Preparatory Work for Establishing an Expert Subgroup to the HELCOM/VASAB MSP WG on MSP Data, Spatial Data Infrastructure and an MSP Data Network in the Baltic Sea Region

Report submitted to Bundesamt für Seeschifffahrt und Hydrographie (BSH) as part of the PartiSEApate project

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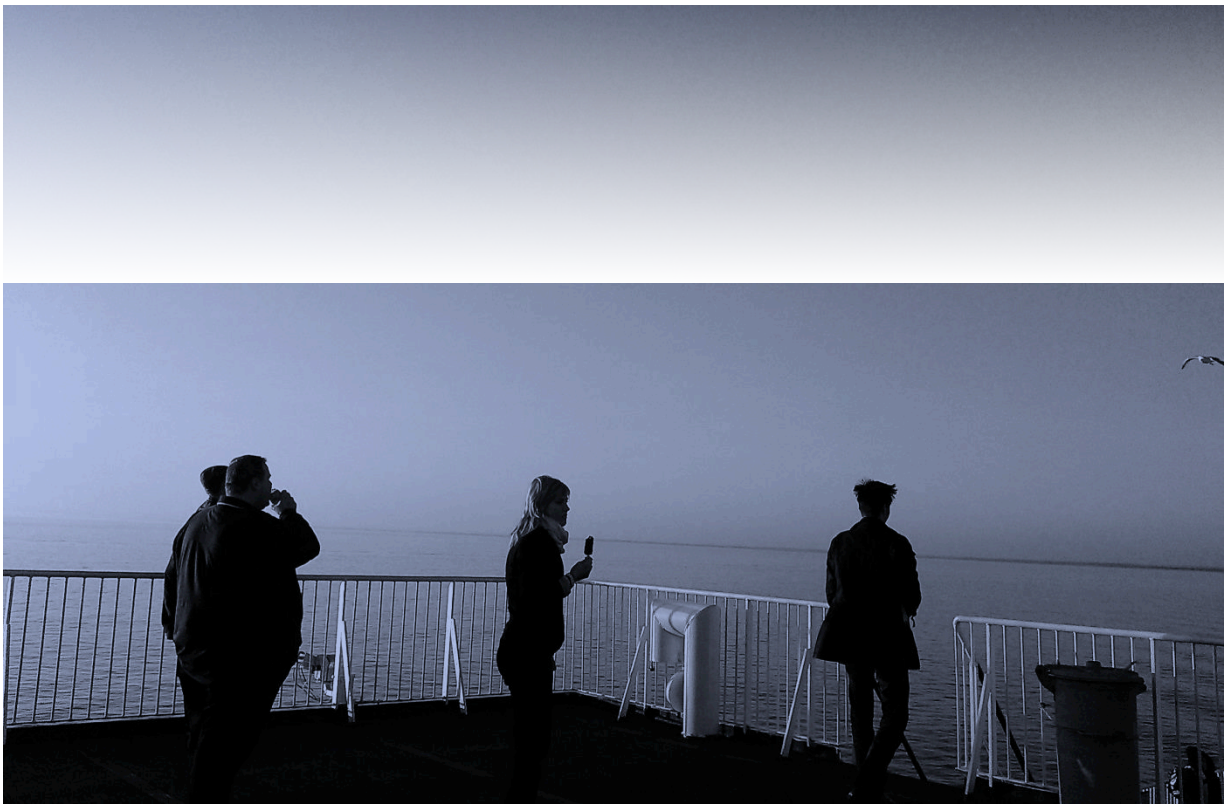

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1. Introduction

This report was prepared for the Bundesamt für Seeschiffahrt und Hydrographie (BSH) as part of the INTERREG IV-funded PartiSEApate project (www.partiseapate.eu). The aim of this work is to support the delivery of services related to the MSP governance model for the Baltic, specifically the establishment of expert groups under the roof of the HELCOM/VASAB MSP WG.

1.1 The PartiSEApate project

PartiSEApate is an Interreg IVB-funded project designed to develop and test instruments for multi-level governance in Maritime Spatial Planning (MSP) in the Baltic Sea Region. One of the main outputs has been a multi-level MSP governance model in the Baltic (Schultz-Zehden and Gee 2014), which suggests the establishment of non-permanent Expert Groups under the umbrella of the HELCOM/VASAB MSP WG to deal with urgent topics related to MSP development. Conceived as ad hoc groups, these would be expected to work to agreed TOR, requiring them to deliver clearly defined outputs to the HELCOM/VASAB MSP WG within a given timeframe. The establishment of a dedicated expert group "MSP Data and the future setup of an MSP Data Network" could be the first opportunity to translate this proposal into practice.

1.2 MSP data needs in the Baltic Sea Region

Successful implementation of MSP depends on good quality data and information. This has been widely acknowledged at policy and project level, most recently in the MSP Directive which requires Member States to "organise the use of best available data" for MSP. Translating this requirement into practice, however, is no easy task as there is no clear-cut definition of "best available data" or established process for organising such data.

Identifying MSP data needs is a useful starting point. This acknowledges that planners need different types of data at different stages of planning, and that different data will be needed for different types of decision. Stocktaking for example demands information on the marine environment and the distribution of human activities, whilst planning and siting decisions may require information on synergies or potential conflicts between activities. It also acknowledges that planners are less likely to require data as such, but information generated from data, such as pressure and impact assessments. Data needs also depend on the scale of the planning activity and will vary depending on whether a transnational or local maritime spatial plan is drawn up.

The "best available data" criterion applies to all data required for MSP. It not only implies high inherent data quality, but also access to and consistency of data. The latter particularly

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applies in a transboundary context where consistent use of data is an important prerequisite for creating a coherent network of maritime spatial plans. This in turn requires agreed terms and standards for sharing and displaying data in maritime spatial plans. "Organising the use of best available data" is thus a question of drawing together and sharing the best available data sources, ensuring the compatibility of data from different sources, and setting common standards for using data in MSP across sea basins.

A multitude of national and transnational data sources and providers exist that could provide important input to MSP. These, however, are widely dispersed, not always known to planners, and not always suited to the specific needs of MSP. There are also a range of other data issues that have yet to be resolved, such as data resolution, ownership and metadata requirements.

1.3 Past MSP data initiatives in the Baltic Sea Region

Various past initiatives have recognised the above issues and put forward suggestions for dealing with them. Recognising the need for a transboundary approach to MSP in the Baltic, data comparability and establishing a system for data sharing have been a special point of focus.

In 2008, the **PlanCoast handbook on MSP** called for improved quality, comparability and accessibility of spatial data by implementing the EU INSPIRE Directive and recommends systematic information exchange as well as needs-based data collection. The **HELCOM/VASAB principles on MSP** (2010) state that MSP should be based on the best available, up to date and comprenehsive information of high quality, which is to the largest extent shared by all. "*Close cooperation is therefore needed between relevant GIS systems and geo-statistical databases, monitoring and research to facilitate a transboundary process of data exchange, which in the best case could lead to a harmonised pan-Baltic data and information base for planning. This database should include historical baselines, the present status of the marine environment and human activities, as well as future projections. The database should be as comprehensive as possible, as openly accessible as possible, constantly updated and compatible with European and global initiatives.*"[1]

In line with these principles, the **BaltSeaPlan project** (2011) put forward recommendatios for an MSP data infrastructure based on an assessent of data quality, data availability, data usability, and data reliability[2]. Key suggestions include:

[1] HELSINKI COMMISION (2010): Minutes of the 34th meeting of Heads of Delegation, Helsinki, Finland, 8-9 December 2010 (HELCOM HOD 34/2010).
[2] Wichorowski, Fidler & Zwierz (2011): Data exchange structure for Maritime Spatial Planning. BaltSeaPlan Report 20, www.baltseaplan.eu

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- Creation of a pan-Baltic MSP data infrastructure to ensure the availability of up to date, transferable and interoperable data and metadata,
- Definition of specifications with regard to data scope, format, and technical requirements, starting with a minimum range of MSP-relevant data to be expanded gradually,
- Creation of a pan-Baltic MSP data coordination point responsible for managing the Baltic MSP data infrastructure, including making available pan-Baltic datasets and creating harmonised datasets from national data; this group should be complemented by national MSP data contact points (responsible for making available relevant national data), regional MSP data contact points (in federal countries), and MSP data providers (feeding in data in line with set standards and rules).
- Creation of a Baltic Sea MSP data portal offering digital map and geodata services, to which registered users could have unrestricted data access in exchange for providing regular updated datasets to national contact points.
- Agreeing regular intervals for updating data.

The BaltSeaPlan report suggests specific datasets to be collected across the BSR, including maritime uses and facilities, boundaries, maritime features, geological data (sediment, geology), climate data (sea level, wind), ecological data (migrations, abundance, spawning, habitat), nature conservation, oceanographic data (bathymetry, salinity, ice, currents), other (wrecks, cultural heritage, tourism), regulations (corridors, priority areas, conservation areas etc). These should be linked to external databases and incorporate common Baltic Sea datasets.

Last not least, the BaltSeaPlan project also suggests an MSP Data Expert group as advisors to the data coordination point, consisting of data experts (socio-economic, ecology others), GIS experts, and MSP planners. This group could be tasked with putting forward suggestions for improving the content of pan-Baltic data sets, the data exchange system and data management, as well as ensuring links to other data networks and the MSP coordination point.

A stakeholder workshop took place as part of the **PartiSEApate project** to discuss MSP Data and a Data Network (http://www.partiseapate.eu/dialogue/data-network/). This resulted in the following key findings:

- National MSP data contact points need to be set up in the BSR,
- A pan-Baltic Spatial Data Infrastructure (SDI) for MSP should be set up, allowing decentralised data holding,
- Common priorities need to be set for data compilation, bearing in mind the concrete evidence to be generated for MSP,

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- Common data standards need to be developed for data exchange, focusing on issues of transboundary relevance,
- Socio-economic data gaps need to be filled,
- Strong metadata needs to be included to create transparency on data reliability and significance.

A decentralised spatial data infrastructure for the BSR would link diverse data sources, providers and users in order to ensure consistent and sustainable MSP in the Baltic Sea. The main question is how such a data network and MSP spatial data infrastructure should be set up and managed.

1.4 Moving towards establishing a BSR MSP Data Group

Based on the PartiSEApate Stakeholder Workshop on Data and Data Networks (see above), the German PartiSEApate partner (Federal Maritime and Hydrographic Agency, BSH) prepared a first proposal for setting up a dedicated MSP Data subgroup under the HELCOM/VASAB MSP WG. A key aim of the group would be to work towards an MSP data network which would make available up to date, comprehensive, harmonised spatial data relevant for MSP, in particular with respect to transnational and cross-border planning issues, encompassing information on human activities, marine environmental and socio-economic data. The following preliminary TOR have been suggested:

- To identify MSP data needs from a planners' point of view, including setting priorities;
- To identify relevant available data from MSP authorities and institutions;
- To identify data and information gaps, especially with regard to transnational MSP;
- To identify requirements and propose solutions for data scope, content, attributes, formats, etc, and estimate harmonisation needs;
- To agree on measures for data quality, reliability, accuracy, accessibility, etc;
- To identify research priorities to fill evidence gaps;
- To develop terms of reference for a regional spatial data infrastructure for MSP;
- To develop funding applications for external services for tasks that cannot be performed by the group.

The proposal for creating such an expert group was presented to the HELCOM/VASAB MSP WG at its 9th meeting on 16th June 2014 and welcomed. The suggestion of establishing an MSP Data Group has since been put forward to the HELCOM Heads of Delegation and the VASAB CSPD/BSR for official approval.

