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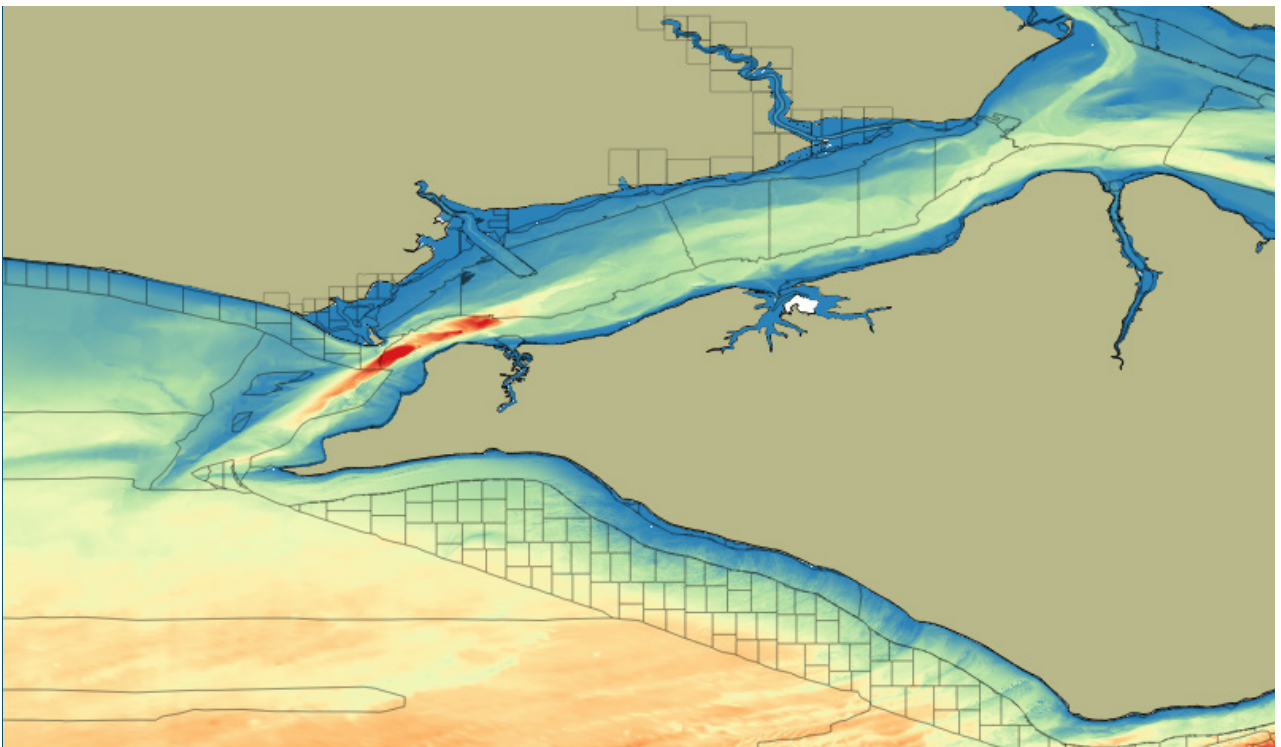
Working with water

Growth and Innovation in the Ocean Economy: North Sea Checkpoint

Data Adequacy Report 01, including literature survey

August 2014

Document information

Document permissions	Unrestricted
Project number	DLS0342
Project name	Growth and Innovation in the Ocean Economy: North Sea Checkpoint
Report title	Data Adequacy Report 01, including literature survey
Report number	RT002
Release number	R1-00
Report date	August 2014
Client	European Commission DG MARE
Client representative	Iain Shepherd
Project manager	Marie Pendle
Project director	Keiran Millard

Document history

Date	Release	Prepared	Approved	Authorised	Notes
07 Aug 2014	1-00	ONM	MPN	TKM	

This unsigned document has not been formally checked and authorised for release. Until it has been reviewed and signed off by qualified technical staff within HR Wallingford, this document must not be considered complete or final.

Executive Summary

This document summarises findings of existing studies related to the adequacy and data available for the North Sea basin. Although this review was not constrained by any particular North Sea data activity or study, a particular consideration was studies that have made use of EMODnet and Copernicus data services and where the experiences of using these data services have been reported.

This report is deliverable 02 to DG Mare under the North Sea Check Point project (Growth and Innovation in the Ocean Economy – Gaps and Priorities in Sea Basin and Observation Data MARE/2012/11:North Sea) contract reference [SI2.658142]. The work was undertaken by HR Wallingford Ltd with input from the project members IMARES and McAllister-Elliot & Partners (MEP).

EMODnet was established on the principles that there was a lot of public sector data available that was not used adequately to underpin decision making in support of commercial and policy objectives across Europe. This situation persisted at a national level, but compounded at the international level where it was practically impossible for organisations to use marine environmental data across and between member states. In the scope of this check point, the literature review examines if this is still the case following ten years operation of the EMODnet and Copernicus programmes, with a focus on commercial and non-governmental users.

The literature survey considered public reports, journal papers, grey literature and web published articles and used the Mendeley tool to collate and discuss the findings. In total 50 documents were reviewed. Based on an analysis of the documents, we are still very much at the Wild West stage of the Blue Economy when it comes to data provision across the North Sea. If you know where to look, you could probably find the data you need, but it is not a case of 'Google, click, download'. Services that deliver data are increasing and some are maturing, however the vast majority would not be considered as 'trusted providers' or the 'go to' place for data. Indeed many are not discoverable via web searches either. Furthermore data portals or independent literature do not give widespread information on the value of the data for a particular use. In most cases it is incumbent on the user to download the data and then make assessment as to its value.

The Blue Economy comprises many actors and there is a desire to re-use data beyond its original collection intent, especially where the original collection was publicly funded. The key value add of public services like EMODnet is in providing data custodianship, version control and flexible download services. Allocating resources to these tasks should be seen as a priority over creating new data products and services that widen the gap between data 'as collected' and data 'as provided'. They also burden the public sector with the need to maintain these products. Actors in the Blue Economy will take sound data and create innovative products (including web services and apps); unfortunately they would be less likely to undertake data curation tasks.

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1. Introduction

1.1. Overview

This report is the second deliverable to DG Mare under the North Sea Check Point project (Growth and Innovation in the Ocean Economy – Gaps and Priorities in sea basin and observation data MARE/2012/11:North Sea) contract reference SI2.658142. The work was undertaken by HR Wallingford Ltd with input from the project members IMARES and McAllister-Elliot & Partners (MEP).

This document presents a literature survey summarising the findings of existing studies relating to the adequacy and data available for the North Sea basin. The purpose of this survey is to provide a context for the Blue Economy in the North Sea and where data gaps are limiting its development. As such this review compliments the specific analysis of data gaps for the data challenge exercises to be undertaken subsequently as part of the North Sea Checkpoint (NSCP) project.

The literature survey included the following types of documents

- <u>Portal-specific documentation and reports</u> ; where portals known to provide information within the North Sea area were identified, information about the portals was sought, particularly with respect to whether there was separate documentation discussing usability, data gaps or user experiences.

- <u>Scientific literature</u>; where peer-reviewed publications contained information about the experience of sourcing data, what type of data gaps may exist and the constraints experienced with accessing data.

- <u>Grey literature</u>: conference and workshop proceedings where articles contained information about the experience of sourcing data, what type of data gaps may exist and the constraints experienced with accessing data.

Each of the literature was reviewed at two levels. First is an analysis of the literature items themselves; second is the content of the literature. The analysis of the literature items considered what literature exists; the analysis of the content of the literature considered "what does this literature tell us about data supply?" This two level approach is needed to assess how generally accessible useful information on marine data activities are, as well as the science of using these data to solve actual problems.

A key consideration in the literature review is an assessment of the discovery and assessment of information such that users can make use of data. This is, if a data portal cannot be discovered and assessed as useful, and/or the portal does not allow for data to be subsequently discovered and assessed then it is of limited value to a user.

The survey has been undertaken using the free web-based tool Mendeley[1] as a collaborative area to share and comment on literature between project partners. The assessment of the literature was recorded using a scheme agreed within the data-challenge spreadsheet[2]. The findings from each of the literature was recorded in a separate schema within Mendeley.

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[1] www.mendeley.com

[2] In this way the literature review, the literature review is treated as a project challenge , however unlike the data challenge, literature, rather than data, is assessed as to how it meets the challenge

1.2. Context of Literature Survey

The literature survey is approached from the perspective as a proxy-user of data services in the Blue Economy. This is to reflect not only the findings of the literature itself, but also the challenges in discovering and accessing the value of the literature. In this context, it has been attempted to not just consider commercial users, which is a temptation when 'economy' is mentioned, but to also consider non-governmental usage by others such as the leisure sector and the non-profit services of stakeholder organisations such as charities. Both of the latter have a significant role in marine usage, generate economic activity and exert influence over more obviously commercial users.

Data adequacy and availability means different things to different communities. This is an important consideration as much of the monitoring, data collection and aggregation has been undertaken by public bodies and the academic community, whose efforts have been extensive. However, the driving factors in the blue economy of commercial and other users may not directly match to the experiences of the academic and public sectors who are already very involved in the EC initiatives.

This is not to say that the latter sectors are being ignored. Indeed, data requirements of the Marine Strategy Framework Directive (MSFD) are considerable and the use of existing monitoring programmes and data sets will be essential to measure the progress over time of the steps taken to meet the aspirations of the MSFD. However, academic and public sectors have extensive linkages to the data initiatives, so their data requirements and accessing behaviours are likely to be different to that of commercial or other concerns. It was therefore decided that a 'two-pronged' approach should be taken, looking at both the data initiative reporting, and also seeking commercial or practical user reports.

1.3. Relationship between Literature Survey and Data Challenges

The overall aim of the literature survey is to identify and report on the contents of the documentation available on the adequacy and data available for the North Sea basin and summarise findings of existing studies. Data adequacy in the context of this literature survey means how easily the literature was discovered, accessed and how much it provided information on providing data to users.

Analysis of the literature using the data registry model will provide information on the effectiveness of data delivery systems as well as the data they deliver. This information is equivalent to those included in the adequacy reports for each of the challenges. It may be that literature discusses the same topic areas as the challenges, however this is not the expectation. The expectation is that the literature provides a set of conclusions about adequacy of data supply in the North Sea basin that can verify (or otherwise) the conclusions from the data adequacy reports produced by the challenges.

Full data gathering that is specific to the various challenges was considered to be an activity for that challenge, rather than an activity for this literature survey. The decision to keep the data gathering for challenge activity was taken because the value of specific data can only be assessed in the specific context of the challenge. No two usages of data are likely to be exactly the same, at the very least because of temporal and geographic alterations. However, literature that describes the data portal functioning and its usability, or the use of data portals for accessing data, was considered to be the main target for this literature survey. Literature that included gap analysis of data portal holdings was included as a secondary target.

In summary, the literature survey is designed to have a symbiotic relationship with the data challenges, providing background information for the challenges while expecting the result from each of the challenges to build upon the results of the literature survey.

2. Methodology

2.1. Data Gathering

The project team has searched for a broad range of research papers and grey literature from online resources such as portals, via internet search engines such as Google Scholar, the Biodiversity Heritage Library and Scirus and through electronic subscriptions to resources such as the Web of Science, the British Library and Elsevier Science Direct.

Each of the identified literature was initially documented using the Mendeley citation tool and shared with the project team. The literature was then graded using the data registry model according to the value criteria of: Contribution, Location, Commercial, Attributes, Delivery and Usability. An assessment was then undertaken of the content of the literature itself, relating to data gaps which may be relevant to the challenges and to the broader objectives of the project. This is discussed in more detail in Section 2.2

The survey of literature identified 50 separate literature resources and these could be allocated into the following categories:

- Data Portal and Data Initiatives Documentation;
- Research papers;
- Other grey literature.

Detail of each of these literature lists are presented in Appendix B.

Testing the discoverability of the various data initiatives (not the data themselves) through use of different search engines and search terms was assessed. This is to understand whether commercial, non-governmental and private sector users with no previous link to these activities would find them quickly and easily when identifying a need to access North Sea data.

There are barriers to finding information on data adequacy

A high priority for the literature survey was to focus on data adequacy and what 'adequacy' actually means in the context of finding, accessing and utilising data. Addressing this aspect started to provide information on finding and accessing data – for example, the use of electronic subscription services when surveying literature. There is a cost implication in accessing much scientific literature, which is difficult to accurately forecast when undertaking a piece of commercial or potentially charitable work.

Many non-academic organisations do not have comprehensive library services which are invaluable in assisting with targeted data retrieval. Some organisations may be operating in situations where even internet access is filtered so as to become an obstacle. Sometimes necessary software to work with particular data formats requires Information Technology sections to approve the download and installation. This means that the IT section may take a considerable time to test for system compatibility prior to releasing and installing the 'free' software on a potential user's machine or providing server access. This adds a time penalty to data access and further resource requirement, even if that necessary software is provided free.

2.2. Data Register

The findings from the literature survey are recorded in a data register. The data register is implemented as a spreadsheet and records the accessibility of the literature and the value of the literature. The concepts of Accessibility and Value are described in Table 2.1 and Table 2.2 below. The approach taken for the literature review in the context of the Access and Value criteria is shown below in Figure 2.1.

