

NERC

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ENVIRONMENT

**Developing the MAREMAP Toolbox
to allow the Marine Renewable
Energy sector to access NERC data**

September 2013



MAREMAP
Marine Environmental
Mapping Programme



Executive Summary

The Marine Environmental Mapping Programme (MAREMAP) is a collaboration between the Scottish Association for Marine Science (SAMS), the British Geological Survey (BGS) and the National Oceanography Centre (NOC) and was publicly launched on 23 June 2010 at the National Maritime Museum, Greenwich, London. As MAREMAP continues to develop, the programme will utilise and assimilate increasing volumes of existing NERC funded data resources, including geological, bathymetric, and seabed habitat datasets, and develop a data and information toolbox which can be utilised by marine industries. The principle aim of this project was to scope the environmental data requirements of stakeholders involved in development of the marine renewable energy sector and to utilise stakeholder needs to inform the design parameters of the required products and services.

The project was structured to include a series of one on one consultations led by an initial stakeholder mapping exercise aimed around potential end-users operating within the Marine Renewable Energy Industry (MREI). The feedback from the consultation process informed the design of an interactive workshop, bringing together a range of end-users to explore industry-wide gaps and problems relating to gathering marine data, the potential to use MAREMAP, and the requirements of an online delivery system.

Ultimately, end-users would like a system that guides them through the process of accessing, downloading, and/or integrating with information provided by MAREMAP and it is clear that a number of sophisticated design parameters are required if the MAREMAP online toolbox is to achieve this goal from its current state. Trust and confidence in the system will come, initially, from the provision of good quality meta-data and robust search facilities. The adoption of a staged development approach, alongside a stepped increase in resourcing, will facilitate the timely development of this service. It is proposed that the upcoming NERC/TSB Business Solutions from Environmental Data Call should be used to support a feasibility study, reviewing, trialling, and evaluating, the provision of the sophisticated delivery system, which implements the range of tools outlined in this report. The proposed system would have industry wide applications and it is therefore important that match funding is provided by a wide range of businesses to ensure a wide range of stakeholder interests are accommodated for.

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Introduction

Introduction to MAREMAP

The Marine Environmental Mapping Programme (MAREMAP) is a collaboration between the Scottish Association for Marine Science (SAMS), the British Geological Survey (BGS) and the National Oceanography Centre (NOC) and was publicly launched on 23 June 2010 at the National Maritime Museum, Greenwich, London. Since then, MAREMAP has grown to include a further five distinguished associates, applying a uniquely multi-disciplinary approach to marine mapping, incorporating geology, geophysics, biology, oceanography and technology. Through informed design, the MAREMAP portal has the potential to act as an innovative vehicle, linking end-users to high quality, accurate information and data products. Focussed on UK waters, MAREMAP research works across 7 research themes:

- Coastal and shelf geological and habitat models
- Deep water geological and habitat models
- Submarine hazards
- Sediment mobility and 4D monitoring/modelling
- Technology and techniques
- Heritage and archaeology
- Data and Products

As MAREMAP continues to develop, the programme will utilise and assimilate increasing volumes of existing NERC funded data resources, including geological, bathymetric, and seabed habitat datasets, and develop a data and information toolbox which can be utilised by marine industries. The UK has a vast and growing number of industries operating in the marine environment including, sand and gravel extraction, oil and gas, cable and pipeline construction, fishing and aquaculture, and the marine renewable energy industry. By working with stakeholders, the MAREMAP team can ensure that the developing marine sector has access to the vast NERC data resources and world-leading integration of science and technology.

At present historical data is stored within the MEDIN Data Archive Centres and available publically – however, the real need is to develop derived products and services, to support a diverse range of stakeholders involved in industry development. Although the main driver and demand at present is from marine renewable energy – in the longer term this project will benefit all industry development in the marine system.

The principle aim of this project was to scope the environmental data requirements of stakeholders involved in development of the marine renewable energy sector and to utilise stakeholder needs to inform the design parameters of the required products and services.

This scoping report summarises the outcomes from the project. The purpose of this project was to engage potential end-users involved in the development of the marine renewable energy industry, and to identify their environmental data needs to inform the design parameters of the MAREMAP online facility currently under development.

Objectives

The key objectives of this project were;

- Engage with marine environmental data end-users, with focus on the marine renewable energy sector, to scope stakeholder data and information requirements;
- Identify which products and services are most needed and what data management tools will be needed to enable end users to access data and information; and
- Create design parameters for the development of the MAREMAP data portal.

