australian space sector that lifts the broader economy, and inspires and improves the lives of Australians. The Australian Government's Advancing Space: Australian Civil Space Strategy 2019-2028 (the Strategy) sets overarching goals – to triple the size of the Australian space sector to AU$12 billion and create up to 20,000 jobs by 2030.

On 21 September 2019, the Prime Minister launched a new partnership on future space cooperation between the Agency and NASA. Australia's contribution to this partnership, the Moon to Mars initiative ('the Initiative'), consists of a $150 million investment by the Australian Government for Australian businesses and researchers to join NASA's inspirational endeavour to return to the Moon and then go on to Mars. The Initiative commenced in FY20/21 where investment is focused in Australia for a period of 5 years.

Moon to Mars initiative

A dark cloud next to the Southern Cross that stretches out across the Milky Way as an emu. In some cultures, the emu's position in the sky signals the best time for emu egg collection.

Emu in the Sky

The Initiative will provide $150 million to support Australian businesses and researchers to access national and international space supply chains, create jobs in Australia and support the growth of industries across the economy through the development and application of space technologies. By this means, Australian space organisations will join with NASA and other international partners to bring Australian capabilities to the Moon, Mars and beyond.

The Initiative is comprised of three interconnected programs:

- **Supply Chain program** – A program that consists of both grant and facilitation components. The Supply Chain program targets projects and activities that build capability in Australia's space industry and support Australian industry to deliver products and services into domestic and international space supply chains. The supply chain capability grants are open until April 2023. Further information can found here. The facilitation component is being designed and will commence this year.
- **Demonstrator program** – A grant program that supports demonstrator and pilot projects which showcase Australia's strengths to the world. These projects provide a pathway for Australian industry and researchers to rapidly develop and demonstrate products and projects, including in space, that will create new capability and enable new business ventures, revenue streams and the creation of new markets. This program is divided into feasibility grants, which have recently closed, and mission grants, which will open later this year. Further information on this program can be found here.
- **Trailblazer program** – Australia's flagship mission supporting NASA's Moon to Mars activities that demonstrates and develops Australia's strengths, ingenuity and capabilities, while inspiring the nation.

The Supply Chain and Demonstrator programs form the foundation of the Moon to Mars initiative, and are complemented by the Trailblazer program as the flagship element of the Initiative.

The Journey

The Southern Cross, which many Australians are familiar with. The fifth star is now known by its Aboriginal name, Ginan, a small dilly bag full of songs of knowledge.

Ginan

In Feb-Mar 2020, the Agency conducted a public consultation on the Moon to Mars initiative which received over 70 written submissions and engaged over 550 participants in consultation meetings. In this consultation, respondents requested that the Initiative**:**

- provides an early articulation of the Trailblazer mission to set a vision,
- ensures the Trailblazer mission connects with the broader Australian community,
- leverages existing Australian capabilities.

Further detail on the content and outcomes can be found here.

The process started via identifying the Strategy's key priority areas, suited for exploration and leveraged by Australian key capability:

- Advanced communications
- Remote operations and automation
- In-situ resource utilisation (ISRU)
- Position, navigation and timing
- Space life science and remote medicine
- Digital mapping of celestial bodies
- Space situational awareness (SSA)

The Agency consulted with NASA and technical experts from across the sector to set exploration visions and define potential exploration missions that are achievable by Australian industry. The Agency also sought to understand international agency interest, along with the gaps in the international exploration market which could be matched by Australian capabilities identified through the outputs from the Space Priority Area Roadmaps (the Roadmaps) which the Agency is developing. This approach guided the Agency to identify three Exploration Services, along with potential missions to support Australia's overall exploration vision. This paper not only seeks to receive feedback on the conclusions of these broader exploration discussions but also to address the feedback received over the previous consultation.

Purpose of Consultation

The Initiative includes the Trailblazer program, a flagship mission that will demonstrate Australia's strengths and ingenuity, while creating jobs, growing the economy, and inspiring the nation. As a part of this consultation, this paper will present:

- The Trailblazer program's objectives and outcomes,
- Australia's space exploration vision including potential lunar missions, and
- The proposed implementation method of the Program.

The Agency is seeking the public's feedback on all of these elements.

