Maritime Spatial Planning (MSP) for Blue Growth

Final Technical Study

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EXECUTIVE SUMMARY

Background and introduction

The relation between MSP and Blue Growth is multi-faceted and not yet fully explored. Of course, MSP aims to reduce or avoid conflicts between a variety of economic and non-economic functions. But it is also a tool to identify and give the suitable room to new and changing spatial uses. MSP may be used to open new economic potentials by fostering synergies between different uses.

Against this background, this report aims to provide information on how MSP can help Member States deliver sustainable growth for their maritime economies. It provides Member States with practical guidance in three distinct aspects of MSP:

1) How to develop a vision for maritime space that can be effectively used in MSP?

2) What kind of future trends impact on sector development and how do they influence the MSP process?

3) How can MSP authorities monitor whether they are on the right track with their MSP objectives?

These three distinct aspects were developed as stand-alone documents. In addition, this report lays out the connections between them and some general findings.

Ad 1) **How to develop a vision for maritime space that can be effectively used in MSP?**

Numerous past and ongoing transnational and national MSP projects and initiatives have worked on developing maritime visions. While all of them can be considered visions, they show significant differences. This study clarifies what shape MSP relevant visions may take, how they can be created and presented on different grounds and in different circumstances. Vision processes and resulting outputs have taken different formats with more or less far-reaching purposes, scopes and legal effects. The ***Handbook for developing Visions in MSP*** (Annex I) clarifies the meaning of the different formats and elements a vision may entail, i.e. scenarios, forecasts, visions, strategies, action plans and roadmaps; and how they can be used in MSP processes. The Handbook presents methodological approaches used in existing and on-going vision development processes and highlights the lessons learnt. The purpose of the Handbook is to provide support to those involved in planning or implementing future vision development processes.

A maritime vision can be developed as part of MSP processes, but can also be initiated separately. Visions are not necessarily linked to the use of space, while maritime spatial plans generally are. The former tends to adopt a long-term perspective (beyond 10 years), while the latter is revised more often (usually every 6 years). The development of a vision or strategy may support agreement among stakeholders on a common long-term goal. Therefore, vision development can prepare stakeholders for providing input in an MSP process, help prioritise the uses considered in maritime spatial plans and set out general planning principles and objectives. Just like MSP, the development of a vision should not be a one-time exercise, but rather a continuous process that adapts to internal and external changes.

The Handbook acknowledges that the development of such visions requires a broad set of skills. In comparison to skills required for the MSP, a vision development process requires greater emphasis on visualization and social skills, including moderation and strategic communication skills.

Ad 2) What kind of future trends impact on sector developments and how do they influence the MSP process?

Planners need robust information and tools to assess spatial requirements for current and possible future maritime activities. Maritime spatial planning processes as well as their resulting plans need to consider the implications of new developments in maritime sectors. This study's **Sector fiches** explain how to best consider the development of each sector during MSP processes and how to reach the related Blue Growth potentials in a sustainable manner. The fiches are the result of the review of existing work on the future uses of the sea and the evolution of different maritime sectors.

The nine fiches cover offshore wind energy, tidal and wave, coastal and maritime tourism, marine aggregates and marine mining, shipping and ports, oil and gas, cables and pipelines, fishing and marine aquaculture.

The fiches deal mainly with the spatial dimension of the expected evolution of the sectors. They also look into the interactions between the sectors, and offer a set of concrete recommendations on how both planners as well as sectors may inform each other to create optimal MSP solutions. Finally, the fiches aim at being a solid first information source listing the most relevant actors, initiatives, and available literature in the sector in question.

Taken together, the Sector fiches point towards an extraordinary diversity of spatial implications of each sector given their spatial characteristics (e.g. place-based, water depth, mobility, land-sea interaction); planning time horizons; as well as implications of technological change both for spatial planning purposes as well as the resulting plans. Evidently, growing and emerging activities have potentially stronger MSP implications than mature and established ones. Furthermore, the ability to forecast the potential for development differs strongly between sectors and so does the level of sophistication and robustness of such prognoses.

Ad 3) How can MSP authorities monitor whether MSP processes are on the right track in relation to promoting sustainable 'Blue Growth'?

MSP processes should be guided by pre-defined objectives, whose achievement may be tracked through appropriate indicators. Several studies provide guidance on MSP indicators, but they do not explain how to develop indicators related to MSP processes and Blue Growth. The **Handbook for developing MSP indicators** does so, as it suggests indicators related to Blue Growth, maritime sectors and MSP processes. A short hands-on version of the Handbook is included in Annex III.1 of this report, while a more in-depth version is presented in Annex III.2.

Linking MSP and Blue Growth via indicators is not straightforward. MSP needs and processes are location-specific, so indicators should be tailored to the national or regional objectives. Furthermore, indicators are just one small part of complex MSP decision-making systems. They are only meant to support decision-making and should not become an end in themselves.

Taking this variety into account, the Handbook describes the indicator development in three main steps, and provides examples and checklists that MSP authorities may apply. The standard process of indicator development starts with the definition of objectives (step 1) both for the planning process and for its outcomes. The selected indicators (step 2) should measure the progress in reaching the objectives. The indicator development process includes the definition of baselines and related target values as well as the given sources of information, including the analysis of data coverage and gaps. Progress in reaching the objectives can be monitored with the help of the defined indicators (step 3), both during the preparation of maritime spatial plans, and once these are in place. Depending on the actual progress, objectives may have to be redefined, which would also trigger a revision of the indicators.

Conclusions

Although each of the above three strands has led to distinct findings, some overarching conclusions can be drawn. Many of these were reinforced by the 'MSP for Blue Growth' Conference, which was held in October 2017 as part of the activities of the MSP Assistance Mechanism.

- Visions as well as MSP processes are an important tool to promote collaboration between sectors and stakeholders as they provide a positive framework for which to work for. They should not be one-off exercises but continuous adaptive processes. This long-term commitment is also required for a monitoring framework to be effective.

- Defining a clear vision and objectives is a key element of MSP, which leads to having SMART indicators. Nevertheless, the study clearly shows that establishing a causal link between specific sectoral and MSP indicators may be challenging.

- Visions and objectives should not only be clearly formulated, but also communicated to stakeholders in an understandable language. Indicators can support such communication, and express success achieved and/or challenges ahead.

- There is an enormous variety and diversity between and within sectors. MSP can be an important tool particularly for the support of emerging sectors (e.g. tidal and wave energy). It is important that MSP practitioners and related stakeholders are well aware of the dynamic nature of the maritime economy, including that of the more mature sectors such as fishery, shipping or tourism.

This study provides tools that could support MSP processes, but they are not a 'one-size fits all' solution and their application should be customised to the specifics of each country and sea-basin.

1. INTRODUCTION

Context

Since the inception of the EU **Blue Growth** Strategy in 2012[1], seas and oceans are increasingly seen as one of the drivers for the European economy and sources of great potential for innovation. **Maritime Spatial Planning (MSP)** is one of the key tools for achieving sustainable Blue Growth and tackling its challenges. MSP has been endorsed by the Blue Growth Strategy as providing "greater confidence and certainty for investors"[2]. In particular ecosystem-based MSP is seen as a process that informs the spatial distribution of activities in the maritime space in a way that existing and emerging uses can be accommodated, spatial conflicts reduced, ecosystem health and services protected and sustained for future generations[3].

The economic benefits of MSP include greater certainty of access to desirable areas for new private sector investments, as well as streamlined and increased transparency in permit and licensing procedures[4]. In the draft Declaration on Integrated Maritime Policy[5], the competent ministers from the EU Member States reaffirm the role MSP can play in the overall framework of Blue Growth. They call on the Member States to step up their efforts to use MSP as a tool to enhance growth and sustainability at the same time. Until 2021, EU Member States will be gradually advancing in their implementation of the EU Directive on Maritime Spatial Planning.

By analysing and mapping current developments, the MSP process provides a comprehensive picture of **spatial impacts of given maritime sectors**. However, it is also relevant to take into consideration possible future trends in maritime sectors, including changes in their growth and technological advancements (i.e. autonomous operations, VMS systems) which might have spatial implications beyond the usual 6 years planning horizon and/or provide new ways of information sourcing for planners. **Vision and scenario processes** have been often used at the initial stages of the MSP process. Their aim is to anticipate changes in maritime sectors, discuss different options for the maritime space in question, and agree on a preferable course of development. These processes have been beneficial for creating understanding on long-term planning objectives and on this basis aligning different sectoral priorities and defining planning objectives. Achievement of such guiding objectives may be tracked through appropriate **indicators**, particularly indicators with a spatial dimension.