Table 2.1: Accessibility Criteria

AccessCriteria	
Discovery – *Can the dataset be found?*	Can the dataset be found. Any data that cannot be found, whether by humans or search engine will have no value
Evaluation – *Can the dataset content be assessed?*	Is there sufficient information (metadata) to determine if the dataset is of value? This determines whether a user will make use of the data. The evaluation metadata should ideally allow all the value criteria to be assessed

Table 2.2: Value Criteria

ValueCriteria	
Contribution - *What impact the data have on solving the problem.*	Fundamentally the data must contain the required parameter or phenomena to be of value. This is clear for single variables, but has more meaning when applied to groups of data such as total suspended matter, hydrodynamic conditions, rainfall etc. For example, total suspended matter alone may have less contribution to solving a problem than a combination of water quality and hydrodynamic parameters.
Location - *Where the measurements have been taken and at what time.*	The spatial and temporal distributions of the data are critical as most data are required for a particular site and/or time frame.
Commercial- *What the data costs.*	Any data will have to be selected within the constraints of what the data costs and the allocated budget. For end-customers data costs need to be set against benefit realised. Previous studies have shown organisations do not object to paying for data, but pricing needs to be clear so they can budget for it. Commercial terms are also a factor as this may dictate what can be done with the data
Attributes - *Fitness for purpose.*	This covers a number of factors about the data such as accuracy, precision and spatial and temporal resolution. In addition, it also embraces quality control parameters such as metadata and the traceability of processing applied to the data.
Delivery - *Can the data be supplied in time.*	Delivery is important in time critical applications. This is particularly the case in emergency operations such as monitoring oil spills, and in areas where the data have a short shelf life e.g. weather forecasts. This may also encompass the continuity issues of data, i.e. can the data be supplied on an on-going basis.
Usability - *How easy is it to use the data*	This covers such factors as the ease of visual presentation or ease of extraction to provide input to a numerical model or software package. Clearly, the demand will be greater for data that can be readily consumed by the customer.
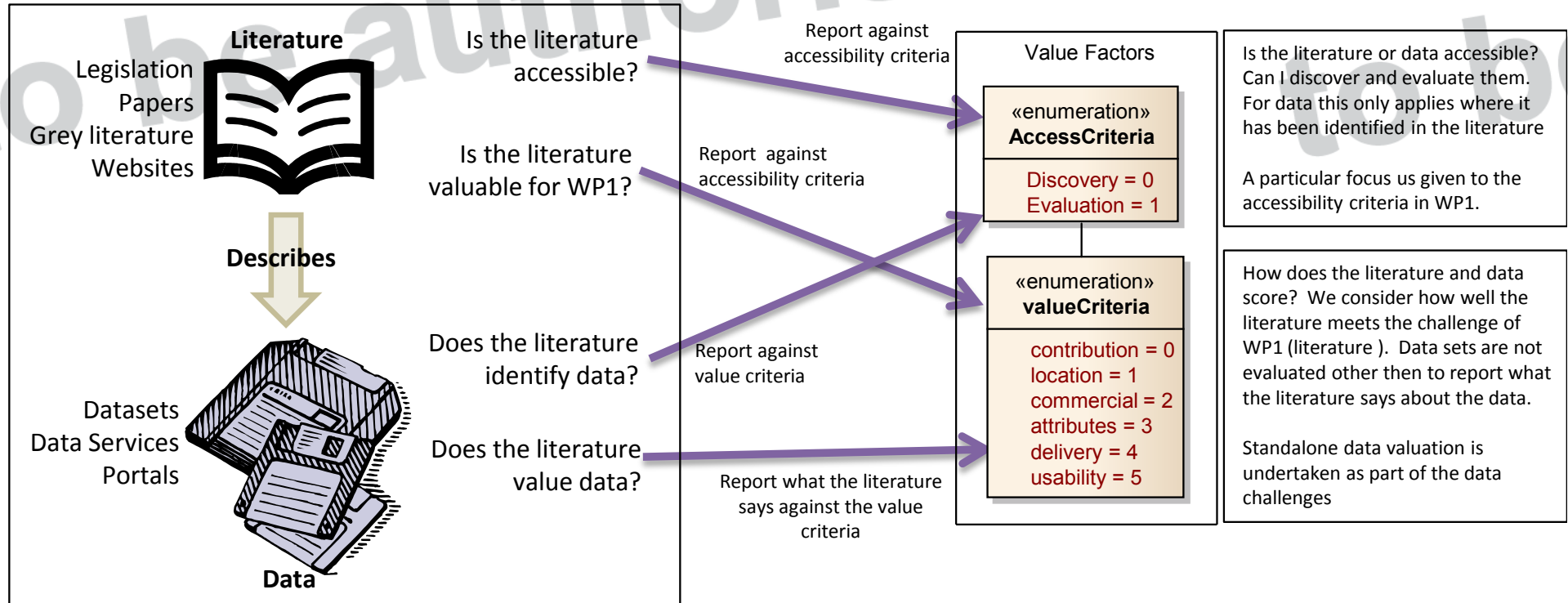
Figure 2.1: Literature Review Approach

3. Results of literature survey

3.1. Introduction

The items identified in the literature search are presented in Appendix B. Each of these items were also compiled into the data register as described in Section 2.2 I, This was partly to inform the approach to the challenges, which will also use this system, but also to document the various attributes of the literature information as it was discovered and its usefulness in informing this survey. The data register model can be found in Appendix C. Appendix B and C contain the 'raw' results of the literature review. subsequent sections in this chapter present the results. Overall, the results from the literature survey are presented as follows:

- Appendix B Literature identified;
- Appendix C Value assessment of literature;
- Section 3.2 Results from literature of policy initiatives for marine data management in the North Sea;
- Section 3.3 Results from literature of marine data management initiatives for the North Sea;
- Section 3.4 Results from literature on discovering data sources for activities in the North Sea;
- Section 3.5 Results from literature on accessing data to support activities in the North Sea;
- Section 3.6 Results from literature on the value of current data to support activities in the North Sea.

3.2. Policy initiatives for the North Sea

Documentation from the policy initiatives was also sought and reviewed as shown in **Error! Reference source not found.**

Table 3.1: Policy initiatives documentation

Project	Summary	Documents
OSPAR Convention	[The Convention for the Protection of the Marine Environment of the North-East Atlantic](#) (1992)	-OSPAR Convention Annexes (I-V) - OSPAR Quality Status Report (QSRs)
HELCOM Convention	Convention on the Protection of the Marine Environment of the Baltic Sea Area	HELCOM Convention Amendment Articles 16-18 HELCOM COMBINE manual HELCOM Map and Data Service
Marine Strategy Framework Directive	EU Directive setting out a regional approach to the management of our seas, requiring Member States to cooperate with their neighbours when developing their marine strategies.	Marine Strategy Co-ordination Group reports (particularly WG DIKE – Data, Information and Knowledge Exchange)

Project	Summary	Documents
INSPIRE Directive	EU Directive setting out a general framework for a Spatial Data Infrastructure (SDI) for the purposes of European Community environmental policies and policies or activities which may have an impact on the environment. Its prime objectives are data exchange, data sharing and data re-use, for effective governance and policy making purposes.	INSPIRE Technical guidelines
Aarhaus Convension	The right of everyone to receive environmental information that is held by public authorities (**"access to environmental information"**).	

3.2.1.   Marine Strategy Framework Directive (MSFD)

The Marine Strategy Framework Directive (MSFD) outlines a transparent, legislative framework for an ecosystem-based approach to the management of human activities which supports the sustainable use of marine goods and services. The overarching goal of the Directive is to achieve 'Good Environmental Status' (GES) by 2020 across Europe's marine environment.

Marine strategies will be implemented through regional sea conventions to protect and conserve the marine environment, prevent its deterioration, and, where practicable, restore marine ecosystems in areas where they have been adversely affected. The Conventions seeks to protect the marine environment by establishing programs of scientific and technical research. The MSFD also stipulates that data should be made available by the competent authorities on the state of the marine area, activities and measures adversely affecting activities introduced by the convention.

3.2.2.   UN Conventions

The OSPAR and HELCOM conventions provide an infrastructure for protection of the marine environment for the North Sea (NE Atlantic and Baltic respectively). The convention documents do not specifically identify gaps in marine data, however they do underline the importance of data and support its generation.

3.2.3.   Aarhus Convention

The Aarhus Convention (1998) Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters enforces The right of everyone to receive environmental information that is held by public authorities (**"access to environmental information"**). This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment. Applicants are entitled to obtain this information within one month of the request and without having to say why they require it. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession" "

One of the national data initiatives to meet the Aarhus Convention aspirations is that of the UK government, which is currently assimilating various previous governmental departmental websites, in order to provide a completely linked website at www.gov.uk. This website also has an area for accessing government data

(data.gov.uk) and each dataset that has been catalogued so far has a star rating on the provision. This follows Tim Berners-Lees' Five Stars of Openness

Table 3.2: Tim Berners-Lees' Five Stars of Openness

Star rating	Description
★	make your stuff available on the Web (whatever format) under an open license
★★	make it available as structured data (e.g., Excel instead of image scan of a table)
★★★	use non-proprietary formats (e.g., CSV instead of Excel)
★★★★	use URIs to denote things, so that people can point at your stuff
★★★★★	link your data to other data to provide context

Source: http://5stardata.info/

This type of grading system allows users to understand how 'open' the data is prior to downloading it and gives value information which is simple to understand, unlike various other types of scientific metadata provided in data portals, although it cannot substitute for that metadata. It is additional user-friendly information and this approach of providing additional user-friendly information has informed the design of our grading spreadsheet system (data register model).

Unfortunately, many of the marine environmental datasets score 0 stars, demonstrating that although the datasets exist, they cannot be accessed directly. Many of these marine environmental datasets also have metadata and exposure through the UK Marine Environmental Data and Information Network (MEDIN), but likewise, the data is not yet directly accessible through this route either.

3.2.4.   INSPIRE

Documentation on the INSPIRE Directive was discoverable with a simple Boolean search of "INSPIRE" or 'environmental data directivetive' using an internet search engine. However, several tries were required to find a good search term not including the name, so anyone currently unfamiliar with INSPIRE could encounter difficulties with discovering it. The favoured search engine was Google, although Bing and Yahoo Search were also tested. The INSPIRE website offers a feedback survey to those using it, although it asks visitors to the site to fill in the survey prior to accessing the site, which may lead to a lower response rate than if the survey popped up when visitors attempted to leave the site. The landing page of http://inspire.ec.europa.eu/index.cfm has a clear link to INSPIRE library, which makes the documentation location very obvious and is thus user friendly.

3.3. Data management initiatives for the North Sea

Data management initiatives are often implemented to meet the obligations of policy instruments to improve management of the environment. Documents from the various initiatives were read, and the outcomes recorded below in **Error! Reference source not found.**.

Table 3.3: Portal and data initiative documentation outcomes

Data search	Outcome
EMODnet reports	EMODnet final report proved to contain by far the most useful feedback relating to accessibility, coverage and usability of data compiled for each of the portals for the North Sea. The reports were however often difficult to locate and are not directly available via the current individual portal websites, or links to their location adequately expressed.
SeaDataNet reports	Data Policy document was useful. Further information was available in the project handbook though this wasn't clearly signposted on the website. No reports relating to product development were found.
EurOBIS reports	Good source of papers assessing quality, coverage and fitness for use of marine biogeographic data
BLAST reports	The State of the Art report was particularly useful
EDMERP	Provides metadata on relevant reports which include contact details but no way of directly accessing the reports.
EDMED	Inventory of marine data and Data Holding Centres. Appears to have been integrated into SeaDataNet
EDIOS	Directory of ocean observatory metadata. May be useful for challenges. Appears to have been integrated into SeaDataNet
MESMA	Primarily provides access to policy documents, useful for context
MASPNOSE	May provide useful contextual reports for some of the challenges, no papers found directly relating to data management
GMES	Useful for signposting to other EU projects such as MERSEA and MarCoast
MyOcean	Registration to the website required before any document searches could be undertaken
WINDSPEED	Very good access to project reports which contained information on project methodology
Project Adair	The scope of the project was too localised to benefit the literature survey.
MESH	Much of the documentation is quite dated in the context of this project. It is therefore considered likely that the reports on data gaps would now be out of date
MEDIN	The structure of the portal and report pages were very accessible. Documentation was useful, although some broken links were experienced during the review.
OSPAR Convention	Documents useful for context. No specific gaps identified from review of literature.
HELCOM Convention	Documents useful for context
Marine Strategy Framework Directive	Documentation useful for context. Restricted registration to CIRCA required to access WG DIKE papers and thus these papers were not scrutinised.
ICES	Documents particularly useful regarding user feedback survey, giving an idea of the gaps which exist between provider and user perceptions of data

Data search	Outcome
	requirements.
Google searches	Discoverability was more exposed – various documents were located which did not directly link to initiatives, but assisted in adequacy considerations
Other search engine searches	Discoverability proved to be more awkward, with search results being less focussed. This may reflect the familiarity of the users with particular search engines, or indexing algorithms.

3.3.1.   INSPIRE

Data management policy instruments such as the INSPIRE Directive encourage the streamlining of data, for the North Sea and beyond, through the development of data standards encouraging interoperability, guiding quality assurance and enabling the development of harmonised derived datasets.

Inspire data standards are all based on ISO standards for metadata, data product design and data delivery via web services. INSPIRE has become the EU reference for data interoperability, however many of the data services relevant for marine data fall under Inspire Annex III which means Member States have until 2019 to adopt INSPIRE standards. INSPIRE however is only about data frameworks, it does not explicitly consider data content.

3.3.2.   EMODnet

The European Marine Observation and Data Network (EMODnet) is a consortium of organisations within Europe that collate marine data, data products and metadata from a broad range of sources with the aim of improving access to quality-assured, standardised and harmonised marine data. EMODnet is an initiative from the European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE) as part of its Marine Knowledge 2020 strategy. EMODnet complements INSPIRE in that EMODnet works with public authorities in Member States to release their data in accordance with INSPIRE standards.

EMODnet has generated six sub-portals which provide access to marine data from the following themes: bathymetry, geology, physics, chemistry, biology, and seabed habitats (EUSeaMap). All of the EMODnet portals are up and running though some are in earlier stages of their development. These portals provide access to metadata and, where possible, the download of derived data, for a broad range of datasets for the North Sea.

EMODnet is easily discoverable via search engines, using the term 'European marine data initiative', where it is returned on the front page of results. However, the documentation associated with each sub portal has become very difficult to discover, partly due to some original sub portals having had their own web address, which have subsequently been rationalised. In some cases both the outdated address and the new address provide a portal and only the outdated address has the documentation associated with it explicitly. This provides possibility for confusion, particularly with respect to which site will be of use and contains the most recent information.

Whilst a web address exists with all of the EMODnet documentation contained in one place, reaching this is more accidental than well-signposted from the portal sites, as the description on the link ("European Marine Observation and Data Network on EU maritime forum" button on the new rationalised portal pages) does not suggest that it is a document repository, especially since frequent internet users associate 'forum' usage with

internet forum message board pages. There is opportunity to improve terminology to enhance user-friendliness.

3.3.3. EurOBIS

The use of data standards such as taxonomic classifications facilitate the discoverability of data by the end user. For example, EurOBIS set standards for taxonomic classifications based on WoRMS – the World Register of Marine Species, which was then re-used for the development of the EMODnet Biology web portal. The use of shared standards for classifying data encourages data providers to standardise taxonomic classification during data recording and enables users to find biological data through a broader application of the same standards of classification. EurOBIS put in place quality control procedures to check quality, completeness and identify errors. As part of the procedures, a quality flag system was developed to help users identify fit for purpose data. It is suggested that the quality flag system could be extended, across the various initiatives, to allow users to add their own flags indicating how useful the data was found for their purposes, such that crowd-sourced information makes the quality system more robust. Our assessment from each challenge, the data register model, is one example of how this approach could be applied, although it may need refinement to be more explicit (fields such as attributes are fine when an explicit decision is taken about them between a working team, but are unsuitable for general dissemination at present).

