



# **ANTARCTIC SCIENCE PLATFORM SUBMISSION ON TE ARA PAERANGI FUTURE PATHWAYS 2021 GREEN PAPER**

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## Overview

The Ministry for Business, Innovation & Employment (MBIE) launched Te Ara Paerangi Future Pathways<sup>1</sup>: a multi-year programme focused on designing the future of New Zealand's research, science and innovation (RSI) system. The Te Ara Paerangi – Future Pathways Green Paper<sup>2</sup>, highlighting a range of issues faced by the RSI system, was released in October 2021 and MBIE opened a consultation round for feedback.

This report shares a submission made to this process on 16<sup>th</sup> March 2022. The submission team comprised Nancy Bertler, Melissa Climo, Tim Naish, Ian Hawes, John Cottle, Caroline Pratt, Gillian Wratt\*, Sandy Morrison\*, Helen Cleugh\* and Peter McComb\*.

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## Submission on Te Ara Paerangi Future Pathways Green Paper

This submission has been prepared from the perspective of the Antarctic Science Platform (ASP), by members of the ASP leadership team and reviewed by independent members of the ASP Steering Group. The submission does not represent the views, opinions or official position of any participating organisation or individual participant in the ASP, neither has it been endorsed by them. This submission was approved for release by the ASP Leadership Team and ASP Steering Group Chair.

MBIE is commended on the insightful assessment of challenges and opportunities faced by the RSI system as summarised in the Green Paper. A reform of Aotearoa New Zealand's RSI system is necessary and timely, and the Green Paper approach provides a useful pathway.

To meet the challenges of the future, Aotearoa New Zealand's RSI system is going to require new, innovative research and funding approaches. The ASP is a relatively new initiative, and some of the directions flagged in the Green Paper have been adopted in its structure. This submission by the ASP seeks to share lessons learned through our context and experience as a unique platform-style funding model in the existing RSI system, to pose ideas on how to take the positive attributes forward, and to address short comings experienced. We highlight the consequences (positive and negative) of the ASP's structure and approach in one of Aotearoa New Zealand's strategically important, internationally-connected, and highly-collaborative research areas.

For alignment, we have arranged these observations using the six themes of the Green Paper, and where possible mapped the ASP experience to the questions posed in the Green Paper. Supporting details are laid out in each section. The document concludes with a summary of the ASP's key considerations and recommendations, all of which are rooted in our experience to date.

## 1. The Antarctic Science Platform

The ASP is a seven-year, \$49M Strategic Science Investment Fund (SSIF) platform of Antarctic research, funded by MBIE, that commenced operations in 2019. The ASP, hosted by Antarctica New Zealand, involves three CRIs and six university partners, and over 100 researchers, ranging from internationally renowned specialists to new postgraduate students. It has a Steering Group (in a governance role to hold the Platform to achieving its objectives through regular oversight of strategic direction, performance and delivery of Platform science), an Independent Science Panel (providing ongoing

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<sup>1</sup> <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/research-and-data/te-ara-paerangi-future-pathways/>

<sup>2</sup> Ministry for Business, Innovation and Employment. 2021. Te Ara Paerangi Future Pathways Green Paper 2021. ISBN 978-1-99-100874-9.

international science peer-review), a Kāhui Māori (providing guidance on the integration of Mātauranga Māori / Te Ao Māori and recruitment of Māori talent), and a three-person Leadership Team that has been seconded from their various home institutions.

The ASP is not a physical organisation or legal entity — it is, in essence, a virtual research team — and has a unique funding model and organisational construct within Aotearoa New Zealand’s current RSI funding system. It has many elements recognisable in other SSIF-funded platforms, National Science Challenges (NSCs) and TEC-funded Centres of Research Excellence, but operates differently in some strategic and structural aspects. This novelty provides an opportunity from which to learn from as the future RSI system is designed.

*Table 1: Generalised overview of key characteristics of existing funding mechanisms. (Note: SSIF Platforms in CRI or IRO are devolved funding, while contestable SSIF platforms refer to investments such as Advanced Energy Technology, Data Science or Kauri Dieback programmes).*

	Strategic Investment Based on Government Priorities	Devolved Funding	Hosting is decoupled from research organisations	Independent Governance Group	Long-term funding	Multiple organisations participate
SSIF Platform (in CRI/IRO)	✓	✓	✗	✗	✓	✗
SSIF Platform (contestable)	✓	✗	✗	✗	✗	✓
ASP (SSIF Platform)	✓	✓	✓	✓	✓	✓
National Science Challenges	✓	✓	✗	✓	✓	✓
Endeavour Fund	✗	✗	✗	✗	✗	✓
Centre of Research Excellence	✗	✓	✗	✓	✓	✓

## 2. Research Priorities

### ASP position with respect to the Green Paper:

#### 2.1 Importance of independent research

Aotearoa New Zealand’s Antarctic research programme has a proud history and is recognised internationally as world leading. Its research impacts, for example the current ability to provide policy-ready advice on sea level rise, have built on the ability of the science community to foresee upcoming challenges. Decades of fundamental research, the development of strategic capability, significant infrastructure investment, and robust and trusted relationships with national and international collaborators and policymakers lie behind current relevance. For research programmes to be successful, an excellent, resilient, and diverse science community and research environment is critical, which supports capabilities and a mix of basic and applied research that is driven by both the science and policy communities.

