Marine Environmental Data and Information Network (MEDIN) - Business Plan for 2014-2019, the National Framework for Marine Data

1 Introduction

MEDIN is a collaborative and open partnership, established in April 2008, working to improve the management of marine data and information, and provide better access to the UK's marine data resources. Sponsors include government departments, research councils, environmental and conservation agencies, trading funds and commercial organisations. It operates under the auspices of, and reports to, the Marine Science Coordination Committee (MSCC), which has tasked MEDIN to develop a Marine Data and Information Strategy for the UK[1]. In addition, MEDIN is coordinating the UK Marine Sector response to the EC INSPIRE directive, for sharing spatial environmental information across Europe, and to data.gov.uk, the UK government's portal for public data.

This document presents the MEDIN Business Plan for 2014-2019. It describes previous work, summarises the main recommendations from the recent independent review of MEDIN and outlines a five-year programme to fully consolidate MEDIN as the national framework for the management of UK marine data and information. This framework will provide core capability in support of UK Government and devolved administrations' marine objectives and will act for the benefit of the whole marine data and information community, including government bodies, research organisations, the private sector and the general public.

2 MEDIN Background

In January 2005, an expert group was established by the Inter-Agency Committee on Marine Science and Technology (IACMST) to "deliver proposals for increased cohesion, collaboration and harmonisation of data and information issues across the highly fragmented marine environmental community in the UK". This expert group[2] recommended the creation of the Marine Data and Information Partnership (MDIP) alongside the pre-existing Marine Environmental Data Action Group (MEDAG).

With limited funding over a period of two and a half years MDIP developed a pilot framework and a proposal to the Marine Science Coordination Committee (MSCC) to merge MDIP and MEDAG and establish the Marine Environmental Data and Information Network (MEDIN) as a fully funded long-term programme. Thus MEDIN was established in 2008, as a sub-group of MSCC and with sponsorship funding from a range of key organisations, with the objective to "improve access to, and management of, UK marine data and information". The period since then can be divided into two three-year phases, an initial development phase (2008-11) during which the MEDIN framework was developed and established, and the current transition to operations phase (2011-14). The challenge for the next phase (2014-19), addressed by this Business Plan, is to widen the adoption of MEDIN so that it becomes the accepted and widely used national framework for marine data management.

[1] " A Marine Data and Information Strategy for the UK – A MEDIN Discussion Paper for the MSCC", March 2011

[2] "Marine Data and Information Partnership (MDIP): A Proposal", IACMST Expert Panel, January 2005

3 What Has MEDIN Achieved?

3.1 Benefits and Resources Delivered

The MEDIN framework is now fully operational. Metrics are not yet available to provide a measure of the uptake of the MEDIN resources, but a baseline has been established against which future uptake can be measured. It may not be as easy to measure the financial benefits that MEDIN partners and many others in the UK marine sector enjoy: the costs of discovering, accessing and processing data are often hidden within project budgets. However, a number of studies have shown that significant efficiency gains may be expected to follow from improved data and information management and access e.g.

- A report for INSPIRE[3] identified a range of "Return On Investment" on actions to improve data interoperability centred on 14:1.
- An economic evaluation of the Economic and Social Data Service (ESDS) demonstrated that for each £1 currently invested in data and infrastructure, the service returns £5.40 in net economic value to users and other stakeholders.[4]
- A Research and Information Network study[5] based on questionnaire feedback from users found that "Data centres contribute to research efficiency by making it quicker, easier and cheaper to access research data."

None of these examples specifically considered marine data, and it could be argued that factors particular to marine data, such as the sparseness of available data and the expense of data collection, could push up the anticipated benefits even further.

Some examples of the uptake of MEDIN resources are given below:

The **MEDIN Discovery Portal** provides a search interface to metadata descriptions of over 6000 datasets, and is moving towards achieving the aim of becoming the main central search point for all UK Marine Data. The portal currently receives 12,500 visits per year.

The **MEDIN Discovery Metadata Standard** has been widely accepted as the industry norm, and was used by the UK Location Programme as a basis for developing a more generic standard for all UK Spatial Data. There have been over 350 registrations and downloads for the MEDIN metadata tools. MEDIN provides a metadata helpdesk and runs an ongoing series of well-subscribed standards workshops. MEDIN metadata and data standards have been adopted wholesale by The Crown Estate as recommended practice for the offshore wind Round 3 developers.

The **Data Archive Centre (DAC) Network** is becoming recognised as a cost-effective option for archiving data for secure long-term storage and access, with the confidence that best practices for data management are employed. In 2012-13 695 new datasets were archived within the MEDIN DAC network and over 200,000 individual data requests were made to the DAC Network in the same period.

MEDIN's role in providing **expert advice** is proving important to government, through MEDIN's support on European Working groups such as the Working Group for Data, Information and Knowledge Exchange, and the Marine Observation and Data Expert Group (which provides oversight to EDMODnet[6]).

[3] MOTIIVE Report on Cost Benefit Analyses, Roger Longhorn, 24/05/2007
[4] Economic Impact Evaluation of the Economic and Social Data Service, Charles Beagrie, 2012, http://www.esrc.ac.uk/impacts-and-findings/impact-assessment/economic-impact-evaluation.aspx
[5] "Data centres: their use, value and impact", A Research information network report, September 2011, available at http://www.jisc.ac.uk/publications/generalpublications/2011/09/datacentres.aspx
[6] EMODNET – European Marine Observation and Data Network

3.2 MEDIN support in a developing policy environment

MEDIN supports UK marine management policy in the following ways (see Annex 1 for a table of relevant policies and key dates):

- MEDIN effectively facilitates streamlined access to data collected for Marine Strategy Framework Directive (MSFD) monitoring programmes, and to the marine data for use in future Marine Assessments, including those in relation to the MSFD.
- MEDIN is establishing the necessary connections with data infrastructure at the European level, and supports making available data relating to the UK implementation of EU Marine Directives to the European Commission, European Environment Agency and OSPAR[7].
- MEDIN provides developers and regulators with the key point of access to data from statutory agencies and NDPB[8]s via the DACs.

In terms of the wider Government data policy landscape, MEDIN also provides support, input and leadership for the marine sector:

- MEDIN is working (in cooperation with data.gov.uk) to provide all the necessary guidance and protocols for marine data to ensure marine data meets all required standards e.g. INSPIRE.
- MEDIN is working with devolved functions such as the Scottish Spatial Data Infrastructure[9] to ensure minimisation of duplication between initiatives.
- Although MEDIN is established as the UK marine data framework, it is also important that it ensures coordination and links with relevant developments from key European and International bodies (e.g., OSPAR, ICES[10], IOC[11])
- The MEDIN DAC network provides all the necessary methods of archiving marine data, in particular to support MSFD.
- MEDIN works with partners to establish regular data flows into and out of DACs.

Government policy with regard to public data has developed significantly since MEDIN was created in 2008, in particular in terms of implementing the agenda for open access to data and establishing the data.gov.uk programme.

data.gov.uk[12] forms part of the implementation of the UK Government's "Transparency Agenda", bringing together (access to) public data in one searchable website. The data.gov.uk portal has been adopted as the route to provide the data search, view and download capabilities required for INSPIRE.

MEDIN is working closely with data.gov.uk as the coordinating point for marine data, providing the necessary underlying management structure for marine data including, via the DAC network, data view and download services.

[7] OSPAR – Oslo Paris Convention (www.ospar.org)
[8] NDPB – Non-Departmental Public Body
[9] http://scotgovsdi.edina.ac.uk/srv/en/main.home
[10] ICES – International Council for the Exploration of the Sea
[11] IOC – Intergovernmental Oceanographic Commission
[12] http://www.data.gov.uk/

4 MEDIN Review – Achievements and Recommendations

In 2013 DEFRA and Marine Scotland initiated an independent review of MEDIN to consider progress towards the original objectives of MEDIN and to assess whether those objectives remain fit for purpose, in the light of national priorities and international developments. These questions were posed to a wide range of MEDIN Stakeholders, and an Expert Team was assembled to review their answers and ask further questions of the MEDIN team and Stakeholders and provide recommendations.