3.3.4. ICES

Notes from the ICES Working Group on Operational Oceanographic Products for Fisheries and Environment (WGOOFE) in ICES Insight 2010 stated "it became clear that the wider ICES community might not be adequately represented by the users around the table. There was an additional danger that producers would drown out the views expressed by the user community". They sent out a user questionnaire to marine researchers from environmental and fisheries backgrounds and the answers returned illustrated that the producers and users emphasis were not matching. Preferences about formats of data were divergent, but 91% of researchers wanted direct access to numerical data, whilst only 40% were interested in graphical presentations. This shows that the presentation format or data products are not often valued as highly as raw or meaningful numeric data for many users, despite producers expending considerable effort in developing products. The user community questioned was also the group as explicitly defined by ICES, so did not include the widest possible user community, which may alter the results. A more detailed write up of this exercise is available (Berx et al, 2011).This may change with time, but is a useful exercise that many data portal initiatives have not yet engaged in, or have failed to document adequately in an area which is directly accessible or signposted from the portal.

Data Portals and Engagement with the wider Blue Economy

Marine data initiatives either directly or through third parties, should have greater outreach to those who may be considered likely to be Blue Economy or marine community data users to actively elicit their feelings and understanding of likely usage and usability. This will be required to ensure that the data portals are genuinely providing value to this sector of the user community.

When data portals do gather feedback from their users, there can be a focus on gathering statistics about web-site visits, rather than capturing the information on usability such as:

- was the data required held or signposted in the portal?
- was the data successfully accessed?
- was the data useful for the intended purpose?
- was the data adequately described prior to download, so that the user understood what was being provided?
- what sort of time did it take to access the data?
- does the data require specialist or proprietary software to read it?

Publishing this feedback in reports which are directly accessible from the portal site can further the dialogue with users, who are more likely to volunteer their views if they see that those views are actively considered.

3.4. Discovery of data for North Sea challenges

3.4.1. Documentation Review

There are numerous projects and initiatives underway to improve the management of the Blue Economy and data availability for the North Sea. Discovery of the relevant projects is a challenge in itself as many of the projects and data resources are interlinked, with data from one repository feeding into one or more other portals. The "Review of International Data Initiatives" available on the MEDIN website provides a useful summary and diagram showing the relationships between the data initiatives currently underway and is therefore reproduced below in Figure 3.1. In many cases, the task of identifying documents most likely to contain useful feedback on data fitness for purpose and accessibility, such as the methodological reports, was more challenging than sourcing the data itself.

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Figure 3.1: MEDIN representation of relationships between EU data initiatives

Source: MEDIN 2012, "International Data Initiatives Summary"

The overlap between the portals does complicate the task of gathering literature relating to the development and content of the portal, the data that they hold and user feedback. The user needs to be able to identify where possible the primary supplier of a dataset, in order to be confident that they are sourcing the most up-to-date definitive version of the dataset. This can be difficult where the pattern of supply of updates between the data provider and other portals is not made clear. Much of the information provided in the EMODnet portal reports on data gaps and quality relates to information drawn from other portals. For example, the Physics portal uses data from both SeaDataNet and MyOcean as key resources.

The broad range of data initiatives currently active are further complicated by the presence of webservices on the internet which are no longer actively being updated and, though still relevant, have been superseded by more recent initiatives and research. For example, any information gained through reviewing reports from the MESH project (last reports published in 2007), though important for documenting the work carried out for the MESH project, are not necessarily useful to the literature review as data issues and gaps identified then may have been resolved.

Similarly, several links to documents identified led to webpages which were no longer active. In some cases, the webpages appeared to have been security compromised according to virus checking or firewall software and as such, were not accessed. Whilst false positives are known to occur with such software, the risks of ignoring organisational security were too high to pursue these websites further.

Databases such as that which the Global Monitoring for Environment and Security – European Earth Observation Programme (GMES) and websites such as the MEDIN portal provide useful signposting to current EU funded projects. However, it was also easy to find signposting information that was outdated or

contained numerous broken links, when attempting to start from search engine enquiries. This 'noise' in information gathering by people unfamiliar with what initiatives might be live carries a significant resource implication for those users who may be restricted by time or money in their efforts to access data. Unfortunately, despite considerable searching, very little proactive published feedback from industrial or commercial users could be located. This was of considerable disappointment and the reasons behind this must be considered.

> Unfortunately, despite considerable searching, very little proactive published feedback from industrial or commercial users could be located. This was of considerable disappointment and the reasons behind this must be considered.

The Blue Economy is not always considered as an important data user – for example, the International Council for the Exploration of the Sea (ICES) Data and Information Group explicitly recognises only two types of user: that of internal to ICES for science and advisory purposes; and the marine and maritime research community. The type of data that ICES holds with respect to fish stocks, eggs and larvae will however be almost essential for anyone required to undertake an environmental impact assessment in the North Sea, even if just as a basis for informing the design of local surveys. Likewise non-governmental organisations, who represent a significant proportion of interested marine stakeholders, may wish to interrogate such data for their members, who have considerable influence in the way that the marine environment is managed.

Thus, there is a need for such users to be considered and for more information about usage of the data to be made available. It was noticeable how difficult it was to find relevant literature describing usage of data portals. Even where such literature exists, it is frequently not directly located with the data portals and poorly described in terms of tagging and exposure such that search engines can recognise and return such in web searches.

There also seems to have been very limited involvement of any data users in the provision of many of the data portal initiatives, with the data producers providing the impetus. Whilst it is laudable that the producers are providing access, the lack of feedback from users has led to a disconnect in what is provided against what is required. Few consultancies that represent potential marine and maritime developments have the resource available to them, or the motivation to engage sufficiently with the data portal working groups and partners, in order to reflect this type of usage.

Limited mention was made of data users from the commercial and non-governmental organisations. This can lead to an amplification of the data producer's views on what and how data should be provided, at the expense of the perspective of potential users outside of governmental policy and decision making. This runs the risk of failing to meet Blue Economy requirements, as representatives of that sector are not part of the brainstorming and direction setting at such meetings.

3.4.2.   Data Review

Where documentation has been identified of potential use to challenges for later project work packages, the information found has been summarised and signposted in the data inventory. This meets the requirement of the literature to identify documents while avoiding duplicating effort with later work packages.

The key points identified during the study relating to sourcing data for the North Sea are as follows:

There exists extensive signposting for data where metadata has been generated. However, it remains difficult to identify and source data where metadata has not yet been produced. Extensive feedback has been provided through the EMODnet reports and via projects such as BLAST on the harmonisation of metadata for EU projects. Many instances have been identified where metadata is not available for datasets or the metadata has been compiled to a different standard or in a different language. But standardisation of approach, such as defined vocabularies, URI assignation, code lists and dataset citations, is gradually emerging in the data provider community and is anticipated to lead to improvements in this area.

The EMODnet project reports for each of the portals contained by far the most useful and accessible information relating to data access, coverage and usability for the North Sea Data. Many of the portals have set up a facility for receiving feedback from users which will prove very helpful in identifying data gaps and shortcomings. It however proved difficult to source the project reports relating to each portal. While some project final reports were held on the Europa Webgate resource, others were found on parallel portal sites, such as the Pilot EMODnet – Biology Pilot Portal at http://www.emodnet-biology.eu/ . No link to the same report was available through the central EMODnet portal which led to a different web address for the Biology Portal http://www.emodnet.eu/biology. EurOBIS data feeds into EMODnet, also available via the EurOBIS website and portal.

The data portals provide a valuable resource for signposting users to data providers for access to raw or meaningful numeric data. In many cases, data which can be downloaded from portals has been derived from multiple sources, quality assessed and harmonised to produce derived datasets which can be accessed via the portal. Where users require access to source data, they will in many cases need to revert to primary data providers to gain access. Access from primary data providers is highly variable in terms of response times, which can have an effect on timetabling and forecasting for commercial users.

The reports produced for the BLAST project provided useful insight into issues surrounding the sourcing of data for the North Sea. The project developed a metadata catalogue to gain an overview of existing projects, reports, documents and data. The database was developed to comply with both the INSPIRE directive and ISO19115 metadata standard. the "State of the Art" report assessed the data used for the project for INSPIRE compliance and to ensure the metadata could be useful beyond the lifespan of the project.

The BLAST project - State of the Art and Data audit for North Sea Region WP 3.1 and 3.2 – Final report (2011): Partner countries experienced different challenges in producing INSPIRE compliant discovery metadata:

- For Belgium, Denmark, difficult to access metadata for data not owned by project partners.
- Language differences , much of Norway's metadata is in Norwegian only.
- Review of parallel projects identified lack of standardised discovery metadata for EU projects.

The multilingual needs for data portals was resolved in the case of the EMODnet Geology portal by delivering data via the multilingual OneGeology – Europe portal.

It is unclear as to whether the BLAST metadata catalogue has fed back to other EU portals to improve discoverability as information on that was not discovered. This was a common occurrence with reports – they

would set out ways forward, but no follow-up reporting was associated with this, so there was a lack of clarity as to whether the ways forward or recommendations were ever pursued. This leads to a lack of confidence that full value is being extracted from every data initiative project.

3.5. Accessing data for North Sea challenges

3.5.1.   Information Review

Most of the documentary resources collated for the literature review were freely available online. In many cases, reports could be sourced through policy maker websites or via data and information portals.

In some cases, such as for SeaDataNet and CIRCA[3], registration was required to a website by the user to gain access to reports. Registration can often act as a deterrent to users, with concerns over whether this signifies some type of legal acceptance on behalf of companies, which staff are not authorised to undertake. It is also used to restrict access – for example, CIRCA access is not freely available to everybody.

HR Wallingford also had the benefit of membership to online resources such as the Web of Science, the British Library and Elsevier Science Direct. HR Wallingford has a strong focus on research in addition to consultancy and engineering services, but it should not be assumed that all potential data users on behalf of commercial and non-governmental entities will have invested in such subscription services. Whilst open source peer reviewed scientific papers are becoming more common, with services such as PLoS One or the Open Oceanography Journal increasingly popular, a vast majority of scientific literature is still extremely costly to access, although free services for discovering literature, such as Google Scholar, are now sophisticated and offer good results, with at least abstracts available for reading.

3.5.2.   Data Review

Vast quantities of physical, environmental and socio-economic data has been produced for the North Sea, supporting the development of the Blue Economy. Each of the North Sea nations hold government-funded national repositories of data as well as generating extensive research-led and commercially-led marine datasets. Accessing marine data for the North Sea is therefore a complex process where users are required to identify definitive up-to-date and useable data, often at a cost, whether that cost be monetary or temporal.

The key issues affecting access to data include commercial sensitivity, intellectual property and cost. In many cases, data is freely available from data portals unless explicitly specified. This is the case for SeaDataNet. EMODnet portals provide metadata and derived data which are freely available while raw data is accessible via data providers. Commercial data often proved difficult to obtain for many of the portals.

Licensed data is often available from national and international data repositories such as hydrographic offices and government funded research facilities. Raw or meaningful numeric data is however often difficult to gain access to and there may be cost implications or time implications. The latter has often been neglected in the past, but is of importance in understanding data adequacy for commercial projects – response times from organisations holding data are extremely variable, particularly where data provision is not a priority for those organisations or has had insufficient resource allocation. This has particular implications where a strict timetable has been imposed by the commercial pressures and has led to inferior

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[3] CIRCA is the document management system utilised by the EU MSFD working groups

or patchy data being used in preference to more complete and extensive sets, which were more difficult to access in a timely manner.

Research funded data are in some cases freely available and raw and meaningful numeric data can be found, but this varies between research bodies.

Commercial data is often sensitive, with restricted access. Even when commercial data sensitivity is lessened, there are rarely drivers to release this to the wider community. Sometimes there are concerns that there may be a decrease in market share if the data is made available to competitors. However, sometimes in newer markets, all or a majority of interested companies are agreeable to data gathering being a co-operative effort, or to regulatory restrictions requiring data dissemination. This has been true for some of the data gathered for the offshore renewables market, where initiatives such as the Collaborative Offshore Wind Research Into the Environment (COWRIE) and the UK Crown Estate Marine Data Exchange have been put in place.

Non-governmental organisations often act as data providers too, with volunteer surveys of considerable use, such as the Wetland Bird Survey (WeBS) carried out by the British Trust for Ornithology and again, efforts should be made to ensure that representatives of this sector have the resources available to them to be included in the data community, with their unique perspectives on user requirements as well as incorporating their data gathering outputs in the data portal dissemination community.

Data and metadata discovery portals such as EMODnet, SeaDataNet and MEDIN (UK) play a crucial role in providing signposts where raw and derived data cannot readily be downloaded. However, it has been found in the case of MEDIN that the service has been underutilised as initial experiences of users with actual data accessing have not lived up to expectations. These users then seek alternatives, rather than persisting. This has been acknowledged as a weakness and the focus has turned from ensuring that the MEDIN Data Archive Centres (DACs) are populated with data, to considering the ease of data access.

The technical workshop held on July 1st and 2nd 2014, titled 'Making Marine Data Make a Difference – Linking Data to enable Societal and Economic Benefits' was convened in the UK to discuss these hurdles, drivers towards better data accessibility and the tools that might be utilised for this aspiration. This has been a response to the UK Open Data White Paper – Unleashing the Potential, which is not focussed on marine data, but provides a great deal of direction to the UK government departments involved in collection and provision of data.

Often the same data is available from multiple sources. This can make it difficult to ensure that the most up to date versions were found. Portals again are key to identifying original data providers and documenting "versioning" metadata.

3.6. Value of data for North Sea challenges

3.6.1. Information Review

The fitness for purpose of the documentation reviewed for the literature survey varied a great deal. The documents which provide the richest source of feedback on data gaps are the methodological reports which accompany the development of data initiatives such as data and metadata portals and data harmonisation projects.

Although some data initiatives provide valuable feedback on data management issues experienced during their set-up, many others do not provide open access to their technical reports. The provision of these

reports and ease of access is something that should be encouraged to ensure that information on data gaps remains discoverable and available.

The identification of specific data gaps via the review of academic papers proved more difficult as papers did not always discuss data issues or failed to provide enough detail to make the feedback useful. Identification of feedback through the review of papers proved time consuming for less return than the review of methodological reports and the review and regular management of user feedback.

Similarly, the review of minutes from working group proceedings provided limited useful feedback for the level of effort required to review the documents.

