

Updated Issue...

The NMR's Record of England's Underwater Heritage

by Martin Newman (Datasets Development Manager, National Monuments Record, English Heritage)



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[more »](#)

Events

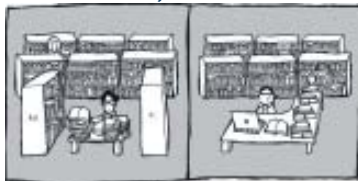
[MEDIN Partner's meeting 1st Sept 2010, IMarEST](#)

Partner Organisation's News

[HR Wallingford and SeaZone join to advance marine information](#)

Implementing Information Systems for Coasts and Oceans

by Tim Stojanovic (School of Geography and Geosciences, University of St. Andrews)

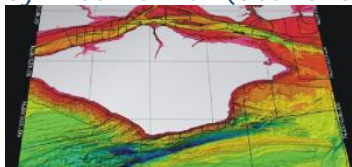


A 'bottom up' perspective of data and information management in the marine and coastal environment.

[more »](#)

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[more »](#)

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[more »](#)

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[more »](#)

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The English National Monuments Record (NMR), the public archive of English Heritage, contains over 10 million items and curates large corporate datasets. In 1992, the NMR began the systematic compilation of a record of historic ship wrecks and submerged archaeological sites out to the 12 nautical mile limit. The record was created through desk based research by combining several data sources, some of which were previously published and others representing original archive research, a process which is continuing today and has now been integrated with the NMR's terrestrial recording.

The NMR's database of sites now contains over 400,000 records of which over 46,000 relate to the maritime historic environment. The maritime records comprise located wreck sites (over 5,500), casualties (over 31,500 where the location of a loss has been reported but no wreckage located) and over 9,000 submerged archaeological sites, along with archaeological finds such as those and finds for example reported to the Receiver of Wreck or under the BMAPA (**British Marine Aggregate Producers Association**)/English Heritage protocol for the reporting of finds recovered as a result of dredging activity. Research findings from maritime projects funded through English Heritage's Historic Environment Enabling Programme (HEEP) and the Aggregates Levy Sustainability Fund (ALSF) also contribute to the enhancement of the record. As a result of this the record is dynamic in nature, constantly being updated with the results details of fieldwork, reported finds and the results of desk based research.

The record contains sites of all periods from the prehistoric to the 20th century. Initially, the NMR's remit for compiling the record was vessels lost up until the end of World War II. This was seen as an 'historical' cut-off date but the growing interest in modern maritime archaeology, coupled with the increasing demands on our marine environment within the planning realm, has led to an increase in demand for data from the second half of the 20th century. A six month project which is about to start with funding from MEDIN (Marine Environmental Data and Information Network) will be addressing this by recording historic shipping losses from 1945 till the present day and an update on this will be published here at a latter date. This will also have the advantage of harmonising maritime and terrestrial recording policy.

Similarly all types of vessel are represented in the record, including prehistoric logboats, naval vessels, fishing boats and merchant ships. Wreckage and reported loss locations for crashed aircraft are also recorded predominantly dating from the World War II. This also ties into terrestrial recording where the remains of historic crashed aircraft are also recorded.

The record was originally compiled before the introduction of GIS, however, the NMR is now using its data in conjunction with SeaZone hydrospatial data to improve the spatial accuracy of its data and the service it provides to users.