#### 2.2 Long-term research is enabling

Many of the current funding models seek to support new, innovative research, at times in preference to continued support for existing capability [business as usual] in core areas. An example of this is the lack of dedicated long term funding for environmental research (as noted in the PCE report, 2020), and the MBIE Endeavour Fund’s emphasis (70%) on research that delivers economic impacts, over

research for environmental and social impact. A focus on the ‘new’ fails to recognise that research is rarely completed within a three- or five-year timeframe. Capability, data collection, monitoring and time series studies mature after decades of continued investment, at which point, highly sought-after results become visible and lead to transformational impacts. Most research builds upon previous investment and research, and it is critical to continue to support long-term capabilities that position and protect Aotearoa in the future, as this is what nourishes innovative and impactful research.

### **2.3 Stable, long-term funding is critical to effectively implement strategic priorities**

Such a horizon should consider a 20+ year vision, with secure funding for 10+ years and five-year reviews / adjustments. The seven-year ASP horizon, with the possibility of a renewal of the contract for a second term, enabled the team to obtain institutional support for transformation capabilities and initiate bold and high impact initiatives. Examples include: investment into major infrastructure (drilling systems, robotics, marine monitoring network etc), as well the establishment of new capability (an interdisciplinary, cross-institutional modelling hub). These investments, long-term planning horizons (for coordinated research and infrastructure (see section 7)), and committed funding, also successfully leveraged substantial national and international collaborations and resources and development of combined momentum.

#### *Lessons learned from ASP experience:*

### **2.4 Co-design enables ownership of the research priorities**

The design of the ASP was developed by the research community, in consultation with government and sector stakeholders, and underwent rigorous international peer review. Formulating the science plan for the ASP was a multistage process, but the key component was to assemble the science community with stakeholders to identify a consensus on the key issues that required reach to place Aotearoa New Zealand in a position to develop a defensible policy approach for the future. The Antarctic science community embraced this opportunity and was able to put aside personal and institutional perspectives and preferences to achieve this goal.

### **2.5 Expert capabilities and strategic infrastructure must be retained in Aotearoa**

Antarctic and Southern Ocean research, and particularly that of the ASP, has positive feedbacks on building of national capability because of the way its high performing, multi-agency research teams, continuously innovate and apply the latest technologies and engage internationally. Such capabilities are vital to interpret and apply national and international advances for Aotearoa New Zealand’s benefit (e.g. IPCC, sea level rise, climate impacts, CCAMLR, CEP). Antarctic research elevates Aotearoa New Zealand’s international voice, leverages overseas capability and resources, and contributes to international, strategic science priorities. Long-term, committed funding in strategic areas enables sustained capability and growth.

### **2.6 Translation and implementation of science needs to be resourced and valued**

The translation of science to policy-ready products requires close collaboration between researchers and policymakers, and this science to policy effort has to be planned, resourced and executed effectively, and valued once complete. The ASP created two Expert Groups; one to prioritise modelling experiments to provide timely and most needed future projections for the ASP research teams and

policy makers; and one to collaborate with policymakers to translate science results into policy ready outputs. The ASP has built on the Antarctic research community's track record of close collaboration with policy makers in the climate change and environmental protection space and is developing partnerships in other ecosystem impacts. However, our experience across many organisations and individuals, is that researchers and stakeholders (including government policy teams) lack sufficient resources and time, and find limited value in such work. Dedicated funding and capacity to support this process is essential to fill this gap.

## 2.7 Vulnerabilities through key research partners' reliance on short-term funding

The ASP has a strong mandate to collaborate with existing partners, rather than duplicating efforts, for translating results and achieving impact. For example, a collaboration between the ASP and the NZSeaRISE programme is a highly successful partnership that translates Antarctic ice dynamics into regional sea level rise impacts on Aotearoa New Zealand communities, infrastructure and the environment. Another example is our collaboration with the RossRAMP programme, where the ASP focuses on climate change impacts on the Ross Sea ecosystem (including the Marine Protected Area), while RossRAMP focuses on more direct impacts from fishing. But these critical partners are funded through contestable Endeavour grants, tied to a shorter funding/planning horizon. The uncertainty of continued support for these partner programmes threatens their future in these areas of high priority for Aotearoa New Zealand, and creates vulnerabilities to the ambitions of the ASP and its funding investment.

### GREEN PAPER QUESTIONS: RESEARCH PRIORITIES

- Q1. *Priorities design: What principles could be used to determine the scope and focus of research Priorities?*  
 Q2. *Priority-setting process: What principles should guide a national research Priority-setting process, and how can the process best give effect to Te Tiriti?*  
 Q3. *Operationalising Priorities: How should the strategy for each national research Priority be set and how do we operationalise them?*

Aotearoa New Zealand's Antarctic research community has a strong, international track record as leaders in high impact research of global and national relevance. The ASP (as a strategic science funded platform) was formed to build on this strength by a coordinated approach and long-term funding. The design of the ASP was then developed by the research community in consultation with government and sector stakeholders, and underwent rigorous international peer review.