3.6.2. Data Review

Feedback

The provision of feedback from data end users provides a valuable insight into data shortcomings and gaps, user requirements and information on how data is being used. The facilitation of feedback was the weakest part of most data initiatives. It has been mentioned at apposite points elsewhere in this report that there is a real gap in terms of meaningful feedback to understand in many cases whether the aspiration of data underpinning future stimulation of the Blue Economy is likely to be met. More efforts are required for meaningful discussion with the communities that underpin such things, for example (but not exclusively) commercial consulting companies, port authorities or oil and gas industry, who often carry out data gathering exercises to inform developments, environmental impact assessments or other marine activities.

Each of the EMODnet portals set up an infrastructure for receiving feedback from portal users. The initial feedback comments received from users were reported on in the final reports. In some cases, the timeframe between launch of the portal and delivery of the report may have been too short to gain a fair representation of the challenges faced by users. The long term management strategy for feedback by each portal was not clearly documented in the reports.

Whilst many Blue Economy and non-governmental users were keen to receive raw or meaningful numeric data from providers, such data will require user manipulation. Some data formats could be provided which were not easily manipulated with standard available software, adding an extra time or cost implication in order to procure suitable software.

Metadata

There are more initiatives surrounding metadata than direct access to raw or meaningful numeric data. Controlled vocabularies are increasingly being implemented, along with direction as to what metadata is required for input to data portals, to standardise what users will require when searching for data.

The EurOBIS database employed stringent quality control procedures to improve the usability of data. The use of taxonomic standards, data viewing portals and a quality flagging system enable the user to identify data which is fit for purpose before they have downloaded the data or contacted data providers.

Portals, such as EMODnet and MEDIN which support INSPIRE compliant discovery metadata enable the user to gain an initial view on a dataset's usability by checking metadata relating to data delivery formats, extent and resolution before pursuing a dataset further. However, it is not always possible to assess data without initially viewing it. Some portals do not support a map viewing facility, limiting the user's ability to view the data before downloading it. Equally, where raw or meaningful numeric data needs to be sourced from

suppliers, it may not be possible to assess fitness for use until the data has been plotted and manipulated by the end user.

SeaDataNet identified the speed of upload of data to the portal as being key to its usefulness. Therefore the provision of metadata informing users of the survey and upload timeframes enables the data to be assessed for its fitness for purpose and filtered where necessary.

No information appears to exist about the speed of download of data for users, which is likely due to local conditions of users such as the type of internet connection available and the speed of local firewall and virus checking software. Nonetheless, download speeds do have an influence on whether users find the data useful or not. This was experienced when attempting to get time series data from MyOcean for a different project, where a limit was placed on how much data is accessible in one download.

Quality Management

Homogeneity in data is being encouraged through agreed data standards as promoted by the INSPIRE Directive. Many portal initiatives have actively pursued this with data providers, so whilst this is still currently a constraint, there is evidence that standards are being increasingly specified, utilised and documented as part of the metadata, particularly at the national governmental level.

During the harmonisation of Electronic Navigational Charts (ENCs) for the BLAST project, a new chart datum was developed to enable the co-ordination of land and sea data from countries surrounding the North Sea. This provided a harmonised seamless coverage between territorial waters and between land and sea.

The EMODnet biology report shows how data was reviewed to improve interoperability through quality control measure such as taxonomic standards and identification and removal of geographical errors.

Spatial Coverage

Coverage of data is likely to vary a great deal between datasets and for different areas within the North Sea region, and may be particularly reduced outside of territorial waters and in areas of lesser commercial human activity. The coverage and resolution of data depends on the commercial, national and EU priorities for gathering data and making it available. National and EU priorities have driven the collation of vast amounts of marine data for the North Sea, much of which is now accessible to end users. There are also extensive amounts of marine data that have been gathered for commercial purposes but have not been made publicly available.

In some cases, restrictions in access are due to issues of commercial sensitivity, although this is not always the case. Sometimes no resource is available to curate and provide the data, as lack of engagement from the commercial and non-government sectors with the data initiatives leads to a lack of consideration of the effort required to format, provide metadata and upload the information. It is not always clear to these sectors that any benefit would be derived by engaging.

The use of map browser facilities in data portals enables users to assess the spatial extent of data available via the portal, however, such services need to be quick and responsive for users to rate this facility highly. Specific feedback on data coverage for the North Sea will be best gathered through the collation and use of data for the project challenges.

The provision of feedback facilities for data portals and by data suppliers and the regular review and dissemination where appropriate of that feedback will both further the identification of data gaps and encourage the breaching of those gaps through the amendment of survey priorities where necessary.

A gap analysis was undertaken for EurOBIS data; the results are reflected in the EMODnet biology report which considers data coverage issues such as temporal gaps (lack of recent data and pre-1950 data), lack of commercial data and are reported in further detail in Hydrobiologia (Vandepitte et al 2011).

4. Key points for further discussion

4.1. Increasing the value of data services

It is highly recommended that outreach to those who may be considered likely to be Blue Economy or marine community data users to actively elicit their feelings and understanding of potential usage and usability will be required to ensure that the data portals are genuinely providing value to this sector of the user community. Documenting this outreach and linking to it from the data portal site, is also recommended to demonstrate that such user feedback is valuable and being acted upon.

Consideration needs to be given to whether data are truly accessible – the Tim Berners-Lee five star grading is being usefully applied by the UK government to their data initiatives. This could go further by also considering the time aspects of data accessibility, particularly when data is not directly downloadable but has to be requested from the data producer or archive centre. This project offers a data register model with a built-in method of assigning quality flags which can be further examined and refined to be more user-friendly.

As internet content matures, there may be a lack of curation to remove superseded, obsolete information, incorrect signposting or repair broken links. If resources are moved, then whilst information is removed, it would be useful for a link to the new information to be posted on the old site, rather than completely withdrawing the old site, for a limited time.

Resource requirements for maintenance and curation need to be explicitly stated and costed in any data provision initiative, so that users are aware of:

- whether the portal they are using is kept current;
- how long it will remain active; and
- how much confidence can be placed in the linking to other sources.

4.2. Challenges

Data discoverability depends on the search behaviour of the user seeking such information and constraints on resources, software and internet policies which may not have been considered previously by data providers. Dialogue between providers and users could assist in addressing some of these constraints.

Data accessibility may have some 'hidden' constraints, particularly with respect to time, resources available to the primary data provider or individual organisational information technology policies. These aspects should be identified as part of the challenges, to give a more realistic 'pseudouser' view.

Where user feedback is sought, consideration should be given to whether the feedback is focussed on meaningful questions about data discovery, accessibility, usability and value to that user. In addition, the widest possible range of potential users should be included in the solicitation of feedback.

Data portal sites where registration is required can act as a discouragement to potential users, particularly where it is unclear as to why registration is requested.

4.3. Data Products and Services

The Blue Economy comprises many actors and there is a desire to re-use data beyond its original collection intent, especially where the original collection was publicly funded. The key benefit of public services like EMODnet is in providing data custodianship, version control and flexible download services. Allocating resources to these task should be seen as a priority over creating new data products and services that widen the gap between data 'as collected' and data 'as provided'. They also burden the public sector with the need to maintain these products. Actors in the Blue Economy will take sound data and create innovative products (including web services and apps); unfortunately they would be less likely to undertake data curation tasks.

> **EMODnet in the Blue Economy**
>
> Services like EMODnet cannot expect to address all possible users of the data and should be cautioned against creating data products. There may be more benefit in focussing on creating routes for third parties, focussed on particular user communities, to exploit public data. These targeted data services may come and go with the market, however EMODnet should be a consistent layer, unaffected by such market or technological conditions.

5. Conclusions

This project reviewed literature on the adequacy of data on the North Sea to support the Blue Economy. The data review considered the accessibility of the literature, the value of the content of the literature and what the literature said about the value of particular data.

A general overview of existing information on data for the North Sea has been produced with the aim of providing context for the challenges and signposting to literature which has been evaluated for its usefulness in supporting the challenges.

The documentation collated for the purpose of the literature review was mostly freely available, but in some cases difficult to find. Gaining access to technical reports sometimes required registration to website, while other documents were linked to websites which were no longer active. Fitness for purpose of documentation gathered for the review varied with technical reports providing the richest source of information on data gaps while academic reports required a high level of effort to identify useful information.

The provision of data for the North Sea is supported by a complex network of data initiatives which enable access to data and metadata via online portals. The development of these portal and the associated projects underway to harmonise the data and make it more usable has proved a valuable exercise in identifying the gaps in marine data and challenges to making it accessible to end-users.

The lessons learnt from bringing marine data together via data portals such as EMODnet and SeaDataNet should be considered in conjunction with the needs of end-users to gain a full appreciation of the next stages in making marine data available. The (1) ongoing management of feedback facilities and (2) improving access to technical reports via the portals themselves will be key to improving our understanding of user requirements, facilitate the reporting of information gaps and quality issues and in turn enable them to gain a greater understanding of the data they use.

Data portals play a vital role in the sourcing and accessing of marine data through the provision of data download facilities, the signposting of raw data and provision of standardised discovery level metadata. The overlaps between portal facilities can however be confusing to users, particularly where identical datasets

can be sourced from different repositories. For the user to ensure that data downloaded is the most definitive and up-to-date version can be time consuming.

Some of the issues and constraints affecting user behaviour may have been 'hidden' by lack of documentation as they are not necessarily similar across different sectors. These include the organisational policies on information technology, availability of library services and competence (and confidence) of the users in search behaviours.

Key issues affecting access to data include:

1. commercial considerations , which limit the availability of large amounts of publically funded data through portals;
2. focus on aggregated data without maintaining access to the source data;
3. lack of provision for resource to make data available online or signposted by portals;
4. intellectual property, which often restricts the re-use of data;
5. cost, where users are required to access data under a commercial agreement; and

> **Commercial Data Supply**
>
> Although we recognise that although licencing and payment for data services may be regarded as a barrier to data users, they are a key enabler to value-add organisations building services to satisfy users in particular markets.

Information regarding the fitness for purpose of different datasets in particular contexts can only be gathered through (1) lessons learnt from undertaking the challenges and (2) regular review and acting upon user feedback.

Metadata and systems such as quality flagging play important roles in enabling users to identify data which meets their requirements. Data delivery formats however play an important part in the usability and fitness for purpose of data as, particularly in the case of raw data, can restrict the data's re-use without resourcing to expert support. However both metadata and data flagging are not at a maturity in the Blue Economy that they are systematically relied on when assessing data.

We are still very much at the Wild West stage of the Blue Economy when it comes to data provision across the North Sea. If you know where to look, you could probably find the data you need, but it is not a case of 'Google, click, download'. Services that deliver data are increasing and some are maturing, however the vast majority would not be considered as 'trusted providers' or the 'go to' place for data. Indeed many are not discoverable via web searches either. Furthermore data portals or independent literature do not give widespread information on the value of the data for a particular use. In most cases it is incumbent on the user to download the data and then make assessment as to its value.

HR Wallingford
Working with water

Appendices

A. Scope of work of Literature Review

WP1:	Literature Review	
Lead Contractors:	HR WALLINGFORD IMARES	
Start Date : Month 1		
End Date : Month 9		
OBJECTIVE :		Client Ref
• Summarise findings of existing studies relating to the adequacy and data available for the North Sea basin.		Sec 2.1.5
INPUTS:		
• Reports and information drawn from EMODnet and GMES projects, fish stock assessments, OSPAR and Barcelona conventions and the Marine Strategy Framework. • Search web based library portals such as Web of Science, Scirus, Scopus, GreyNet, Google Scholar and Biodiversity Heritage Library, • Additional sources proposed: BLAST,		
TASKS :		
	Collation of Documentation	
	Review of Literature	
	The literature review will seek to classify findings as per the following: • Data sourcing and availability • Data coverage • Data resolution and fitness for purpose	
	Reporting	
	Produce a report of results outlining the conclusions of each assessment as well as a consolidated view of each parameter.	
RISKS:		
	• Literature review does not identify all available data sources • Required input data is not obtained within the required timescale • Required input data is protected by the Data Protection Act • Required input data is privately owned data and not publicly available • There are unforeseen or unreasonable costs are associated with acquiring data	
EXPECTED OUTCOMES :		
	Understanding of the adequacy of data available in the North Sea, considering parameters such as: • Presence • Metadata availability • Discoverability • Accessibility (including costs) • Purpose for which dataset was gathered • Other purposes for which dataset might be suited • Spatial coverage and resolution of datasets • Compatibility with other datasets • Quality assurance information	

WP1:	Literature Review
EFFORT AND STAFFING:	
Staff	
	25 days, HR Wallingford 6 days, MEP 23.5 days, IMARES

B. Literature Reviewed

B.1. Data Portals and Initiatives

Table B.1: Data portals and initiatives

Project	Summary	Relevance	Documents
EurOBIS	Database of biogeographic information on marine organisms	Data portal covering North Sea area linking users to marine species occurrence information.	MarBEF Data reports
EMODnet	European Marine Observation and Data Network – Aims at building a European marine data infrastructure	Framework of several data portals linking users to data arising from monitoring and surveillance. Covers North Sea area.	EMODnet workshop reports EMODnet final report
GMES	Global Monitoring for Environment and Security – European Earth Observation Programme. Includes a database of projects funded by the European Commission and the European Space Agency	Framework for various data portals linking users to data arising from remote sensing.	- MyOcean 2 reports - DORIS_Net reports
EDMED – European Directory of Marine Environmental Data	Developed by SEA_SEARCH and SeaDataNet EU initiatives	Data portal that has established itself as a European standard for indexing and searching data sets relating to the marine environment.	Products and tools available on SeaDataNet website (http://www.seadatanet.org/)
EDMERP – European Directory of Marine Environmental Research Projects	Developed by SEA_SEARCH and SeaDataNet EU initiatives	Data portal covering various European research projects	Products and tools available on SeaDataNet website (http://www.seadatanet.org/)
EDIOS – European Directory of Ocean observing Systems	Developed by EuroGOOS initiative	Data portal covering various observing systems operating repeatedly, regularly and routinely in European waters.	Products and tools available on EDIOS website (http://www.edios.org/)

Project	Summary	Relevance	Documents
MEDIN	Marine Environmental Data & Information network is a partnership of public and private UK organisations committed to improving access to marine data. MEDIN report directly to the Marine Science Coordination Committee (MSCC)	Data portal covers data in UK and abroad. Data standards review and quality reviews Data delivery to global databases	Review of EU data initiatives Analysis on reporting of marine data to Europe
BLAST - Bringing Land and Sea Together	Interreg IVB project for the North Sea Region Programme focussing on the harmonisation and integration of land and sea data.	-Data requirements for ICZM - Harmonization of spatial maritime information used for navigation and land-sea modelling	State of the Art and Data Audit for the North Sea Region WP 3.1 and 3.2
Project Adair	Partnership between Historic Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) to improve the record and dissemination of the marine historic environment to underpin Scottish Ministers' policies for encouraging sustainable economic growth in the coasts and seas around Scotland	Presents marine heritage information for Scottish waters	Project Adair Report 2011-12
MESH	Establishing standards to produce a framework for quality seabed mapping in the future	Accurate, repeatable and standardised methodologies for data collection and interpretation for seabed mapping.	Products and tools are available through the website (http://www.searchmesh.net/).
WINDSPEED	The overall objective of the project was to develop a 2020-2030 roadmap for the deployment of Offshore Wind Energy (OWE) in this region of the North Sea as bounded by Belgium, Denmark,	Present state (in GIS) and future trends data for major human use functions in Central and Southern North Sea. Overview of policy for development of human use functions	Many reports and a scientific publication available through the website (www.windspeed.eu).

