9 September, 2016

National Research Infrastructure Roadmap Taskforce
Research and Higher Education Infrastructure
Research and Economic Group
Australian Government Department of Education and Training

RE: National Research Infrastructure Capability Issues Paper

Thank you for the opportunity to comment on the National Research Infrastructure Capability Issues Paper, and to engage with the consultation sessions.

These comments are provided from the perspective of a large research infrastructure, successfully operated by a consortium of seven Universities, three publicly-funded research agencies (two Federal, one State), and Australia’s national meteorological and oceanographic agency, all working together in the national interest.

Enabled by NCRIS, these 11 operating institutions have built the capability to deliver an unprecedented level of open access research infrastructure used by another 103 national partner organisations and 95 international collaborating organisations, across academia, government and industry.

Speaking with a single voice, this large community recommends much clearer articulation of the requirement to sustain and expand our national integrated marine observing system to drive the development of Australia’s blue economy.

From a current value of $47 billion, oceans are expected to make an annual contribution to the Australian economy of $100 billion by 2025. This will come from a combination of growth in traditional marine industries (such as offshore oil and gas, marine tourism, shipping and ports), and rapid emergence of new industries (such as ocean renewables, green engineering, and ocean information services).

IMOS is now a key component of the scientific underpinning required for informed decision making about sustainable development of Australia’s vast and valuable marine estate.

The Issues Paper specifically references IMOS in Section 3.3 on International. In Section 6.2.2 on Marine Environment it states that “ocean observation and monitoring...capabilities need to be sustained”. The National Marine Science Plan (which recommends that IMOS be sustained and expanded) is referenced in Section 6.3 as a key input to “an overarching national strategic plan for future environmental research capabilities”. The need for marine observations is noted in Section 6.3.2 on National Model Systems.

This support is welcome. However taken in the context of the Issues Paper as a whole, it represents a relatively weak articulation of the requirement to sustain and expand our national integrated marine observing system.

IMOS is a national collaborative research infrastructure, supported by Australian Government. It is led by University of Tasmania in partnership with the Australian marine and climate science community.
The recommendation to more clearly articulate the requirement to sustain and expand our national integrated marine observing system is backed by the National Marine Science Committee’s decadal plan (2015-25) which is focused on driving the development of Australia’s blue economy.

It is backed by the marine-industry-led Forum for Operational Oceanography which is adopting a value chain approach to improving the safety and efficiency of Australian marine industries.

It is backed by developments in the Global Ocean Observing System, where Australia, along with the United States and the European Union, is considered to be leading the way in regional implementation.

Hard evidence can be provided to support these assertions, with three examples provided by way of attachments:

- Recent correspondence from a large, marine-industry-led research partnership underpinned by IMOS/NCRIS research infrastructure, and seeking further engagement.
- An extract from the just released review of Commonwealth Marine Reserves (found here) which makes specific recommendations about IMOS and its marine data facility, the Australian Ocean Data Network (AODN).
- A letter from the U.S. Department of Commerce National Oceanic and Atmospheric Administration (NOAA), provided in the context of a decadal impact document we are preparing to celebrate ten years of integrated marine observing in Australian waters.

Over the last ten months, IMOS has undertaken a comprehensive forward planning exercise in anticipation of the 2016 National Research Infrastructure Roadmap. The current version of the IMOS Five Year Plan (2017-22) can be accessed here and it will be finalised by the end of September 2016. This planning process has included extensive consultation with our user and stakeholder base. We are confident that the resultant Five Year Plan is clearly focused on marine science with measurable impact on Australia’s blue economy, in line with the imperatives of the National Innovation and Science Agenda.

In the following points we summarise how the IMOS Five Year Plan (2017-22) responds to the questions posed at the recent consultation sessions:

1. **Thinking big** – New capability in smart sensors and autonomous systems is required to turbocharge understanding of coastal and estuarine systems, and reduce uncertainty as to the future impacts of planning and investment decisions. This will deliver benefits to Australia’s blue economy in developed regions such as the Great Barrier Reef where sustainable development remains a hotly contested issue, and in remote regions such as northern Australia where significant future development is being planned. Spin off benefits will accrue in the marine services sector.