4.1 Achievements

The Review Panel, considering the progress made by MEDIN on all its objectives, firmly concluded that the MEDIN initiative has been, and continues to be, a sound investment in UK marine data infrastructure.
It therefore invited the MEDIN sponsors to continue their support of MEDIN, and urged the sponsors to provide sufficient funding in order that MEDIN will be able to deliver the benefits of its unified UK approach to marine data access and management. In particular, the Review Panel noted with satisfaction that:

- MEDIN is making data more widely available in the UK marine domain through enabling their discovery;
- MEDIN is highlighting and facilitating data management issues and standards and the related resources within individual organisations and that this has led to improvement in practices;
- The distributed structure with DACs, all linked to a central portal with a solid management organisation maintaining it, is a good approach to dealing with diverse organisations and data management cultures.
- MEDIN creates a (positive) pressure to conform to data standards.

4.2 Key Recommendations:

The Review Panel indicated the following Key Recommendations should be seen as a priority for the future development of MEDIN. They are numbered here and referenced in the Work Stream Work Programmes in Section 6:

KR1: To provide direct access to data from the MEDIN Data Discovery portal. This would substantially enhance the engagement of users in MEDIN.

KR2: Sponsoring organisations and their agencies need to ensure that MEDIN and its objectives are recognized as an integral part of their operational strategy. This will ensure that MEDIN is engaged and supported in a sustained way as an integral part of the UK marine data system.

KR3: To develop a stronger focus on making datasets, services and products (even if 3rd party) available through the MEDIN homepage and portal at least as metadata records. This would be of substantial benefit for users and be of benefit for both product providers and MEDIN itself.

KR4: To develop specific cost benefit examples of the value of MEDIN. These would provide clear evidence of the benefit of the MEDIN data infrastructure and clarity on the range of user requirements.

The more detailed list of recommendations is included in Annex 2. It was also recommended that MSCC should consider including the Chair of MEDIN as a member of MSCC as a dedicated independent representative.

5 MEDIN Objectives for 2014-19

The objective for the 2014-19 period is to consolidate the adoption of MEDIN across the UK as the national framework for marine data management, so that organisations across all marine sectors will be making use of MEDIN resources and experiencing the benefits of vastly increased re-use of marine data.

5.1 High Level Objectives

Based on the outcomes of the review, and further discussions with key partners, the following high level objectives are proposed for MEDIN for 2014-19. They are numbered here and referenced in the work stream work programmes in Section 6. We have also identified the major contributing work streams (WS1: DACs, WS2: Standards, WS3: Portal, WS4: International Links, WS5: Resources and Applications, WS6: Communications, WS7: Management)

HLO1 Ensure the MEDIN framework (DAC network, standards, metadata portal) is adopted across the UK within organisations' (public and private sector) operational data strategy. WS1, WS2, WS3

HLO2 Establish a coordinated approach for archiving and retrieving marine data within the MEDIN DAC network with support for users. WS1, WS2

HLO3 Working closely with data.gov.uk, support the UK marine sector in meeting INSPIRE obligations to publish metadata and provide compliant data view and download services for all public data covered by the directive. WS1, WS2, WS4

HLO4 Ensure that the MEDIN discovery portal contains the most comprehensive coverage of marine data held by UK organisations, 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. WS1, WS3

HLO5 Store, manage and make available UK monitoring data for use in MSFD assessment, according to the agreed approach. WS1, WS3, WS4

HLO6 Provide access to defined key data services and priority common data products [13] WS3, WS5

HLO7 Promote the re-use of data resulting in a sustained increase in the number of successfully furnished requests for archived data from the public, government and industry. WS1

HLO8 Develop and provide a suite of easy to use data guidelines to be adopted across the marine sector, including MSCC members as a standard condition of funding for data collection. WS2

HLO9 Provide tangible case studies demonstrating the value of using the MEDIN framework when locating, accessing and retrieving data for projects. WS7

HLO10 Raise the profile of MEDIN in the academic and private sectors, attracting further members to the network and widening the sources of data. WS6

[13] To be reviewed specifically by Sponsors, with supporting paper to be given at Sponsors Board.

5.2 Challenges

These are challenging objectives, and in MEDIN's paper to the Review Team[14] some potential barriers to progress were identified.

- Direct access to data – Although this is a clear user requirement, this requires significant development within the DACs, which has to be funded internally by the DAC host organisation. Nonetheless all DACs are committed to provide data view and download services by the relevant INSPIRE deadlines.
- Adoption of standards – The adoption of standards is key to the achievement of the "gather once, use many times" principle. However, some organisations have found it difficult to adopt MEDIN standards, arguing that the extra time needed would impose too high an overhead. The importance of establishing the use of common standards was highlighted by a recent EA and DASSH study, which investigated whether datasets held at DASSH could be re-used for Water Framework Directive (WFD) Reporting. This study concluded that data were not useable for WFD unless specific standards applied. A similar situation applies with regard to seabed survey data and the need for IHO[15] standards to be applied if these data are to be useful for the MCA and UKHO.
- Funding of data archiving into DACs – Once new datasets are archived in a DAC the ongoing costs for management are borne by internal DAC resources and MEDIN support. However, the initial archiving process for new data can require significant staff effort and these ad-hoc "one-off" costs cannot be met from internal DAC resources. MEDIN recommends that such costs, typically around 1% of the cost of collection[16], should be supported by the agency funding the original data collection. This is the model adopted by the Natural Environment Research Council, but there is a need for all agencies/organisations funding data collection to recognize this fact and to build funding for data management into their planning.

5.3 Approach

The MEDIN review endorsed the MEDIN approach, in particular commenting that *"the distributed structure with DACs, all linked to a central portal with a solid management organisation maintaining it, is a good approach to dealing with diverse organisations and data management cultures."*
In addition the review noted that: *"…the collective approach to funding is excellent for achieving shared buy-in, but the relatively short time horizon of (project type) funding may not be optimal when dealing with longer term policy objectives, for example, in relation to MSFD or INSPIRE. A more coherent multi–annual plan towards fulfilling policy objectives would be facilitated by a corresponding funding certainty."*

Thus MEDIN proposes to maintain the existing management structure, with the Sponsors' Board as the overall decision making body, the Executive Team to make within year management decisions, and the current arrangement of seven work streams to be continued. However, it invites sponsors to consider the review statement about funding, in particular the need for more funding certainty over the longer term, to allow MEDIN to address objectives over a longer time scale.

[14] "MEDIN Review and Forward Look " – MEDIN Executive Team, November 2012
[15] IHO – International Hydrographic Organisation
[16] This proportion varies between datasets depending on the complexity of the data, and the degree of data preparation carried out by the data provider.

6 Work Plan for 2014-19

Below we list the outline work plans for 2014-19 for each of the seven MEDIN work streams, with an initial summary of the funding requirements.

6.1 Funding

The total cost of MEDIN activities in 2014-19, will be £519,000 per annum as follows:

Total funding required per work stream is:

WS1: DACs	£123,100
WS2: Standards	£76,500
WS3: Web Portal and Services	£91,500
WS4: International Coordination	£19,500
WS5: Resources and Applications	£44,400
WS6: Communications	£42,000
WS7: Management	£122,000
Total	**£519,000**

Support for this programme anticipates continued funding from sponsors as given in the table below:

Sponsor Name	Funding
DEFRA: Department of Environment Food and Rural Affairs	£175,000
NERC: Natural Environment Research Council	£131,000
Scottish Government	£100,000
DECC: Department of Energy and Climate Change	£30,000
Cyfoeth Naturiol Cymru / Natural Resources Wales	£14,000
Marine Management Organisation	£14,000
Met. Office	£14,000
The Crown Estate	£7,000
Maritime and Coastguard Agency	£7,000
UK Hydrographic Office	£7,000
HR Wallingford	£5,000
The Joint Nature Conservation Committee	£5,000
Department of the Environment, Northern Ireland / Agri-Food Biosciences Institute	£5,000
Oceanwise	£5,000
TOTAL	**£519,000**

Table 1 Funding requests MEDIN Sponsors for 2014-19

Regrettably, the Environment Agency, which used to sponsor MEDIN at the level of £14,000 per annum, has advised that it will not be able to continue this sponsorship in the near future.

Allocations within work streams are indicated below. These are definitive for the first year of the work plan (2014-15) but may be revised in subsequent years.

