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Background

The **Guidelines on transboundary MSP output data structure (Guidelines)** set out technical requirements (data specification) for the interoperability and harmonisation of spatial data sets corresponding to the transboundary/cross-border maritime spatial planning output data (MSP output data).

The Guidelines prescribe how the GIS data, presenting MSP output data, could be structured in convenient and flexible way, so they can be comprehensible to stakeholders from other countries. In this regard the Guidelines aim to ensure the coherence of the maritime spatial plans and data availability across the Baltic Sea region, as well as support transboundary consultations.

The Guidelines indicates next steps that needs to be taken towards a common Baltic MSP web-map where MSP output data of all BSR countries will be displayed in a harmonized way.

The Guidelines should be considered as legally non-binding, however all BSR countries are encouraged to make use of and to apply them in the MSP in order to support coherent MSP processes in the cross-border context.

Initially *The Recommendations on transboundary MSP Output data structure and exchange* were approved by the BSR MSP Data Expert Subgroup (MSP Data group) in its 9th meeting of17-18 April in Vilnius, Lithuania, and then presented at 16th meeting of the joint HELCOM-VASAB MSP Working Group. The Meeting welcomed the progress in the work of the MSP Data group and agreed in general on the suggested approach to transboundary MSP output data. The Meeting took note of the opinion of Finland that the recommendations serve mainly for zoning-based MSP and that other potential approaches should be taken into account. The Meeting agreed to start drafting a Guidelines on transboundary MSP output data and welcomed the offer of Latvia to take a lead in the drafting of the document with the assistance of Finland, Germany, Poland, and Russia.

The drafting of the Guidelines was coordinated with Finland, as well as other representatives of the MSP Data group. Principles and steps for exchange of national/regional MSP output data is still under development and will be adopted as technical guidance by MSP Data group on later stage.

Action requested

The Meeting is invited to consider and agree on the Guidelines.

Guidelines on transboundary MSP output data structure

Contents

Glossary

BSR countries	- Baltic Sea Region countries adjacent to the Baltic Sea, in particularly: Denmark, Estonia, Finland, Germany, Lithuania, Latvia, Poland, Russia and Sweden.
MSP	- maritime spatial planning
GIS	- geographic information system
OGC	- Open Geospatial Consortium (http://www.opengeospatial.org/)
WMS	- OGC Web Map Service
WFS	- OGC Web Feature Service
HELCOM	- Baltic Marine Environment Protection Commission - Helsinki Commission
VASAB	- "Vision and strategies around the Baltic Sea" –intergovernmental spatial planning cooperation

1. Introduction

The goal of these Guidelines on transboundary maritime spatial planning (MSP) output data structure (Guidelines)is to facilitate data availabilityand coherence of MSP, as well as transboundary cooperation under national/regional MSP consultations. Specifically, the Guidelines set out technical requirements (data specification) for the interoperability and harmonization of spatial data sets corresponding to the transboundary/cross-border maritime spatial planning output data (MSP output data).

Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for MSP introduced an obligation to develop maritime spatial plans which are coherent and coordinated across the marine region concerned. In this regard Member States shall organize the use of the best available data, and decide how to organize the sharing of information, necessary for maritime spatial plans.

The Regional Baltic MSP Roadmap 2013-2020 indicates the necessary steps to fulfill the goal of drawing up and applying maritime spatial plans throughout the Baltic Sea region by 2020 which are coherent across borders and apply the ecosystem approach. Additionally, it requires the promotion of the creation and sharing of MSP relevant Baltic Sea regional data sets.

In order to facilitate coherent MSP process, the Guidelines on transboundary consultations, public participation and co-operation (elaborated by the joint HELCOM-VASAB MSP Working Group (HELCOM-VASAB MSP WG)) emphasizes the need for transboundary consultations at the early stage to avoid costly misalignments and negative environmental impacts, as well as promoting efficiency gains and synergies.

MSP Data could be grouped into two categories:

- **Input data** - data, information or evidence that is used for preparation a maritime spatial plan, such as environmental data, information about existing sea uses, social economic data, as well as other maritime spatial plans.
- **Output data** - outcome of maritime spatial plan (alignments and preconditions for possible sea-use in the future).

