

# **The Marine Data and Information Partnership**

Dr P. D. Cotton, MDIP Manager, Inter Agency Committee on Marine Science and Technology, Joseph Proudman Building, 6 Brownlow Street, Liverpool L3 5DA, UK

## **1 Introduction**

In this paper we discuss the aims and plans of the recently formed UK Marine Data and Information Partnership, specifically as they relate to Geographic Information Systems and the implications for data standards in marine applications.

## **2 The UK Marine Data and Information Partnership (MDIP)**

Marine data and information are collected by a variety of UK government, non-government, academic, private sector and other research organisations for many different reasons. An almost inevitable consequence of these many separate marine data gathering and management activities is a legacy of differing ways of storing and sharing data and information. As new questions are asked of marine science and more holistic assessments required, it is essential that the UK adopts a coordinated approach to the management and stewardship of marine data and information.

The concept of a Marine Data and Information Partnership (MDIP) was the main outcome of a short-life Expert Group set up through the Inter-Agency Committee on Marine Science and Technology (IACMST). This recommendation led to the launch of MDIP in March 2005, with 21 initial partners from the public and private sector. The partnership includes UK Government holders of marine data at its core, but is open to all marine data providers on an equal basis – with the view that its outcomes should be of benefit to the whole marine community.

MDIP's mission is to support the establishment of harmonised stewardship of and access to marine data and information, to facilitate improved management of the seas around the UK. The initial overall objectives were identified as:

- (a) To provide a framework for the UK marine data community with respect to data capture (including ingestion), interoperability, curation and dissemination;
- (b) To develop, adopt and promote standards, specifications and procedures in support of (a);
- (c) To contribute to the marine component of and support for the geospatial strategy for the UK.

### **3 Requirements, Implementations and Initiatives**

There are requirements for Geographical Information Systems across the whole gamut of applications for marine data, and a number of initiatives to provide access to marine data (mostly regional) have already been undertaken in response to specific requirements. We provide a brief overview of key applications and initiatives below:

#### **Integrated Assessments**

Central to the motivation behind the formation of MDIP is the increasing need to combine different types of information in integrated assessments of the marine environment, to support a more holistic ecosystem based approach to marine management. The recent Defra publication: “Charting Progress – An Integrated Assessment of the State of UK Seas”, assessed the capability of the UK Marine Monitoring Systems to deliver such assessments and identified some key defects. A key challenge for MDIP is to support the development of this capability within the UK.

Such integrated assessments are also required to implement international obligations for water quality monitoring, for instance under the European Water Framework Directive and OSPAR. CEFAS are currently carrying out a pilot integrated assessment of the North Sea (REGNS) for ICES (the International Council for the Exploration of the Sea), and will be working closely with MDIP.

MDIP will also be working to support the evolving UK Marine Monitoring Strategy, currently under development.

#### **Spatial Planning**

Another of the major objectives of MDIP is to contribute to the marine component of the geospatial strategy for the UK. This relates to a number of activities, including licensing of sites for wind farms, and the management of oil and gas exploration. Recent initiatives in these two fields include COWRIE (Collaborative Offshore Wind Research into Environment, and UK Deal (<http://www.ukdeal.co.uk>). To investigate some of the challenges and issues, DEFRA recently contracted ABPmer to carry out a spatial planning pilot for the Irish Sea (<http://www.abpmer.net/mspp/>).

Also important is the need to support strategic operational planning, for instance prioritizing locations for surveying, according to existing coverage. The Maritime and Coastguard Agency (MCA) use the Integrated Coastal Hydrography for this purpose ([www.coastalhydrography.com](http://www.coastalhydrography.com)) although data coverage is incomplete in some key thematic areas.

#### **Existing Initiatives**

A number of web sites have been established that offer some form of GIS access to marine data sets – but at present these are rather piecemeal and are either limited to providing access to marine data and information holdings of individual organisations, or to data sets held across organisations but lying within specific categories (see Box 1).

Some new initiatives have been identified whose aims are closely aligned with those of MDIP. To a certain extent they can be regarded as MDIP pilot projects, as they will provide test beds for key aspects of the MDIP approach. These projects are:

**DASSH** – Data Archive for Seabed Species and Habitats. The development by the Marine Biological Association of an authoritative archive for benthic marine life data sets, funded by DEFRA.

**The ALSF<sup>1</sup> Marine GIS project** - The development of a GIS web map server by ABPmer to provide access to existing research relevant to ALSF.

**COWRIE** – Collaborative Wind Research into the Offshore Environment – <http://www.offshorewindfarms.co.uk>. A data management plan has been prepared by the GeoData institute for the Crown Estate.