This process of scoping and focussing research priorities was robust. Strengths included:

- Co-design enabled ownership of the science priorities by the broader science community
- Future focus in an area of significant impact (climate change: environmental, social, economic)
- A 20+ year horizon and clear vision — avoiding short-term political or organisational views
- Involvement of experts and new entrants from the research community, building on a strong history and introducing new ideas and technology
- Co-design with stakeholders leading to clearly defined impact statements and mapped delivery pathways
- Global collaboration and leverage of capabilities and resources
- International peer review to ensure science excellence

### 3. Te Tiriti, Mātauranga Māori and Māori Aspirations

*ASP position with respect to the Green Paper:*

#### 3.1 There is a place for Māori in all Aotearoa New Zealand research

Antarctic and Southern Ocean research is traditionally a space with little engagement with/involvement of Māori, despite future environmental impacts affecting Aotearoa New Zealand, and therefore Māori. Antarctic science research and on ice activities, while based on principles of environmental stewardship and intergenerational welfare, have had little incorporation of Te Ao Māori or Mātauranga Māori. Antarctic science has yet to benefit from these unique strengths, and Māori have received little direct benefit from Antarctic research. The ASP (and wider Antarctic community) are early in this journey, and there is growing whakapapa to/for Antarctica that provides a pathway to forge additional, new ways of operating and thinking. In addition, Aotearoa New Zealand's Antarctic research is high performing, internationally-recognised and connected, and researchers have leadership roles in distinguished international committees and fora. There is an important opportunity through these networks to recruit Māori across the Antarctic community.

*Lessons learned from ASP experience:*

#### 3.2 Shared Kāhui guidance strengthens the research, researchers and impact

Key to collaboration is initiating and building trusted partnerships. The joint appointment of the Deep South National Science Challenge (DSC)/ASP Kāhui has offered a constructive mechanism to share learnings, collaborate on efforts, and build on successes achieved by the ASP and/or others. This model has been successful as the DSC and ASP have aligned and complementary research interests and policy support aspirations. This has also provided the Kāhui with a wider perspective and significantly aided the integration of common goals. Kāhui guidance offers an important opportunity to build lasting relationships between the Antarctic science system and Māori, to grow opportunities for knowledge exchange in the spirit of reciprocity, translation of core messages, and ongoing learning and understanding, as well as Iwi/Hapū led research and capability development for scientists and Māori.

##### *GREEN PAPER QUESTIONS: TE TIRITI, MĀTAURANGA MĀORI AND MĀORI ASPIRATIONS*

Q4. Engagement: How should we engage with Māori and Treaty Partners?

Q5 Mātauranga Māori: What are your thoughts on how to enable and protect mātauranga Māori in the research system?

Q6. Regionally based Māori knowledge hubs: What are your thoughts on regionally based Māori knowledge hubs?

The ASP is not yet positioned to meaningfully answer these questions. Antarctic and Southern Ocean research is traditionally a space with little engagement with/involvement of Māori, and Māori have received little direct benefit from Antarctic research. We are open to new ways of operating and thinking, and while this journey is in its infancy, we, with the Kāhui, have co-created goals to which we have committed. Key to meaningful engagement is initiating and building trusted partnerships, capability and capacity, and listening to the voices of Māori and their aspirations. Appropriate resourcing for Māori is also a key factor. The ASP community are training on the incorporation of Te Ao Māori and will do more to build our own awareness towards being respectful Treaty partners. We are aware of the strong debate occurring on Intellectual Property Rights and Māori — this extends to the guidelines by Te Mana Rauanga. While we have not been directly faced by these concerns, we uphold Māori rights to have authority over any knowledge shared. We would defer to Māori/hapū/iwi guidance on regional hubs.

## 4. Funding

### *ASP position with respect to the Green Paper:*

#### **4.1 Long-term funding creates certainty and promotes high impact research**

The ASP contract spans seven years, with the potential for a renewal of the contract for a second and perhaps subsequent additional contracts. This certainty has allowed the team to enact a 10+ year vision and planning horizons, encouraged commitment by research providers, and supports large-scale, courageous, and high impact science.

#### **4.2 Long-term funding allows science plans to evolve**

The ASP is delivering science excellence, relevance and impact with the support of its Steering Group, distinguished Independent Science Panel, twice-yearly project reporting, close collaboration between programme leaders and principal investigators, and an annual MBIE review of KPIs. Impacts from the Covid-19 pandemic and the Scott Base redevelopment, as well as the usual changes to research, require our science plans to evolve to meet new opportunities and constraints. This is supported by the ASP's long-term funding model, where annual contract variations provide an opportunity to renegotiate science objectives that best support the ASP mandate, aspirations and goals across organisations, individual projects and disciplines.

#### **4.3 Long-term funding improves the quality of contracting and collaboration**

The seven-year timeframe for the ASP, and the complexity that comes with a large-scale, multi-institutional research programmes, meant the establishment phase was not rushed. Time was taken to get the research plans 'right', including international peer review. Time was also taken to design a fit-for-purpose contracting framework, where a standardised Research Co-operation Agreement (i.e. Master Services Agreement) was used for all research providers (three CRIs and six universities). This approach engendered a collaborative ethos and strong relationship building, ensured the ASP had a resilient basis from which to manage future changes, and provides a productive, equitable and collaborative environment for all.

#### **4.4 Funding for research and impact delivery**

'Research delivery' goes beyond publication. In applied research (or where there is an expectation for impact, uptake and engagement), the RSI funding needs to be sufficient to be able to engage nationally and internationally at appropriate scale and intensity. Unrealistic promises often secure funding in a competitive system, but often can't deliver with the available budget. From a perspective of longer term support and a well-defined mandate, the ASP has been able to budget for engagement activities, to support research impact through support for stakeholder engagement by individual researchers, formation of expert groups, and partnering with stakeholders for joint projects. Large, long-term research platforms are better placed, through critical mass, collaboration, funding level, oversight through governance etc, to achieve this kind of impact.

