

Marine Knowledge 2020; from seabed mapping to ocean forecasting

Identification of Respondent	
Are you replying on behalf of your organisation or individually? -single choice reply-(compulsory)	on behalf of organisation
name of organisation -open reply-(compulsory)	European Marine Board
Are you registered in the Interest Representative Register (the EU transparency register for organisations and self-employed individuals engaged in EU policy-making and policy implementation) -multiple choices reply-(compulsory)	no
country where you live or work -single choice reply-(compulsory)	Belgium
contact e-mail. We ask for this in the unlikely case that we need to contact you to validate the response. The address will not be used for any other purpose. It will not be passed on to anybody not involved in administering this consultation. It will not be published. -open reply-(compulsory)	klarkin@esf.org
Type of organisation? Even if you are replying on an individual basis, we would like to know where you are coming from. if you are in employment then this should be the type of organisation you work for. If a large proportion of a public body's work is research, it should be classified under "research". -single choice reply-(compulsory)	public
responsibility of public body -single choice reply-(compulsory)	European
Consultation	
(1) Are there any reasons why there should be exceptions, other than those related to personal privacy, to the Commission's policy of making marine data freely available and interoperable? -single choice reply-(compulsory)	yes
what reasons? -multiple choices reply-(compulsory)	commercial sensitivity - allowing time to publish
explain -open reply-(optional)	
<p>There is growing consensus that freely available and interoperable marine data will drive a knowledge-based society and underpin evidence-based management of our seas and oceans. Incentives are required to overcome current restrictions to sharing data. These include correct accreditation to data producers, traceability through developing common standards for metadata/data formats, analysis of the academic publication requirements and public-private partnerships.</p>	
(2) How can Member States ensure that the data they hold are safely stored, available, and interoperable? -open reply-(optional)	
<p>European initiatives (e.g. SeaDataNet and SeaDataNet II) have provided a common platform for national and regional data centres to establish international agreements on best practice for data storage, common standards and metadata architecture (aligning with the Inspire directive). Member States should build on these efforts, developing more mechanisms at a national level to ensure that data are safely stored, made publicly available and can be delivered to European and international networks including EMODNET, GMES (MyOcean) and GEO. Potential ways forward include implementing a credit system for datasets and creating penalties if data are not delivered to a National Data Centre. Member States could also consider establishing a national platform (e.g. expert panel) or other</p>	

mechanisms to ensure certification and quality control at the Member State level. Regional systems such as EuroGOOS could also play a role in developing data assembly centres and interconnections with national facilities. Such efforts will require sufficient funding at Member State and European level to ensure quality control. In addition, governments/ authorities should ensure implementation and long-term viability and sustainability by moving from finite short-term contracts towards a sustained, longer-term funding model for monitoring and collecting data. Knowledge exchange at a Member State, European and international level is also vital to ensure marine data management takes into account the continuous progress in Information Communication Technology (ICT) which is set to revolutionize marine data management in the coming decades. International best practice developed by partnerships such as the Group on Earth Observation (GEO) should also be taken into account to promote international interoperability.

(3) Are the seven thematic groups of the European Marine Observation and Data Network the most appropriate? Should some be combined? (e.g. geology and hydrography) or should some be divided? -single choice reply- (compulsory) appropriate

why? -open reply-(optional)

The seven thematic groups and regional and sub-regional scales of the European Marine Observation and Data Network have provided a solid evidence base for providing data for the Marine Strategy Framework Directive (MSFD). More links could be made between the seven thematic groups to enhance the use of these datasets for cross-disciplinary research. For example, more linkage could be achieved between seafloor topography data (within Hydrography) and Geological data (within Geology). In addition, some linkage between the thematic groups Hydrography and Physical Habitats could be beneficial, although it would be necessary to take into account the different formats and timescales of physical and geological datasets. Notable gaps in parameters include geophysical measurements, a better coordination of hydrological databases (including river runoff and loads) and a current lack of molecular and genetic data. In addition, a mapping exercise could be useful to ensure that EMODNET can deliver the full set of parameters required for constructing indicators that will be necessary to assess the state of the environment under the MSFD.