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University of Liverpool has been subcontracted to further prepare the establishment of the potential BSR MSP Data Group. The specific tasks of the subcontractor comprised:

- To identify and assess **relevant initiatives and projects** addressing marine and maritime spatial data and data infrastructure that could be built;
- **To identify potential experts** as members of the group;
- To further develop the suggested **TOR** for the group;
- To develop a **roadmap** for implementing the group.

2. Method

In order to deliver results on all of the above quickly, the method of choice was an internet-based questionnaire survey of a wide range of data and MSP experts (see Appendix) supplemented by individual telephone interviews, a follow-up teleconference and a workshop during a PartiSEApate partner meeting.

A broad range of MSP and data experts were invited to take part in the survey. They included PartiSEApate data experts and partners, data experts presenting at the 2014 Baltic MSP Forum in Riga, as well as other data experts known to the BSH and consultants. The survey was consciously kept short and focused on:

- Establishing the specific competences of the respondents,
- Good examples of existing databases or approaches, including at the national level,
- Refinement of the TOR,
- The preferred modus operandi for the group,
- Willingness to participate in the group.

27 respondents took part in the survey, representing a good mix of nationalities, institutions and expertise. 4 did not fully complete the survey and were not included in the subsequent analysis. Out of the remaining 23, 5 respondents were from Poland, 4 from Germany, 3 from Finland and Sweden, 2 from Estonia, Latvia and Denmark, and one from Lithuania and Norway. They included representatives from government authorities, universities/research and private companies. 15 stated they primarily had MSP expertise, 15 GIS expertise, and 16 marine data collection and management expertise (several answers allowed). 4 additional telephone interviews were carried out with data experts from Germany, Estonia, Sweden and Denmark, following the same questions as above.

The respondents to the internet survey, the PartiSEApate data and MSP experts and representatives from HELCOM and ICES were then invited to take part in a teleconference to discuss some of the issues in more detail. The agenda for the teleconference included:

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- Good examples of MSP data infrastructure,
- Data priorities for transboundary MSP,
- Practical setup of the group.

Eleven experts took part in the teleconference, representing Germany, Latvia, Estonia, Denmark, Sweden, Poland, as well as HELCOM and ICES data experts (see list of participants in the Appendix).

Initial results from the survey and teleconference were presented at the PartiSEApate partner meeting in Bergen on 9 September 2014. A brief workshop was held in Bergen which discussed the same questions as above, this time asking for the specific viewpoint of maritime spatial planners.

3. Data management needs to support MSP in the BSR

The results obtained make clear that different countries have different views of MSP and therefore also different data needs. Countries are also at different stages of MSP implementation, meaning they are at different stages of considering data needs.

Survey respondents were asked to describe what was most needed for more effective data management to support MSP, at national and transnational levels, in the Baltic Sea Region. The following aspects emerged as particularly relevant:

- Data harmonisation and coordination,
- Data systems and access to data, and
- Better understanding of data gaps.
- Acknowledge the difference between spatial and scientific data

3.1 Data harmonisation and coordination

There is a widespread call for more consistent data. Working with the appropriate ISO standards for GIS systems, harmonised data based on OGC and INSPIRE compliant services, and harmonised data structures were frequently mentioned as minimum requirements, including better preparation of data. There was criticism that datasets often lack the accompanying metadata and are not updated regularly enough. The greatest need is therefore *"clearly described datasets (metadata filled in according) with a regular update interval."*

Another aspect mentioned was effective transnational data management, although some respondents thought equal state of play may need to be achieved at the national level before countries can begin to think about the transnational level.

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3.2 Data systems and access to data

The main issue presently preventing coordinated planning is considered to be data fragmentation, as there are numerous data holders who are sometimes hidden or difficult to access. Easy access to reliable and high quality GIS data and knowledge was mentioned as a key requirement for coherent planning across the Baltic. This includes access to spatial statistics, such as statistics on small areas such as grids. More effort needs to be made to publicise the existence of data and to make privately owned data more widely accessible. *"(There should be a) short way from data producers to the international level to the respective data base/data user."*

A consistent marine spatial data infrastructure (MSDI) for the Baltic Sea Region was often mentioned as a goal, which should ideally be based on open standards and data harmonisation. This is recognised as an ambitious goal, as it requires coordination between countries and minimum common standards for data acquisition, processing and representation. Map tools, preferably as GIS layers, were also called for, including the possibility to include metadata in these tools. Such a system – which might include a metadata portal - would need to be flexible enough to allow datasets from various countries to be imported.

Rather than a large data store, respondents favour a centralised warehouse system or "broker" solution, where institutions remain responsible for their data. This warehouse system would need to be able to include different types of data and combine them on a single platform. It would also require some form of coordination between the BSR countries. A decentralised system could build on existing national examples, such as the German MDI-DE structure and standard or the Estonian Land Board Geoportal and associated map server (http://geoportaal.maaamet.ee/eng/Map-Server-p35.html). Both are examples of effective data management at the national level; the same principle could be applied at the transnational level as a network of similar geoportals.

An important message was also to keep data management systems simple and user friendly as planners in municipalities do not have time to get acquainted with complex new platforms. *"Planning of coastal waters in Finland and Sweden is handled by municipalities with less resources and knowledge. The SeaGIS project made all data accessible (if the data owner or provider agreed to this) to download to a working environment the planner is familiar with. Keeping it simple is a good way to get the process started."* Adaptiveness should be built into the system from the start to allow for fine-tuning later on. *"A basic MSDI will take time to develop into something larger. We also need to accept that some data will need to be paid for, and that there is a data security issue which may mean some countries are unwilling to share certain data."*

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There is also understanding that any GIS-based system will need to be maintained, so some budget would need to be made available for operating a decentralised MSDI.

3.3 Better understanding of data needs and gaps

Respondents were unanimous in pointing out that data needs to be fit for purpose. In order for cross-border cooperation to work, there needs to be clear and common understanding of what data is needed for transboundary MSP. *"A gap analysis would be useful – what is needed to fulfil the MSP Directive, and what is each country's approach?"*

The most significant data gap is not necessarily data as such, but up to date and relevant data for the specific purpose of maritime spatial planning. Environmental data was acknowledged as important, but gaps are more apparent with respect to human activities and socio-economic aspects, such as ferry routes. Coordination of such data was considered the most immediate need. This requires good communication, both national and internationally between stakeholders, managers and scientists, as well as policy makers. It was also pointed out that municipalities and local operators only have data from coastal areas, and that links to national authorities and national land surveys can be lacking.

3.4 Acknowledge the difference between spatial and scientific data

Respondents made the point that a fundamental difference exists between scientific and sea use data and that this difference impacts on the quality standards that apply. "Official" sea use data from state databases must hold up in court as an official record and document, which requires specific quality standards with respect to boundaries and data reliability. Scientific data is collected according to best practice standards but should be considered more at the level of scientific results, i.e. valid only until proven wrong. Nevertheless, MSP relies on both types of data, and both need to ensure they apply relevant quality standards. A wide range of existing structures were mentioned both at the national and international level.

4. Existing data structures/systems at the BSR level

Respondents were asked to describe existing initiatives for spatial data infrastructure at national or transnational levels which could inform the Baltic Sea Region's approach to MSP-related data management. The list below is therefore not a comprehensive overview, but rather an indication of which data structures / systems are known and used. They are listed in the order of frequency of mention.

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4.1 Current status of national data infrastructures

National systems were considered an important element in a wider BSR data infrastructure as they can be an effective means of bringing together official data and scientific data and links to international systems. Nevertheless, countries have different practices with regard to data infrastructures.

Relatively well developed decentralised systems exist in Estonia and Germany. The **Estonian Land Board Geoportal and associated map server** is one example where all data and metadata are collected according to the INSPIRE Directive, quality checked, regularly updated and made available free of charge. Scientific data is fed into the map server directly, meaning daily updates of the resulting images. Scientific data (e.g. fisheries data) is also fed into the ICES and HELCOM databases on a regular basis.

Apart from Estonia, Germany is another country with a well-developed decentralised system. The **Geoseaportal** (www.geoseaportal.de) brings together all the data held by the Federal Maritime and Hydrographic Agency, while MDI-DE (www.mdi-de.org) is a web portal for marine data held by different authorities. This is an example of a data infrastructure which makes marine and coastal data accessible via a joint data portal, but keeps the data hosted and owned by the original holders. In federal Germany, the combination of a decentralised system and common portal is particularly important due to the many regional systems that need to be brought together, not least for spatial data on land.

Sweden has not yet implemented a national centralised system for organising MSP data collection and storage, but is currently building a wider spatial data infrastructure whose information will be accessible via the internet. Information is to be collected and stored by local, regional and national authorities as well as other players that generate geodata. The system will contain geodata together with regulations, services for searching, finding and using the information, as well as systems for cooperation between different parts (www.geodata.se).

Denmark is also in the process of building a marine spatial data infrastructure, specifically designed to fulfil obligations under the MSP Directive. Maritime agencies in Denmark are currently considering what is needed to fulfil the requirements of the Directive and what data need to be exchanged; so far, about 100 datasets have been identified as important. INSPIRE is used as a common standard, and metadata is considered a key to quality. The idea is to create a unified approach to MSP-related data but to operate a decentralised system, with all MSP related data made available through a central portal.

In **Finland**, the Finnish Environment Institute (SYKE) and Finnish National Land Survey have engaged with data management and INSPIRE issues. The **UK** is building a comprehensive evidence base for MSP.

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There is no well-established data collection for MSP in **Russia** at present apart from pilot projects and attempts to collate the necessary information, including the Programme of Gulf of Finland Year-2014.

4.2 International data infrastructures

HELCOM and ICES were mentioned most frequently as examples of permanent databases and good intergovernmental data structures. Both have become established as leading suppliers of environmental data, and connections to their services provided are essential for MSP-specific systems.

ICES[3] has a well established **Data Centre**, which manages a number of large dataset collections related to the marine environment (see http://ices.dk/marine-data/dataset-collections/pages/default.aspx). The ICES Data Portal allows data to be searched and displayed by area (e.g. ICES areas, HELCOM areas), with maps indicating e.g. the number of samples and sampling points for particular species. Dataset collections comprise:

- Biological community
- Contaminants and biological effects
- Eggs and Larvae
- Fish predation
- Fish trawl survey
- ICES historical plankton
- Oceanographic

Metadata can also be downloaded. The database is primarily useful for scientific purposes, but some information may also be relevant to MSP. The ICES database is a good example of a decentralised system which is fed by various national sources.

The **HELCOM Map and Data** Service builds on HELCOM's role as a regional environmental focal point, providing information on the state of the Baltic Sea environment and also the effectiveness of protection measures. Complex scientific information is communicated by means of static and dynamic maps, allowing users to view, create and save/print their own maps and download datasets on e.g. pollution loads. The HELCOM Map and Data service provides some spatial data on marine activities (e.g. dredging sites), but these data may not always have the necessary detail or resolution required for legally binding MSP processes[4] (http://maps.helcom.fi/website/mapservice/index.html).

