EMODnet Secretariat

Service Contract MARE/2012/15

EMODnet Phase 2 – Annual Progress Report

Reporting Period: September 2016 – September 2017

Contents

1 Introduction

This report presents an overview of the progress of the thematic portals and regional activities achieved during the fourth year of operation of the EMODnet Secretariat, i.e. in the period from September 2016 to September 2017. The report is largely based on the inputs provided by the EMODnet thematic lots and Sea-basin Checkpoints, inter alia from available progress reports supplemented with updates from the Secretariat. It must be highlighted, however, that periodic reporting from the thematic lots was interrupted during several months, in the interim period elapsing from the end of the Phase II contracts (July-October 2017) and the signature of new Phase III ones (March-May 2017) so many of those reports in that period are missing. Despite not being formally under any contract, all thematic portals maintained the service during that period, but understandably the activity was reduced significantly.

The most important achievements in this period were:

- **Consolidation of the Arctic, Atlantic, Baltic and Black Sea Sea-basin Checkpoints** with significant progress presented in their first Adequacy Reports. These reports were first discussed with Experts Panels for each sea-basin and further considered during the EMODnet Stakeholder Conference (see point below).

- Successful organisation of the **EMODnet Stakeholder Conference and Sea-basin Workshops** (14-15 February 2017, Brussels), giving the opportunity to present the Sea-basin Checkpoints findings to more than 150 stakeholders and discuss recommendations on how to better meet the needs of marine data users.

- **Strengthening of the links between EMODnet and initiatives such as MSFD and MSP**. Both the Secretariat and the Thematic lots coordinators participated in several meetings and conferences where EMODnet's role in helping with the implementation of both directives was discussed.

- Much more active presence of EMODnet on social media including Twitter and **increased visibility** through regular communication via the Central Portal, as well as thanks to the release of new communication material (infographics and the Annual Report).

- Consolidation of EMODnet as a reference amongst stakeholders within and beyond the monitoring and observation communities, with specific efforts undertaken to reach the private sector.

- **Strengthening of cross-lot collaboration**: the exchange of information between lots has increased and is now facilitated by the Secretariat. Some extensions of the EMODnet intranet have been implemented for that purpose. Thematic lots meetings are now open to participation of partners from other lots and several coordinators have attended other lots kick-off meetings. There is also joint cross-thematic work on-going in the framework of EMODnet Data Ingestion.

- Successful collaborative work achieved within the EMODnet Technical Working Group which has enabled the **implementation of a Map Viewer and EMODnet Products Catalogue on the Central Portal**. The Technical Working Group also enabled progress towards establishing a new progress monitoring system and a shared user identification system using Marine-ID.

- Creation of an **EMODnet Data Ingestion Portal** www.emodnet-ingestion.eu to guide data holders who do not yet contribute to the EMODnet data repositories to share their data.

2 Progress summary

2.1 General highlights and achievements

- September 2016: End of EMODnet Phase II and submission of final reports from the different Thematic lots to EASME/DG MARE. The reports were evaluated and suggestions for changes were implemented before final approval.

- September 2016: The MedSea Checkpoint held its final Annual Meeting in Bologna, which included an important training session on SEXTANT, the marine data infrastructure supporting the assessment work undertaken by this Checkpoint.

- September 2016/October 2017: EMODnet partners and the Secretariat increase efforts to reach the private sector and further involve them both as users of EMODnet data and products and as contributors of data. Several workshops were organized with representatives of private companies (Atlantic Stakeholder Platform Conference in Dublin, SeaTech Week in Brest).

- October 2017: Release of the latest version of the Bathymetry global Digital Terrain Model (DTM), with an increase of 10% in the number of data sources used to produce the maps coming from 31 data holders in 18 different countries.

- October 2017: Period of intense reporting for the Checkpoints. The North Sea checkpoint submitted its final report, while the Arctic, Atlantic, Baltic and Black Sea were in different stages of preparation and submission of their first Data Adequacy Reports.

- November 2016: creation of an EMODnet Associated Partner category to encourage the participation of institutions which are not project partners, but have an interest on EMODnet activities and can contribute to them.

- November/December 2016: The Atlantic, Baltic and Black Sea Checkpoints presented their first Adequacy Reports to a panel of experts. These experts represented different stakeholder communities, including scientists as well as the private sector and public bodies. The results of those meetings were submitted as Expert Panel Reports and will be taken into account in the continuation of the projects.

- December 2016: EMODnet forged links with the private sector on the occasion of the Sustainable Ocean Summit (SOS) in Rotterdam, where the Secretariat gave a presentation and took part of a panel.

- January 2017: The award of contracts corresponding to EMODnet Phase III Lots 1-6 (Geology, Seabed Habitats, Physics, Chemistry, Biology and Human Activities) was communicated.

- January 2017: Interaction between the Checkpoints, DG MARE and the Secretariat to distil the most important messages stemming from the Data Adequacy Reports and Expert Panel Reports in preparation of the EMODnet Stakeholder Conference (to be held in February 2017)

- February 2017: The first EMODnet Stakeholder Conference and Sea-basin Workshops took place at the Royal Flemish Academy of Belgium for Science and the Arts in Brussels, Belgium presenting the findings of the EMODnet Checkpoints to more than 150 participants (Conference Report and other materials are available at http://www.emodnet.eu/checkpoints/stakeholder-conference-2017).

- February 2017: Final results and recommendations of the Coastal Mapping project presented at a European Parliament event entitled "Mapping EU's

coasts: A key towards sustainable Blue Development", addressing the importance of coastal bathymetric data for marine activities.

