



Business Plan 2019-24

Measure once, use many times

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1. Introduction

The Marine Environmental Data and Information Network (MEDIN) is a collaborative and open partnership, established in April 2008 to improve the management of and access to the UK's valuable marine data and information resources. MEDIN is a group under the UK Marine Science Coordination Committee (MSCC) and is supported and funded by a group of 14 public and private organisations². MEDIN holds and provides access to marine environmental data predominantly within UK territorial waters. However, MEDIN further provides archiving and access to some marine environmental data on a global scale.

MEDIN and its partners³ share a commitment to open, accessible data, in line with government policy [add links], whilst recognising that there are instances and sectors that are required to have legitimate restrictions on data publication, and to cover the production and, where required, maintenance of higher level datasets if not funded centrally. The MEDIN approach can be summarised as “Data should be as open as possible, and only closed if necessary”.

MEDIN has done fantastic work in the last 10 years, building an extensive breadth of knowledge on marine data management across the UK, alongside a suite of well-regarded community resources. MEDIN's collaborative funding model has proved to be relatively stable and facilitates community buy in, although the loss of sponsors (not matched by incorporation of new sponsorship) is seen as an ongoing threat. MEDIN seeks to develop substantially in the next period, seeking opportunities as technical barriers to interoperable data sharing decrease and data volumes continue to increase. MEDIN will continue to both improve and develop its offering and so contribute fundamentally to the enhanced use of marine data for the benefit of the UK's economy, evidence-based policy decision making and scientific standing.

1.1 National framework

MEDIN has established a national framework for providing access to and management of marine environmental data and information. This comprises:

- An operational network of coordinated, accredited, marine Data Archive Centres (DACs), which provide the national marine data management for MEDIN. The **DAC network** encompasses a wide range of marine data themes and continues to grow as gaps in the network are identified.
- A web [portal](#) to make it easy for users to find UK marine data. The portal is the most comprehensive of its type and currently provides access to over 220 TB of marine

² DEFRA: Department for Environment Food and Rural Affairs; NERC: Natural Environment Research Council; Scottish Government; BEIS: Department of Business, Energy and Industrial Strategy; Cyfoeth Naturiol Cymru / Natural Resources Wales; Met Office; The Crown Estate; Maritime and Coastguard Agency; UK Hydrographic Office; CEFAS: The Centre for Environment, Fisheries and Aquaculture Science; Joint Nature Conservation Committee; OceanWise; DAERA: Department of Agriculture, Environment and Rural Affairs, Northern Ireland; AFBI: Agri-Food and Biosciences Institute.

³ <https://www.medin.org.uk/about/sponsors-and-partners>

data, originating from more than 400 organisations and includes data collected for a range of scientific, policy, conservation and commercial uses.

- A discovery **metadata standard** that ensures all relevant information about a dataset is readily available to allow a potential user to make an informed decision about whether it is pertinent. MEDIN maintains this standard and provides tools to allow users to create the metadata that populates the MEDIN portal. Standards ensure that data systems are interoperable.

These three components provide the overall framework for MEDIN. There are two additional complementary areas of work that MEDIN pursues: international awareness and resources and applications. The first of these ensures that MEDIN DACs link up with international marine data centres and are actively involved with international developments in data management procedures, standards and technology. This 2-way linkage ensures the UK benefits from international developments and the UK has a platform for sharing UK developments with the international marine community. The second ensures MEDIN is alert to developments in new technologies and applications that can be harnessed for the benefit of MEDIN partners.

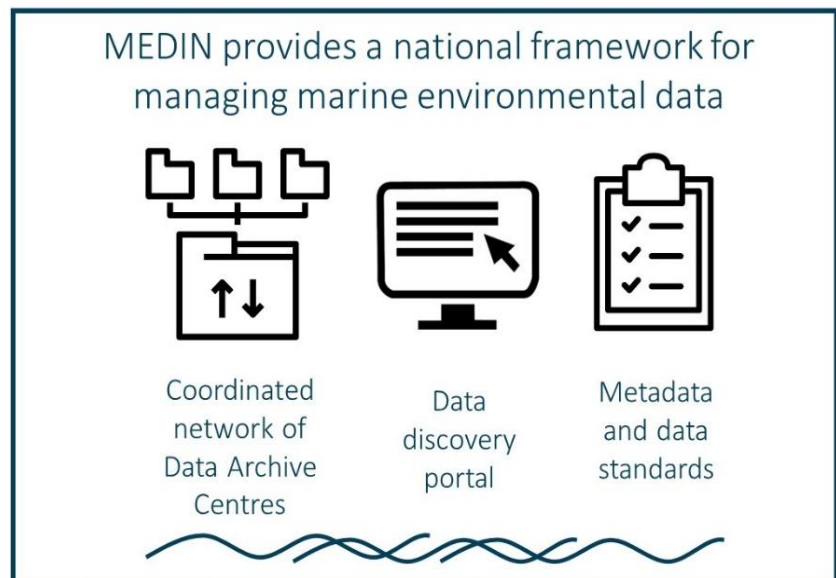


Figure 1: Summary of the national framework for managing marine environmental data provided by MEDIN.

1.2 The first 10 years: a legacy of success

Over the past 10 years, MEDIN has established and made operational a national framework for marine data management. Handling millions of requests for data each year, the MEDIN Data Archive Centres⁴ provide the expertise and infrastructure to meet the growing demand for marine data. The MEDIN portal currently provides access to over 14,000 datasets, a huge increase from the 800 datasets that were available when the portal launched in 2010 (Figure

⁴ British Oceanographic Data Centre (BODC); British Geological Survey (BGS); UK Hydrographic Office (UKHO); Met Office; DASSH; Centre for Environment, Fisheries and Aquaculture Science (Cefas); Marine Scotland; Archaeology Data Service (ADS); Historic Environment Scotland (HES); Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMW).

2⁵). A report in 2015⁶ recognised MEDIN as a sound mechanism for increasing access to industry data and MEDIN continues to work with a variety of marine industries to help overcome barriers to sharing commercial data. Since its inception, MEDIN has engaged with European and wider international data initiatives to help our partners comply with relevant legislation. By delivering a well-received programme of free training workshops to hundreds of organisations, both in the UK and internationally, MEDIN has vastly improved marine data management practices across the commercial, public and academic sectors.