### *Lessons learned from ASP experience:*

#### **4.5 The 'full cost model' is challenging**

Under the current regime, any loss in funding threatens not only the research, but also support for basic and critical infrastructure (staff, capabilities, buildings). This leads to counterproductive institutional protectionism at the expense of the best investment for Aotearoa New Zealand. In addition, it leads to fragmentation of FTE within provider organisations, with staff spread thinly across

multiple projects to ensure job security. Increasing the required FTE commitment of key researchers to a minimum of 0.3 FTE or higher would be a powerful step to mitigate fragmentation and overpromising, and to reduce transaction costs and administrative burden. The ASP has attempted to impose minimum FTE allocations for key staff, which has had some success in this respect. Also, overheads and other costs vary across organisations, with insufficient visibility, accountability or equity. This continues to be a challenge in managing funding allocation and reporting. The ASP supports the design of a funding model that offers base grants to proven research providers, separate to specific research funding.

#### **4.6 Long-term funding allows for flexibility in work plans**

The ASP investment structure is a mix of long-term, stable funding to core areas (83%) and contestable/un-allocated funding (17%). The ASP devolved the majority of its funding into six-year funding contracts for four, highly interconnected flagship research projects, a National Modelling Hub and transformational capability. This significant, committed investment allows for bold, high-priority science to be supported, and ensures certainty for the teams and research organisations. The remaining funds are contested for, which allows agility and flexibility to respond to arising opportunities or challenges, and to provide an entry point for new researchers. This mixed funding model has worked successfully, and such an approach could be scaled up for larger, longer-term research programmes/platforms.

#### **4.7 Long-term funding allows for succession planning**

Ongoing lack of support for adequate recruitment and succession planning has already had a noticeable impact in the national research community and undermines our ability to recruit talent to refresh the Aotearoa New Zealand science community and to retain it. Postdoctoral researchers are a highly productive cohort in any research community, and the lack of government funded postdoctoral fellowships has created an almost insurmountable hurdle for the recruitment of early career researchers. Also, in a long-term funding model, there must be flexibility to recruit throughout the entire funding period.

#### **4.8 Sizable, long-term investment attracts co-funding**

The SSIF investment in the ASP has allowed New Zealand's Antarctic and Southern Ocean research community to build international partnerships, leveraging co-funding comparable to ASP funding, and gaining access to complementary capabilities and expertise. Examples include support from and collaboration with other national Antarctic programmes in the form of flights to Antarctica, ship time and equipment. ASP seed funding has catalysed a New Zealand-led international Antarctic drilling project, with funding coming from the International Continental Scientific Drilling Program, as well as international funding agencies, industry, academies, universities. A modest membership fee to the International Ocean Discovery Programme has allowed the team to access hundreds of millions worth of in-kind leverage in research capability, access to ships and equipment. Nationally, the ASP research is able to align and coordinate with CRI and university research activities, Endeavour programmes, Marsden projects and the Deep South National Science Challenge for greater impact.

#### **4.9 The current post-doctoral funding model is counterproductive**

The ASP has invested in four 3-year, fully-funded postdoctoral fellowships (1.0 FTE each, with reduced overheads) and one post-doctoral fellowship jointly-funded with the Deep South National Science Challenge. This was a critical investment for the ASP to bring new talent into the science community. Negotiating reduced overheads was critical, as the institutional overhead costs for post-docs are

disproportionately high. A separate base grant / research grant funding model would remove the financial disincentives currently inhibiting involvement of post-doctoral researchers. Note that one fully costed postdoc currently equals the cost of approximately six PhD students.

#### 4.10 Importance of valuing peer review

The ASP has an Independent Science Panel, which is comprised of eleven highly-respected international Antarctic researchers. This has proven an invaluable asset for the ASP and, by extension, Aotearoa New Zealand, but the Independent Science Panel member involvement is essentially voluntary; it is built on the high calibre of the ASP researcher reputations. Aotearoa New Zealand rarely has a sufficient pool of experts without conflicts to provide peer review. As programmes and institution size grows (with increased research and development expenditure as proposed by the Green Paper), this lack of capacity will be more apparent. Aotearoa needs to design and fund a peer review system to embrace and adequately resource international input, including engagement with NZ scientists who are based overseas.

##### GREEN PAPER QUESTIONS: FUNDING

*Q7. Core Functions: How should we decide what constitutes a core function, and how do we fund them?*

*Q8. Establishing a base grant and base grant design: Do you think a base grant funding model will improve stability and resilience for research organisations? How should we go about designing and implementing such a funding model?*

The ASP is a 'core function' for Aotearoa (and was created as a strategic science priority), that supports the functioning of the nation currently, *and* positions Aotearoa for the future (e.g. climate change adaptation, environmental performance, international treaties). The ASP is not a research organisation, service agency nor government department but critically relies on core functions (expertise and capability) supported and maintained by the research providers (principally universities and CRIs). In addition, the ASP offers a complementary model for delivering a national 'core function' that allow alignment and strategic collaboration between organisations (i.e. via a long-term, multi-institutional funded research platform). The ASP successfully delivers both a 'service' function (data collection) and research function (generating new knowledge). If these functions were to be separated, there needs to be processes for access to, and robust coordination of, capability, expertise, and data (see section 7).