The feedback from this consultation will aid the key decision making process for determining the Trailblazer program's signature mission. This mission will be decided upon prior to the release of the program guidelines, and will be informed by this consultation and other sources including the Demonstrator program and collaboration with NASA. The Agency will also continue to work closely with key stakeholders, including our partners at NASA.

Trailblazer program

The Kaurna People see the stars of the Southern Cross as the footprint from Wirltu the eagle's claw. Echoed by other groups who all see a footprint or talons of the eagle

Eagle's Footprint and Claw

Questions for your consideration

1. Are the objectives and outcomes of the Trailblazer program in line with your expectations? What objectives would you remove or add?
2. What would you consider as the most important objective and outcome and why?

The Trailblazer program provides an opportunity for the Australian space sector to design, build and execute a flagship lunar exploration mission, while supporting NASA's endeavour to go forward to the Moon and on to Mars. This program will demonstrate Australia's key strengths in a complex lunar environment in order to grow the industry and inspire the public.

The key proposed objectives of the Program are as follows:

- Contribute flagship Australian space and cross-sector capabilities within an international space exploration program,
- Develop a global competitive advantage for the Australian space sector, building capability and creating jobs,
- Demonstrate Australian capabilities to the world, and
- Inspire the Australian public.

At the end of this program, the following outcomes are expected to have been achieved:

- An Australian asset (satellite, rover, other spacecraft or equipment) will have been operated on the Moon or in the lunar vicinity,
- Improved collaboration with international space agencies including NASA,
- Increased employment in the Australian space sector,
- Increased size of the Australian space sector,
- Key technologies are spun out to develop other sectors of the Australian economy,
- Increased investment into the Australian space sector,
- A growth in Australian space capability,
- Strengthened relationships between international organisations and the Australian space sector,
- Increased interest in STEM and related highly skilled careers,
- Galvanisation of national pride in Australia's space activities, and
- Increased community engagement in space activities.

The Australian Government has committed $50 million to the Trailblazer program for Australian space researchers and businesses to achieve these objectives and outcomes. To provide an industry led solution, it is proposed to be delivered as a single grant according to the yearly funding allocation shown in Table 1.

Table 1: Trailblazer program funding profile

	2021-22 ($m)	2022-23 ($m)	2023-24 ($m)	2024-25 ($m)	Total ($m)
Trailblazer program	0.0	12.0	18.0	20.0	50.0

Mission Attributes

A number of Indigenous groups see the Southern Cross as a stingray, often being pursued by sharks across the sky.

Stingray Pursued by Sharks

Questions for your consideration

1. Are there any mission attributes that are unnecessary or missing and why?
2. Are there further considerations for how the project will build upon its attributes?
3. Any further comments on the objectives and outcome of the Trailblazer program or on the mission's attributes?

The Trailblazer program provides an opportunity for the Australian space sector to design, build and execute a flagship exploration space mission. The Agency has defined seven proposed key attributes (Figure 1) that the Trailblazer mission must meet to achieve the program objectives. These attributes directly link to the Strategy, and contribute to its economic goals.

Figure 1: Trailblazer desired attributes

Proposed Mission Attributes	
Build international relationships	The Trailblazer mission will reinforce Australia's strong relationship with the US, NASA in particular, and pave the way for future collaboration with other international space agencies.
Feasible	The Trailblazer mission will be designed to be conducted within the desired time frame and budget under a defined risk profile based on Australian industry capability.
Grows industry	The Trailblazer program will be designed to promote collaboration between multiple Australian organisations. This way mission development experience and space heritage can be shared across the sector. The project will be a first, helping Australia develop a global competitive advantage while also fostering further investment, new jobs and revenue streams. This investment and capability should spill over into other sectors, creating impact and growth in the broader Australian economy.
Australian made	The Trailblazer mission will maximise Australian involvement, especially in the space manufacturing sector. This means that key spacecraft design, manufacture, integration, testing and operations is expected to be performed by Australian organisations.
Demonstrates capability	The Trailblazer mission will carve out a niche role for Australian involvement in international space exploration missions. Furthermore, the mission will drive Australia towards commercial market opportunities in the wider space economy. This will involve demonstrating Australia's capabilities and providing tangible benefit to the build-up of sustained operations on the Moon.
Inspiring	The Trailblazer mission will be inspiring to the Australian public as the flagship element of the Moon to Mars initiative. A public audience should be able to understand the aim and impact of the mission. The Agency and successful applicant will endeavour to maximise the visibility of the project. It should also have clear links to STEM, and be considered socially and environmentally responsible, to increase the inspirational element of the project. This mission should generate excitement and engage the nation, from the youngest to the oldest members of the community.
In-line with Strategy	The Trailblazer mission will leverage the National Civil Space Priority Areas (outlined in the Strategy), the Agency's technical roadmaps and reinforce Australia's capabilities in space through targeting gaps in the market.