Project	Summary	Relevance	Documents
	Germany, the Netherlands, Norway and the United Kingdom. The potential for OWE and claims of other human use functions were included.	Interactions between human use functions Development of Decision Support Tool for spatial planning. Roadmap for the deployment of offshore wind energy (OWE) in the Central and Southern North Sea.	
MESMA	MESMA will supply innovative methods and integrated strategies for governments, local authorities, stakeholders and other managerial bodies for planning and decision making at different local, national and European scales. The aim is to combine an optimized use with a sustained ecosystem of high quality, taking into account ecological and economic differences.	This data system, containing information on the distribution of marine habitats and species, economic values and benefits and human uses and its effects will also be an interface between science, policy and decision makers. MESMA will supply strategic tools for sustainable development of European seas and coastal areas. An integrated toolbox that can be applied throughout Europe and includes the socio-economic settings and requirements	Products and tools are available through the website (http://www.mesma.org/).
MASPNOSE	Facilitation of concrete, cross-border cooperation among European countries on ecosystem-based maritime spatial planning (MSP).	Building on previous and ongoing initiatives, the project will explore opportunities for collaboration among North Sea countries and envision an international strategy for the Southern North Sea, establishing elements for a common agenda for cooperation of countries in the region	Reports and other project related information is available through the website (https://www.surfgroepen.nl/sites/CMP/maspnose/default.aspx).
Impact Assessment	Analysis of the impacts of many human activities in the Natura 2000 (Habitats Directive and Birds Directive) areas on habitat types, habitat species and bird species	Data about the spatial and temporal distribution of activities, species and habitats as well as the sensitivity of these species and habitats for those activities.	Several reports

Project	Summary	Relevance	Documents
	with conservation objectives. Revelation of the activities that may compromise the Natura 2000 conservation objectives. Proposal of mitigation measures to meet the objectives.	Identification of the habitats and species not meeting the conservation objectives.	
ODEMM	Options for Delivering Ecosystem based Marine Management. The overall aim is to develop a set of fully-costed ecosystem management options that would deliver the objectives of the Marine Strategy Framework Directive, the Habitats Directive, the European Commission Blue Book and the Guidelines for the Integrated Approach to Maritime Policy.	Operational Objectives to achieve the High-Level Policy Objectives set by the MSFD and the HD, and with reference to the proposed Maritime Policy; Management Options to meet the Operational Objectives; A risk assessment framework for the evaluation of Management Options and the risk; A cost-benefit analysis of a range of Management Options using appropriate techniques; Stakeholder opinions on the creation of governance structures directed towards implementation of the ecosystem approach, Communicating and consulting on the outcomes of the project effectively with policy makers and other relevant user groups.	Many reports and some scientific publications. Available through website (http://www.liv.ac.uk/odemm/)
BMDC	The Belgian Marine Data Center (BMDC) provides a web portal for monitoring data mainly from the Belgian Coast. An internal quality check procedure is applied to	The data include a number of bio-chemical and optical parameters as well as remote sensing reflectance data.	Reports associated with the centre not identified

Project	Summary	Relevance	Documents
	any archived data.		
BODC	The British Oceanographic Data Centre (BODC) is a UK national facility, holding a large number of biological, chemical, physical measurement data of the marine environment, for search and data distribution.	Publicly accessible marine data including biological, chemical, physical and geophysical data	Reports associated with the centre not identified
MaNIDA	The Marine Network for Integrated Data Access is a German national facility. It aims to provide a networked approach to access and mining of federated e-infrastructures together with a management strategy targeting its long-term sustainability and create a new paradigm in respect to integration, harmonization and aggregation of various types of quality-controlled data and related data products.	The data portal offers an integrative "one-stop-stop" framework for coherent discovery, visualization, download and dissemination of scientific information originating from nationally operated research platforms and monitoring facilities (vessels, observatories, alert systems). The content offered originates from distinct content providers by German marine research institutions ranging from cruise-related metadata to reports, publications, data (archived and near real time) and data products. The portal is based on open technologies and access is freely available for scientists, funding agencies and the public (no registration is required).	Mission statement and strategy, but no documents discovered about usability.
GeoSeaPortal	BSH is Germany's central provider of maritime services, with a focus on customer service and product quality. Its customers include shipping and other maritime industries and	Private company offering data discovery services.	Reports not identified with respect to the usage of GeoSeaPortal

Project	Summary	Relevance	Documents
	all those who need data and information about the oceans: business and science, federal and state authorities, departments, and political bodies. GeoSeaPortal is the data portal belonging to BSH.		
National Georegister	Geoinformation in the Netherlands	Meteorological and sea level information	Feedback is directed to the data providers, rather than collected at the portal. No reports on usability discovered.
ICES WGOOFE	ICES Working Group on Operational Oceanographic Products for Fisheries and Environment (WGOOFE) provides an interface between the users of operational oceanographic data products and their providers. WGOOFE runs a web based portal and is developing a number of new initiatives to improve the integration of operational oceanography in ICES Science and Advice.	Signposting oceanographic data and providing direct links.	Some grey literature published by members of working group – very useful in terms of user surveys
ICES Data Portals	Datasets are organised around specific thematic data portals, There is a start point at the ICES Data portal	Data portals include Ecosystem Data, Ocean, DATRAS (Fish trawl surveys), DOME (Contaminants and biological effects), Historical plankton, fish stomach data, and fish eggs & larvae.	Clearly signposted and thus easily discovered library of reports, mainly documenting the various data focussed working groups, with varying levels of pertinent information for the project.
iMarine	An open and collaborative initiative that will establish a data infrastructure to	As website wasn't accessed, no judgement was made.	Security warning received from firewall services when access

Project	Summary	Relevance	Documents
	support the Ecosystem Approach to fisheries management and conservation of marine living resources		was attempted.
ODIMS	OSPAR have endorsed a data and information management strategy in order to establish a long term strategic approach to the management of OSPAR data and information, ensuring discoverability, accessibility and usefulness. A key stage of the delivery of this strategy is the development of an online interface to facilitate access to data and information – the OSPAR Data and Information Management System (ODIMS). The initial objectives are to review the existing and anticipated data and information flows from Contracting Parties to OSPAR and the potential contribution of these data to MSFD implementation requirements, and review of the processes and systems for acquiring, managing and making available these data and information and to identify where these could be improved, including streamlining and harmonisation between Contracting Parties,	The two-year project for the development and implementation of ODIMS began in May 2014. The OSPAR Commission endorsed the data and information management strategy which aims to establish a long term strategy for the management of OSPAR data and information to ensure its availability and accessibility.	OSPAR coordinates monitoring in the North-East Atlantic Monitoring and Assessment 2014 No. 622 Available at http://www.ospar.org/documents/dbase/publications/p00622/p00622_ospar_monitoring_coordination_report.pdf However, as project has only just begun, no reports on usability are yet available

Project	Summary	Relevance	Documents
	RSCs and the EU/EEA in the MSFD and other relevant marine policy context		

B.2.   Research papers

Berx, B., M. Dickey-Collas, M.D. Skogen, Y.-H. De Roeck, H. Klein, R. Barciela, R.M. Forster, E. Dombrowsky, M. Huret, M. Payne, Y. Sagarminaga, and C. Schrum. 2011. Does operational oceanography address the needs of fisheries and applied environmental scientists? Oceanography **24(1)**:166–171, doi:10.5670/oceanog.2011.14.

Costello, M.J. and Vanden Berghe, E. (2006) Ocean biodiversity informatics': a new era in marine biology research and management. Marine Ecology Progress Series **316**: 203–214.

Huettmann, F. (2005). Research and Management Viewpoint; Databases and Science-based Management in the Context of Wildlife and Habitat: Toward a certified ISO Standard for objective decision-making for the global community by using the Internet. Journal of Wildlife Management, **69(2)**:466-472 DOI: http://dx.doi.org/10.2193/0022-541X(2005)069[0466:DASMIT]2.0.CO;2

Richardson, E.A., Kaiser, M.J., Edwards-Jones, G., and Possingham, H.P. (2006) Sensitivity of marine-reserve design to the spatial resolution of socioeconomic data. Conservation Biology **20(4)**: 1191–1202

Muxika, I., Borja, A. and Bald, J. (2007). Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive. Marine Pollution Bulletin **55**: 16–29

Narayanaswamy BE, Coll M, Danovaro R, Davidson K, Ojaveer H, et al. (2013) Synthesis of Knowledge on Marine Biodiversity in European Seas: From Census to Sustainable Management. PLoS ONE **8(3)**: e58909. doi:10.1371/journal.pone.0058909

Staneva, J.V. and Stanev, E.V. (1998). Oceanic response to atmospheric forcing derived from different climatic data sets. Intercomparison study for the Black Sea. Oceonologica Acta **21(3)**: 393-417

Woodworth, P.L., Rickards,L.J. and Perez, B. (2009). A survey of European sea level infrastructure. Natural Hazards and Earth System Sciences **9**: 927-934

B.3.   Other grey literature

Charlesworth, M. and Grant. C. (2008). Marine Data Accessibility and Use: A Review of Government and Industry Sectors in the UK. Hydro International March 2008, 25-29

Kent, E., Woodruff, S., Rayner, N., Arbetter, T., Folland, C., Koek, F., Parker, D., Reynolds, R., Saunders, R., Smolyanitsky, V., Worley, S. and Yoshida, T. (2005). Advances in the Use of Historical Marine Climate Data, 2nd International Workshop on Advances in the Use of Historical Marine Climate Data 17-20 October 2005 – Met Office, Exeter, United Kingdom.

Nyberg, J., Lindberg, T., Holmberg, J., Zetterlund, S. and Stolen, L. K. (2007) Marine environmental data, availability and harmonisation. BALANCE WP1 report SGU-Report 2007:36.

Rüh, C., Korduan, P. and Bill, R. (2011). Development of the reference model for the marine spatial data infrastructure Germany (MDI-DE). EnviroInfo2011: Innovations in Sharing Environmental Observations and Information.

Rüh, C., Korduan, P. and Bill, R. (2012) A framework for the evaluation of marine spatial data infrastructures to assist the development of the marine spatial data infrastructure in Germany (MDI-DE) – Accompanied by international case-studies. Proceedings of Global Geospatial Conference 2012 Québec City, Canada, 14-17 May 2012

Schäfer, A and Scientific MaNIDA Team (2013). MaNIDA: Insight into the German Marine Network for Integrated Data Access. Geophysical Research Abstracts 15, EGU2013-PREVIEW

Vandepitte. L, Waumans, F., Tyberghein, L, Vanhoorne, B. and Hernandez, F. Marine biogeographic data in EurOBIS: assessing their quality, completeness and fitness for use. International Conference on Marine Data and Information Systems 2013. 23-25 September, 2013 - Lucca (Italy)