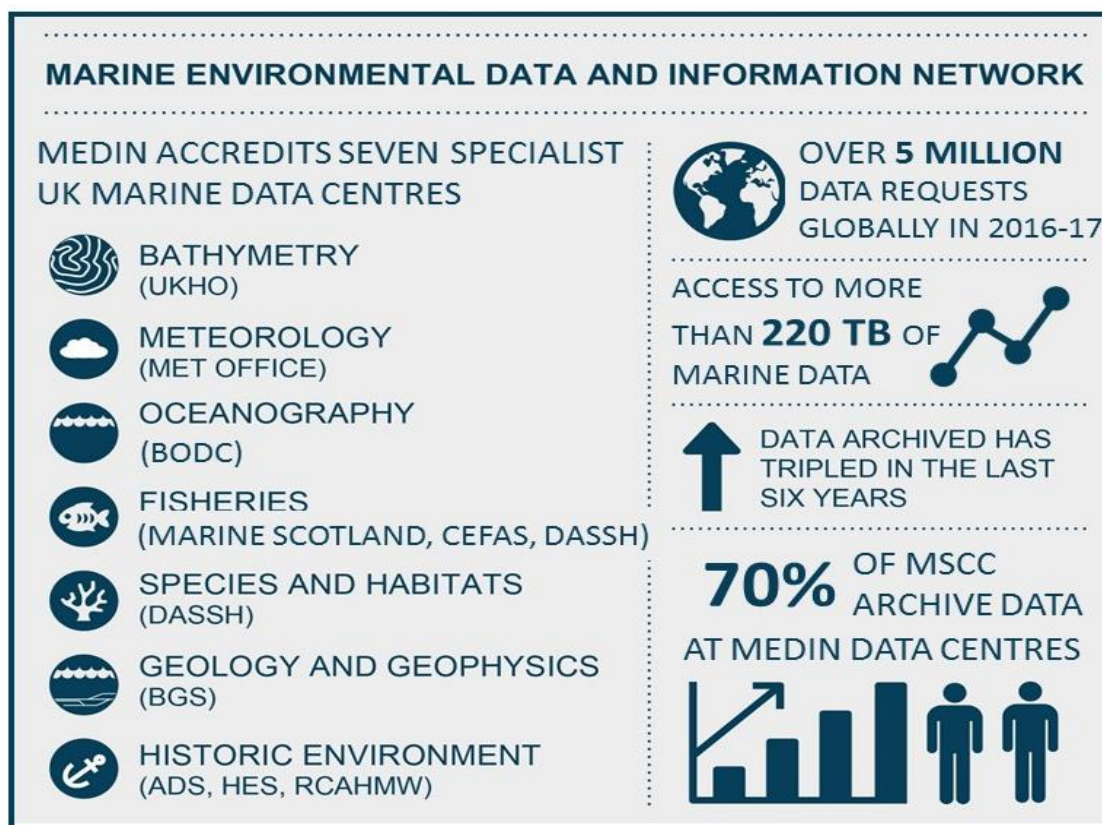


Figure 2: Infographic showing MEDIN's impact on the availability of marine environmental data in the UK.

MEDIN's ambitious new 5-year business plan builds upon this legacy of success and will see MEDIN strengthen its position as an internationally recognised authority on marine data management. By setting out a framework of strategic goals and deliverable activities, the plan captures MEDIN's objectives and aspirations for its next half-decade.

1.3 Looking to the future: The 5-year plan

MEDIN's governing body, the MEDIN Sponsors' Board, commissioned the development of a new strategic business plan in November 2017. Over the subsequent year, MEDIN consulted extensively across the marine community, among both the private and public sectors, to

⁵ Image courtesy of the Marine Science Coordination Committee.

⁶ ABPmer, (2015). A Review of Access to Industry Environmental Data. A report produced by ABP Marine Environmental Research Ltd for Productive Seas Evidence Group, November 2015.

identify emerging priorities for the community and inform the next 5-year plan (Appendix D). In parallel to this consultation, an internal appraisal of the network's Strengths, Weaknesses, Opportunities and Threats (SWOT) was carried out (Appendix A). A small team of marine data experts from the MEDIN Executive Team and DAC Working Group drafted a new Business Plan based on the findings from the consultation and SWOT analysis.

This document outlines MEDIN's plan for the next five years and sets out an ambitious programme to tackle the key data management objectives identified by MSCC and other stakeholders, supporting the whole UK marine community (including policy, industry, commerce and academic sectors) in a changing data landscape and so to fulfil the MEDIN strapline 'measure once, use many times'. Delivery of this plan will see MEDIN continue its successful management of UK marine data, being internationally recognised for doing so. MEDIN will provide measurable benefits to the UK economy and will:

- **Increase the efficiency** of gathering marine data for government, industry and academia when carrying out marine planning, sustainable development, scientific research and conservation by providing efficient access to marine data.
- **Support better decisions** via a more comprehensive evidence base for decision makers by increasing the quality and volume of marine data available.
- **Add value** to UK marine data by maximising interoperability and enabling the UK to contribute to, and benefit from, global best practices in this domain.

2. Vision, mission and strategic goals

2.1 Vision

MEDIN's vision is that all UK marine data are findable, accessible, interoperable and reusable.

2.2 Mission

MEDIN's mission, in line with MSCC's strategic priorities, is to maximise the value of the UK's marine data, providing innovative solutions for their efficient capture, storage, access and reuse, to increase the understanding of our marine environment and support the sustainable development of the blue economy.

2.3 Strategic goals

MEDIN has set three major goals to help deliver its vision:

A	MEDIN delivers its vision for <i>all</i> of the UK marine community by providing tools and services that are beneficial across the wide spectrum of the marine data community and the full data lifecycle; ensuring widespread archiving and open access to high-quality data to enable maximum use and security and to provide integration and coordination of services.	<i>Adoption and organisation</i>
B	MEDIN delivers the technical infrastructure required to ensure UK's marine environmental data are Findable, Accessible, Interoperable and Reusable (FAIR) by providing a coordinated network of marine Data Archive Centres, a single portal to access all UK marine data and standards, tools and services to support the UK marine community.	<i>Technical infrastructure</i>
C	MEDIN delivers an open and constructive data management culture , fostering global collaboration and partnerships, addressing skills gaps, providing training and education.	<i>Community and education:</i>

3. Drivers and objectives

3.1 Drivers

MEDIN supports UK marine data management across policy, industry and academic sectors and is crucial to delivering the Marine Science Coordination Committee's (MSCC) strategy. Since MEDIN's inception in 2008, the data landscape has changed significantly. Data continue to be required to make policy, scientific, commercial, management and conservation decisions but there is a much greater expectation on easy and open access to ever-larger volumes of data. The UK government has responded to this by establishing the Geospatial Commission to maximise the value of geospatial data. This section details the four key drivers for the work that MEDIN plans for the next 5 years: to aid achievement of MSCC's high-level objectives, developing policy, sustainable industrial growth and potentially EU Exit.

