

Paper for consideration by the MSCC

A Roadmap for a UK-Integrated Marine Observing Network fit for the Decade and beyond.

Authors: Matthew Palmer (IMON Chair), Alejandro Gallego (IMON v.Chair), Katy Hill (UK G7 Marine Science Coordinator)

1. The Challenge:

Improved coordination of the UK marine observing network is essential to provide the sustainability and stability required to meet UK ambitions for healthy seas¹, Clean Growth² and sustainable coastal communities, and to help meet its potential as a world leader of climate diplomacy within the timeframe of the UN Decade³ and as part of the Green Recovery from the Covid-19 crisis. The challenge however, is to maintain growth in established marine industries and enable the success of growing sectors (such as renewables, aquaculture and autonomous technologies) while ensuring protection of the future health and biodiversity of our natural marine resources and the associated wellbeing of society, against a background of climate change.

UK marine waters do not however, exist in isolation but are a part of the global ocean; connected to the atmosphere, coasts, seabed and freshwater systems. To meet UK national and international obligations and commitments therefore requires a marine observing network that engages those tasked with observing and understanding the catchment-to-coast continuum, coastal and open-ocean connectivity, benthic-pelagic coupling and air-sea interaction. Meeting government targets on good environmental status and zero net carbon emissions alongside the Grand Challenges of the UK Industrial Strategy (promoting Artificial Intelligence & the Data economy, Clean Growth and the Future of Mobility) requires engagement with stakeholders from transport, leisure, industry, social sciences and other sectors to ensure a holistic approach to action and innovation to meet these ambitious targets.

We must therefore look beyond currently fragmented activity by research, monitoring and operational practitioners to work across disciplines and across organisational and national boundaries to develop a coordinated approach to marine observing. Rather than merely linking sectors and agencies to provide improved efficiencies, we must provide an Integrated Marine Observing Network (IMON) for the UK that ensures integration of efforts and resources to enhance collective benefits and impacts. This will provide the tools that enable reliable and timely assessment and prediction of the state and behaviour of UK regional seas for all users and stakeholders and support its commitments to international ocean observation and governance.

2. How will IMON address the challenge:

IMON will provide strategic coordination of planning, investment and co-investment to enable an observational network that delivers optimal combined impact while focusing and enabling the efforts of institutional partners. This will be achieved through an integrated network of people, technology and infrastructure that gathers the collective capability of UK marine observing communities. User and stakeholder community engagement will aid delivery of the management tools and data required to quantify, interpret and forecast the impacts of natural variability, climate change and human activity on UK regional seas and the open ocean, as well as the communities and individuals that

¹ A Green Future: Our 25 Year plan to improve the environment. DEFRA 2018

² The Clean Growth Strategy- Leading the way to a low carbon future. BEIS 2017

³ UN Decade of Ocean Science for Sustainable Development (2021-2030)

depend upon them. Crucially, this will promote the collection of environmental data and information alongside social, economic, cultural and heritage information to ensure a fully rounded framework for observing the UK's marine waters⁴.

The groundwork for this initiative has already started within the MSCC framework, which has initiated the bringing together of representatives and experts from across UK marine sectors to shape a more coordinated approach to the delivery of UK marine strategy and has directed the formation of IMON. Many of the essential components of a UK observational network already exist. IMON must build upon lessons learned in the development of relevant components of the MSCC (e.g. the Marine Environmental Data and information Network – MEDIN; Marine Climate Change Impacts Partnership – MCCIP; UK Marine Monitoring and Assessment Strategy (UKMMAS) Evidence Groups; Social Science Task Group - SSTG) and develop closer partnerships with other coordinating bodies within the marine sector (e.g. DEFRA Marine Monitoring Coordination Group; Marine Alliance for Science and Technology for Scotland, MASTS; National Centre for Earth Observation, NCEO; National Partnership for Ocean Prediction, NPOP; NERC Climate Linked Atlantic Sector Science, CLASS; Institute for Marine Engineering, Science and Technology, IMarEST). IMON has already developed strong links with these and other established groups and is further improving links across the UK marine observing community and its users within each of the devolved administrations.

UK-wide coordination of sustained marine observing however, requires a transformational approach to be inclusive of all elements of marine science, and requires a change to marine management frameworks that are currently fragmented across multiple budgets, departments and agencies. Transformation is dependent on each of the funders and partners within the UK marine observing network being suitably engaged in the strategy, drivers and priorities of the IMON to recognise the value of their investment in providing a stable, sustainable, fit-for-purpose marine observing programme that is inclusive of all elements of marine science. Once established, IMON will be suitably placed to meet evolving requirements of marine sectors through a programme of both UK and national scale review, thus enabling the interests and deliverables within and across devolved responsibilities to be suitably maintained.