C. Data Register

Datasets Identified by the North Sea Checkpoint

AutoFilled

Full ID	Project ID	Requirement	URI	Name	Description	Datasets
DT.Lite.LS001-EMODNET Biology Report 2011	LS001		http://www.emodnet-biology.eu/documents/func-startc	EMODNET Biology Report 2011	Report outlining the development of an online marine biological data portal allowing the access and download of marine biological data across Europe.	Species data, microfauna, macrofauna and benthos
DT.Lite.LS002-EMODNET geology Final Report	LS002		https://webgate.ec.europa.eu/maritimeforum/sites/mar	EMODnet geology Final Report	Webpage outlines datasets produced and link to portal. No reports found via portal. Report was found on Europa Webgate by searching "EMODnet Final Report"	seabed sediments, seafloor geology, geological boundaries, rates of erosion and sedimentation, geological events, seismic profiles, minerals
DT.Lite.LS003-OSPAR Quality Status Report 2010	LS003		http://qsr2010.ospar.org/en/downloads.html#	OSPAR Quality Status Report 2010	Website providing full access to the report, chapter by chapter.	No
DT.Lite.LS004-OSPAR Convention 2007	LS004		http://www.ospar.org/html_documents/ospar/html/osp	OSPAR Convention 2007	Link to a pdf file for the OSPAR Convention document , 2007 revision	No
DT.Lite.LS005-MyOcean Quality Information Document for Global Sea Physical Analysis and Forecasting product	LS005		http://www.myocean.eu/automne_modules_files/pme dia/public/r1135_9_myo2-glo-quid-001-002-v1.2_accepted_rfc-394.pdf	MyOcean Quality Information Document for Global Sea Physical Analysis and Forecasting product	Technical report outlining data accuracy for the Global high-resolution system and callibration results	satellite observations, meteorology, sea colour (chlorophyll), sea level, sea surface temperature, weather forecasting model
DT.Lite.LS006-State of the Art and Data Audit for the North Sea Region WP 3.1 and 3.2	LS006		http://blast-project.eu/media.php?file=470	State of the Art and Data Audit for the North Sea Region WP 3.1 and 3.2	Report providing overview of existing projects. Reports, documents and data relevant to the project and assessing their compliance with INSPIRE	No
DT.Lite.LS007-MEDIN International Data Initiatives Summary	LS007		http://www.oceannet.org/library/key_documents/key_docs.html	MEDIN International Data Initiatives Summary	Spreadsheet summarising international data management initiatives relevant to the marine environment	No
DT.Lite.LS008-EMODnet - Hydrography Final Report 2011	LS008		https://webgate.ec.europa.eu/maritimeforum/sites/ma ritimeforum/files/Hydrography-Final-Report-v1-total.pdf	EMODnet - Hydrography Final Report 2011	Report was found on Europa Webgate by searching "EMODnet Final Report", not via EMODnet Hydrography Portal	Bathymetry data
DT.Lite.LS009-EMODNET - Chemistry Final Report 2011	LS009		https://webgate.ec.europa.eu/maritimeforum/sites/ma ritimeforum/files/EMODNETChemistry_Final_Report. pdf	EMODnet - Chemistry Final Report 2011	Report was found on Europa Webgate by searching "EMODnet Final Report", not via EMODnet Chemistry Portal	Chemical buffer data
DT.Lite.LS010-EMODNET - Physics Bimonthly reports	LS010		http://151.1.25.219/emodnet2dnn//documents	EMODNET - Physics Bimonthly reports	reports were found via a search for "EMODnet final report physics"	Physical parameters
DT.Lite.LS011-Project Adair Report 2011-12	LS011		http://www.rcahms.gov.uk/rcahms_media/files/public ations/project_adair_report_2011_12.pdf	Project Adair Report 2011-12	Available via online search	Wrecks
DT.Lite.LS012-Project Adair Report 2012-13	LS012		http://www.rcahms.gov.uk/rcahms_media/files/public ations/project_adair_report_2012-13.pdf	Project Adair Report 2012-13	Available via online search	Wrecks
DT.Lite.LS013-WINDSPEED WP4 - Windspeed Methods and Tools Report 2009	LS013		http://www.windspeed.eu/media/publications/D4.2.pd f	WINDSPEED WP4 - Windspeed Methods and Tools Report 2009	Good documents list available on the Windspeed website.	No
DT.Lite.LS014-WINDSPEED WP2 - Inventory of Windspeed potential based on sea depth, wind speed and distance from shore. 2011, (WP 2.1)	LS014		http://www.windspeed.eu/media/publications/WINDS PEED_D2_1_revised_May_2011.pdf	WINDSPEED WP2 - Inventory of Windspeed potential based on sea depth, wind speed and distance from shore. 2011, (WP 2.1)	Good documents list available on the Windspeed website.	wind speed data, bathymetry, seabed geology
DT.Lite.LS015-WINDSPEED WP3 - Current & Future non wind sea use functions	LS015		http://www.windspeed.eu/media/publications/Windsp eed_WP3_D3.1_update_V2_final.pdf	WINDSPEED WP3 - Current & Future non wind sea use functions	Good documents list available on the Windspeed website.	Marine infrastructure and sea-use
DT.Lite.LS016-EMODnet - Human Activities 3rd Bimonthly report, May 2014	LS016		http://www.emodnet-humanactivities.eu/documents/3rd%20progress%20r eport.pdf	EMODnet - Human Activities 3rd Bimonthly report, May 2014	Useful report describing data gathering challenges	Human activities
DT.Lite.LS017-Defra Magic Map	LS017		http://magic.defra.gov.uk/MagicMap.aspx	Defra Magic Map	Can check for all environmental areas or protected areas within a specified region, contains a variety of datasets, some of which are downloadable	Terrestrial, marine conservation zones, bathing water quality, shellfish waters, shellfish harvesting areas, offshore windfarms, subsurface infrastructure, surface infrastructure, oil and gas installations, marine and coastal habitat classifications, important bird areas, seabird nesting areas, seabird vulnerabilities to oil spill, marine mammals, SPA & SAC, marine protection areas, protected wrecks
DT.Lite.LS018-Recommended Protected Zones in the North Sea (MCZs)	LS018		http://www.northseawildlife.org.uk/userfiles/File/YWT %20Protect%20%26%20Connect%208%20FINAL%2 0KS.pdf	Recommended Protected Zones in the North Sea (MCZs)	Graphical representation of zones on a map	Marine conservation zone proposals
DT.Lite.LS019-Marine Life	LS019		http://www.marine-life.org.uk/about-us	Marine Life	Collecting and collating data on cetacean and seabird research and monitoring projects	Marine mammals, seabirds
DT.Lite.LS020-Marine Life publications	LS020		http://www.marine-life.org.uk/press--publications/publications--reports	Marine Life publications	Collection of their reports and publications	No
DT.Lite.LS021-OSPAR map of protected areas	LS021		http://carto.ospar.org/1/ospar.map	OSPAR map of protected areas	Convention for the protection of the Marine Environment of the North-Ease Atlantic (OSPAR) have an interactive map system as well	Marine conservation areas
DT.Lite.LS022-UK Marine Science Strategy	LS022		http://archive.defra.gov.uk/environment/marine/docu ments/science/mscc-strategy.pdf	UK Marine Science Strategy	see p.33 and 34 MEDIN who are collating data and making it more available?!	No
DT.Lite.LS023-MMO Master Data Register)	LS023		http://www.marinemanagement.org.uk/evidence/docu ments/mdr.pdf	MMO MDR (MMO Master Data Register)	The Marine Management Organisation (MMO) has developed a comprehensive catalogue of spatially referenced environmental data to inform its functions. This catalogue is known as the MMO Master Data Register (MDR) and it currently contains information to support their business and regulatory and decision-making functions. The MDR is a key internal tool for data management.	No
DT.Lite.LS024-MMO Data Management	LS024		http://www.marinemanagement.org.uk/evidence/gath ering.htm	MMO Data Management	Policy on how the MMO sort and keep data	No
DT.Lite.LS025-MESH - mapping European Seabed Habitats	LS025		http://www.searchmesh.net/	MESH - mapping European Seabed Habitats	The website is designed to give easy access to the hundreds of project outputs that include an interactive mapping page, a catalogue of mapping studies, practical guides, tool kits, data templates and technical reports.	Marine habitat classifications
DT.Lite.LS026-Belgian Marine Data Centre	LS026		http://www.mumm.ac.be/datacentre/	Belgian Marine Data Centre	Belgian national data portal.	Marine water quality, air temperature, winds, atmospheric pressure, air quality, sediment quality, sediment particle size, sediment shear stress, biota contaminant concentrations, species densities and abundances
DT.Lite.LS027-ICES Data Portal	LS027		http://ecosystemdata.ices.dk/	ICES Data Portal	International Council for the Exploration of the Sea collates a variety of information, primarily for fisheries management purposes. There are a collection of data portals from ICES, but these are all signposted from the site given	Biological communities, contaminants and biological effects, fish trawl surveys, fish eggs and larvae, fish stomach contents, oceanographic
DT.Lite.LS028-British Oceanographic Data Centre	LS028		https://www.bodc.ac.uk/data/online_delivery/	British Oceanographic Data Centre	United Kingdom national data portal and data archive centre	Oceanographic, including acoustic, sea colour, currents, meteorolgical, waves, bathymetry, water quality
DT.Lite.LS029-National Oceanographic Data Centre	LS029		http://www.nodc.nl/	National Oceanographic Data Centre	Netherlands national data portal of oceanographic observations	Not determined
DT.Lite.LS030-NAUTILUS portal French Marine Data Centre	LS030		http://www.ifremer.fr/sismer/index_FR.htm	NAUTILUS portal French Marine Data Centre	SISMER Systémes d'Infomations Scientifique pour la MER	
DT.Lite.LS031-MaNIDA Marine Network for Integrated Data Access	LS031		http://manida.awi.de/	MaNIDA Marine Network for Integrated Data Access	German national data portal of scientific information arising from national marine research and monitoring	Still under construction
DT.Lite.LS032-GeoSeaPortal	LS032		https://www.geoseaportal.de/gdi-bsh-portal/ui	GeoSeaPortal	Privately owned portal to provide data and information needed by marine and maritime customers	Not determined
DT.Lite.LS033-Nationaal Georegister	LS033		http://www.nationaalgeoregister.nl/geonetwork/srv/du t/search	Nationaal Georegister	Netherlands national data portal of geoinformation	Meteorological, sea level
DT.Lite.LS034-ICES Working Group on Operational Oceanographic Products for Fisheries and Environment	LS034		http://groupsites.ices.dk/sites/wgoofe/Pages/default.a spx	ICES Working Group on Operational Oceanographic Products for Fisheries and Environment	Signposting various oceanographic hindcast, realtime and forecast data sources.	No, signposting only
DT.Lite.LS035-Vandepitte, L, Waumans, F., Tyberghein, L, Vanhoorne, B. and Hernandez, F Marine biogeographic data in EurOBIS: assessing their quality, completeness and fitness for use. International Conference on Marine Data and Information Systems 2013. 23-25 September, 2013 - Lucca (Italy)	LS035		http://www.vliz.be/imisdocs/publications/251125.pdf	Vandepitte, L, Waumans, F., Tyberghein, L, Vanhoorne, B. and Hernandez, F. Marine biogeographic data in EurOBIS: assessing their quality, completeness and fitness for use. International Conference on Marine Data and Information Systems 2013. 23-25 September, 2013 - Lucca (Italy)	Report outlining the data adequacy of EurOBIS portal	No
DT.Lite.LS036-2nd Interim Report of the Working Group on Operational Oceanographic Products for Fisheries and Environment (WGOOFE)	LS036		http://www.ices.dk/sites/pub/Publication%20Reports/ Expert%20Group%20Report/SSGSUE/2013/WGOOF E2013.pdf	2nd Interim Report of the Working Group on Operational Oceanographic Products for Fisheries and Environment (WGOOFE)	Working Group Report, containing information on user feedback of the website as well as consideration of data adequacy	No
DT.Lite.LS037-OSPAR coordinates monitoring in the North-East Atlantic Monitoring and Assessment 2014 No. 622	LS037		http://www.ospar.org/documents/dbase/publications/ p00622/p00622_ospar_monitoring_coordination_repo rt.pdf	OSPAR coordinates monitoring in the North-East Atlantic Monitoring and Assessment 2014 No. 622	Report setting out the future OSPAR portal, which is currently under development	No
DT.Lite.LS038-Berx, B., M. Dickey-Collas, M.D. Skogen, Y.-H. De Roeck, H. Klein, R. Barciela, R.M. Forster, E. Dombrowsky, M. Huret, M. Payne, Y. Sagarminaga, and C. Schrum. 2011. Does operational oceanography address the needs of fisheries and applied environmental scientists? Oceanography 24(1):166–171	LS038		http://www.tos.org/oceanography/archive/24-1_berx.html	Berx, B., M. Dickey-Collas, M.D. Skogen, Y.-H. De Roeck, H. Klein, R. Barciela, R.M. Forster, E. Dombrowsky, M. Huret, M. Payne, Y. Sagarminaga, and C. Schrum. 2011. Does operational oceanography address the needs of fisheries and applied environmental scientists? Oceanography 24(1):166–171		No
DT.Lite.LS039-Costello, M.J. and Vanden Berghe, E. (2006) Ocean biodiversity informatics': a new era in marine biology research and management. Marine Ecology Progress Series 316: 203–214.	LS039		http://www.int-res.com/articles/meps_oa/m316p203.pdf	Costello, M.J. and Vanden Berghe, E. (2006) Ocean biodiversity informatics': a new era in marine biology research and management. Marine Ecology Progress Series 316: 203–214.		No
DT.Lite.LS040-Huettmann, F. (2005). Research and Management Viewpoint; Databases and Science-based Management in the Context of Wildlife and Habitat: Toward a certified ISO Standard for objective decision-making for the global community by using the Internet. Journal of Wildlife Management, 69(2):466-472	LS040		http://dx.doi.org/10.2193/0022-541X(2005)069[0466:DASMIT]2.0.CO;2	Huettmann, F. (2005). Research and Management Viewpoint; Databases and Science-based Management in the Context of Wildlife and Habitat: Toward a certified ISO Standard for objective decision-making for the global community by using the Internet. Journal of Wildlife Management, 69(2):466-472		No

DT.Lite.LS041-Richardson, E.A., Kaiser, M.J., Edwards-Jones, G., and Possingham, H.P. (2006) Sensitivity of marine-reserve design to the spatial resolution of socioeconomic data. Conservation Biology 20(4): 1191–1202	LS041	http://www.uq.edu.au/spatialecology/docs/Publications/2006_Richardsonetal_Sensitivityofmarine-reserve.pdf	Richardson, E.A., Kaiser, M.J., Edwards-Jones, G., and Possingham, H.P. (2006) Sensitivity of marine-reserve design to the spatial resolution of socioeconomic data. Conservation Biology 20(4): 1191–1202	No
DT.Lite.LS042-Muxika, I., Borja, A. and Bald, J. (2007). Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive. Marine Pollution Bulletin 55: 16–29	LS042	http://www.sciencedirect.com/science/article/pii/S0025326X06002220	Muxika, I., Borja, A. and Bald, J. (2007). Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive. Marine Pollution Bulletin 55: 16–29	No
DT.Lite.LS043-Narayanaswamy BE, Coll M, Danovaro R, Davidson K, Ojaveer H, et al. (2013) Synthesis of Knowledge on Marine Biodiversity in European Seas: From Census to Sustainable Management. PLoS ONE 8(3): e58909. doi:10.1371/journal.pone.0058909	LS043	doi:10.1371/journal.pone.0058909	Narayanaswamy BE, Coll M, Danovaro R, Davidson K, Ojaveer H, et al. (2013) Synthesis of Knowledge on Marine Biodiversity in European Seas: From Census to Sustainable Management. PLoS ONE 8(3): e58909. doi:10.1371/journal.pone.0058909	No
DT.Lite.LS044-Staneva, J.V. and Stanev, E.V. (1998). Oceanic response to atmospheric forcing derived from different climatic data sets. Intercomparison study for the Black Sea. Oceonologica Acta 21(3): 393-417	LS044	http://www.sciencedirect.com/science/article/pii/S0399178498800261	Staneva, J.V. and Stanev, E.V. (1998). Oceanic response to atmospheric forcing derived from different climatic data sets. Intercomparison study for the Black Sea. Oceonologica Acta 21(3): 393-417	No
DT.Lite.LS045-Woodworth, P.L., Rickards,L.J. and Perez, B. (2009). A survey of European sea level infrastructure. Natural Hazards and Earth System Sciences 9: 927-934	LS045	doi:10.5194/nhess-9-927-2009	Woodworth, P.L., Rickards,L.J. and Perez, B. (2009). A survey of European sea level infrastructure. Natural Hazards and Earth System Sciences 9: 927-934	No
DT.Lite.LS046-Charlesworth, M. and Grant. C. (2008). Marine Data Accessibility and Use: A Review of Government and Industry Sectors in the UK. Hydro International March 2008, 25-29	LS046	http://www.hydro-international.com/issues/articles/id889-Marine_Data_Accessibility_and_Use.html	Charlesworth, M. and Grant. C. (2008). Marine Data Accessibility and Use: A Review of Government and Industry Sectors in the UK. Hydro International March 2008, 25-29	No
DT.Lite.LS047-Kent, E., Woodruff, S., Rayner, N., Arbetter, T., Folland, C., Koek, F., Parker, D., Reynolds, R., Saunders, R., Smolyanitsky, V., Worley, S. and Yoshida, T. (2005). Advances in the Use of Historical Marine Climate Data, 2nd International Workshop on Advances in the Use of Historical Marine Climate Data 17-20 October 2005 – Met Office, Exeter, United Kingdom.	LS047	http://journals.ametsoc.org/doi/pdf/10.1175/BAMS-88-4-559	Kent, E., Woodruff, S., Rayner, N., Arbetter, T., Folland, C., Koek, F., Parker, D., Reynolds, R., Saunders, R., Smolyanitsky, V., Worley, S. and Yoshida, T. (2005). Advances in the Use of Historical Marine Climate Data, 2nd International Workshop on Advances in the Use of Historical Marine Climate Data 17-20 October 2005 – Met Office, Exeter, United Kingdom.	No
DT.Lite.LS048-Nyberg, J., Lindberg, T., Holmberg, J., Zetterlund, S. and Stolen, L. K. (2007) Marine environmental data, availability and harmonisation. BALANCE WP1 report SGU-Report 2007:36.	LS048	http://balance-eu.org/xpdf/balance-technical-summary-report-no-1-4.pdf	Nyberg, J., Lindberg, T., Holmberg, J., Zetterlund, S. and Stolen, L. K. (2007) Marine environmental data, availability and harmonisation. BALANCE WP1 report SGU-Report 2007:36.	No
DT.Lite.LS049-Rüh, C., Korduan, P. and Bill, R. (2011). Development of the reference model for the marine spatial data infrastructure Germany (MDI-DE). EnviroInfo2011: Innovations in Sharing Environmental Observations and Information.	LS049	http://enviroinfo.eu/sites/default/files/pdfs/vol6919/0419.pdf	Rüh, C., Korduan, P. and Bill, R. (2011). Development of the reference model for the marine spatial data infrastructure Germany (MDI-DE). EnviroInfo2011: Innovations in Sharing Environmental Observations and Information.	No
DT.Lite.LS050-Rüh, C., Korduan, P. and Bill, R. (2012) A framework for the evaluation of marine spatial data infrastructures to assist the development of the marine spatial data infrastructure in Germany (MDI-DE) – Accompanied by international case-studies. Proceedings of Global Geospatial Conference 2012 Québec City, Canada, 14-17 May 2012	LS050	http://www.gsdi.org/gsdiconf/gsdi13/papers/113.pdf	Rüh, C., Korduan, P. and Bill, R. (2012) A framework for the evaluation of marine spatial data infrastructures to assist the development of the marine spatial data infrastructure in Germany (MDI-DE) – Accompanied by international case-studies. Proceedings of Global Geospatial Conference 2012 Québec City, Canada, 14-17 May 2012	No
DT.Lite.LS051-Schäfer, A and Scientific MaNIDA Team (2013). MaNIDA: Insight into the German Marine Network for Integrated Data Access. Geophysical Research Abstracts 15, EGU2013-PREVIEW	LS051		Schäfer, A and Scientific MaNIDA Team (2013). MaNIDA: Insight into the German Marine Network for Integrated Data Access. Geophysical Research Abstracts 15, EGU2013-PREVIEW	No

