



SIAA Submission

Moon to Mars Program

6 March 2020

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ABOUT THE SPACE INDUSTRY ASSOCIATION OF AUSTRALIA

The Space Industry Association of Australia (SIAA) is a national organisation formed to promote the growth of the Australian space industry. We speak with authority and credibility on behalf of our members on policy and commercial issues connected with the Australian space industry.

The SIAA takes a leading role in advising government on behalf of the space industry. We also provide a forum to promote networking and collaboration among members. Through meetings and events held in various Australian locations, we engage with our members to devise and communicate policies to support the development of the Australian space industry. We actively promote and facilitate commercial, industrial and research opportunities for our members nationally and internationally.

We also harness the skills and expertise of our membership to address issues of common concern to corporations, businesses and individuals involved in, or seeking to become involved in, the benefits of the space sector in Australia and internationally.

The SIAA welcomes the opportunity to provide input into the program design of the Moon to Mars (M2M) Initiative. We are pleased to provide this submission to the Agency on behalf of our members.

The SIAA was established in 1992 to promote and assist the development of a viable and self-sustaining space sector in Australia and to encourage, advocate for and promote education, research and development in space science in Australia. Our members include Australian satellite operators, global aerospace prime contractors, Australian State and Territory Governments, the CSIRO, Australian owned companies, research institutes of Australian universities, scientists, engineers, consultants and individuals. As the peak space industry body in Australia we have been at the forefront of space policy formulation and debate in this country for over 25 years.

INTRODUCTION

At the outset the SIAA heartily congratulates and commends the Australian Space Agency (the Agency) on its remarkable achievement in obtaining the Australian Government agreement to support NASA in their efforts to return to the Moon and on to Mars and in securing \$150 million to support the Australian space industry to participate in these efforts.

The SIAA notes that this is the largest amount of funding ever provided to the Australian space industry. In fact by itself this \$150 million of funding is larger than all previous competitive grant funding amounts for the Australian space industry combined (including funding from the 10 years of the Australian Space Office, the Australian Space Research Program (ASRP) grant scheme, the International Space Initiative (ISI) grant scheme and the Space Infrastructure Fund projects). There have been some specific space-related projects where the funding has exceeded this amount such as the purchase of the NBN Sky Muster satellites, the current Space Based Augmentation System (SBAS) project or the Defence Department purchase into the Wideband Global Satcom (WGS) satellite system but none of these projects required Australian industry participation and the funding was largely spent offshore. This 'Growing Australia's Space Industry' program which is known publically as the M2M initiative is a watershed moment for the Australian space sector and the Agency deserves high praise for its efforts and its role in creating the environment to make this possible.

The M2M Initiative will play a critical role in helping Australia and the Agency achieve its goals of tripling the size of the Australian space industry from \$3.9 billion to \$12 billion and to add another 20,000 jobs to the Australian space workforce by 2030. In its June 2019 submission on the Agency's *International Space Investment Initiative (ISI)*¹ the SIAA noted that the ISI funding level of \$15 million over three years was at the extreme low end of what was realistically required to establish a sustainable Australian presence in the international space marketplace and likely to be inadequate to make a significant step towards achieving the growth goals for the Australian space sector outlined in the Australian Civil Space Strategy 2019-2028 as stated above. The SIAA was concerned that the ISI funds were simply not large enough to make any significant contribution towards the Space Strategy goals including influencing international space agencies to take Australia seriously.

The M2M initiative is 10 times larger than the ISI funding levels and certainly of an order of magnitude which international space agencies notice. Unlike the ISI funding the international space community sees this as a substantial Australian commitment to space and is beginning to consider Australia as a potential partner in space activities. Thus the program is already achieving one of its objectives by establishing Australia as

¹ https://www.spaceindustry.com.au/wp-content/uploads/2019/09/Submission_Space-Industry-Association-of-Australia.pdf

a potential space partner in the eyes of the international space community.

The SIAA recognises that the success of the M2M initiative is critical both to the growth of the Australian space industry but also to the ability to secure future funding for the Australian space programs.

As with the ISI program the SIAA is aware that success might be determined in many ways beyond the pure metrics of revenue and growth. For instance some people might view the number of Australian organisations involved in the M2M initiative as a measure of success with more organisations equated with better success while others might consider the ‘wow’ factor and the ability to inspire the Australian populace as a key success factor.

The overall public and governmental perception of the program is as much a factor in determining the program’s success as the pure program metrics and this needs to be recognised in the selection process.

For these reasons the SIAA recommends that all aspects of the M2M initiative incorporate maximum flexibility to ensure that the program can stretch or morph to accommodate worthy projects of impact rather than force these projects to fit within certain streams or arbitrary funding limits for specific streams. This theme of flexibility will be reflected throughout the more specific comments that follow.



“ *This M2M Initiative will play a critical role in helping Australia and the Australian Space Agency achieve its goals of tripling the size of the Australian space industry from \$3.9 billion to \$12 billion...* **”**

GENERAL COMMENTS ON THE M2M INITIATIVE DESIGN

The SIAA has a number of general observations and comments about the M2M Initiative based on members experience in the space industry and observations about the dynamics of the international space industry.