- March 2017: Presentation of EMODnet to an EU-Chines delegation in Bruges in the context of the EU China Blue Year. The meeting provided an opportunity to discuss the status of marine science and data in Europe and China as well as to consider areas for closer cooperation with China during the EU-China Blue Year and beyond.

- March 2017-May 2017: All the thematic lots held their kick-off meetings during this period, with few changes in terms of partners participating, even though some of the lead partners have changed. In particular, EMODnet HRSM/Bathymetry is now coordinated by the French Hydrographic Office (SHOM), Seabed Habitats by the Joint Nature Conservation Committee (JNCC) and Geology is now lead by GTK-Geological Survey of Finland.

- March 2017: Launching of a revamped HRSM/Bathymetry portal coinciding with their Kick-off meeting in Venice, Italy.

- April 2017: Numerous representation of EMODnet thematic lots and Checkpoints during the European Geophysical Union Assembly in Vienna with several EMODnet talks and posters presented.

- May 2017: Release of the first EMODnet Infographics, which provides an attractive overview of EMODnet, its mission, strands, timeline and benefits.

- May 2017: Most of EMODnet thematic groups met in Limassol, Cyprus, on the occasion of the EMODnet Data Ingestion partner meeting where they identified data sets for ingestion and safe-keeping

- May 2017: Successful representation of EMODnet at the European Maritime Day 2017 in Poole, UK. EMODnet, together with the COLUMBUS project, co-organised a workshop on Blue Growth Data Challenge and Engaging with Industry.

- June 2017: Release of the first EMODnet Annual Report for a wider public, describing the different components of the network and showing progress in each of the EMODnet strands.

- July 2017: 2nd EMODnet Technical Working Group Meeting, with significant progress towards the consolidation of the EMODnet Central Portal Catalogue as well as the EMODnet Geoviewer.

- August 2017: Drafting of the EMODnet Visual Identity Guidelines, to be discussed at the Steering Committee which will contribute to the harmonization of the EMODnet thematic portals and is key to support the communication activities performed by the different thematic groups and to consolidate the EMODnet branding.

- August 2017: Definition of an action plan for piloting the new EMODnet monitoring system, which will allow for a more clear and comparable statistics of portals performance.

- September 2017: Release of the EMODnet Geoviewer containing layers from every thematic portal and allowing for their multiple visualization and combination.

- September 2017: First steps towards making available shipping density maps in EMODnet Human Activities portal. A meeting was conveyed by DG MARE to explore ways of using data from AIS anti-collision systems for that purpose.

2.2 Specific progress and achievements of the thematic lots

The contracts for the thematic lots in Phase II ended between July 2017 and October 2017, and contracts for Phase III were awarded in December 2016-February 2017. As a result, activities during the last quarter of 2016 slowed down while activities in the first quarter of the 2017 focussed primarily on administrative and management aspects related to the formalisation of the consortia and the signature of the contracts. All thematic lots participated also in the 7th Steering Committee Meeting which took place in Brussels on 15-16 February. In addition, all thematic lots prepared and held their kick-off meetings in the period March 2017-May 2017. These meetings were also open for members of other thematic lots (see section 2.6 about cross-thematic collaboration). Below some details about other activities developed specifically by each of the thematic lots.

- **EMODnet HRSM/Bathymetry** produced its latest version of the EMODnet Digital Terrain Model (DTM) during 2016 and the new version was released in October 2016, followed by an intense promotional activity to present it in different venues including several international conferences such as the AGU (San Francisco), or the EGU (Vienna). Work towards the production of a higher resolution DTM has begun taking advantage of an extended partnership (41 institutions from 20 countries, compared 31 from 15 to in the previous

phase). This new DTM will have a resolution of 1/16 * 1/16 arc minutes (the previous one was 1/8 * 1/8 arc minutes), i.e. circa 115 m, and is due on September 2018. Data providers have received training and guidelines so that they can pre-process survey data sets and composite DTMs using GLOBE software and provide suitable metadata attributes. Another important fact is the upgrade of the portal to improve the user experience, with an attractive layout including responsive design.

- The final report and executive summary of **EMODnet Coastal Mapping** was presented in January 2017 and accepted in March 2017 and since then, the project has entered a maintenance phase. SHOM, the coordinator of the Coastal Mapping project, was invited to several events to present their results and recommendations, in particular advocating for a EU strategy to support acquisition of high resolution bathymetric data.

- **EMODnet Geology** changed coordinator in this new phase (the project is now lead by the Geological Survey of Finland, GTK). Previous problems with the open source catalogue application used for the portal have been resolved, the portal has been migrated and a new revamped web is now available online giving access to the maps produced during Phase II while work progresses for the new products and services planned for Phase III. An important workshop on submerged landscapes (one of the novelties of Phase III) was held in Copenhagen where the work plan for the first year was defined. Geology partners were very active in outreach activities with eight talks and posters presented at different events and conferences.

- **EMODnet Seabed Habitats** released an update of the EMODnet Broad-Scale Seabed Habitat Map (EUSeaMap) which included the new MSFD benthic broad habitat types, and published a comprehensive report where they explained the method behind the EUSeaMap and the calculation of the confidence layers. The assembly group has also initiated a programme to contact potential data holders who could contribute with habitat maps and are working towards the next version of EUSeaMap.

- **EMODnet Chemistry** has taken its first steps to develop new products related to marine litter, which is one of the novelties in Phase III, including beach litter, seabed litter and microliter. This work is done in strong collaboration with OSPAR and ICES and also taking advantage of the participation in the Technical Group on Marine Litter (TG ML). EMODnet Chemistry also participated in the Technical Group on Marine Data related to the implementation of MSFD. Some of the EMODnet Chemistry maps have been

used for reporting by EEA and Black Sea Commission. A major revamping of the website is also planned and a new portal mock-up has been presented.