Study questions and outputs

Developed in the framework of the MSP Assistance Mechanism (also known as the European MSP Platform), this study provides information on how MSP can help Member States deliver sustainable Blue Growth. While the role of MSP in supporting sustainable Blue Growth has been recognised in many different aspects, this study limits its scope to providing practical guidance with regard to the three key questions, as presented in Table 1. These distinct aspects were developed as stand-alone documents, which are annexed to this report.

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[1] Ecorys et al. (2012).
[2] The European Parliament and the Council of the European Union (2014).
[3] Foley, M. M., et al. (2010).
[4] Ehler, et al. (2009).
[5] Draft Declaration of the European Ministers responsible for the Integrated Maritime Policy on Blue Growth (2017).

Question	Outputs[6]
How to best support a process for the development of a shared vision among stakeholders for the maritime space the MSP is designed for?	Handbook for developing visions in MSP
How can development trends and potential future spatial requirements be considered by MSP?	Sector fiches
How can MSP indicators be developed?	Handbook for developing a system of indicators (short and long version)

Table 1 Questions and outputs

The ***Handbook for developing an MSP relevant vision*** (Annex I) has been developed on the basis of various existing MSP-relevant visions. These have or are currently ongoing in some Member States as part of statutory MSP processes (e.g. Belgium, UK). The aim of such visions is to define what is distinctive about the maritime area and to show what the area can look like in the long run if the maritime spatial plan is implemented. Moreover, numerous past and ongoing transnational MSP projects (e.g. BaltSeaPlan, ADRIPLAN, BlueMed Initiative) have worked on developing sea-basin wide visions providing important input for the development of the respective national MSPs in those sea-basins.

The Handbook does not only highlight good practices on related formats, processes and tools from these given processes, but also lessons to be learned to inform and potentially improve future vision processes.

The development of a MSP vision usually starts with an investigation of future trends, using methods such as **forecasts** and/or scenarios to analyse possible and/or desirable future conditions. Providing an overview of the existing maritime sector developments and their evolution can be the first step for planners when assessing spatial requirements of maritime sectors. The development of a vision also allows for the identification of priorities in a given space and an agreement on the objectives - for which indicators can then be developed.

The ***Sector fiches*** (Annex II) explain how to best consider the development of each sector during MSP processes and how to reach the related Blue Growth potentials in a sustainable manner. After all, planners need robust information and tools to assess spatial requirements for maritime activities (both current and future) and the implications of new developments (including technological, economic and environmental ones) in any given sector.

The fiches are the result of the review of existing work on the future uses of the sea and the evolution of different maritime sectors. They present the effect of sectoral evolution on spatial needs and on MSP exercises. They also provide general guidance on how MSP authorities and experts may use the information on the evolution of the sectors and involve them in their planning exercises.

The analysis of sectoral aims (reports made by industry actors) and national priorities (high-level strategies and policy targets) is usually part of the scoping process in the MSP process. The Sector fiches provide descriptive and analytical background information of future trends in each sector. As explained above this information can support the development of visions and scenarios and allows planners to better define related planning

[6] The methodology for developing these tools is presented in Annex IV.

objectives. Thus both Sector fiches and the Vision Handbook also provide important background information on how to define objectives for MSP, which is necessary to select suitable and relevant indicators.

MSP processes should be guided by pre-defined objectives, and their achievement may be tracked through appropriate **indicators**. Several studies provide guidance on MSP indicators, but they do not explain how to develop indicators related to MSP processes and Blue Growth. The Handbook for developing MSP indicators suggests indicators related to Blue Growth, maritime sectors and MSP processes. A short hands-on version of the Handbook is presented in Annex III.1 of this report, while a more in-depth version is presented in Annex III.2.

Sector fiches provide information that can support the development of visions, but this is also relevant for the process of developing indicators. Each Sector fiche provides ideas on context indicators (e.g. on MW of offshore wind energy in Europe) and their quantification, which may be used in the selection of indicators at sea-basin/country level. The trends described may be considered when defining baseline and target values of the selected indicators. The fiches also contain information on stakeholders, which may give a valuable contribution to vision processes and can help define MSP process indicators.

Study process

The study provides methodological guidance based on **desk research** and **interactions** with the MSP community and maritime sector representatives. The desk research included a review of good practices (e.g. on developing visions), maritime spatial plans, maritime strategies, projects, and scientific literature. The interactive process included: semi-structured interviews with experts involved in drawing up current MSP visions as well as experts from various Blue Growth sectors, contacts with MSP authorities, feedback at MSEG meetings and at the Blue Growth conference. Furthermore, the study has benefited from the **MSP for Blue Growth Conference** of 11/12 October 2017 in Brussels, where intermediate deliverables were validated, elaborated and adapted in a structured exchange between MSP policy makers, practitioners and sector representatives.

Finally, this report builds on extensive consultations and quality control within the MSP Platform consortium. It takes full account of previous commenting rounds of draft final deliverables by DG MARE and EASME. More details on the methodology underpinning the three Tasks are provided in Annex IV of this report.

2. DEVELOPING VISIONS IN MSP

A wide range of different process formats and outputs

MSP is not only about minimising current conflicts, but also about preventing such conflicts from happening in the future. The development of a maritime vision or preferred scenario, as an agreed-upon perspective, can play an important role in creating a common understanding of the future of a maritime area, which maritime spatial plans should support. On this basis, vision development creates a common goal agreed by all stakeholders on what to aim for in a maritime spatial plan.

The study has shown that there are many types of MSP-relevant vision processes. These processes differ with regard to their purpose, geographical scale, initiating organisations, methods used, as well as presentation and further use of results. The resulting outputs (e.g. the documents that set out the framework for the future or define relevant options) vary greatly, from philosophical and artistic descriptions of the future to presentations of quantified analyses.

MSP visions can be developed through exercises, which make use of scenario analysis and/or evidence derived from forecasts. Such exercises can also support the development of strategies, which are used to generate more detailed roadmaps and actions plans.

Given the complexity of these processes and their multiple outputs, the terms used may be confusing, e.g. strategy, vision, roadmap or action plan. The understanding and definitions of these formats vary significantly among process facilitators and outputs users, and common agreement is scarce. While literature that defines forecasts and scenarios is abundant, literature that defines visions, strategies, roadmaps and action plans is limited, or the definitions provided are not applicable in the specific context of MSP. Based on the interviews conducted during the study, definitions have been adapted and used in the following way:

Scenarios[7][8]	Consistent and coherent descriptions of alternative hypothetical futures intended to explore how current and alternative development paths might affect the future, and consider assumptions about the drivers of change and the impact they have.
Forecast[9]	An estimate of a variable of interest at some specified future date by analysis of trends in the past and present status.
Vision	Preferred evolution of maritime developments in the course of a given timeframe, which has been agreed on in general terms, either only among those developing the vision, or together with stakeholders. In some cases, a vision is seen as the preferred agreed upon scenario, which implies that scenarios must have been developed and discussed prior to the actual adoption of the vision.
Strategy	A strategy outlines various actions, usually in broad terms, necessary to reach the vision. Preferably, it can also define the specific objectives together with the set of actions and responsible bodies for reaching each of the objectives. The timelines and indicators for tracking progress towards the objectives are sometimes also defined.

[7] ABPmer & ICF International (2016).
[8] Alcamo, J. (2001).
[9] Armstrong, J. S., ed. (2001).

Roadmap	A roadmap defines the steps needed to attain the vision and/or objectives. It is usually underlined by milestones and concrete timelines.
Action plan	Usually defined as complementary to a strategy and a roadmap, an action plan proposes clear actions and responsible actors for the implementation of the roadmap or strategy.

Table 2 Definitions of possible formats of vision process outputs

Why develop a vision for a maritime space?

Vision processes are employed for different purposes, both as integral parts of MSP processes or separately. MSP extensively uses data-based, analytical, quantitative and spatial techniques. In comparison, vision development at the initial stages of an MSP process uses more creative, imaginative techniques. In some cases, the vision development process itself has proven to be more important than the final vision document by serving as a stakeholder engagement and cooperation mechanism, and by facilitating dialogue on a joint future among those who currently experience tensions. Along these lines, a vision process helps to clarify the focus of MSP and may also provide the basis to derive agreed upon SMART[10] objectives for an MSP process. The task of MSP is to link this desired future to present conditions, e.g. by analysing the spatial implications of future sector trends and defining specific and achievable development objectives. One such long-term vision is in development as part of the Belgium MSP revision process, which gathers a large number of stakeholders with diverse backgrounds on a continuous basis.