1. The Key Program Objective should be to maximise the Long-term Benefits of this Funding to Achieve Growth for the Australian Space Industry

The M2M Initiative funding represents an amazing opportunity to establish key elements necessary for a long-term sustainable space industry in Australia. One of the key challenges for the M2M Initiative however is how to best allocate the \$150 million in order to build the key structural elements for a sustainable industry and to obtain the maximum impact towards achieving the space industry revenue and jobs goals of the Space Strategy by 2030. The SIAA view is that every decision on the structure of this program should bear this core objective in mind – the question of whether the program structure or the funding structure significantly advances and maximises the long-term growth prospect of the Australian Space Industry. It may be that some of the currently suggested program splits are inefficient in delivering substantial outcomes towards the growth of the space industry. It is possible that the industry would be better served by fewer larger projects rather than a larger number of smaller projects. Ultimately this will likely need to be determined based on a comparison between the various proposals. In reviewing the merits of the various proposals the key criteria

should be the long-term benefits that the proposal will bring to the growth of the Australian space industry.

In its June 2019 submission to the Agency on the ISI submission the SIAA included an outline of the relative costs of various levels of space projects based on member experience which gives a rough indication of the funding levels required for different tiers of engagement with international space projects. This list is also relevant to this M2M Initiative and is replicated here.

- \$250,000 buys a concept of operations or a slight improvement in a software tool or start of engagement with an international space entity.
- \$500,000 buys a slight improvement or readiness maturity in a hardware device or investigation for a new standard with some indirect association with an international space entity.
- \$1m buys a project proposal to work with an international space entity.
- \$3-5m buys a top up of a current project or only the start of a new project with an international space entity involvement.
- \$5-10m buys a start on a significant space infrastructure project for the local space industry ecosystem with some international space entity involvement.

It is the view of the SIAA that only projects in the last two categories on this list or larger projects are likely to boost the Australian space industry on a trajectory able to deliver sustainable growth and jobs to meet the Australian Space Strategy objectives.

The SIAA does not oppose smaller projects but again stresses that the key criteria should be the impact on the Australian space industry and whether the project can demonstrate sustainable long-term benefits. It is recognised that some projects may well be required stepping stones to larger projects and that funding these projects can be a valuable and worthwhile allocation of funding.

However, based on the international experience in the space industry the SIAA feels that projects that will have a large impact on the growth of Australian space revenue and jobs are generally projects that are likely to require more funding than less. The SIAA recognises that one of the goals of the program is to obtain as many new companies in space as possible. While this is a worthwhile goal the underlying objective should not be number of companies in the industry but the potential of the companies to generate sustainable revenue and jobs towards 2030 and beyond. The SIAA feels that while the breadth of the space industry in terms of companies is important the most important criterion at this stage is the depth and sustainability of the industry which will provide the best platform upon which the industry can grow.

The SIAA is concerned that the drive to grow the number of companies may dilute the funding at the expense of building sustainable fundamental businesses in this industry.

The SIAA recommends that the Moon to Mars program be structured to facilitate building the depth of the space industry to enable Australia to realistically compete on the world stage.

2. Transparency in Quantum of Funding

The M2M initiative is described in Government announcements and in the Consultation Paper as a \$150 million program. However, the funding profile in Table 1 on page 4 of the Consultation Paper only shows \$142.4 million of funding with no explanation of the \$7.6 million discrepancy in the funding totals. This represents a significant reduction in the expected funding noting that \$7.6 million equates to three-quarters of the maximum grant (equivalent to one fairly large project) under the Demonstrator program.

The SIAA notes that a similar funding discrepancy exists with the Agency's characterisation of the Space Infrastructure Fund. The announcements and statements on the Agency website describe the Space Infrastructure Fund as a \$19.5 million fund. Yet the list of Space Infrastructure projects on the Agency website only totals \$18.6 million.

The SIAA finds this consistent shortfall in stated program funds confusing. Certainty and clarity regarding the precise amount of funding available provides greater certainty for the space industry and avoids confusion and over-claiming of support for space industry.

The SIAA recommends that the Agency be transparent and consistent about the amount of funding in the M2M initiative as well as all other space programs and clearly state whether any of this funding is retained by the Agency or other areas of Government to administer the program. It should be made clear whether the administration of the M2M funding is undertaken as part of the regular functions of the Space Agency or is being deducted from the allocated \$150 million.

3. Administrative efficiency and reporting levels

The SIAA recognises that a certain level of reporting and administration is required from the grant recipient in order for the Agency to effectively administer the program.

The SIAA strongly recommends that these reporting and administrative overheads be kept to a minimum to ensure that they do not erode the benefits for the grant recipient and consume resources that could otherwise be spent on delivering program outcomes.