Methodology

The project was structured to include a series of one on one consultations led by an initial stakeholder mapping exercise aimed around potential end-users operating within the Marine Renewable Energy Industry (MREI). The feedback from the consultation process informed the design of an interactive workshop, bringing together a range of end-users to explore industry-wide gaps and problems relating to gathering marine data, the potential to use MAREMAP, and the requirements of an online delivery system. As well as meeting with end-users, meetings were arranged with staff engaged in the delivery of the MAREMAP programme. This ensured that the project aims were aligned with the information needs of MAREMAP staff. Figure 1, below, displays the structure of the project.

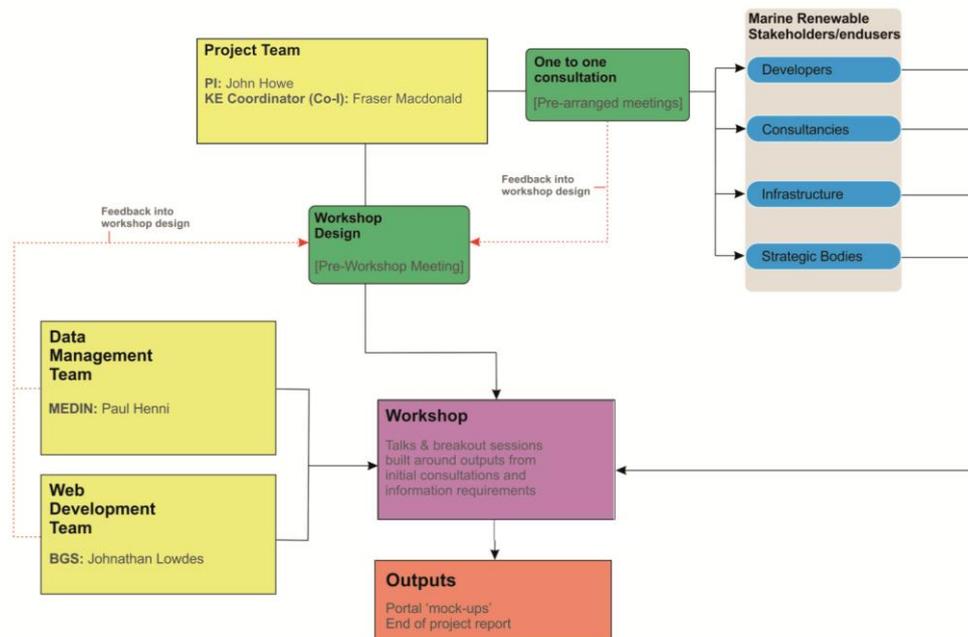


Figure 1 - project structure

Stakeholder Mapping

Prior to engaging with end-users, a stakeholder map (Figure 2) was generated to identify suitable contacts within the MREI. Key stakeholders were identified based on their industry type, influence on seabed mapping requirements, and interest in the programme. This process ensured maximum impact when engaging with stakeholders.

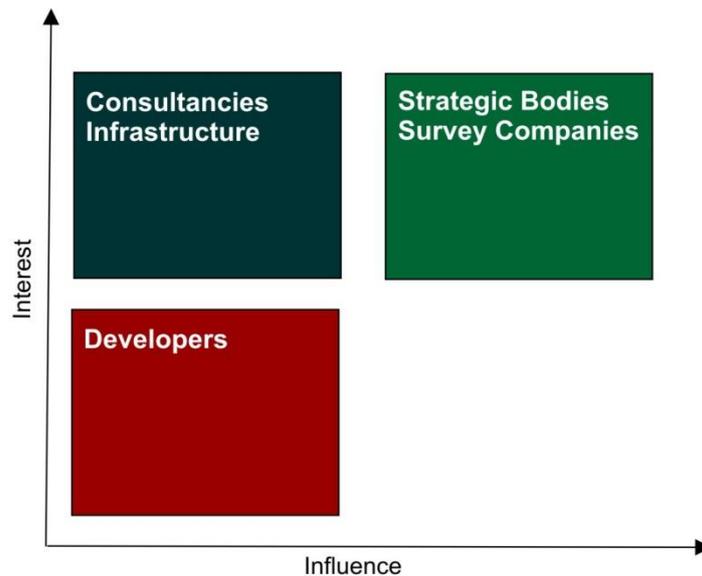


Figure 2 - Stakeholder map identifying key endusers.