Australia's Exploration Services Vision and Missions

A story from the Boorong People, Purra is the red kangaroo that was pursued by the hunters Wanjel and Yuree.

Wanjel and Yuree Pursuing Purra

Questions for your consideration

1. Do the visions leverage key capabilities of Australia and apply to a gap in the international exploration market?
2. Are there any exploration visions that should be excluded?
3. Are there any exploration visions that should be included?
4. What can the industry or public independently do to support these exploration visions and Trailblazer program?
5. What do you think are the main challenges/risks of these missions?
6. Are there any missions, under the visions, that should be excluded?
7. Are there any missions, under the visions, that should be included?
8. Any further comments on the vision and potential missions for Australian space exploration.

The Agency has identified Exploration Services as areas of high opportunity and enduring priority for the application of Australian space capability. They are based on both national need and market considerations spanning more than one Civil Space Priority Area. Exploration Services are a key cross-cutting area central to the Initiative.

The Agency has significant interest in these Exploration Services based on Australia's existing capabilities and needs in the market. Identifying these services sets a vision for potential Trailblazer missions in turn enabling Australia to carve out its niche on the international stage. Following consultation with industry, technical experts across the sector, and international space agencies, the Agency has identified three Exploration Services of interest.

Exploration foundation services

Australia has global competitive advantages in trusted remote operations and autonomous systems from our resource industries, strengths in niche field robotic systems and related technologies, resource technologies and planetary science. Australia can leverage our capabilities to realise a long-term flagship role in foundation services, which would add unique value to the global space exploration ecosystem and further its endeavours, with associated market opportunity.

Definition - Foundation services are operational services that support exploration missions to build towards and to maintain a sustained off-earth presence. These are services for which the application demand is recurrent, continuous or enduring in nature. The scope of foundation services is monitoring and inspection, planning and logistics, civil construction, materials transport and cargo handling, remote maintenance, component manufacture and assembly. These services are distinct from but complementary to mission critical systems such as power, communications and life support. A major opportunity exists for Australia to not only participate in international development efforts but to take a leading role in the design, development and provision of foundation services and their associated technologies and processes.

Exploration communication services

Australia has solid foundations in communications technologies and services, with burgeoning global capabilities in some niches. These capabilities have been identified and shown in the Agency's

Communications Services and Technologies Roadmap. An exploration communications services mission could showcase these capabilities by enabling connectivity to assets, and providing a tangible contribution to international missions.

Exploration health services

Australia has an extensive history in the delivery of telemedicine and remote health services, from the Royal Flying Doctor Service to the Australian Antarctic Division. Exploration activities will present an important pathway to leverage our expertise for space opportunities with high potential to benefit everyday Australians.

These services can exist independently or be interlinked. One mission could cover multiple services. Figure 2 depicts how the Exploration Services could interconnect and contribute to a broader vision for Australian space exploration.

Figure 2: Artist's impression of Australia's vision for space exploration; **Communication, Foundation services and Health services**, a part of a bigger international exploration program within the next decades

These services are, of course, not inclusive of all that Australia has to offer. The three Exploration Services outlined are those in which our international partners have shown the greatest interest and align best with our collaboration with NASA to match our capabilities to gaps. The remaining priority areas will continue to be pursued under other activities such as Agency roadmap implementation.

An overview of each Exploration Service chosen follows, providing example mission concepts that could contribute towards the overall vision. Each overview includes:

- A vision for the Exploration Service,
- The rationale for its inclusion,
- Some potential mission concepts.

These example concepts are not exhaustive and have been presented to give an example of what may fit the Agency's vision. The Agency is seeking feedback on the ability of the Australian space sector to deliver such missions, and on how respondents perceive the alignment of these missions with the attributes specified. All the missions will be consistent with our international obligations.