- In the first months of Phase III, **EMODnet Biology** has been organising an important international workshop which has taken place in London, where the requirements of core EMODnet Biology data products were defined, based on inputs from stakeholders. A tutorial movie was developed and is currently online, explaining how to use the download tool. They also launched a call to support marine biological data collectors to become EMODnet Biology Associated Data Partners and contribute data.

- Between September 2016 and August 2017, **EMODnet Physics** has continued increasing the number of platforms, such as HF radars from US and Australia, and adding 35 new FerryBox lines from Stena shipping company. This has been accompanied by a whole range of new features added to their portal: the help desk service, an improved map viewer and some new products from operational platforms. EMODnet Physics has also started some preparatory work to manage the two new types of datasets that are part of their contract: underwater noise and river flow. Data from rivers are already available from 93 stations around Europe.

- Part of the activity for **EMODnet Human Activities** in the first months of the new phase focused on the setting up of the Web Feature Services for most of their data layers. In addition to that, a new communication plan was designed and discussed with the partners, including publishing more blog entries. They have also held several meetings with DG MARE and other partners to advance in the publication of vessel density maps, which is one of the new objectives of their contract in Phase III.

2.3 EMODnet Central Portal

EMODnet Central Portal has consolidated as the preferred gateway to give access to the thematic and sea basin activities. But more importantly, it has become the showcase of EMODnet, evolving from a relatively static portal, to a dynamic instrument providing timely information about EMODnet developments. The portal has experienced layout changes to accommodate new sections such as the "News Overview" and the "Events". These sections have helped making the entry page of the Central Portal a more attractive and user-friendly point of access to EMODnet information.

In addition to that, the Central Portal Data Services have been enlarged and two important new components are now in place: the Product Catalogue and the Map

Viewer. Both are important advances to improve the visibility of EMODnet and to provide a more comprehensive vision of what EMODnet offers. Up to now, users had to go to each individual portal to find and retrieve what they were looking for. That situation has changed now, the catalogue provides a glimpse on EMODnet products which have a pan-European coverage, regardless the theme, and the map viewer enables the superposition of data layers from the EMODnet thematic portals.

The Central Portal becomes also instrumental to give visibility to EMODnet-related events such as the EMODnet Stakeholder Conference, and more recently the Open Sea Lab competition, hosting specific webpages for those events.

2.4 Specific progress and achievements of the Sea-basin Checkpoints

Between September 2016 and 2017 the North Sea and the Mediterranean Checkpoints ended their contracts, while the other four Checkpoint projects covering the Baltic, the Artic, Atlantic and the Black Sea made significant progress producing their first important deliverable: the Data Adequacy Report. The Data Adequacy Reports summarize the work developed by each of the teams facing the challenges. This work implies a literature survey to collect existing marine datasets and metadata which can be relevant to face the challenge, the design of an assessment method with indicators and the application of that method to evaluate how fitness for use the compiled data were when trying to develop the challenge outputs. The Checkpoints have made an effort to present the different aspects of the workflow in their respective webpages were. Those webpages contain general information about the projects and method, as well as access to reports and outputs from the challenges, but it also allows for a more interactive way of presenting the results to the visitor. Indeed many of the Checkpoints have implemented a service in their web pages where users can have access to the indicators that they have used for their data adequacy reports. The Sea-basin Checkpoints were also heavily involved in the preparation of the EMODnet Stakeholder Conference (see section 5.1). The Checkpoint coordinators mobilised their stakeholders to participate in the conference and organised the break-out workshops. In addition to that, in preparation of the event, they distilled the most important messages from the Data Adequacy Report into a number of thematic reports, which could be used to foster the discussion in a more structured way.

2.5 The EMODnet Data Ingestion Service

The EMODnet Data Ingestion Data Ingestion Project guides data holders who do not yet contribute to the EMODnet data repositories, through a two-step process where

they must submit their marine data along with a submission form providing some specific information. Their data are assigned to a data centre, responsible for their subsequent processing and curation, in dialogue with the data holder. At the end of the process, original data will be fit for long-term storage and stewardship in appropriate existing repositories and will be made accessible through EMODnet thematic portals. A help-service is also available to answer questions from data providers.

During this period considerable efforts were devoted to building the EMODnet Data Ingestion portal including all facilities needed so that data providers can submit their data such as the Data Submission service and the Help desk service. It also includes sections on Use Cases, News and Promotional material. The portal was launched early February 2017 and provided an attractive interphase which could also be directly accessed through the EMODnet Central Portal. In addition to that, all EMODnet thematic portals included a reference to the advantages of contributing data to EMODnet with a link to the Data Ingestion portal which considerably increased the number of visits.

Data Ingestion Project not only assists those interested in submitting data but also actively seeks for sources of data and encourages potential contributors. As part of the process of identification of potential data providers, a first inventory per country has been compiled, covering 26 countries and 466 potential data sources which the project will attempt to access in the following months. This has relied greatly on the cooperation and synergy within the EMODnet community which was involved in this identification process. It has also implied producing and distributing promotion material to encourage potential contributors (preparation of bookmarks and a promotional video and several presentations in Conferences).