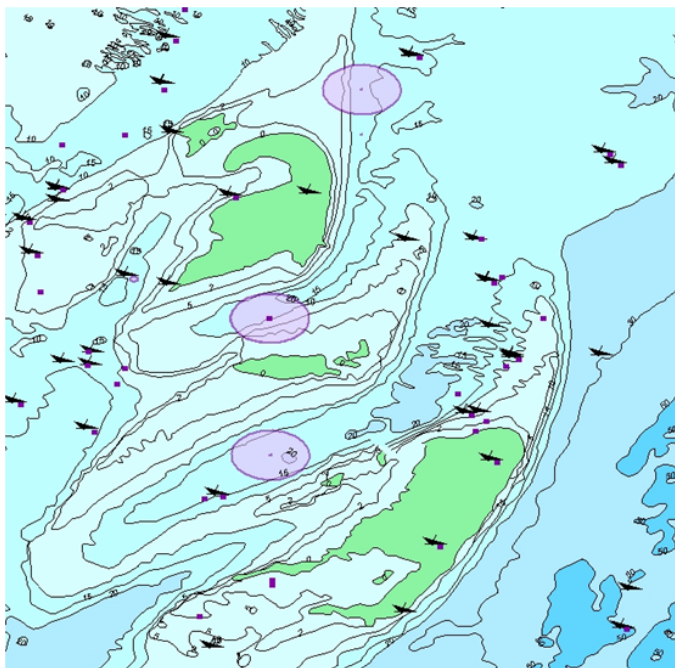


Fig 1 NMR data for the area of the Goodwin Sands in GIS displayed against SeaZone Hydrospatial including UKHO data. The purple dots are wrecks recorded in the NMR and the polygons represent named locations for groups of casualty records. SeaZone Hydrospatial mapping: © British Crown and SeaZone Solutions Limited. All Rights Reserved. Product Licence No. 102006.006.

All of the NMRs records are freely available on the PastScape website (www.pastscape.org.uk). The site was re-launched last year following a major redevelopment. Some of the improvements to the site were specifically designed to improve the retrievability of maritime data and increase the amount of information on wreck sites available. These included:

- the ability to search on Latitude and Longitude as well as grid reference
- maritime craft type can now be searched on using the 'Quick Search' on the home page as well as in the 'Advanced Search'
- the 'Place' search box on the 'Advanced Search' now additionally searches for Named Locations which are used to record reported positions of shipping losses
- a new tab on the record page 'More Information and Sources' gives access to the full description. Previously the website had only showed the summary. This longer text is particularly important for maritime records with a detailed description of the vessel, the manner of its loss and shows details of the original sources from which the record was compiled
- users can now search specifically on maritime craft types on the advanced search page as well as using the quick search

- there is a link to use the maritime and aircraft type thesauri

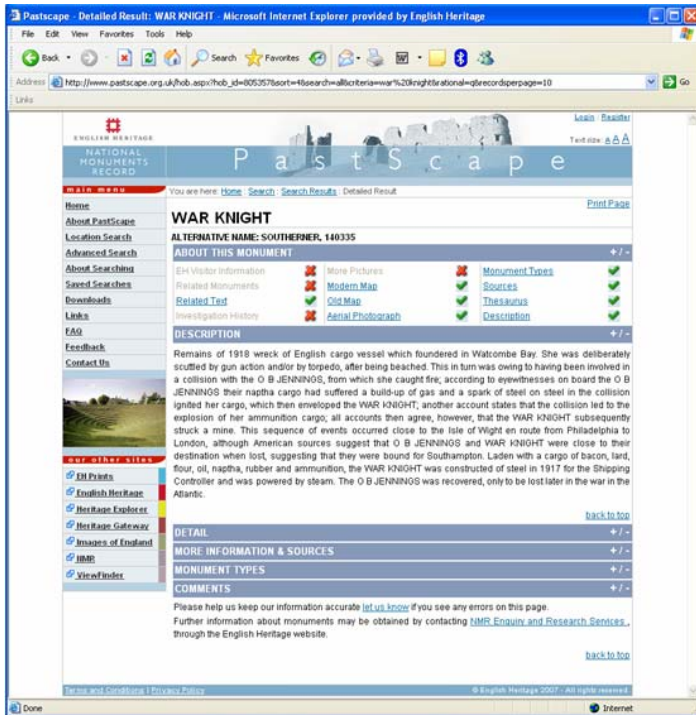


Fig 2 The record for the wreck of the War Knight as it appears on the PastScape website. © English Heritage 2010

The NMR's archive of photographs plans, drawings and reports also contains maritime information including the archive of the Archaeology Diving Unit (ADU). A selection of the photographs from the NMR are also freely available online at the ViewFinder website (<http://viewfinder.english-heritage.org.uk/>). Full archive catalogues will also soon be available on the internet.