3. Vision:

IMON will provide a central body for coordination of UK marine observing that works in partnership with other service providers to enable the MSCC to meet UK marine sector requirements, obligations and commitments, both nationally and internationally. IMON will increase the capability, sustainability and stability of sustained marine observing programmes through the provision of,

- continuous review and evaluation of marine observing capability against the collective UK requirements for marine environmental, social and economic data and information.
- an ongoing and open programme of interdisciplinary research and development that adopts, develops and implements best practice through a standards based approach and promotes innovation in the delivery of UK marine observing via active engagement with all relevant sectors.
- a sustainable funding programme that enables 'over the horizon' and transdisciplinary planning across the network and aligns efforts across national, organisational and discipline boundaries while encouraging investment from funders and co-investment from stakeholders and partners.

⁴ Burdon, D., 2020. Review of marine cultural, social and heritage indicators. (DEFRA ME5118).

4. IMON implementation strategy

The devolved responsibility and competence related to UK marine observing requires development and gradual introduction of a new governance structure capable of meeting UK as well as national requirements and objectives. IMON will follow a phased implementation strategy that will work towards a UK coordination framework that works for each nation instead of a series of national and organisational coordination activities that subsequently feed into the delivery of UK requirements, obligations and commitments. This strategy will follow a homogenous, standards-based approach using a commonly agreed set of *Key Performance Indicators* that will encourage collaboration and trust across sectors and national boundaries.

4.1 Phase 1 (Months 1-12): Preparation

The objective of this initial phase is to undertake the required gathering of information and subsequent analyses and evaluation to enable holistic understanding of the drivers, challenges, risks and deliverables of the UK marine observing network, around which the IMON strategy, governance and future funding frameworks can be developed. Work will be overseen by the IMON Executive Committee, progressing along the following lines;

4.1.1 *Information gathering:*

- Gathering of all relevant Marine Strategy documents that direct, influence or benefit from UK marine observing. These will include strategies for delivery of sustained observing programmes for statutory monitoring, research, operational and commercial purposes and will include strategies that might not have been developed directly for marine observing sectors. This will include those relating to hydrology, meteorology and ocean prediction as well as relating to human dimensions of marine waters such as ocean literacy, marine licencing, governance and social science.
- Complement ongoing work of established and emerging UK coordination frameworks as well as efforts of MEDIN and other relevant data and information services to map the drivers for maintaining UK sustained observing programmes. This will be informed by a broad evidence base drawn from stakeholder consultation to capture the value chain associated with each programme.
- For each programme, gathered information will include (but will not be limited to),
 - Funding: requirements, sources and stability.
 - Resources: skills, facilities and infrastructure; requirements, availability, cost and stability.
 - Strategies: planning, management, delivery, impact.

4.1.2 *Analyses, evaluation and solutions:*

- Gap analysis: Gaps in deliverables and areas of risk will be identified by mapping existing observational efforts and its deliverables to collective national and international requirements and obligations of UK marine sectors and policy obligations. This process will also identify where significant overlap or redundancy exists.

- **Sustainability:** utilising the combined information gathered under this initiative and other available resources, the costs and benefits of each programme will be mapped onto deliverables and combined to assess the collective sustainability of the UK marine observing programme.
- **Evaluation:** IMON will draw on the gathered evidence and analyses to provide the best informed advice on future effort and investment. Evaluation will be developed through consultation with delivery partners and funders of activities with focus given to identified gaps, redundancy and programmes at risk. Regular reporting to the MSCC will be established to provide transparency on the stability of the UK marine observing network for users, practitioners and funders.
- **Solutions:** Solutions to identified gaps and risk within the network will be sought in the first instance from available effort via a process of consultation. Where solutions don't exist within current observing programmes or available funding, recommendations on future effort and investment will be provided to funders via regular updates and reporting to the MSCC.

4.2 Phase 2 (Months 13-24): Governance & Funding

This second phase will establish the future governance and funding structure of the IMON that will enable 'over-the-horizon' coordination of funding, management and delivery of marine sustained observing around a 'backbone' of common infrastructure. To ensure support from both funders and community the IMON will demonstrate value added through a series of *Key Performance Indicators* that demonstrate increased sustainability and stability to UK observing programmes.