2.6 Cross-thematic collaborations

Now that all thematic lots have reached a good level of maturity, it is time to work less in isolation, therefore cross-lot collaboration and interactions are one of the priorities in this new Phase III. Cross-lot interactions are particularly relevant for those thematic lots relying on inputs, data and products from other thematic assembly groups for their own work – as was often seen in Phase II. There is a growing need to keep each other well informed and establish appropriate interlinkages to ensure the mutual support necessary for everyone to deliver in a coherent way. Several actions have been initiated in this regard. The Secretariat is now ensuring that cross-thematic discussions are part of the Steering Committee Agenda. An exchange module in the **Central Portal** has been implemented and coordinators have been requested to use it to exchange information about internal meetings/workshops, relevant updates and

activities and to circulate project meeting reports. In addition to the Steering Committee meetings, representatives of all thematic groups were present in the **EMODnet Data Ingestion** Annual Meeting, as well as in the EMODnet Technical Group Meeting. These joint meetings provide an occasion to discuss issues of common interest and facilitate the flow of information between thematic groups. Also, thematic lot meetings are now open for other lots to join internal meetings. **EMODnet Seabed Habitats** has been particularly active in this regard: members of that thematic group attended the kick-off meetings of **Biology** and **Geology** and other related workshops. They also made a review of all Data Adequacy Reports from **EMODnet Checkpoints** and identified points of interest for them and possible actions. Active communication is maintained between all thematic lots on diverse issues. For instance, **Geology** and **HRSM/Bathymetry** have drafted and agreed upon cooperation plans, but less formal exchanges are also done through other channels, in meetings and by email. In some occasions user's enquiries are redirected from one thematic portal to the other.

3 Key challenges of common interest

Huge progress has been achieved during the reporting period at various levels (data uptake, access, portal development, etc.), a number of important challenges remain to be addressed by all EMODnet lots to progress further. These challenges are not new and were already highlighted and detailed in earlier progress reports. The main common challenges relate to developing a single sign-on procedure; maintaining realistic stakeholder expectations; open access/licences; data ingestion; user feedback and interoperability issues. For details, we refer to the first and second year progress report and the 2017 Secretariat activity report.

4 User Feedback

As the portals have developed and the services provided through them have increased and improved, strengthening the relationship with the users and obtaining information from them has become even more important. This is essential to understand their needs and improve the system accordingly. It also provides a way to better understand how EMODnet is providing benefits to the different users communities.

In this new Phase III, thematic groups are contractually obliged to offer support to users through a help desk, which must be available daily in office hours and deal with their feedback in a timely manner. Most of the thematic groups had already

implemented some type of contact/enquiries form in their portals during Phase II and they report on the interaction with their users, the nature of the feedback and the response time to address the requests. In most cases, enquiries have a technical nature, and are addressed within hours and normally solved within few days (1 day for **Physics**, 3 days on average for **HRSM/Bathymetry**, 6 days for **Biology** in the April-July 2017 report). These enquiries help detect errors or bugs in the different services (i.e. error in metadata for platforms in Physics; Bug on the Download Tool of Biology, errors with registration…). Web portals are subsequently modified/updated to correct those errors. Users also ask questions about how to cite the data sources and about data policy issues (e.g. **Human Activities**). In other cases, users also make suggestions to improve the service, which are being considered (e.g, **Seabed Habitats**, Progress Report April-June 2017). Positive feedbacks from users are also received regularly, among others highlighting success of some of the EMODnet products (e.g. this video about Seabed Habitat map on youtube: https://t.co/6ZutwM3Ip6).

Since the new projects have only been running for less than a year, for the time being none of the thematic groups has circulated any user survey.

Users can also get in contact through the info@emodnet.eu email address indicated on the **Central Portal**. Many of the inquiries are addressed and solved directly while in other cases users are redirected to the corresponding thematic portal depending on the nature of their question.

5 Outreach and communication activities

During this period, and in spite of the interruption of activities due to the transition between Phase II and Phase III, all portals have maintained their services and coordinators have continued to showcase their projects at different conferences and events. In addition, remarkable changes have been introduced in the Central Portal, following several modifications reported in Section 1.3 with the implementation of a News Section and an Events section. This was followed by the distribution of the EMODnet News Digest, which highlights the most important news related with EMODnet, including releases of products, important meetings attended, event organized, etc. Both the animation of the Central Portal and the distribution of the EMODnet News Digest by email have meant a significant effort to increase

EMODnet visibility, especially for those outside the EMODnet community. There is also a much more active presence of EMODnet on social media, in particular on Twitter.

The EMODnet brochure and videos are still popular products and together with the reports on the 1st EMODnet Open Conference and the most recent report on the EMODnet Stakeholder Conference, they have been widely distributed at many of the conferences and events attended by the EMODnet Secretariat and/or thematic lots/checkpoints in 2016 and 2017. But this year also saw the production of a series of new communication products, which are also worth mentioning: the Annual Report and the Infographics, two new animation movies and a newsletter. The work on the annual report and the infographics have been led by Trust IT with input from The Secretariat and from EMODnet Steering Committee as well as DG MARE.

We list here a selection of the conferences and events where EMODnet partners contributed, indicating the title and dates:

- INSPIRE Conference (European Commission, 26-30 September 2016, Barcelona, Spain)

- 3rd Atlantic Stakeholder Platform Conference (Atlantic Action Plan, European Commission, 27 September, Dublin, Ireland)

- SeaTech Week (Brest Technopôle, 10-14 October, Brest, France)

- International Conference on Marine Data and Information System, IMDIS Annual Conference (11-13 October, Gdansk, Poland)

- Sustainable Ocean Summit SOS 2016 (30 November- 2 December Rotterdam, the Netherlands)

- American Geophysical Union AGU Fall Meeting (12-16 December 2016, San Francisco, USA)

- Mapping EU's coasts Conference (7 February 2017, Brussels, Belgium)

- EMODnet Sea-Basin Checkpoints Stakeholder Conference 2017 (14-15 February, Brussels, Belgium)

- Blue Growth Data For North Sea   (07 February 2017,   Edinburgh, Scotland)

- 2nd International Conference on MSP (15-17 March, Paris, France)

- Twenty fourth session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE) (28-31 March, Kuala Lumpur, Malasya)

- EGU conference Viena (23-28 April, 2017, Viena, Austria)