Marine Science Coordination Committee

The Marine Science Coordination Committee (MSCC) is MEDIN's parent body and provides strategic direction to MEDIN. MSCC's emphasis on enabling the efficient capture, storage and reuse of data is clearly reflected in MEDIN's mission. The recently published MSCC strategy, 'UK Marine Science for Sustainable and Productive Seas', details nine high-level science and evidence priorities. MEDIN's remit to provide easy access to the UK's valuable marine data resources supports all of these High-level Priorities. Table 1 describes the contribution MEDIN makes to delivering MSCC High-level Priorities.

MSCC high-level priorities	MEDIN contribution
Better understand the capacity of the marine ecosystem to supply ecosystem services, natural resources and societal and economic benefits now and into the future.	To achieve these objectives, the UK marine community will require a wide range of data, including that relating to habitats, species, geology, oceanography, meteorology and bathymetry. Data will be required to span a range of scales from regional to global. These types of data are all available from MEDIN DACs. Indeed, over 10,000 of the datasets held in MEDIN DACs relate to these data themes and are available to contribute to the evidence base required to address these objectives and answer the policy questions associated with these priorities.
Better understand the structure, function, resilience and variability of marine ecosystems.	
Better understand the impacts of climate change, including its multiple stressors and feedbacks, and the ocean's resistance and resilience to a changing climate.	

Promote and represent UK marine science at international fora, strengthening existing and building new relationships with international partners including research organisations and infrastructure.	This priority will involve data exchange between UK and international marine data infrastructure to support scientific collaboration. MEDIN DACs regularly submit data to international data repositories on behalf of the UK marine community e.g. International Council for the Exploration of the Seas (ICES), the Global Biodiversity Information Facility (GBIF) and the Intergovernmental Oceanographic Commission's (IOC's) International Oceanographic Data Exchange (IODE).
Better enable the efficient capture, storage, use and security of marine scientific data.	This priority captures MEDIN's mission. MEDIN's contributions to this priority are described throughout this document and in the annual work plans.
Better understand society's relationship with our oceans and seas.	A broad range of data are required to understand marine societal benefits e.g. the ecosystem services provided by the seas as well as its natural capital. Marine environmental data such as the abundance and location of species and habitats, geological resources, and oceanographic conditions, all accessible from MEDIN, are key data required for being able to both understand and quantify ecosystem services leading to an understanding of marine societal benefits.
Better understand cumulative and in-combination impacts on the capacity of marine systems to supply food, energy and mineral resources as well as mitigate against the risk and effects of natural hazards.	MEDIN DACs hold data about fisheries, species, habitats, geology, meteorology, oceanography, bathymetry and the historic environment. These types of data are all used to monitor, manage and predict food security, energy availability, natural-hazards and safe operations at sea.
Support the long-term monitoring, observing and mapping of the marine environment and ocean systems.	Long-term monitoring is used to identify and understand any changes to the system being monitored. The MEDIN DAC network provides access to the data from these programmes and are committed to curating that data for the long term. The DACs will increasingly provide data in real or near real time. The UK Directory of Marine Observing Systems (UKDMOS), managed by MEDIN, provides details of all UK monitoring and observing programmes, with links to metadata in the MEDIN portal. This allows users to identify existing monitoring activities being carried out around the UK to prevent duplication of effort and resource.

Facilitate the communication of high-quality, up-to-date marine science and evidence.	<p>Data accessible from MEDIN Data Archive Centres (DACs) provide the underlying evidence required to deliver this objective e.g. has been used in the recent OSPAR and UK MSFD assessments.</p> <p>The communication of high-quality science occurs predominantly in international, peer-reviewed journals. These journals increasingly require data to be openly available from public repositories before scientific papers can be published. MEDIN DACs are accredited repositories for marine data and can mint Digital Object Identifiers (DOIs) for scientists archiving data with them. DOIs allow data to be cited, so that other scientists can easily access the data used in a study and transparently build upon an author's claims.</p>
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Table 1: A summary of the contribution MEDIN makes to delivering MSCC High-level Strategic Objectives.

Marine data for a developing policy environment

MEDIN's activities support UK marine management and science policy arising from many international, national and local drivers. The key policy drivers are listed below based on their regional focus:

International

- OSPAR Quality Status Reports.
- United Nations Convention on the Law of the Sea (UNCLOS) – supporting process for global reporting and assessment of the state of the marine environment.
- International Convention for the Safety Of Life At Sea (SOLAS) (Regulation V/9 “Hydrographic Services”) to update nautical information necessary for safe navigation at sea.
- United Nations Sustainable Development Goals (SDGs) – a blueprint to achieve a better and more sustainable future for all. In particular, SDG 14: Conserve and sustainably use the oceans, seas and marine resources.

European

At the time of writing this plan, the relationship of the UK to the EU for the duration of the plan is far from clear. There are a number of high profile marine EU initiatives in which the UK may well continue to play a key role.

- Marine Strategy Framework Directive (MSFD) Assessment of Good Environmental status of the Greater North Sea and Celtic Seas.
- Water Framework Directive Assessment of Ecological and Chemical Status.
- Common Fisheries Policy Annual Assessment.
- Habitats and Birds Directive reporting.
- INSPIRE Directive compliance.
- European Environment Agency State of the Environment Reporting.

- Copernicus Marine Environment Monitoring Service (CMEMS)

UK / National level

- Domestic UK Assessments e.g. possible new Charting Progress, Scotland's Seas assessment due in 2020, Scottish regional marine plan assessments, Marine Management Organisation (MMO) regional plan preparation, Welsh National Marine Plan, Marine Area Statements and State of Natural Resources reporting in Wales.
- Reporting for Marine Conservation Zones (MCZs) and the Marine Protected Area (MPA) network
- Development of Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs).
- Geospatial Commission, established in 2018, to develop a national geospatial strategy and set regulation and policy in relation to geospatial data created by the public sector. Of relevance to MEDIN, the Geospatial Commission includes two of the MEDIN DACs i.e. British Geological Survey and the UK Hydrographic Office.