The Agency should endeavour to drive down the cost of administrative overheads to ensure maximum funding for space programs. The SIAA believes that the Agency should specifically measure the amount of administrative overhead it adds to space projects and that it should strive to achieve world's best practice in minimising this administrative overhead to maximise real funding for actual space projects.

4. Proposed Program Streams

The SIAA notes that the M2M Initiative funding is proposed to be split into three separate programs: the Supply Chain program, the Demonstrator program and the Trailblazer program. The SIAA understands from Agency comments at the different briefing sessions that these programs are supposed to build on each other i.e. the Supply Chain program is intended to establish Australian businesses in the global space supply chains where they develop the capability to supply their space qualified products into one or more Demonstrator programs. The SIAA understands that the Demonstrator programs are intended to be precursors for the Trailblazer program which will be part of

Australia's participation in and contribution to the NASA Moon and Mars programs.

The SIAA notes that this structure is the exact opposite from the way that most of the current space-faring nations developed their space capabilities. Historically most nations have started with the commitment to the equivalent of a fully funded national Trailblazer program. They have used the requirements of that national program to identify the national supply chains needed to build that program and then worked with their local industries to develop the space qualified capabilities necessary for their Trailblazer program equivalent. After development of the necessary national supply chains they have conducted the equivalent of Demonstrator missions to space qualify their systems and mitigate risk for the Trailblazer equivalent mission. After the success of the Trailblazer equivalent mission these national companies have used their newly developed space capability as a stepping stone into international space supply chains.

One of the real challenges for the bottom up approach that Australia has proposed (i.e. starting with engagement with international supply chains rather than a national mission) is that there is no guarantee that the products that Australian companies produce for international space supply chains will be relevant to, or even compatible with, the eventual Trailblazer mission. This approach is likely to lead to significant national capability gaps when trying to build the Trailblazer mission which will need to be filled by overseas resources. It is for this reason that most other space-faring nations started with the national Trailblazer mission and used this to drive the capability requirements down to their national industry base to

ensure the development of the requisite national capability for the program.

Hence there is a risk that this program structure will not lead to the national capabilities necessary for the Trailblazer mission and ultimately to developing sustainable space industries. The SIAA recognises that most of the space-faring nations developed their capabilities a long time ago and that the modernisation of space technology might create a different dynamic that may work to Australia's advantage but this is not guaranteed.

The SIAA recommends that a framework of the required capabilities for a generic Trailblazer mission be developed and used as an assessment tool in the decision process for the grant of supply chain funding to ensure that the maximum number of essential capabilities can be developed to support the eventual Trailblazer mission.

The SIAA recommends clarification as to whether the M2M initiative funding will support projects which will lead to commercial outcomes but not necessarily to another stage of the M2M program structure.

The SIAA believes that significant projects that maximise the long-term potential growth of the Australian space industry should be allowed under this program even if they do not necessarily connect towards other stages of the M2M program structure.

5. Supply Chain Capability Grants Program

The SIAA has some concerns about this program.

a) Quantum of Funding

Breaking into international space supply chains is a formidable challenge and virtually impossible without track record of delivering space qualified products and services. One of the major barriers for Australian companies is the 'local content' or 'geographic return' requirements of the major space agencies. NASA policy is that US taxpayer funds be directed towards US products and services. The ESA supply chain is dictated by the 'Just Retour' policy which drives the supply chains towards European companies whose countries have contributed funding to the ESA program.

It is unclear how effective this program will be towards achieving the goals of growing the Australian space industry given the formidable challenges faced in entering international supply chains. The SIAA recognises that achieving Australian participation in international supply chains will be one of the best ways to build a sustainable structure for the Australian space industry so the SIAA supports this program in principle.

However, given the closed nature of international space supply chains, the SIAA recommends that the Agency retain the flexibility to utilise this funding in other ways.

For example, it might be more prudent for the Agency to purchase Australian space products or services and give this to NASA (or other organisations) as an Australian contribution to their program. This has been used by other space-faring nations is likely to achieve quicker success than trying to get an international supplier to purchase the

Australian equipment and services. The Agency should also retain the flexibility to redirect this supply chain funding to the Demonstrator or Trailblazer programs if success in the supply chain arena is slow to emerge and the funding could be better utilised in the other programs.

b) Eligible Activities

The SIAA recommends the widest range of eligible activities because it is hard to anticipate which activities will be most attractive to international supply chains.

The proposed list is a good start, but it should include a phrase 'other activities that meet the objectives of the M2M Initiative'.

Just as with the funding quantum the SIAA recommends the maximum flexibility within the program to respond to strong endeavours. The Agency should be in a position to support promising projects that meet the overall objectives rather than having to reject them due to a technicality.

c) Merit Criteria

The SIAA is concerned that a strict interpretation of the proposed merit criteria might disqualify worthwhile projects. If the Agency requires criteria for this program the rationale for those strict criteria should be stated so that the applicants understand the limits of the program.