Initial Consultations

The initial consultation process provided an opportunity kick-start engagement with selected businesses and strategic bodies. A series of meetings were completed either by teleconference, face to face, or a combination of both, between July 2013 and September 2013. Discussions were based around the following key questions to ensure comparability between consultations;

- **Question 1:** What are your specific data requirements during renewable projects?;
- **Question 2:** Can you identify potential uses for the MAREMAP programme that will assist with your involvement within the renewable industry?; and
- **Question 3:** How would you like an programme like MAREMAP to function so that it may better benefit you?

Furthermore, the consultation process provided an opportunity to discuss the development of the MAREMAP programme and answer any questions regarding its proposed outputs.

The resulting outputs of consultation process were collated and displayed as a series of wordles, highlighting the collective thoughts regarding data requirements, potential MAREMAP uses, and programme requirements (appendix 1). The collective outputs provided an insight into the principal areas of interest, which were fed back into the workshop design as discussion topics.

Internal MAREMAP Meetings

Communication with MAREMAP staff within BGS, NOC and SAMS was maintained throughout the project. Members of staff working within MEDIN and, specifically, the BGS Data Archive Centre (DAC) were included in discussions to ensure that the proposed MAREMAP delivery system aligned with future development of the DACs, avoiding duplication of effort. Communication with staff from the MAREMAP web development team ensured that any inclusions to the website were technically possible.

MAREMAP MREI Workshop

The MAREMAP workshop took place on 4th September at BGS Murchison House, Edinburgh. The scope of the workshop was to build on initial consultations and discuss where MAREMAP could benefit the MREI and identify industry wide data requirements for businesses and strategic bodies.

The day was divided into a series of talks and breakout sessions. Breakout sessions were based around a series of wordles. The wordles provided a starting point for discussion, allowing participants to agree, disagree or build on outputs from consultations. Appendix 2 details the full workshop agenda.

Breakout session 1 - *'Where can MAREMAP fit into the renewable development landscape and what are your data/product requirements?'*

The first breakout session aimed to identify how an information delivery tool would fit into the marine renewable landscape and what specific data/products are required by end-users.

Breakout session 2 - *'What are the requirements from an online toolbox?'*

The second breakout session aimed to identify any features that could be included to make MAREMAP a more accessible tool to end-users.

Breakout Session 3 – *'What should be the priorities for the next 5 years?'*

The third breakout provided delegates an opportunity to discuss areas of interest that they felt could be prioritised within the MAREMAP programme.

Results

Initial Consultations

A total of 14 consultations were completed between July 2013 and September 2013. Table 1 illustrates the range of stakeholders contacted during the process.

Table 1 – Contact list

Business Name	Industry	Attended Workshop
Pelamis	Wave Developer	Yes
Scottish Natural Heritage	Strategic Body	Yes
Scottish Power Renewables	Developer	Yes
Marine Scotland	Strategic Body/Licensing	Yes
The Crown Estate	Strategic Body	Yes
Xodus	Consultancy	Yes
Oil States	Developer	No
Senergy	Consultancy/Infrastructure	No
Mainstream	Consultancy	No
Aquatera	Consultancy	Yes
EMEC	Test Facility	No
Fugro EMU	Surveying/Consultancy	Yes
Thompson Ecology	Consultancy	Yes
Garrad Hassan	Consultancy	No

Discussions included a mix of teleconferences and face to face meetings, the majority of which incorporated an introduction to MAREMAP and a discussion about their role within the marine renewables sector. The aim of the consultation process was to better establish specific data requirements, additional thoughts about the functionality of the MAREMAP programme, and where they felt the programme would best fit into their project development.

Workshop Outputs

Each breakout session lasted approximately 40min, where the attendees were split into 3 groups of 4-6 attendees. At the end of each session the groups were given the opportunity to summarise their discussion to the other delegates.