MEDIN supports these policy drivers by tackling the key marine science priorities as identified by the Marine Science Coordination Committee (see table 1). Moreover, MEDIN provides:

- Streamlined access to data collected for monitoring programmes e.g. Marine Strategy Framework Directive (MSFD), OSPAR and domestic Marine Assessments.
- The necessary connections with data infrastructure at the European level e.g. submission of data to the International Council for the Exploration of the Sea (ICES) for OSPAR reporting.
- Developers and regulators with the key point of access to marine data via the DACs.
- infrastructure to support the Government's "Open Data Agenda" via such platforms as data.gov.uk and Scottish Spatial Data Infrastructure, Welsh Government Open Data Portal and meeting international standards e.g. INSPIRE
- Infrastructure to support the long term archiving of marine data for UK plc.
- MEDIN is in a unique position of being able to represent the whole of the marine environmental data community, which naturally includes data with a geospatial component. MEDIN will ensure that the Geospatial Commission is properly informed to help address challenges specific to marine environmental data.

Marine data for sustainable industrial growth

The term 'industry' covers many types and size of organisation across numerous sectors, from shipping, commerce, fisheries, ports, harbours, oil & gas, dredging and renewable energy to recreation and tourism, plus the many private sector organisations that complement and support these sectors. Digital technology is transforming industry, as it is elsewhere, but it is also transforming the markets in which industry operates. Innovation is ever more interdisciplinary and requires user input to succeed commercially. Countries now consider data, and the ability to process and use it in more advanced ways, as a route to economic success. Ever greater volumes of data are being generated daily and the challenge to manage and use this data as efficiently as possible is gaining greater recognition.

Industry is both a generator and consumer of marine data. Traditionally, the focus on data is project based, meaning that data are acquired as part of a project, or even a single stage of a project, and not used more widely or longer-term. Much of the data gathered is used once

to attain a result and then forgotten, even though this data could be shared and re-used to gain wider benefit.

Industry therefore has data it could share and has an important role to play in data management. Taking account of industry's needs and viewpoints with respect to data, developing policies that work for industry and the environment and facilitating public-private sector collaboration will help free up this data and more generally bring significant scientific, societal and economic benefits.

To mobilise these industry data, MEDIN will:

- Demonstrate that the data are of wider benefit and that industry also gains from these benefits. For example, re-using data to make the EIA process less time consuming or onerous, or by reducing regulation and/or limiting monitoring requirements.
- Make it as easy – and low cost – as possible for industry to make the data they acquire more widely and readily available. One option is to do this by making the submission of data mandatory as part of lease or licence conditions (with appropriate checking and enforcement). This has been used to good effect by The Crown Estate in their offshore Leases and Licenses; with data ultimately made publicly available through the Marine Data Exchange. However, it is generally accepted that to facilitate improved data sharing across the various industry sectors, a flexible and inclusive approach is needed to encourage improved awareness and education amongst the industry, leading to greater sharing of data.
- Demonstrate that public-private monitoring initiatives can reduce the burden on monitoring. A fair system and building trust that industry data will not be misused, used against their commercial interests or impact their ability to compete is therefore required.
- Ensure developers/operators include data management/data sharing in their scopes of work and conditions of contract consistently to create a level playing field between contractor and sub-contractors.
- Provide tools and resources so that the costs associated with data management are kept to a minimum, ideally to the extent that contractors see the advantage of offering this as added value at zero cost to the customer.
- Encourage contractors to promote data sharing and robust data management with their customers; give them reasons to do so.
- Consider the data 'value chain' in its entirety, as focusing on data alone and not on downstream products can be inefficient and lead to inconsistency. We should embrace opportunities that industry provides for the greater good and not shy away from them.
- Implement policies that promote collaboration with industry for mutual benefit and provide testbeds and other opportunities that encourage the adoption of new technologies.

Industry and the UK's Marine Science Strategy

Industry should play a major role in the delivery of 'UK Marine Science for Sustainability and Industrial Growth: 2018 – 2025'. With regards to data, 3 (of the 10) priorities are of relevance to industry.

The first is to facilitate alignment of science and policy to ensure the continued growth of the UK's sustainable 'Blue Economy'. This can only be done in partnership and partnership can only be achieved by considering the drivers presented above.

MEDIN's contribution will be to ensure that data captured as part of this priority are archived in DACs, so that they will be available for informing policy and wider decision making. **The challenge then is for MEDIN to address the above drivers to ensure that industry engages in this process.**

The second is to better enable the efficient capture and storage of data. This priority must include data collected by industry. MEDIN has a central role to play in this, but for this to include industry data then the industry drivers presented above must be considered.

The third is to support long-term monitoring and observing. Monitoring by industry (leading to industry data) should be included in this. More can be done on coordinating and sharing data from monitoring stations and programmes and by working with companies providing off-the-shelf data collection, managing and display systems.

EU Exit

With EU Exit approaching⁷, a question that arises is, will this affect MEDIN's ability to work with the UK marine community to improve access to marine data? Although MEDIN is primarily focused on UK marine data, EU Exit presents a number of risks to UK marine data initiatives. For example, many MEDIN partners and DACs have benefitted from EU Horizon 2020 funding to develop marine data infrastructure. These projects not only bring funds into organisations but also build internationally interoperable infrastructure. Thus, the risk to the UK is not purely financial with the loss of a funding stream, but also to the ability of the UK to contribute to and benefit from European data sharing initiatives.

The UK marine science community will need strong leadership in data management to ensure that this discipline remains a priority and to make the most of any new opportunities that arise. Through promotion of best practice and development of standards, MEDIN will play a key role in safeguarding the UK's marine data management capabilities over the next 5 years. MEDIN has strong links with international marine data management initiatives, which will allow the UK to continue to benefit from the flow of data to and from the global marine science community. MEDIN will facilitate and support partnerships with overseas organisations to enable the fusion of international best practice with UK expertise, ensuring the UK will be a centre of excellence for marine data management.

3.2 High Level Objectives

MEDIN has defined 12 High Level Objectives (HLOs) for 2019-2024 to help achieve its three goals (table 2 and figure 3). Some of the HLOs are a continuation of objectives set in the previous MEDIN Business Plan, as they remain relevant. Any new HLOs are highlighted in blue in table 2.