[3] Source: www.ices.dk
[4] Wichorowski et al. 2011

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EMODnet[5] (http://www.emodnet.eu) was also frequently mentioned as a potentially useful database in an MSP context. EMODnet is an open data system operated by a consortium of organisations within Europe that assemble marine data, data products and metadata from diverse sources in a uniform way. Rather than collect new data, its purpose is to bring together fragmented and hidden marine data resources and to make these available to individuals and organisations (public and private) as quality-assured, standardised and harmonised marine data. EMODnet is funded by DG MARE as part of its Marine Knowledge 2020 strategy. EMODnet is currently organised in six sub-portals that provide access to marine data, which are bathymetry, geology, physics, chemistry, biology, and seabed habitats. A portal covering human activities is under construction. EMODnet feeds into the **Water Information System for Europe (WISE)** that will be developed for dealing with marine information (WISE-Marine, mentioned by one respondent) and supporting the data and indicator needs for the initial assessments required by member States in 2012 by the Marine Strategy Framework Directive. WISE and **WISE-Marine** are thematic branches of the envisaged **Shared Environmental Information System (SEIS)** based on INSPIRE principles. EMODnet data should be directly available for viewing through WISE-Marine.

Germany's Federal Maritime and Hydrographic Agency operates several international data systems, including[6]:

- Continental Shelf Information System (CONTIS)
- Nautic hydrographic information system (Nauthis)
- Water pollution (GVU)
- Marine Environmental Monitoring Network (MARNET)
- Remote Sensing
- Sea Surface Temperature (SST)
- Prediction Model
- Shelf Geo Explorer (SGE)
- Marine Environment Database (MUDAB)

Databases are made available through the metadata portal **GeoSeaPortal** (GDI-BSH, https://www.geoseaportal.de/gdi-bsh-portal/ui) which also offers a map client and a metadata catalogue and thus harmonised presentation of data. Respondents specifically mentioned the following:

- **CONTIS** (http://www.bsh.de/en/Marine_uses/Industry/CONTIS_maps/index.jsp) is a well-known marine database which highlights the human activities in the sea. Geodata from CONTIS, such as shipping activities, raw material extraction, planned

[5] Source: www.emodnet.eu
[6] Source: Wichorowski et al. 2011

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offshore wind farms or nature conservation areas, are made available in a bundled format in digital maps. Maps visualise the area share of each activity, intersections to other uses and sea areas currently free of particular uses. CONTIS concentrates on the German continental shelf and the EEZ, but also holds maps for the North Sea and Baltic Sea.

- The **Shelf Geo-Explorer** is a marine and engineering geology database for the German North and Baltic Sea. It is composed of a file-based geodatabase for vector data (organised in four modules Survey, Seabed Sediments, Subsurface Sediments, Morphodynamics), a raster database containing Backscatter mosaics of SSS and MBES and datasets from geostatistical interpolation, and a geotechnical database with corings and cone penetration testings. Data comes both from German research institutions but also from the Netherlands. One of the aims is to provide full-coverage mapping for biological and geological benthic data. Data held in the SGE is accessible via the MDI-DE geoportal.

SEAGIS (http://maps.seagis.org) is another open-access system which allows the download of GIS sheets. Developed for Sweden and Finland, it uses the same data base for two countries in a region. Attempts were made to harmonise data between the countries as far as possible. Login is possible using the username LstGUEST and password 12345678. Unfortunately the portal is only available in Swedish and Finnish, and some of the tools might need left- or right mouse clicking in certain places to work. A guide will soon become available (in Swedish).

The **SeaDataNet**[7] (www.seadatanet.org) infrastructure links 90 national oceanographic data centres and marine data centres from 35 countries around all European seas. The data centres manage large sets of marine and ocean data, originating from their own institutes and from other parties in their country, in a variety of data management systems and configurations. A major objective and challenge in SeaDataNet is to provide an integrated and harmonised overview and access to these data resources, using a distributed network approach. This is achieved by developing, implementing and operating the Common Data Index service that gives users a highly detailed insight in the availability and geographical spreading of marine data across the different data centres across Europe. The CDI provides an ISO19115 - ISO19139 based index (metadatabase) to individual data sets (such as samples, timeseries, profiles, trajectories, etc) and it provides a unique interface to online data access. Data sets are available in ODV format which can be used directly in the Ocean Data View (ODV) software package including the Data Interpolating Variational Analysis software tool (DIVA). There are four specific databases/directories. There is a query interface to enable searches by a set of criteria. Lists can be sorted by a number of key fields.

[7] Source: www.seadatanet.org

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- **European Directory of Marine Organisations (EDMO)**: This directory lists the organisation profiles and addresses of all (2500+) Data Holding Centres, Research Institutes, Monitoring Agencies and Research Vessel operators with an active role in one or more of the SeaDataNet Discovery services (EDMED - data sets, EDMERP - research projects, CSR - research cruises, EDIOS - observing stations/ systems, and CDI - index to data) as well as those maintained together with other groups (EUROFLEETS - European cruise programmes, POGO - global ocean going cruise programmes, SIMORC - oil&gas industry metocean data, Scientists - IODE OceanExperts).
- **European Directory of Marine Environmental Data sets (EDMED):** This refers to the marine data sets and collections held within European research laboratories, so as to provide marine scientists, engineers and policy makers with a simple mechanism for their identification. It covers a wide range of disciplines including marine meteorology; physical, chemical and biological oceanography; sedimentology; marine biology and fisheries; environmental quality; coastal and estuarine studies; marine geology and geophysics; etc. Data sets are described in EDMED irrespective of their format (e.g. digital databases or files, analogue records, paper charts, hard-copy tabulations, photographs and videos, geological samples, biological specimens etc). Currently, EDMED describes more than 3.500 data sets, held at over 700 Data Holding Centres across Europe.
- **European Directory of Marine Environmental Research Projects (EDMERP):** EDMERP covers marine research projects for a wide range of disciplines including marine meteorology; physical, chemical and biological oceanography; sedimentology; marine biology and fisheries; environmental quality; coastal and estuarine studies; marine geology and geophysics etc. Research projects are described as metadata factsheets with their most relevant aspects. The primary objective is to support users in identifying interesting research activities and in connecting them to involved research managers and organisations across Europe. Currently, EDMERP describes more than 1.800 research projects from organisations across Europe.
- **Cruise Summary Reports (CSR):** Cruise Summary Reports (CSR = former ROSCOPs) are the usual means for reporting on cruises or field experiments at sea. Currently, the Cruise Summary Reports directory covers cruises from 1873 till today from more than 2.000 research vessels: a total of nearly 53.000 cruises, in all European waters and global oceans. This also includes historic CSRs from European countries, that have been loaded from the ICES database from 1960 onwards.
- **European Directory of the initial Ocean-observing Systems (EDIOS):** EDIOS is an initiative of EuroGOOS and gives an overview of the ocean measuring and monitoring systems operated by European countries. This directory includes discovery information on location, measured parameters, data availability, responsible

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institutes and links to data-holding agencies plus some more technical information on instruments such as sampling frequency. The United Kingdom has adopted EDIOS as key directory to maintain and give a central overview of all UK marine monitoring programmes. Monitoring agencies from other countries are also encouraged to gather and enter more EDIOS entries, which results in a steady increase of European countries in EDIOS and more monitoring programmes and systems.

The **Oceanographic Database of IOW**[8] holds Oceanographic readings and metadata (mainly Baltic Sea) from 1877 - 2014 obtained on 887 research cruises of the IOW resp. IfM and cooperating institutes. (IOWDB, http://www.io-warnemünde.de/en_iowdb.html). It contains approx. 63 mio. measured samples such as CTD profiles, hydrochemical and biological data, current-meter time series, trace metal data and meteorological data, as well as phyto- and zooplankton data from 1994 to 2013. A new WebGIS portal is currently being developed.

The **EEA** hosts some interactive maps which could be relevant to MSP, such as the state of European bathing waters and Natura 2000 sites. It also has datasets on climate change (e.g. increases in the frequency of flooding) and a range of pollutants.

The **ESPON 2013 Database**[9] provides fundamental regional information provided by ESPON projects and EUROSTAT (http://www.espon.eu/main/Menu_ToolsandMaps/DataNavigator/) The ESPON's Data Navigator provides direct links to more than 3000 statistical data sources and gives access to statistical territorial data and geographical datasets. This information can be used to support territorial development analysis at different geographical levels, although the main focus is on national structures at NUTS 2 and NUTS 3 territorial scale. In some cases, data related to other territorial scales have been incorporated as well (NUTS 0, NUTS 1, LAU 1 or LAU 2). The source of data covers many thematic fields, such as economy, population, education, agriculture, energy and transport, some of which are relevant to MSP through land-sea interaction.

PANGAEA[10] (http://www.pangaea.de/about/) is an Open Access library hosted in Germany aimed at archiving, publishing and distributing georeferenced data from earth system research. It lists a wide range of EU and national research projects and makes available their data free of charge. They can be used under the terms of the license mentioned on the data set description. Each dataset can be identified, shared, published and cited by using a Digital Object Identifier (DOI). Data are archived as supplements to publications or as citable data collections. Citations are available through the portal of the German National Library of Science and Technology (GetInfo). PANGAEA also provides software for the visualization,

[8] Source: www.io-warnemünde.de/en_iowdb.html
[9] Source: www.espon.eu
[10] Source: www.pangaea.de

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exploration and interpretation of scientific data. The tools are freeware; its use in combination with the PANGAEA Information System is recommended. They include PanMap (a Mini-GIS (Geographical Information System) to draw point and vector data in maps), PanPlot (to plot data versus time or space in multivariable graphs), or Pan2Applic (to convert and compile single files or folders of output files (ascii/tab-separated data files with or without metaheader) downloaded from the information system PANGAEA to other formats used by applications, e.g. for visualization or further processing).

Eurostat data also offers a potential source of data, although its resolution may be too low for MSP purposes. The advantage of Eurostat is that it offers statistical information on socio-economic parameters, such as population, economic activities per sector etc. (http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database).

The **INSPIRE Geoportal** (http://inspire-geoportal.ec.europa.eu/), still under construction, will provide the means to search for spatial data sets and spatial data services, and subject to access restrictions, to view spatial data sets from the EU Member States within the framework of the INSPIRE Directive.

The **Baltic Sea Bathymetry Database**[11] (http://data.bshc.pro/about/) is an effort to in one place gather and distribute water depth data — bathymetry — for the areas of all Baltic Sea countries. Measuring bathymetry is mostly a national duty but activities that may depend on this data cross-national borders. This web site offers complete, homogeneous and up-to-date Baltic Sea bathymetry data from "official" sources: All Baltic Sea national hydrographic offices under the umbrella of the Baltic Sea Hydrographic Commission.

The following EU programmes were also mentioned as potentially relevant:

- EU BONUS EEIG projects: BAMBI and BIO-C3
- Integrated maritime surveillance (situational awareness of activities at sea)
- Marine Knowledge 2020 initiative
- Common information sharing environment (CISE) (integration of existing surveillance systems)
- Copernicus programme
- UN-GGIM Europe
- ELF project (European Location Framework)

4.3 Suitability for MSP

The key question with regard to these existing systems is whether they are actually suitable for MSP purposes. This depends on the type of data they make available, how regularly they

[11] Source: http://data.bshc.pro/about/

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are updated, whether data adhere to common standards, and whether they can serve the dynamic MSP process. Relevant data for MSP purposes needs to be fresh and up-to-date, and there is the danger that existing data infrastructures will be too slow and often outdated. A point of conflict emerges here between data quality and freshness, as quality control can slow down the process of updating databases. Ensuring data is always fresh and up to common standards is thus the main issue any future marine spatial data infrastructure will need to address.

Respondents suggest that **guidance** is required on **what the various databases can and/or should deliver for MSP purposes**. This implies some form of assessment.