- *Supports Moon to Mars activity* - For example, the criterion of supporting a Moon to Mars activity does not seem to be in accordance with the proposed objectives of this Capability Grant scheme which do not mention anything about Moon to Mars – they simply talk about growing Australian companies in global supply chains. If this

particular criterion is interpreted broadly almost any activity could apply. If interpreted narrowly this could restrict the activities to actual NASA Moon to Mars activities which might disqualify promising projects which have opportunities to enter other aspects of the space global supply chains. The SIAA believes that if the goal of this Capability grant is to increase Australian participation in global supply chains that this should have the widest possible interpretation and include entry into ESA, JAXA, CSA and other Agency and commercial supply chains rather than just NASA.

- Majority of investment in Australia – In principle the SIAA supports this criterion but notes that there are particular issues with this criterion when the activity requires funding a launch into space. The SIAA will address this more fully in a subsequent section.
- Support of the buyer – The SIAA does not believe this should be a strict criterion for this scheme. It is usually very difficult to obtain a buyer for a product that is not yet qualified and if the company has a buyer they may not need a grant. The SIAA believes that the proponent should be able to demonstrate a path to commercialisation. A buyer can be an important part of this but finding buyers for unfinished products is a significant challenge in any industry and is more problematic in the space industry. The lack of a specific buyer should not necessarily disqualify a project.

Provides a unique capability that offers a competitive edge – this is an important criterion. The SIAA thinks that this is the most likely way that Australian companies will break into global space supply chains.

Maximises co-funding or in-kind contributions – the SIAA will comment more fully on this in a subsequent section.

d) Application Process

The SIAA understands that the Agency is considering a process where anyone could apply for this Capability Grant at any time or a system of semi-regular funding rounds. Both options have their merits but the SIAA believes that the overriding objective of this M2M program should be to maximise the long-term benefits of the funding for the Australian space industry. The SIAA believes that this is best accomplished through regular funding rounds announced well in advance or on a regularly scheduled basis, where projects can be compared against each other based on their relative ability to achieve the growth of the Australian space industry.

6. Supply Chain Management Engagement and Facilitation Program

The SIAA has some concerns about this program as details for this program were not fully discussed during the public consultations, and it is not at all clear what this program is intended to do and how it will function. It is not stated, but by deduction it appears that there is \$22.2 million of funding allocated to this program with no indication of how this money will be spent. One interpretation is that this funding will be used to induce the industry prime contractors (Primes) to accept Australian companies into their supply chains. The SIAA is very concerned about this approach as experience indicates that Australian companies will be dropped once the inducement runs out. Another interpretation is that this funding will

be used by the Agency to fund staff to run this program. The SIAA is also concerned about this approach as this would effectively be another overhead syphoning funding that could otherwise be spent on Australian space projects.

The SIAA recognises that there is a legitimate role for Agency activity with the Primes to develop opportunities for Australian companies to enter the Primes' supply chains. However clarity is needed as to how this money will be used and how this scheme will be structured.

The SIAA recommends that the Agency be fully transparent about its intentions for this program, clearly state how this funding will be used and justify why this funding should be used in this way instead of being used for additional Australian space projects.

As discussed in the Capability Grant scheme above the national procurement rules create significant barriers to entry for Australian companies entering into international space supply chains. Clearly this program is intended to address this in some way but without large amounts of funding it is unclear whether this will be successful. The consultation paper makes reference to the Joint Strike Fighter Program or the Defence Global Supply Chain program as examples of successful programs that could serve as a guide for the space industry for developing global supply chains.

Successful as these programs might be, it is important to note that they attract interest from the international Primes because the Defence Department has significant funds available for its various Defence projects that the Primes are interested in securing. There is no comparable level of available Australian Government space funding to interest the Primes and entice their

participation into similar programs for space.

As discussed above the SIAA recognises that achieving Australian participation in international supply chains will be one of the best ways to build a sustainable structure for the Australian space industry so the SIAA supports efforts to achieve this.

However, given the challenges of breaking into the closed international space supply chains, the SIAA recommends that the Agency retain the flexibility to utilise this funding in other ways. As discussed above the SIAA believes that the direct purchase of Australian space products or services by the Agency and provided to NASA (or other organisations) as an Australian contribution to their program might be a more effective use of this funding.

The SIAA also recommends that the Agency retain the flexibility to redirect this supply chain funding to the Demonstrator or Trailblazer programs if success in the supply chain arena is slow to emerge and the funding could be better utilised in the other programs.



7. Demonstrator Program

a) Program Objectives

The SIAA agrees with the stated objectives of this program. The SIAA believes that this is one of the most important elements of the M2M Initiative and that it is worth considering whether the money allocated to the Supply Chain program might achieve better outcomes for the Australian space industry if it were to be reallocated to Demonstrator program projects.

