THE ASSOCIATION FOR **GEOGRAPHIC INFORMATION**

The Rise of Open Data and How It's shaping Marine GI Analytics

Fiona Miller | ABP Marine Environmental Research Ltd

Marine GI analysis, like all GI analysis, can only provide results as good as the data that is input. Additionally, the analysis of the marine environment has always had the added complication that many parts of it are inaccessible making data collection time and cost intensive. However 'Open Data' is creating a tide of change for marine science; public bodies and private companies are now making available data for use by all. Never before has so much data been at our fingertips. And it couldn't come at a better time, when an increased interest in the marine environment with an emphasis on marine spatial planning has become evident in the UK, Europe and the world.

'Open Data' widens the possibilities to complete new and innovative research, providing fresh solutions to old issues, redefining the opportunities available to the whole GI community. We need to now think about how we can maximize the use of 'Open Data' in the future and consider how to clear the path to finding the best available data. Every marine GI user needs to keep the current trend of data sharing and openness moving forward.

The History of Open Data

'Open Data' is the far right of the data spectrum; data which are open to everyone and are freely available to use and republish without restrictions beyond attribution to the source provider[1]. The last five years have seen an increase in the availability of 'Open Data' in the UK, which has been spearheaded by the government through the creation of the Open Government Licence (OGL) in 2010. At the same time the marine environment was becoming a higher priority for the European Union and the UK government. Both the EU Marine Strategy Framework Directive (MSFD) 2008 and the Marine and Coastal Act 2009 came into force, with overarching goals to achieve Good Environmental Status (GES) within the marine environment. To achieve GES an onus was put on the use of marine GI data to inform decision-making through spatial planning, increasing the need for accurate, up to date and wide ranging spatial data for the marine environment. It was inescapable that this would highlight the huge hole that exists where up to date and readily available marine GI data should be.

Historically, the collection and processing of marine data was costly due to the equipment and expertise required, and was generally obtained for a specific project or area. Many people can relate to being charged inexplicably high costs for data which were classed as fundamental for marine planning and expected to be included in projects. The increase in 'Open Data' and a shift in the UK government's mentality have resulted in a wealth of data becoming available, such as bathymetry, benthic samples and metocean recordings, allowing a much greater volume of analysis of marine data to be carried out. At the same time there has been a rapid increase in open source software allowing everyone the chance to process and analyse spatial data. Marine spatial analysis is no longer only available to those who can afford to complete data collection and own expensive technical software.

The same year in which the UK government created the OGL, the Ordnance Survey (OS) created the OS open data portal which provides a wide range of OS products for free under the OGL licence. This was quickly followed by other public bodies making data available through web portals like the Environment Agency (EA) and its Geostore data portal which now also holds data from the Marine Management Organisation (MMO) including, fisheries landings and shipping AIS data. This year (2015) the EA has also released all EA LiDAR data for England, marking a big change in the government's stance on sharing data, as previously this data was only available at cost. Other public body data portals developed recently include the United Kingdom Hydrographic Office (UKHO) INSPIRE bathymetry data portal and The Crown Estate's Marine Data Exchange (MDE) which houses data from offshore renewable energy developments.

The Opportunities and Issues for Marine GI Users

The rise of 'Open Data' and increased access of marine GI data to all has not come without its issues. The size, both extent and volume of data, now available is so large that without processing it can be too great for many off the shelf software programs to handle and store, so how do we find a 'work around' using the software we have? Creating new innovative solutions is the only way to succeed, with all the information and software now available the possibilities are endless.

With each public body creating its own web portals and industry collaborations creating even more access points to share data, how can marine GI users find what they need? The Marine Environmental Data Information Network (MEDIN) was formed in 2008 with the aim of improving access to marine data and is a partnership of UK organisations (public and private). In 2010 MEDIN released a data discovery portal providing links to large volumes of marine environmental data, helping to point people in the direction of marine GI data although this does not always help to identify the 'best available' data from hundreds of data sources. UK 'Open Data' providers need to work together to make sure that data are made available in the most efficient way possible.

Using Open Data

The benefits of open source data can be seen by all marine spatial data consumers and consequently the whole marine science community. It is clear to all that, with more up to date reliable data available, better spatial analysis will be completed, however the phrase 'rubbish in, rubbish out' still applies to any GI analysis. We need, therefore, to have good data going in to get reliable answers coming out. Such a need creates a mass of opportunities to further our knowledge of marine communities and processes as well as to apply findings which will guide future marine science objectives.