An example for the kind of assessment required is provided by the **BaltSeaPlan** project which looks at the suitability of a range of databases for MSP purposes (Wichorowski et al. 2011). Criteria in this assessment include available data and scope of the database, data format, data sharing/restrictions, and application of the data for MSP. The report also provides a summary of past European transnational projects with MSP data relevance, and importantly also lists data sharing experiences collected during the BaltSeaPlan project in 8 transboundary and national pilot projects. This concentrates on a broad range of maritime activities and baseline information (offshore wind farming, shipping, cables and pipelines, sand and gravel extraction, gas and oil extraction, dredging, dumping, underwater heritage, military, tourism, ecological information, meteorological information, oceanographic and geological information), listing the kind of data that was considered necessary or potentially useful for planning, the data actually obtained and the respective source, and missing data and data problems encountered (p. 23 ff). Contrasting these actual planning needs with the data available from various sources is thus an important step in establishing data gaps.

The BaltSeaPlan report takes the important step of acknowledging actual MSP experiences in identifying MSP data needs. This emphasises the importance of close cooperation between MSP planners and data experts in developing a suitable data sharing structure for transboundary MSP.

An important task for the proposed group is therefore to revisit the BaltSeaPlan assessment. Additional criteria may need to be developed to allow a more comprehensive evaluation of the data contained in existing databases. These criteria should be based on minimum MSP planning needs for developing MSP across borders.

In order to assess the suitability of databases, more **transparency** may be required on the part of the database hosts with respect to the analyses that are provided and the methods used for data product development.

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5. Towards a marine spatial data infrastructure for the Baltic

5.1 Acknowledging the challenges

Data compatibility, usability and spread emerged as the main issues, but participants acknowledged that overcoming these is a huge challenge. Harmonised datasets are a worthy goal but it is very time-consuming to achieve a standardised data structure. Agreeing on parameters may be difficult, as experience with the Water Framework Directive has shown. There was a sense that any first steps towards establishing a standardised data structure in the BSR should not be too ambitious.

5.2 Advantages of a decentralised approach

All agreed that a decentralised approach has many advantages, not least the fact that responsibility for data would remain with the data owners. The alternative would be to establish a new central system or data warehouse which is compatible with EMODnet or HELCOM standards, but this would impose additional burden on GIS technicians and data holders and collectors, require staff for its operation and be more expensive. It would also mean that data exchange is not necessarily harmonised.

The German Marine Data Infrastructure was put forward as an example of a decentralised approach which operates as follows:

- Data is stored by the respective data owners, but according to certain standards.
- Metadata are made available in a joint portal.
- Searching the database by topic is possible, and results are brought together automatically and are shown via WebGIS.
- Data are retrieved live for each query, but the viewer cannot see the origin of the data.

The advantage of the decentralised approach is that data are always current since the data owners are responsible for updating theirs. However, common standards need to be agreed on aspects such as legends, and technical solutions need to be explored to enable results to be shown in several languages. Another advantage of the decentralised approach is that sources of data can vary and include authorities and scientific data, as well as ecological, socio-economic and spatial data.

The most important criterion for a decentralised approach is to agree on a common basis as different data standards may be used by the data owners, and that some adaptation of data may be necessary.

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5.3 Mixed structures as a way forward

Given the complexity of establishing a MSDI, mixed structures could be a pragmatic initial way forward. A useful starting point would be a list of data providers in the BSR, giving information on who holds which detailed data with relevance to MSP. This would need to include national and regional levels, as well as international data systems. Initially, responsibility for the data format could also stay with the data owners who would be seen to provide a service to a centralised data portal. Harmonised datasets can then be worked towards and used where available.

5.4 Central national data points

There is widespread acknowledgement that each country has its own national data structure, and should develop its own approach to dealing with MSP data. Irrespective of each national system, however, there would ideally be one central data point per country which could bundle data from various sources including sub-national data centres. Denmark for example has several regional data centres; the Danish Geodata agency is a central hub which provides pooled time-stamped datasets. Where datasets are spread across institutions, one region could therefore be tasked with providing harmonised datasets on behalf of the others. The Danish example shows that harmonisation is not without difficulty but the decentralised system does work.

Germany has a decentralised data infrastructure (MDI and GDI-DE) where data is made available through a central collecting point. Data is delivered to the hub in the format chosen by the data-providing organisations, so the aim is not to provide fully harmonised data. Central access to data is the main benefit of this system. Estonian Spatial Data Law requires data sharing, which has enabled the establishment of the Estonian Geoportal as a central national data hub. All spatial information relevant for MSP is held in this hub in an INSPIRE-compliant format.

Similar structures could be conceivable for the Baltic, so country data could either be accessed directly in the countries or through this system. A platform would be needed connecting the various national portals and international systems such as ICES and HELCOM at the BSR level. A minimum requirement would be for data to be INSPIRE-compliant. A list of data entry points and a metadata catalogue would be good starting points, as would a single coordinate reference system.

The BaltSeaPlan project (2011) has already proposed a spatial data infrastructure for the BSR which foresees a central data hub linking national data hubs. The project also pointed to the importance of data harmonisation in order to ensure data compatibility. A key task for the proposed group would be to consider how the same content can be ensured behind spatial

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data across the BSR (e.g. cables, pipelines), so there can be common datasets that would be valid for some time. This would reduce the need for constant updating of some data (e.g. linear infrastructure). Regular updates are also less important in areas of the Baltic which are less busy. Scale is also important as scales of 500m^2 are not useful to the municipal level; a resolution of 25m^2 would be required here. Data therefore needs to be accompanied by information on the resolution and scale.

Standardised data classification and centralised data portals are crucial to initiating BSR-wide MSP work. Parallel data collection can begin in BSR countries as soon as such a standardised classification system exists. Standardisation is therefore an important first task for the proposed group, potentially more important than a pilot case focusing on particular datasets to start with.

EMODnet is considered a useful starting point for mapping (such as Natura 2000, fishery, military) and offers a good structure to build on. Data should be compatible with EMODnet.

PlanBothnia is a useful regional example which used HELCOM data to produce a plan.

6. Towards a BSR MSP Data Working Group

6.1 Existing BSR data and MSP working groups

A number of international data groups already exist. Some of these are relevant to the proposed BSR MSP Data Group as there may be potential overlap in some terms of reference.

The International Hydrographic Organisation (IHO) has a **marine spatial data infrastructure working group (MSDIWG)**. Its objective is to support the activities of the IHO related to Spatial Data Infrastructures (SDI) and/or Marine Spatial Data Infrastructures (MSDI).[12] Members monitor national SDI developments and identify actions and procedures that the IHO might take to contribute to the development of SDI and / or MSDI in support of Member States, for example. The group is also tasked with identifying and recommending possible solutions to any significant technical issues related to the interoperability between maritime and land based inputs to SDI, in particular:

- Datum issues.
- S-100 interoperability with SDI.

[12] Source: http://www.iho.int/srv1/index.php?option=com_content&view=article&id=483&Itemid=370, Terms of Reference

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- S-100 interoperability with oceanographic, marine biological, geological and geophysical data structures.

The WG comprises representatives of IHO Member States, Expert Contributors and Accredited NGIO Observers. Expert Contributors principally from industry participate in the WG at the invitation of the Chairman. The WG mostly works by correspondence, and uses group meetings, workshops or symposia only if required.

The Baltic Sea Hydrographic Commission has a **Baltic Sea Marine Spatial Data Infrastructure Working Group (BSMSDIWG)** which focuses on hydrographic data and MSDI in the BSR. The WG's main tasks are to identify and analyse the current status of individual MS MSDI implementation; analyse how maritime authorities can contribute their spatial information and related updates, or monitor the development of SDI that could be relevant for the Baltic region. The current work plan includes a study of different laws with relevance to MSDI in the Baltic countries (coordinated by Denmark), a closer look at which hydrographical data is relevant for MSP, a list of MSDI relevant projects, and establishing a framework for common understanding of MSDI (coordinated by Latvia). Although the WG is not primarily dedicated to MSP, it does recognise the relevance of MSP and the impact of the new EU MSP Directive. The current work plan therefore also includes a study of national approaches to MSP and use cases for MSP.[13]

In 2013 Eurostat set up a new **Task Force on the integration of geography and statistics**, and in 2015 an Eurostat ESSnet grant project will be launched aiming at creating a framework for point based statistics.

ICES is actively exploring the use of its data and databases in MSP. It also has dedicated working groups which deal with aspects related to MSP. **ICES Working Group Marine Planning and Coastal Zone Management (WGMPCZM)** (http://www.ices.dk/community/groups/Pages/WGMPCZM.aspx) discusses current developments around Marine Spatial Planning (MSP) and Coastal Zone Management (CZM) in the ICES area. It is an inter- and transdisciplinary group which involves people from social and natural sciences and from administrations in ICES Member countries. The group monitors current developments in marine planning practice and research and focuses on knowledge gaps in MSP, risk analysis, and quality assurance of a) advice for MSP and b) of mechanisms and processes in coastal and marine planning. It also focuses on social-cultural dimensions of marine ecosystem services and the use of fisheries data in plan decision making processes. At its last meeting in 2014 it also began a categorisation of data needs for MSP. The group has an annual meeting and actively contributes to conferences and other events, and has significantly contributed to the **ICES Strategic Initiative Group MSP (STIG-**

[13] Source: www.iho.int/mtg_docs/com.../MSDIWG5-6.1_Inf_BS-MSDIWG.pdf

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MSP) (http://www.ices.dk/community/groups/Pages/STIGMSP.aspx) which is a high-level strategic planning group within ICES.

This brief list shows that there would be some overlap between the new proposed group and existing groups. At the same time, none of the existing groups have the same practice orientation or specific combination of MSP data needs analysis and MSDI development. The proposed group can therefore be expected to fill an important gap at the interface of planning and data. It is suggested that the proposed group should build links to these existing groups (see recommendations).

6.2 Function of the proposed group

Diverging opinions exist on the exact purpose and function of the group. On the one hand, the BSR MSP Data Group is understood as a group tasked with solving technical obstacles to sharing data and evaluating data. Planners, on the other hand, point out the importance of creating a platform for users of data and a facility for planners to come together do discuss cross-border data needs.

6.2.1 Bridge communication gaps

The PartiSEApate governance framework foresees a group at the interface of MSP policy, sectors and MSP practice, consisting of technical data experts selected for their expertise in the field, (potentially) country data experts nominated by national MSP contact points, as well as MSP experts. This mixed approach is advantageous for several reasons:

- A communication gap exists between planners and data experts. MSP needs are not always clearly communicated to data experts, and data experts may create data infrastructures that are not suitable for MSP purposes.
- The need to communicate with data experts can help planners to sharpen their own debate on what data is most urgently needed for MSP purposes at different stages of the MSP process and at different spatial scales.
- Planners are not always aware of data restrictions or technical issues with respect to the transfer of data or spatial data infrastructure.

An expert group bringing together these two sides could help to bridge this communication gap, ensuring a marine spatial data infrastructure is created which is realistic and delivers what MSP planners need at different stages of the MSP process, both in cross-border and wider transboundary contexts.

Key benefits recognised for a mixed group would also be to overcome political and/or institutional inconsistencies, and the creation of a stable communication platform where planners and data experts can come together to discuss the issues at hand. Last not least,

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the group can become an important source of education and information, contributing to awareness-raising and potentially actively lobbying for good data governance.