Planned sea uses are regulated by spatial planning documents elaborated at various levels of administration, defined by responsible authorities. Sea use regulation over a geographical area could be, for example, composed of the following elements:

- An overall strategic orientation that describes the development will of the competent administrative authority which is a textual document,
- A textual regulation that determines the planned sea use,
- A cartographic representation composed of elements regulated by spatial planning documents.

These Guidelines focus on standards for spatial data sets used for cartographic representation of future sea use for two types of the MSP Output data: **1) Maritime spatial plan area** and **2) Planned sea uses**.

2. Towards common Baltic MSP web-map

With the help of a Baltic MSP web-map, BSR countries should be able to exchange vector data needed for any kind of analysis in order to have maritime spatial plans coherent across borders.

In order to support regional efforts towards a common Baltic MSP web-map, the BSR countries should be encouraged to implement the web-services (WFS) that can ensure data availability through a decentralized approach. The Baltic MSP web-map will be based on national Marine Spatial Data Infrastructures (MSDI) in order to access the data from the original sources and no central database storage is involved. Hence, the system allows users to have access to the most updated data sets. Taking into account that not all countries have web-map user interfaces in place, the provided solution will be a hybrid data exchange system by combining centralized and decentralized data approaches.

What concerns MSP output data in BSR, the aim is to facilitate the development of pan-Baltic MSDI and build a web-map interface based on those principles to the data available. The web-map will be developed using the BASEMAPS platform, developed in Interreg BSR Programme`s project "Coherent Linear Infrastructures in Baltic Maritime Spatial Plans" (Baltic LINes), which will be further developed to meet this purpose. The web-map will display the available MSP output data from national MSDIs using distributed spatial data as far as possible and following INSPIRE principles of hosting data at source and harmonization of data.

As the BSR countries are on different stages of elaboration of national/regional MSP and MSP plan data can be stored in different formats, several options on adding MSP output data to the web-map need to be developed, including adding shapefiles to the system. The web-map should also contain a conversion tool for transferring national/regional MSP output data into common data model defined in this document, which is a prerequisite for building a Baltic MSP web-map presentation.

3. How INSPIRE Directive can help us

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE Directive) aims at making data harmonized and published in open standard format (through INPSPIRE compliant web services such as WMS / WFS / WCS)across all EU countries by the end of 2020. It deals with the tasks regarding the availability, quality, organization, accessibility and sharing of spatial information across the various levels of public authority and across different sectors. The INSPIRE Directive, especially INSPIRE 'Data Specification on Land Use', should be taken into accountas a guidance when compiling the data sets that are needed for indicated transboundary issues.

As the implementation of the INSPIRE Directive is in progress, harmonization of MSP Input data could be further explored and tested by thematic projects and after the full implementation of INSPIRE Directive. Meanwhile national and pan-Baltic spatial data infrastructures could be developed in a way that makes it possible to utilize a decentralized MSP data approach.

4. Guidelines for transboundary MSP output data structure

The main value of the Guidelines for MSP output data is its simplicity, and flexible structure that allows data providers to publish their existing data in the most convenient way. It is expected that the effective use of the model will help in transboundary consultation processes, and will be used for maritime spatial plans which are coherent across borders.

4.1. Spatial environment

Coordinate reference systems:

1. Coordinate reference system and map projections used for MSP should be clearly defined.

2. Coordinate reference system used for MSP should be valid for any kind of information/ resolution/ accuracy (the resolution and accuracy of MSP output data are out of scope of this document).

3. Map projections based on ETRS89 and corresponding to GRS80 ellipsoid are preferred for the MSP purposes[1].

4. Map projections based on WGS84 and corresponding to WGS84 ellipsoid couldalso be used for the MSP purposes[2].

INSPIRE Annex II, Section 1.2
Datum for three-dimensional and two-dimensional coordinate reference systems
For the three-dimensional and two-dimensional coordinate reference systems and the horizontal component of compound coordinate reference systems used for making spatial data sets available, the datum shall be the datum of the European Terrestrial Reference System 1989 (ETRS89) in areas within its geographical scope, or the datum of the International Terrestrial Reference System (ITRS) or other geodetic coordinate reference systems compliant with ITRS in areas that are outside the geographical scope of ETRS89. Compliant with the ITRS means that the system definition is based on the definition of the ITRS and there is a well-documented relationship between both systems, according to EN ISO 19111.