While development of a maritime spatial plan is a requirement under EU as well as national legislation, the development of a maritime vision or strategy is not an obligation under EU law, and is usually developed on a voluntary basis. However, some outputs of these processes may actually hold legal or political standing. The final document, for example a national strategy, can be crucial if it provides a legal framework for the future (i.e. statutory norms and principles), or even a basis for evaluating MSP. For example, the Portuguese National Ocean Strategy is a legally binding document and will be used to evaluate MSP processes.

A vision developed to supplement a Maritime Spatial Plan usually provides a long-term perspective by considering the evolution of key maritime sectors beyond the typical MSP timeframe. This long-term perspective is vital for some physical infrastructures on land and at sea(e.g. offshore wind parks, port development, tourism centres). In many instances, not only do the planning periods of these sectors go well beyond the typical six-year horizon of the MSP, but also the resulting structures remain fixed for decades.

Local strategy development processes have been particularly helpful in providing a long-term perspective and focus for businesses, and also serving as an umbrella to better link MSP and coastal zone management and territorial development objectives. The results of local processes can be seen quickly local authorities are more commited to the strategy development process, and defined actions are usually legally enforced. However, interviews have highlighted that some fragmentation can occur at the local level, due to lack of connection with other higher-level processes.

Many sectors also require cross-border coherence in planning (e.g. shipping lanes, energy corridors, underwater cables), and development of a joint transnational vision and planning principles has been beneficial in this regard. Such processes have also reviewed whether

[10] Defined as Specific, Measurable, Achievable, Relevant, Time-Bound

the national policies/strategies are compatible with each other and where synergies could be enhanced (i.e. energy corridors). However, those involved in cross-border processes emphasise that – apart from some important overarching principles developed (e.g. spatial efficiency) – such visions have so far only led to limited uptake in national statutory MSP processes.

The development of a vision for MSP is especially useful in:

- raising awareness of emerging issues;
- enabling co-ordination between different authorities responsible for the respective sectors and issues and leading to overarching positive common joint goal;
- engaging stakeholders and capacity building, particularly where MSP is a new process;
- providing a long-term focus for MSP that may exceed political cycles;
- accounting for future uses not present so far;
- achieving better land-sea integration of planning.

A Handbook based on experience and needs

The study and resulting Handbook is based on a review of existing vision documents and current approaches on how to develop them. The review included over 30 visions, as well as over 20 handbook-style documents and peer-reviewed articles. A wide range of initiatives and projects from Europe and beyond have been studied with the aim to capture the "state of the art" of vision development processes. These include statutory MSP processes, MSP projects, and non-MSP visions, such as those that have been used in sectorial planning, terrestrial planning, as well as macro-regional strategies. Different spatial scales were also covered, revealing a wide diversity of practices, and approaches.

The desk research phase was supplemented by semi-structured interviews based on two sets of questions: 1) questions for facilitators focused on the development of the visions, the role of the visions in the MSP process, the purpose of stakeholder consultation in formulating the vision, the impacts and benefits the visions may have had and the lessons learned from the process; 2) questions for vision users focused on their awareness of existing visions, perceived quality of their communication and impact, relevance of the visions for MSP, how the visions were taken up, and, if applicable, the experience of stakeholders in the vision development process.

Over the course of the study, interim results on lessons learned as well as the structure of the Handbook were presented to stakeholders in different formats. The feedback received at these events was taken into consideration for the final draft version of the Handbook.

As a result, the Handbook provides an overview of the vision processes that have been developed so far; presenting the methodological approaches that were taken; and their lessons learned.

Past and ongoing MSP relevant vision processes around Europe

Figure 1 shows the distribution of 33 analysed vision development processes, in regard to their cross-sectoral or single-sector nature, and the geographical scope they cover. Some additional vision processes have been examined only partially, due to their limited relevance to the process (e.g. processes developed outside of the maritime context).

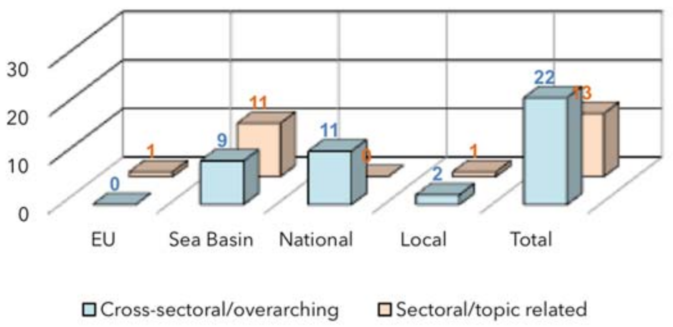

Figure 1 Vision processes analysed according to geographical and thematic scope

Given the holistic nature of MSP, the majority of the analysed MSP-relevant visions are cross-sectoral. However, a considerable number of the EU-funded transnational projects, with focus on one sector, have developed single-sector, sea-basin wide scenarios and visions. These projects have, among others, served to align national visions and establish common planning principles for maritime sectors with a strong transnational component (e.g. energy, shipping).

Past and ongoing transnational MSP projects with an integrated approach (e.g. BaltSeaPlan, ADRIPLAN, Bluemed Initiative) have worked on developing visions for a given sea-basin. Some of these have provided important inputs for countries where MSP is in its initial phases. For example, transnational MSP projects in the Baltic Sea (e.g. BalticSCOPE, BaltSeaPlan and BalticLINes), have provided important support to the national MSP process for the Latvian part of the Baltic Sea.

Apart from transnational projects and initiatives, the development of EU macro-regional strategies during the last decade has been particularly useful as a cross-border cooperation mechanism, setting common objectives and enabling countries to start planning from commonly agreed elements. However, interview results point to some disconnection between such high-level visions and the needs of the MSP processes at a local level. Hence, in some cases EU macro-regional strategies have not been systematically used in practice.

Figure 2 illustrates the sea-basin distribution of the 33 analysed vision processes, most of them from the Baltic and North Sea basins. While the process of identifying relevant visions intended to ensure a balanced number of visions across sea-basins, the assumption is that the present disproportion is a result of the longer history of MSP in these two sea-basins. Vision processes also vary with respect to the institution that is initiating such a process (Figure 3). Even though most of them have been led by relevant authorities, certain aspects of work (i.e. policy or sector analysis, forecasting, stakeholder engagement and process facilitation, technical assistance) have often been outsourced to a specialised consultancy, university or institute.

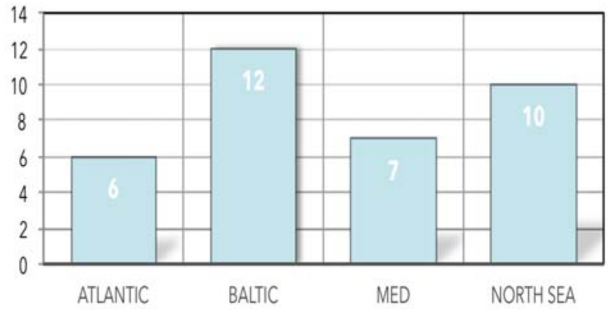

Figure 2 Vision processes analysed per each sea-basin

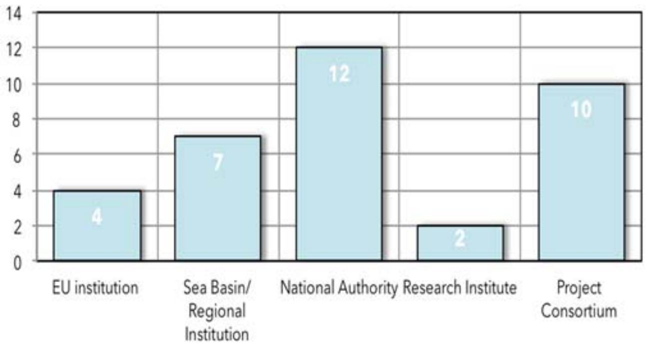

Figure 3 Type of vision process initiators

Visions are often developed through scenarios (Figure 4). Interviewees emphasised that more innovative approaches need to be applied to interactive development of scenarios, where stakeholders are inspired to think far ahead and where a cross-sectoral perspective is applied. Hence, one section of the Handbook is devoted to scenario development processes and relevant tools. By categorising scenario development processes according to geographic scope, it is evident that scenarios and the corresponding sample of approaches come mainly from sea-basin and national vision development processes.