⁷ Correct at the time of publishing, September 2019.



Figure 3: Summary of MEDINs High Level Objectives for 2019-24. The objectives are listed in detail in table 2.

1	Access to data. Provide efficient access to arguably the most comprehensive coverage of high-quality marine data held by UK organisations via the MEDIN portal and DAC network, thereby enabling wide-ranging and dynamic access to UK marine data, UK marine Reference data, view and download services and other data products in line with user requirements.
2	Frictionless archival. Facilitate frictionless, secure, cost effective, long-term archiving of marine data within the MEDIN DAC network.
3	Tools and standards. Develop and provide an open access suite of easy to use, forward-looking data management tools and standards e.g. data guidelines, Application Programming Interface (API) service guidelines, fostering community sharing of expertise and code, to ensure more efficient handling of all marine data generated now and in the future.
4	Community building. Lead and build a community of engaged users of marine data, fostering good data management practice.
5	Environmental assessments. Facilitate domestic and international assessments of the marine environment through the storage, management and dissemination of UK monitoring data and provision of advice on retrieval and amalgamation of large, multidisciplinary datasets.
6	Data interoperability. Support the UK marine sector to implement globally and cross-domain interoperable marine data services e.g. machine readable Application Programming Interface (API) for DACs and others.
7	Adoption of MEDIN. Achieve full adoption of the MEDIN framework (DAC network, standards, metadata portal, data guidelines, data clause) across UK organisations (public and private sector), promoting open data principles to ensure widespread data accessibility.
8	Data from new technologies. Lead the UK marine community in data management for new and emerging technologies, including autonomous and robotic systems.
9	Monitoring. Record and provide access to information on monitoring activities in the UK to support the UK Marine Monitoring and Assessment Strategy (UKMMAS) Community.
10	Skills and education. Enhance data management skills within the marine community, providing training and education.
11	Data retrieval. Develop a coordinated approach for users to retrieve marine data distributed throughout the MEDIN DAC network.
12	Influence and co-ordination. Integrate, coordinate and influence international and cross-domain data initiatives, promoting good data management practice.

Table 2: MEDIN's High Level Objectives (HLOs) for 2019-24. HLOs shaded in blue are new.

3.3 User benefits

One of the challenges MEDIN faces is delivering a service that will benefit the whole of the UK marine community, which has broad and disparate needs and priorities. MEDIN users typically fall into five categories: Government departments/agencies, commercial organisations, academia, charities/Non-Governmental Organisations and the public. The following snapshots show some examples of how successful delivery of this business plan will benefit MEDIN's users.

MEDIN WILL MEET THE NEEDS OF A MARINE EVIDENCE MANAGER FROM A GOVERNMENT AGENCY BY:

- Ensuring that marine data gathered at public expense are readily available for all who wish to access and use them, for commercial or non-commercial purposes, to ensure that our seas are managed sustainably.
- Archiving marine data for the long term to ensure they remain available to contribute to valuable time series for periodic assessments and identifying long-term trends.
- Implementing standards and protocols so that all marine data remain interoperable, whoever the data collector, so facilitating cost-effective use of the data by the 'blue economy'.

MEDIN WILL MEET THE NEEDS OF AN OFFSHORE DEVELOPER FROM THE ENERGY SECTOR BY:

- Providing ready access to the many types of in situ data required to support a range of activities from planning, engineering design, and model calibration and validation, through to environmental impact assessment and monitoring.
- Making it as easy as possible to find raw and processed data and providing a means by which higher-level data products can be created, maintained and disseminated, thus fuelling the marine information or 'blue' economy.
- Providing know-how and resources to ensure that the acquisition, management and archive of new data is undertaken to international best practice, so that it is consistent, comprehensible and ready for use (and re-use, should the data owner allow).

MEDIN WILL MEET THE NEEDS OF AN ACADEMIC RESEARCHER BY:

- Providing easy access to quality assured data that allows them to put their own research into a wider context.
- Allowing them to easily supplement their own data with data from industry, government agencies and the wider marine community, enhancing the scientific and societal value of their research.
- Providing a long-term, secure archive for any new data they collect that allows their data to be published, bringing transparency to their research and increasing the impact of their work.

MEDIN WILL MEET THE NEEDS OF A POLICY OFFICER FROM THE CHARITY SECTOR BY:

- Providing free and open access to raw and quality assured data to ensure the evidence behind decision making and policy are transparent.
- Ensuring that data are free at the point of delivery, to optimise use of charitable funds.
- Ensure access to the evidence base facilitating a cohesive network of marine protected areas.

MEDIN WILL MEET THE NEEDS OF GENERAL PUBLIC INTEREST GROUPS BY:

- Providing unprecedented access to marine datasets (over 220 TB) via the easy to use MEDIN portal. The search functionality allows quick locational searching for marine datasets from the local to national level.
- Providing links to the UK's unique network of long-term data archive centres, which allows access to fascinating resources, ranging from marine life to wave height, shipwrecks and much more.
- Providing access to data and key policy documents to allow informed commentary of the marine planning process.

MEDIN WILL MEET THE NEEDS OF ITS PARTNERS BY:

- Allowing membership to MEDIN working groups, so that its partners steer and influence MEDIN.
- Providing priority access to MEDIN's expert advice and training on marine data management.
- Providing an independent platform for knowledge exchange.
- Prioritising partner activity in promotional materials and in the online newsletter, [Marine Data News](#).

4. Delivery and funding

4.1 Delivery

Each year covered by this Business Plan, an operational work plan, including full breakdown of costs, detailed Key Performance Indicators (KPIs) and deliverables, will be developed for approval by the MEDIN Sponsors' Board. A series of activities associated with each High Level Objective have been identified and are included in Appendix B. These activities, which are subject to change depending on emerging initiatives, will form the basis of each year's operational plan. After three years, the activities will be reviewed and amended as required, to reflect the rapidly changing data infrastructure sector.

Over the past 10 years, MEDIN has established a series of seven **Work Streams (WS)**⁸ to help deliver its annual work plan. These work streams will continue as the mechanism for defining and delivering the operational plan. A **Core Team** of staff (3 Full Time Equivalent staff) based at the British Oceanographic Data Centre (BODC), part of the National Oceanography Centre, will coordinate the Work Streams. Several **Working Groups**, comprising MEDIN partners from across the marine community, will support the core team with key activities.