INSPIRE Annex II, Section 1.3
Coordinate Reference Systems
1.3.2. Two-dimensional Coordinate Reference Systems
- Two-dimensional geodetic coordinates (latitude and longitude) based on a datum specified in 1.2 and using the parameters of the GRS80 ellipsoid.
- Plane coordinates using the ETRS89 Lambert Azimuthal Equal Area coordinate reference system.
- Plane coordinates using the ETRS89 Lambert Conformal Conic coordinate reference system.
- Plane coordinates using the ETRS89 Transverse Mercator coordinate reference system.

INSPIRE Annex II, Section 1.5
Coordinate Reference System Identifiers

Coordinate reference system	Short name	http URI identifier
3D Cartesian in ETRS89	ETRS89-XYZ	http://www.opengis.net/def/crs/EPSG/0/4936
3D geodetic in ETRS89 on GRS80	ETRS89-GRS80h	http://www.opengis.net/def/crs/EPSG/0/4937
2D geodetic in ETRS89 on GRS80	ETRS89-GRS80	http://www.opengis.net/def/crs/EPSG/0/4258
2D LAEA projection in ETRS89 on GRS80	ETRS89-LAEA	http://www.opengis.net/def/crs/EPSG/0/3035
2D LCC projection in ETRS89 on GRS80	ETRS89-LCC	http://www.opengis.net/def/crs/EPSG/0/3034

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[1]According to INSPIRE Specification on Coordinate Reference Systems - Guidelines (D2.8.I.1) The European Terrestrial Reference System 1989 (ETRS89) should be used as preferred coordinate reference system for MSP purposes. ETRS89 is related to the International Terrestrial Reference System (ITRS) and its realisations are designated by European Terrestrial Reference Frames (ETRFyy).

[2]World Geodetic System 1984 (WGS84) may be used for the MSP purposes. According to INSPIRE Specification on Coordinate Reference Systems - Guidelines (D2.8.I.1) the most recent WGS84 realisations are in agreement with the ITRF at the level of a few centimeters. In consequence, the WGS84 products are considered as realisations of the ITRS.

4.2. Visualization of MSP areas

Every MSP document indicates a strategic direction for the development of a given sea area. Maritime spatial plan area can be presented as a data set that corresponds to the spatial planning document and its area. Only the spatial planning documents that are or have to be legally adopted by an authority are considered within thisdocument.

MSP output data of 'maritime spatial plan area' represents the extent of maritime spatial plan with additional attributes describing the type, level and status of the plan, scale, area of the plan, responsible institution, timeframe of the validity of the plan, as well as other or previous maritime spatial plans in particular area, if there are such.

'Maritime spatial plan area' data set has polygon geometry and specific attributes that provide general information about the MSP process in BSR country, and it can be provided by every BSR country. It can visualize also spatial plans where no vector data exists.