(4) What should be the balance in EMODnet between providing access to raw data and developing digital map layers derived from the raw data across seabasins? -single choice reply-(compulsory) roughly equal

explain -open reply-(optional)

EMODnet has made significant progress in providing access to raw data for a wide range of users, with particular emphasis on providing access to standardized and quality controlled raw data at a regional seas level. This is an important service which should be continued in the operational phase, with an emphasis on providing quality-controlled raw data accompanied by a high level of metadata (sampling methodology, calibration data) to allow a wide range of users to have confidence in EMODnet. EMODnet could also further develop data products based on high quality raw data available on the EMODnet portal. Some of the data products could be offered automatically, whilst others could allow users to customize their own products (e.g. choosing map layers, linking with indicators). Development of such data products should be done in close collaboration with other existing initiatives e.g. MyOcean, OBIS, WoRMS, GLOSS, PESI.

(5) Should a common platform be set up to deliver products from both GMES and EMODnet? -single choice reply-(compulsory) yes

why? -open reply-(optional)

GMES and EMODnet portals were set up originally to serve different user needs (real-time marine monitoring and delayed mode raw data and data product provision respectively). However, there are clear links between the two platforms, particularly since GMES marine products and services increasingly use historical time-series datasets for calibration and validation. Once the EMODnet platform is more mature, it may be useful to move towards a common platform with GMES to avoid duplication of effort and to offer a one-stop shop for in situ and satellite-derived data and to link historical consolidated datasets (EMODnet) with real-time datasets, reanalysis and model outputs. However, future development of both platforms should at all times take into account the existing and future customer needs and the added value of combining such platforms. A primary goal should be the interoperability between the platforms. This does not necessarily dictate that GMES and EMODnet platforms need to be fully merged, particularly if merging delayed-mode and real-time data streams causes technical problems.

(6) Should the GMES marine products and service also be tailored for use by those studying climate change and environmental protection as well as those needing a near-real-time operational service? -multiple choices reply-(compulsory) yes

explain -open reply-(optional)

The existing GMES marine service has proven very successful for operational marine monitoring, utilizing both near real-time and historic (delayed mode) datasets for reanalysis studies, calibration and validation of products e.g. model outputs. Such high resolution long-term time-series datasets (both satellite-derived and in situ) are also vital for climate change studies and can be used to reduce the uncertainty of future patterns of climate change and its impact on marine environments (see recommendations of the CLAMER / Marine Board Special Report - Synthesis of European Research on the Effects of Climate Change on Marine Environments). In the future, the GMES operational services could be diversified to include products tailored for stakeholders involved in climate change research, marine management and governance (e.g. coastal protection). Such data services and products could significantly enhance society's understanding and ability to adapt and resist the effects of climate change. It will be necessary to ensure that operational services are produced in a format needed by such user groups to maximize the uptake and value of these products and to align with existing monitoring services such as the Global Sea-level Observing System (GLOSS) and developing initiatives such as the GMES Climate service. Ref: <http://www.marineboard.eu/images/publications/Climate%20Change%20Research%20Results-70.pdf>

(7) Should data that are assembled under the Data Collection Framework for a particular purpose such as a fish stock assessment be available for re-use without the requirement to obtain authorisation from the original providers of these data? -single choice reply-(compulsory)

yes

explain -open reply-(optional)

In view of building an integrated marine and maritime strategy for Europe, fisheries data assembled under the Data Collection Framework should be made available in the public domain. Many marine and maritime sectors (e.g. gravel extraction, offshore energy producers) are already required to make data openly available, particularly as a condition for obtaining a license for commercial operations. There is no reason why the fishing sector should be an exception. There is likely to be an increasing demand from new user-groups for access to these datasets e.g. for fundamental research to further our understanding of marine ecosystems and as data underpinning evidence-based decision making governed by legislation such as the Marine Strategy Framework Directive. Wider access to fisheries data is therefore likely to accelerate scientific understanding and stimulate growth. In addition, public access to such data will reduce duplication of monitoring efforts by other sectors, resulting in economic savings across the marine and maritime community. It is recommended that the current legal framework is revised to ensure that fisheries data can be shared across borders. At the same time, issues such as accreditation for data providers, traceability and common (or interoperable) data formats and metadata will need to be addressed.