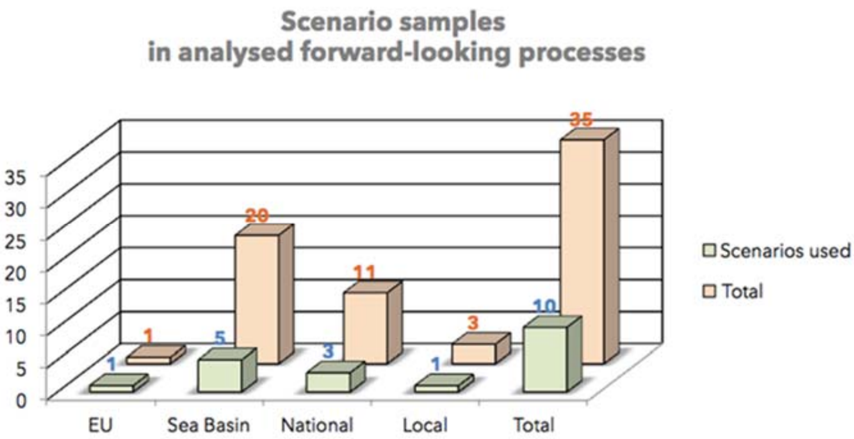

Figure 4 Presence of scenarios in analysed vision processes

In order to serve its purpose, creating a vision usually involves a broad range of stakeholders, and thus requires substantial time for drafting, discussion and finalisation. The analysis (Figure 5) revealed a limited use of interactive methods in vision development processes, and the Handbook responds to a high demand for more information on this topic. In particular, if the process is to result in an action plan or a roadmap intended to be implemented, it is important that the process is inclusive and promotes ownership of the resulting action. Nevertheless, it has been emphasised during the stakeholder consultation that the stakeholders are also more likely to engage if there are indications that the resulting goals and action plans will have a strong political support.

On the other hand, many visions developed so far are almost exclusively exploratory and are designed to bring together stakeholders and raise the awareness about the given topic. In such cases, dissemination and engagement are particularly important, especially towards stakeholders who significantly influence the uptake or active use of the vision. It is also essential to ensure that the process is supported by sufficient resources, to enable effective and thorough outreach.

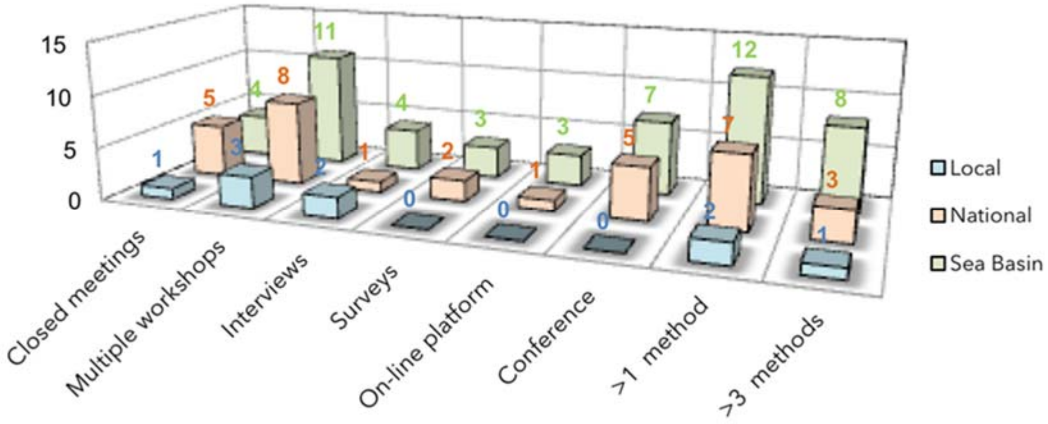

Figure 5 Employed stakeholder engagement methods per geographic scope

Need for a diverse set of social skills

In comparison to MSP, the development of a vision usually requires considerable social skills, especially in workshop moderation and strategic communication. To ensure an effective process leading to stakeholder support for an agreed upon vision, interviewees indicated that quality facilitation and moderation of workshops and meetings that combine learning and information sharing with interactive group work tools is of crucial importance. However, interviewees have also pointed out that a certain level of GIS, participatory mapping and visualisation skills are required to produce a vision that really provides an image of how the maritime space may look like in a given time frame.

Moreover, effective communication within the vision process, as well as results dissemination is a skill needed to ensure involvement of relevant actors in the process, and active use of process outputs. This includes identification and engagement of those who could promote the vision, demonstrate commitment and encourage related civic actions.[11] While relevant good practices have been predominantly applied in the local context, their use is highly needed in processes initiated for a broader geographical scale.

A very small number of vision development processes undertaken so far have taken a systematically pre-defined structured approach, and few make a conscious selection of tools and methods applied throughout the process. Limited use has been made of tools and methods already available from similar processes in other policy fields. More extensive use of social sciences, general management, and urban planning techniques may be relevant to the various steps of the vision process – they could ensure a more efficient and robust process.

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[11] Usually defined as citizens working together to make a change

Key findings and lessons learned

- It is vital to clearly identify which elements and formats the whole vision process shall entail and pay attention that they are coherent with each other. In practice, visions, scenarios, forecasts, strategies, action plans and roadmaps are interconnected and are elements of the same process. For example, a vision making process can make use of scenario analysis and use evidence derived from forecasts. Strategies are then based on previously agreed visions and can be used to generate roadmaps and actions plans.

- Spatially-oriented visions have proven to be more useful than non-spatial one's. Visions with a spatial component show future consequences of sea-use trends in a given area within existing sectors, as well as possible new uses. The level of detail is relevant as well as the way spatial information is presented, so that it can be attractive to a wider audience and easily understood.

- Interviewees emphasised that the vision process should be based on specific and verified information, in order to provide a basis for developing SMART objectives. Such objectives are needed so that more concrete actions, timelines and actors can be defined. It is also essential to ensure that the process is sufficiently resourced, to enable effective and thorough stakeholder engagement, as well as process monitoring and adaptations.

- How a country defines its maritime vision planning objectives depends on various factors, i.e. political, environmental, socio-economic, or even geomorphological characteristics. For example, the size of maritime space in question can be a relevant factor – such as in Belgium where MSP focuses on multi-use given the need for space efficiency. Another factor is the resource potential e.g. variety of forms of energy generation. Closed or semi-closed seas usually give rise to shared issues among bordering countries, e.g. MSP implementation in Baltic countries has a strong emphasis on cross-border cooperation and joint action towards delivering good environmental status[12].

- The study has shown that it is vital to establish links between the MSP vision and higher-level policy processes, and potentially use visions to link MSP to other relevant planning and management processes. These may be related to other parts of maritime policy.

- The role of monitoring has also been emphasised during the study process. It is important to establish a clear timeline for a vision development process and monitor progress so that time and budget remain within set limits. As many vision processes are developed on a learning by doing basis, monitoring should also be done with respect to lessons learned from the process, so that these can be used when eventually revising a vision. Monitoring also has an important role in the improvement of the stakeholder engagement process as it allows for tracking various factors: who was invited and who actually participated; who did not show up, so that the process is perhaps lacking a certain perspective; who has extensively contributed to the process and should be definitely invited again; who was difficult to engage or manage during the process, etc. It is also important to have a clear understanding of the purpose of a vision development process, and think of the best ways to monitor changes that could affect its purpose and outputs. New developments may be identified through targeted data collection or included on an

[12] Helsinki Convention and the HELCOM Baltic Sea Action Plan

ad-hoc basis. The purpose of the process and resulting outputs should then be updated to better reflect this new knowledge.

- The study has shown that there is a need to consider a wider range of tools and techniques to develop an engaging and informative process. General management, social sciences and urban planning techniques may be relevant to the various steps of the process. So far, only a very small number of vision processes have used structured approaches borrowing tools and methods from adjacent policy fields.

3. Investigating current and future potential spatial demands of key maritime sectors

This study provides Sector fiches for the following nine key maritime sectors: offshore wind energy; tidal and wave; coastal and maritime tourism; marine aggregates and marine mining; shipping and ports; oil and gas; cables and pipelines; fishing; and marine aquaculture. These are meant as a tool to investigate current and future potential spatial demands.

The Sector fiches deal mainly with the MSP dimension in the expected evolution of the analysed sectors, putting the focus not only on the present spatial needs of each of the sectors, but also on the anticipated future developments of the industry. At the same time, the fiches look at the interaction that exists among sectors, and offer a set of concrete recommendations to inform MSP processes. Finally, the fiches aim at being a solid first information source listing the most relevant actors, initiatives, and available literature in the sector in question.

The structure of the fiches is presented in the table below.