The ASP supports a base grant funding model, linked to priority research (to be reviewed by government) and core functions (to be reviewed by research providers). This approach would address current issues for institutions (section 5), workforce (section 6) and infrastructure (section 7). Also, a commitment to long term funding (10+ years) for priority areas is essential. Funding certainty promotes high impact research, allows science plans to evolve, improves collaboration, and enables succession planning.

## 5. Institutions

### ASP position with respect to the Green Paper:

#### 5.1 Proposed changes to institutions would support strategic research areas of critical importance

The ASP is a 'hub of capability' albeit a virtual one, spanning the nation, that offers a successful model for delivering on research priorities. We agree that changes as proposed by the green paper to institutions could support strategic research areas of critical importance if, as proposed, 'institutions have better workplace and capability development' and 'stronger coordination and optimisation of

large capital investments'. Also, 'removing the company model', which has a strong focus on securing institutional FTE, would free researchers to participate more fully and openly in the research. During the ASP contracting phase (>\$30M in six-year projects) to the lead research provider organisations, we witnessed the competition between organisations, diverse and unequitable financial models, and different internal priorities for influencing decision making. Such considerations, at times, are in opposition to considerations on how to form the best team and capability for the best service to Aotearoa New Zealand.

## **5.2 Involve stakeholders in the design and implementation of research**

The Green Paper references "transactional stakeholder relationships". The ASP supports stakeholders being involved in co-design and advising on programme delivery. The inception and structuring of Impact Statements for the ASP were guided by stakeholders. Our Steering Group and expert groups directly involve stakeholders and are working examples of how systems can be designed to support this goal. Involvement builds relationships. The ASP currently connects with national key bodies, global research communities and international fora, and is well positioned to positively influence research and policy decision making on the national and international stage. For long-term, strategic priorities, there needs to be a balance to ensure there isn't a bias towards one stakeholder or any short term goals. There also needs to be mechanisms and succession planning pathways to support ECRs to build relationships, to not just rely on established researchers.

### *Lessons learned from ASP experience:*

## **5.3 Independent governance is key to avoid institutional capture**

"Host capture" is an issue in long-term, multi-organisational programmes (due to the issues raised in Green Paper, e.g. competition, fragmentation, conflicted roles etc). There is no such thing as an independent host. The ASP has successfully implemented an independent governance model: the ASP leadership team reports to a Steering Group, where the majority of members having strong science backgrounds. Steering Group members bring Te Ao Māori expertise and senior representation from MBIE, MFAT and Antarctica New Zealand, as well as members who are independent of the funder, research, host and logistics provider organisations. This independent governance model (separate from the host's management reporting lines), combined with the Independent Science Panel providing peer review, has been integral to the ASP's success and ability to reach across research providers. This structure supports the leadership team in providing robust and pro-active leadership and oversight for the ASP.

## **5.4 Seconded leadership is advantageous**

The ASP has a seconded leadership team, instead of the individuals being employed by the host. This has been advantageous as it allows for highly regarded, active and well-connected scientists to be recruited, but to retain connection with their home institution. The seconded team reports to the ASP Steering Group, which reduces the potential for an institutional perspective to constrain efforts in building the best approach, team and research priorities. Having a leadership team outside of the host organisation's management structure has been beneficial when having to negotiate operational support (from the host), especially when combined with the governance model. Our ASP leadership team has the backing of the Steering Group, the Independent Science Panel and contracted research providers. This model provides for a strong collaborative approach to planning and delivery.

## 5.5 There is strength in a virtual community

The ASP's four core research programmes are a successful mechanism to reduce barriers and competition between organisations. These collaborative, cross-institutional programmes provide a united purpose and mission-led goal. Researchers form an allegiance to the programme (and thus the research mandate) that overcomes silos and employer bias. We have particularly seen instances where our teams' working together have redesigned Antarctic logistics requests for what is best overall for the ASP's interests, over what is preferred by the research organisation or individual.

## 5.6 Large, interdisciplinary, cross-organisational research programmes require management support

The ASP host organisation is not a research provider and has had to develop some of the usual infrastructure, systems and expertise to support the needs of a research Platform. While there are clear benefits of having the ASP's host (Antarctica New Zealand) independent from the research, there are challenges associated with a host organisation that has limited existing capacity for, or prior experience of, research management. We also see NSC host organisations separately developing systems and processes to support the management and governance for each NSC. We recommend that consideration be given to establishing a separate entity under MBIE that hosts the governance of large programmes, like the ASP and NSCs – to provide consistent systems and process across the programme entities and remove potential host conflicts of interest and duplication in the development of support systems and processes.

### GREEN PAPER QUESTIONS: INSTITUTIONS

*Q9. Institution design: How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?*

Large, strategic research investments (SSIF, platforms, challenges) benefit from two complementary and collaborating governance bodies. An independent governance board / steering group (Section 5.3) focuses on research priorities/relevance and science excellence. The senior leadership and management team of the research providers focus on financial viability, workforce, capability and infrastructure. Such a model mitigates internal conflict of interests and prioritises support, for the benefit of Aotearoa New Zealand.

*Q10. Role of institutions in workforce development: How can institutions be designed to better support capability, skill and workforce development?*

Implementing base funding for staff (removal of the full-costing model) mitigates the strong focus on securing institutional FTE, and would free researchers up to participate in high priority research and reduce inefficiencies of FTE fragmentation.