#### **Marine Monitoring**

There are a number of regional marine monitoring initiatives including a number of coastal observatories, for instance the Liverpool Bay Coastal Observatory (<http://cobs.pol.ac.uk/>), and the Channel Coast Observatory (<http://www.channelcoast.org/>)

#### **Mapping**

A number of applications have been developed to provide map-based views of marine data sets, for instance:

- NBN Gateway (National Biodiversity Network) <http://www.searchnbn.net/>
- MarLIN (Marine Life Information Network) <http://www.marlin.ac.uk/>

#### **Data Search**

##### *Individual Data Archiving Centres (DACs)*

Most UK marine DACs offer a data search capability, though not all are map based. Examples include

- BGS GDI (Geology) <http://www.bgs.ac.uk/geoindex/home.html>
- BODC (Oceanography) <http://www.bodc.ac.uk>
- CEFAS iSea (Fisheries, marine environmental) <http://www.cefasc.co.uk/isea>

##### *Single Point Access to Information on Separate DACs*

- Oceanography - EDMED [http://www.bodc.ac.uk/data/information\\_and\\_inventories/edmed/](http://www.bodc.ac.uk/data/information_and_inventories/edmed/)
- Coastal Surveys – ICH <http://www.coastalhydrography.com>

**Box 1: Some existing web based marine data access systems.**

## **4 Marine Data and Information Issues**

We have already noted that the legacy of the development of independent marine data centres within the UK, established by different organizations with different remits, is a lack of coordination and coherence in how marine data and information are gathered, archived and shared. As an example of the difficulties this can cause, Box 2 summarises issues identified in a study for Defra in preparation for the UK Coastal and Marine Resource Atlas (“Magic for Marine”).

Such complaints are common, and lie at the source of a great deal of frustration and delay experienced in projects working to bring marine data sets together, and ultimately can result in significant extra cost. MDIP was set up to provide a practical response to these real difficulties, repeatedly encountered.

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<sup>1</sup> Aggregate Levy Sustainability Fund

- **Poorly managed, inaccessible data.** Some datasets exist only in hardcopy, or are not properly mapped, but referenced in an inconsistent manner to geographical co-ordinates or features.
- **Inconsistent data records within a single dataset.** Some datasets have been collected over time using different coordinate referencing systems and at different levels of spatial accuracy resulting in time consuming processing.
- **Incomparable regional datasets.** Data have not been collected with a view to its wider use in broad scale mapping projects, resulting in inconsistent survey methodologies in different areas producing incomparable data.
- **Incomplete data coverage at a national level.** The result of data capture at a regional level for specific projects.
- **Multiple datasets for the same type of data.** Data are often captured for different projects using different methodologies, meaning that they cannot be combined (or that there are significant difficulties in so doing).
- **Incomparable national datasets.** Different approaches to data classification, survey techniques and mapping exist between national agencies. This hinders the combination of data from different information themes.
- **Inconsistent data collection and classification between national agencies.** Some key datasets exist in some areas but not in others. Even where equivalent data sets do exist across the UK regional / national agencies, the methods by which the data have been collected and managed are often inconsistent, hindering (or even precluding) attempts at integration.
- **High spatial resolution for broad-scale mapping purposes.** Some datasets like designated boundaries and coastal morphology types were captured at very high spatial resolutions that far exceed that needed by projects of this kind – official reduced resolution versions' of these datasets are sometimes unavailable.
- **Lack of knowledge of the origins, quality, scale or appropriate use of datasets.** Many data sets do not have complete metadata records. It can be very difficult to identify which organization is responsible for the maintenance of key data sets.

**Box 2: Issues limiting ease of use of marine data for integrated or holistic analyses. Identified by DEFRA in the preparation for the UK Coastal and Marine Atlas.**

We can identify four questions which summarise the major difficulties:

### **Who has what?**

We have seen that marine data and information are collected by a variety of UK organisations for many different purposes, resulting in a large number of multi-

disciplinary archives (e.g. ~130 UK agencies listed in The European Directory of Marine Environment Data -EDMED<sup>2</sup>).

Thus there is a need for an accessible definitive catalogue of UK holdings in Marine Data and Information, identifying the important UK marine Data Archive Centres (DACs) and that these DACs adhere to suitable metadata standards to support cross catalogue searching. This work is being tackled jointly by MEDAG<sup>3</sup> and MDIP.

### **Which data sets are reliable and authoritative?**

A consequence of the many different data bases and approaches to data management is that different standards have been applied to data capture, archiving and generation of metadata. Also there may be more than one repository for identical (or equivalent) data sets. This can make it difficult to identify which data can be relied upon, and which data set is the authoritative version.

To address this problem a common approach to standards is required. The UK marine DACs must progress towards a consistent policy for metadata, and work together in the identification and implementation of appropriate standards for all important marine data sets.