Multiple uses

In 2011 the Marine and Coastguard Agency (MCA) made available AIS data from shipping around the UK to the MMO. The MMO then processed the data[2] and released spatial layers for public consumption of shipping density grids through the EA Geostore portal. These data have since been used to inform multiple marine planning studies and Environmental Impact Assessments in UK waters. Further opportunities existed to use the processed data in 2015 study[3] where AIS shipping density was used to predict underwater noise distribution from shipping. This demonstrates that GI data can be used for multiple studies beyond the obvious and by making data available for wider re-use it could result in new innovative ways of conducting marine GI analysis.

Trend analysis

As part of the MSFD the UK wants to establish GES in its waters, this can be achieved through the informed designation of protected sites based on an understanding of the past and present distributions of marine species and habitats. During the MCZ consultation process, UK industries contributed to the data sharing movement by providing benthic GI data to public bodies, thus giving them a larger set of base data. The collection of data over many years to the same standards and the provision of these data to all interested parties will help identify trends which can go on to help target monitoring of impacts on the marine environment. This will only be achieved where industry and public bodies work together to share data and understanding.

Added value

The winter of 2013 to 2014 was not one people in the UK are likely to forget any time soon, it was one of the wettest winters on record and resulted in storm surges and extensive flooding causing major damage to parts of the UK. Following this event there was a renewed interest in creating precise and dependable metocean predictions, which rely on the availability of complete and reliable observation data for UK and Global waters. Metocean models are able to fill in the spatial gaps left by observations at discrete points, and predictions from such models are available from multiple sources. Innovative new models will be created where more reliable data are available to all i.e. 'Open Data'.

The Future

The next five years will see even more marine GI data become available; there will be more marine GI users and probably a lot of confusion over how all the data link together.

As more information is made available and more research and analysis can and will be done, then the marine GI community will develop and gain more and more knowledge helping to make informed decisions.

However, we have to be careful that searching for GI data doesn't become a harder task than processing the data. This will happen if each public body and private organisation creates its own data portal without taking into account what is already available. At present the UK public bodies have over a handful of data portals and in some cases provide access to duplicate data sets. Speaking from experience, this leads to the marine GI user being confused about which is the authoritative data source and uncertain of where to start looking.

Call to Action

It is a simple call to action, "Encourage the use of 'Open data' to complete spatial analysis". This can be achieved by making it clearer to the GI community what data exist and where they can be sourced from. Organisations, such as MEDIN, are trying to make this happen, however it is not a simple task. All marine GI users need to take responsibility for understanding the data they use and encourage their re-use by making them and any processed outputs available.

The last five years have seen dramatic change to the availability of marine spatial data, this has already resulted in a greater understanding of the marine environment. The increased focus on marine spatial planning has been buoyed by the availability of data allowing plans to be drafted on the best available data.

The marine GI community now needs to think outside the box and use all this open data to its fullest potential going into areas of research which were not previously possible without costly data collection over multiple years.

Commercial companies and academia are now able to bid for projects which were previously out of reach due to high costs for buying spatial data from competitors and public bodies. This opens up a new source of expertise, where work would have been previously won by those with access to the data, it is now won by those with the best expertise to complete the analysis.

The GI community needs to keep these trends moving forward to allow further data to become available including data from marine industries. This will see a large improvement in the spatial analysis completed, and will further our understanding of the marine environment. Identifying other data sources, currently not available, and understanding how these data can be made available will build on the wealth of marine data open to all.

About your Company

ABPmer is a leading UK marine environmental consultancy with an excellent track record in managing and contributing to integrated environmental projects across a wide range of industries as well as undertaking strategic work for government departments, devolved administrations and related agencies. ABPmer's Data and GIS team has worked on multiple large scale data collation and analysis projects which has led to in-depth understanding of marine GI analysis techniques and how these have changed over the last two decades.