To provide traceability we have indicated which work streams contribute to which High Level Objectives, and also indicated with specific activities contribute directly to the **K**ey **R**ecommendations (**KR***M*- Section 4.2), or **D**etailed **R**ecommendations (**DR***N* -Annex 2)

6.2 WS1 Comprehensive Network of Data Archive Centres

6.2.1 Introduction:

MEDIN has established an operational network of linked, accredited, marine Data Archive Centres (DAC) to provide a national framework of secure long-term storage for marine data.

The DAC network provides the national marine data management framework for MEDIN.

The required capabilities of DACs within the MEDIN framework are:

- To ensure the secure, long term, curation of key marine datasets, according to best practice and to relevant national and international standards.
- To make available clear, searchable information on their data holdings, by the generation and publication of metadata on the MEDIN portal.
- To provide view and download services for datasets covered by INSPIRE
- To form the first point of call of expertise for the management of marine data.

The **Data Archive Centre network** is recognised as a cost-effective option for archiving data for secure long-term storage and access, with the confidence that best practices for data management are employed. In 2012-13 695 new datasets were archived within the MEDIN DAC network and over 200,000 individual data requests were made to the DAC network in the same period

6.2.2 Objectives for 2014-19:

The DAC network makes the major contribution to the first three High Level Objectives:

HLO1 The MEDIN framework (DAC network, standards, metadata portal) adopted across the UK within organisations' (public and private sector) operational data strategy.

HLO2 Establish a coordinated approach for archiving and retrieving marine data within the MEDIN DAC network with support for users.

HLO3 Working closely with data.gov.uk, support the UK marine sector in meeting INSPIRE obligations to publish metadata and provide compliant data view and download services for all public data covered by the directive.

The DAC network also makes a direct contribution to a further three High Level Objectives:

HLO4 Ensure that the MEDIN discovery portal contains the most comprehensive coverage of marine data held by UK organisations, 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

HLO5 Store, manage and make available UK monitoring data for use in MSFD Assessment, according to the agreed approach.

HLO7 Promote the re-use of data resulting in a sustained increase in the number of successfully furnished requests for archived data from the public, government and industry. WS1

The DAC network contribution is key to the overall delivery of MEDIN and at the heart of its development. In 5 years time the MEDIN DAC network will be the automatic place to lodge, archive and access data for the UK and north-west Europe. The DACs will provide a secure long-term archive for marine data across all major themes and INSPIRE compliant view and download services easily accessed through search results on the MEDIN Discovery Portal.

The DAC Network will be in a position to provide data and analysis to Government on key deliverables, including in particular the European Marine Strategy Framework Directive, and to support compliance with the INSPIRE directive through close cooperation and linkage with data.gov.uk.

6.2.3 Outline Work Programme

1) Operational DAC networks (Core Team 15 days, DAC support £80,000, plus share of £17,000 funds for external contracting)

Ongoing Tasks:

Archiving

a. DAC network continue to receive and archive datasets from established suppliers, maintain 2012 archiving rate.

b. National framework. Building a coordinated approach to data archiving, including a central initial point of enquiry and a data archiving helpdesk (link with WS3), and improved guidance for data submission (**DR 17**).

Data Dissemination

a. Continue to disseminate archived datasets through existing capabilities at DAC level and linked to the Portal.

b. MEDIN helpdesk support for data access enquiries.

Reporting and DAC Network Management

a. DAC Annual Reporting (which includes monitoring of data archiving and dissemination).

b. Establish periodic audit of DACS, based on analysis of annual reports (**DR 18.**)

c. Establishing long-term sustainability for DAC network.

d. Continue to promote data archive funding model at MSCC level, including the need to allocate costs of archiving before data collection is initiated.

Developments

Archiving

a. Best practice shared through the DAC network.

b. Increase submission of data and archiving from new suppliers/third parties.

Data Dissemination

a. DACS to establish and release INSPIRE compliant view and download services, directly linked to portal metadata records (**KR1, DR1, DR6**).

b. Encourage wider re-use of data held within MEDIN DACs by holding events where the community is encouraged to access the data and build products.

c. Liaise and publish data for integration with existing/and emerging tools and initiatives (e.g. EMECO[17] and EMODNET[18]) (Link with WS4).

Reporting and DAC Network Management

a. Programme of accreditation renewals of existing DACS.

b. DAC development. Working with existing DACS on developing roles/services.

2) Consolidation of DAC Network Coverage (Core Team 20 days, plus share of £17,000 funds for external contracting)

Ongoing tasks:

a. Complete the FishDAC to incorporate Northern Ireland and inshore data.

b. Complete the Historic Environment DAC with RCAHMS[19] (first), RCAHMW[19] and English Heritage.

[17] EMECO – European Marine Ecosystem Observatory: www.emecodata.net

[18] EMODNET - European Marine Observation and Data Network

[19] RCAHMS/W – Royal Commission on Ancient and Historic Monuments Scotland / Wales

c. Publish advice/recommendations on other areas – litter data; socio-economic data; noise data.

Development

a. Meeting MSFD requirements:
- Identify MSFD datasets to be managed within DAC network.
- Put in place data access arrangements as agreed with EC / UKMMAS.
- Consider requirements for data themes not currently covered (noise, litter, socio-economic data).

b. Archiving new major datasets, which are expected to include: Marine conservation zone site survey data, Scottish MPA data, and renewables round 3 site Survey data currently held by the Crown Estate. Seek external funding where possible.

c. Review of historical data (i.e. uncaptured data outside of the DAC Network) against key delivery mechanisms.

d. Seek additional funding for programme of key data capture.

3) Coordination with other Work Streams (Core Team 5 days)

Ongoing Tasks

a. Standards: Ensure DACS meet INSPIRE and international compliance, and deliver clear UK data standards for the collection, collation and archive of marine environmental data.

b. Portal: Work with MEDIN portal and other delivery mechanisms to maximize data use, providing centralized services.

c. Resources and Applications: Assist in establishing user requirements.

6.2.4 Funding

Note that all indicated funding allocations are per annum.

£123,100 is provisionally allocated to this work stream, as follows:

Core team staff costs (40 days):	£24,100
Travel and subsistence	£2,000
DAC funding for coordination costs	£80,000
Additional funds for contracted work:	£17,000
Total	*£123,100*

Note that this funding does not include the costs for archiving significant new datasets, which is expected to include the MCZ and Scottish MPA survey data, and renewable Round 3 data held by The Crown Estate.

6.3 WS2 Standards for Data and Metadata

6.3.1 Introduction

One of MEDINs main aims is to make it easier and cheaper to share marine data. MEDIN achieves this by:

- allowing users to "discover" what marine data are already available and how they can access them.
- ensuring that data they acquire through MEDIN consistently contains the information that is needed to make them useful.

work stream 2 plays a vital role in both these through the discovery metadata standard and data guidelines. Moreover, it provides a means for MEDIN partners to meet their obligations to European and UK legislation for making data accessible (INSPIRE and data.gov).

6.3.2 Objectives for 2014-19

It is envisaged that by 2019 there will be widespread adoption of the MEDIN data guidelines across all sectors involved with the UK marine environment, in addition to the already widely implemented MEDIN discovery metadata standard.

The standards work has direct links to 3 of the High Level Objectives:

> **HLO1** The MEDIN framework (DAC network, standards, metadata portal) adopted across the UK as an integral part of organisations' (public and private sector) operational data strategy.
>
> **HLO3** Working closely with data.gov.uk, support the UK marine sector in meeting INSPIRE obligations to publish metadata and provide compliant data view and download services for all public data covered by the directive.
>
> **HLO8** Provide and promote a suite of easy to use data guidelines to be adopted by MSCC members as a standard condition of funding for data collection.

WS2 will also contribute to achieving Objective 2: Establish a coordinated approach for archiving and retrieving marine data within the MEDIN DAC network with support for users, Objective 4: the discovery portal, by maintaining the discovery metadata standard and associated keyword lists; Objective 6: providing access to key data services and data products, by establishing/recommending relevant standards Objective 10: Increased profile of MEDIN across the academic and private sectors, by encouraging the adoption of MEDIN standards.

6.3.3 Outline Work Programme

80% of funding for this work stream will be allocated to ensuring that these metadata and data standards and their tools are maintained and get into common use and 20% will be allocated to developing new initiatives, detailed below.