Fig 3, An example of the maritime images available on ViewFinder. The Ramses

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It ran aground in the Lydney Sands in the Severn Estuary on 23rd March 1951. This photograph showing the ship starting to break up it was taken in May 1951 by Harold Wingham. ©Crown copyright. NMR. The Wingham Collection. HAW 9416/05. This is also an example of the type of wreck that will be recorded in the post 1945 shipping losses project mentioned previously.

The NMR also maintains GIS data on wrecks designated under the Protection of Wrecks Act 1973. This, together with GIS data for the other heritage designations for which English Heritage is responsible, can be downloaded for free from the NMR's data download site (<http://services.english-heritage.org.uk/NMRDataDownload>) following registration.

More developments are planned for the future and feedback from users would be most welcome on the site, particularly on how it can be improved further and the content of individual records.

Implementing Information Systems for Coasts and Oceans

by Tim Stojanovic (School of Geography and Geosciences, University of St.Andrews)

Happy New Year 2010, along with a new decade, we have a new UK Marine (and Coastal Access) Act, with the Scottish Act given Royal Assent on 10th March. Altogether there seem to be plenty of drivers for better data and information management in the marine and coastal environment! A lot of work has already started with [Marine Environmental Data and Information Network](#) (MEDIN), and the Crown Estate's [Marine Resource System](#) (MaRs) and the development of [European Marine Observation and Data Network](#) (EMODNET) by the EU. This will be coupled with the demands for data and information by the new [Marine Management Organisation](#) and initiatives in devolved governments including [Marine Scotland](#).

In this short article, I'd like to present the view from a more 'bottom up' perspective. The one thing the initiatives listed above have in common is that they are all national and international 'top down' approaches. One of the challenges they are likely to find is that 'the devil is in the detail' as far as data and information are concerned! At the local and regional levels, Engineers, Planners, Surveyors, Tourism and Recreation officers, Developers, Marine Industries, Fisheries officers, Port managers, Environmental managers, Conservations, Wardens, Archaeologists and Scientists all collect and use marine and coastal data and information for a variety of purposes. As we focus on the sub-national regional scale, vast data and information are already being employed for practical planning and management purposes (although there remain significant gaps in our knowledge). The challenge is to co-ordinate this better, not only for the purpose of producing the new marine plans, but for a variety of other planning and management purposes, for which this information constitutes a vital evidence base.

There are two key ideas I would like to raise in this article:

Firstly, we should find ways of linking different initiatives happening in coasts and seas at different scales - in my opinion, sharing data and information is best attempted using the concept of an 'Information System.' This concept has been unpacked in a succinct set of guidelines produced for coastal professionals which are introduced below.

Secondly, we should be aware that new Information and Communication Technologies (ICTs) are providing new opportunities and ways of going about this- arguably the internet has allowed us to develop beyond the concept of libraries and repositories towards virtual networks of knowledge. A cartoon illustration below is provided to help us reflect on what the implications of this might be.

Guidelines for Information Systems Development

The COREPOINT EU Interreg 3C project (<http://corepoint.ucc.ie/>), with twelve partners from Ireland, the UK, France, Netherlands and Belgium sought to generate collaboration between scientists, policy makers and managers through focusing research on the issues and policies that influence coastal management at regional, national and local levels across the Northwest Europe. As part of an integrated approach to capacity building, the project also conducted research into data and information management at the coast. The key output of this part of the research is a 30 page set of guidelines, targeted at coastal professionals. The report entitled "[Guidelines for Implementing Local Information Systems at the Coast](#)" is available in French and English on the COREPOINT Project [website](#)

What?