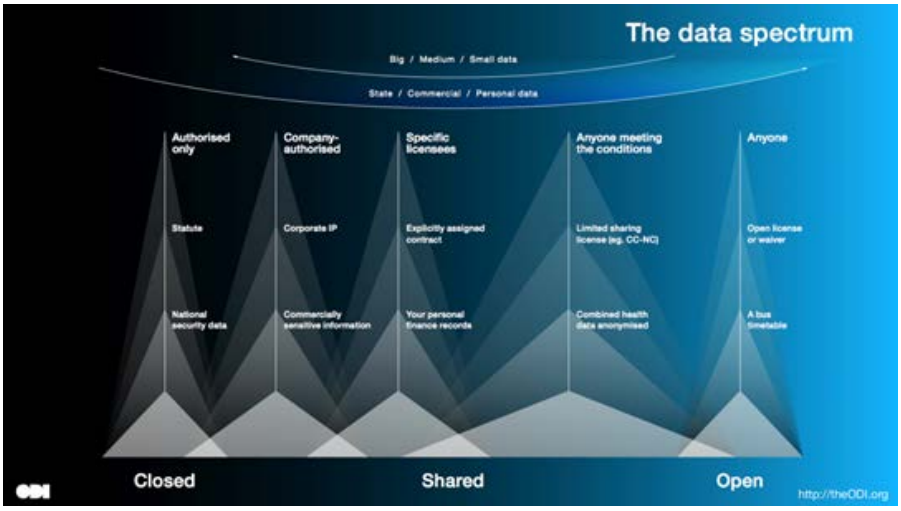

Figure 1 – The Data Spectrum. ODI copyright, 2015.

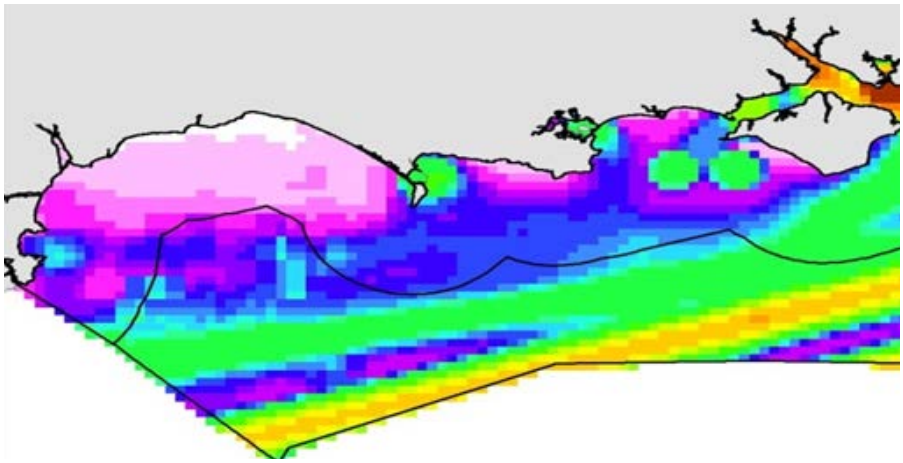

Figure 2 – Image of Underwater Noise Distribution. ABPmer copyright 2015.

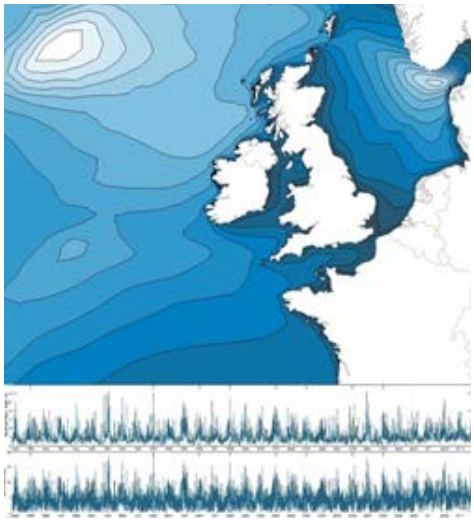

Figure 3 – Image of Metocean Models. ABPmer copyright 2015. All rights reserved.

References

1 ODI accessed via http://theodi.org/

2 MMO, 2014. Mapping UK Shipping Density and Routes Technical Annex. A report produced for the Marine Management Organisation, pp 52. MMO Project No: 1066. ISBN: 978-1-909452-26-8.

3 MMO, 2015. Modelled Mapping of Continuous Underwater Noise Generated by Activities. A report produced for the Marine Management Organisation, pp 50. MMO Project No: 1097. ISBN: 978-1-909452-87-9.