*Q11. Better coordinated property and capital investment: How should we make decisions on large property and capital investments under a more coordinated approach?*

Infrastructure capabilities need to be shared, with appropriate prioritisation of critical capability aligned with research priorities and future outcomes (see section 7). Critical infrastructure would be most beneficially used for Aotearoa New Zealand if it was funded and hosted by the Government. Joint ownership models may also be appropriate in some instances. An independent science panel should provide oversight for appropriate prioritisation of critical capability and infrastructure.

*Q12. Institution design and Te Tiriti: How do we design Tiriti-enabled institutions?*

As stated earlier (see Section 3), these must be built on relationships with Māori/iwi/hapū which are based on manaakitanga and reciprocity. Māori must benefit from our research and our research must advance equitable outcomes. Institutions built on western traditions must improve their ability to be culturally relevant to Māori, share resources and decision making processes. Therefore, we must build our capacities to engage at the level of governance, leadership and in science. Perhaps MBIE should also have monitoring functions as well.

*Q13. Knowledge exchange: How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge into operational environments and technologies?*

Fund research and the policy translation and implementation of research, by also resourcing engagement, communications and stakeholder involvement (see Section 2 and section 4). Increase accountability and visibility of science objectives and delivery.

## 6. Workforce

*ASP position with respect to the Green Paper:*

### 6.1 Diversity is strength

The ASP team comprises close to 100 people from three CRIs and six universities. This includes some of Aotearoa New Zealand's most distinguished science leaders, ECRs and graduate students, technical and engineering experts, artists, writers and policy analysts. The team includes Antarctic science veterans and new talent recruited into the Antarctic research community, has a high proportion of overseas recruits, and represents a diverse range of disciplines.

### 6.2 Support for ECRs and post-docs is critical

Our experience within the Platform had found post-doctoral positions and funding are critical, at an appropriate salary level. Job security, tied to long-term funding (see section 4) ensures that researchers can rally around a mission/impact, rather than being worried about personal futures. Tensions do exist within the post-doctoral community around security and tenure. Research organisations need to be empowered, perhaps via core funding, to embrace post-docs as 'real' staff, with associated privileges, career planning and progression. There is also a need for fixed-term positions, to support the recruitment of specialists from overseas, and provide short term opportunities for those who want that, and for projects that only need short duration specialists. Also, the RSI funding system must not disincentivise team building, including ECRs (for example, the PBRF system rewards long track records).

*Lessons learned from ASP experience:*

### 6.3 Build critical mass in early career researchers

The ASP fully funds four research fellowships and one joint fellowship with the Deep South National Science Challenge. These fellows represent the core of the newly built National Modelling Hub, which adds critical capacity and diverse expertise in providing high priority future projections for the research community, policy makers and stakeholders. The five fellows are international experts, with only one already resident in Aotearoa New Zealand. Feedback from the fellows includes that part of the attractiveness of these positions was the sense of an ECR cohort; five fellows work closely with other postdocs partially funded through the ASP, as well as collaborators and world-leading senior staff. The Modelling Hub also has attracted and hosts a number of PhD students. This hub model is

successful – it crosses institutions, reaches across projects and disciplines, and enables critical mass. The challenge now is to retain this talent in Aotearoa New Zealand.

## 6.4 Joint appointments break down competition

Joint appointments break down competition between institutions and create a ‘mobile’ workforce. This is a way to ‘create movement within the research system’ without physically having to move. We see this with ASP senior researchers jointly employed by two research organisations, and in the ASP modelling hub fellows (ECRs/postdocs who have an employing organisation and are also jointly hosted at Victoria University of Wellington as a physical workspace). This hub model took some time for fellows and organisations to develop a functional operational model, and is constantly evolving. We are still working on how to embed fellows within the research teams, and we don’t have a robust model for how these ECRs move into permanent positions. But this model is a mutually beneficial arrangement and enables leveraging of complementary resources and capabilities.

## 6.5 Missing Māori ‘expertise’

There is a significant gap (see section 3) in Māori capability, capacity and involvement in Antarctic and Southern Ocean research. The ASP is privileged to call upon the advice and support of the Kāhui, but there is a lot of other RSI system pressure on them. Māori are often fragmented across many projects – demand outstrips available capacity and capability. There is a major need to build capability in Māori, to develop a supportive environment where Maori want to be part of the Antarctic research community, which may include senior Māori scientists providing mentorship of Māori early career researchers, and education / upskilling of our Pākehā-dominated research community.

### GREEN PAPER QUESTIONS: WORKFORCE

*Q14. Workforce and research priorities: How should we include workforce considerations in the design of national research priorities?*

Capability often takes significant time resource and time to be developed, but can be quickly and, at times, irreversibly be lost. For this reason, support for fundamental functions need to be stable, and independent of short term variations in priorities. Nonetheless, national research priorities need to be forward looking — aligning and positioning the workforce, the funding, and the research priorities for future needs. The RSI system needs to maintain and grow critical workforce capabilities in priority areas that are fundamental to Aotearoa New Zealand’s future and support a more mobile (perhaps postdoctoral-level) workforce.

*Q15. Base grant and workforce: What impact would a base grant have on the research workforce?*

A separate base grant / research grant funding model would have positive impacts on the research workforce, including:

- removing the financial disincentives currently inhibiting involvement of post-doctoral and early career researchers
- reducing the fragmentation of researcher FTE
- focus on high priority needs for Aotearoa New Zealand over the highest paying user

*Q16 Better designed funding mechanisms: How do we design new funding mechanisms that strongly focus on workforce outcomes?*

Positive outcomes for the workforce will come from:

- reviewing the full cost financial model,
- separating base grants from research funding,
- investing in large, long-term stable funding, and
- focussing research priorities for Aotearoa New Zealand’s future.