(8) Should an internet portal similar to those for EMODnet be set up to provide access to fisheries data held by Member States, as well as data assembled for particular stocks, particular fleet segments or particular fishing areas? If so, how should it be linked to EMODnet? -single choice reply-(compulsory)

yes

explain -open reply-(optional)

Fisheries data form a crucial contribution to the assessment of Good Environmental Status of our European seas and oceans. However, data from Member States' commercial fishing activities are not currently available through existing data portals such as EMODnet. To achieve an ecosystem-based approach as set forward in the EU strategy for marine and maritime research, fisheries data should be made more openly accessible and treated in the same manner as data on other marine resources. Creation of an internet portal for fisheries data is one way to achieve this. Such a portal would need to be interoperable with the EMODnet portal, and other relevant European initiatives (e.g. GMES marine core service) to promote multidisciplinary research. Shared datasets with common standards would also facilitate integration of fisheries management with management of other marine industry sectors, an overarching requirement of the Integrated Maritime Policy (SEAMBOR, Marine Board-ESF Position Paper 14, Joint Marine Board, ICES, EFARO). Open access to fisheries data could also encourage cross-sector partnerships between the fisheries sector and the marine research community, including the use of fishing vessels as ships of opportunity, to act as data gatherers for the multiple oceanographic parameters. Ref: <http://www.marineboard.eu/images/publications/Ecosystem%20Approach%20to%20Management-14.pdf>

(9) Should control data, such as that derived from the Vessel Monitoring System that tracks fishing vessels, be made more available? -single choice reply-(compulsory)

yes

how can confidentiality concerns be resolved?

-open reply-(compulsory)

Control data from fishing vessels, such as that derived from the Vessel Monitoring Systems (VMS), provide detailed information on fishing effort (e.g. tonnage, power, trajectories) at high spatial and temporal resolution. There is increasing demand to make such

datasets freely available to assess the impact of fishing at local, regional and European scales. Such data could also contribute to assessments of Good Environmental Status (GES) in the context of the Marine Strategy Framework Directive (MSFD) and to enable the design of a more sustainable, ecosystem-based approach to fisheries management. Engaging with the fisheries sector and potential user groups is essential to communicate the rationale behind releasing such datasets and establishing a level of detail of VMS data that does not breach confidentiality concerns but still meets user needs. For instance, clear rules should be set out to restrict certain confidential information e.g. individual vessel names, full location details, or to provide data in an aggregated form where appropriate. Open access to VMS data in near real-time also offers opportunities for a more integrated approach to marine spatial planning at a pan-European scale. It could also encourage mutually beneficial partnerships between the fishing sector and the marine research community, as fishing vessels could become ships of opportunity for oceanographic observations, providing near real-time information on environmental conditions and phenomena (e.g. location of fronts or phytoplankton blooms) that can both improve efficiency of the fleet and provide an early warning of marine hazards such as oil spills.

(10) What should be the focus of EU support to new marine observation technologies? How can we extend ocean monitoring and its cost effectiveness? How can the EU strengthen its scientific and industrial position in this area? -open reply-(optional)

What should be the focus of EU support to new marine observation technologies? The EU should focus support on new marine observation technologies that meet current and future societal needs for marine environmental data. There is a need for innovative multifunctional sensors for in situ monitoring of the marine environment and related maritime activities, along with further automation and miniaturization of existing sensors and samplers to increase the capability (e.g. lifespan and payloads) of autonomous ocean observation technology. The current operational ocean observation capability is focused on physical and some chemical measurements. An emphasis should therefore be placed on innovative technologies to autonomously monitor biogeochemical and biological variables and rates (e.g. that can help quantify the status and future impact of climate change on the full marine ecosystem- see CLAMER / Marine Board Special Report - Synthesis of European Research on the Effects of Climate Change on Marine Environments). Marine Acoustics has also been identified by the marine community as a promising and emerging field for marine observation that will advance ecosystem-based management such as predictive modeling and species-specific monitoring (see 3rd Marine Board Forum). Advances in numerical and statistical models will require a new wave of parameters (or novel combinations of existing parameters) to validate and constrain analyses of historical, current and future scenarios. Geographically, gaps in systematic observations are found in the Arctic and Black Sea and the open and deep ocean remains under-sampled. However, as commercial activities move further offshore and climate change results in an increasingly ice-free Arctic, the need for higher resolution measurements in these areas will increase, along with the role for EU support in areas outside Member State jurisdiction. Real-time capabilities for ocean monitoring should be enhanced, particularly with respect to developing early warning systems for marine hazards that have a high societal and economic consequences such as tsunamis, storm surges and oil spills. There is also growing evidence that future or emerging "Blue Technologies" may come from diverse areas outside of marine research such as Information Communication Technology (ICT) and renewable energy (as presented at the 3rd Marine Board Forum). Such technologies could be applied to seas and oceans observation systems, revolutionizing the capabilities and cost-effectiveness of software, data storage, transfer and power sources for autonomous platforms. Extend ocean monitoring and cost effectiveness With the increasing cost of fuel and manned vessels, funds for routine ocean monitoring should be focused on autonomous platforms and sensors such as gliders, smart buoys, moorings and animal tagging systems. However, the importance of research vessels should not be overlooked to provide platforms for maintenance, deployment of autonomous platforms and for crucial process studies. Further cost-efficiency and integration can be achieved by promoting the use of volunteer ships of opportunity such as fishing vessels, offshore support vessels, ferries, cargo ships and recreational users (citizen scientists). To be more cost-effective, each of these platforms could be treated as a shared resource when possible, and should be used according to local needs, which could change from day to day or year to year. There is also a real need to further standardize data collection and data management both to make economic savings and to ensure an integrated pan-European approach to ocean monitoring. Establishing a standard set of 'Essential Ocean Variables' (EOVs) that meets the needs of key users would allow cheap, standardized sensor packages to be fitted to a range of platforms. This could significantly increase the cost effectiveness of ocean monitoring for European legislation such as the Marine Strategy Framework Directive (MSFD). In addition, the current landscape of EU-scale Marine Research Infrastructures (MRI) and initiatives is too complex and the EU should support the integration and rationalization of existing MRI governance structures. Optimal monitoring strategies should be designed, where data from all relevant remote (e.g. satellite) and in situ platforms/systems are considered to produce datasets which meet user needs at local, regional and European scales. Further links can also be made with the private sector e.g. Marine Renewable Energy, to extend the possibilities of the European ocean observation network. Future gap analysis and priority setting of the European ocean observing infrastructure should build on the work achieved by SEAS-ERA, GISC, the EC MRI expert group and recommendations by pan-European marine networks such as the European Marine Board to move towards an integrated European Ocean Observing System of Systems, coordinated through a range of European platforms e.g. EuroGOOS, ESFRI, EMODnet, GMES and Member State agencies. Ways to strengthen the scientific and industrial