1) MEDIN discovery metadata standard (Core Team 35 days, Contract funding £15,000)
The MEDIN discovery metadata standard complies with both GEMINI 2.2 and INSPIRE and is the accepted standard for marine datasets in the UK. Although the standard already allows for the creation of metadata for services and products, it now needs to be tailored to ensure the content is appropriate for these derivatives of the underlying datasets. It is important for MEDIN to encompass relevant services and products as these are the forms preferred by decision makers. Gaps in the coverage of the MEDIN discovery metadata standard will continue to be identified and targeted. The following objectives have been identified:

Ongoing Tasks

a. Ensure the MEDIN discovery metadata standard is maintained to be consistent with relevant national, European and global standards (e.g INSPIRE & ISO); (**DR6**)
b. Ensure that the MEDIN metadata creation tools keep pace with changes in the MEDIN and other relevant metadata standards and meet user expectations for usability and operation
c. Work with the MEDIN DACs and sponsors to ensure all that all their relevant services/non-commercial products have MEDIN discovery metadata.
d. Ensure the MEDIN discovery metadata standard captures all relevant information for services (e.g. INSPIRE compliant data view and download website) and products (e.g. data collated from many sources), including the facility to link the service/product discovery metadata to the associated underlying raw datasets.
e. Provide ongoing assistance for organisations creating MEDIN metadata via workshops and MEDIN metadata helpdesk.

Development

a. Increase engagement with providers of GIS software to include facilities for creating MEDIN discovery metadata
b. Create links with satellite data providers in order to ensure MEDIN discovery metadata for marine satellite data is created so that this type of valuable marine data can be discovered on the MEDIN portal.

2) Data Guidelines (Core Team 40 days, Contract funding £18,000)

MEDIN has developed over 20 data guidelines specific to different data collection methods to ensure marine data are provided with the relevant information to make them useable by others. The focus now moves to ensuring the usability and widespread uptake of the guidelines within the marine community. During the next five years it will be important to increase to as close to 100% as possible the uptake of the guidelines within all sectors of the marine community (academic, industry, governmental, conservation, charity). There is also scope to create additional guidelines as necessary.

Ongoing Tasks

a. Work with contracting organisations to promote uptake of MEDIN data guidelines. Supply template data clause and monitor how many contracts issued by MEDIN sponsors contain the data clause. (**DR15**)
b. Provide worked examples of the data guidelines to illustrate compliance.
c. Explore the options for recommending data collection standards for different data types and include these in the MEDIN data guidelines where appropriate.
d. Provide assistance to organisations using the MEDIN data guidelines via workshops.

Development

a. Develop new data guidelines as required e.g. for geotechnical (e.g. borehole) data, bird surveys, wind measurements. If international guidelines already exist for such data types, provide links. (**DR16**)
b. Provide a mechanism to create a MEDIN discovery metadata record from a MEDIN data guideline.
c. Guidance to be provided on (i) what information should be stored when collating data into derived products and (ii) consistent methods for recording spatial confidence and accuracy in such products.

d. In order to ensure long term uptake of data guidelines it is essential that the next generation of marine scientists are educated in best practice techniques for managing the data they collect. WS2 will work with the communications group to develop resources based on the data guidelines.

6.3.4 Funding

£76,500 is provisionally allocated to this work stream:

Core team staff costs (75 days):	£39,500
Travel and subsistence (including workshop costs)	£4,000
Funds for contracted work:	£33,000
Total	*£76,500*

The £33,000 per annum for contracted work will include support for tools and standards maintenance from MEDIN Partners, support at standards workshops, and the development and promotion of new standards as required.

6.4 WS3 Web Portal, Products and Services

6.4.1 Introduction

Marine data in the UK are collected and archived by a diverse group of organisations. Knowing about 'where' and 'how to' access these data and the derived products from these data is essential for its reuse. The MEDIN discovery metadata portal provides a single access point from which to find out about marine data from all the different UK organisations across the many marine areas from marine archaeology to seismic survey data. The MEDIN portal went online in June 2010 and since then the number of metadata records of marine datasets and products has steadily increased to 6000. The number is likely to increase further but not at the same rate as to date (as we get closer to complete coverage). The flow of metadata to the portal has also been set up for most metadata providers.

6.4.2 Objectives for 2014-19

The portal work makes a direct contribution to four of the High Level Objectives:

HLO1 The MEDIN framework (DAC network, standards, metadata portal) adopted across the UK within organisations' (public and private sector) operational data strategy.

HLO4 Ensure that the MEDIN discovery portal contains the most comprehensive coverage of marine data held by UK organisations, 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

HLO5 Store, manage and make available UK monitoring data for use in MSFD assessment(s), according to the agreed approach. *UKDMOS is expected to play a central role in supporting MSFD implementation.*

HLO6 MEDIN to provide access to defined key data services and priority common data products. *The portal will provide the access point for services and products*

In addition the Portal will support achievement of Objective 10: Raise the profile of MEDIN in the academic and private sectors, attracting further members to the network and widening the sources of data; and Objective 2: Establish a coordinated approach for archiving and retrieving marine data within the MEDIN DAC network with support for users, by again providing the central point for the initial search and hence links to datasets.

For the next five years, the key aim will be to maintain the portal as the 'go to' site for marine data. This will mean providing a better data discovery service than we currently have. Feedback suggests that the user community and especially expert users need to be engaged in helping to improve the search facilities and display of results on the portal web pages. Currently the pages are seen as non intuitive and improvements in functionality are needed to attract more users.

Critical to an improved data discovery service will also be reducing the effort required by the user to reach the data itself. Presently, the link on the metadata records page returns a homepage for a different site which then requires further searching on the part of the user. A direct URL to the data from the metadata will vastly improve the user experience.

The United Kingdom Directory of the Marine Observing Systems (UKDMOS) provides a tool for searching UK monitoring programmes. This tool was built to coordinate monitoring effort across the different UK organisations. Over the next five years, this will be a key resource to maintain and upgrade as monitoring programmes and the data from those programmes are required for assessments under the Marine Strategy Framework Directive (MSFD).

To date, we have supported MEDIN partners in creation of metadata to describe their datasets for INSPIRE compliance. Metadata for new and remaining datasets will continue to be added to the MEDIN portal over the next five year period and it will be important to continue to provide support for this activity. The system that will shortly be in place to transfer metadata through to data.gov.uk will continue to be supported also. Creation of service metadata is mandated by INSPIRE and the portal will require development to accommodate this different type of metadata.

By 2019, MEDIN WS 3 plans:

1. To have positioned the MEDIN portal as the primary online resource for users wanting marine data in the UK (**DR8**)
2. To be instrumental in providing support through MEDIN tools for MSFD reporting
3. To provide support to partners in meeting their INSPIRE obligations (**DR6**)

6.4.3 Outline Work Programme

The major tasks for work stream 3, in 2014-19 are listed below:

MEDIN Discovery Portal (Core Team 58 days, Contract funding £18,800)
Ongoing Tasks

a. Portal maintenance (bug fixing, error tracking)
b. Routine metadata entry, check portal metadata records for 'dirty' data
c. IT support and maintenance for the MEDIN portal at BODC and for the Discovery Web Service at the Science and Technology Facilities Council (STFC)

Developments

a. Consultation to gauge end user opinion on how the portal should be improved
b. IT Development of the portal pages in response to user needs
c. Embed new direct URLs into resource locator fields (**KR1, DR2**)
d. Incorporation of service and product metadata (**KR3, DR14**)

UKDMOS (Core Team 55 days, Contract funding £2,500)
Ongoing Tasks

a. Routine updates and checks of monitoring programme information in UKDMOS
b. UKDMOS portal maintenance by the Marine Information Service (MARIS)

Developments

a. Development of the UKDMOS database and web pages to support MSFD

Support for Metadata Generation and Publication (Core Team 10 days, Contract funding £10,000)
Ongoing Tasks

a. Continued 'metadata helpline' at DASSH
b. Transfer of metadata where applicable to data.gov for INSPIRE compliance