Valuation of the data for the literature review

NSC-000-Lite

Data Set / Source	Consideration	ValueCriteria	VCFlag	ValueCrireriaReason
DT.Lite.LS001-EMODNET Biology Report 2011	Used	Contribution	True	Useful report, containing lots of feedback on the management of data
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free and accessible, though the pilot portal was found by chance at http://www.emodnet-biology.eu/, not via the main portal http://emodnet.eu/biology
		Attributes	True	Report was structured in a similar way to the requirements of the project brief. Very useful
		Delivery	True	Available online
		Usability	True	Very helpful document which informed the literature survey
DT.Lite.LS002-EMODNET geology Final Report	Used	Contribution	True	Useful report containing plenty of information on geology data available for North Sea, data gaps and harmonisation work undertaken
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely available
		Attributes	True	Report contains information on how data was compiled and harmonisation, along some information on gap analysis
		Delivery	True	Downloadable, but difficult to find as there is no link on the EMODnet Geology portal pages
		Usability	True	Useful for identifying gaps and user challenges for geological data for the North Sea
DT.Lite.LS003-OSPAR Quality Status Report 2010	Considered	Contribution	True	Provides overview of progress in meeting requirements under the OSPAR Convention
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely accessible
		Attributes	False	Non-specific references to data gaps
		Delivery	True	Available online, easy to find
		Usability	False	Useful for context. Provides overview of progress made. Some general references to data requirements
DT.Lite.LS004-OSPAR Convention 2007	Considered	Contribution	False	Used for context though no specific feedback relating to data
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely accessible
		Attributes	False	legal document which didn't specifically feedback on data gaps
		Delivery	True	Available online
		Usability	False	Useful for context. Highlights need for research, data and quality standards
RQ.Lite.LS005-MyOcean Quality Information Document for Global Sea Physical Analysis and Forecasting product	Considered	Contribution	True	Used for context, lots of information on physical ocean measurements
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely accessible
		Attributes	True	Provides information on quality assessment and validation process for data presented in MyOcean
		Delivery	True	Report available online
		Usability	True	Useful for challenges employing physical marine data
DT.Lite.LS006-State of the Art and Data Audit for the North Sea Region WP 3.1 and 3.2	Used	Contribution	True	Useful report, containing lots of feedback on the management of North Sea data
NSC-000-Lite		Location	True	Covers part of North Sea area
		Commercial	True	Freely available
		Attributes	True	Useful summary of EU projects and assessment of INSPIRE compliance at the end of the report.
		Delivery	True	Available online via BLAST website
		Usability	True	Contained useful information which informed the literature survey
DT.Lite.LS007-MEDIN International Data Initiatives Summary	Used	Contribution	True	Summary of data management strategies relevant to the marine environment
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely available
		Attributes	True	Useful overview
		Delivery	True	Available online via the MEDIN website
		Usability	True	Useful in summarising current data initiatives and the complex relationships between them
DT.Lite.LS008-EMODnet - Hydrography Final Report 2011	Used	Contribution	True	Useful report describing the compilation of data for the EMODnet Hydrography portal and associated data management issues
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely available
		Attributes	True	Describes how data was collated and compiled for the portal, covers issues with coverage, metadata, resolution and data gaps
		Delivery	True	Online, but difficult to find as there is no link on the EMODnet Hydrography portal page. Found via Europa website
		Usability	True	Plenty of useful information to feedback via the literature review
DT.Lite.LS009-EMODnet - Chemistry Final Report 2011	Used	Contribution	True	Useful report which providesvaluable information on data management issues through compilation of chemical data for the portal
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free access to user (you have to log in maybe you have to pay to become a member?)
		Attributes	True	Provides review of spatial and temporal coverage, metadata compilation, quality assurance and feedback from users and user web-statistics
		Delivery	True	Unknown (you have to log in), difficult to find, eventually found through Europa site
		Usability	True	Very useful for reviewing data gaps for chemical data for the North Sea
DT.Wind.LS010-EMODnet - Physics Bimonthly reports	Used	Contribution	True	Latest report (17) provides useful overview of entire project which enables access to marine data from measurement stations and ferryboxes including wave measurements, temperature salinity, horizontal velocity, light atenuation and sea level. Both near real-time and archived data of time series.
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	True	provides review of gap analysis, data and metadata compilation and feedback from users and user web-statistics
		Delivery	True	via EMODnet Physics portal, although there appears to be two running in parallel?? http://151.1.25.219/emodnet2dnn/Home and http://www.emodnet.eu/physics
		Usability	True	Contains useful information for literature survey
DT.Lite.LS011-Project Adair Report 2011-12	NotConsidered	Contribution	True	Project integrating wreck data around Scottish Waters
NSC-000-Lite		Location	True	Covers Scottish territorial waters
		Commercial	True	Freely available
		Attributes	False	Focuses solely on wrecks in Scottish Waters.
		Delivery	True	Report available online via project website
		Usability	False	Too specific for use in the literature survey.
DT.Lite.LS013-WINDSPEED WP4 - Windspeed Methods and Tools Report 2009	Considered	Contribution	True	project modelling technical viability of offshore windfarm sites
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free and acccesable
		Attributes	True	Document refered to other report sections for further information on data
		Delivery	True	Document available via Windspeed website, saved as pdf
		Usability	False	Better information on other report sections
DT.Lite.LS014-WINDSPEED WP2 - Inventory of Windspeed potential based on sea depth, wind speed and distance from shore. 2011, (WP 2.1)	Used	Contribution	True	Useful review of some of the data used in the development of the Windspeed model
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely available
		Attributes	True	Provides some information on quality of data used. Will be reviewed in further detail for the windfarm challenge
		Delivery	True	Document available via Windspeed website
		Usability	True	Useful
DT.Lite.LS015-WINDSPEED WP3 - Current & Future non wind sea use functions	Used	Contribution	True	Useful review of some of the data used in the development of the Windspeed model
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Freely available
		Attributes	True	Provides information on quality of data used, data gaps and harmonization work required to undertake the project. Will be reviewed in further detail for the windfarm challenge
		Delivery	True	Document available via Windspeed website
		Usability	True	Useful
DT.Lite.LS016-EMODnet - Human Activities 3rd Bimonthly report, May 2014	Used	Contribution	True	Report outlining early stages of portal development
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	free
		Attributes	True	Provides useful information on data gaps and harmonisation issues.
		Delivery	True	pdf available online

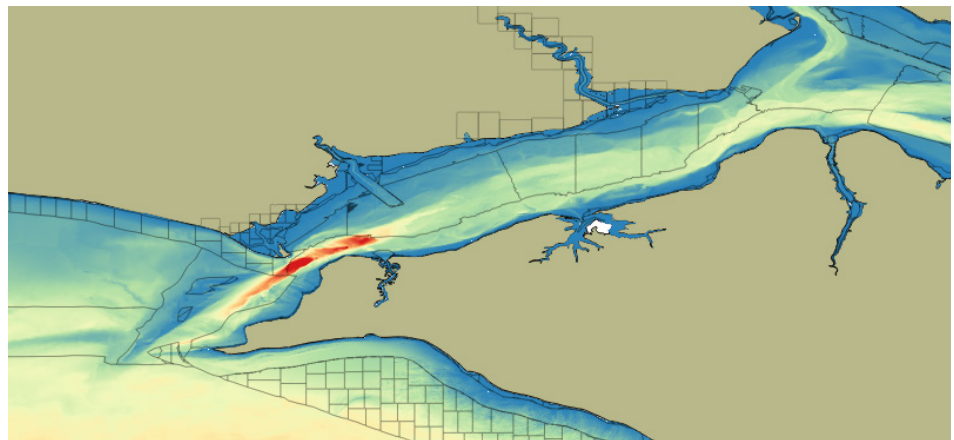|				
		Usability	True	Useful
DT.Lite.LS017-Magic Map	Considered	Contribution	True	Information on presence of protected areas or areas of concern etc
NSC-000-Lite		Location	True	UK territorial waters
		Commercial	True	free
		Attributes	False	Original website became moribund, with no resources for curation and thus was badly out of date and some datasets which mapped contained errors. However, it has recently been refreshed and commitment made (with explicit reference to responsibilities) to maintain and curate. However, it does not provide any information on data adequacy.
		Delivery	True	Comes up as a box/table on screen. - can also use the download summary linked below to access some of the raw data. Not all datasets that are mapped are available to download, however. Some are available through other websites, some have to be requested from the data providing organisation
		Usability	True	User Interface - draw area of interest and then it compiles list of designations etc that would affect that area. T&Cs: http://magic.defra.gov.uk/Copyright_Information_Data_Download.htm Raw data download: http://magic.defra.gov.uk/Dataset_Download_Summary.htm
DT.Lite.LS018-Recommended Protected Zones in the North Sea (MCZs)	Considered	Contribution	True	graphical idea of location of MCzs
NSC-000-Lite		Location	True	North Sea
		Commercial	True	Free
		Attributes	False	Information available elsewhere and no provision of information on data adequacy
		Delivery	False	a map image with areas identified
		Usability	False	No metadata
DT.Lite.LS019-Marine Life	Considered	Contribution	True	They are collecting and collating data on cetacean and seabird research and monitoring projects
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	False	Unknown - it is unclear whether the collected data is available for sharing or purchase
		Attributes	True	cetacean and seabird data
		Delivery	False	Unknown
		Usability	False	Unknown
DT.Wind.LS019-Marine Life	Considered	Contribution	True	Collection of publications and reports listed on the website arranged by date
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	False	Marine ecosystems and particular animals focused
		Delivery	True	Downloadable pdfs off the website
		Usability	False	No information on data adequacy
DT.Lite.LS020-Marine Life publications	Considered	Contribution	True	Location of marine protected areas (MPAs) also there is more specific info about the individual areas on the same site at the following address: http://mpa.ospar.org/home_ospar/keyfigures
NSC-000-Lite		Location	True	North East Atlantic
		Commercial	True	Free
		Attributes	True	Various protected site locations
		Delivery	False	A map image with areas identified
		Usability	False	No direct information for literature survey
DT.Lite.LS021-OSPAR map of protected areas	Considered	Contribution	True	Location of marine protected areas (MPAs)
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	True	Directs users to MEDIN who may make the information wanted available
		Delivery	True	Pdf on website
		Usability	False	No direct information for literature survey
DT.Lite.LS022-UK Marine Science Strategy	Considered	Contribution	True	List of organisations/company with data, any MMO data can be asked for here:http://www.marinemanagement.org.uk/a2i/index.htm
NSC-000-Lite		Location	True	UK territorial waters
		Commercial	True	Pdf of contacts is free
		Attributes	True	Information and links for data
		Delivery	True	Downloadable pdf
		Usability	False	No direct information for literature survey
DT.Lite.LS023-MMO MDR (MMO Master Data Register)	Considered	Contribution	False	List of datasets, but doesn't really give any flavour of accessibility, but designed to make the evidence base transparent rather than accessible
NSC-000-Lite		Location	True	UK territorial waters
		Commercial	True	Free
		Attributes	True	Signposts and catalogues MMO data holdings, fully compliant metadata to MEDIN standards.
		Delivery	True	Viewable pdf
		Usability	False	No direct information for literature survey
DT.Lite.LS024-MMO Data Management	Considered	Contribution	False	No consideration of users or data adequacy
NSC-000-Lite		Location	False	No location associated
		Commercial	True	Free
		Attributes	True	Provides useful context on which standards are being applied to the database
		Delivery	True	Available to read on website
		Usability	False	No direct information for literature survey
DT.Lite.LS025-MESH - mapping European Seabed Habitats	Null	Contribution	False	No consideration of users or data adequacy
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	True	Contains extrapolated models to map areas without direct data, so provides a way of removing data gaps. However, this needs careful treatment, but consideration of this approach could be useful for other data sets
		Delivery	True	GIS data layers available for direct download
		Usability	False	Likely to be useful for challenges, but not for assessing general data adequacy
DT.Lite.LS026-Belgian Marine Data Centre	Considered	Contribution	False	No consideration of users or data adequacy
NSC-000-Lite		Location	True	Covers Belgian territorial wates
		Commercial	True	Free, but registration required
		Attributes	True	Many datasets available, but associated literature does not include user feedback or data adequacy considerations
		Delivery	False	Not tested due to registration requirement
		Usability	False	Likely to be useful for challenges, but not for assessing general data adequacy
DT.Lite.LS027-ICES Data Portal	Used	Contribution	True	Good associated library with extensive additional documentation
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free access to datasets
		Attributes	True	Regular working group outputs contain a variety of information
		Delivery	True	Documents all available for download, mostly delivered as pdf
		Usability	True	Likely to be useful for challenges as well
DT.Lite.LS028-British Oceanographic Data Centre	Used	Contribution	True	Good associated library with extensive additional documentation
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free, but registration required
		Attributes	True	Documents contain a variety of information
		Delivery	True	Documents all available for download, mostly delivered as pdf, some information available for reading on website
		Usability	True	Likely to be useful for challenges as well
DT.Lite.LS029-National Oceanographic Data Centre	Considered	Contribution	False	Unable to access data area of website
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	False	Expected to be free although not tested due to accessibility
		Attributes	False	Currently not assessed due to accessibility
		Delivery	False	Unable to access data area of website
		Usability	False	Likely to be useful for challenges if data access is made available, but not for assessing general data adequacy
DT.Lite.LS030-NAUTILUS portal French Marine Data Centre	Considered	Contribution	False	No information on data adequacy
NSC-000-Lite		Location	True	Covers French territorial waters
		Commercial	True	Free
		Attributes	True	Large number of datasets
		Delivery	True	Downloads available, but not tested
		Usability	False	Likely to be useful for challenges, but not for assessing general data adequacy
DT.Lite.LS031-MaNIDA Marine Network for Integrated Data Access	Considered	Contribution	True	Good associated documents with consideration of users
NSC-000-Lite		Location	True	Covers German territorial waters
		Commercial	True	Free
		Attributes	False	Not yet fully populated, although data portal prototype is available. Feedback from users being elicited from prototype
		Delivery	False	Not yet fully populated, although data portal prototype is available
		Usability	True	May be useful for challenges if progressed further before challenges are undertaken
DT.Lite.LS032-GeoSeaPortal	Considered	Contribution	False	No information on data adequacy
NSC-000-Lite		Location	True	Covers German territorial waters
		Commercial	True	Free
		Attributes	True	Some parts of website only in German, although others offer alternative translations
		Delivery	False	Information displayed, rather than downloadable