position in the EU The EU should focus on bridging the gap between innovative technology prototypes and commercialization of environmental sensors and samplers that can be marketed at a European and international level. This is often a question of funding, but can also be stimulated through public-private partnerships which encourage simultaneous use of marine observation platforms for both operational and research purposes, offering a test-bed for the marine research community and industry to work together. This could fast-track innovations and may lead to cost savings by reducing duplication of effort and establishing a more sustained funding model and user-base for such platforms. There are significant opportunities for marine and maritime technology enterprises in developing software and hardware for ocean observation systems. A European dimension will drive competition and innovation, but will also reward investments for SMEs working in a pan-EU marketplace. For this to work, the disconnect and lack of communication that often exists between the academic and commercial worlds must be addressed.

<http://www.marineboard.eu/images/publications/Climate%20Change%20Research%20Results-70.pdf>

<http://www.marineboard.eu/fora/3rd-marine-board-forum>

(11) Should there be an obligation for research projects to include a provision ensuring the archiving and access to observations collected during the research project? -single choice reply-(compulsory)	yes
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why? -open reply-(**optional**)

Despite existing data policies at National and European level, data management and access to data remains fragmented in Europe. As a result, much marine knowledge is currently still restricted for use in individual projects/sectors, with no long-term strategy or requirement to make this accessible, resulting in a missed opportunity for marine and maritime stakeholders. Archiving and access to observation datasets should be a mandatory part of all EU and publicly funded national research projects. A European approach is required to ensure that the data (and metadata) management process is standardized, traceable and interoperable from the point of raw data production/collection to quality control and data products and services. Mechanisms should be considered to enforce this, such as making timely delivery of sufficient quality datasets a pre-requisite for receiving final funding.

(12) Should the 'push' process whereby marine environment reports are delivered be progressively replaced by a 'pull' process, whereby data are made available through the internet and harvested by the competent authority using technology developed through EMODnet? -single choice reply-(compulsory)	yes
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why? -open reply-(**optional**)

There is still a requirement for a 'push' process whereby technical reports are produced to serve specific user needs e.g. as part of a regular assessment process. However, the current drive for free and open provision of all marine data, including fisheries data, is enabling a shift to a 'pull' process, whereby multidisciplinary raw datasets with associated metadata are accessible online and can be used for multiple purposes to create tailored data products and services by competent authorities and other stakeholder groups. Agreeing on common standards and formats for data and metadata will improve the efficiency of this process.