Other MEDIN Supported Marine Catalogues and Databases (Core Team 15 days)

a. Continue to update, expand and maintain the existing web-based marine catalogues and databases, and consideration how to better integrate these catalogues:
   UK Directory of Marine Observing Systems
   UK Tide and sea level catalogue
   UK Wave data catalogue
   UK part of European Directory of Marine Environmental Datasets
   Cruise Summary Database
   Foreign Cruises in UK Waters

6.4.4 Funding

£91,500 is provisionally allocated this work stream:

Core team staff costs (138 days):	£59,700
Travel and subsistence	£2,000
IT operational costs (detailed below):	£29,800
Total	*£91,500*

IT Operational costs include:

Portal hosting and IT support at BODC estimated as yet to be negotiated	£3,000 pa
Discovery web service (STFC)	£11,000 pa
UKDMOS portal maintenance (MARIS)	£1,500 pa
'Metadata helpline' at DASSH	£10,000 pa
Portal mirroring by GeoData	£800 pa
Contingency	£3,500 pa

In addition, future planning should be made for the following one-off *estimated* development costs:

Portal redevelopment (in response to user consultation)	estimated £20,000
Development of the UKDMOS database and web pages	estimated £10,000

6.5 WS4 International Awareness, Co-ordination and Delivery to Global Databases

6.5.1 Introduction

WS4 ensures that UK developments are linked in and consistent with EU and other international initiatives, and that obligations to provide data to global databases are met.

6.5.2 WS4 Objectives and Work Programme Overview

Although this is the smallest MEDIN work stream in terms of funding and core team effort, it is a very important one as it is essential that MEDIN's work is aligned with international developments, and that MEDIN provides support and guidance to UK organisations in playing a leading role in relevant European / International projects and working groups, so that any consequent developments are practical and suit the UK's requirements.

Work Stream 4 activity will contribute to the following 2 High Level Objectives:

HLO3 Working closely with data.gov.uk, support the UK marine sector in meeting INSPIRE obligations to publish metadata and provide compliant data view and download services for all public data covered by the directive. *WS4 will track the emergence of new INSPIRE guidelines and implementations rules*

HLO5 Store, manage and make available UK monitoring data for use in MSFD assessment(s), according to the agreed approach. *WS4 will participate in working groups (Wise Marine, MODEG) which will discuss how information/data on MSFD implementation are reported to the EC.*

6.5.3 WS4 Work Programme Overview (Core Team 28 Days)

The main objectives for the international work-stream in 2014-19 are to:

Ongoing Tasks

a. Provide a UK view on European and international initiatives/drivers relevant to MEDIN.

   Continue to review (and contribute to) developing requirements from the European Marine Strategy Framework Directive, and provide recommendations as to how MEDIN can support the UK community.

   Continue to track new guidelines and implementation rules as they emerge from INSPIRE and ensure the MEDIN work streams develop appropriate standards and web services (WS2 and WS3).

b. Support UK representation on international data working groups (e.g. ICES Working Group on Data and Information Management, IOC/IODE[20], EC Marine Observation and Data Expert Group, EU Working Group on Data, Information and Knowledge Sharing (WISE Marine)), European Environment Information and Observation Network (EIONET).

c. Inform UK community of relevant international initiatives

d. Provide and support links to global databases and centres (including real-time data via GTS, and "delayed mode" data)

e. Identify what the priorities for engagement are and/or how the UK is covering this (e.g. could be through others engaging in INSPIRE – not necessarily core MEDIN). This should in part be driven by managing risks.

[20] (IODE) International Oceanographic Data and Information Exchange

The 28 days of core team time allocated to this work stream are spread across all tasks, with approximately 22 days to prepare for and attend meetings and the remaining ~0.5 days per month for the remaining activities.

6.5.4 Funding

£19,500 has been provisionally allocated to this work stream, as follows:

Core team staff costs (28 days):	£15,500
Travel and subsistence	£4,000
Contracted costs	£0
Total	*£19,500*

6.6 WS5 Resources and Applications Development

6.6.1 Introduction

The aims of WS5 are to:

- Identify, design and develop resource requirements of MEDIN sponsors, providing advice and research, as appropriate, to help them design and develop specifications for resources to meet these needs.
- Consider the resources that MEDIN is well placed to deliver which are of direct relevance to the data needs of the UK's Marine Science and Monitoring and Assessment Strategies.
- Assist in the delivery and monitor the performance of existing and new data resources which may be operated by other MEDIN work streams or an external body (e.g. the MMO) through the continuation of use cases.
- Continue to strengthen reference datasets through the identification of Competent Authorities and provide advice, support and tools to organisations identified as authorities responsible for key data themes (under the INSPIRE regulations or elsewhere).

6.6.2 Objectives for 2014-19

This prime aim of WS5 in 2014-19 is to deliver the high level MEDIN objective:

> **HLO 6** MEDIN to provide access to defined key data services and priority common data products.

In order to deliver on this objective, WS5 will define and facilitate access to data services and products that meet the needs of MEDIN users, in particular its sponsors. Services include for example tools for data mining and linking and products include strengthening and publishing reference datasets, including socio-economic datasets. These activities require MEDIN to work closely with data holders to encourage and help them deliver on their data sharing and publishing objectives. The services and products will be delivered to users via enhancements to the MEDIN portal (WS3).

WS5 will also monitor the performance of the resources and applications provided by MEDIN and seek to improve these through its engagement with users. Engagement will include participation in partner meetings, questionnaires, a working group of experts and interested bodies, and liaison with other MEDIN work streams.

6.6.3 Outline Work Programme (Core Team 43 Days)

Specifically, over the next five years WS5 will:

Ongoing / Development Tasks

a. Maintain and grow the catalogue of key reference datasets. The catalogue will provide details of these datasets and include persistent links (URIs), so that the datasets can be discovered, viewed and/or downloaded by users. The catalogue may or may not include datasets that attract license fees or include some other form of restriction, although preference is that all data is made available under an Open Government Licence. (**KR3, DR14**)

Development Tasks

b. Assist data custodians to strengthen and, if necessary, repurpose their data, so that it is of benefit to the wider marine community, and thereby increase its value. This activity will focus on datasets that are bound to particular need or application, where datasets are not being maintained or where multiple overlapping and inconsistent datasets exist. (**KR3, DR14**)

c. Host and potentially maintain datasets, but only where there is no natural custodian e.g. for multi-disciplinary project based data or where there is no recognised responsible authority e.g. marine gazetteer. In the latter case, MEDIN will become the *de facto* responsible authority. MEDIN will also look to identify a natural custodian where possible before taking on this role as it has long term implications. (**KR3, DR14**)

d. Work with public sector bodies e.g. Ordnance Survey, Office of National Statistics and DEFRA to deliver datasets that are fit for purpose and easily accessible in marine applications. This activity will also serve to promote the marine sector in a wider context i.e. national and international (e.g. INSPIRE) spatial data infrastructures. (**KR3, DR14**)

e. Inform MEDIN and its sponsors of emergent technologies and initiatives that assist in improving the accessibility and usability of marine data. This activity could also help deliver these technologies to MEDIN and its sponsors where it is deemed more efficient to this collectively rather than individually.

f. Monitor the performance of MEDIN and its value to the marine community by soliciting feedback from users and keeping abreast of sponsors and partners changing needs. The results will provide input to MEDIN's annual report and inform future work programmes.

6.6.4 Funding

£44,400 has been provisionally allocated to this Work Stream, as follows:

Core team staff costs (43 days):	£20,400
Travel and workshops	£4,000
Contracted costs	£20,000
Total	*£44,400*

Contracted costs include further development of the reference layer web pages and content.

Because the details of activities in this work stream are under review, the estimate of core staff time required (43 days) is based on that required in previous years.

6.7 WS6 Communications: Outreach, Forums, Publicity

6.7.1 Introduction

Communications and outreach are key activities for MEDIN as it is essential to communicate to the marine community the resources that have been developed, to provide advice and support on how to use them, and to receive feedback on the utility of these resources.

6.7.2 Objectives for 2014-19

The communications activities under WS6 make a direct contribution to one High Level Objective:

> **HLO 10**: An increased profile of MEDIN in the academic and private sectors, attracting further members to the network and widening the sources of data. In addition WS5 will play an important role is supporting the first objective in widening the adoption of the MEDIN framework across the UK.

