Submission on developing the Aotearoa New Zealand Aerospace Strategy

Your name and organisation

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Overview of the Aerospace Strategy

Do the four areas above provide the right basis for the Aerospace Strategy?

What are the critical factors that you see for aerospace sector development?

How would an Aerospace Strategy help you?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

1. Do the four areas above provide the right basis for the Aerospace Strategy?

The four areas are sufficiently broad to capture most foreseeable activity required to build a strong aerospace sector, and for the country to subsequently benefit from its formation.

2. What are the critical factors that you see for aerospace sector development?

We see a key need for sustained support and consistent financing over several political cycles. To quote from Russell Boyce's report on the sector following his 2022 visit:

> *"The overwhelming impression is that the New Zealand space sector is small enough to form Team NZ and work together in a cohesive way, too small to tackle everything without the dilution that would render each endeavour somewhat pointless, but not so small that it couldn't collectively, pragmatically choose one or two niche themes in the overlap between space and other disruptive areas, and go after the challenge of becoming the best in the world at them.*
>
> *Put another way, if New Zealand does **not** do this, then its space sector will be too diluted, and with a few exceptions its space industry will struggle to be competitive." [Boyce, 2022]*

The immediate question is how do we best make these choices. Our strong advice is we avoid government "picking winners" or funding apparently promising opportunities as they present

themselves (or are presented) to policy makers. A key step to success will be meaningful community engagement – not just vertically between sector participants and government, and laterally to build broad consensus between sector participants for plans that deliver broadly defined outcomes.

Sector-wide engagement always happens informally, but "Decadal" style processes allow a sector to build a plan that responds to broad expectations for outcomes (e.g. technical development, workforce enabling, economic value and public engagement) via an organised process:

> *A decadal plan is at the heart of many other nation's space activities. As an example, the Australian decadal plan for 2021–2030 was published by the Australian Academy of Science, overseen by an executive working group, 12 expert working groups and the Academy's National Committee for Space and Radio Science [National Committee for Space and Radio Science, 2022]. The principal US agencies that provide primary federal funding for astronomy and astrophysics commission a survey into the status and opportunities in that field [National Academies of Sciences, Engineering, and Medicine, 2021]. The survey identifies important areas and goals for the field, and makes recommendations for actions. A NZ space sector decadal plan is a possible evolution of the current work underway in defining the nation's aerospace strategy and space policy portfolio [New Zealand Government, 2022a, New Zealand Government, 2022b]. The decadal plan would set the agenda from a Team NZ perspective and would serve to avoid or at least mitigate the "dilution" risk referred to in the excerpt above.* [Rattenbury, 2022]

In the United States, Decadal Plans are managed by the National Academies but commissioned by interested funding agencies. In New Zealand, plan development could be managed by Te Apārangi Royal Society of New Zealand with input from groups including Aerospace New Zealand and COSPAR, and would need to include a large industry-facing component.

A key benefit of Decadal Plans is that they provide a semi-public venue for testing assumptions and proposals (which are effectively "red teamed" by other interested parties) and the resulting plan provides an "audit trail" for the decision making process. Well-managed Decadals naturally build community consensus and credibility around their outcomes and clearly articulated strategies are more easily updated as the external conditions setting their underlying assumptions evolve.

One example of this approach is the UAE space programme, which successfully pursued the deliberate and effective development of capacity to operate interplanetary missions, through partnership with selected US research and engineering groups and selecting specific science niches to address.

We note that the proposed strategy covers topics ranging from enabling regulatory environments through to possible "flagship" projects, and the goal of building an "aerospace nation". It is critical that key projects are chosen through an open and contestable process. In particular, New Zealand planners often assume that any space-related activities are equally "marketable" to the wider public, but the reality is that broad interest in space-based activity is fickle and often transient.

For example, the New Zealand media only showed significant interest in the experimental lunar Capstone mission (whose launch from our shores was a genuinely remarkable event from any reasonable perspective) when it appeared that the spacecraft may have suffered an anomaly after its successful launch. Similarly, while MethaneSat has an outreach and science programme, perceptions of its success as an initial "mission" rely in part on attention not being drawn to the overlapping capacity offered by other resources or that its primary focus has little relevance to New Zealand's methane emissions and that the locally-funded science programme was never competed against proposals for methane or atmospheric science using other resources or methodologies. This project undoubtedly works as a "capacity building" strategy but projects that can carry the country through to the end of the decade will need to be chosen with more deliberation – both to optimise the

outcomes, and to mitigate any risk (in terms of opportunity cost and potential reputational harm if it is seen as being oversold) that our "flagships" are a collection of white elephants.