The **MEDIN Sponsors' Board** is the overall governing body for MEDIN. Membership comprises one representative per sponsoring organisation. This is the ultimate decision-making body, responsible for approving budgets and work plans. The Chair of this Board is appointed by MSCC. The Sponsors' Board is supported operationally by the **MEDIN Executive Team**, comprising: the MEDIN core team Programme Managers, four sponsor

⁸ WS1 - Network of Marine Data Archive Centres;

WS2 - Standards for Data and Metadata, Guidelines and Tools;

WS3 - Web Portal, Products and Services;

WS4 - International Awareness, Coordination and Data Delivery to Global Databases;

WS5 - Resources and Application Development;

WS6 - Communications and Outreach;

WS7 - Coordination, Planning and Management.

representatives and four thematic experts as agreed by the Sponsors' Board and the existing Executive Team.

4.2 Funding.

MEDIN is funded by a consortium of sponsors. In its start-up phase from 2008-2011 its budget was ~£760K per year. This decreased to ~£530K during 2011-2014 and further to ~£512K during 2014-2019, to reflect the financial situation at the time. This Business Plan is based on the allocation of extra resources compared to the last period, in order to deliver an ambitious programme of work, developing the network in addition to carrying out ongoing operational work.

An increase in funding is therefore required to deliver the full plan.

The detailed annual work programme will include a full breakdown of how the budget will be allocated. Should insufficient funding be available, this plan will be trimmed to reflect the available resources with a focus on core priorities, in agreement with the MEDIN Sponsors' Board (noting that these priorities may change over the duration of the plan).

Appendix A – SWOT analysis of MEDIN

After 10 years of operation and as MEDIN formulates a 5-year forward business plan, it is constructive to consider the network's Strengths, Weaknesses, Opportunities and Threats (SWOT) to inform the next 5 year plan. An internal appraisal (SWOT analysis) of MEDIN is summarised here.

Strengths Community Breadth of knowledge Decentralisation, diversity = resilience Resources (Data guidelines) Funding Model Impartiality Growth Training Visibility in some organisations Cross-UK input Expertise Findability (metadata) Senior engagement Global reach Domain specific Capacity development, expertise and experience	Weaknesses DAC sustainability (some DACs have long-term funding in place but others e.g. DASSH are more financially vulnerable). Gaps in coverage Decentralisation (between DACs – not enough integration) Lack of industry sponsorship Low academic involvement in some areas Hard to capture metrics on users of portal Spatial resolution of metadata Accessibility (2 clicks) Support for assessments (handling monitoring) Lack of visibility (in other organisations) Metrics (comparability – measure of re-use) Inconsistent engagement from senior managers across organisations
Opportunities Public profile (litter/Blue planet effect) growing willingness Growing Market EU Exit Support for assessments (lessons learned) Technology (Linked Open Data) Training Global Reach Technical barrier decrease Senior engagement (change data management culture) Interoperability (development of services) Community collaboration Machine learning Industry partnerships (Google) Data volume Gaps in coverage Visibility	Threats Decentralisation (everyone doing their own thing) Scottish Independence EU Exit Loss of sponsors Proliferation of portals Generic initiatives Technical barrier decrease Data volumes Technology development (rate of change) Community expectation (linked to tech & other initiatives) Machine learning Geospatial Commission funding/requirements Perception no longer a priority

Table 3: Summary of an internal assessment looking at MEDIN's Strengths, Weakness, Opportunities and Threats (SWOT analysis).

Appendix B - Activities:

The plan below breaks down each of MEDIN's overarching High Level Objectives (HLOs) into specific activities required to achieve them. The likelihood of completing these activities and the impact of completing these activities have been assessed using the criteria described in Appendix C. Activities below are ranked in the first instance based on their impact, and secondly on the likelihood of them being realised. Any low impact activities have already been removed from the list. Each activity links to one of the three strategic goals described in section 2.

HLO 1. Provide efficient access to arguably the most comprehensive coverage of high quality marine data held by UK organisations via the MEDIN portal and DAC network, thereby enabling wide-ranging and dynamic access to UK marine data, UK marine reference data, view and download services and other data products in line with user requirements.

	Activity	Impact	Likelihood	Goal
1.1	Manage and further develop the MEDIN discovery portal and its data services.	High	High	B
1.2	Increase visibility of the MEDIN portal to community through workshops; training; undergraduate/postgraduate courses; branding.	High	High	C
1.3	Identify user needs for finding data (e.g. policy, science, industry) and use as a basis for development to MEDIN portal and DAC network.	Medium	High	C
1.4	Determine and develop the MEDIN community role in reference data.	Medium	High	C
1.5	Proactively identify, target and engage with new suppliers to get their data on the MEDIN portal.	Medium	High	A
1.6	Deliver a comprehensive list of reference data through the MEDIN portal.	Medium	Medium	A
1.7	Develop the MEDIN portal and other MEDIN infrastructure and tools as necessary so that it can allow datasets with accompanying Web Map Services to be visualised.	Medium	Medium	B
1.8	Explore MEDIN guidance on a work flow for developing data products. ⁹	Medium	Medium	B

⁹ By working on real life use cases on stakeholders developing data products, MEDIN will gain insights into what is working well and what needs to be improved in terms of MEDIN's data delivery mechanisms. The activity is to work with stakeholders in identifying needs, and provide guidance on how best to utilise the

1.9	Provide a user forum to discuss new ideas/products/development.	Medium	Medium	C
1.10	Identify master datasets and deliver them through the MEDIN infrastructure, making all necessary changes as required.	Medium	Low	B
1.11	Add industry/country specific filtering mechanism to MEDIN portal.	Low	High	B

HLO 2. Facilitate frictionless, secure, cost effective, long-term archival of marine data within the MEDIN DAC network.

	Activity	Impact	Likelihood	Goal
2.1	Work with MEDIN partners and other UK organisations to adopt data guidelines to alleviate costs further down the line from reformatting, archiving etc.	High	High	A
2.2	Provide training and advice on data management planning, data archiving and publishing.	High	High	C
2.3	Provide training courses/workshops/standards/processes on MEDIN DAC network and structures.	High	High	C
2.4	Promote the use of a data clause in all contracts that involve the collection of marine environmental data.	High	Medium	A
2.5	Facilitate automated ingestion of data across the DACs.	High	Medium	A
2.6	Strengthen and formalise the triage process for archiving multidisciplinary datasets (develop workflow).	High	Medium	B
2.7	Include persistent identifiers for dataset submissions, enabling linked data usage.	High	Medium	B
2.8	Provide a clearing house/single submission point for data to be submitted to the DACs.	High	Low	A
2.9	Develop cost benefit exemplars to demonstrate advantages of use of DAC network/marine data.	Medium	High	C
2.10	Provide a data ingestion model, covering costs, timescales and capabilities for all DACs.	Medium	Low	B

MEDIN network. This in turn can be shared as lessons learned for the wider community to increasingly support other organisations wishing to utilise the MEDIN network of data.