The challenges MEDIN will continue to face in the 5 years after 2014 are those of trying to reach as wide an audience in the marine community as possible with limited resources. Given these constraints using free, online methods to engage with the public, including instructional and promotional video content, will be a fundamental strategy for the communications and outreach work stream.

MEDIN will continue to develop its relationships with stakeholders in the marine community, instructing them in development in MEDIN tools, standards and guidelines, enabling them to pass these skills on the wider community. A key area of development in terms of outreach will be in establishing links with academia, from undergraduate to lecturer emphasising the benefit that MEDIN can provide. It is hoped that this approach will engender the use of MEDIN by graduates who will go on to work in the marine community.

6.7.3 Work Programme Overview (Core Team 79 Days)

Ongoing Tasks

1) **Marine Data News**

MEDIN will continue to publish Marine Data News on a quarterly schedule using free online distribution (MailChimp), resulting in a saving of £2,088pa (£10,440 over 5 year period) compared to the previous paid method. We will also advertise the publication online and at events and conferences around the UK and attempt to increase subscriptions to it. In addition, MEDIN will continue to seek to publish articles in other marine sector publications, where possible.

2) **Meetings and events**

MEDIN will continue to attend relevant meetings and conferences, and will organise at least two partner's meeting in the 2014-2019 time period, with planning being started for another after 2019 if not held within the time period. We will also specifically target UK universities to promote the use of MEDIN, emphasising the benefit that MEDIN can give to both staff and students alike, and plan for workshops with industry to ensure that the private sector benefits from MEDIN resources at the same time as opening access to industry data.

3) **MEDIN Website (oceannet.org)**

The oceannet.org website will continue to be maintained and developed in line with feedback and developments in other work streams.

Development

1) Outreach to the Academic Community

MEDIN will build links with the academic community, from undergraduate to lecturer emphasising the benefit that MEDIN can provide, making use of existing partner contacts where possible. It is hoped that this approach will engender the use of MEDIN by graduates who will go on to work in the marine community, and ensure that data collected by universities are made available for re-use through the MEDIN framework.

2) Video content

MEDIN plans to use video as a means of instruction (online tool, Maestro and portal instructional videos), and general communication.

Video can give a human face to a website. Users can more easily learn how to use tools provided by MEDIN from a step-by-step 'how to' style video than they can from text. This could help to increase the number of people using MEDIN tools, the number of people having knowledge of their use which can be shared with colleagues. It could also reduce the number of calls made to the metadata helpdesk with technical questions.

Video can also drive up web statistics by keeping the user on the site for longer[21], and video content is also more likely to be shared[22], thereby widening MEDIN's audience without further effort.

Some ways that video could be used to communicate with web viewers include:

- A short video welcoming visitors to MEDIN and its website
- A 'visual tour' of oceannet.org showing viewers what the site/MEDIN offers, and where to find it.
- Profile videos that introduce key figures in the MEDIN core team and/or partnership
- Testimonial-type videos that communicate MEDIN's value from an end user perspective.

MEDIN has free access to the relevant equipment and skills via NERC, so apart from staff time, this would not attract a cost.

The 79 days core team time allocation includes:

12 days: (4 x 3) days to compile, edit and publish 4 editions of Marine Data News.
5 days: To plan and organise a partners meeting.
10 days: (5 x 2 days) For core team as a whole to prepare for and attend partners meeting.
15 days: Website review, maintenance and update.
10 days: Preparation, attendance, promotion at relevant forums and meetings.
10 days: Outreach to the academic community.
9 days: Development of video promotional Content.
8 days: Preparation and submission of articles for journals.

6.7.4 Funding

£42,000 has been provisionally allocated to this Work Stream:

Core team staff costs (79 days):	£30,000
Travel and subsistence	£5,000
Contracted costs	£7,000
Total	*£42,000*

[21] http://www.marketingsherpa.com/article/how-to/videos-attract-300-more-traffic#
[22] http://moz.com/blog/what-makes-a-link-worthy-post-part-1

6.8 WS7 Management, Planning and Co-ordination

6.8.1 Introduction

The management work stream concerns overall planning and coordination of activities across all the other Work Streams.

The main objectives for MEDIN in 2014-19 are to consolidate the components of the framework that have been developed, and to build use of this framework by the marine community (public and private sector) as part of "normal operations", so that MEDIN becomes adopted as the national marine data management framework for the UK.

This work stream contributes in some way to all the High Level Objectives, but provides the major contribution to:

HLO9 Provide tangible case studies demonstrating the value of using the MEDIN framework when locating, accessing and retrieving data for projects.

6.8.2 WS7 Work Programme Overview (Core Team 150 Days)

Specific Tasks in the management work stream are:

Ongoing / Development Tasks

a. To continue to widen active participation in MEDIN across the whole marine sector – engage new sponsors and partners. In particular work to engage the commercial sector through direct meetings and participation with the MSCC Industry Liaison Group. **(Development)** To discuss with the relevant bodies how licencing conditions could be adapted to widen access to data collected for licensing. (15 days Core Staff time)

b. To continue to encourage the adoption of MEDIN "best practice" in terms of generation of metadata, use of data guidelines, and archiving data in MEDIN accredited DACs. (10 days Core Staff time) (**KR2, DR5**)

c. **(Development Task)** Develop specific cost benefit examples of the value of MEDIN. These would provide clear evidence of the benefit of the MEDIN data infrastructure and clarity on the range of user requirements. (**KR4, DR4**)

d. To raise awareness of the need for all (public sector) data acquisition contracts to require a data management plan, which includes an allocation of funds to support one-off data archiving costs. (15 days Core Staff time) (**DR15**)

e. To continue to support UKMMAS, through participation in Marine Assessment and Reporting Group (MARG) meetings, in the "Tier 3" evidence group meetings, and in some ad hoc steering groups. Significant support is expected from MEDIN in the coming years to support the UKMMAS community in the MSFD reporting process. Previously these activities have constituted a significant commitment in terms of time and travel by the MEDIN Core team, so in recent years MEDIN partners have been funded to represent MEDIN on some of the Evidence Groups. A key focus for the coming years is to build an agreed approach for MSFD data management and access (35 days Core Staff time, £6,000 contracting)

f. To support the marine Sector in meeting its obligations to publish metadata and data to data.gov.uk and INSPIRE. Build liaison with the data.gov.uk arrangements. (10 days Core Staff time) (**DR6**)

g. **(Development Task)** To raise with MEDIN Sponsors relevant recommendations from the review:
(**DR3)** Reach agreement on the main end users/end products of MEDIN;

(**DR7**) Consider different approaches to the funding cycle as the current 3-year funding cycle may not be optimum to achieve the longer-term goals they have set;
(**DR11**) Consider making additional dedicated resources for specific tasks in the work plan.
(**DR12**) Help to guide identification of key priorities to be addressed with the recognition that it may not be able to address all possible tasks.

h. To report to and engage with the Marine Science Coordinating Committee as required. (6 days Core Staff time), and raise relevant recommendations from the review:
(**DR8**) Funding agencies need to enforce more vigorously the use/search of existing data before funding new data collection.
(**DR9**) MSCC should examine the potential conflicts of the Government policy on open data access with some agencies requirements to generate revenue from their data and associated products and consider whether this should be given further attention.
(**DR10**) MSCC to consider having the Chair of MEDIN on MSCC.

i) To hold four executive team meetings (20 days Core Staff time) and at least one sponsors' board per year (5 days core staff time). (£4,000 contracting)

(j) To provide general management to core team (24 days Core Staff time)
Develop more direct management documentation throughout MEDIN. (**DR13**)
To provide financial management (10 days Core Staff time)

£122,000 has been provisionally allocated to this Work Stream:

Core team staff costs (150 days):	£109,000
Travel and subsistence	£3,000
Contracted costs	£10,000
Total	*£122,000*