Exploration Foundation Services

Vision: Australia will translate its core strengths in remote asset management and field robotics into space, to become a leading provider of foundation services for exploration missions, contribute to our scientific understanding of the Moon and other celestial bodies, and support a sustainable lunar presence.

Rationale: Foundation services are a necessity for the sustained build-up of exploration infrastructure, with a near-term opportunity in Artemis to leverage Australian competitive advantages into this market gap. The capabilities developed in delivering foundation services are also relevant to address longer-term nascent space markets such as OSAM (On-orbit Servicing Assembly and Manufacture), in-situ resource utilisation (ISRU), space agriculture, in-space logistics, science services and exploration of other planetary bodies. Learnings are translatable to terrestrial industries.

Photo credit: CSIRO

Mission concept: Foundation services rover

Aim: Demonstrate, deliver and progress Australian exploration foundation services capability with remotely operated and autonomous Australian robotic lunar assets.

Benefit: This mission concept would allow for Australia to directly contribute to NASA's initiative to go to the Moon and onto Mars by providing foundation services to a specified NASA mission. In building heritage, capability, generating new datasets, and demonstrating how we can meet our international obligations, it would be a significant entry point for Australian industry to realise a continuous flagship role in exploration. The lessons learned and technologies developed would also be beneficial to the progression of Australian satellite systems, other space infrastructure developments, and terrestrial industries.

Example: Land on the Moon (e.g. via NASA's Commercial Lunar Payload Services (CLPS) program). Deploy a single Australian rover onto the lunar surface. Deliver foundation services to another mission. Perform relevant technology demonstrations. Operate the rover using Australian remote operation centre(s) and mission control capabilities. Key considerations:

- A mass-limited lunar surface payload including a small rover, rover deployment system, and an optional fixed payload.
- Mission scope could optionally also include precursor or accompanying CubeSat(s) (different launch to the rover, or part of CLPS systems mass allocation) in support of the primary mission.
- Assume landing location will be specified by the Agency, possible locations may include the lunar South Pole region.
- Survival only lunar day or twilight.
- Consider novel sustainability approaches and be in accordance with Australia's international obligations.
- Functional applications of interest are as follows, one or more of which may be applied:

Remote inspection	Regolith provision	Regolith characterisation	Automation
Provide foundation service(s) by performing remote inspection services for other payloads on the lunar lander or the lander itself.	Provide the foundation service of collecting regolith (e.g. from outside the landing engine blast zone), and delivering this lunar regolith to another landed payload (same lander), in quantities that are appropriate to support the scientific investigation of the Moon and a defined mission.	With in-situ sensors, characterise the nature of and map the location of regolith. Provide data that adds value to the payload that the regolith is being provided to. The data should contribute to our scientific understanding of the Moon, support future exploration and the build-up of lunar activities, and develop datasets to grow Australian space capability.	Utilise Australian remote operation centre(s) and a compartmentalised architecture to deploy and demonstrate pre-trained various AI/ML/Sensor fusion and visual processing/ perception algorithms that: align with mission objectives; support other functional applications; and are scalable for various operational robotic or remote and autonomous management missions in the future.

Exploration Communication

Vision: Australia aims to leverage its industry strengths into the development and operation of lunar, planetary and deep space communication infrastructure in order to support national and international exploration missions.

Rationale: Showcase Australian space industry's strengths and aspirations in LEO based internet of things (IoT) constellation and software defined radios to support lunar exploration missions. Subsequently grow Australian industry by establishing Australian built and operated communications infrastructure in lunar orbit, promoting many potential terrestrial applications that everyday Australians can benefit from. Mission concepts can cross-cut the other exploration areas, as it is likely that any foundation services based on autonomous remote operations or astronaut health support services will require communications support.

Photo credit: NASA

Mission concept: Lunar Communications Data Relay

Aim: To demonstrate a Lunar Data Relay capability with approximately 1-2 small satellites (smallsats (<100kg)) to enhance and support communications infrastructure for lunar exploration missions.

Benefits: Support industry capability development and contribute to international partners, establishing an Australian presence in interplanetary communications infrastructure.

Example: A smallsat as a step towards a constellation (future goal) with software defined radios to communicate with lunar assets. This can serve as a high data rate radio-frequency (RF)/optical downlink channel for lunar surface and lunar orbit assets from Australia and other nations to Earth. Key elements could include: space and ground based RF communications infrastructure, cognitive and software defined radios, resilient smallsat platforms, well defined interface definitions and standards.