Breakout 1 – Requirements of MAREMAP

The first breakout session looked broadly at where MAREMAP could fit within the marine renewable landscape alongside the information that should be provided. The main outputs from the discussions may be summarised as follows;

Usage of MAREMAP

- MAREMAP, functioning as a gateway to the provision of others information, was seen as a useful tool within the initial stages of site development. It was identified that the provision of existing information would be useful during the site selection phase and would facilitate improved survey design and identification of risks (i.e. resource allocation pending on information available). It was highlighted that a full site survey would still need to be carried out during later stages of site development.
- The requirement for information changes throughout the development of a renewables site. Initially, it was noted that although habitat information may not be important during the initial planning stages, it was, however, increasing important during the consenting stages of development.
- It highlighted that the largest concerns with using the MAREMAP service will be maintaining confidence in the information being received and ensuring that it is up-to-date and continually maintained.

Data Requirements

- It was established that, where possible, industry would seek derived products and not raw data.
- It was identified that the type of information required, and the expected delivery of information, varies greatly between wave and tidal developers.
- Improved coastal information is required within the marine renewable sector and a clear gap in the provision of this data exists. Cable routing and near shore construction is based, initially, on very low quality information prior to commissioning surveys. It was made clear that improved coastal data would better inform the initial planning stages during development.

Breakout 2 – Online service requirement

The requirements of an online delivery system were discussed in full and continually referred back to throughout the day. To summarise the ideas discussed, the outcomes have been categorised under the headings: *Functionality*, *Visual*, and *Additional Features*.

Functionality

- **Simplicity** – The online delivery system must be simple, with minimal steps to accessing data and information. Including;
 - **Linking to source** – Maintaining querying details when redirected to a product sources i.e. they should not have to begin a new search through a second website once identifying what they wanted via the MAREMAP gateway.
 - **Finding areas of interest** – The addition of a search facility which allows end users to input site location (co-ordinates) to facilitate a more accurate search.
- **Volume of information** – The volume of products, information and metadata displayed through the system was debated among the participants. It was found that different delegates expected differing volumes of information, ranging between ‘only what data and products are immediately available’ to ‘everything (readily available to inaccessible) located in their interest area’. Although difficult to meet both expectations, it was generally agreed that the most acceptable way forward was to provide detailed metadata explaining availability would leave onus and decision with the end-user.
- **Formats** – Exchange formats must allow for varied end-user capabilities including. Formats discussed included WMS, WMF, CSV, Excel, and Google/KML. It was also suggested that an open data format be used, however this way forward would need to be discussed at a future licencing meeting.

Visual

- **Thumbnails** - A number of delegates suggested the addition of thumbnail images, which give a visual indication of the downloadable product, should be provided to allow end-users to see what they are getting prior to ascertaining a product.

Additional Features

- **Product Reports** – Option of producing search reports, which can provide a breakdown of the products available, metadata, and any accessibility issues.
- **Searching Facilities** - Sophisticated keyword searches that allow for a wide range of technical knowledge.
- **RSS Feeds** – Provision of up-to-date news regarding the addition of new layers that can be linked to from the end-users computer.
- **Licencing Information** – Provision of a simple explanation of the licencing procedures/cost that the end-user will experience.
- **Test Audience** – Release a beta version of the system to small audience prior to full roll-out.

- **Confidence** – Building in confidence layers into the system or detailed provenance information to reduce risk to end-users.

Breakout 3 – Future projects

The afternoon session included a series of talks aimed at demonstrating the past and current projects that have been facilitated by the MAREMAP programme. Following the presentations the delegates were asked to partake in strategic exercise to identify where they would like to see MAREMAP capabilities focused over the next five years. The main outputs from this discussion were as follows;

- **Utilising commercial data** - Promoting and facilitating the use of data stored within the Crown Estate Marine Data Exchange for future mapping projects supported by MAREMAP.
- **Inshore Coastal Survey Data** – Utilising range of capabilities to develop cost effective methods for completing comprehensive coastal information around Scotland’s coast line.
- **Prioritising Renewable leasing areas** – Focusing the efforts of the MAREMAP community towards improving our understanding of areas proposed through the Crown Estate Leasing rounds.

Outputs Summary

Current status of programme

The MAREMAP programme has been running for three years, during which there have been a large number of projects supported and generated by the co-ordinated efforts of BGS, SAMS and NOC. Across the range of partners and associates it is currently unknown the full extent of derived UK seabed data and information. The MAREMAP programme is now at the stage where it can start collating information across its partners and associates to facilitate both end-user engagement and forward planning, to ensure that existing datasets and products are advertised and utilised.

As the MAREMAP programme grows, the online system will act as a central point for communicating and advertising the programme's achievements and outputs. The current online system is in the preliminary stages of development, showing only BGS products and providing no obvious means of acquiring information.