BSR national MSP Data focal points ensure the data and information accuracy by providing the HELCOM Secretariat with most updated information and data of MSP area, when necessary.
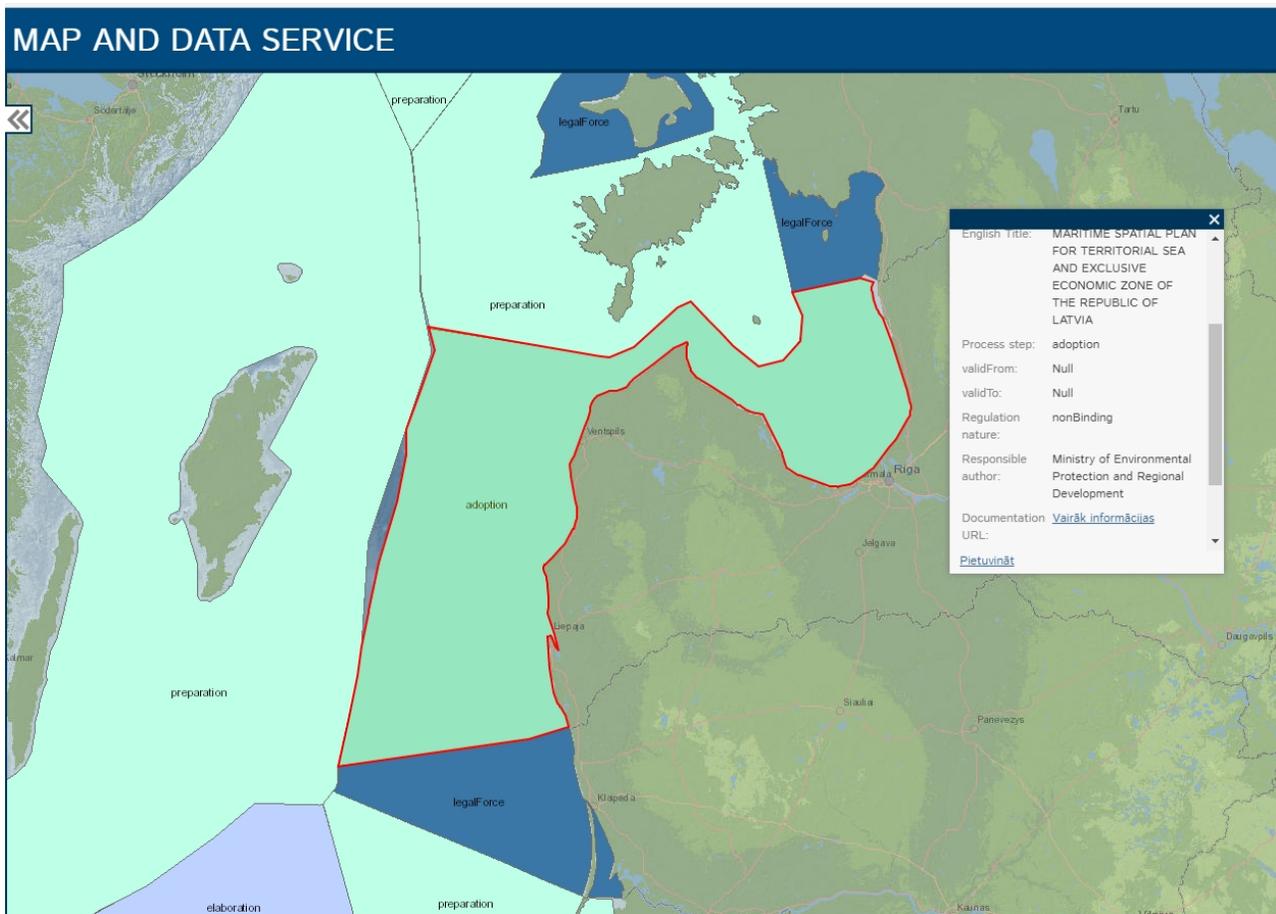
The first attempt to visualize a general overview of maritime spatial plans around the Baltic Sea, is available on HELCOM Map and Data Service: http://maps.helcom.fi/website/mapservice/?datasetID=aa96bca9-23f5-4e24-bc92-be24cf101d59. It is planned to be included in the Baltic MSP web-map on later stage.

Attributes for the 'maritime spatial plan area'data set are described in Annex 1.

4.3. Steps for extension of national/regional data sets for planned sea-uses

BSR countries (or regions) have own views of MSP and therefore also specific MSP output data. BSR countries are also at various stages of MSP implementation and therefore on different stages of MSP data management systems. To ensure that maritime spatial plans are coherent across the Baltic Sea, minor modification of national data structures may be needed. According to the suggestions below, every country should consider extending their MSP data structures by adding several attributes to existing national/regionaldata sets. It will illustrate thematically spatial designations in the maritime spatial plan in coherent way. This can be achieved by extending existing thematic data sets by following steps:

➢ Identification of relevant sea use *(SeaUse)* for each thematic designation in MSP data structure;

➢ Defining functionality *(SeaUseType)* for particular thematic designation *(SeaUse)*;

➢ If necessary, other intervening sea-uses that are indicated in the plan as, for example,priority, allowed, restricted or forbidden in particular thematic designation;

➢ If needed, adding a description of each selected thematic designation outlining specific conditions or restrictions, or interpretation of the classification (*useDsc*).