The guidelines describe how a group of organisations should go about establishing an information system. They are based on the experience of coastal managers operating at local and regional scales.

How?

Drawing on practical experience and ideas from the discipline of information science, the guidelines outline seven key steps involved in implementing an information system:

1. Justifying Information Systems

Making the case for systems development, including improved data accessibility, inter-agency co-operation and public accountability.

2. Having Clear Purposes

Supporting decisions: this is the difference between an internal filing system and an inter-organisational communication system.

3. Involving Users

Mapping existing information resources and clearly relating them to decision making processes, (including the general public).

4. Solving Technical Obstacles

Metadata, Standards, Interoperability, XML, Access agreements, Object Taxonomies, Portals. Ontologies. Distributed Applications and Programming Interfaces.

5. Deploying Technology

Using a variety of ICT tools to collect, store, analyse, visualise and communicate information, increasingly via distributed information systems.

6. Checking for Quality Assurance

Avoiding 'Rubbish in - Rubbish out' syndrome, developing information policies.

7. Implementation and Training

Getting a system embedded into the daily practices of stakeholders.

Why?

The guidelines were developed in response to a long heritage of work that has identified problems and inefficiencies in the way we manage marine and coastal data and information. A variety of organisations began to recognise the challenges and possibilities from the 1990s onward. BODC produced an integrated CD of UK marine data entitled [UKDMAP](#). The British National Space Centre and [EU Space Agency](#) commissioned comprehensive reviews of the demand for Earth Observation data in the coastal zone. A number of overview reports were produced by the now defunct UK Inter-Agency Committee for Marine Science and Technology (IACMST), which recognised the need to address many problem issues, via its Marine Environment Data Action Group (MEDAG).

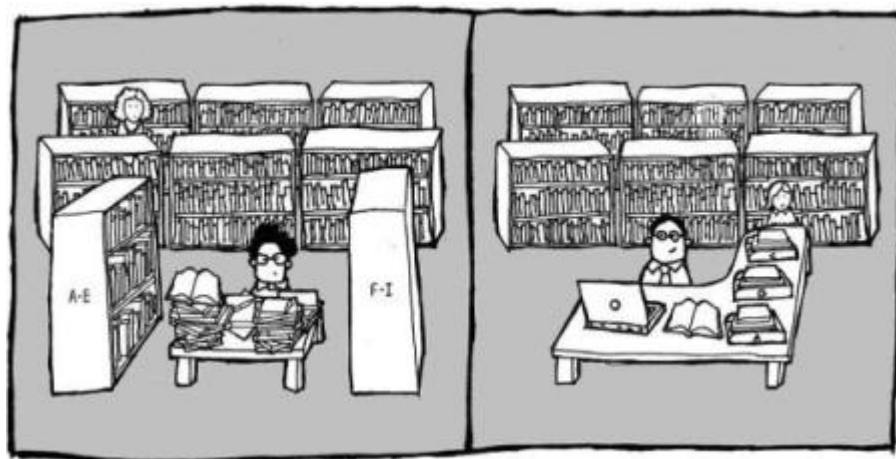
In the UK, the issues were drawn together and highlighted as part of a series of UK [workshops](#) run by Frances Franklin and Jules Harries at CEFAS, which eventually led to the establishment of the very magazine you are reading - Marine Data News. More recently the Association for Geographic Information [Coastal and Marine Special Interest Group](#) have championed the integration of marine geospatial information, and [SeaZone](#) have produced a suite of marine geospatial data products. CoastNet have launched [CoastWeb](#), an intelligent marine and coastal portal support professionals. Efforts to coordinate coastal data at regional scales have also been significant, especially the work of Coastal Defence Groups and some Coastal Partnerships- the [Channel Coastal Observatory](#) was the first of a number of a regional coastal monitoring programmes. Commercial interests have together highlighted the potential advantages of better use of publicly funded data as the UK Marine Information Council (now [Marine Information Alliance](#)). In Europe, "information" was a key topic EU Demonstration Project on ICZM 1996-1999, and now building a [marine data infrastructure](#) has emerged as a key action for DG Maritime Affairs and Fisheries. So are you feeling any better off for all this?