Organisations Active in MEDIN

ABPmer	Marine Environmental Consultancy, (www.abpmer.co.uk)
AFBI	Agri-Food and Biosciences Institute (Northern Ireland), (www.afbini.gov.uk/)
DECC	Department of Energy and Climate Change *Sponsor*, (www.decc.gov.uk/)
BGS	British Geological Survey, *Accredited MEDIN DAC* (www.bgs.ac.uk)
BODC	British Oceanographic Data Centre, *Accredited MEDIN DAC* (www.bodc.ac.uk)
CEFAS	Centre for Environment Fisheries and Aquaculture Science, (www.cefas.co.uk)
CCW	Countryside Council for Wales (www.ccw.gov.uk). *Sponsor*
The Crown Estate	*Sponsor*
DASSH	Data Archive for Seabed Species and Habitats, hosted at MBA. *Accredited MEDIN DAC*. (www.dassh.ac.uk)
DEFRA	Department for Environment Food and Rural Affairs. *Sponsor* (www.defra.gov.uk)
DOENI	Department of the Environment, Northern Ireland. *Sponsor* (www.doeni.gov.uk)
EA	Environment Agency, *Sponsor*. (http://www.environment-agency.gov.uk/)
EDINA	Unit of Edinburgh University. Provides GI services for academic Community, (www.edina.ac.uk)
English Heritage	(www.english-heritage.org.uk)
Finding Sanctuary	A project aiming to create a network of Marine Protected Areas of the South West Coast of England. (www.finding-sanctuary.org/)
Geodata	Consultancy based at University of Southampton, specialising in environmental data management. (www.geodata.soton.ac.uk)
Historic Scotland	www.historic-scotland.gov.uk
HR Wallingford	Marine consultancy. *Sponsor* (www.hrwallingford.co.uk)
IMAREST	Institute for Marine Science and Technology. (www.imarest.org.uk)
JNCC	Joint Nature Conservation Committee. *Sponsor* (www.jncc.gov.uk)
MMO	Marine Management Organisation, *Sponsor*
Marine Scotland Science	(www.marlab.ac.uk)
MBA	Marine Biological Association (www.mba.ac.uk)
MCA	Maritime and Coastguard Agency. *Sponsor* (www.mcga.gov.uk)
Met Office	*Sponsor* (www.metoffice.gov.uk)
MOD	Ministry of Defence. *Sponsor* (www.mod.uk)
NERC	Natural Environment Research Council, *Sponsor* (www.nerc.ac.uk)
NRW	**Natural Resource Wales / Cyfoeth Naturiol Cymru** *Sponsor* (www.naturalresourceswales.gov.uk)
OceanWise Ltd	Private independent consultancy specialising in marine data acquisition, management and GIS
RCAHMS	Royal Commission on the Ancient and Historic Monuments of Scotland www.rcahms.gov.uk
SAMS	Scottish Association for Marine Science (www.sams.ac.uk)
Scottish Government	*Sponsor* (www.scotland.gov.uk)
SNH	Scottish Natural Heritage (www.snh.org.uk)
SeaZone	Commercial Company delivering marine GI products, *Sponsor* (www.seazone.com)
SEPA	Scottish Environment Protection Agency. (www.sepa.org.uk)
SSMEI	Sustainable Scotland Marine Environment Initiative. (clydeforum.org/SSMEI/) and (www.nafc.ac.uk/Marine_Management/General/SSMEI/)
UKHO	United Kingdom Hydrographic Office. *Sponsor, and MEDIN Accredited DAC for Bathymetry data* (www.ukho.gov.uk)
Wessex Archaeology	(www.wessexarch.co.uk/)

Glossary

AGI	Association for Geographical Information
DAC	Data Archive Centre
EMODNET	European Marine Observation and Data Network
FRS	Fellow of the Royal Society
GEMINI2	Discovery metadata standard managed by the AGI and adopted by UKLP
ICES	International Council for the Exploration of the Sea
INSPIRE	Infrastructure for Spatial Information in Europe, EC Directive (inspire.jrc.it/)
IOC	Intergovernmental Oceanographic Commission
IPR	Intellectual Property Rights
ISO	International Organisation for Standards
MEDIN	Marine Environmental Data and Information Network
MMO	Marine Management Organisation.
MSCC	Marine Science Coordination Committee
OSPAR	International Commission for the Protection of the Marine Environment of the North-East Atlantic (www.ospar.org)
OPSI	Office of Public Sector Information
UKDMOS	UK Directory of Marine Observing Systems – an initiative under the UK Marine Monitoring and Assessment Strategy to provide information on marine monitoring programmes.
UKLP	UK Location Programme
UKMMAS	UK Marine Monitoring and Assessment Strategy. The UK government led programme to coordinate marine monitoring necessary to meet government objectives of a clean, healthy, safe, productive and biologically diverse marine ecosystem (see www.defra.gov.uk/environment/water/marine/uk/science/monitoring.htm)

Annexes

Annex 1: Key Policy & Legislative Drivers for Marine Data and Information, with key dates.

	Driver	Reporting Requirement	Date
International	OSPAR	Interim Quality Status Report 2017 Quality Status Report 2022 Annual Reporting	
	Convention on Bio-diversity	Objective was to achieve "Significant reduction" in biodiversity decline by 2010	At intervals to be determined by the COP Fifth national reports due in 2014.
	Convention on Migratory Species	Measures taken and conservation status of migratory species	2014 and every three years thereafter
	UNCLOS – Regular process for global reporting and assessment of the state of the marine environment	Assessments based on regional assessments	2014
	SOLAS (Regulation V/9 "Hydrographic Services")	Arrange, collect and compile hydrographic data to update nautical information necessary for safe navigation at sea.	Ongoing
European	European Environment Agency	State of the Environment Reporting	Every five years
	Marine Strategy Framework Directive	*Review of the Initial Assessment*	*2018, 2024*
		Data and information resulting from the initial assessment to be made available to the European Commission and EEA	*15 January 2019*
		Monitoring Programmes established	July 2014
		Make data from monitoring programmes available to European Commission	Jan 2015 onwards (six months after relevant data have become available)
		Programme of measures established	December 2015
	Water Framework Directive	Assessment of Ecological and Chemical Status	2015, 2021
	Common Fisheries Policy	Annual Assessment	annual
	Habitats Directive	SAC[23]s, Quality of features	2013, 2019
	Flooding Directive		
	Birds Directive	Reporting on the national provisions taken under the Directive	2013, 2019
	INSPIRE Directive	*Annex III Metadata Discovery published*	*Dec 2013*
		View and download service capability for Annex III Data	Dec 2013
		Publish new / restructured Annex II,III data	2015
		Publish all Annex I data	2017
		Publish all Annex II,III data	2020
	Integrated Maritime Policy, EMODnet etc		
UK / National level	UK National Assessment	*Charting Progress 2 was published in 2010. If a further composite assessment is preparted it is likely to draw on assessments under the MSFD.*	*2010*
	Scotland's Seas assessment	Scotland's marine Atlas published in 2011. Revised assessment of Scotland's seas required before another / revised national marine plan published (due 2019)	Pre 2019
	Wildlife and Countryside Act		

[23] SAC –Special Area of Conservation

	Biodiversity Action Plan	Halt biodiversity decline	
	UK Location Plan / data.gov	As for INSPIRE	
	Marine and Coastal Access Act, Scottish Marine Act etc…	Marine Conservation Zones and the extent that an ecologically coherent network has been achieved Report to Scottish Parliament 2018 on MPA network	Every six years. 2018
Regional / Local	Development proposals / licensing	Strategic Environmental Assessments (SEAs)	as required
	Development proposals / licensing	Environmental Impact Assessments (EIAs)	as required
Marine Plans	Scottish National Marine Plan		Due 2014 Update due 2019
	East Inshore and East Offshore Marine Plans	20 year plan with monitoring and assessment of effectiveness after 4 years. Draft pans for the South Inshore and South Offshore Marine Plans are currently being proposed.	Due late 2013/early 2014 (England)
Marine Survey Industry	EIA, SRA	Making data available to support development processes	Ongoing

Annex 2: Report from the Review Panel on the Review of the Marine Environmental Data and Information Network – Recommendations

Below we list the detailed recommendations as provided by the MEDIN Review Panel. The full review report is available at http://www.oceannet.org/library/key_documents/key_docs.html

Portal (user interaction, search and functionality)