Mission concept: Lunar IoT Network

Aim: To establish a small lunar IoT spacecraft constellation and demonstrate support for lunar surface sensor(s).

Benefits: Establish Australia's leadership in space based IoT and support upcoming exploration missions**.** Lunar habitats and ISRU exploration settlements will benefit from diagnostics and health checks

Example: Spacecraft constellation to provide sensing of assets on lunar surface. Potential applications include: an astronaut emergency beacon; asset location and/or health tracking; temperature, dust, or radiation monitoring; and lunar prospecting. Key elements could include: lunar smallsat constellation, lunar surface sensor networks, dust mitigation on sensors, resilient smallsat platforms, well defined interface definitions and standards.

These capabilities were identified within the target segments of the Australian Space Agency's Advanced Communications Technology Roadmap released in December 2020. The options in this exploration area remain open for Australian collaborations to either define, develop, build, launch or operate the entire space segment infrastructure or collaborate with international partners to lead mission segments of identified strategic importance.

Exploration Health Services

Vision: Australia aims to establish a key role in driving health management decision making and processes, as well as providing commercially viable contributions which enhance human/astronaut wellbeing and performance.

Rationale:

- Establish an ongoing role for Australia in a growing area of opportunity – Growing medical technology and space markets present a strong opportunity to carve out a long-term role in international supply chains; by showcasing competitive Australian capabilities such as remote medicine and bioinformatics.
- Improve the lives of Australians – Target the development of novel health management solutions for space that provide translatable solutions for shared issues and limitations of health management on Earth, especially for Australian people in rural and remote communities.
- Commercialise and grow as an industry leader – Dual-use space and Earth markets present a pathway to translate space-related health research in a commercially viable way.

Photo credit: NASA

Mission concept: Integrated data systems for astronaut health

Aim: Establish an ongoing Australian role in managing collection, processing and transmission of health data used to drive health management decision making.

Benefits: Demonstrate Australian strengths in real-time data transmission and integrated information processing. Establish a trusted platform as a stepping stone to integrate future Australian platforms into primary astronaut health management processes. Applied mission systems could also support integrated, interdisciplinary health management on Earth.

Example: An integrated platform for Australian and international health sensors will provide in-situ processing and real-time data transmission to support decision making for enhanced astronaut wellbeing and performance. The platform will support sensors for environmental, behavioural and physiological monitoring networks.

Mission concept: End-to-end astronaut cognitive performance & mental wellbeing system

Aim: Establish an ongoing Australian role in managing delivery of health management across all mission phases to drive wellbeing and performance in one targeted area of expertise: mental health.

Benefits: Demonstrate strengths in psychological human centred design, unobtrusive monitoring, and support for remote workers. Applied technologies can help to address mental health needs on Earth, in a cost effective way.

Example: An end-to-end system for maximising astronaut mental wellbeing and cognitive performance – from training, to launch, on-mission, and return. The system will support elements such as pre-flight training, on-mission solutions, unobtrusive monitoring and post-flight reconditioning.

Program Implementation

The Noongar People see the Southern Cross as four women that had camped near a forest and were swept into the sky.

Women in the Sky

Questions for your consideration

1. Does the industry led approach achieve its aims of allowing all organisations to apply while ensuring a consortium can achieve the overall objectives? Please give comments on how it does or doesn't.
2. Does the Australian industry have the capability to deliver one or more qualifying demonstrations (phase B maturity) in order to apply for the $50M grant?
3. Are there any challenges that are considered with this implementation approach?
4. What difficulties does the Australian industry face forming a consortium that is capable of achieving a lunar mission?
5. Any other comments on the implementation strategy.

The Agency wants to ensure that the intended implementation of the program is understood by potential industry and research sector participants and encourages Australian industry to participate and succeed. The results of this consultation will inform the program guideline development. The Agency is seeking feedback on the proposed 'industry led' methodology outlined in this section.

Industry led

As a grant program, Trailblazer is aimed at providing Australian businesses and researchers with the opportunity to develop and showcase their capability on an international stage while choosing a national consortium which has the potential to maximise the objectives of the program. This program is expected to be open to all Australian industry stakeholders including researchers, institutes, and businesses as either the lead applicant or as a part of the consortium.