The SIAA recommends that the Agency consider retaining the program flexibility to reallocate funding from the Supply Chain program to the Demonstrator program after the commencement of the M2M Initiative. The SIAA also supports the preference for projects that have the potential to operate in space or support operations in space.

b) Funding Levels

The SIAA agrees with the proposed range of grant funding levels from \$500,000 to \$10m. To ensure maximum flexibility the SIAA encourages the Agency to have the discretion to award grant funding in excess of \$10m to particularly promising Demonstrator projects.

c) Funding Rounds

The SIAA supports the proposal to hold two funding rounds for the Demonstrator program. This concurs with the notional intent to disburse lesser funds in the first round which will be treated as a development round for more substantial projects in the second round however the SIAA recommends that the Agency maintain the flexibility to award higher funding levels to particularly promising projects in the first round.

The SIAA also recommends that the second round of funding be open to applicants that did not participate in the first funding round.

d) Merit Criteria

The SIAA broadly agrees with the proposed merit criteria with the following comments made under the Capability Grant program.

- Supports Moon to Mars activity – The SIAA agrees that this criterion applies more specifically to this program than to the Capability Grant program. The SIAA recommends that this should have the widest possible interpretation and include entry into ESA, JAXA, CSA and other space agencies and commercial supply chains rather than just NASA.
- Majority of investment in Australia – In principle the SIAA supports this criterion but notes that there are particular issues with this criterion when the activity requires funding a launch into space. The SIAA will address this more fully in a subsequent section.
- Maximises co-funding or in-kind contributions – the SIAA will comment more fully on this in a subsequent section.

8. Trailblazer Program

a) Program Objectives

The SIAA agrees with the stated objectives of this program. The SIAA believes that this is one of the most important elements of the M2M Initiative and that it is worth considering whether the money allocated to the Supply Chain program might achieve better outcomes for the Australian space industry if it were to be reallocated to the Trailblazer program.

The SIAA recommends that the Agency consider retaining the program flexibility to reallocate funding from the Supply Chain program to the Trailblazer program after the commencement of the M2M Initiative.

The SIAA notes the intent for the outcomes of the Demonstrator programs to inform the design of the Trailblazer program but is not sure this is practical. The funding timelines indicate that these two programs will largely run concurrently hence diminishing the ability of the Demonstrator programs to inform the Trailblazer program.

The SIAA agrees with the potential opportunities for the Trailblazer program listed in the consultation paper but recognises there might be other worthy options. The SIAA looks forward to additional consultations to discuss the final design of the Trailblazer program later in 2020.

9. The Challenge of Access to Space using Grant Funding

The SIAA supports the intent of the M2M Initiative that the majority of the program funding be spent in Australia to support the growth of the Australian space industry. The SIAA has a concern however, that the current level of capability and expertise in the Australian market might make this target difficult to achieve for many worthwhile projects. This is particularly true for any project that requires launch to space.

Currently there is no capability to obtain launch access to space from Australia and this might remain the case for the first few years of this program. This means that initially any Australian program requiring launch will inevitably need to spend money overseas to achieve this. Dedicated launches to low earth orbit cost in the range of US\$5m which is already more than 50% of the proposed maximum funding available for a Demonstrator program grant which is specified to have a preference for activities conducted in space.

Given the costs of launch it is likely that a program involving overseas launch may end up with a majority of the funding being required to be spent overseas in order to get the satellite into space. In order to avoid the exclusion of worthy projects that may breach this majority Australian expenditure funding requirement the SIAA recommends that the Agency adopt the broadest possible interpretation of the majority Australian investment rule in order to allow the widest range of Australian space projects to be eligible for this funding.

The SIAA also recommends that the Agency have the right to offer special exemptions for this requirement, particularly for projects involving

overseas launch, to ensure that promising projects have the maximum opportunity to use this funding to get their payloads into space.

The SIAA also recommends strong support for the developing Australian launch industry so that this issue can be quickly solved through access to Australian launch capability.

10. Co-contribution and Co-funding

The Consultation Paper states that the merit criteria for both the Capability Grant program and the Demonstrator program state that matching funds are expected from the grant recipient. The SIAA believes that this might be counterproductive by excluding otherwise promising projects. The SIAA recognises that projects which include some sort of funding contribution from the applicant or other sources will naturally be more attractive to the Agency. However, the SIAA does not believe that specified co-contribution or co-funding levels should be a requirement for any project. This is of particular concern for smaller scale projects (projects below \$1 million) and applications from start-ups where there is less ability to attract co-contributions or co-funding.

The SIAA notes that even without an explicit requirement many applicants will try to find co-contribution or co-funding sources to meet the investment principle of the Space Strategy to 'leverage contributions from other sources'.

The SIAA recommends that the Agency include 'in-kind' contributions from the applicant and other project members as a co-contribution and evidence of 'leveraging contributions from other sources' when assessing an application for funding under the M2M Initiative.

The SIAA notes that international space agencies have typically built their local space industry by supplying all of the funding for their space projects. This M2M Initiative, particularly the Capability Grant program, is intended to assist Australian organisations to break into the existing international supply chains that were built through full project funding by international space agencies. Requiring Australian applicants to find additional funding in order to be eligible for M2M funding is a challenge not faced by Australia's international competitors for space projects and hence should be avoided in the design of the Moon to Mars program.