2. **Emerging research capability** – Bringing genomic technologies out of the laboratory and into the ocean is the most exciting new research capability currently within our reach. Implementing a marine microbial observatory in Australian coastal waters would be a world first.

3. **Industry partnerships** – Working with marine industries and service providers we have identified gaps in the observational capability required to improve forecasts of key ocean phenomena such as waves and currents, and predictions of extreme weather and
seasonal climate variability at time scales relevant to operational decision making. Investment in these capabilities will continue to attract industry partnerships.

4. International engagement – Australia needs to position itself to fully exploit new international satellite missions covering the southern hemisphere, and to be an active participant in international programs gearing up to measure the deep ocean (below two kilometres depth) and the sea ice zone. Targeted investment in the required capabilities will leverage substantial international co-investment and grow Australia’s reputation as a world leader in marine, climate and Antarctic sciences. It will support the development of a national, decadal forecasting capability.

In these priority areas, significant synergies will be generated through collaboration with national research infrastructure available in ‘omics (genomics, proteomics, metabolomics and bioinformatics), high performance computing, and virtual laboratories. National benefit will be maximised through close collaboration with the national research vessel fleet (bluewater, polar, and coastal) and relevant marine experimental facilities.

As a large and well-established NCRIS capability, IMOS is fully aware of the financial implications of a $150M pa commitment to maintain world class infrastructure. We also note that scope of the 2016 National Research Infrastructure Roadmap goes beyond current NCRIS. The IMOS Five Year Plan (2017-22) has therefore been carefully designed to be ‘scalable’.

Focused continuation of IMOS requires an investment of ~$20M pa (‘core IMOS’). This is considered to be a plausible allocation of available NCRIS funding within the context of a Research Infrastructure Roadmap that values the contribution of the blue economy to a National Innovation and Science Agenda.

The IMOS Five Year Plan also provides a pathway for enhancement and extension if the 2016 National Research Infrastructure Roadmap concludes that there is a case for increased investment in marine research infrastructure to accelerate the development of Australia’s blue economy.

As summarised in the four points above, the world class capability already enabled by NCRIS investment could be leveraged to grow IMOS into the ice and the deep with an emphasis on Southern Ocean and Antarctica, and into the coast and estuaries with an emphasis on northern Australia. These opportunities would take full advantage of next generation technologies and nascent national and international partnerships that are ripe for development. It would require an additional investment of ~$10M pa (i.e. $30M pa in total).

Detailed comments on the Issues Paper are provided in the attached Submission Template.

Please do not hesitate to contact me if you wish to discuss further.

Yours sincerely,

Tim Moltmann
IMOS Director
on behalf of the IMOS Advisory Board, Operating Institutions, Users, and Stakeholders
Dr Tim Moltmann  
Director  
Integrated Marine Observing System (IMOS)  
University of Tasmania  
Private Bag 110  
Hobart, TAS, 7001  

24 August 2016  

Dear Tim,  

Re: Utility of IMOS data in the Great Australian Bight region  

As you are aware, the Great Australian Bight Research Program (GABRP) has entered its fourth and final year and I’d like to take a moment to reflect positively on the constructive relationship between IMOS and the Program.  

Specifically, IMOS facilities and data collected from moorings, ocean gliders, Ships of Opportunity as part of the Australian Plankton Survey, Satellite Remote Sensing, and satellite tagged Australian sea lions are used in the GABRP to improve the outputs of at least six projects via:  

1. Hydrodynamic model development and validation  
2. Assessments of the drivers of change in lower trophic ecosystem dynamics in the region  
3. Analysis of foraging habitats of tagged apex predators  

To build on the achievements of the GABRP, planning has commenced for the period post July 2017 and utilisation of IMOS facilities and data will remain a cornerstone of ongoing research activities in the region. We recognise that IMOS has expressed their interest in becoming involved in any future research developments in the GAB and we will work with you as planning develops.  