The above sets a minimum amount of information needed to have a general overview of particular maritime spatial plan and to allow different plans to be mutually compatible. However, for more comprehensive information and specific conditions transnational/cross-border consultations, as well as strong collaboration between planners and GIS specialists should be facilitated.

Step 1. Defining sea uses

Sea use *(SeaUse)* within this document can be considered as spatial implication of the existing or planned activities or potential areas of development in the sea. The code list values for the possible sea uses are listed in the Annex 2 and also available online at VASAB webpage[3]. The list indicates thematic designations both as single uses by sector (e.g., transport, nature protection, aquaculture etc.), and multi-use, combining existing or potential various sea uses in one thematic designation (geometry). In the areas where no particular sea uses are identified or undefined future reservation is foreseen, 'general' sea use may be applied.

Single uses may overlap with each other – the value for each sea use should be defined separately, while multi-use can be visualized as single geometry with multiple sea uses.

It should be noted that the list is not fixed and is open for update if any new sea use occurs. It is also important to mention, that not all of the indicated sea uses need to be considered – it depends from specifics and goals of national or regional MSPs. Every maritime spatial plan can indicate various sea uses or their combinations – the listed sea uses should be considered as a guidance.

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[3]http://vasab.org/index.php/maritime-spatial-planning/bsr-msp-data-esg

Step 2. Identification of sea use types

Different objects or areasmarked by the same sea use may have different functionality. For example, in one thematic designation fishing may be allowed, while in other thematic designation the same use is restricted or even forbidden. Going forward, in some area fishing-recreational may be allowed, but in the same area fishing-industrial may be forbidden.

In order to specify the funcionality of particular sea use with known geometry, additional value should be given - **priority** function (*priority*), **reserved** use (*reserved*) **allowed** use (*allowed*), **restricted** (*restricted*) or **forbidden** (*forbidden*). It should be noted that identification of sea use type do not automatically grants permission for particular sea use – in each case there might be specific preconditions. Therefore comprehensive and concise description should be added into additional attribute ´Sea use description'*(UseDsc)* with text information (free text).

Different objects or areasmarked by the same sea use may have different functionality. For example, in one thematic designation fishing may be allowed, while in other thematic designation the same use is restricted or even forbidden. Going forward, in some area fishing-recreational may be allowed, but in the same area fishing-industrial may be forbidden.

In order to specify the funcionality of particular sea use with known geometry, additional value should be given - **priority** function (*priority*), **reserved** use (*reserved*) **allowed** use (*allowed*), **restricted** (*restricted*) or **forbidden** (*forbidden*). It should be noted that identification of sea use type do not automatically grants permission for particular sea use – in each case there might be specific preconditions. Therefore comprehensive and concise description should be added into additional attribute ´Sea use description'*(UseDsc)* with text information (free text).

Attribute Suggested names	Definition
priority (Priority Use)	Indicating planned sea use (-s) which **has a priority** in given sea area in the maritime spatial plan.
reserved (Reserved Use)	Indicating planned sea use (-s) which is to be **given specific weight** in relation to other spatially relevant activities.
allowed (Allowed Use)	Indicating planned sea use (-s) which **is allowed** in given sea area in the maritime spatial plan.
restricted (Restricted Use)	Indicating planned sea use (-s) for which some **kind of restriction is imposed** in given sea area in the maritime spatial plan.
forbidden (Forbidden Use)	Indicating planned sea use (-s) which **is forbidden** in given area in the maritime spatial plan.
useDsc (Use Description)	Comprehensive and concise description of the requirements and restrictions, and interpretations of the classification in given area in the maritime spatial plan.

Adding attributes (*prority, reserved, allowed, restricted, forbidden* and *useDsc*) to existing or new data sets is up to countries, whether to add them when preparing maritime spatial plan or after the plan is adopted.

Each geometry can have multiple options for each sea use type, separated with comma ", ".