HLO 3. Develop and provide an open access suite of easy to use, forward looking data management tools and standards (e.g. data guidelines, Application Programming Interface (API) service guidelines), fostering community sharing of expertise and code, to ensure more efficient handling of all marine data being generated now and in the future.

	Activity	Impact	Likelihood	Goal
3.1	Publish and promote new MEDIN data management tools and guidelines, proactively horizon scan for gaps, ensuring they are well explained to end users to ensure widespread adoption, targeting relevant stakeholders.	High	High	A
3.2	Facilitate semi-automated completion of MEDIN discovery metadata from MEDIN data guidelines.	High	Medium	B
3.3	Produce tools to support dynamic data sub-setting e.g. guideline format to NetCDF or vice versa.	High	Low	B
3.4	Manage existing data management tools and guidelines, ensuring they are well explained to end users to ensure widespread adoption.	Medium	High	A
3.5	MEDIN hosted code repository i.e. GitHub ¹⁰ .	Medium	High	B
3.6	Work with user fora (e.g. MEDIN partners meetings, marine science conferences, workshops) to ensure community buy in of new data management tools. ¹¹	Medium	Medium	C
3.7	Identify and develop new tools, sharing ideas with UK marine community.	Medium	Medium	C
3.8	Provide training and code fests to develop new ideas and products for the benefit of the marine community.	Medium	Medium	C

¹⁰ A code repository will allow for significant improvements in accessing versions of standards as well as supporting tools.

¹¹ This is closely linked with 3.1 where the fora of shared ideas is needed to effectively identify and develop new tools.

HLO 4. Lead and build a community of engaged users of marine data, fostering good data management practice.

	Activity	Impact	Likelihood	Goal
4.1	Provide user fora for marine data management to allow an exchange of ideas across the marine community (MEDIN partners meetings, marine science conferences, workshops).	High	High	C
4.2	Promote the data management services offered by MEDIN and the MEDIN DACs to the marine community using newsletters, website and social media.	Medium	High	C
4.3	Ensure high visibility of MEDIN across marine community by attending events, including sector specific events; talks; organisational visits.	Medium	High	C
4.4	Marketing – provide MEDIN branding for accreditation, data outputs and services.	Medium	High	C
4.5	Provide accreditation for data practitioners.	Medium	Medium	C

HLO 5. Facilitate domestic and international assessments of the marine environment through the storage, management and dissemination of UK monitoring data and provision of advice on retrieval and amalgamation of large, multidisciplinary datasets.

	Activity	Impact	Likelihood	Goal
5.1	Engage with national assessment leads to develop suitable pre-filters to be applied to the MEDIN portal to allow them to easily identify datasets that meet their assessment needs.	High	Medium	A
5.2	Liaise with UK Marine Monitoring and Assessment Strategy (UKMMAS) community to understand data needs and plans.	Medium	High	C

HLO 6. Support the UK marine sector to provide globally interoperable marine data services e.g. machine readable Application Programming Interface (API) standard for DACs and others.

	Activity	Impact	Likelihood	Goal
6.1	Promote global developments in interoperability to the UK marine community (acting as the hub).	High	High	C

6.2	Horizon scanning for new technology approaches e.g. schema.org, so that MEDIN is prepared to adapt to advances in technology ¹² .	High	High	B
6.3	Work with DACs to implement a DAC network API.	High	Medium	B
6.4	Develop Resource Description Framework (RDF) specifications for each MEDIN data guideline to make them more interoperable. ¹³	High	Medium	B
6.5	Define an API structure for all DACs to adopt.	High	Low	B
6.6	Lead a shared development project to implement an API structure across DACs.	High	Low	B
6.7	Supply MEDIN discovery metadata XML Schema Definition (XSD) for datasets and services.	Medium	High	B
6.8	Offer MEDIN infrastructure and training/helpdesk to global market.	Medium	Medium	C
6.9	Promote MEDIN as providing globally interoperable services.	Medium	Low	C

HLO7. Achieve full adoption of the MEDIN framework (DAC network, standards, metadata portal, data guidelines, data clause) across UK organisations (public and private sector), promoting open data principles to ensure widespread data accessibility.

	Activity	Impact	Likelihood	Goal
7.1	Increase number of organisations using MEDIN framework in operational data strategy.	High	High	A
7.2	Maintain and expand a comprehensive DAC network.	High	High	A
7.3	Maintain and expand comprehensive list of MEDIN data guidelines.	High	High	A
7.4	Promote adoption of MEDIN framework to Marine Science Coordination Committee (MSCC).	High	High	C
7.5	Maintain and increase the sponsorship of MEDIN.	High	Medium	A
7.6	Increase number of MEDIN partners.	Medium	High	A

¹² Enabling these cross cutting activities relating to RDF and schema.org means that MEDIN data becomes interoperable on a far more global level that enables interoperability well outside the traditional user community.

¹³ RDF is a standard model for data interchange on the web that enables more global merging of data, even where underlying schemas or standards differ. See <https://www.w3.org/2001/sw/wiki/RDF> for more details. By mapping MEDIN standards into this interchange model, the MEDIN standards become interoperable – addressing one of the key FAIR principles.

7.7	Educate organisations on adoption of MEDIN framework through training, workshops, publicity that demonstrate the benefit.	Medium	High	C
7.8	Publish data retention policies to help MEDIN partners and other UK organisations archive their data at the relevant MEDIN Data Archive Centre(s).	Medium	High	A

HLO 8. Lead the UK marine community in data management for new and emerging technologies, including autonomous and robotic systems.