		Usability	False	Likely to be useful for challenges, but not for assessing general data adequacy
DT.Lite.LS033-Nationaal Georegister	Considered	Contribution	False	No information on data adequacy
NSC-000-Lite		Location	True	Covers Dutch territorial waters
		Commercial	True	Free
		Attributes	True	Large number of datasets
		Delivery	True	Free
		Usability	False	Likely to be useful for challenges, but not for assessing general data adequacy
DT.Lite.LS034-ICES Working Group on Operational Oceanographic Products for Fisheries and Environment	Used	Contribution	True	Directly considers user requirements
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	True	Available as a pdf document
		Delivery	True	Downloadable pdf
		Usability	True	Information quoted in report
DT.Lite.LS035-Vandepitte. L, Waumans, F., Tyberghein, L, Vanhoorne, B. and Hernandez, F. Marine biogeographic data in EurOBIS: assessing their quality, completeness and fitness for use. International Conference on Marine Data and Information Systems 2013. 23-25 September, 2013 - Lucca (Italy)	Used	Contribution	True	Directly considers data adequacy
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	True	Available as a pdf document
		Delivery	True	Downloadable pdf
		Usability	True	Information quoted in report
DT.Lite.LS036-2nd Interim Report of the Working Group on Operational Oceanographic Products for Fisheries and Environment (WGOOFE)	Used	Contribution	True	Directly considers user requirements
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	True	Reports available as pdf documents
		Delivery	True	Downloadable pdf
		Usability	True	Information quoted in report
DT.Lite.LS037-OSPAR coordinates monitoring in the North-East Atlantic Monitoring and Assessment 2014 No. 622	Considered	Contribution	False	Report focussed on provision of new data portal
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Free
		Attributes	False	Wrong focus for the literature survey
		Delivery	True	Downloadable pdf
		Usability	False	Data portal not yet released, although good information on frame of reference
DT.Lite.LS038-Berx, B., M. Dickey-Collas, M.D. Skogen, Y.-H. De Roeck, H. Klein, R. Barciela, R.M. Forster, E. Dombrowsky, M. Huret, M. Payne, Y. Sagarminaga, and C. Schrum. 2011. Does operational oceanography address the needs of fisheries and applied environmental scientists? Oceanography 24(1):166–171	Considered	Contribution	False	Little consideration of data delivery
NSC-000-Lite		Location	True	Non-specific
		Commercial	True	Scientific publication subscription may be required, copyright applies
		Attributes	False	Wrong focus for the literature survey
		Delivery	True	Available through scientific subscription service
		Usability	False	Not as focussed on data delivery as expected
DT.Lite.LS039-Costello, M.J. and Vanden Berghe, E. (2006) Ocean biodiversity informatics': a new era in marine biology research and management. Marine Ecology Progress Series 316: 203–214.	Used	Contribution	True	Consideration of users
NSC-000-Lite		Location	True	Non-specific
		Commercial	True	Scientific publication subscription may be required, copyright applies
		Attributes	True	Focussed on data delivery for real world requirements
		Delivery	True	Available through scientific subscription service
		Usability	True	Good information for this literature survey
DT.Lite.LS040-Huettmann, F. (2005). Research and Management Viewpoint; Databases and Science-based Management in the Context of Wildlife and Habitat: Toward a certified ISO Standard for objective decision-making for the global community by using the Internet. Journal of Wildlife Management, 69(2):466-472 DOI: http://dx.doi.org/10.2193/0022-541X(2005)069[0466:DASMIT]2.0.CO;2	Used	Contribution	True	Consideration of users
NSC-000-Lite		Location	True	Non-specific
		Commercial	True	Scientific publication subscription may be required, copyright applies
		Attributes	True	Focussed on data delivery for real world requirements
		Delivery	True	Available through scientific subscription service
		Usability	True	Good information for this literature survey
DT.Lite.LS041-Richardson, E.A., Kaiser, M.J., Edwards-Jones, G., and Possingham, H.P. (2006) Sensitivity of marine-reserve design to the spatial resolution of socioeconomic data. Conservation Biology 20(4): 1191–1202	Suitable	Contribution	True	Little consideration of data delivery, although highlighted a particular aspect of data coverage
NSC-000-Lite		Location	True	Non-specific
		Commercial	True	Scientific publication subscription may be required, copyright applies
		Attributes	True	Spatial resolution is one of the attributes that may affect challenge outputs
		Delivery	True	Available through scientific subscription service
		Usability	True	Likely to provide more information to individual challenges than to the literature survey
DT.Lite.LS042-Muxika, I., Borja, A. and Bald, J. (2007). Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive. Marine Pollution Bulletin 55: 16–29	Suitable	Contribution	True	Little consideration of data delivery, although highlighted a particular aspect of data coverage
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Scientific publication subscription may be required, copyright applies
		Attributes	True	Historical data is one of the attributes that may affect challenge outputs
		Delivery	True	Available through scientific subscription service
		Usability	True	Likely to provide more information to individual challenges than to the literature survey
DT.Lite.LS043-Narayanaswamy BE, Coll M, Danovaro R, Davidson K, Ojaveer H, et al. (2013) Synthesis of Knowledge on Marine Biodiversity in European Seas: From Census to Sustainable Management. PLoS ONE 8(3): e58909. doi:10.1371/journal.pone.0058909	Used	Contribution	True	Highlights lack of data interoperability
NSC-000-Lite		Location	True	Non-specific
		Commercial	True	Open source peer-reviewed publication, copyright applies
		Attributes	True	Not directly reviewing data portals, but does point out a problem with historic datasets and amalgamating them
		Delivery	True	Free
		Usability	True	Good information for this literature survey
DT.Lite.LS044-Staneva, J.V. and Stanev, E.V. (1998). Oceanic response to atmospheric forcing derived from different climatic data sets. Intercomparison study for the Black Sea. Oceonologica Acta 21(3): 393-417	Considered	Contribution	True	Compares changes in forecasting and understanding dependent on data set usage
NSC-000-Lite		Location	False	Black Sea
		Commercial	True	Scientific publication subscription may be required, copyright applies
		Attributes	True	Shows that the challenges may be affected by which dataset is chosen for use, so gives a perspective that must be considered hereafter
		Delivery	True	Available through scientific subscription service
		Usability	True	no direct information for literature survey
DT.Lite.LS045-Woodworth, P.L., Rickards,L.J. and Perez, B. (2009). A survey of European sea level infrastructure. Natural Hazards and Earth System Sciences 9: 927-934	Used	Contribution	True	Thoughtful consideration of why gaps exist, showing that engagement with international data portal initiatives is patchy amongst government agencies, that data is useful for more than one purpose and how it can be manipulated for multipurpose usage with some user requirements included. Also noted that multiple delivery sites can confuse users as to where they should most correctly access data.
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Scientific publication, but published with a creative commons licence, allowing frree access
		Attributes	True	Peer-reviewed, so reliable. May not be easily discoverable, as title doesn't really indicate it's usefulness to discussing data delivery

		Delivery	True	Downloadable
		Usability	True	Good information for this literature survey
DT.Lite.LS046-Charlesworth, M. and Grant. C. (2008). Marine Data Accessibility and Use: A Review of Government and Industry Sectors in the UK. Hydro International March 2008, 25-29	Used	Contribution	True	Report of a UK workshop that engaged industry representatives from various sectors. The findings emphasised that industry users felt that most important were clear licence conditions, evaluation metadata, geographic definition and direct access (ie internet downloads) to data.
NSC-000-Lite		Location	True	UK territorial waters
		Commercial	True	Trade publication so possibly originally subscribers only, but available free from internet now
		Attributes	True	Workshop report, in a trade publication, so good coverage to industry, may be less visible to data providers
		Delivery	True	Downloadable
		Usability	True	Good information for this literature survey
DT.Lite.LS047-Kent, E., Woodruff, S., Rayner, N., Arbetter, T., Folland, C., Koek, F., Parker, D., Reynolds, R., Saunders, R., Smolyanitsky, V., Worley, S. and Yoshida, T. (2005). Advances in the Use of Historical Marine Climate Data, 2nd International Workshop on Advances in the Use of Historical Marine Climate Data 17-20 October 2005 – Met Office, Exeter, United Kingdom.	Used	Contribution	True	Concentrated on the usage of data for scientists, with no reference to other potential users. However, the findings suggested that for this sector of users felt that most important were comprehensive metadata, communication between scientists and data providers, well documented gridded datasets, integrated datasets and dataset intercomparison
NSC-000-Lite		Location	True	Covers North Sea area
		Commercial	True	Available from American Meteorological Society journal so possibly originally subscribers only, but available free from internet now
		Attributes	True	Workshop report, in a science sector publication, so good coverage to data providers, may be less visible to Blue Economy
		Delivery	True	Downloadable
		Usability	True	Good information for this literature survey
DT.Lite.LS048-Nyberg, J., Lindberg, T., Holmberg, J., Zetterlund, S. and Stolen, L. K. (2007) Marine environmental data, availability and harmonisation. BALANCE WP1 report SGU-Report 2007:36.	Considered	Contribution	True	Whilst a user survey was undertaken, there was no indication as to what type of users were surveyed and a lack of population of the data portal was evident, so there were more gaps than information
NSC-000-Lite		Location	False	Black Sea
		Commercial	True	Free
		Attributes	False	Workshop report - a little information about users
		Delivery	True	Downloadable
		Usability	False	Not enough about data adequacy for this literature survey
DT.Lite.LS049-Rüh, C., Korduan, P. and Bill, R. (2011). Development of the reference model for the marine spatial data infrastructure Germany (MDI-DE). EnviroInfo2011: Innovations in Sharing Environmental Observations and Information.	Considered	Contribution	False	Article concentrates on technical specifications for future data provision - no information on accessing data or potential gaps.
NSC-000-Lite		Location	True	German territorial waters
		Commercial	True	Free
		Attributes	False	Focus not on data accessibility
		Delivery	True	Conference report, in a science sector publication, so good coverage to data providers, may be less visible to Blue Economy
		Usability	False	Not enough about data adequacy for this literature survey
DT.Lite.LS050-Rüh, C., Korduan, P. and Bill, R. (2012) A framework for the evaluation of marine spatial data infrastructures to assist the development of the marine spatial data infrastructure in Germany (MDI-DE) – Accompanied by international case-studies. Proceedings of Global Geospatial Conference 2012 Québec City, Canada, 14-17 May 2012	Considered	Contribution	False	Article concentrates on technical specifications for future data provision - no information on accessing data or potential gaps.
NSC-000-Lite		Location	True	German territorial waters
		Commercial	True	Free
		Attributes	False	Focus not on data accessibility
		Delivery	True	Conference report, in a science sector publication, so good coverage to data providers, may be less visible to Blue Economy
		Usability	False	Not enough about data adequacy for this literature survey
DT.Lite.LS051-Schäfer, A and Scientific MaNIDA Team (2013). MaNIDA: Insight into the German Marine Network for Integrated Data Access. Geophysical Research Abstracts 15, EGU2013-PREVIEW	Considered	Contribution	False	Article concentrates on technical specifications for future data provision - no information on accessing data or potential gaps.
NSC-000-Lite		Location	True	German territorial waters
		Commercial	True	Free
		Attributes	False	Focus not on data accessibility
		Delivery	True	Workshop report, in a science sector publication, so good coverage to data providers, may be less visible to Blue Economy
		Usability	False	Not enough about data adequacy for this literature survey

HR Wallingford is an independent engineering and environmental hydraulics organisation. We deliver practical solutions to the complex water-related challenges faced by our international clients. A dynamic research programme underpins all that we do and keeps us at the leading edge. Our unique mix of know-how, assets and facilities includes state of the art physical modelling laboratories, a full range of numerical modelling tools and, above all, enthusiastic people with world-renowned skills and expertise.

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