6.2.2 Identify priorities from the perspective of planners

There is widespread agreement among planners that any discussion of data exchange and transfer must be based on a better definition of (transboundary) MSP data needs. Data to be included in any international Spatial Data Infrastructure for MSP must be **selective**, based on a minimum dataset required for MSP and priority needs. "*Otherwise planners will awash in information and unable to fulfil our main task – to make a plan of economically viable use of the sea on the base of ecosystem approach.*"

The most urgent task is thus to determine what would constitute these minimum data needs. This must go hand in hand with standardisation of MSP parameters and shape files between countries, taking into account the results of previous projects such as BaltSeaPlan. Early agreement on cartographic material is also essential, including which international baseline maps to use, the scope of maps, language and symbols. This is very important for Russia for example, where maritime spatial planning will be linked to territorial planning within single spatial projects and it is desirable to unify the planning process and the results. The group should therefore not only focus on technical problems, but on the final result: "*We need to agree which maps (planning layers) will be used in the main (approved by the authorities) plans and which only in the supporting materials. So for these kinds of maps (levels) we need data structure (a set format, monitoring, etc.). Then we can solve the remaining tasks*".

Close cooperation of MSP practitioners and data experts can only begin **after** the minimum data sets required have been determined and when data needs can be clearly communicated. At this point, a specialised international database or MSDI can be created.

It is recognised that full standardisation of data will take time and that planners will need interim solutions. "*MSP needs to be done now and cannot wait for the perfect system*".

Planners suggest that **short-term and long-term objectives** are defined for the group, ensuring that certain more urgent tasks are given priority over others. Suggested **priorities and first steps** include:

- An inventory of minimum data requirements for MSP should be drawn up. This is a task for MSP experts which may not require GIS expert input. This should be linked to bringing together existing experiences with data gathering and management in the BSR countries.
- Data needs should then be contrasted with the "landscape" of available data in the BSR region: Who holds what type of data, where and in what format? Who are the

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agencies responsible for MSDI in the various countries? This could be a simple list of information and contact points.

- The list of available data can then be used to pinpoint data gaps. This should include a check of existing project results for their relevance and use in MSP. Both steps should consider the resolution of data which depends on the purpose for which it is to be used.
- The group should then seek to generate access to reliable data sources to service immediate MSP needs. This should include access to relevant socio-economic and land-based data to take account of terrestrial activities and their impact on the sea.

Mid-term tasks are suggested as follows:

1. The group should highlight responsibilities of authorities, planners, and data experts – who should do what in order to implement a cross-border approach to MSP data?
2. A common map should be generated to test the common approach to data, focusing on one or two pilot topics (e.g. linear infrastructure). This would establish principles for cooperation, once again highlight data gaps, and allow for any other problems with data sharing and harmonisation to be identified. It would also lead to a recognisable output and "success story" for the group.
3. A BSR-wide agenda should then be set for missing data and priorities in data collection.

6.2.3 Working towards a marine spatial data Infrastructure

In terms of developing a marine spatial data infrastructure, it is important to be clear about its purpose in order to avoid duplication and facilitate links to existing SDIs at the national and international level (e.g. EMODnet). An advantage of a decentralised system is that it will serve national MSP needs, but include transnational dimensions. Hence it could provide a source of information and data to help with the production of national plans.

It is unclear whether a marine spatial data infrastructure should be based on, and make available, downloadable data, or whether it would be sufficient to create a web-based map service which visualises data. A mixed approach may also be conceivable.

6.3 Assessment of the proposed TOR for the group

The survey asked respondents to rate the importance of each of these TOR, and to suggest amendments or additional TOR for the group as they saw fit.

Fig. 1 illustrates that identifying and prioritising MSP evidence and data needs from a planner's point of view, especially from a transboundary perspective, and identifying relevant available data from MSP authorities and institutions are considered the most urgent

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tasks. This is closely followed by identification of data and information gaps, especially in transnational MSP contexts, and identifying detailed requirements and solutions for data sharing. Developing terms of reference for a regional spatial data infrastructure for MSP and developing funding applications for external services were also considered important but less urgent. Agreeing on measures to ensure high data quality, reliability, accuracy and accessibility, and identifying research priorities to fill evidence gaps were still considered important but least urgent.

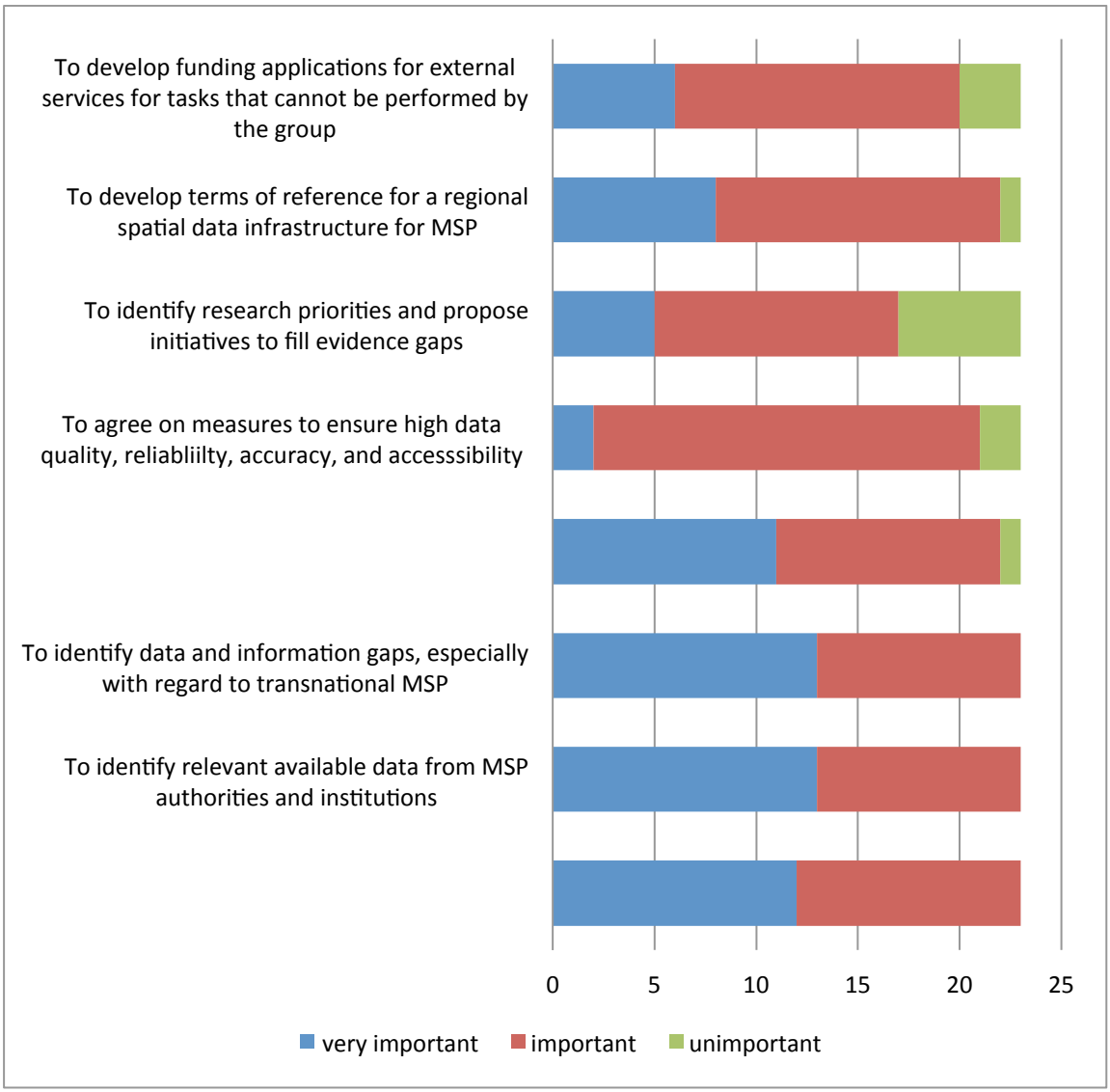

Fig. 1: Survey results, "Please indicate the importance of each of the following proposed tasks for the group" (n = 23)

Other tasks suggested for the group included a review of existing examples of data infrastructure to assess the potential for extending this to pan-Baltic data management, and the establishment of a financial model for a marine spatial data infrastructure. Another

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suggestion is the development of tools for practical use at the management level, such as map tools, which would need to be transnational.

6.4 Membership of the proposed group

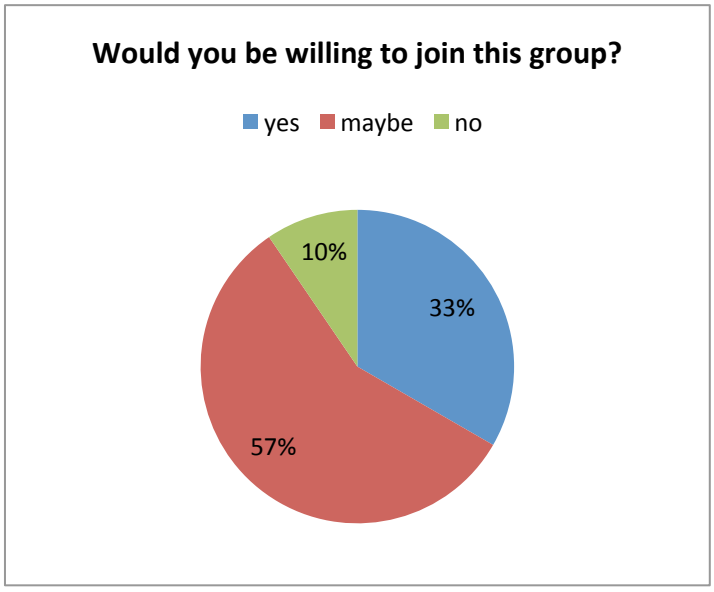
In line with the diverging views of the purpose of the group, there were two views on the primary membership of the group:

- MSP planners should come first – those who do "hands on" MSP and have first-hand experience of data needs and issues
- The group should be led by GIS experts who respond to MSP needs by developing appropriate systems.

In order to make progress with transboundary MSP, both types of experts will be needed. Three categories of participants are suggested as important:

- the officials who determine the purpose and content of work by MSP,
- planners directly involved in the planning process,
- database professionals defining the presentation and format of input data and output materials.

The added value of the group would be its broad representation, including government and research representatives, representatives of countries and larger regions and intergovernmental agencies. Sectoral input could be invited if and when needed.



There should also be links to international MSP data providers such EMODnet and HELCOM, as well as links to other relevant data groups (e.g. the Hydrographic Agencies' MSP group). Links to ESPON were highlighted as ESPON has a spatial database and its own standards, as were links to ICES as a major holder of scientific data.

Fig. 2: Survey results, "Would you be willing to join this group?" (n = 23)

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It is unclear how national representatives would be selected or appointed or how federal countries could be represented, especially since the group should also not become too large. One possibility may be to establish technical sub-groups which can draw in other specialists for specific tasks. Another is to create an advisory board and observer status, which might suit representatives from EMODnet, HELCOM, other data groups, or even representatives from other sea basins.

Out of those who responded to the internet survey, only 10% indicated they would not be willing to join the group. 57% indicated their possible willingness, depending on the time commitment required, availability of funding and specific tasks of the group. A range of contact names were suggested as potential members of the group (see Appendix 3).

6.5 Preferred mode of working

Most of those who indicated their potential interest in this group are willing to dedicate time, depending on the specific tasks of the group and the available funding. Face to face meetings were considered important at least once a year, and 37% of the respondents indicated they would make time for such meetings. Teleconferences were also considered a useful way of communicating. 16% indicated they may not be able to attend meetings, but could dedicate time to the group in-between meetings. Respondents estimated they could commit between 2 and 24 hours per month to the task of the group including meetings.