- GEoHab 2017 (3-4 May 2017, Halifax, Canada)

- European Maritime Day Poole, UK   (18-19 May 2017, Poole, UK)

- EuroGOOS General Assembly (31 May 2017, Brussels, Belgium)

- Blue Growth China Event   (01 June 2017 Brussels, Belgium)

- 4th Technical Group on marine data (TG DATA, EEA) (7-8 June 2017)

- European GEO Workshop (19-21 June 2017, Helsinki,   Finland)

- International User Conference, CARIS software (19-22, Ottawa, Canada)

- Copernicus for coastal zone monitoring and management (29 June 2017, Brussels, Belgium)

- EMODnet Technical Group Meeting (05 - 07 July 2017, Genova, Italy)

5.1 *EMODnet Stakeholder Conference*

On 14 and 15 February 2017, approximately 150 marine data experts and users gathered in Brussels at the Royal Flemish Academy of Belgium for Science and Arts for the first EMODnet Stakeholder Conference, held together with a series of Sea-basin Workshops. Participants considered whether marine data collected via current observation and monitoring activities in Europe effectively served the needs of users. The Checkpoints develop different methods to assess those activities, and the Conference was an occasion to showcase the results of their work to date, highlighting where they had identified major gaps. The Conference lasted one and half day, with a series of plenary and break-out sessions. The plenary sessions included a number of keynote presentations and panel discussions. Considerable preparatory work was done by the Checkpoints coordinators, in particular to present their results in a harmonized way to facilitate the discussions at the Plenary. Coordinators summarised the results of the stress-test according to the seven EMODnet themes and a compilation of "key findings" per theme were distributed to attendees of the conference. During the break-out sessions, each of the Checkpoints hosted a regional Sea-basin Stakeholder Workshop, presenting the main findings of their Data Adequacy Reports to the participants.

Special efforts have been done to make sure that all results of the Conference can be accessible in the future. With this purpose, there is a specific section in the Central Portal, with all the information concerning the Conference (programme, presentations, photos, Conference report). In addition to that, videos with testimonials from the

Checkpoint coordinators and other participants are also available in the same section (http://www.emodnet.eu/checkpoints/stakeholder-conference-2017). A Stakeholder Conference Report has been produced which describes the event and condenses the conference outcomes and recommendations, including those from the break-out and plenary sessions. The Conference report is downloadable and hard-copies have been distributed widely.

6 Summary of progress indicators and user statistics

This report covers the period September 2016-September 2017. Most of the thematic lots ended their Phase II contracts between July-October 2016, and only started officially in December 2016-May 2017. This means that they were not obliged contractually to provide reports. This makes it difficult to provide meaningful figures that show evolution. We are offering, nevertheless, some comparisons when they are possible. Below is a summary of relevant observations based on user statistics and indicators reported up to July 2017 (date of the last quarterly report), based in the information we have, with significant gaps due to the interim period.

6.1 Supply of data, metadata and data products

6.1.1 Volume of data made available through the portal

All thematic lots are making available new data and products through their portals, which have become the cornerstones of the EMODnet service. In this section we will provide an overview of the most relevant additions over the last annual period.

- From September 2016 until July 2017 (date of the last progress report), **EMODnet HRSM/Bathymetry** indicated that the number of CDI (Common Data Index) entries for available bathymetric datasets in European waters increased from 14791 to 14864. This is just a slight increase compared to the previous year (one tenth approximately) and applies mostly to datasets from non-European waters. The number of DTMs available at the Sextant Directory has remained stable (80 in September 2017, 78 in September 2016). This slower increase is not surprising given that the activity was interrupted for a long period.

- The **Coastal Mapping** project developed a web portal that allows visualizing and downloading for more than 60 datasets up to date. These datasets include

coastal baselines, topography-bathymetry and imagery. The project is in maintenance mode, but the portal is still operational and receives approximately 100 unique visitors per month.

- The supply of maps through the **EMODnet Geology** portal during this reporting period has improved greatly thanks to the new webpage which facilitates access to 92 geological datasets/maps providing information about sediment accumulation rates, sea-floor geology, bedrock lithology, bedrock stratigraphy, coastline migration, mineral resources and geological events. The total number of resources that can be accessed through the web page has not changed much with respect to the former period (there were more than 80), however, the interphase has greatly developed and represents a big change with respect to Phase II where access to datasets and data products assembled and created by the project was very limited. Visitors now can use the map viewer to display the different layers and they can also add their own WMS service-URL. Access to the most popular maps is also possible through a dedicated "Products" section where you find a more detailed description of the different maps, that you can visualize and download. Another section of the webpage shows the Services that will be made available during Phase III. Currently, the datasets and maps are available through an EGDI metadata database, but in the future services will be implemented to allow access through OGC standard web services.

- The number of datasets and maps available through the **EMODnet Seabed Habitats** portal have not increased since September 2016. The most important novelty is that the EUSeaMap, the broad scale seabed habitat map for Europe, was updated to include the new MSFD benthic broad habitat types (defined in Part II of the Annex to Commission Decision EU 2017/848).

- From September 2015 to August 2016, **EMODnet Chemistry** CDI records relevant for European waters increased from 716062 to 741779 (from 847981 to 813309 for the whole globe). Approximately 16% require negotiation with data originators through the Seadatanet interface. The number of data providers remains stable (64 data providers in 32 countries).