Summary of end-user thoughts

This project has provided an essential platform for engaging with stakeholders from the marine renewables industry. During the initial consultation process it was clearly evident that the marine renewables sector is willing to engage with the programme. It is evident that a wide range of industries within the sector would benefit greatly from a single resource point for high quality geological and habitat maps, data and information of the UK Marine Area in a form and standard which meets industry requirements.

The feedback received during the workshop has provided a much needed insight into the specific requirements of the sector. It is evident that end-users require a simple, yet sophisticated, web based delivery system that will remove the time required to search for and licence marine seabed information. Maintaining confidence in the information being received was the clear message provided by all delegates. The short term solution to building confidence was through the provision of extensive and informative metadata, allowing end-users to self-evaluate the benefits of using information through the programme based on their own terms.

The outputs from the afternoon session of the workshop have provided key areas of interest with regards to utilising the capabilities of the MAREMAP consortium. The outputs of the session will be brought forward to a technical workshop, provisionally scheduled for November 2013. The technical workshop will bring together representatives from the nine members of MAREMAP to discuss research priorities. The outputs from this most recent workshop will provide a key insight into how efforts may be best focused to ensure maximum impact within the developing marine renewables sector.

Summary of requirements

Ultimately, end-users would like system that guides them through the process of accessing, downloading, and/or integrating with information provided by MAREMAP and It is clear that a number of sophisticated design parameters are required if the MAREMAP online toolbox is to achieve this goal from its current state. Trust and confidence the system will come, initially, from the provision of good quality meta-data and robust search facilities. The adoption of a staged development approach, alongside a stepped increase in resourcing, will facilitate the timely development of this service. Figure 3 illustrates a possible staged development approach, accommodating for the features identified during the workshop.

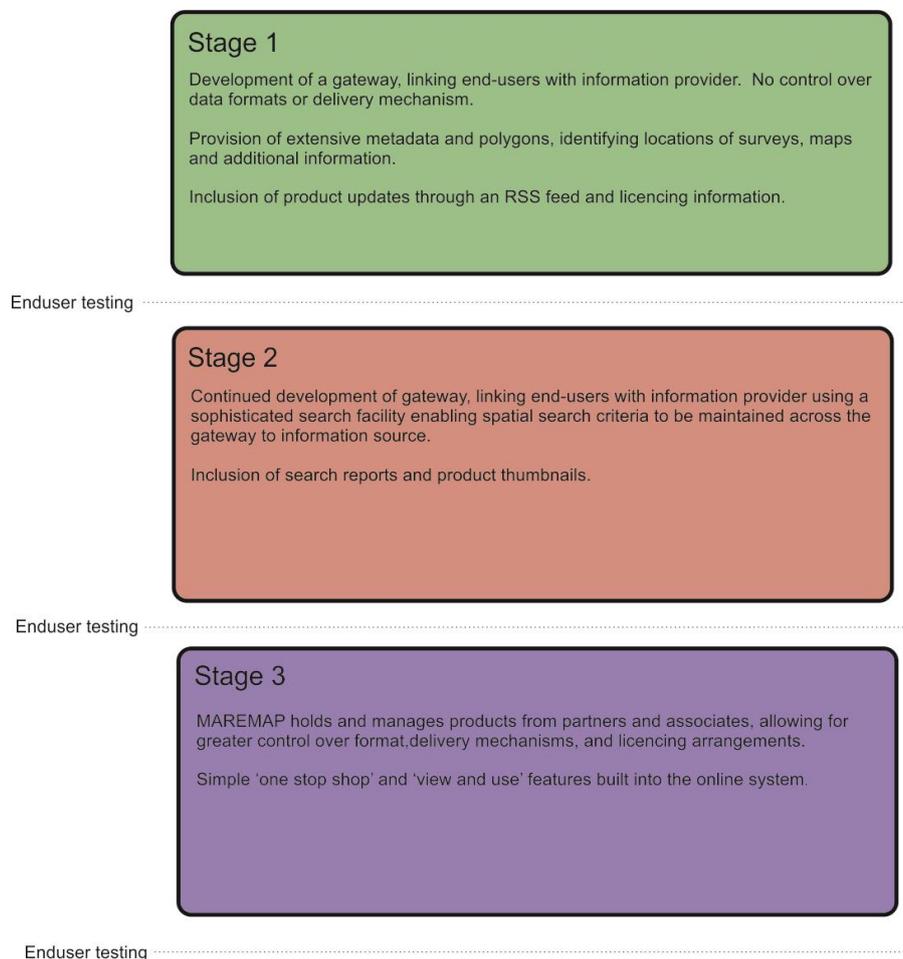


Figure 3 - Example of staged developed of online delivery system, incorporating suggestions made during workshop.