Step 3. Extension of national data set

The six sea use type attributes mentioned above need to be read together to have a full overview of maritime spatial plan designations and principles. The definitions of the suggested attributes provide a generalized overview of the MSP. However, the national/regional definitions of sea use types and interpretations in the classification to the sea use types should be taken into account when interpreting the MSP output data. Considering the limits of data attribute fields, MSP Country Fiches[4] (initiated by the joint HELCOM-VASAB MSP Working Group) could be updated with an explicit clarification on national or regional planning approach and interpretation of sea uses and types.

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[4]http://vasab.org/theme-posts/maritimespatial-planning/msp-country-fiches/

Schematically, extension of the MSP data structures can be described as follows:

Identified geometry in MSP data structure	priority [SeaUse CodeList] [multiple options possible - 0...*, separated with comma]	reserved [SeaUse CodeList] [multiple options possible - 0...*, separated with comma]	allowed [SeaUse CodeList] [multiple options possible - 0...*, separated with comma]	restricted [SeaUse CodeList] [multiple options possible - 0...*, separated with comma]	forbidden [SeaUse CodeList] [multiple options possible - 0...*, separated with comma]	useDsc [CharacterString]	PlanID Permanent identifier of maritime spatial plan, unique at international level - the country code (eg. DE, FI, LT) followed by unique identifier at national level; Identifier will help to link geometries from different countriers
xxx	Selection from *seaUse* code list		Selection from *seaUse* code list	Selection from seaUse code list	Selection from seaUse code list	Requirements & restrictions within sea use area	
Examples:							
	installations-owf		aquaculture - mussel		transport, fishing	*Areas suitable for OWF development. Aquaculture might be considered after additional investigation.*	
			fishing-bottom trawling		installations	*Areas important for sea bottom trawling. No permanent installations or infrastructure allowed.*	
					transport	*Areas prohibited for navigations*	

This simple effort gives standardized data format and transboundary comparability. It is suited to any geometry type: polygon, line or point without any change for current MSP Data workflow. When structuring the output data, strong team work between planners and GIS experts should be promoted in order to link the background information with planning designations - visualization itself is not always all-encompassing. This approach promotes common practices for structuring MSP output data that are already in use in some BSR countries.

BSR national MSP data focal points ensure the data accuracy by providing the HELCOM Secretariat with most updated information and data, when necessary. The information and data provided by the responsible authority should be considered as the official one. Data focal points should be considered as a first-stop (especially in countries which have national maritime SDI, like Germany or Denmark) when looking for MSP data or information with regards to the transboundary coordination and consultations in the BSR. These focal points then can guide to the relevant institution/data source or provide information upon request.

Thus, MSP Data focal points play an important role before the maritime spatial plan is adopted, as the web-map will display only plans that are in legal force. Until then MSP Data focal points are the main distributors of national MSP output data for transboundary consultations.

Annex 1. Attributes for the 'maritime spatial plan area' data set

Attribute name Description	Required	Data model	[Code-list] value	Comment
Country [CharacterString] Respective country code (eg. DE, FI, LT)	✓		*Free text*	
officialTitle [CharacterString] Official title of the maritime spatial plan in national language	✓	INSPIRE Land Use	*Free text*	
alternativeTitle [CharacterString] Alternative (unofficial) title of the maritime spatial plan in national language		INSPIRE Land Use	*Free text*	
englishTitle [CharacterString] Title used for transboundary consultations purposes	✓		*Free text*	
responsibleAuthority [CharacterString] Indication of the responsible authority for maritime spatial plan	✓		*Free text*	
documentation Identification of the available documentation of the maritime spatial plan (link with eng version, if available)			*Link*	
levelOfSpatialPlan [CodeList] Territorial hierarchy of maritime spatial plan	✓	INSPIRE Land Use	national	Plan at BSR Country level. (This attribute should be considered also for regional and local plans if they are adopted by national authority)
			supraRegional	A plan that overlaps several administrative regions.
			regional	Plan at regional level (equivalent to NUTS2 or NUTS3 of EUROSTAT nomenclature of statistical units as established in Regulation (EC) No 1059/2003).
			infraRegional	A plan that overlaps several infra-administrative units in one administrative region
			supraLocal	A plan that overlaps several municipalities (entirely or partially).
			local	Plan at municipal level, corresponding to the lower level of administration equivalent to LAU2 as laid down in Annex III to Regulation (EC) No 1059/2003
			other	Other level of spatial plan