My own research as an academic^[1] has demonstrated how stakeholders involved in producing coastal strategies struggle with 'information overload.' This is partly an outcome of the complexity of what is going on in our coasts and seas, and partly our bureaucratic systems of administration. These have developed since the Victorian era and have led to increasing specialisation of knowledge about our coasts and oceans. In place of a sectoral approach that produces 'silos' of knowledge, we now have the opportunity to apply new technologies and develop new networks of collaboration. But beware of the computer geek flogging you techie solutions- many of these have foundered on

the rocks, partly I believe due to misplaced ideas- in the final part of this article I'd like to outline a particular vision for making sense of our data glut...

From Repositories of Data to Virtual Networks of Knowledge

The cartoon below represents two different ways of thinking about solutions. The left hand picture presents a traditional way of thinking. The right hand picture presents the solutions which hopefully the next generation, brought up on social networking technologies, will build for us. The table below describes some of the differences behind the two concepts.



<ul style="list-style-type: none"> • Concept like a traditional library/data warehouse/repository 	<ul style="list-style-type: none"> • Concept like an inter-organisational information system
<ul style="list-style-type: none"> • Some Metadata 	<ul style="list-style-type: none"> • Full metadata according to marine standards
<ul style="list-style-type: none"> • Use of search engines and portals 	<ul style="list-style-type: none"> • Use of intelligent systems to sort and share data (e.g. semantic webs or ontologies)
<ul style="list-style-type: none"> • Conceived around the user as an individual 	<ul style="list-style-type: none"> • Conceived around the users as a collaborative network of learning
<ul style="list-style-type: none"> • More focus on tools for analysing data, less focus on the human element. 	<ul style="list-style-type: none"> • Focus on both analytical tools and deliberation tools. Close integration of communication and information technologies.
<ul style="list-style-type: none"> • Problematique: glut of data and difficulties accessing other organisations holdings. 	<ul style="list-style-type: none"> • Problematique: Overload of data for individual and specialisation of knowledge.
<ul style="list-style-type: none"> • Mainly a data management solution 	<ul style="list-style-type: none"> • Mainly a knowledge management solution, built on a data management infrastructure
<ul style="list-style-type: none"> • Data Driven (based around needs of organisations who collect or supply data) 	<ul style="list-style-type: none"> • Goal Driven (based around needs for successful planning and management)

New technologies certainly have dramatic potential, but it's probably worth remembering that the aim of marine data and information management is ultimately to support good relationships and networking, and to help sort and deliver information to users at the appropriate stage of decision making.

Dr Tim Stojanovic, School of Geography and Geosciences and Scottish Oceans Institute, University of St.Andrews/ Marine and Coastal Environment Research Group, Cardiff University. (Timothy.Stojanovic@St-Andrews.ac.uk)

[1] Stojanovic, T. Ballinger, R.C. (2009) Responding to Coastal Issues in the UK: managing information and collaborating through partnerships. *Oceans Yearbook* 23 Brill: Leiden. 445-472.

New High Resolution Bathymetry Model of the English Channel

by Alison Smith (SeaZone)

SeaZone took a major step forward in December 2009 towards its aim to create a high resolution and accurate bathymetry model of the UK Continental Shelf by completing the first phase of its Bathymetry Improvement Programme for the northern English Channel between South Foreland and Land's End. The new bathymetry model will become a core reference dataset in SeaZone's digital marine mapping product, HydroSpatial.