I look forward to further developing the links between IMOS and the GABRP and finding new and innovative ways to maximise the utility and benefit of IMOS data to the Program and more broadly to the Great Australian Bight region.  

Sincerely,  

[Signature]  

Dr Rod Lukaletich  
Chair, Great Australian Bight Management Committee
ATTACHMENT 2 – Recommendations from the Commonwealth Marine Reserves Review

Requirements for managing effectively

7. The Expert Scientific Panel recommends institutionalising a transparent approach to research and management within Parks Australia as part of building relationships with the research community.

The Expert Scientific Panel considers the research and monitoring requirements framework set out in table 4.1 is sound and recommends it as an input to the development of a Parks Australia research and monitoring strategy for the Commonwealth marine reserve estate, with the reserves in the South-east Commonwealth Marine Reserves Network included in its scope.

Managing the proposed research, monitoring, data and evaluation framework

8. The Expert Scientific Panel strongly recommends that approvals and support for research and monitoring activities in the Commonwealth marine reserve estate require that the raw data and metadata obtained through these activities are made publicly accessible through the Australian Ocean Data Network to enable independent examination and analysis.

Data acquisition and management

9. The Expert Scientific Panel (ESP) recommends that existing marine research and monitoring data be maintained in the long term and that it is made readily accessible to the scientific community, reserve managers and other relevant users so that they may contribute to the adaptive management of Commonwealth marine reserves and the management of Australia’s Exclusive Economic Zone.

The ESP recommends that Parks Australia becomes an active contributor and core partner in the Australian Ocean Data Network.

The ESP recommends the continuing support of the Integrated Marine Observation System (noting that the National Marine Science Plan also makes this recommendation) and the Australian Ocean Data Network as vital to the future success of the monitoring and management framework of the Commonwealth marine reserve estate.

The ESP recommends that the Australian guidelines for the ethical conduct of research be emphasised in the collection and use of data.

Facilitating the setting of research priorities

10. The priority research investments that the Expert Scientific Panel recommends to the Government as making a significant contribution to the management of the Commonwealth marine reserve estate are:

- the research, monitoring, data and evaluation framework should be established, together with baseline studies
ATTACHMENT 3 – Recommendations from the Commonwealth Marine Reserves Review

Tim Molnmann
IMOS Director
University of Tasmania
Private Bag 110
Hobart TAS 7001 Australia

Dear Tim,

As you celebrate 10 years of IMOS, it is a great opportunity to reflect on our efforts of working together.

Both the United States and Australia have invested in ocean observing programs that support global, regional and national scales. The United States Integrated Ocean Observing System (IOOS®) and Australia’s IMOS have developed a strong partnership and collaborative effort. Both programs have the goal, at their core, the integration of ocean information so it can be used across many sectors. IOOS and IMOS continually learn from each other and have agreed to common data standards. IMOS made this a priority by having your data management lead as a liaison to not only IOOS but also European projects to enable this synergy. Your foresight was refreshing to see. Both are recognized as Global Ocean Observing System (GOOS) Regional Alliances (GRA) and are active in advancing GRA Council. My successful chairing of the GRA council from 2012-2015 was because of the support from all but especially from IMOS and so I was pleased to hand over the chairmanship to the Director of IMOS. In the area of technologies, we work together under the Group on Earth Observations, Blue Planet Initiative and the Global High Frequency Radar task. We are also increasingly coordinating on profiling glider operations. IMOS will host the next leg of the Challenger Glider Mission that reimagines the historic four-year voyage of the HMS Challenger that began in 1872. Beyond the programmatic, cooperation has been the personal engagement between IOOS and IMOS partners and stakeholders, an invaluable commodity that can’t be overlooked. We look forward to strengthening the ties between IOOS and IMOS because we know that understanding our oceans is vital to life on the planet and it will only be accomplished by working together.

As the Director of IOOS, it has been both a personal and professional pleasure to work you Tim and your entire IMOS enterprise

Sincerely,

Zdenka S. Willis
Director, US IOOS