Opportunities for further development under the *'NERC/TSB Business Solutions from Environmental Data Call'*

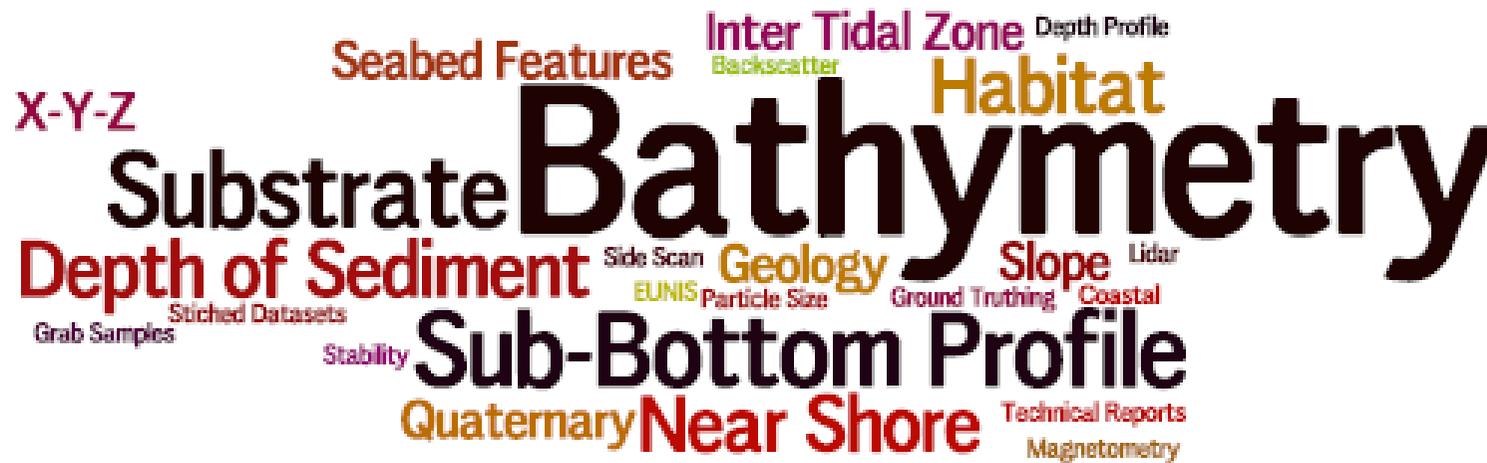
This scoping study has provided an outline of the necessary developments required if the MAREMAP programme is to provide a tool that is accessible and useable by the MREI. It is proposed that the upcoming NERC/TSB Business Solutions from Environmental Data Call should be used to support a feasibility study, which will review, trial, and evaluate the provision of a sophisticated delivery system, which implements the range of tools outlined in this report. The proposed system would have industry wide applications and it is therefore important that match funding is provided through a consortium of businesses from across the MREI

Appendix 1 - Wordles

Potential uses for MAREMAP



MREI data requirements



Additional requirements of MAREMAP



Appendix 2 – Agenda

- 0945** – Coffee
- 1010** - Introduction to day
- 1015** - Introduction to MAREMAP
- 1030** - Introduction to MEDIN and MEDIN BGS DAC (Paul Henni, BGS/MEDIN)
- 1100** - Coffee
- 1120** - Breakout Sessions (1)
- Building on initial consultation
 - How can the MAREMAP toolbox meet data requirements?
 - Developing a standardised approach
- Summary discussion
- 1300** **LUNCH**
- 1400** - Introduction to afternoon session
- 1410** - Case Study 1 – INIS Hydro (John Howe, SAMS)
- Case Study 2 – Isle of May & Automated Sediment Mapping (Dayton Doves, BGS)
- Case Study 3 – Dorset Coast (Keith Westhead, BGS)
- 1510** - Coffee
- 1520** - Breakout Session (2)
- Discussion exercise - Setting future MAREMAP priorities
- 1620** - Closing remarks and networking opportunities