Our advice is that the key attributes of any flagship project will be:

- That it meets a real need (whether economic, scientific or strategic) that cannot be delivered by any competing platform or technology.
- That it is paired with an effective and sustained education and outreach campaign to inspire and inform the wider public.
- That it underwrites genuine technical capacity-building for the sector

These attributes are best tested by a Decadal-like consultative process – typical competitive rounds do have the capacity to bring the same level of scrutiny to proposals.

3. How would an Aerospace Strategy help you?

From the COSPAR perspective, the key value of this work is how it will help the country. Aerospace constitutes an historic opportunity for New Zealand: we need to do everything we can to make the most of this moment, and the progress we have made to get to this point.

Area One - A strategy for building our aerospace sector

Question 4 Is the 2030 Future State set out in a way that enables New Zealand to build on its existing advantages to develop a leading place in the global aerospace economy?

Question 5 Will the 2030 Future State support your ambitions for growth and participation in the sector?

Question 6 What barriers are there to optimising sector growth?

Question 7 How could the government and the sector work together to achieve the 2030 Future State?

Question 8 How can the Government enable Māori ambitions for the sector?

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Is the 2030 Future State set out in a way that enables New Zealand to build on its existing advantages to develop a leading place in the global aerospace economy?

The Future State does not reference tertiary research institutions and the role they play in research and development of aerospace, or of the role they play in training future generations of skilled workers. Recognising and optimising this contribution will be critical to the development of the sector.

Will the 2030 Future State support your ambitions for growth and participation in the sector?

Speaking from the perspective of the research community there is no recognition that space-based activity can support fundamental science and discovery. The Strategy has a clear goal of building an awareness of New Zealand as an "aerospace nation" but its potential to catch the national imagination may decline as this activity becomes normalised – in this context, participation in world-leading discovery (to which New Zealand can contribute via alliances with international partners and well-chosen niche efforts) will work as a shop window for the field, act a calling card for our national capability, and help guide and underwrite capacity development.

What barriers are there to optimising sector growth?

Growing the sector will require a skilled workforce, but recognition of who will train this workforce and what their skillset(s) should be is missing from the current document.

The document cites goals such as "growing the number of high-wage, high-skilled jobs" and "ensur[ing] that the sector has access to essential infrastructure and investment" but says little about workforce development. NASA in the United States invests a significant amount in outreach to communities, clubs, museums, etc. and in partnerships with educators at all levels. Moreover, NASA has had a strong focus in the past few decades in establishing connections with demographics historically underrepresented in science and technology – which in the New Zealand context will

include Māori and Pasifika, as well as women and minority genders. These goals should be explicitly stated and defined: NZ has an opportunity to be world-leading in how it addresses this. Outreach work also helps Americans to understand the broad scope of work undertaken by NASA and how it benefits them – in New Zealand an analogous approach would build support for the AeroSpace Nation Pillar.

In particular, MBIE should regularly survey industry leaders to determine what skills and resources are in greatest demand, and work more closely with Te Pūkenga to support the development of people in skilled trades. There should also be greater awareness of the importance of universities and research institutions in training the future generations of leaders in the field.

How could the government and the sector work together to achieve the 2030 Future State?

As noted elsewhere in this document, the key tool to achieving this outcome will be better and more regular engagement, idealling via a Decadal-like framework that co-creates the specific strategy.

How can the Government enable Māori ambitions for the sector?

This question is best answered in detail by Māori. However, we see the need for a clear plan to grow participation of Maori in the aerospace sector and to ensure that its scope captures all forms of activity, including education, business and research, coupled to a clear understanding of the present participation of Māori in the space sector.

Area Two - Building strong foundations (Three Pillars)

Question 9 What do you think of the Three Pillars and do you think they will support the 2030 Future State?

Question 10 What else would you like to see in the Three Pillars?

Question 11 What actions and initiatives could the sector focus on to support the Three Pillars?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

What do you think of the Three Pillars and do you think they will support the 2030 Future State?

The Pillars provide the support needed.

What else would you like to see in the Three Pillars?

N/A - see above.

What actions and initiatives could the sector focus on to support the Three Pillars?

Pillar One focuses on generating a knowledge-intensive and innovative sector, which grows the number of high-wage, high-skilled jobs – to achieve this training and resourcing this training will be critical.

Pillar Two is about the enabling environment. NZSA provides a good regulatory service for the sector. However, there is a reasonable amount of rollover in the staff of NZSA. This harms the establishment of relationships and trust, and the continuity of community input. It would be good to see the space agency gain greater independence and better alignment with the role of the space agency in other major space economies. NZSA should have permanent roles focussed on the development of the aerospace industry, decoupling the frequent conflict between its regulatory and industry-nurturing requirements. Moreover, in the short term we are aware of considerable concern in the sector regarding the effective process of permits for novel aerospace activities.