11. Flexibility on the use of M2M funding

The Consultation Paper makes no mention of any restrictions on how the grant funding can be used and the SIAA believes that this is the best approach. The SIAA recommends that no restrictions be placed on the grant funding to allow the grant recipient the maximum flexibility to use the funding to maximum effect on the project.

This would enable the grant money to be used for the widest range of project expenses including staff wages, travel costs, capital equipment, etc.

12. Include Space Services in the M2M Program

The focus of the M2M Initiative is directed at getting Australian companies into international supply chains and getting Australian Demonstrator missions into space. There is an inherent underlying assumption that these measures are focussed on products into supply chains and into space. Yet the most lucrative parts of the space economy are the services derived from space platforms and it is the market for space services that offers the best opportunity for sustainable growth for the Australian space industry.

The SIAA recommends that the Agency include the provision of services as part of the M2M Initiative as this is one of the most effective ways to sustainably increase the size of the Australian space industry.

13. Develop Australian Space Primes

Obtaining Australian access into international supply chains is a worthy goal but places Australian companies well down the food chain and at the mercy of international interests and foreign decision makers.

The SIAA believes that for Australia to meet the objectives in the Space Strategic Plan Australia will need to develop space Primes based in Australia. There are a number of Australian organisations that are large enough and have sufficient capabilities to make that leap in the near future.

The Agency should use the M2M initiative to encourage the development of Australian space Primes where possible. The Demonstrator missions and the Trailblazer mission are obvious opportunities to develop Australian space Primes and should actively be used to encourage Australian companies to step up into this role.



COMMENTS ON THE QUESTIONS POSED IN THE CONSULTATION PAPER

MOON TO MARS INITIATIVE

1. Are there other opportunity areas for Australian industry (outside the list on page eight)?

SIAA Response: The five areas listed on page 8 are a good start and provide a wide scope for relevant Australian opportunities. One area that is not mentioned where Australia has some world leading expertise is the realm of small space propulsion systems. These systems will be essential for transportation between the Lunar Gateway and the Lunar surface as well as for transfers between orbits.

The SIAA recommends that the Agency avoids a prescriptive list to take enable these programs to take advantage of new ideas and emerging Australian capabilities in traditional and non-traditional space areas.

The SIAA notes that the In-Situ Resource Utilisation area is limited to scientific exploration which is allowed under the Moon Agreement which Australia has signed and ratified. The real opportunities in this field will be in the commercial extraction and processing of in-situ resources for use in off-earth facilities. Australia has significant capability to be a major player in this emerging field but may be constrained from an active role due to the lack of an appropriate international legal framework which is compatible with the Moon Agreement. It is imperative that Australia take a leading role in expediting the development of a legal framework for commercial extraction and use of off-earth resources that is consistent with the Moon Agreement otherwise Australian companies with considerable expertise will be

excluded from this promising emerging commercial space activity.

2. Are the program objectives appropriate, and do you have additional suggestions?

SIAA Response: The objectives of building Australian space capability and capacity are worthy goals of the program. However the SIAA believes that the Key Program Objective should be to maximise the long-term benefits of this M2M funding to achieve growth for the Australian Space Industry.

3. Noting the objectives of the program, are there areas you'd like to see the Moon to Mars initiative target or focus?

SIAA Response: As stated above, the key program objective of this M2M initiative should be to maximise the long-term benefits funding to achieve growth for the Australian space industry. This is most likely to be achieved in areas where Australia has a unique capability that offers a competitive edge internationally. The five categories listed on Page 8 are all areas where Australia might be in a position to develop a competitive edge and are worthy target activities. The space industry is not static however and the Agency should be flexible enough in this program to embrace emerging Australian capabilities or expertise that has the potential to significantly grow the Australian space sector.

4. Are there activities excluded under the initiative that you think should be supported?

SIAA Response: In principle SIAA does not believe any activities should be excluded. As stated above the Key Program Objective should be to maximise the long-term benefits of this M2M funding to achieve sustainable capabilities and growth for the Australian Space Industry. Any activities that can fulfil this objective should be supported by this program.

5. Do you have suggestions for how this initiative can support STEM engagement?

SIAA Response: The SIAA believes that this program itself will stimulate STEM engagement and offers tremendous opportunities for STEM engagement. The SIAA believes that a program that talks about the program in high schools from the Agency and possibly involving grant recipients would be a natural mechanism to promote STEM. However, the SIAA does not believe that funds from the M2M Initiative should be diverted to STEM engagement.

6. Are there other programs that could be leveraged to support the objectives of the Moon to Mars initiative?

SIAA Response: The SIAA recommends leveraging and supporting extant local and international programs relevant to M2M initiative outcomes in addition to those already involved with NASA.

The SIAA endorses Agency recognition of Australian space heritage capabilities as important elements in the all program design.

The SIAA particularly recommends leveraging and supporting internationally competitive research and testing facilities already extant in Australia.