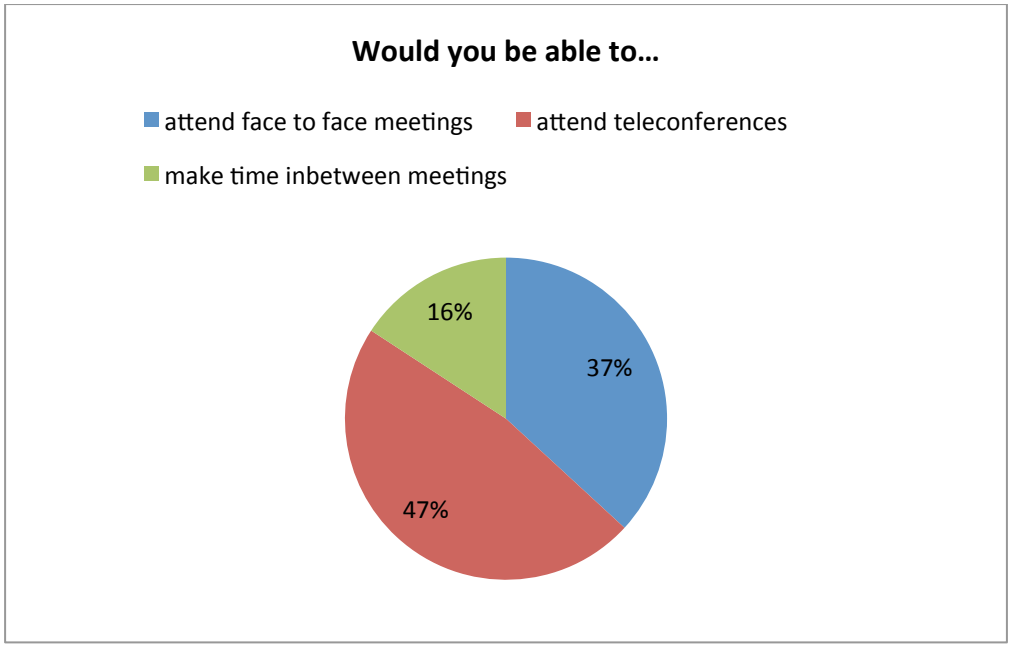

Fig. 3: Preferred mode of working of those who indicated their willingness to join the group (n = 19)

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6.6 Funding

Travel and subsistence is considered essential to enable non-authority participants to take part in the group and to ensure balanced representation in the group. However, in order to cover additional costs and the work of the group carried out in-between meetings, additional funding may be needed, e.g. for writing tasks and for coordination within and between countries. Funding would also be needed for an advisory board should this be created.

Data is one of the core tasks of MSP authorities, and a coordinated approach to MSP data is in their interest as it can generate economies of scale and promote a more efficient overall approach. As a result, there was the view that MSP authorities should contribute funding for group, at least to secure travel and subsistence for the yearly meeting of the group. Given that the group is likely to start small, and expected to grow gradually, a small budget would suffice initially. Project funding could also be used to fund the group or some of its activities, and PartiSEApate was highlighted as an example of how projects can be used for this purpose.

Because of the primarily spatial orientation of the group, the VASAB Secretariat was considered an appropriate coordinating body. This could be a shared task with the HELCOM secretariat.

6.7 Success factors

In addition to the primary functions of the group set out above, the following specific success factors were identified.

6.7.1 Output orientation

A specific tangible output is considered crucial for the success and recognition of the group and for demonstrating its added value. Maps would constitute such an output, presented through a web viewer. One idea is to choose a pilot topic to test a transboundary data approach. Topics suggested for pilot projects include military areas (although these may have been mapped already), linear infrastructure (such as shipping lanes based on AIS data of shipping density, recognising that shipping lanes are understood differently in different countries), and fishery, potentially together with relevant socio-economic data. Work could start as a cross-border exercise and gradually expand to become Baltic Sea wide, with more topic areas added gradually. The aim would be to ultimately work towards a common inventory of human activities plus biological data.

Testing the MSP spatial data infrastructure using linear infrastructure as a pilot case is useful, since this affects the interests of the majority of countries in the BSR.

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6.7.2 Demonstrating value for money

In order to ensure its recognition by MSP authorities, it is important to show that cooperation by means of a MSDI is more cost-effective than every country working separately.

6.7.3 A driving force

An important aspect is that the group will need a driving force and combined willingness to succeed.

6.7.4 Transparency

The group should operate as transparently as possible and should regularly inform planners and authorities about its work, for example through a mailing list.

7. Conclusions

7.1 The current context

As stated in the proposal for establishing a subgroup on MSP data, presented to the HELCOM-VASAB MSP WG on 16 June 2014, the Baltic Sea's jurisdiction is highly fragmented, rendering transparent, comparable and harmonised information and data of prime significance for consistent transnational and cross-border MSP. This is widely recognised by those who participated in this study. There is also recognition of initiatives such as EMODnet or the implementation of the INSPIRE Directive which seek to overcome existing data challenges. At the same time, a number of issues still need to be addressed. One side of the coin is the identification of actual MSP data needs, which might differ depending on the type of plan that is generated or the scale of the planning process. The other is the provision of appropriate data through data infrastructures to ensure the timely availability of the required data. In the latter context, data availability, quality and scope of data, metadata and interoperability of data are still largely unresolved. It is also unclear what data is absolutely required for MSP implementation, and how raw data can be converted into formats that can be used by planners.

The "case for MSP data" is strengthened by the MSP Directive[14], which requires Member States to:

- take into account **land-sea interactions**;

[14]Directive 2014/89/EU of the European Parliament and of the council of 23 July 2014 establishing a framework for maritime spatial planning

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- take into account **environmental, economic and social aspects, as well as safety aspects**;
- aim to promote **coherence** between maritime spatial planning and the resulting plan or plans and other processes, such as integrated coastal management or equivalent formal or informal practices;
- ensure the **involvement of stakeholders**;
- organise the use of the **best available data**;
- ensure **trans-boundary cooperation** between Member States (ensuring maritime spatial plans are consistent and coherent across the marine regions concerned); and
- promote **cooperation with third countries**.

Although data quality is emphasised as a requirement in its own right, data and information actually play a key role in all of these. Transnational data exchange will be crucial for achieving the desired coherency in MSP, but will also be necessary to account for land-sea interactions, considering sustainability aspects and implementing transboundary cooperation.

The above has shown that many international initiatives and projects such as EMODnet have been working towards enabling greater consistency of spatial data and access to such data. However, none of these have been set up **to specifically serve MSP needs**. It is also clear that progress has been made in testing approaches to transboundary MSP in a series of pilot projects. These have led to recommendations both at the technical level (e.g. recommendations for creating marine spatial data structures, such as the BaltSeaPlan project, or recommendations for setting up shared GIS systems, such as the TPEA project) and the practical level (e.g. how to set priorities for data and data exchange in transboundary contexts, such as the TPEA project[15]). These experiences now need to be brought together and translated into a system which delivers the data required for transboundary MSP in the Baltic Sea in the right quality and in an easy to use and easy to maintain format.

Recognising the importance of data fit for purpose, the Commission has recently launched a call for "**Sea basin checkpoints**"[16]. Two such checkpoints already exist for the North Sea and Mediterranean (http://www.emodnet.eu/northsea and http://www.emodnet-mediterranean.eu/), but more are to be established, including one for the Baltic Sea. The purpose of the checkpoints is to audit the value and adequacy of marine data services to solve particular commercial and policy challenges in a sea basin context. This is done by running through a series of "challenges", which are largely derived from situations where

[15] see the TPEA Good Practice Guide, download from www.tpeamaritime.eu
[16] http://ec.europa.eu/information_society/newsroom/cf/mare/itemdetail.cfm?item_id=17763

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data from more than one country's waters are required. The aim is to assess whether the resolution, availability and consistency of existing data are sufficient to address each challenge. One of the challenges relates to offshore wind farming and asks contractors to determine the suitability of sites for development of a wind farm. This is to take into account a variety of "real life" aspects such as wind strength, seafloor geology, environmental impact, distance from grid, shipping lanes etc. Specifically for the Baltic, this assessment is to be carried out:

- at point where waters of Estonia, Latvia, Lithuania, Poland and Sweden meet
- at point where waters of Finland, Lithuania and Russia meet
- at point where waters of Denmark, Germany and Poland meet

Other challenges refer to marine protected areas, an oil spill scenario (e.g. assessing the trajectory of the slick and which tourist beaches might be affected), climate change, fisheries management, mapping fisheries impacts on the sea floor, eutrophication, annual river input, bathymetry, and alien species. Although the sea basin checkpoints are concerned with the integration of data relevant for implementing the MSFD Directive, they are also highly relevant for MSP since the project is concerned with the integration of all marine spatial data, including environmental data, biological data and data related to human activities. The approach can therefore be expected to yield useful results with respect to mapping capacities and data exchange in the Baltic, which in turn would be very useful as input to the proposed BSR MSP Data Group.

7.2 Suggested core principles for the group

The idea of establishing a BSR MSP Data Group has met with much enthusiasm by those who took part in the study. Data quality and common standards are recognised as urgent issues by practitioners, so the proposal of establishing this group is **very timely**. With the EU MSP Directive as a framework, data exchange across borders will become even more important, so the proposed group could act as a **leader and model within the EU**.

Based on the results of the study, the following principles are suggested for establishing a BSR MSP Data Group.

Function of the group

The group should bridge the gap between MSP planners and data experts

The proposed BSR MSP Data Group should have two primary tasks:

- To provide a platform for the users of data to discuss cross-border MSP data needs,

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- To provide a platform for developing technical solutions to sharing and evaluating MSP data across the BSR.

The main purpose of the group is thus to provide a discussion forum for MSP practitioners and data experts and bridge any gaps between them. Presently, there are no formats allowing for this type of dialogue, and it has been difficult in the past for both groups to find a common language. Group membership should therefore reflect the view of MSP practitioners – ideally those who are actively involved in preparing maritime spatial plans and have first-hand knowledge of the data issues encountered – as well as data expertise, both in terms of data harmonisation and spatial data infrastructure.

The group should allow for dialogue between sub-groups

Given the dual aims of the group, it may be necessary to find ways to discuss more technical issues with just some of the group. One possibility is to establish sub-groups which could convene if and when needed. A practitioners' subgroup, for example, would allow planners to establish exactly what their data needs are in various cross-border and transboundary contexts (see below). A data expert subgroup may be necessary to discuss technical matters related to formats of data exchange or MSDI. The need for subgroups may decrease as the group moves beyond the initial stages of its work plan and begins to work on data harmonisation and infrastructures.

Build links to existing data groups and data holders (e.g. agencies)

The proposed group should build links to existing groups that deal with MSP or data both within the BSR or internationally. This should specifically include representatives of the new Sea Basin Checkpoints. It should also create links to data holding institutions and organisations, in particular national data centres and those responsible for SDI in each country. This could be done by inviting members of these other groups to MSP BSR Data Group meetings, or by presenting the group's work at other group's meetings. Such ongoing dialogue is important to avoid duplication of effort, create awareness of each other's activities, and especially also to make use of existing lessons, standards or practices that have already been developed elsewhere.