### **Which data can be aggregated / combined?**

One of the central aims of MDIP is to support the easier combination of data and information from different sources. Thus interoperability between different data sets needs to be developed and established at the root of good data management practice. An MDIP working group has been looking into these issues and considering how to ensure that any developments are consistent with initiatives such as INSPIRE (Infrastructure for Spatial Information in Europe - <http://www.ec-gis.org/inspire/home.html> ).

Underpinning this again lies the importance of consistent application of metadata standards and formats across marine themes.

### **How can I use the data and how much will they cost?**

Different organizations have different positions with regard to copyrights, licencing and costing. Some data centres hold data on terms agreed with the individual original data owners, and are required to respect these rights. Some organizations take the view that they require all the data they gather should be available for onward use without further restriction and at no cost (or cost of reproduction only) to the user. Other agencies (e.g. trading funds) are required to achieve a commercial return from their activities.

It is important that the conditions attached to each data set are readily available to the potential user, so that they can take an early view as to whether the data can be used in the proposed application. It is also important that systems establishing access to disparate and combined data sources must respect existing rights and costing models. MDIP is in a

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<sup>2</sup> [http://www.bodc.ac.uk/data/information\\_and\\_inventories/edmed/](http://www.bodc.ac.uk/data/information_and_inventories/edmed/)

<sup>3</sup> Marine Environmental Data Action Group, IACMST.

position to consider how to bring together different systems whilst respecting these rights.

## 5 MDIP Approach

MDIP plans an incremental pragmatic approach to achieve its aims. The aim is not to replace the existing data systems, which have evolved within agencies to meet key user needs. Instead MDIP proposes to build upon the existing systems and capability and work towards harmonising these resources. This will be achieved by identifying key standards and protocols and encouraging DACs to work towards operating to these standards so that they can be recognised by the UK Marine Community as an authoritative source of Data and Information.

A staged approach is planned, as outlined below:

1. Identify relevant common standards.
  - for metadata (e.g. ISO 19115, eGMS, UK Gemini)
  - for data collection and management (e.g. NMMPQC<sup>4</sup>, BEQUALM<sup>5</sup>)
  - for interoperability (UK Gemini, INSPIRE)

A preliminary list is available at

[http://www.oceannet.org/medag/data\\_standards/data\\_standards\\_homepage.htm](http://www.oceannet.org/medag/data_standards/data_standards_homepage.htm)

2. Identify the major UK Marine DACS that are able to meet a set of requirements identified by an MDIP working group: (Box 3)
3. Encourage DACs to work towards implementation of these standards.
4. Recognise as “MDIP” DACs when requirements are satisfied.
5. Map progress towards the coverage of all key marine data sets by recognised DACs.

- Adherence to e-GIF and appropriate international principles.
- Data collection according to defined quality principles and accepted procedures.
- Quality assurance of the collected data.
- Data-basing and banking with appropriate metadata standards.
- Auditable process for long term custodianship & updating, with appropriate disaster planning.
- Making datasets freely available wherever possible (not necessarily at zero cost).
- Committed to raising awareness of the holdings.
- Advise 3rd party organisations collecting similar types of data on procedures, and providing data-banking and curation facilities for such similar data from other sources
- Committed to promoting the use of the data
- Committed to, and focus on, customer service
- Possess expertise and a track record in the scientific area of the data
- Committed to return of data holdings to originators, or lodging with an alternative and suitable repository, if the DAC becomes unsustainable

### Box 3: DAC Requirements agreed by MDIP Working Group

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<sup>4</sup> National Marine Monitoring Programme Quality Control

<sup>5</sup> Biological stuff

## 6 Summary

As new questions are asked of marine science and more holistic assessments required, it is essential that the UK adopts a coordinated approach to the management and stewardship of marine data and information. MDIP was established, with the support of a wide range of UK marine organizations, to identify and support actions necessary to achieve this coordination. It is clear that the adoption of common and relevant standards by agencies responsible for marine data management will play a key role.

An MDIP manager was appointed in November 2005, and he has been working on establishing a work plan for MDIP, in particular addressing three key areas of activity:

- Improving access to existing UK Marine Data and Information resources
- Establishing a marine data and information management resource base.
- Identifying where the existing UK Marine Data and Information system falls short of users' requirements, and recommending activities to improve the system.

One of the MDIP working groups will soon identify initial key Marine Data Archive Centres which can be recommended as the major repositories for marine data, meeting defined standards, and which provide a resource of data management expertise.

Other working groups are working towards identifying appropriate standards and protocols for marine data management and interoperability, and providing recommendations to support consistent and reliable mapping of marine data.

Further information is available through the MDIP programme manager, David Cotton (dcott@oceannet.org).