Overview

The Agency expects to propose a specific mission in the Trailblazer grant guidelines. The mission proposed will take into account feedback from this consultation, current Australian industry capability, and the outcome of consultations with NASA and Government in addition to the mission attributes.

This mission is expected to follow the typical project life cycle of a space mission. Good examples are standards set by Europe (ECSS) and NASA. The mission will progress from pre-phase A to phase F, which includes concept studies, concept development, preliminary design, final design, testing, launch, operations and close-out, as shown in Figure 3.

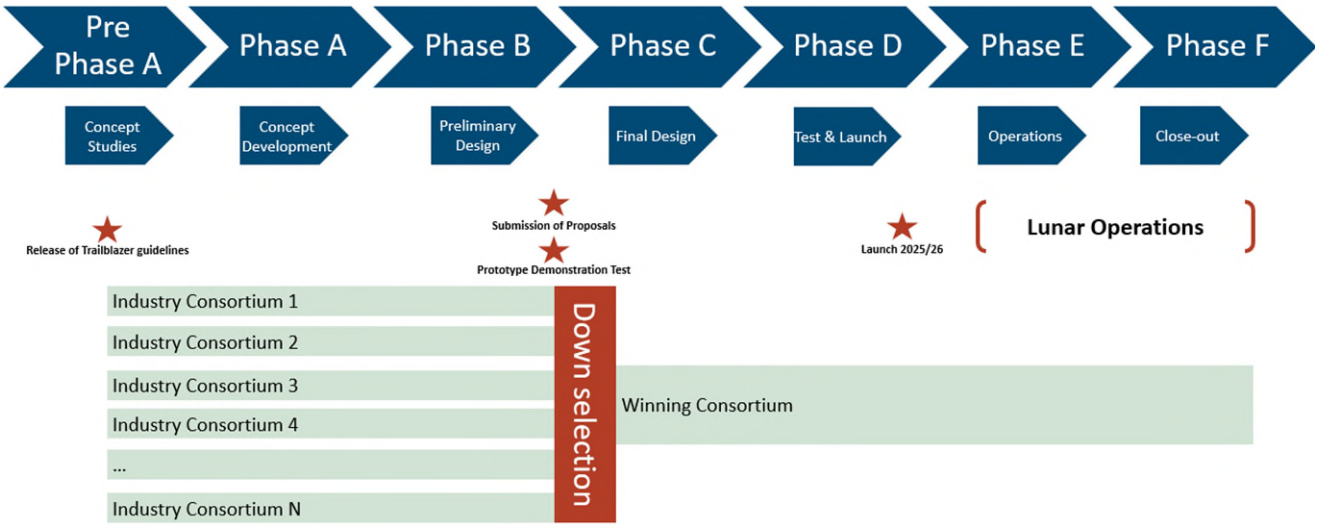


Figure 3: The proposed implementation methodology for the Trailblazer program aligned with the typical phasing of a space program according to international standards.

The aim of the industry led method is to give applicants a significant amount of time to apply (approx. 1-1.5 years) in order for all parties to be able to form suitable consortia, secure funding and start the planning, development and testing of their projects. At the end of the proposal timeframe, the applicant is expected to submit a full proposal at a Phase B standard (preliminary design review conducted and reviewed) along with a prototype demonstration test. Due to the nature and scope of the flagship mission it is likely that only a single grant will be awarded. Further details on the key aspects are explained in the following sections.

Timeline

Table 2 is an indicative timeline of a grant executed under the industry led methodology. The key approach is to ensure that industry has a significant amount of time to develop their products, generate proposals and form key consortia.

Table 2: Indicative timeline of the industry led methodology

Event	Date
Grant release	July 2021
Register to apply	Dec 2021
Applications close	Feb 2023
Demonstration test	Feb 2023
Assessment conducted	Feb – May 2023
Grant awarded	June 2023
Launch to the Moon	2025 – 2026

Application stage (Pre Phase A – Phase B)

This phase begins when the program is open and the guidelines have been released, and finishes when the grant is closed for applications. This phase is expected to be approximately 1-1.5 years to ensure there is enough time for teams to form along with the development of prototypes. There will be no funding from this grant in this phase of the application process.