The group should be output-oriented and demonstrate value for money

A specific tangible output is crucial for the success and recognition of the group and for demonstrating its added value. Maps would constitute such an output, presented through a web viewer. One idea is to choose a pilot topic to test a transboundary data approach. Topics suggested for pilot projects include military areas (although these may have been mapped already), linear infrastructure (such as shipping lanes based on AIS data of shipping density, recognising that shipping lanes are understood differently in different countries),

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and fishery, potentially together with relevant socio-economic data. Work could start as a cross-border exercise and gradually expand to become Baltic Sea wide, with more topic areas added gradually. The aim would be to ultimately work towards a common inventory of human activities plus biological data.

Testing the MSP spatial data infrastructure using linear infrastructure as a pilot case is useful, since this affects the interests of the majority of countries in the BSR.

In order to ensure its recognition by MSP authorities, it is important to show that cooperation by means of a MSDI is more cost-effective than every country working separately.

B. Setup and coordination

Simple and transparent structures

The setup of the group should be kept simple, comprising:

- A core group of MSP and data experts (ca. 15-20 members)
- A chairperson, elected by the members
- A list of added technical experts who can be brought in to cover specific issues
- The possibility of observer status, enabling other groups or organisations/institutions to be directly linked to the work of the group
- A small supporting secretariat
- An annual meeting supported by teleconferences
- The possibility to call additional meetings if the need arises.

The setup should be flexible enough to allow for sub-groups to be created and meet in order to discuss specific technical issues.

Stability and consistency

Although the group should not be conceived of as a permanent institution, continuity over its lifespan is important, which implies continuity of members. This in turn requires commitment on the part of the participating institutions and individuals, as well as the necessary administrative support. The expected level of commitment should be made clear to potential participants from the very beginning.

VASAB as the coordinator of the group with support from HELCOM

The focus of the group is on planning, even though some environmental ministries will likely also be involved. This suggests that VASAB might be in the best position to act as the group's coordinator and lender of administrative support. A small secretariat should be created to

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facilitate organisational tasks (e.g. organise an annual group meeting) and a minimum level of administrative support.

VASAB should ideally to take over the process of establishing the group, such as organising the first meeting etc in close collaboration with HELCOM.

A small initial budget to facilitate the start-up phase of the group

A small budget is needed to pay for travel and subsistence of non-authority group members and allow for equitable representation. Work in-between meetings, especially time-intensive tasks such as evaluation and writing of reports should be compensated for.

Ensure transparency

The group should operate as transparently as possible and should regularly inform planners and authorities about its work, for example through a mailing list.

C. Work towards an MSDI system of the future

Work towards a decentralised MSDI

Survey results indicate a decentralised SDI as the preferred model for building a MSDI in the BSR. Examples of such models exist in various countries and transnational projects; these examples should be carefully analysed, evaluated and built on.

Ensure future MSDI systems are relevant and fit for purpose

The most important aspect is to ensure that future MSDI systems are fit for purpose. Systems must not be built for the sake of it, but serve a clear and commonly defined MSP purpose. This highlights the importance of **continuous dialogue between planners and data experts, as well as recognition there will not be one perfect system.**

Retain flexibility within the system to accommodate national approaches

The system should retain enough flexibility to accommodate different national systems and data infrastructures. Relevance of outputs should also be ensured in the context of new MSP developments, especially the MSP Directive.

An important task for the proposed group is therefore to revisit the BaltSeaPlan assessment. Additional criteria may need to be developed to allow a more comprehensive evaluation of the data contained in existing databases. These criteria should be based on minimum MSP planning needs for developing MSP across borders.

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7.3 A suggested task list for the group

The following TOR have emerged as particularly important and are therefore suggested as priorities for the group:

1. To identify MSP evidence and data needs from a planners' point of view, especially from a transboundary perspective, including setting priorities, through close cooperation with MSP experts from all contracting states, taking into account results and insights from completed as well as on-going MSP and sectoral planning processes and projects;
2. To identify relevant available data from MSP authorities and institutions, as well as European sources including HELCOM and ICES databases,
3. To identify evidence, data and information gaps, especially with regard to transnational and cross-border MSP;
4. To identify detailed (minimum) requirements for data sharing, and propose solutions for data scope, content, attributes, formats, including coordinate systems and language needs, and estimate harmonisation needs as regards existing data sets;

Other TOR of less immediate importance are:

5. To agree on measures to ensure high data quality, reliability, accuracy, and accessibility, and transparency with respect to these qualities,
6. To identify research priorities and propose initiatives to fill critical evidence gaps (incl. relevant socio-economic and –cultural data etc.);
7. To develop terms of reference for a regional spatial data infrastructure for MSP, taking into account existing national and regional data infrastructure developments and making available relevant MSP data via a common hub;
8. To develop funding applications for external services for tasks that cannot be performed by the group

The following is a list of tasks which are suggested for the group based on the results of the study and which pick up on the TOR suggested for the group. Apart from the first and last, they are not in any order of priority; in fact, it is suggested that several could be tackled at the same time. There is some degree of overlap between the tasks, and some logically lead on to others. Also, some tasks call for greater MSP expert and practitioner involvement, whilst others may need to be led by data and GIS experts. This is not an exhaustive list, so one of the first tasks for the group would be to revisit this list and to decide on a proper work programme.

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Identify transboundary MSP data needs

A key task for the group should be to draw up an inventory of minimum data requirements for transboundary and cross-border MSP. What is needed for MSP decision-making at different scales and at which points of the MSP cycle? Inventory phases for instance might require spatial information on the marine environment and current distribution patterns of human activities, whilst planning phases will need information on potential and expected conflicts between activities, possible synergies and co-location options, and future trends. This can draw on past experiences in countries already engaged in MSP processes, as well as project results, for example the BaltSeaPlan and PartiSEApate projects.

Planners can then draw on the help of GIS experts to translate these data needs into a shared list of parameters to be collected or made available.

Develop a protocol for collecting and making available data

The group should establish a protocol for collecting and/or making available data, including:

- The selection of standard formats of information exchange;
- A unique geodetic reference system for all information from different jurisdictions;
- A unique coordinate system for storing information in a geodatabase;
- Specifying work scales;
- Requirements about data quality to ensure consistency in the information system;
- Rules to facilitate the topological consistency of information (e.g. data integrity, consistency, validity, accuracy, relevance and vintage);
- Criteria and process to harmonise attributes in similar layers for the whole BSR; and
- Metadata for corresponding geographic data.

This would enable national plans to take into account and map cross-border activities in a way that is coherent and compatible.

Canvas problems encountered in ongoing MSP processes

This step may depend on whether the group already feels well informed on this matter. It could be a fairly rapid “round the table” assessment, drawing together problems encountered in ongoing MSP processes with respect to data collection, and documenting any solutions that have been found to these problems. Which data were easy to come by, which data were difficult to obtain? Was the necessary data available in the right format, and was it associated with metadata? Which data gaps were identified? Have there been any hands-on experiences with obtaining data from neighbouring countries? A comparative

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approach should lead to a list of problems which affect all BSR countries or just some countries, which can then be prioritised in terms of finding solutions.

Identify data holders and common data requirements

The data needs identified in the first task should then be contrasted with the "landscape" of available data in the BSR region: Who are the data holders in the BSR, which agency and organisation holds what type of data? Where is this data stored, in what format, and is it made available through a central access point? This could be a simple list of information and contact points.

Pinpoint data gaps

The group can then cross-check the available data with the data needs to identify data gaps. This should include a check of existing project results for their relevance and use in MSP, and should also consider the issue of data resolution (requirements will vary depending on the purpose for which the data will be used).

A BSR-wide agenda should then be set for missing data and priorities in data collection.

Create access to reliable data sources to serve immediate MSP needs

The group should seek to generate access to reliable data sources to service immediate MSP needs. This should include access to relevant socio-economic and land-based data to take account of terrestrial activities and their impact on the sea.

Create a BSR map to test the common approach to data

An example map should be created as the first tangible output of the group, focusing on one or two pilot topics (e.g. linear infrastructure). This would establish principles for cooperation, once again highlight data gaps, and allow for any other problems with data sharing and harmonisation to be identified. It would also lead to a "success story" and demonstration of added value for the group.

Develop proposals for establishing a MSDI for the BSR

The group should develop a proposal for setting up a regional spatial data infrastructure for MSP, taking into account existing national and regional data infrastructure developments and making available relevant MSP data via a common hub.

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8. Next steps and roadmap

8.1 Endorsement of the group

As indicated in the introduction, preparatory steps have already been taken towards an official endorsement of the proposed BSR MSP Data Group and its establishment as a sub-group of the HELCOM-VASAB MSP WG:

- At the 8th meeting of the HELCOM/VASAB MSP WG, which took place in January 2014, Germany presented a first draft proposal for setting up an MSP data expert group for the BSR. This meeting recognised the need to carry out further work on MSP data in line with the new work plan for the group, and asked for a more complete proposal.
- At the 9th meeting of the MSP WG, which was held on 16 June 2014, Germany presented a proposal for establishing a subgroup to the MSP WG; this was welcomed by the meeting. It was decided to suggest the adoption of the establishment of a data group to HELCOM HOD and VASAB CSPD/BSR.

The HELCOM-VASAB MSP WG Work Plan 2014-2016, which mentions the data working group in section 4.3, has since been confirmed by subsequent meetings of HELCOM HOD and VASAB CSPD/BSR. The **VASAB CSPD/BSR 66th meeting** (Helsinki, 25.-26.06.2014) states:

- *CSPD/BSR invited the expert meeting for establishment of the sub-group to review the current work of different fora in order to avoid duplication and save resources, and set a limited number of realistic tasks with regard to MS obligations to implement MSP*
- *VASAB Committee will come back to the issue of supporting/adopting the establishment of the sub-group on MSP data when the ToRs will be developed and proposed for adoption*

Discussing the proposal for establishing a subgroup on MSP data to HELCOM-VASAB MSP WG, **HELCOM HOD 46-2014** (Helsinki, 16.-17. Sept. 2014) states:

- *"The meeting endorsed the proposal for holding a meeting, to be hosted by the HELCOM Secretariat, with the aim to develop ToR for regional work on MSP relevant data and with the aim to consider a possible sub-group on MSP data to HELCOM-VASAB MSP WG"*

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8.2 Nature of the group

Interviewees are keen to emphasise that the proposed group should **enable output-oriented work** (*"not like the meetings in PartiSEApate"*). This requires a reasonably flexible administrative environment which **allows the group to work independently**. ICES working groups could be a good role model. The group could report to the HELCOM/VASAB MSP Working Group once a year, detailing progress in the past year and setting out the next steps to be taken en route to fulfilling the TOR.

8.3 An exploratory meeting

In line with the endorsements of VASAB and HELCOM, **an exploratory meeting of a small core group of experts** is proposed to take the proposal of setting up a BSR MSP Data Group forward. This core group should represent MSP and GIS/Data expertise and a range of BSR countries, and should be regarded as the core of a potentially wider BSR MSP Data Group. Some representatives at the exploratory meeting may suggest other representatives from their countries who could better represent MSP data knowledge and interests. A key task for the exploratory meeting will therefore be to consider other potential group members to ensure all interests and countries are adequately represented.

Ideally, the exploratory meeting should take place **before the next meeting of the HELCOM/VASAB MSP WG** which is scheduled for late January 2015. It should be made clear to participants that the BSR MSP Data Group has not yet been officially approved by HELCOM or VASAB, but that both organisations are strongly interested in progressing with the idea. In the case that no travel budget can be made available by HELCOM/VASAB for the meeting, participation in this meeting will need to be at participants' own expense. This is likely to restrict participation. In order to ensure transparency, the meeting should therefore be minuted and minutes circulated to all invitees.