For Pillar Three the space-involved New Zealand universities have people, skills and networks to provide the outreach and advertising services which underlies this pillar. Outreach activities require specific funding and organisation, clear goals, and be delivered by people and organisations with demonstrated expertise. Long-term socialisation of the activities in and benefits from aerospace will require corresponding dedication in terms of funded education positions. Activities could include funding outreach liaison positions to work between high-school and universities.

Area Three - Goals for 2030

Question 12 What do you think of the Goals for 2030?

Question 13 Are the goals framed in a way that will enable New Zealand to build on its strengths and comparative advantages to achieve the 2030 Future State?

Question 14 What activities and milestones can help us achieve these Goals?

Question 15 Where do you see yourself in realising these Goals?

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What do you think of the Goals for 2030?

The goals are well chosen and exciting. However, there is considerable complexity in the details, as noted below.

Are the goals framed in a way that will enable New Zealand to build on its strengths and comparative advantages to achieve the 2030 Future State?

Goal 1: This goal is critical to New Zealand, given our geography, and is realistically framed in terms of likely technological developments for 2030.

Goal 2: We are broadly supportive of this goal, but note the need for social license with respect to initiatives that lead to significantly increased traffic by aerial vehicles. As noted above, current activity is also challenged by permitting issues and needs immediate attention from MBIE officials to avoid impeding progress.

Goal 3: The explicit focus on collision avoidance is overly limited here. There is a vast range of ways in which space activity can be "unsustainable" (including the loss of amenity for terrestrial observers associated with large constellations in near earth orbit), and we really need to throw this open as widely as possible. This is also an area in which our broader work on policy and the growing understanding of the role of kaitiakitanga in the management of the natural world could have critical impact.

Goal 4: We are broadly supportive of the Goal, which has improved greatly in detail from the initial draft.

We remain surprised to see the emphasis on "human presence in space" and reference to the Artemis Accords as a potential driver, which appears to imply a focus on in-situ lunar exploration. If this is taken to mean the support of actual human beings in space, this is likely to be premature for New Zealand on a 2030 timescale. It is also worth recalling that however "inspirational" a human presence on the moon might be, the Artemis program itself is behind schedule, and is currently coupled to a launcher that is late and significantly over-budget. Consequently, any specific mission that couples New Zealand's ambitions directly to Artemis has the possibility to be mired in the delays and difficulties which have challenged that programme.

More broadly, it will be important to construe the "human presence in space" in the broadest sense and to remain clear that this extends beyond human spaceflight itself. In particular, the activities undertaken in support of this goal must be well motivated by clear research goals and or economics

opportunity – the “novelty value” of this activity will decay quickly as it becomes routine, in the same way that Antarctic science has evolved from the heroic age to the present.

Goal 5 This is a critical area, but also one that will need clear planning and focus. There is a huge amount of available data – we should take advantage of this to address important questions and work toward more independent efforts, developing the New Zealand remote sensing community. We note that many emerging space nations focus on assets that facilitate environmental monitoring and decision making. However, given the large and rapidly growing number of “commodity” data sources any investment in instruments will need to be rigorously assessed against possible alternative approaches.

What activities and milestones can help us achieve these Goals?

To help build the highly skilled workforce and get students engaged, MBIE should facilitate internships in the NZ space sector and with multiple overseas space-research organisations for tertiary students. The current JPL internship is overly limited in scope and scale to provide the level of support needed to enact meaningful change in the cohort. More broadly (and as touched upon elsewhere) a coherent plan for education and workforce development for the sector.

Where do you see yourself in realising these Goals?

We provide training and research direction for the workforce who will realise and deliver the Goals.

Area Four - Pathway to the 2030 Future State

Question 16 What policies, ideas, actions, and/or initiatives would you like to see in the Action Plan to help achieve the ambitious 2030 Future State?

Question 17 What would be the benefits of these actions and how would they help grow the New Zealand aerospace sector?

Question 18 How would you like to be involved in the delivery of the Aerospace Strategy?

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16. What policies, ideas, actions, and/or initiatives would you like to see in the Action Plan to help achieve the ambitious 2030 Future State?

As already noted we strongly support a Decadal Survey style approach to cooperative planning. We also see the importance of well-chosen flagship activities which are evaluated against rigorous criteria for impact and importance, to ensure that they provide a viable basis for action.

17. What would be the benefits of these actions and how would they help grow the New Zealand aerospace sector?

As largely covered elsewhere, international experience is that well-managed community driven planning processes can deliver programmes that have been subject to robust analysis, fosters buy-in and underwrite transformative outcomes.

18. How would you like to be involved in the delivery of the Aerospace Strategy?

COSPAR provides a key national network inside the science community and across the university sector, with strong linkages to the technology section. We are ready to play a constructive role in shaping and delivering the strategy that grows out of this process, and excited to participate in realising the vision for 2030 provided by this Strategy.