processStep [CodeList] General indication of the step of the planning process	✓	INSPIRE Land Use	preparation	Plan in the process of preparation - no official decision to elaborate the plan yet, but legislation is in the place and/or preparatory work for MSP has been launched (preparation of the ToR, context analysis etc.)
			elaboration	Plan is under elaboration - decision of the starting the plan has been taken by responsible authority and officially announced
			adoption	Plan is in the process of being legally adopted
			legalForce	Plan is already adopted and is in force.
			obsolete	Plan has been substituted by another plan, or is not any longer in force
scale [CharacterString] Indication of the scale of the plan			*Free text*	
regulationNature [CharacterString] Legal nature of the land (marine) use indication	✓	INSPIRE Land Use	Binding for developers	The sea use indication is binding only for the entity in charge of developing an area
			Binding for authorities	The sea land use indication is binding only for certain authorities.
			Defined in regulation	The sea land use indication is defined by the legislation
			Genaral binding	The sea land use indication is binding for everybody
			Not binding	The sea land use indication is not binding
validFrom [DateTime] First date at which the maritime spatial plan is valid in reality	✓		*Date*	
validTo [DateTime] The time from which the maritime spatial plan is no longer valid			*Date*	
previousMspPlan [URI] Identification of the previous maritime spatial plan, if such exists (with link to eng version, if available)			*Link*	
planId [CharacterString] *Permanent identifier of maritime spatial plan, unique at international level - the country code (eg. DE, FI, LT) followed by unique identifier at national level*	✓		*Free text*	

Annex 2. The code list values for the possible sea uses

Attribute code	Sea use description
aquaculture	aquaculture
aquaculture-fish	fish
aquaculture-mussel	mussel
aquaculture-plant	plant
coast	coast protection
coast-deposit	reserved areas for coast protection (sand deposit area)
extraction	raw material extraction areas
extraction-co2	CO_2
extraction-gas	gas
extraction-oil	oil
extraction-sand	sand and gravel
fishing	fishing
fishing-industrial	industrial fishing
fishing-recreational	recreational fishing
fishing-small-boat	small boat fishing
general	future reservation for undefined activities or general use
heritage	underwater cultural heritage
heritage-landscape	landscape protection
heritage-wreck	wreck
installations	installations and infrastructures
installations-owf	offshore wind farm
installations-platform	platform
installations-wave	wave energy
line	submarine cable and pipeline routes
line-electricity	electricity cable
line-pipeline	pipeline
line-telecom	telecommunication cable
military	military areas
military-training	military training areas
military-radar	military radar area
nature	nature and species conservation
nature-biodiversity	biodiversity
nature-infrastructure	green infrastructure (connectivity, green corridors etc.)
nature-mpa	marine protected areas (HELCOM Baltic Sea Action Plan, Directive 2008/56/EC (Marine Strategy Framework Directive)
nature-spa	special protection areas (Directive 2009/147/EC on the conservation of wild

	birds)
nature-sac	special areas of conservation (Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora)
nature-scs	species conservation sites (e.g., fish spawning areas etc.)
nature-spawning	spawning area
other	other
other-bridge	bridge
other-dredging	dredging
other-dumping	dumping
other-islands	artificial islands
other-multi-use	multifunctional economic development
other-radar	buffer zones of radars
other-tunnel	tunnel
research	scientific research
research-monitoring	monitoring station
tourism	tourism
tourism-bathing	bathing place
tourism-birdwatching	birdwatching areas
tourism-boating	leisure boating
tourism-diving	diving areas
tourism-recreation	recreation areas
tourism-seascape	seascape (sea-land landscape)
transport	maritime transport routes and traffic flows
transport-anchorage	anchorage
transport-deep	deep water route
transport-flow	traffic flow
transport-infrastructure	infrastructure providing access to the port
transport-port	port
transport-recommended	recommended route
transport-safety	safety zone