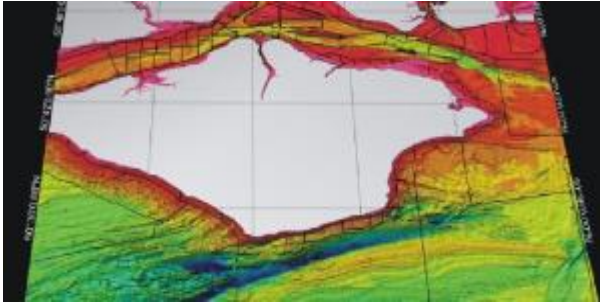
With increasing pressure on the marine environment and the requirement to maximise value from existing public sector information holdings, the new model in particular and HydroSpatial generally are already proving to be important tools to support offshore renewable energy development, marine planning and policy making. The bathymetry model, believed to be the first of its kind, is created from 'best available' digital survey bathymetry data from a variety of different sources. It is being used by British Geology Survey to improve our understanding of sea bed geology and by Cefas (and others) as input to habitat mapping.

SeaZone has spent the past three years gathering and digitising data, going as far as identifying and gaining permission to use and capture survey sheets (also known as fair sheets) stored in archive at the UK Hydrographic Office. In total, SeaZone has invested in the capture of over 400 surveys to create this unique database of the UK's underwater terrain. The data represents the most detailed water depth data available, either from modern multibeam surveys or single beam surveys dating back to 1970. All of the data used in the work has been collected to the IHO's International Survey Standard, S-44, and quality controlled at the UK Hydrographic Office or another competent authority. By using survey data as input, the new model is more accurate than depth data displayed on traditional navigational charts, which is widely known to be coarser in resolution and conservative in depth.

To date, SeaZone has collated over 2.2 billion soundings from 5,000 surveys. Accurate area extents and metadata are created for each survey and the metadata published to the MEDIN portal, as well as being used internally by SeaZone and its customers. The data and metadata is used as input to SeaZone's Digital Survey Bathymetry (DSB) data product and as input to the bathymetry model. From this unique Oracle database, significant resource is invested to create a single seamless surface of sea bed elevation representing the most up to date and dense data available. The work, typically known as 'survey de-confliction', is undertaken using specially designed GIS software developed at SeaZone to read survey points directly from Oracle.

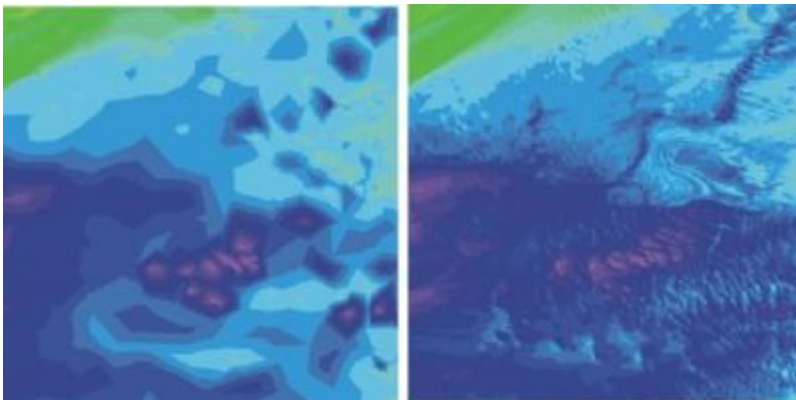
The de-confliction work separates the many overlapping surveys against each other based on a number of rules or attributes, most importantly survey age, survey type and sounding density. The result is a set of modified survey

extents which are clipped against one another to keep the best available data in full, creating a seamless surface of depth soundings. The clipped survey extents are used to label each sounding in the Oracle database, with an active or inactive identifier, so that only the active soundings from each survey are used as input into the bathymetric model. The survey extents also form a meta layer, similar to the 'source data diagram' on an Admiralty Chart, which is used to identify the age and provenance of the data used in the model. An example of these clipped survey extents in the Isle of Wight area is shown as Figure 1.