## 7. Infrastructure

### *ASP position with respect to the Green Paper:*

#### **7.1 Coordination and optimisation of infrastructure is essential**

Under the current RSI model, equipment and infrastructure capability are currently funded by internal funds from the research organisations, which depend on business cases built on financial return. Each organisation has a different mechanism to support capital expenditure. This model leads to complex negotiations when large investments are being sought to support a community beyond and outside of a single organisation. The long-term and strategic vision of the ASP afforded the research partners certainty to invest into transformational capability. This includes unique drilling equipment, underwater robotics, and an ocean monitoring network, among other examples. Some of the equipment is jointly owned between organisations and some carry additional sensors or modules from other organisations, leveraging collective resources to achieve common priorities.

#### **7.2 Data infrastructure needs coordination**

The ASP employs a Data Curator, whose focus is on ensuring a long-lasting legacy of the research, timely access to data by the science community and the public, and delivery of data products to stakeholders and policymakers. At present, there is little national oversight or safe handling and appropriate curation of scientific data. Each organisation's internal policies are independent, and are likely to object to external data curation requirements. The ASP has a Data Management policy, which among other requirements, requires data to be made publicly available within a reasonable (defined) timeframe. Supporting the science community and enforcing this policy is time intensive, requires resilient relationships and diplomatic approaches, and needs to be adequately resourced and supported by the senior leadership team.

### *Lessons learned from ASP experience:*

#### **7.3 Connect funded science and funded logistics/infrastructure for better outcomes**

The ASP seven-year research funding horizon provides an important opportunity for Antarctica New Zealand and the science community to strategically plan field deployments, capability needs, and alignment with and development of international priorities and collaborations. However, Antarctic logistics demand for support (from the whole NZ Science system, including the ASP) far outstrips resources. About 70% of logistics funding is provided from vote Foreign Affairs, administered by MFAT, while science funding is sought from MBIE, from Vote Business, Science and Innovation. This disconnect can result in conflicting strategic and organisational priorities (e.g. Scott Base rebuild vs. logistics support for science), with the outcome being an inability to deliver promised research, even though the science funding was awarded to the 'best' programmes (based on, for example, excellence, impact, government priorities). Effective alignment between the two votes, with the combined aim of supporting high-priority research, is critical to address this barrier. Investment and support for non-ASP Antarctic research programmes remains equally important, to ensure fundamental research capability and capacity is not lost and can continue to support future research. The RSI system must allow for logistic support and science to walk together, and to ensure that national research assets are supported and upgraded as necessary.

## 7.4 Shared capabilities benefit everyone

Presently, much of Aotearoa New Zealand's major infrastructure (for example, *RV Tangaroa*, major analytical capabilities [such as accelerator, ice core facility], large drilling equipment) are owned by individual organisations. This creates substantial risk and a cost-burden for these organisations. This in turn can lead to counterproductive use of critical assets, where commercial or high fee use of assets competes with high priority scientific / policy support use. Critical infrastructure would be most beneficially used for Aotearoa New Zealand, if it was funded and hosted by the Government. NeSI and Scott Base assets are useful examples. Such an approach would ensure that the highest priority research, and not the highest paying user or the host organisation, has preferred access. An independent science panel should provide oversight for appropriate prioritisation of critical capability and infrastructure.

### GREEN PAPER QUESTIONS: INFRASTRUCTURE

*Q17. Funding research infrastructure: How do we support sustainable, efficient and enabling investment in research infrastructure?*

- A. Major infrastructure capabilities need to be shared. Critical infrastructure would be most beneficially used for Aotearoa New Zealand, if it was funded and hosted by the Government. Joint ownership models may also be appropriate in some instances. An independent science panel should provide oversight for appropriate prioritisation of critical capability and infrastructure.
- B. Align vote funding. Connect funded science and funded logistics / infrastructure / equipment commitments. Bring research priority and planning horizons into sync.
- C. Invest in data management. Provide national oversight, coordination, safe handling and appropriate curation of scientific data to remove duplication in development of systems and remove organisational conflicts of interest.

## 8. Summary & Recommendations

The ASP funding model and structure is already enabling benefits for Antarctic science in Aotearoa New Zealand. Based on our experience, we recommend a RSI system that, where appropriate, makes a strong investment in long-term funding to support strategically-important research priorities. Priorities should be determined and investments led independently of individual research organisations' management and governance, but building on research capabilities supported by institutional funding. Such an approach is dependent on continued strategic funding into core functions of the science system, as well as diverse and thriving support for fundamental / blue sky science to innovate and maintain capability to support and respond to future research needs.

Changes to the national RSI system that would support this include:

### 1. Long-term, large investments in strategic areas address national research priorities

The ASP is set up as a long-term strategic investment, with an initial seven-year contract for funding and the possibility of renewal contracts thereafter. This has enabled the development of a strong, strategically-focused nationally and internationally collaborative programme of research with a planning horizon well beyond the current contract length. The seven-year science plan attracted international interest, collaboration and funding, as well providing information to Antarctica NZ on multi-year logistics needs.

Long-term investment has enabled flexibility in the way funds can be allocated: to four long term "core" research projects, a modelling hub with post-doc fellowships, which is enhancing cross-

platform linkages and projections, and two expert groups. The remaining funds are contested for new projects, which allows agility and flexibility to respond to arising opportunities or challenges, and to provide an entry point for new researchers.