The Agency's role in this stage

The Agency is looking to facilitate and build relationships in this stage of the program across the complete space sector while being open and transparent. We would also aim to collect feedback from the sector on key information of the program, to help further clarify any uncertainties.

Register and tracking of potential applicants

The Agency proposes that the potential applicants will indicate their interest and register early in order for the program to understand the potential consortia that may apply. Along with this registration, quarterly updates of the team's progress would be desired. Inclusion in this early registration would allow applicants to gain positive media attention and build a community to rise to this lunar challenge. It will be expected that the majority of the team is located and working in Australia by the end of this stage.

Consortia and partnerships

The ability to partner and build consortia is fundamental to any space mission, especially lunar missions. It is expected that applicants will identify missing experience that is needed to achieve the outcome of the program and partner in order fill these gaps. A good instance is where a consortium leverages existing strengths over a range of disciplines including, for example, systems engineering, program management, manufacturing, and exploration space experience. The consortia should also consider the governance of the group in order to effectively administer the program. It will be the responsibility of the lead applicant to ensure all tasks that are prosed are conducted. The Agency would expect consortia to consider how the broader Australian space industry will benefit from their proposal and how they will inspire the Australian public and bring them along for the journey.

Proposal submission and selection of recipients

A full proposal is expected for the application of the grant along with the ground demonstration test. This test will be conducted in a grand challenge style where all teams are posed to compete, at a national level, to demonstrate that their consortium has the right stuff.

Full proposal

It is expected that a full proposal would be submitted for the grant application explaining the details of mission concept at a Phase B standard (Preliminary Design Review conducted and reviewed), along with a successful ground demonstration test being conducted. As part of this proposal is it is anticipated that the following would be documented and submitted for assessment:

- Executive summary,
- Strategic proposal,
- Technical proposal,
- Management & Implementation proposal, and
- Financial proposal.

A template for proposal documentation will be attached to the program guidelines to ensure the requirements are clear. The applicant's plan would need to address a wide range of topics, from mission

objectives, requirements, concept of operations, system design, budget and timelines; to regulation, export trade controls and security, to name a few. The proposal should give confidence to the assessment committee that the consortium has a feasible plan that they are able to execute in a manner which achieves the program's objectives.

Ground demonstration test

It is proposed that a ground demonstration test, funded by the applicant's consortium, will be a part of the assessment process for the application. This test will allow all applicants to demonstrate what they are able to do in a 'grand challenge' style. It is expected that this demonstration event will not only provide evidence of the consortia's capability but will inspire the nation by showing what Australian innovation can achieve. Examples of the types of ground demonstration tests for the different types of missions is shown in Table 3. Please note that items in Table 3 are examples only. The actual tests that are expected to be conducted, will be explained in the guidelines of the program.

Table 3: Example demonstration test for the assessment process

Example Lunar Mission	Example demonstration test for the assessment process
Lunar rover	A ground demonstration of a prototype model rover performing the key functions in a lunar analogue facility.
Lunar orbiter	Lab demonstration of prototype orbiter performing the key functions that are possible on the ground.
Astronaut health system	A prototype of the health device performing the key functions on a patient on the ground.

Selection Criteria

The selection criteria of the program will be articulate in the guidelines once released.

Grant delivery stage (Phase C – D)

Once the selection process is conducted, it is proposed that all grant money will be awarded to the lead applicant. The delivery of the grant is anticipated to follow typical space mission project management standards including key milestone reviews with technical assessment committees. The details of delivery will be proposed and discussed with the lead applicant after the assessment of the applications.

Conclusion

The Seven Sisters are seen as a group of women, being chased by a man, with song-lines for the story stretching across our continent.

The Seven Sisters

The Agency values feedback and comments during the consultation period and is seeking written comments on this paper and proposed program design. Written submissions can be uploaded into the Department of Industry, Science, Energy and Resources consultation hub. The online portal will be open until 11:59pm AEST on 2 May 2021. Further enquiries can be sent via email to consultation@space.gov.au or by calling +61 2 6276 1166.

In addition to accepting written submissions, the Agency will be holding a public webinar as detailed on the consultation hub. To register for this event please follow the links on the consultation hub page.

Please note this consultation session is intended for the broader space industry and those who intend to apply under the Trailblazer program, it is not open to media. Should media be interested in a briefing, please contact media@space.gov.au.

Looking forward to seeing you on the Moon.