- **EMODnet Biology** reported an increase of 50 datasets and 150000 more records since January 2017, which is comparable to the increase in the previous reporting period. Most of the datasets come from the same institution (KMFRI in Kenya). In addition to giving access to datasets, the portal currently provides more than 60 data products indicating the abundance of different marine species. Access to data and data products through the portal

has been improved: (1) a tutorial movie to use the download toolbox has been created and is available at: http://www.emodnet-biology.eu/tutorials (2) A clear description of the EMODnet Biology API and how to access its web services has been published at: http://www.emodnet-biology.eu/emodnet-biology-api

- The number of operational platforms providing data accessible through the **EMODnet Physics** portal has increased with approximately 8000 platforms in the last year according to the numbers that can be accessed through the portal's dashboard service, being 19000 the total number of platforms made available since the beginning of the project. Platforms include drifting buoys, ferrybox, gliders, fixed buoys, profiling floats and ARGO floats. However, the numbers can oscillate considerably since the platforms/instruments can operate intermittently, in particular de drifting buoys and the ARGO floats, which are the most numerous. Amongst the new platforms, it is worth noting that due to the joint efforts with the Data Ingestion project, 30 tide gauges, 23 ferry boxes, 3 HF radars and 1100 mammals time series have been incorporated into the portal. In addition to providing access to the time series, the portal displays numerous data products that are continuously improved.

- In this reporting period, **EMODnet Human Activities** has updated 12 of their data and metadata sets corresponding to their 32 data layers currently available according to 13 types/themes related to human activities. No new data layers have been incorporated. The datasets include points, lines, polygons, related tables or records, and raster tiles/cells. The user can view datasets as maps, and can also search metadata, download GIS files and link to web services according to the 13 themes and using keywords.

6.2 Usage of EMODnet data, metadata and data products

6.2.1 Portal user statistics and preferred user navigation routes

The Central Portal has become the preferred way to access information about EMODnet and it has experienced significant improvements to make it more dynamic, useful and attractive for visitors. The following two figures provide an overview with the monthly history of visits to the **EMODnet Central Portal** (www.emodnet.eu) in 2016 and 2017 and reflect the increasing visibility of the site, with a number of visitors that has doubled over the last year. It is not easy to interpret the figures and know exactly what has drawn the attention of the public, but presumably the higher number of visitors in September 2017 is related to the publication of the

announcement of the EMODnet Open Sea Lab Competition (which will take place in November 2017) and the new Map Viewer (hence, the greater bandwidth).
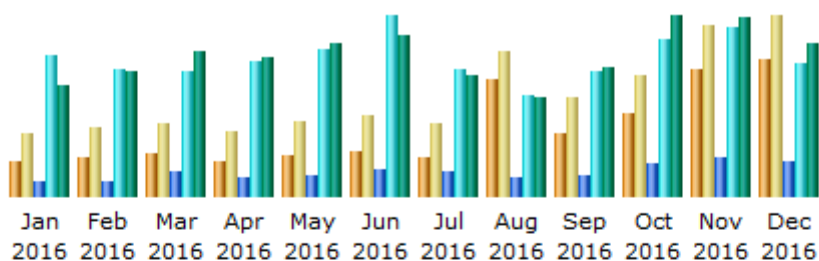
Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2016	2,629	4,681	19,289	175,501	5.10 GB
Feb 2016	2,911	5,113	17,747	157,191	5.67 GB
Mar 2016	3,186	5,439	31,474	155,167	6.57 GB
Apr 2016	2,598	4,804	22,603	167,090	6.30 GB
May 2016	3,041	5,481	25,420	182,674	6.96 GB
Jun 2016	3,256	5,986	32,626	222,794	7.33 GB
Jul 2016	2,924	5,389	30,140	156,300	5.55 GB
Aug 2016	8,616	10,730	22,521	123,811	4.52 GB
Sep 2016	4,731	7,334	26,269	154,387	5.87 GB
Oct 2016	6,109	9,019	40,348	193,776	8.20 GB
Nov 2016	9,465	12,583	48,789	208,696	8.18 GB
Dec 2016	10,132	13,318	42,182	164,197	6.93 GB
Total	59,598	89,877	359,408	2,061,584	77.17 GB

Figure 1: Monthly history 2016
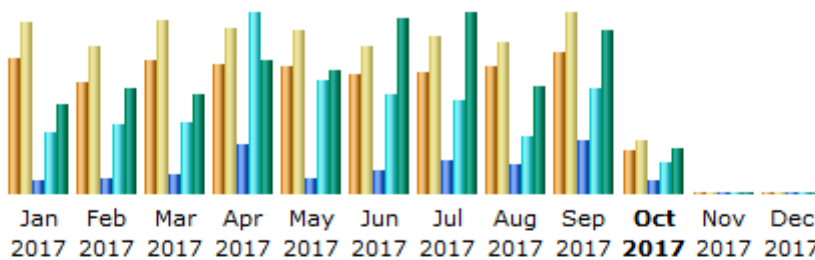
Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2017	15,481	19,416	84,842	392,569	12.74 GB
Feb 2017	12,665	16,681	102,449	452,777	15.04 GB
Mar 2017	15,203	19,611	117,162	463,286	14.24 GB
Apr 2017	14,665	18,685	323,176	1,165,851	19.06 GB
May 2017	14,546	18,469	98,680	737,132	17.64 GB
Jun 2017	13,511	16,656	146,871	635,794	25.17 GB
Jul 2017	13,865	17,934	209,830	605,285	25.96 GB
Aug 2017	14,446	17,277	192,915	374,753	15.32 GB
Sep 2017	16,083	20,491	339,373	680,553	23.42 GB
Oct 2017	4,872	6,019	85,835	203,910	6.58 GB
Nov 2017	0	0	0	0	0
Dec 2017	0	0	0	0	0
Total	135,337	171,239	1,701,133	5,711,910	175.19 GB

Figure 2: Monthly history 2017

Periodic reporting from the thematic lots was interrupted during several months from the end of Phase II contracts till the new contracts started. It is difficult to make comparisons as many thematic lots have not reported on data portals usage for several months. On the other hand, it is also important to bear in mind that many portals have incorporated now web services, which means than usage of data is not reflected on actual visits (because the user do not download data or data products manually, but they do it automatically using the web services). Some comparisons are nevertheless offered.