Deconflicted survey extents overlaid on the bathymetric model of the Solent and waters surrounding the Isle of Wight, (30m grid resolution)

Using BathySIS software from SeaZone's French partner, Geomod, the deconflicted sounding data are used to create a triangulated irregular network (TIN) model (using Delaunay triangulation methods), which in turn is used to create a gridded model of varying resolutions. Figures 2 and 3 show a comparison of a gridded bathymetry model using only data derived from nautical charts (Figure 2a) and a model using digital survey data as input (Figure 2b). At a resolution of 1 arc second (or approximately 30m), physical features such as trenches, ridges, sand banks and sand waves are more easily distinguishable, even in areas where only single beam echo sounder data is used as input. By maximising the value of existing data in this way, investment in new surveys, such as those of the MCA's Civil Hydrography Programme, can be better targeted on priority or unsurveyed areas. As new data becomes available, this can be easily ingested into SeaZone's database to update the model.



Comparison of the bathymetric model (1arc second grid resolution) created from survey data from nautical charts (2a) and from digital survey data (2b)

Acknowledgements

SeaZone is pleased to acknowledge the Civil Hydrography Programme of the Maritime and Coastguard Agency (MCA), the Channel Coastal Observatory, the Port of London Authority and various other ports, harbours and third parties in contributing survey data to this programme. The modelling work is supported by a contract from CEFAS (Centre for Environment, Fisheries and Aquaculture Science) where the results are being used to undertake habitat mapping work in the English Channel on behalf of Defra.

Further Information

For further information, including how your organisation can prioritise an area of particular interest or otherwise contribute to SeaZone's Bathymetry Improvement Programme (BIP), please contact SeaZone directly using the details below.

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Web: www.SeaZone.com

Notes to Editors:

SeaZone is a world leader in the field of marine geographic information solutions, including its innovative data product, SeaZone HydroSpatial, the first 'off the shelf' authoritative digital marine map.

SeaZone's knowledge of marine science, data acquisition and use, with expertise in geographic information systems (GIS) and data management, provides customers with innovative solutions that address their data access, processing and management needs.

Over 750 organisations across the oil and gas, renewable energy, conservation and public sectors use SeaZone data, software and services to help support decision making in the Marine Environment and Coastal Zone.

HUMBOLDT: providing tools to harmonise geographic data

by Mark Charlesworth - MEDIN

The EU HUMBOLDT (2006-2010) project facilitates the harmonization of spatial data and metadata by providing tools to automate the necessary processes as far as possible using web services. These tools may therefore be useful to assist organisations to meet the requirements of INSPIRE. A number of open source tools exist that can be downloaded with accompanying documents and examples at <http://community.esdi-humboldt.eu/>. For example, open sources tools have been developed to 'edge match' geographic data which could be utilized in cross-border or other applications. Other tools exist to allow the 'on the fly' transformation of data in a source database to another schema such as one specified by INSPIRE.

As part of the HUMBOLDT project, a number of scenarios have been developed to demonstrate how the tools can be used in real-world cases. [BODC](#) and 3 other European partners are involved in the ocean scenario whose focus is on making pollution reports available from disparate sources and harmonising the data. This harmonization is done 'on the fly' within each country using mappings between the source database and a target 'model' using the Humboldt Alignment Editor ([HALE](#)). Once this stage is complete a web processing service 'the Humboldt Conceptual Schema Translator ([CST](#))' is used to translate the data into the target model. Thus users can view harmonized details for pollution incidents from both English and French records without the host organisations having to change the structure of their database. The ocean scenario is also considering sensitive area information and model outputs.