The core research of the ASP provides a focus for other research proposals that complement the strategic focus of the ASP. The strategic goal of the ASP could not be achieved within a constrained three or five year project. Our challenge has been that key research partners, in national priority areas that are critical pathways for the ASP to achieve policy impact, rely on short-term funding (e.g. Endeavour funded programmes).

2. **Focus on mechanisms, models and structures that support independent governance of key strategic research programmes.** Consider establishing a separate entity under MBIE that hosts the programme governance to provide systems and processes across the programme entities to remove potential host conflicts of interest and duplication in development of support systems and processes.

Success in the ASP platform approach has resulted from:

- (i) an independent governance model, with a Steering Group comprising independent members with strong science backgrounds, Te Ao Māori expertise and senior representation from the key policy agencies (MBIE and MFAT) and host (Antarctica NZ);
- (ii) an Independent Science Panel of highly connected/respected overseas-based Antarctic scientists who have provided robust reviews of science outputs as well as science plans; and
- (iii) the ASP leadership team, with strong science credentials, being seconded to the Platform, reduces the potential for an institutional perspective to constrain efforts in building the best approach, team and research priorities.

3. **Revise the full-costing financial model and consider base grant separate to research funding.**

A separate base grant / research grant funding model would have positive impacts on the research workforce, including removing the financial disincentives currently inhibiting involvement of post-doctoral and early career researchers; reducing the fragmentation of researcher FTE; and overpromising with respect to afforded, insufficient FTE commitments. The disproportionately high overhead charges, particularly on post-doctoral fellowships, effectively limits the science that can be delivered from the available funding.

4. **Stable, appropriate and certain funding for post-docs, ECRs and postgraduate students.**

The ASP chose to fund four research fellowships and jointly fund one fellowship with the Deep South National Science Challenge. These fellows represent the core of the newly built National Modelling Hub led by senior staff. The Hub adds critical capacity and diverse expertise in providing high priority future projections for the research community, policy makers and stakeholders. Long term support of this ECR capability remains challenging.

5. **Fund research and the policy translation and implementation of research, by also resourcing engagement, communications and stakeholder involvement.**

The ASP has funded pathways to policy translation, such as supporting stakeholder engagement by individual researchers, formation of expert groups (Future Projections and Science to Policy Expert Groups), and partnering with stakeholders for joint projects.

- 6. Design and resource a peer review system with expert national and international input (peer-review) and continued monitoring (independent science panels) of significantly sized, long-term programmes.**

The ASP's Independent Science Panel is a valuable asset, but the member involvement is essentially voluntary; it has resulted from researcher relationships and reputations. This contribution needs to be appropriately resourced in the RSI system design.

- 7. Recruit Māori and build capability; resource people and information to promote and value Mātauranga Māori and Te Ao Māori.**

Antarctic and Southern Ocean research is traditionally a space with little engagement with Māori. New ways of operating and thinking are needed, and for the ASP, this journey is in its infancy. A joint Deep South National Science Challenge/Antarctic Science Platform Kāhui Māori has been instrumental in initiating and building trusted partnerships.

- 8. Consider secondments, joint appointments and alternative employment models to promote collaboration and a mobile workforce.**

Joint appointments and secondments break down competition between institutions and create movement within the research system without physically having to move. We see this with ASP senior researchers jointly employed by two research organisations, and in the ASP modelling hub fellows (who have an employing organisation and are also jointly hosted at Victoria University of Wellington as a physical workspace).

- 9. Coordinate and optimise critical infrastructure, data and equipment as national capabilities.**

The ASP has been both hugely successful and also experienced challenges getting alignment of institutional priorities with ASP priorities around infrastructure/equipment requirements. Critical infrastructure would be most beneficially used for Aotearoa New Zealand, if it was funded and hosted by the Government. Joint ownership models may also be appropriate in some instances. An independent science panel should provide oversight for appropriate prioritisation of critical capability and infrastructure. There have also been limits on computational capacity for key modelling work, and institutional differences in data management expectations.

- 10. Connect and better align funded science and funded logistics, infrastructure and equipment**

A substantive challenge for the ASP has been the mis-match between logistics funding and research funding, and the difficulty in anticipating the impact of the Scott Base redevelopment on logistics support available for Antarctic field programmes.

We would be pleased to be contacted regarding this submission and can provide additional and supporting information on request.

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## Acronyms

Acronym	Definition
ASP	Antarctic Science Platform
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEP	Committee for Environmental Protection
CoRE	Centre of Research Excellence
CRI	Crown Research Institute
DSC	Deep South (National Science) Challenge
ECR	Early Career Researcher
FTE	Full Time Equivalent
IODP	International Ocean Discovery Program
IPCC	Intergovernmental Panel on Climate Change
IRO	Independent Research Organisation
KPI	Key Performance Indicator
MBIE	Ministry of Business, Innovation and Employment
MFAT	Ministry of Foreign Affairs and Trade
NeSI	NZ eScience Infrastructure
NSC	National Science Challenge
PBRF	Performance Based Research Fund
RSI	Research, Science and Innovation
SSIF	Strategic Science Investment Fund
TEC	Tertiary Education commission

# ANTARCTIC SCIENCE PLATFORM SUBMISSION ON TE ARA PAERANGI FUTURE PATHWAYS 2021 GREEN PAPER