- **EMODnet HRSM/Bathymetry portal** has seen a very significant increase in the number of users of their OGC compliant web services, which comprise various layers. In the last report period (July 2017), these services were used by 648 users per day on average, which is almost three times more than the average number registered in July 2016. Visitors to the HRSM/Bathymetry main portal have more than doubled from July 2017 to July 2017 (3000 to

7000) whereas the visitors to the Bathymetry DTM viewer amount for 4000. Again, Bathymetry is the more popular EMODnet portal after the Central one, but sharing for the first time its position with Biology. Figures for **EMODnet Geology** are not yet available, as the portal experienced a complete revamping following the award of the contract in Phase III and they have not reported on user statistics yet. As a reference, figures from the final report (covering the period January 2016-August 2016) showed an average number of 3000 visitors per month.

- According to the last quarterly report (April 2017-June 2017), **EMODnet Seabed Habitats** portal was visited by approximately 400 users per month, which is comparable with figures reported in an equivalent period in 2016. They have implemented web services, but statistics on their use are not available yet.

- **EMODnet Chemistry** provided statistics differentiating between users of the data discovery and access service, the Ocean Browser service and the web site. The number of visitors to those services and the main portal has not increased since last year (monthly average of 300 unique visitors) and it is still low compared to the other portals.

- **EMODnet Biology** reports on monthly unique visitors to their website which oscillate between 9000 and 12000, so this is a huge increase with respect to the average last year (1500 on average).

- **EMODnet Physics** present very detailed information on the number of visits to the different sections of their website, and this information is also available for each platform in their web page. The number of visits to the portal landing page, for instance, has increased considerably (800 visits per month on average between March 2017 and July 2017, less than 300 in 2016). A similar progression is seen in the number of visits to the map page and using web services. Latest available figures indicate that the map page is visited 2600 times per month on average (950 in the equivalent period of 2016), while the number of visitors using web services is 12000 (2000 in 2016). The increase in the use of web services is particularly important, and is now comparable to the one reported by HRSM/Bathymetry.

- **EMODnet Human Activities** provided statistics based on Google Analytics and distinguished between visits to their Home, View data and Search data pages. Globally speaking, the number of visitors and number of page views has not increased significantly since last year (monthly average of around 800 unique visits per month). The percentage of new visitors is again around 40%.

6.2.2 Volume of data and data products downloaded from the portals

This report covers the period September 2016-September 2017. Most of the thematic lots ended their Phase II contracts between July-October 2016, and only started officially in December 2016-May 2017. This means that they were not obliged contractually to provide reports. This makes it difficult to provide meaningful Figures that show evolution. We are offering, nevertheless, some comparisons when they are possible, based in the information we have, which in most cases will not cover the whole year.

- In the last year of contract in Phase II, regional Digital Terrain Models (DTMs) were downloaded 40800 times from **EMODnet HRSM/Bathymetry** site (monthly average = 3400 downloads). In the quarterly period April 2017-June 2017, they reported a similar monthly average (3230). Web services are widely used to view and download data (20000 users per month) with US being by far the most active country.

- **EMODnet Geology** reported for the first time on the data products downloaded from their portal, specifying the different maps that were requested. Those maps (Seabed Substrate Map, Sea-floor Lithology, Coastal Behavior, Minerals, Events and Probabilities) were all downloaded around 50 times in 3 months.

- The list of data products for **EMODnet Seabed Habitats** has changed since 2016 and comparisons are not straightforward. For instance, the Broad-scale habitat map (EUSeaMap), was downloaded 50 times/month on average in 2017, where in 2016 this number was 70 times/month. But this is also due to the fact that in Phase II, several regional maps (Baltic Sea, Western Mediterranean and so on) were offered for download, whereas now it is just one pan-European map. The same trend was observed for Maps from Surveys. During Phase II only a download with a zip containing all maps was possible, where now users can choose individual maps. This makes it difficult to compare numbers for downloads.

- **EMODnet Chemistry** reports on 77 basket transactions and 113802 CDI requested from 30 different users in 41 data centres on the period July 2016 to June 2017. This number do not differ much from the annual averages which can be extracted from their final report for Phase II (60 basket transactions, 150000 CDI). However, they also indicate in their report that there are more requests of datasets being done through the Seadatanet portal (about five times higher).

- **EMODnet Biology** provides a detailed account of the data downloaded from their portal in first half of 2017. The numbers vary greatly between months, but the total sum (553) is lower than the one reported in the same period of 2016 (781 downloads) despite the increase in the number of visits to the portal.

- **EMODnet Physics** track requests of download and provides detailed information in their Dashboard service (http://www.emodnet-physics.eu/map/dashboard). It is possible to identify how many downloads have been requested from each country, for each type of data, manual downloads or web services, identify the most downloaded platforms and so on.

- **EMODnet Human Activities** downloads increased to 140 per month (less than 100 on average in the previous reporting period).Wind Farms was the most popular layer again (15 downloads per month).