	Issue	Recommendation	Work Stream
DR1 **KR1**	Linkage of discovery (meta)data to granular datasets at DACs is not in place (no mapping has been made in an automated/electronic method). This is a critically limiting factor for users/potential uses of MEDIN, which is possible to address technically. DASSH have provided an example that shows how this can be achieved. The panel would encourage other DACs to make progress on this. There are also international examples of operational and successful data access infrastructures in the marine realm. The review panel noted that activity describing this in the MEDIN Annual workplan is very vague, and lacks weight and consequence.	Provide direct access to data from the MEDIN Data Discovery portal. This would substantially enhance the engagement of users in MEDIN.	WS1, WS3
DR2	The MEDIN Data Discovery Portal is not intuitive. Feedback from stakeholders suggests there could be improvements in functionality to improve the use of search terms, enable data slicing, allow filtering by data/licence conditions, product/dataset service There needs to be more interaction with regular users to aid development.	Improve the MEDIN Data Discovery Portal to facilitate use (functionality, signposting, data slicing, overview of what is in MEDIN catalogue, filter by data licence conditions, product/dataset/service) Engage users, especially expert users, in the portal's development in an interactive way that draws on their experience with its use.	WS3
DR3	MEDIN aims to make data available in a way that enables its re-use by a diverse community of consumers. There needs to be a clearer definition of the range of end-users and their respective needs. This should help to engage end users by more clearly articulating their needs.	The sponsors and core team need to reach agreement on the main end users/end products of MEDIN. This will make discussions on what MEDIN should provide much easier	WS7

Funding and Sponsors

	Issue	Recommendation	Work Stream
DR4 **KR4**	The Review Panel has noted that it has proved difficult to demonstrate and the real cost benefit of having the MEDIN infrastructure. However, use cases are needed as evidence of the benefits of investment in MEDIN. These should be real examples relevant to sponsoring organisations and users. For example, anecdotally the panel heard one sponsor state "from a private company perspective, up to 20% of costs of a project can be the initial data mining (finding out what are already available) – if this overhead could be reduced then MEDIN proves its worth". To help identify use cases, users need to be encouraged to acknowledge their use of MEDIN datasets and to report the benefit of doing so. This information needs to be elaborated into real examples of real cost savings/benefits	Develop specific cost benefit examples of the value of MEDIN. These would provide clear evidence of the benefit of the MEDIN data infrastructure and clarity on the range of user requirements.	WS7
DR5	Although signed sponsor agreements are in place, institutional buy-in is closely linked to the interests of the incumbents of the office, and is therefore vulnerable to changes in senior management	Sponsoring organisations and their agencies need to ensure that MEDIN and its objectives are recognized as an integral part of their data management strategy. This will ensure that MEDIN is engaged and supported in a sustained way as an integral part of the UK marine data system.	WS7
DR6	The case for funding needs to have more emphasis on services that MEDIN is to deliver, rather than the provision of data management structure alone. For example, MEDIN needs to be more clearly recognized and acknowledged as the national platform for coordinating UK level delivery of marine data developments required under EU legislation, e.g. INSPIRE. MEDIN can provide a collective technical capacity and associated resources to support this. There are examples from other countries where organisations similar to MEDIN fulfill such a national role with respect to marine data within INSPIRE	MEDIN should take the leading role in monitoring, coordinating and supporting INSPIRE implementation across the marine sector.	WS1, WS2, WS3, WS7
DR7	Funding regime; the collective approach to funding is excellent for achieving shared buy-in, but the relatively short time horizon of (project type) funding may not be optimal when dealing with longer term policy objectives, for example, in relation to MSFD or INSPIRE. A more coherent multi –annual plan towards fulfilling	MEDIN sponsors should consider different approaches to the funding cycle as the current 3-year funding cycle may not be optimum to achieve the longer-term goals they have set	WS7

	policy objectives would be facilitated by a corresponding funding certainty.		
DR8	There are no/few requirements from funding agencies to ensure that applications for new data collection activity make use of/search for relevant existing datasets. This will not realize the MEDIN vision of "measure once use many times" or ensure a return on investment	Funding agencies need to enforce more vigorously the use/search of existing data before funding new data collection.	WS3, WS7
DR9	UK Government policy demands for open access to data are in apparent conflict with some agencies requirements to generate revenue through products and services related to these data	MSCC should examine the potential conflicts of the Government policy on open data access with some agencies requirements to generate revenue from their data and associated products and consider whether this should be given further attention.	WS7
DR10	MEDIN reports to MSCC but has no dedicated independent representative. Reporting and messages need to be relayed via sponsors representatives which may not be the optimum approach	MSCC to consider having the Chair of MEDIN on MSCC	WS7

Resources, use of resources

	Issue	**Recommendation**	**Work Stream**
DR11	Progress on specific issues can be slowed because resources are made available through the overall sponsorship budget on a model that has to fit around other workplans/availability. Dedicated resources (for specific tasks/cases) may be beneficial to drive development more quickly in key areas, and reduce collective frustration on progress. The review panel noted in the meetings that the sponsors recognized that the current resource planning/commitment model was a limiting factor, at the same time they had a desire to progress more rapidly.	MEDIN Sponsors should consider making dedicated resources available for specific tasks in the work plan.	WS7
DR12	In several of the documents examined by the reviewers it is suggested that MEDIN and the DAC network will need to deal with new areas of marine data collection/provision (marine litter, noise, socio-economics). MEDIN runs a very real risk of stretching its resources too thinly. If it is tasked with dealing with these additional areas without additional resources, it may fail on some of its core activities.	MEDIN Sponsors should help to guide identification of key priorities to be addressed with the recognition that it may not be able to address all possible tasks.	WS7
DR13	The Review Panel observed that management documentation, is often expressed in rather vague, caveat-rich terms. Whilst it is understood that this approach has evolved to cover for uncertainties in the flow of contributions in kind, it will be of benefit to adopt a more direct style, identifying deliverables, due	Develop more direct management documentation throughout MEDIN.	WS7

	dates and dependencies. This would enable clearer identification of risks, delays and development of appropriate mitigation strategies.		

Products

	Issue	Recommendation	Work Stream
DR14	The prime focus of MEDIN is generally on the underlying datasets in its discovery catalogue, while products and services derived from the datasets are of more immediate interest/use by the users of such a portal. A stronger focus on data products and services would be a win-win for MEDIN and product providers, e.g. HR Wallingford is prepared to put metadata for all products on MEDIN. The approaches to dealing with licensing of products and services should seek to ensure that these are not a barrier to making products available.	Develop a stronger focus on making datasets, services and products (even if 3rd party) available at least as metadata records in MEDIN (would be a win-win for both product providers and MEDIN itself	WS5

Standards and Data Management

	Issue	Recommendation	Work Stream
DR15	MEDIN has carried out substantial development of marine data guidelines, but there are still substantial barriers to their uptake throughout the user community. There needs to be further work to clarify whether the standards are sufficiently pragmatic in terms of cost of implementation versus benefit derived. There should be clearer processes for adoption of standards ensuring their endorsement by all relevant organisations, possibly through MSCC/UKMMAS. When there is enough confidence that this is the case there should be a broader promotion of the standards by the public sector across the major contractors.	Give greater focus to ensuring that data standards/guidelines be agreed for use by the user community with the aim that the use of MEDIN (approved) standards can become a standard condition of funding for data collection. This will substantially enhance the uptake and value of the MEDIN work on data standards/guidelines.	WS2, WS7
DR16	The review panel would hope within the next year MEDIN could make significant progress in enabling common agreement on, and uptake of, a number of priority data acquisition standards. Currently work around data standards is included in the annual work plan but there is no information on which standards are to be worked on and who should be involved. This information needs to be promoted at an early stage in the work planning process in order to foster engagement	Identify data acquisition standards to be worked at an early stage and publicise the work at an early stage.	WS2

	(e.g. MEDIN identifies, through the Executive Team and Sponsors, those standards to be the subject of its work in the year before it carried out the work)		
DR17	The panel recognizes that DACs have long established processes for accession and these have every reason to continue. However, there is no unified way of making data submission into the DAC network. Alignment and guidance on data submission at the MEDIN Home Page level is needed to help ease the experience for data submitters	MEDIN should provide improved guidance for data submission to the DACs	WS1
DR18	MEDIN accredits the DACs initially but this process does not include a subsequent audit to assess whether standards and procedures are being maintained. It would be prudent for either a member of the accreditation team (or suitable alternative) to formally revisit the DACs and review whether the accreditation still holds.	MEDIN to implement an periodic audit of the DACs as a part of the accreditation process.	WS1