- 4.2.1 Governance:** A **Governing Board** will be established in place of the IMON Executive Committee. The Board will consist of representatives from each of its funders and national governments with additional representation from major user and stakeholder groups. A Chair (or co-Chairs) will be selected from the Governing Board for a limited period of office. It will provide ongoing development of the IMON strategy to ensure delivery of a sustainable management framework built around a common set of *Key Performance Indicators* (4.2.4), designed to meet both UK and devolved national marine observing objectives. Delivery of the strategy will be coordinated by an IMON Director through a collection of overarching Themes. Themes will undergo regular review and assessment by the Governing Board.
- 4.2.2 Research and development:** An **Advisory Committee**, consisting of experts drawn from marine sciences and technology communities, will provide advice on emerging and state-of-the art applications, methods and initiatives. The Advisory Committee will consist of both UK and international experts to expedite knowledge transfer and adoption of new and disruptive technologies. The Advisory Committee will report to the IMON Director to help shape an ongoing programme of Research and Development (R&D) aimed at meeting the IMON strategy. Within Phase 2, small R&D projects will be commissioned on a 3-monthly basis to meet the priority development areas identified by the Advisory Committee and IMON Directorate.
- 4.2.3 Funding:** A transformational approach is required to provide the funding security required to enable sustainable and stable delivery of national and international commitments to marine observing that meet UK and devolved government expectations and aspirations. Funding commitments will be established around the proposed Governance framework to enable central coordination of UK marine observing at sectoral and national levels while meeting common UK-wide objectives. Work during Phase 2 will focus on securing commitments from funding bodies and

delivery partners within a formalised memorandum of understanding to enable a coordinated programme of long-term planning and delivery against UK marine observing requirements. Co-investment in the IMON framework will also be sought through establishing partnerships with user groups, commercial sectors and via innovation driven by an ongoing R&D programme. Initial funder investments will be requested to support the Phase 2 R&D programme.

4.2.4 *Key Performance indicators:*

IMON will work towards a series of *Key Performance Indicators* that are applicable across sectoral and devolved national responsibilities to ensure common commitment from funders and delivery partners.

1. **Observations:** Ensure a sustained programme of optimised marine observing to meet the collective UK requirements and objectives is the principal aim of the IMON. It will provide an ongoing and continuous programme of research, development, review and adoption of identified standards and best practice to ensure optimal performance and efficiencies within the UK marine observing network.
2. **Data:** Advance the implementation of standards based data delivery and management in support of MEDIN and other national and international initiatives through the promotion of recommended best practice in all current and emerging sustained observing programmes. IMON will promote the inclusion of data requirements from the broader marine science community during the planning, design and inception stages of marine observing to increase the benefit from UK investments.
3. **Impact:** Provide regular review and assessment of the UK Integrated Marine Observing Network and maintain an ongoing programme of community engagement to ensure IMON evolves to recognise and meet current and emerging UK national and international requirements and stakeholder needs.
4. **Sustainability:** Ensure sustainable practice and investment through the delivery of appropriate evidence and advice to funders, legislators and policy makers by ongoing assessment and reporting on the state of the UK Integrated Marine Observing Network.

4.3 Phase 3 (Years 3-5): Implementation

This final phase will provide the gradual implementation of the UK Integrated Marine Observing Network strategy with the aim of maximising adoption of the coordination framework developed in Phase 2 within a 3-year period. Implementation will be managed in a step-by-step process with initial adoption being managed within Themes that have UK-wide commitment supported by devolved responsibility and led by suitably experienced Theme leaders. Governance and funding must evolve alongside the level of IMON responsibility, which will be reviewed by the Governing Board on a 6-monthly basis with recommendations made for future levels of investment.

Themes might follow similar lines to the Global Ocean Observing System (GOOS) three critical themes: 1. climate, 2. operational services and 3. ocean health. Such broad categories would allow the various strands of UK marine observing to be captured within sub-group activity and would support alignment of both national and international strategies on ocean governance.

It is acknowledged that some observing programmes or sectors will not suit coordination under IMON. In such instances, partnership will be sought between IMON and other coordination bodies or programme leaders with the aim of aligning deliverables and practices with IMON Key Performance Indicators.

The R&D programme will be expanded under an annual open call for proposals to meet priority development areas identified by the Advisory Committee and IMON Directorate and managed in partnership with complementary activity and funding calls. R&D proposals will be assessed during this implementation phase by the Governing Board however the expectation would be for a peer review process by the end of Phase 3 to meet the evolving requirements of the IMON scope and responsibility. The R&D programme will be aligned with ongoing activity in public, academic and commercial sectors, providing access to IMON resources to encourage public-private partnerships to promote innovation and future resilience within UK marine observing.

IMON will provide a focal point for UK marine observing. It will ensure visibility and accessibility to stakeholders through annual review of its Governing Board and Advisory Committee and via active engagement with national and international marine forums, a visible web presence and an ongoing R&D programme that supports innovation in line with the UK Industrial Strategy Grand Challenges. Its integrated approach will increase the value of UK marine observing, facilitate the introduction of new and disruptive technologies to meet emerging requirements and bridge knowledge and evidence gaps between marine science and UK residents and communities.