Structure of the Sector fiches
1.Basic facts
Information on the maturity of the sector, the overall size and industry structure (including value chain).
2. Composition of the sector
Information on the composition of the sector by different break-down categories.
3. Relationship between the sector and MSP
This section of the Sector fiche includes the answers to two different questions regarding the present spatial needs of the sector on one hand, and on the other, what are the anticipated future developments of the industry relevant to MSP.
4. Interactions with other sectors
An analysis of the spatial implications of the sector and its relationships with the other sectors, both in terms of synergies, conflicts and risks.
5. Recommendations for MSP processes in support of the sector
This section includes a summary of the main recommendations that can be put forward on MSP processes in support to the actual spatial implications and the impact of the expected evolution of the different sectors.
6. Resources/Legal framework/Actors/Initiatives/Selected literature
7. List of acronyms
8. List of references

Table 3 Structure of the Sector fiches

Taken together, the Sector fiches show an extraordinary diversity of spatial implications depending on the sector, their spatial characteristics (e.g. place-based, water depth, mobility, land-sea interaction) and planning time horizons. Evidently, growing and emerging activities have potentially stronger MSP implications than traditional activities, for which access to space is already established. However, some main recommendations for MSP processes in support of maritime sectors can be highlighted as the result of the Sector fiches study carried out.

Overall, MSP processes should always take into account the defined planning criteria (e.g. size of the area, environmental conditions, cost, investment cycles, distances, etc.) and design criteria (e.g. type of infrastructures, efficiency, production, optimisation, arrangement of infrastructures, etc.) of maritime uses. These criteria are not always clear for all maritime uses and MSP could be used as information-base for environmental, social and economic data. Having this information collated would allow for a more accurate resource and activity mapping, identifying areas with high potential for maritime activities and better infrastructure siting.

Similarly, MSP processes should provide a framework for managing conflict and promoting synergies both within (e.g. working with fisheries Regional Advisory Councils) and between sectors (e.g. colocation of wave energy and aquaculture), acknowledging that many aspects related to co-use remain outside the MSP scope (e.g. insurance and safety issues). Processes can also facilitate dealing with issues around social license (public perception and acceptability) by stakeholder involvement and integration at early stages of the planning processes as increasing awareness and cooperation among stakeholders could potentially reduce or minimize conflicts as well as foster synergies between maritime uses.

Another important factor that should be highlighted in MSP processes is the need to provide a strategic planning that would include trans-national and cross-border cooperation either for: (i) reducing conflicts between maritime activities (increasing coherence between plans); or (ii) increasing efficiency and reducing sector´s costs (e.g. offshore energy farm clusters, energy grids, cable hubs, etc.). Having such cross-border cooperation in place also allows strategic planning to better accommodate some sectors´ longer term planning cycles, and take into account potential changes in weather patterns[13] and climate change impacts[14].

Below, the main emerging findings regarding the spatial implications of each Sector fiche and the main recommendations for MSP processes are highlighted.

Offshore wind energy

The continued expansion of offshore wind has major implications for MSP. In addition to the need for more space, the general trend is that projects are carried out in deeper waters and further away from the shore. At the same time, the continuous energy dependency of the EU will push for the development of alternative energy sources such as offshore wind energy, and the creation of an offshore grid (hub-based), which will have technical, economic, legal and spatial implications.

Further developments of the offshore wind farm industry will have to take into consideration other maritime uses and their stakeholders. Potential co-use examples will need to be investigated in order to minimise the potential cumulative impacts from a social and environmental perspective. As such, some stakeholders are proposing the co-use of offshore wind energy platforms together with aquaculture (especially long-lines for algae, etc.) or with conservation and recreational purposes (the use of the platforms as artificial reefs or as FADS- Fish Aggregating Devices).

This use of offshore wind platforms as multi-purpose platforms is still in the research phase with no businesses running yet. However, studies[15] have shown that, if the will of the co-

[13]IMO Resolution A.528, 13: Recommendations on weather routing.
[14]De Silva, S.S. and Soto, D. (2009).
[15] Elginoz, N. and Bas, B. (2017).

using sectors is there (along with financial support), these solutions might be happening quite soon in some European sea-basins.

Many potential implications for offshore energy on other maritime activities exist. Due to the development of offshore wind both in terms of technology and deployment, the sector is competing for space with other established maritime activities. Spatial overlap of offshore wind energy with other maritime activities has already been observed in some sea-basins, i.e. the North Sea[16].

Main recommendations for MSP processes in support of offshore wind development include:

- Create consistency in policy and processes to make sure new business cases receive enough support and funding.

- Create one-stop-shops for developers regarding questions, tenders, licencing etc. Examples can be found in the Netherlands[17] and Denmark.

- Two main methods exist for the designation of specific offshore windfarm zones: the 'call for tenders' method and the 'open door policy' method. Using the 'call for tenders' method, is a valuable tool for large-scale deployment of offshore wind farms in the short term. This method allows the government to make use of their timetable, thereby reaching their renewable energy goals. The 'open door policy' method, providing larger search zones for industry to develop their own business cases, fosters innovation and can facilitate wishes by the industry. Using both methods in a MSP-context will foster both large scale deployment as well as opportunities for business to work on innovative, market based blue energy solutions.

- Clearly inform stakeholders of what the different zones mean. Highlight search areas for open door initiatives, and areas which will be tendered later.

- Work together with experts on the tender criteria, so that the most efficient set-up is put in place. Include criteria related to multi-use if the policy aims at increasing it.

- Increase transnational cooperation to foster cost reduction and pan-European grid development, making offshore wind energy better distributable and more profitable.

- Facilitate the stakeholder integration processes for offshore wind. This will increase the other sector's awareness of offshore wind and may foster synergies, such as multi-use with aquaculture or tourism.

- Decrease the environmental impact of offshore wind, by improving the execution of Strategic Environmental Assessments (SEA) and Environmental Impact Assessments (EIA). This will decrease resistance towards new developments, as well as improving the ecosystem functioning.

- Encourage data collection on the marine environment, thereby increasing the possible use of data by offshore wind developers while developing plans or conducting assessments.

[16] Röckmann, C., et al. (2017).
[17] Offshorewind.rvo.nl (n.d.).

Tidal and wave

Tidal and wave technologies are place-driven, depending on the resource potential in a given location. The spatial implications of the sector could drastically change in the longer term, once breakthroughs are made, leading to an up-scaling and cost reduction in a way similar to offshore wind – with major spatial implications as a consequence.

In general terms, the geographical proximity of ocean energy installations and onshore infrastructure would increase potential spatial conflicts with other coastal uses. This is especially true for tidal energy installations, which are generally located in shallow waters where other maritime activities may also occur (coastal fisheries, shipping, conservation, etc.).

Tidal and wave are emerging sectors which rely heavily on other sectors for creating synergies. Offshore wind (including floating wind) is the most obvious one, considering the potential use of shared infrastructure (e.g. vessels, cables, anchoring). The sector has relatively limited spatial implications vis-a-vis other maritime activities (e.g. fisheries and conservation) in terms of amount of area required.

In supporting Blue Growth, MSP can back the development of tidal and wave energy projects, alongside other sectors and interests. However, MSP processes are highly context-specific, and the emphasis placed on ocean energy will be in accordance with policies set out at Member State level.

Main recommendations for MSP processes in support of Tidal and wave development include:

- MSP should be informed by accurate resource mapping to identify areas of interest for ocean energy development. This should be continually refined based on an improved understanding of wave and tidal resources, and in response to continual technological advancement. The location of onshore transmission infrastructure is also important, as it is a key factor in the feasibility of offshore wave and tidal energy project development.

- Co-operation between authorities responsible for MSP and offshore energy developments is essential to ensure that the changing spatial demands for wave and tidal energy are considered from the outset of planning processes.

- Tidal and wave energy need to be considered separately given their different stages of development. Technical differences between these two sub-sectors also lead to them having different spatial needs.

- MSP mechanisms can be used to facilitate data gathering in relation to environmental impacts, including monitoring the effects of devices and arrays, particularly on mobile species such as fish, marine mammals and birds.

- MSP can help dealing with issues around social acceptance, by engaging stakeholders locally and at an early stage in the planning process.

- Given the cross-border nature of MSP, it can be used to support strategic planning of electricity transmission. This includes transnational grids, submarine cabling, onshore transmission between projects and other technologies such as offshore wind.

Coastal and maritime tourism

The expected continued growth in coastal tourism[18-19], both in terms of nights spent in coastal regions but also in number of tourists, has implications for onshore spatial planning, such as the construction of new infrastructure and ports. This development of the sector, combined with its diversification, may have implications in the context of MSP, especially in terms of transport infrastructure. For example, MSP may be used to ensure mobility between cruise ships, beaches and underwater cultural heritage sites. In addition, coastal tourism may lead to negative land-sea interactions and water quality issues[20]. Hence, even when coastal tourism does not share the same space with other activities, the environmental impacts of the other sectors may affect coastal tourism. An example of this are ships that leak oil. This mechanism goes both ways: trash left behind by beach guests may enter the water, affecting the water quality.