6.2.3 Organisations that have downloaded data

EMODnet thematic lots are requested to provide information about the organisations that have downloaded data from their portal. They have set up different methods to gather this type of information, and in some cases identification is not mandatory for users to download data. Requests do not only come from Europe and in fact, for the **HRSM/Bathymetry** thematic lot, most of the requests come from the United States (as was the case in the previous reporting period), followed by Spain and France. **EMODnet Geology**, reported requests from three institutions from Spain, UK and Finland. **Chemistry**, in its turn, provided a list that only included European countries plus Canada. Half of the users are EMODnet partners and the others are generally research institutions or Universities. Demands of **Physical** data come from a much bigger number of countries from all over the world (more than 50 countries), with Italy being the most active country (like last year) followed by the Netherlands and the United States (whereas last year it was Belgium). The **Biology** thematic lot discloses the names of the most demanding organisations, most of them belong to the research or academic world in Europe, even though there are also some requests from Universities in Israel and United States, and requests from companies (Deltares). **Seabed Habitats** provided a list of more than 50 organisations that have downloaded data, also predominantly universities and research centres. Interestingly enough, out of the more than 50 organisations which identified themselves (this is not a prerequisite to download data in the portal) almost one third were from the private sector.

6.2.4 Use and purpose of downloaded data and products

Getting information about the potential use of the downloaded data and products can help improve the portals. In the case of **EMODnet HRSM/Bathymetry**, users do not have to indicate what is the purpose of their request when downloading the maps, however, bathymetry is a basic and important parameter for many applications, beyond scientific ones and it is likely that a considerable amount of users of the portal come from the private sector. **EMODnet Geology** indicated that the Finnish Transport Agency had used the substrate info for their navigational charts. Similar to the previous reporting period, most of the users indicated that have downloaded **EMODnet Seabed Habitat** maps for research purposes. Government, Education and Industry are the other relevant categories. **EMODnet Biology** prompts users with a form where they have to indicate the purpose of their downloads in free text. There is therefore a great variety of answers, but in most cases they have scientific purposes. **EMODnet Chemistry** has not demanded this type of information from its users, but from the type of organisations referred to (as mentioned in the previous section), the main purpose of downloading is mostly research.

EMODnet Physics is now working on a system to systematically obtain information about the purpose of the downloads, but for the time being, users can have access to the datasets and data products without specifying what they will be using them for. Nevertheless, model assimilation and forecast, validation and re-analysis seem to be one of the major uses. More than halve of the downloaders are interested in the Mediterranean.

Users of the **Human Activities** portal must select their sector when downloading data or requesting WFS links choosing between 13 categories, from environment, to education or health. In this case, the most selected were "Environment" (35%) and "Energy" (29%), followed by "Research" (24%).

List of acronyms and abbreviations

AIS	Automatic Identification System
CDI	Common Data Index, provides a highly detailed description of the data, answering to the questions: where, when, how and who collected the data, and how to get them. One CDI describes a data series which can be a vertical profile on a fixed location, a time series or a trajectory data set
DAR	Data Adequacy Report
DG MARE	European Commission Directorate-General of Maritime Affairs and Fisheries
DIVA	Data-Interpolating Variational Analysis, is a software tool that allows to spatially interpolate (or analyse) observations on a regular grid in an optimal way
DTM	Digital Terrain Model
EASME	The Executive Agency for Small and Medium-sized Enterprises
EEA	European Environment Agency
EGDI	European Geological Data Infrastructure
EMODnet	European Marine Observation and Data Network
EMSA	European Maritime Safety Agency
EUNIS	European Nature Information System
EuroGOOS	European component of the Global Ocean Observing System (GOOS)
GEO	Group on Earth Observation
GIS	Geographic Information System
ICES	International Council for the Exploration of the Sea
INSPIRE	Infrastructure for Spatial Information in the European Community
IODE	International Oceanographic Data Exchange System of UNESCO's Intergovernmental Oceanographic Commission (IOC)
MPA	Marine Protected Areas

MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
NODC	National Oceanographic Data Centre defined within the International Oceanographic Data Exchange (IODE) System of the UNESCO Intergovernmental Oceanographic Commission (IOC)
OceanBrowser	EMODnet data products viewing and downloading service that allows to visualize gridded fields on-line. It is based on open standards from the Open Geospatial Consortium (OGC), in particular Web Map Service (WMS) and Web Feature Service (WFS)
ODP	Ocean Data Portal
ODV	Ocean Data View, is a freely available software package that provides interactive exploration, analysis and visualization of oceanographic and other geo-referenced profiles or sequence data. ODV and NetCDF data file formats are used as mandatory data exchange format in SeaDataNet/EMODnet Chemistry
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic (also known as Oslo Paris Convention)
QA/QC	Quality Assurance/Quality Control
UNESCO	United Nations Educational, Scientific and Cultural Organization
WFS	Web Feature Service
WMS	Web Map Service

Sources of additional information

More detailed information and the annual progress reports of each thematic lot can be found on the Maritime Forum (https://webgate.ec.europa.eu/maritimeforum/) and on the EMODnet thematic portals and Sea-basin Checkpoint portals:

- EMODnet HRSM/Bathymetry – www.emodnet-bathymetry.eu
- EMODnet Geology - www.emodnet-geology.eu
- EMODnet Seabed Habitats- www.emodnet-seabedhabitats.eu
- EMODnet Chemistry - www.emodnet-chemistry.eu
- EMODnet Biology - www.emodnet-biology.eu
- EMODnet Physics - www.emodnet-physics.eu
- EMODnet Human Activities - www.emodnet-humanactivities.eu
- EMODnet Coastal Mapping – www.emodnet-coastalmapping.eu
- EMODnet Data Ingestion – www.emodnet-ingestion.eu
- MedSea Checkpoint- www.emodnet-mediterranean.eu
- Artic Checkpoint – www.emodnet-arctic.eu
- Atlantic Checkpoint - www.emodnet-atlantic.eu
- Baltic Checkpoint - www.emodnet-baltic.eu
- Black Sea Checkpoint - www.emodnet-blacksea.eu
- North Sea Checkpoint – http://www.emodnet.eu/northsea/home