	Activity	Impact	Likelihood	Goal
8.1	Demonstrate the relevance of MEDIN to new technology user communities at conferences and trade fairs.	High	Low	A
8.2	Develop capabilities for real time or near real time data management.	Medium	Medium	B
8.3	Develop data management tools for new/nascent technology as user needs emerge.	Medium	Low	A
8.4	Review implications of cloud adoption in the DAC network i.e. revise MEDIN accreditation should a DAC use cloud technology.	Low	Medium	B

HLO 9. Record and provide access to information on monitoring activities in the UK to support the UK Marine Monitoring and Assessment Strategy (UKMMAS) Community.

	Activity	Impact	Likelihood	Goal
9.1	Develop and maintain a data strategy for UKMMAS community.	High	High	A
9.2	Link data to monitoring programmes in UKDMOS.	Medium	High	B
9.3	Provide a mechanism for UKDMOS to be automatically populated from MEDIN metadata record (negates need to adopt UKDMOS separately and promotes MEDIN as the route in to UKDMOS).	Medium	Medium	A
9.4	Implement use of MIKADO to update metadata in UKDMOS (relevant if DACs increasingly archive time series data).	Medium	Medium	B

HLO 10. Enhance skills within the marine data community, providing training and education.

	Activity	Impact	Likelihood	Goal
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10.1	Deliver workshops on marine data management; metadata and data standards; MEDIN operations and new data infrastructure.	High	High	C
10.2	Link MEDIN training courses into undergraduate/postgraduate courses.	High	Medium	C
10.3	Link MEDIN training courses into professional training so that attending MEDIN courses can be recognised as Continuing Professional Development.	Medium	Medium	C

HLO 11. Develop a coordinated approach for users to retrieve marine data distributed throughout the MEDIN DAC network.

	Activity	Impact	Likelihood	Goal
11.1	All DACs to provide Open Geospatial Consortium (OGC) compliant view and download services.	High	High	B
11.2	Provide helpdesk support for users retrieving data.	High	High	C
11.3	Increase visibility to community through workshops, training, undergraduate/postgraduate course notes and branding.	High	High	C
11.4	Increase the proportion of directly available datasets (2 clicks to data).	High	Medium	B
11.5	Ensure frictionless recovery of data by streamlining processes and promoting adoption of APIs across DACs and help them implement it.	High	Low	A
11.6	Automate re-aggregation of multidisciplinary datasets from disparate DACs.	High	Low	B
11.7	Develop a DAC-wide approach to provenance tracking.	Medium	High	B
11.8	Working with end users to better understand their needs for retrieving data from across the DAC network and their user experiences e.g. targeted interviews/shadowing.	Medium	High	A

HLO 12. Integrate, coordinate and influence international and cross-domain data initiatives, promoting good data management practice.

	Activity	Impact	Likelihood	
12.1	Facilitate flow of data from the UK to international data centres and relevant projects.	High	High	B
12.2	Show the clear links between MEDIN/UK initiatives and international data initiatives to end users.	Medium	High	A
12.3	Monitor and review international standards and their alignment to the MEDIN discovery metadata standard and data guidelines.	Medium	High	B
12.4	Promote MEDIN infrastructure and training to a global audience, demonstrating the relevance of the MEDIN framework to marine communities overseas.	Medium	High	C

Appendix C - MEDIN activity likelihood and impact assessment criteria.

MEDIN have identified a series of activities that will allow its objectives to be achieved. The likelihood and impact of completing these activities have both been assessed using the criteria described in table 4. Where an activity is to maintain infrastructure, the impact is assessed in comparison to the infrastructure no longer being supported.

Value	Likelihood	Impact (assuming Activity is realised – should be independent of likelihood)
Low	A low likelihood activity is not likely to be realised within the business plan period. This may be down to lacking resource, technical capability, a lack of policy/drivers, or external factors preventing progress. Low likelihood can typically be mitigated only through changes in resource or priorities across the network.	Low impact does not necessarily imply that an activity is not worth carrying out. However, the benefits realised may either be relatively small, or only applicable to a relatively small part of the network/community. Some low impact activities may however open up or increase likelihood of higher impact activities in the longer run.
Medium	Medium likelihood is where there is either a recognised need and willingness, but limited resource, or alternatively, that the activity challenges/requirements are not fully resolved. Medium likelihood can usually be increased by prioritisation and agreement on final resolution of challenges across the network.	Medium impact implies a considerable improvement on the current situation for most or all of the community relating to the activity. Medium impact activities will realise benefits without major disruptions, allowing other activities to remain in business as usual.
High	High likelihood means that all capabilities and resources are available and part of the activity may already have been progressed or is in preparation. This is backed up with clear strategic or policy motivation for the activity. High likelihood should be monitored to ensure there are not competing priorities that reduces likelihood.	High impact activities will significantly change and improve the way in which the community/network operates. It will be manifested as large efficiency or capability gains, significant increase in community size, or other related metrics (e.g. more than 20% improvement?)

Table 4: Criteria used to identify the likelihood and impact of completing the activities defined in Appendix B.

Appendix D – Organisations consulted as part of the development of the MEDIN Business Plan 2019-24.

Representatives from the following organisations were involved in the consultations that led to the development of this plan.

ABPmer*	Marine Institute
AgriFood and Biosciences Institute**	Marine Management Organisation*
Aquatera	Marine Scotland*
Archaeology Data Service*	MARIS
Bangor University	Maritime and Coastguard Agency**
British Geological Survey*	Met Office**
British Oceanographic Data Centre*	Ministry of Defence*
Centre for Environment, Fisheries and Aquaculture Science**	National Museums Northern Ireland
Csalt	National Oceanography Centre*
Cyfoeth Naturiol Cymru / Natural Resources Wales**	Natural Environment Research Council**
DASSH*	Newcastle University
Defence Science and Technology Laboratory	OceanWise**
Department for Environment, Food and Rural Affairs**	Orsted
Department of Agriculture, Environment and Rural Affairs, Northern Ireland**	Peel Ports
Department of Business, Energy and Industrial Strategy**	Royal Commission on the Ancient and Historical Monuments of Wales*
Environment Agency*	Scottish Association for Marine Science*
EON	Scottish Government**
EPCC	Scottish Natural Heritage*
Hartley Anderson Ltd.	The Crown Estate**
Historic Environment Scotland*	UK Hydrographic Office**
HR Wallingford*	Unicomarine
ITOPF	University College London
Joint Nature Conservation Committee**	University of East Anglia
Kent Wildlife	Wessex Archaeology*
Lancashire Wildlife Trust	Wildfowl & Wetlands Trust
Marine Biological Association*	York University

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