Climate change adaptation is also an important factor in the growing tourism sector. When coastal cities flood, when coastal deltas change substantially or when the water becomes saltier, tourism is disrupted. Coastal defence is of prime importance to counter coastal erosion and to enable tourism. These implications need to be considered for Integrated Coastal Zone Management (ICZM) as well as for MSP processes. Competing activities in the same waters (e.g. marine aquaculture) may also increase waste generation and energy and water consumption, exacerbate the exploitation of biological and other resources and ultimately lead to more pollution and a serious deterioration of marine and coastal ecosystems. These conflicts may deter or prevent investments in tourism.

Five main recommendations for MSP processes in support of coastal and maritime tourism can be underlined:

- The importance of land-sea interaction. MSP can be used to implement tourism strategies as it ensures sustainability and availability of infrastructure required. In this regard, LSI aspects are very important, as most of the needed infrastructure is land-based.

- A tool for synergies with other sectors. MSP can be a tool to increase synergies with other marine sectors such as aquaculture and fisheries (e.g. pesca-tourism and angling), conservation (e.g. sustainable forms of niche tourism and environmental conservation of key natural assets), and underwater cultural heritage (e.g. diving and snorkeling).

- Diversification. The tourism and recreation sector can benefit from diversification prompted by MSP through time, space and activities. Firstly, MSP can help ensure that intermodal connections are accessible year-round. Secondly, it can reduce the effects on the ecosystem by regulating peaks in visits and maintaining sustainable touristic infrastructure. Lastly, it can provide a template for increasing synergies and managing tensions across activities between tourism and other sectors.

- As the sector appears to be fragmented, MSP can create opportunities for bringing together different actors. However, to be effective MSP should involve the different governance levels and, whenever possible, reach out to local communities and stakeholders.

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[18] Ecorys (2016).
[19] Ecorys (2013).
[20] Ibid.

- A sustainable tourism and recreation sector can only thrive within a sustainable environment. The ecosystem is not just a natural resource, but should be seen as an enabler of synergies and a source of economic gains for the sector.

Marine aggregates and marine mining

Marine aggregates extraction and the marine mining sector´s further development may entail some MSP implications. There is an increasing demand for construction materials to maintain and develop transport, energy and water infrastructures and in general the built environment that society relies upon[21]. The availability of aggregate resources is becoming constrained on land, so more attention is placed on marine resources. At the same time, the availability and value of minerals such as tin and rare earth minerals are going up[22] and so does the drive for high-tech metals.

In a world where most beach and coastal areas are suffering from an increase in erosion due to morphological changes of their environments together with unprecedented sea level rises and climate change impacts, the need for land reclamation and new development sites increases. The demand for new dredging sites for obtaining sand and gravel for coastal adaptation to environmental changes has increased as well (related to beach nourishment, erosion restoration, climate change effects, sea level rise, land-use changes and coastal defence[23]). Such sites can conflict with other marine and coastal uses such as touristic and recreational uses of the beaches, coastal fisheries, aquaculture and conservation. This is why nature-based solutions to beach nourishment are being researched, such as sandscaping - a potential solution as it is an innovative coastal management concept, which is designed to use natural processes (wind, waves and tide) to distribute marine aggregates to nourish and create new beaches[24].

Similarly, the potential impacts of marine aggregates extraction and marine mining onto biological and archaeological resources are still unclear, and the greater driver of development of the sector is to ensure that extraction is sustainably managed and minimizes potential effects on the environment and other marine uses[25].

To conclude, three main recommendations for MSP processes in support of Marine Aggregates or Marine Mining can be underlined:

- The planning cycle needs to be able to provide operators with sufficient certainty to be able to support investment decisions. An effort should be made to ensure that the planning cycles of MSP are more aligned with the temporal scope of the sector, i.e. the marine aggregates sector looks towards 30 years based on investment planning cycles and the duration of regulatory permissions, while and MSP cycles are around 6 years. MSP processes could introduce longer term planning perspectives as to accommodate for the sector temporal scale needs.

- The marine aggregates sector can be included in multi-use planning, and it can be combined with marine protected areas as well as offshore renewable energy, military activities or the fisheries sector, as long as there is proper assessment and management. Multifunctional layering and combinations that take into account the

[21] MPA-Mineral Products Association (2017).
[22] Zhou, B., et al. (2017).
[23] The Dorset Coast Strategy (n.d.).
[24] Hofherr, J., et al. (2015).
[25] Durden, J.M. et al. (2017).

temporal aspect are possible and welcomed by the sector, but a substantial evidence base must be created.

- For the marine mining sector, the greater driver for its development is to ensure that extraction is sustainably managed and minimizes potential effects on the environment and other marine uses.

Shipping and ports

Traffic density is an indication of an area's value for shipping. The more heavily an area is trafficked, the wider a shipping lane should be to allow for safe overtaking. In addition to the traffic density of commercial ship traffic, other types of navigation, e.g. fishing vessels, vessels servicing fixed installations, and leisure boats should also be considered.

Shipping and ports sectors are interlinked. It is important to anticipate which ports will be frequently accessed by what kind of ships in the future in order to determine which routes ships will use. Existing and planned port infrastructure is a decisive factor. For example, only a small number of ports accommodate very large carriers and cargo is then shipped to other destinations. Additionally, the offer of alternative bunkering technology in a port will influence the direction of traffic flows, once an increased number of vessels will use such technology. Some small ports may even decline in importance in such a competitive environment.

Looking ahead into the future, the spatial implications of autonomous vessels, co-existing with manned vessels, should be taken into account. In the trial phase, test beds could be established that may be closed to other ships. Some experts hold the view that autonomous vessels may require a separate lane, at least initially. Others argue that autonomous shipping will require less safety distances, because technology will be more reliable than vessels operated by humans. These spatial implications are yet difficult to foresee.

At the same time, in recent years, extreme weather events have increased in frequency, which also affects shipping. According to IMO Resolution A.528 (13)[26], weather routeing is important and could even take precedence over regular ship routeing. The aim of weather routeing is to ensure that ships are provided with the optimum routes, so that they can avoid bad weather. In order to allow weather routeing, space needs to be available, so that ships can temporarily deviate from established shipping lanes. In addition, climate change may trigger an opening of the Arctic route during summer, which may alter sea traffic patterns in certain areas.

Finally, the following main recommendations for MSP processes in support of Shipping and ports can be underlined:

- To support the shipping sector, MSP should keep free space needed for shipping (rather than limiting shipping activities to designated areas) now and in the future. Furthermore, MSP should make sure that safety zones around incompatible activities are sufficient.

- The freedom of navigation principle applies to this sector, which means that ships are generally free to sail wherever they want. Limitations to this principle are put in place in exceptional cases (see IMO shipping routes). Still, shipping routes can

[26]IMO Resolution A.528, 13: Recommendations on weather routing.

be designated in a MSP, but they do not strictly limit the activities of the sector to this space.

- MSP processes may instigate a debate about changing shipping routes, but changing international shipping routes is a lengthy process[27] and existing IMO shipping routes should be considered in MSP processes.

- The trajectory, width and water depth are the three dimensions that need to be taken into account for assessing present spatial claims of the sector and estimating future ones.

- In order to inform on the trajectory, AIS data is a prime source to identify the present spatial needs of shipping. From the data, the requirements of different navigation types (cargo, passenger, service, and fishing) can be differentiated.

- Neighbouring States should cooperate in order to ensure a mapping of shipping lanes designated in MSPs across borders.

Oil and gas

There are three potential options for an increase in oil and gas production for EU Member States. Some of these have implications for MSP, whilst others may not require an increase of the space required by the activity:

A. An increase in offshore oil and gas production without the development of new exploration and drilling sites (no new rigs offshore) due to efficiency improvements at the extraction phase.

B. An increase in oil and gas production with the development of new exploration and drilling sites (new rigs onshore).

C. An increase in offshore oil and gas production with the development of new exploration and drilling sites (new rigs offshore).

Options A and B would not necessarily imply a spatial growth of the maritime space required by the activity. Thus, these options would potentially not have MSP implications and would not create conflicts with other marine activities. These options are likely to be followed by EU Member States for which oil and gas production has reached its upper limits or where the development of new offshore development areas is too expensive to pursue. Option C would imply giving additional maritime space to the offshore oil and gas sector. Thus, this option would have MSP implications and could create conflicts with other marine activities.