An Update on MEDIN Standards

by Mark Charlesworth - MEDIN

MEDIN aims to deliver secure long-term management of priority marine data sets in approved 'Data Archive Centres', and improved access to authoritative marine data held in this network through a central (discovery) metadata search capability. The MEDIN Standards Working Group has implemented a variety of standards and tools to achieve these aims. These include:

1) **Discovery Metadata Standard.** This standard is compliant with the ISO19115, INSPIRE and UK metadata standards and uses the ISO 19139 schema set for encoding in XML. The standard specifies the use of certain vocabularies to make it 'marine flavoured' such as the Parameter Discovery Vocabulary derived under SeaDataNet. A number of tools are available to allow easy production of the XML which will then be harvested using a portal. These include an ESRI ArcCatalog plug-in, and on-line and desktop form based applications. An ISO 19757 (Part 3) Schematron schema has been developed to allow testing of MEDIN constraints in the content produced by any of these tools. Further details at

http://www.oceannet.org/marine_data_standards/medin_disc_stnd.html

2) **Data Guidelines.** Each data guideline defines the data and information that must be stored with a particular data type to ensure it can be readily used and reused. As this type of information is specific for different data types, guidelines are developed for each type. As such these standards recommend controlled vocabularies and hierarchical structures to the data. Where possible we have used existing standards such as the ICES Data Type Guidelines produced by the ICES WG Data Information Management. The principle benefits of this suite of standards are:

- Allows a contracting organisation to easily specify a format that data should be returned in that can be readily used and includes all relevant attributes
- Provides a consistent format for contractors to work to (rather than a different format for each contract)
- Data can be readily exported to Data Archiving Centres and other users
- Instils good practice amongst users

Further information at:

http://www.oceannet.org/marine_data_standards/medin_data_guide.html

3) **Controlled Vocabularies.** Where appropriate MEDIN is recommending the use of controlled vocabularies to improve interoperability between data sets. This work builds heavily on the work that the European project 'SeaDataNet' has already achieved.

Where possible the standards have built on, and are compliant with, existing international standards which will improve interoperability outside of MEDIN into other domains. Some of these standards, tools and techniques are now being considered for adoption more widely in the UK, demonstrating the progress that the MEDIN Standards WG has made in this area.

News

HR Wallingford and SeaZone join to advance marine information

HR Wallingford is pleased to announce that, as of 23 March 2010, it acquired 100 per cent of the equity of SeaZone Solutions Limited (SeaZone) from the United Kingdom Hydrographic Office (UKHO). Combining the two companies establishes a truly world-class player in the provision of marine information to organisations involved in engineering, marine and coastal management, offshore energy and environmental protection.

HR Wallingford, based in Oxfordshire, UK, provides world-leading analysis, advice and support in engineering and environmental hydraulics, and the management of water and the water environment. Established for over sixty years, the company is recognised internationally in supporting both governments and private organisations to manage floods, water and the maritime environment. HR Wallingford's business includes numerical and physical modelling, numerical analysis and a range of associated consultancy services.

'We are delighted to announce the acquisition of SeaZone' said Dr Jane Smallman, Managing Director of HR Wallingford. 'The businesses are clearly complementary. Together we have a fantastic opportunity to develop a world-leading marine information service, resulting in obvious benefits for all our customers. SeaZone has a bright future as part of the HR Wallingford Group.'

SeaZone was established in response to a market need for digital mapping and has built an established customer base within the private and public sectors in the UK and increasingly overseas. SeaZone's business includes a range of geographic information products, software and services. SeaZone HydroSpatial has become the de facto standard for digital marine reference information for use within a range of applications including marine spatial planning, environmental protection, socio-economic development, risk management and mitigation.

'Over the past six years SeaZone has gone from strength to strength both in the provision of marine geographic data and in services underpinned by definitive marine reference information', said Dr Mike Osborne, founder of SeaZone. 'Owing to the considerable international presence of HR Wallingford, the union will undoubtedly present more opportunities for SeaZone in both the UK and in overseas markets.'

SeaZone, with its existing team, will operate as a separate entity within HR Wallingford Group.

Contact

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About SeaZone Solutions Limited

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Events

MEDIN Partner's meeting 1st Sept 2010, IMarEST

A Partner's meeting will be held at **IMarEST in London on 1st September 2010** to showcase MEDIN's progress and achievements.

Further details and papers will follow.

If you are interested in attending, please [email](#) the MEDIN Core Team.