These include:

- National Space Test Facility (NSTF) at the Australian National University (ANU). The NSTF offers a world-class component, satellite and bioscience 24/7 space testing and diagnostic facilities and international expertise. NSTF is already engaging with NASA, ESA, JAXA and DLR and attracting local and international commercial interest. Testing and diagnostics of satellites and components under simulated space conditions is an integral part of the space industry.
- Hypersonic Impulse Facilities at the University of Queensland (UQ) Centre of Hypersonics. The facilities provide internationally recognised testing based on shock wave generation (shock tunnels, expansion tunnels, light-gas guns, blast generators).

The SIAA has seen previous space heritage programs fade away through lack of support. Programs that could have supported the M2M initiative include the Sintering of Lunar Soil Simulant at the UNSW (for in-situ resource utilisation) (now closed) and the Microgravity Tower at the Queensland University of Technology (QUT) which was sold for scrap last year. To avoid further brain drain, decadal program design must support and sustain such heritage facilities in long-term in order to realise M2M initiative aspirations.

The SIAA believes that programs from other space agencies besides NASA as well as programs/projects from commercial space companies are programs that should also be pursued to meet the objectives of the M2M initiative. Within Australia the Agency should develop a good working relationship with Department of Defence as there could be a number of Defence programs that could be leveraged to support the M2M capabilities. Likewise, programs within government research organisations such as CSIRO and Geoscience Australia could also be relevant to supporting the objectives of the M2M initiative.

7. Is access to space (e.g. supporting ability to launch payloads) a significant gap in the market to support the Moon to Mars initiative? If so, what mechanisms would support better access?

SIAA Response: Access to space is a significant gap because currently Australia does not have the ability to launch payloads into space. It is also not clear whether funding the launch of a payload on an overseas launch vehicle is feasible given program funding constraints and the requirement to expend the majority of the program funds in Australia.

To address this gap the SIAA recommends that the Agency should seek to obtain passage to space on overseas launch programs, which would enable Australian payloads to reach space. It should also encourage and support the development of indigenous launch capability in Australia to close this gap.



SUPPLY CHAIN PROGRAM

1. Are there capability gaps that would increase the ability of Australian businesses to participate in a space global supply chain?

SIAA Response: The main capability gaps are in emerging or new areas within the space sector. The list of opportunities on page 8 of the Consultation Paper provides a good outline of the emerging areas where there is no dominant leader or which are at the cutting edge of research where Australia has some relevant capability. These represent capability gaps where Australia has a reasonable chance of providing a solution.

2. What would encourage the adoption of Australian capabilities in international supply chains?

SIAA Response: The main method of breaking into international supply chains is to have a superior product that inherently adds value or to have a cheaper price. In many cases these attributes alone will not be sufficient. The real key is to have a unique capability that offers a competitive edge to the final product.

There are also structural issues that need to be addressed – specifically the ‘local content’ or ‘geographic return’ requirements of the major space agencies which preclude Australian companies from participation in many supply chains. Exemptions for Australia from these national procurement requirements will be essential to enable access for Australian companies in many international space supply chains.

3. Are there additional activities that would support Australia’s engagement in international supply chains?

SIAA Response: One of the biggest factors in supply chains is that the Primes generally only look for new suppliers when they have a problem or need. They invest a lot of effort in choosing an appropriate supplier at the outset with the view that this will not change for many years. They prefer a set and forget approach to supply chains and do not generally look for additional suppliers if all is going well. So simply getting the Primes to look at what Australian companies have to offer and to seriously consider the Australian capabilities is a big hurdle to overcome. Any program that could get the Primes to take a serious look at Australian companies as a supplier would be very helpful. However, if the Australian products are not of a suitable quality this process will be a waste of time for everyone involved and will likely diminish the prospects of the Primes looking at Australian products again. For this reason there should be a serious vetting process of the Australian products prior to trying to obtain an audience with the Prime to ensure that the Primes take the process seriously. It is important to convince the Primes that it is worth their time to take a serious look otherwise they are likely to just go through the motions. The best outcomes will be achieved when the Primes have an obvious or stated need that is matched by an Australian product.

4. Do you have suggestions for how the program can be used to best partner with Primes to support Australian industry entering international supply chains?

SIAA Response: Most Primes have approved supplier lists and the challenge will be to get the Australian company on that list for their particular product or service. The Australian company will then have to demonstrate that their product provides value over the other potential suppliers (this is usually determined by price or sometimes by ready availability). One possibility is for the Australian company to host the Prime for a product and services demonstration day. This has proven to be challenging in the Defence sector because US Primes have previously indicated that often Australian companies have not been at the level of presentation quality that the US Primes expected. This has included general facility appearance as well as the lack of understanding as to what the US Primes expect (including specific levels of accreditation).

Impressions matter in this industry and bad first impressions are hard to overcome. Instructing the Australian companies on the expectations of major Primes to ensure the Australian companies make the best impression is an important element for success. The Primes will want to be able to demonstrate a tangible benefit from partnering with Australian companies. The benefit that the Australian product offers may not be enough. The Agency must understand all of the objectives of the Prime (both in Australia and in their home country) and try to find something they can offer of benefit to the interests of the Prime that will be compelling enough to encourage the Prime to consider Australian companies for their supply chains.