In parallel to the three Options mentioned above, two main recommendations for MSP processes in support of Oil and Gas can be underlined:

- Despite the predictability of spatial requirements for the oil and gas sector, and little expansion of existing activities expected[28], MSP processes should further engage with the sector to ensure that their current and future activities are taken into account. The sector may be established with presence of offshore

[27] The Nautical Institute (2013).
[28] Oil and gas UK (2016).

infrastructure, safety and exclusion zones and maintenance/supply vessel activity and these should be included in the MSP.

- Decommissioning represents the next significant shift for the oil and gas industry as reserves decline and installations come to the end of their life. The spatial implications for MSP from this are minimal in terms of new demand for space; however, it is relevant to consider the potential increased pressure on ports and harbours for decommissioning activities, and the potential for offshore installations which remain *in situ* to be used for other purposes.

Cables and pipelines

The installation of new submarine cables and pipelines might have MSP implications and effects on various other uses of marine waters, especially in submarine cable hub areas.

The following recommendations for MSP processes in support of Cables and pipelines can be made:

- Due to the trans-national character of the sector, more coordination and cooperation between national authorities are needed in order to increase the existing opportunities for further harmonisation over regulations, licensing requirements and data sharing across countries[29].

- The cables sector could foresee promoting interconnection, offshore meshed grids and coordinated designs as a first step towards an integrated offshore energy grid, especially for the more ambitious renewable energy system scenarios[30-31].

- Parallel routing. To promote efficient use of space, electricity cables, telecommunications cables and pipelines should be bundled to the fullest extent possible[32] (parallel routing).

- Existing synergies with other maritime uses should be further enhanced (e.g. use of the submarine 3D topographic mapping and surveying data for environmental conservation, archaeological purposes, etc.).

Fishing

Historically, fishing (along with shipping) is the sector with the longest tradition in claiming for marine space. Conflicts over access can exist between existing or new marine uses. However, synergies may also be found through co-management, or by spatially allocating areas within fishing grounds to reduce conflicts. Therefore, it is a key issue to observe future trends in the use of the seas.

At the same time, the MSP Directive's requirements related to cross-border planning and to the consideration of land-sea interactions have the potential to encourage fresh thinking about improved cross-border management of fisheries. Of particular importance is the joint-up management of land-sea interaction issues such as landward sources of pollution that adversely may affect fish stocks.

[29] Navarrete, M. (2015)
[30] Gazendam, J. (2015)
[31] European Commission. (2014)
[32] ESCA Guideline No.6. The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters.

Acknowledging the socio-ecological systems involved in fisheries management, extensive and broad expertise (in social, economic, environmental and legislative realms) is needed to better integrate fisheries into MSP. As such, to combat the overexploitation of resources, the reduction of exploitation rates (e.g. by the reduction of the fishing fleet) to secure spawning grounds and migratory roots in particular for diadromous types of fish is foreseen[33]. These links between threats and new management approaches for different stages of fish life cycles are relevant for MSP planners.

As main recommendations for MSP processes in support of Fishing, the following can be underlined:

- Use models, tools and methods as data gathering systems for fisheries management. A range of these tools and methods are available or under development (despite some of them not yet being directly applicable by MSP managers). Data gathering systems, such as VMS and AIS data systems, provide a substantial opportunity for planners to gain a better understanding on where and how maritime space is being used (and therefore valued) by the sector. At the same time, models allow planners to analyse changes in species distribution, assess the effects of competing human activities, address socio-economic challenges and explore the potential benefits of MSP for fisheries.

- MSP processes have to distinguish between relevant areas for fishing and for fish species according to life stages. Fish shows extensive variability in their behaviour, ecology, physiology and they vary in their abilities to detect and utilise sounds. Fish eggs and larvae should be separated for special consideration by planners because of their vulnerability, reduced mobility, and small size[34].

- Neighbouring states should cooperate in order to take the needs of fish (and fisheries) into account as they move across national jurisdictions and live in shared ecosystems[35]. The development of cross-border (pilot) MSPs could foster these processes[36].

- MSP is not the only instrument for the spatial management of fisheries. As such, currently fisheries are usually not or not fully integrated into marine spatial plans. Existing inshore or offshore maritime spatial plans that do take fisheries into account do generally not designate spaces but rather leave the issue to subsequent licensing procedures[37] or focus on sectorial fisheries management[38]. Reconsidering the global scale of fisheries will be important for a better integration of fisheries in MSPs in all EU sea-basins.

- Having an early and permanent engaging and cooperating environment with fishermen is essential in order to allow their participation in MSP processes[39]. Planners should communicate with the sector via stakeholder engagement processes or via conversations within regional fisheries bodies like the General Fisheries Commission for the Mediterranean (GFCM) Secretariat or the BALTFISH FORUM[40] in the Baltic Sea.

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[33] European Commission (n.d.).
[34] Popper, A.N., Hawkins et al. (2014).
[35] Gee, K. et al. (2011).
[36] Käppeler, B. et al. (2011).
[37] H. M. Government (2014).
[38] NME (2011).
[39] Hassler, B. et al. (2017).
[40] Secretariat or the BALTFISH FORUM in the Baltic Sea.

Marine aquaculture

MSP offers a chance for greater recognition of the sector's interests and could be a means to improve the public perception of its potential environmental impacts.

However, criteria for the production of different species would need to be further developed as more research is devoted to determine optimal siting as well as exploring new potential co-location opportunities among various maritime activities. This will help the further development of the sector.

As regards main recommendations for MSP processes in support of Marine Aquaculture, the following can be underlined:

- MSP should consider and identify areas with higher potential for aquaculture. This would support better siting and expansion of the aquaculture sector to new areas (also offshore), including not only those areas suitable for introduction of new cultivated species at present, but also looking to future commercial trends.

- MSP should guarantee the availability of relevant marine data, available for the MSP process, to aquaculture practitioners. Availability of regularly updated spatial oceanographic data and data concerning other maritime activities is crucial for the sector, in order to define the location and the type of different productions. Given the small size of aquaculture companies and the fragmentation of the sector, the opportunity to access collected data - systematised and elaborated - would be a great contribution to the development of the sector.

- In the framework of the aquaculture strategies developed at national level, MSP should contribute to solving critical issues at local and transnational levels (cross-border) through the identification of conflicts and by suggesting co-location strategies with other maritime uses. In doing so, MSP can make available to the sector its specifically developed tools.

- MSP should support longer-term planning for aquaculture by introducing cyclical assessments that could modify the spatial characteristics of the sector. In such a way, major challenges such as those due to new emergence of diseases in the marine environment and potential changes in environmental parameters due to climate change (temperature, ocean acidification, etc.) could be faced better. All of the above will have consequences on future aquaculture production and on the economic results.

- MSP can support the aquaculture sector by stimulating the creation of clusters of farms, each within a management area (Aquaculture Management Areas – AMAs; or Allocated Zones for Aquaculture-AZAs[41]). These would look at the specificities (social, economic and environmental) of their spatial area and manage to reduce those risks that might happen whilst optimising farm production.

- MSP can represent a way to encourage national governments to overcome licensing barriers through providing clarifications, shortening and harmonising procedures for licensing. In fact, limited success in obtaining licenses and time required for licensing procedures are perceived by the operators as major barriers to the sector's development.

[41] Sanchez-Jerez, P. et al. (2016).

MSP can support the aquaculture sector by improving its social licensing. By bringing the sector into a multi-stakeholder debate, including civil society, MSP can bring significant benefits to aquaculture, improving its public perception and social acceptability. Key aspects for public perception are environmental impacts, especially those associated with marine fish farming, and access to and use of coastal resources.

4. DEVELOPING INDICATORS

Indicators have been increasingly used by decision-makers to measure the achievement of their objectives through qualitative and quantitative information. Indicator systems allow evidence-based decision-making and facilitate the communication of (expected) results to stakeholder groups. The literature[42] offers many suggestions for indicators, which are specifically related to Blue Growth and maritime spatial planning, but only a few of them have a spatial element. Overall, the use of indicators in maritime spatial planning has been limited to date, and there is no common agreement between Member States on a standard concept and the added value of indicators in MSP processes. Due to this, a Handbook on MSP indicators development was developed as a part of the study with the objective to assist MSP authorities in their planning processes. The Handbook provides suggestions on how to link MSP processes and Blue Growth through an indicator framework and has two versions:

- A short pragmatic version, which includes ready to use checklists and guiding questions (Annex III.1);
- A longer version, which is aimed at MSP stakeholders with interest in the overall theoretical framework of indicators and their rationale (Annex III.2). To a large extent the indicator theory is operationalised in the short version of the Handbook, which is why they can be considered as stand-alone documents.