The VASAB secretariat has offered to host this exploratory meeting and to act as its coordinator and organiser. The meeting will take place in either November or December 2014, with the following explicit tasks:

- To propose membership of the group, and fill any gaps regarding underrepresented countries or interests,
- To refine and prioritise the TOR for the group,
- To discuss roles and responsibilities,
- To suggest next steps and a date and format for the next meeting.

The meeting will take into account the results of this preparatory study, which will be circulated to all participants. The meeting will be chaired by BSH as the original proposer of

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the data group initiative. BSH will also be the initial point of contact for any substantive issues that may arise in preparation of the exploratory meeting.

8.4 Linking the group to other Baltic Sea projects

A number of activities and projects are emerging at present at the EU level which are also taking up issues of MSP-related data. These include:

- "BaltSpace - Towards Sustainable Governance of Baltic Marine Space", a BONUS project (2015-2017), which will develop an interdisciplinary framework for analysis and evaluation of MSP in the Baltic Sea, analyse institutional and socio-ecological contexts of MSP and critical integration challenges in the Baltic Sea Region, and develop and adopt science-based approaches and tools for MSP,
- A potential future cross-border project for the Gulf of Finland, which is currently being investigated and developed within the ongoing EUSBSR SEED money project "BaltWise",
- A potential future DG MARE project on cross-border MSP which will link transboundary MSP cases to real MSP processes,
- Potential future INTERREG projects expected to come online in 2015/16.

The data group should seek close exchange with these projects from the beginning in order to facilitate personal links and complementarity of efforts (e.g. by inviting project representatives to join group meetings and vice versa).

Beyond the Baltic, links should also be explored with data experts in other marine regions, such as the North Sea, Mediterranean and Atlantic. One example is COGEA srl, a consortium of six companies/institutions (including a mapping company) from all across Europe tasked with developing the EMODnet portal on human activities. Although the consortium is not directly involved in MSP, the portal has received increasing attention from maritime spatial planners. The consortium offers expertise and experience in terms of marine data collection and management, as well as geographic information systems, which may be of benefit to the group.

9. References

Helsinki Commission (2010): Minutes of the 34th meeting of Heads of Delegation, Helsinki, Finland, 8-9 December 2010 (HELCOM HOD 34/2010).

Wichorowski, Fidler & Zwierz (2011): Data exchange structure for Maritime Spatial Planning. BaltSeaPlan Report 20, www.baltseaplan.eu

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Appendix 1: Internet survey

Q1. Your details:

- Your institution
- Your country
- Your email

Q2. Your expertise

Please select one or more:

- Maritime spatial planning
- Maritime data collection and management
- Geographical Information Systems

Your expertise in more detail _____

Q3. What would you say is most needed for more effective data management to support MSP, at national and transnational levels, in the Baltic Sea Region?

Q4. Please describe any existing initiatives for spatial data infrastructure at national or transnational levels of which you are aware, and which could inform the Baltic Sea Region's approach to data management in support of MSP.

Q5. Please indicate the importance of each of the following proposed tasks for the group (rate as very important, important, unimportant).

- To identify MSP evidence and data needs from a planners' point of view, especially from a transboundary perspective, including setting priorities
- To identify relevant available data from MSP authorities and institutions
- To identify data and information gaps, especially with regard to transnational MSP

- To identify detailed requirements for data sharing, and propose solutions for data scope, content, attributes, formats, etc, and estimate harmonisation needs
- To agree on measures to ensure high data quality, reliability, accuracy, and accessibility
- To identify research priorities and propose initiatives to fill evidence gaps
- To develop terms of reference for a regional spatial data infrastructure for MSP

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- To develop funding applications for external services for tasks that cannot be performed by the group

Q6. Please describe any other tasks you think would be appropriate, and make any other comments that you may have about the proposed group.

Q7. Would you be willing to join this group?

Q8. If so, would you be able to:

- Attend face-to-face meetings
- Take part in teleconferences
- Make time for group work inbetween meetings

How many hours you would be able to give to the group each month (counting meetings and time inbetween?

Q9. Please give the names of any other people or institutions who you think it would be appropriate to approach about this group, indicating their area of expertise (spatial data infrastructure, marine data provision, MSP data needs, etc).

Q10. Your availability for a meeting or teleconference during the first week of September

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Appendix 2: Teleconference on 5th September 2014

Participants:

Stephen Jay, Kira Gee (facilitators), Kai Trümpler (BSH, Germany), Bettina Käppeler (BSH, Germany), Jens Perus (SEAGIS project, Finland), Nerijus Blaszaukas (Corpi, Lithuania), Robert Aps (University of Tartu, Estonia), Cordula Göke (Aarhus University, Denmark), Fabio Bellini (WMU, Sweden), Dainis Jakovels (Institute for Environmental Solutions, Latvia), Periklis Panagiotidis (ICES), Joni Kaitaranta (HELCOM Secretariat), Andrei Lappo (JSC "Research and Design Institute of Urban Development", Russia), Ewa Balanicka (Regional Office for Spatial Plannning of Westpomeranian Voivodeship, Poland), Joanna Pardus (Maritime Institute in Gdansk, Poland)

Agenda

1. **Welcome and introduction**
2. **Brief introduction of participants**
3. **Initial thoughts about the proposed group**
4. **Good examples of MSP data infrastructure:**
    a. How is MSP data collection and provision organised in different BSR countries?
    b. What are the advantages and disadvantages of different approaches, e.g. centralised vs decentralised approaches?
    c. What are the best examples of existing spatial data infrastructure?
    d. What are the key attributes that would need to be considered in setting up a BSR spatial data infrastructure for MSP?
5. **Data priorities for transboundary MSP:**
    a. Which data is most urgently needed?
    b. How to facilitate cooperation between MSP practitioners and data experts?
    c. How to link to existing data collections/mechanisms (e.g. EMODNET) and avoid duplication?
6. **Practical setup of the group**
    a. Membership (country representation, balancing MSP and Data/GIS expertise)
    b. The most important tasks of the group (TORs)
    c. Can we think of a "test case" for establishing a BSR marine spatial data infrastructure? (e.g. pipelines)

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Appendix 3: Potential members of the proposed group

This list includes all those who responded to the internet survey, participated in the teleconference and were suggested by their colleagues (see question 9 of the survey)

Name	Organisation	Country	Expertise
Johannes Melles	Federal Maritime and Hydrographic Agency (BSH)	DE	Data and GIS knowledge
Nico Nolte	Federal Maritime and Hydrographic Agency (BSH)	DE	MSP
Kai Trümpler	Federal Maritime and Hydrographic Agency (BSH)	DE	MSP
Bettina Käppeler	Federal Maritime and Hydrographic Agency (BSH)	DE	MSP
Anna Hunke	Federal Maritime and Hydrographic Agency (BSH)	DE	MSP
Kai Christian Soetje	Federal Maritime and Hydrographic Agency (BSH)	DE	MSP, GIS, marine data collection/ management
Miriam Müller	Federal Maritime and Hydrographic Agency (BSH)	DE	MSP, Marine Data collection/ management, GIS
Jürgen Schulz-Ohlberg	Federal Maritime and Hydrographic Agency (BSH)	DE	GIS, marine data collection/ management
Holger Janßen	Leibniz Institute for Baltic Sea Research (IOW)	DE	MSP, GIS
Cordula Göke	Aarhus University	DK	MSP, Marine Data collection/ management, GIS
Jens Peter Weiss Hartmann	The Danish Geodata Agency	DK	MSP, Marine Data collection/ management, GIS
Robert Aps	University of Tartu	EE	MSP, GIS, marine data collection/ management
Anni Konsap	Estonian Ministry of the Interior	EE	MSP
Urmas Lips	Marine Systems Institute, Tallinn University of Technology	EE	Marine data, MSP data needs
Georg Martin	Estonian Marine Institute, University of Tartu	EE	MSP, MSP data needs
Ene Jüriska	Estonian Land Board	EE	GIS
Jonne Kotta,	Estonian Marine Institute	EE	GIS, marine data collection/ management
Jens Perus	Centres for Economic Development, Transport and the Environment	FI	MSP
Anne Nummela	The Regional Council of Satakunta	FI	GIS
Markku Viitasalo	Finnish Environment Institute	FI	

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	(SYKE)		
Nerijus Blaszaukas	Coastal Research and Planning Institute	LT	MSP, Marine Data collection/ management
Kristine Rasina	Spatial planning department	LV	MSP
Dainis Jakovels	Institute for Environmental Solutions	LV	Marine data collection/ management
Anda Rusukule	Baltic Environmental Forum	LV	MSP
Armins Skudra	Ministry of Environmental Protection and Regional Development	LV	MSP data
Kamil Rybka	Ministry of Infrastructure and Development/Poland	PL	GIS, marine data collection/ management
Milena Nowotarska	Regional Office for Spatial Planning of Westpomeranian Voivodeship	PL	Marine Data collection/ management, GIS
Ewa Balanicka	Regional Office for Spatial Plannning of Westpomeranian Voivodeship	PL	Marine Data collection/ management
Joanna Pardus	Maritime Institute in Gdansk	PL	GIS
Juliusz Gajewski	Maritime Institute in Gdansk	PL	MSP, GIS
Jakub Szostak	Maritime Office Gdynia	PL	MSP, GIS
Magdalena Matczak	Maritime Institute in Gdańsk	PL	MSP
Fabio Bellini	World Maritime University	SE	MSP, Marine Data collection/ management
Tobias Rydén	Agency for Marine and Water Management	SE	GIS
Jerker Moström	Statistics Sweden	SE	Marine Data collection/ management, GIS
Per Jonsson	University of Gothenburg	SE	Marine Data collection/ management
Tomas Andersson	Agency for Marine and Water Management	SE	MSP
Geir Ottersen	Institute of Marine Research	NO	MSP
Gro I. van der Meeren	Institute of Marine Research	NO	Marine data collection/ management
Andrei Lappo	Head of the new Institute of maritime spatial planning - “Ermak”.	RU	MSP
Larisa Danilova	Institute of Urban Development NIIPGradostroitelstva	RU	MSP
Joni Kaitaranta	HELCOM secretariat	BSR	Marine Data collection / management, GIS
Liesbeth Renders	EMODnet	EU	Marine Data collection, GIS management
Iain Shepherd	EU Policy Officer	EU	
Periklis Panagiotidis	ICES	BSR	Marine Data collection, GIS management

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Other suggested contacts:

- The Estonian Land Board Geoportal holds official spatial data and map services,
- NSI:s (National Statistical Institutes) of the Baltic Sea countries. Apart from Statistics Sweden, the Statistical offices of Poland, Finland and Denmark are at the forefront of development of geospatial statistics crucial to efficient MSP.
- The Finnish Environmental Institute (Syke) holds environmental data for the National Land Survey of Finland and is responsible for data management of Finnish geographical data

Specialists suggested by the respondents for specific areas of expertise:

- Ulf Bergström, Swedish University of Agricultural Sciences, (protected areas for fish)
- Atte Moilanen, University of Helsinki, (spatial modelling, MPA design)
- Per Moksnes, University of Gothenburg, (habitat quality)
- Linda Laikre, University of Stockholm, (biodiversity and planning)
- Annika Sandström, University of Luleå, (implementation of spatial planning)
- Per Nilsson, University of Gothenburg, (knowledge transfer and spatial planning)

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