DEMONSTRATOR PROGRAM

1. Will the proposed two round process maximise outcomes, that is, will a lower level of funding initially followed by a larger funding round support the projects most likely to contribute to Moon to Mars activities? If so, what would be considered the minimum level of funding for the first round?

SIAA Response: The SIAA supports the two round process in principle but believes that the Agency should have flexibility to award higher level funding in the first round if justified for particularly promising projects.

2. Are there additional niche areas that Australia could consider to grow its space capabilities?

SIAA Response: Space based propulsion systems and space based power systems are possible niche areas where Australia could make a contribution and are areas of great potential in the emerging near earth economy.

3. Would reviews and recommendations by subject matter experts (e.g. from international space agencies) to address technical, programmatic and commercial challenges add value to a project? If so, which type of review (technical, programmatic and commercial) is most needed?

SIAA Response: The SIAA believes that reviews by subject matter experts from international space agencies could definitely add value to Australian projects. A project review by experienced professionals is always of value to less experienced players but the SIAA believes that the main value would be to help Australian companies see the project through the eyes of experienced international space agency staff. They will be able to provide the Australian companies with the insight on how international space agencies view projects which is extremely important for Australian companies trying to sell into these space agency supply chains. One caveat is that space agencies generally have an extremely risk averse approach to projects. This is warranted for high value capabilities which must-work the first time and have very high through life reliability but is at odds with the distributed risk model adopted in the Space 2.0 world. Most Australian space companies have adopted the Space 2.0 model due to its distributed risks allowing lower costs but this may not be compatible with the typical space agency mission risk profile.

There is a fine balance to find between rapid and cost-effective innovation and the high reliability standards typical of space agency programs. If Australian companies are working with space agencies the understanding of the space agency mindset provided by expert review by space agency staff would be essential. However, if the Australian organisations are producing a Demonstrator mission for Australia based on the Space 2.0 approach to distributed risk or acceptance of risk (often due to cost constraints) that the space agencies typically would not accept then the traditional space agency approach may not be the best model and these subject matter expert reviews may have limited value and actually stifle innovation.

In terms of the type of review that is most effective the SIAA would suggest that this would depend on the program with the technical and programmatic reviews being the most helpful.

The SIAA would not recommend space agency experts for a commercial review because the space agencies typically are not concerned with, and hence have little experience in, the commercial dynamics of the space industry.



TRAILBLAZER PROGRAM

1. What projects do you envisage could be supported by this program?

SIAA Response: The SIAA believes that if the key objective of the mission is to put Australia on the world space map then a key aspect of the Trailblazer program is a mission that is dramatic enough to capture the attention of the space industry as well as the Australian public.

The Israeli Beresheet mission is an example of the publicity and notoriety that can be generated from a space program. Beresheet however was a one off mission. Better examples might be the more sustained Indian and Chinese Moon missions which build towards certain goals developing real space capability as well as capturing public attention. The Trailblazer mission should be achievable by Australia and technically challenging enough to impress the space community. But a key criterion for the mission will be to capture

attention and this may be driven more by where the mission goes rather than what the mission does. In that context a Moon mission has proven to be a great attention attractor.

The SIAA recommends that the Trailblazer program contains stepping stone projects to build greater capabilities upon each other toward decadal sustainability of any international Moon to Mars initiative.

2. Are there activities excluded that you consider should be supported?

SIAA Response: The SIAA does not believe that any activities should be excluded. All things should be considered to determine the best program for Australia to meet the objectives of this Trailblazer program.

CONCLUDING COMMENTS

The SIAA welcomes the Moon to Mars Initiative as a major step towards reaching the Australian Space Agency's long-term strategic objectives to triple Australian space revenues and add 20,000 more Australian space jobs by 2030. The SIAA notes that the development of space industry infrastructure and international networks are decadal in scope. The M2M Initiative provides a significant amount of funding to enable Australia to begin to develop the space infrastructure, the space capabilities and the international networks to become a significant player and trusted international partner in the space arena.

The SIAA recommends that the Agency use this M2M Initiative as the first step in a long-term approach to a space program investment framework.

Such a long-term framework, focussed as a minimum on at least for the decade ahead, can sustain the momentum for the nascent Australian space industry to engage and grow internationally. A funding framework that can sustain and build on the early momentum created by the M2M Initiative will be a critical component for sustaining and growing Australian space industry jobs and infrastructure and a necessary component to realise the Agency's long-term strategic objectives for Australian space industry growth.

A large, high-resolution image of the Earth as seen from space, showing the curvature of the planet, the blue oceans, and the green and brown landmasses. The sun is visible on the right side, creating a bright glow and illuminating the Earth's surface.

“ THE SIAA RECOMMENDS THAT THE AGENCY USE THIS MOON TO MARS INITIATIVE AS THE FIRST STEP IN A LONG-TERM APPROACH TO A SPACE PROGRAM INVESTMENT FRAMEWORK.

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