(13) What information on the behaviour of our seas and coasts can best help business and public authorities adapt to climate change? -open reply-(**optional**)

One of the main challenges identified in the Green Paper is to reduce the uncertainty of future climate change predictions to facilitate appropriate planning and adaptation responses. Ocean warming and consequent sea level rise is likely to be one of the most dramatic consequences of climate change for the human population, particularly in the coastal zone where livelihoods and economic activities are focused. Multidisciplinary marine environmental information is increasingly required to constrain and validate models so that businesses, public authorities and society in general will have the time to adapt to a changing coastline. However, information is particularly required to monitor and predict extreme weather events such as storm surges, and natural hazards such as earthquakes and tsunamis. Such events may become increasingly common in a warmer world and are likely to result in the greatest cost to life and infrastructure. Yet in many cases there is a lack of knowledge regarding the drivers of these events. This is likely to require inter-disciplinary studies and an integrated approach to near real-time environmental monitoring and early warning systems. Quantification of the degree, probability and frequency of extreme weather events could help to prioritize geographical areas at most risk. However, it must be noted that history has shown that no European coastline is immune to tsunami risk (e.g. The Storegga submarine land-slide and resulting tsunami that hit Scottish and Norwegian coastlines in c.6100 BC). More focus is also needed to understand the probable effects on marine ecosystems (e.g. species distributions, biodiversity) from scenarios of climate change and aligning information on the responses at different spatial scales of our seas and oceans (e.g. mesoscale to basin-scale). This will require climate models to be further developed to address the

regional scales so that data and products can be transposed for use by business and public authorities. Since management often requires a local approach and response, data should be made available through spatial data infrastructures at the most appropriate spatial scale and resolution.

(14) Are any additional measures required, over and above existing initiatives such as EMODnet and GMES, to enable Europe to support international initiatives on ocean data such as GOOS and GEOSS? -single choice reply-
(compulsory)

yes

what measures? -open reply-(optional)

Europe already contributes substantially to international efforts on ocean data through a range of existing initiatives, including EMODnet and GMES. However, such support would benefit from being more structured and coordinated. EuroGOOS could play a stronger role in enhancing coordination for the European contribution to GOOS. This could be achieved at a Regional level through the EuroGOOS Regional Operational Oceanographic Systems (ROOSes) and by coordinating European contributions to established international ocean and climate observing networks such as the OceanSITES deep-ocean reference sites.

(15) What criteria should be used to determine EU financial support of observation programmes other than those that it already supports? Can you provide examples? Could the Joint Programming Initiative for European Seas and Oceans play a role?< -open reply-(optional)

Support for new ocean observation programmes should be user-driven and based on the socio-economic value of the information generated (data, products and services), such as quantifying the added value of these new datasets for furthering scientific knowledge, societal well-being and economic growth. In parallel, a systematic gap analysis of the current observation system should be conducted to ensure duplication of effort is minimized and so that optimal monitoring strategies can be designed (see also responses to Questions 10 and 13). This should build on the EMODnet phase 2 contracts for sea basin checkpoints which will determine gaps in data and observation systems in selected sea basins (e.g. North Sea and Mediterranean Sea) (see reference below). This gap analysis should also be iterative and take into account the latest scientific and technological understanding. It should also build on the work achieved by European projects such as SEAS-ERA, GISC (GMES in situ coordination) and recommendations from European expert groups such as the EC MRI expert group (final draft report, November 2012) and by pan-European marine networks such as the European Marine Board. The Joint Programming Initiative for Healthy and Productive Seas and Oceans could play a role in this gap analysis and in integrating existing efforts by different platforms (e.g. satellite vs. in situ) or by different organizations (e.g. hydrographic agencies vs. research organizations). JPI Oceans could also play a role in coordinating national funding for regional and pan-European ocean observation. However, as new observations are required further offshore and in deeper waters, the potential role of the EU increases in funding new monitoring strategies for under-sampled regions of increasing global importance such as the Arctic Ocean. Ref: European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE), Call for tender 'Growth and innovation in ocean economy – Gaps and priorities in sea basin observation and data (ref. 2012/S 102 -169285)

(16) How could the governance of EMODnet and GMES evolve to better accommodate the need for long term sustainability? -open reply-(optional)

As EMODnet enters its operational phases, there is a requirement to move from finite short-term contracts towards a sustained, longer-term funding model. EMODnet could consider establishing a long-term strategic partnership agreement and a separate legal entity, similar to the "European Centre for Ocean Monitoring and Forecasting" (ECOMF) being developed for the GMES Marine Core Service (see Nicosia Declaration). Member State commitment to EMODnet and GMES should also be linked to the support of pan-European Ocean & Marine Data Management Infrastructures such as SeaDataNet and SeaDataNet II to ensure continued pan-European coordination of datasets produced by national research activities. However, if a sustained funding model is established, EMODnet and GMES should remain innovative with heterogeneous and flexible partnerships and the ability to improve and adapt to new user demands and run open and competitive calls for developing beyond the current state-of-the-art. Ref: http://www.eurogoos.org/documents/eurogoos/downloads/eg12_21nicosiadeclaration10oct2012.pdf

(17) What could be the role of the Joint Research Centre and the European Environment Agency? -open reply-(optional)

No response

(18) Is a regular process needed to evaluate the effectiveness of the observation and sampling strategy for each sea-basin? -single choice reply-
(compulsory)

yes

explain -open reply-(optional)

A regular process is required that can review the current system, evaluate the socio-economic value and identify gaps and priorities that could should be funded to optimize the monitoring system to meet future needs (see also response to Question 10). Such regular assessments should be aligned, where possible, to existing European policies and funding mechanisms. This will allow gaps and needs to be addressed in future European funding calls (e.g. Horizon 2020) and for state-of-the-art knowledge on monitoring programmes to enhance the implementation of key legislation such as the Marine Strategy Framework Directive. The regional sea-basins level is an appropriate spatial scale to undertake such reviews and this could be achieved in collaboration with the work of Regional Sea Conventions.

(19) What mechanism could be envisaged to manage the evaluation and assessments needed to inform the Commission, Member States and Parliament on priorities for EU support? -open reply-(optional)

A pan-European expert working group with representatives from a cross-section of key marine and maritime stakeholder groups e.g. industry, research, policy, socio-economics, could be set up to evaluate the priorities and recommendations for continued or new EU support to ocean observing systems. This should take into account the gaps and needs at the Regional sea-basin level and European level. However, a global dimension is also vital to ensure that Europe contributes to a wider, integrated international effort.

(20) Should data provided by private companies for licensing purposes be made publicly available? -single choice reply-(compulsory) **yes**

Under what circumstances? -open reply-(optional)

A basic principle of the 'Marine Knowledge 2020' initiative is 'collect data once and use them for many purposes'. Once a licence has been granted to a private company, there does not appear to be any competitive disadvantage to making the ocean observation data freely available for independent scrutiny and use by the wider community (including the private sector) to create added-value data products and services. A clear monitoring strategy and legal framework is required to enforce this. Additionally, engagement with the private sector is required to communicate the added benefit of sharing data and plans for a single reporting mechanism with common INSPIRE-based standards that would reduce the bureaucratic burden currently in place as part of the impact assessment.

(21) Should licenced offshore private sector actors be obliged to contribute to wider monitoring of the sea where this is feasible? -single choice reply-(compulsory) **yes**

what parameters might be monitored? -open reply-(optional)

The Integrated Maritime Policy calls for coordination in the governance of marine and maritime activities. All stakeholders should therefore be engaged in contributing to this effort and benefiting from this process. Multiple use of ocean observation platforms is one key way to increase cost efficiency. It is reasonable to encourage the private sector to equip offshore platforms with environmental sensors as a contribution to good custodianship of the marine environment. A standardized sensor package for the monitoring of "Essential Ocean Variables" including physical, biogeochemical and biological measurements would ensure the maximum interoperability and use of these datasets at a regional and European scale (see response to Question 10).

(22) What public-private partnership models can maximise incentives for industry to share data and investments in data as well as benefits to all stakeholders? -open reply-(optional)

Industry actors are more likely to share data and invest in data quality control and archiving if they receive added-value data products in return. This could be achieved through European data management initiatives such as EMODnet and GMES which could consider handling wider sets of environmental data from all marine and maritime stakeholders, and building on the existing service of producing added value data products and services to meet stakeholder needs. The offshore private sector actors should also be encouraged to interact with the research community to utilize research platforms (e.g. through competitive proposals for trans-national access) as test-beds and access for a network of researchers. Such public-private partnerships could drive innovation, resulting in the commercialization of more sensors and samplers and the creation of more industrial spin-offs. Relevant public organizations (like ICES) and individual institutions, with the help of international bodies (e.g. JPI Oceans or the Arctic Council) should define monitoring strategies including the potential input from industries.

(23) You have now finished the questionnaire but there may be some other points that you wish to raise. This is your opportunity. You may even append a document. -open reply-(optional)

See additional European Marine Board response (as appended document)