The Handbook aims to reveal both the applicability and challenges of using indicators in MSP processes. It has to be acknowledged that linking MSP and Blue Growth via indicators is a very difficult task and may only be done with consideration for a number of limitations and in line with national, regional and even local context in each country. For this reason, the Handbook provides possible overall and sector-specific frameworks of indicators rather than a prescriptive list of indicators. More specifically, the Handbook is aiming to support MSP practitioners in:

- **Following consequential and specific steps when designing indicators**. The standard process of indicator development starts with the definition of objectives. The process includes also the definition of baselines and related target values as well as the given sources of information, including the analysis of data coverage and gaps. These steps are presented in the graph below and explained in both versions of the Handbook:

[42] For example: Ehler, Charles; A Guide to Evaluating Marine Spatial Plans, Paris, UNESCO (2014). IOC Manuals and Guides, 70, ICAM Dossier 8; Bowen, R.E., and C. Riley (2003). Socio-economic indicators and integrated coastal management. Ocean and Coastal Management Journal. Vol. 46, pp. 299-312; and Belfiore, S., J. Barbiere, R. Bowen, B. Cicin-Sain, C. Ehler, C. Mageau, D. McDougall, & R. Siron (2006). A Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management. Intergovernmental Oceanographic Commission, IOC Manuals and Guides No. 46, ICAM Dossier No. 2. UNESCO: Paris.

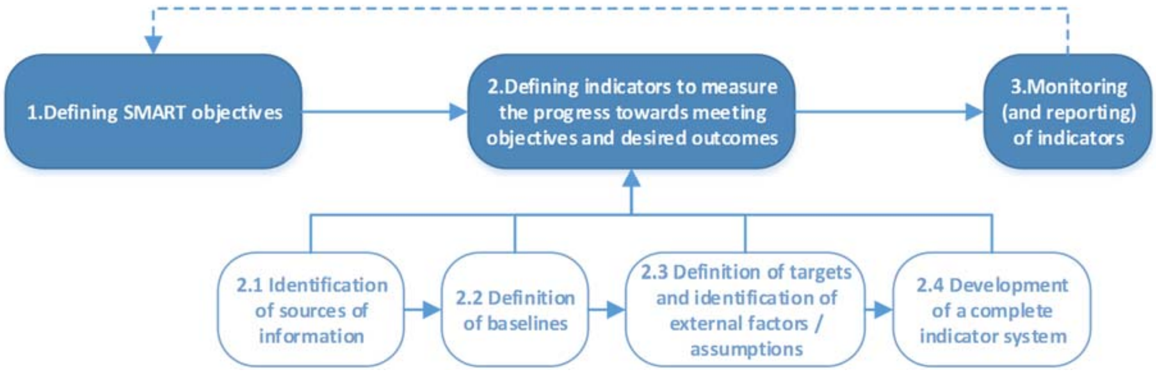

Figure 6 Indicator development process

- **Defining SMART objectives.** Defining clear objectives allows development of appropriate indicators, intended to measure their level of achievement. The short version of the Handbook provides examples of objectives, suggestions on when they could be defined, and a checklist (which operationalises the SMART criteria and the hierarchy of objectives). The longer version of the Handbook adds a description of the structure of objectives and their rationale;

- **Linking objectives and indicators.** Indicators should be linked to relevant objectives. The Handbook offers suggestions on possible ways of linking them and includes the rationale and examples of indicators. Furthermore, it indicates the control area of MSP authorities when it comes to their influence over indicator values. The short version of the indicator provides a checklist, which may assist MSP authorities in selecting specific, measurable, and simple indicators. The longer version presents a visualisation of the objectives and indicator chains in the MSP context and provides the rationale for all suggested indicators;

- **Identifying sources of information.** The Handbook provides a list of usual sources of information for the different types of indicators and a checklist (short version) for selecting appropriate sources;

- **Defining baseline and target values.** Defining baseline and target values are the most difficult steps in indicator development. The Handbook offers recommendations on how to determine these values and which are the critical elements in this process (e.g. considering external factors and identifying assumptions).

The key findings from the literature review and the exchanges with MSP stakeholders during the development of the Handbook are that (1) indicators can be a useful decision-making tool, but they should be specific for the different Member States; and (2) cumulative effects on Blue Growth may result from the combination of different projects, policies and activities that are not necessarily related to MSP, which affects the traceability of effects through indicators.

Building on these findings, the indicators provided in the Handbook have a tentative character and indicate clearly the extent of influence of MSP authorities on their values. Further limitations on the use of indicators in the MSP context include:

- Indicators are just one small part of complex MSP decision-making systems. They are only meant to support aspects of decision-making and should not become an end in themselves;

- Indicators offer support to MSP authorities only if interpreted against agreed country-specific objectives and targets. Thus, the indicators in the Handbook are not meant to provide comparisons between countries on their progress in implementing MSP;

- Once indicator systems are set, a limitation that needs to be considered is that indicators do not provide information on the reasons outcomes have been achieved or not. They are not a proof for causality and tracking performance just through indicators is not recommended[43]. Thus, the use of evaluations, which could single out MSP effects, should be encouraged.

[43] Mackay, K. (2007).

5. CONCLUDING REMARKS

The three topics of this study have been designed as stand-alone deliverables to be used by MSP practitioners, sector representatives, and other engaged stakeholders. Therefore, the study design does not offer major, wide-sweeping conclusions. Nevertheless, some concluding remarks can be made. These are supported by the main messages of the 'MSP for Blue Growth' Conference, which was held in October 2017 as part of the activities within the MSP Assistance Mechanism. The Conference formed an integral part of the overarching study process as it provided the forum for the MSP community to discuss the initial findings of the study together with sector representatives.

- **MSP needs to be put in its wider context.** MSP can only be effective if it takes full account of the socio-economic, ecological, institutional and political context and if it is based on the engagement of a wide variety of stakeholders.

- **MSP is a complex process that involves different steps and levels of decision-making.** It needs to adapt to the dynamic environment and various stakeholders with specific perspectives. This study provides suggestions to MSP actors on how to give an overall direction to MSP by developing visions, how to assess the achievement of objectives through MSP indicators, and how to take into account external factors and overall trends in key maritime sectors.

- **MSP is about planning for the future.** MSP is not only about solving current conflicts, but also about preventing conflicts from happening in the first place. Even more, it is very often a first step to put the maritime space on the 'economic' agenda and highlight the inherent potential in making good use of maritime space.

- **Defining a clear vision and objectives is a key element of MSP.** Having clear objectives is the first step in having SMART indicators. This is, however, a lot more than a methodological requirement. MSP is key to providing certainty for sectors by creating a stable and predictable regulatory environment, which can help to promote investment.

- **Visions as well as MSP processes are an important tool to promote collaboration between sectors.** Even when short-term results are inconclusive, comprehensive stakeholder meetings facilitate mutual understanding, thereby indirectly benefiting Blue Growth.

- **Vision processes are not only a preparatory step for MSP, but provide an overarching framework for an Integrated Maritime Policy.** MSP is only a tool. That is why visions should also clarify what has to be taken on board by other processes in order for MSP to achieve maximum impact.

- Long-term visions have to be complemented by **long-term commitments**. This includes time to build **trust and confidence** among all stakeholders. Thus, both vision and MSP processes should not be one-off exercises but continuous adaptive processes. This long-term commitment is also required for a monitoring framework to be effective.

- **MSP's (expected and actual) benefits should be communicated to sectors.** Visions and objectives should not only be clearly formulated, but also communicated to stakeholders in a language that is understandable for them. In the process of establishing visions, MSP authorities should work with the sectors so that they learn the expected benefits of MSP. Indicators can be used as a tool not only for self-assessment, but also to communicate success and challenges.

- **There is an enormous variety and diversity of sectors.** There are significant differences between sectors, but also within sectors. This means that the spatial implications will vary as well, both in terms of current needs and future development.

- **MSP is an important tool to support emerging sectors.** Emerging sectors such as ocean energy or aquaculture do not always have the resources to communicate their potential to the wider group of stakeholders. MSP can provide such sectors with a platform – allowing them to better articulate and explain what their future space requirements are, and why it is important to take these into account.

- **Mature sectors evolve as well.** It is important that MSP practitioners and related stakeholders are aware of the dynamic nature of the maritime economy, including that of the more mature sectors such as fishery, shipping or tourism. A changing global context and new technologies bring about new spatial requirements, for example through automated shipping, digitalisation in fishing, VMS, or cruise tourism.

- **A lot of sectors depend on specific resource potential.** Ocean energy, marine aggregates, aquaculture, oil & gas **–** their future development depends on a long-term framework providing stable locations. It can be a challenge to combine the need for this stability with adaptive management and flexible planning practices.

- **MSP is a powerful tool for Blue Growth, but its limitations should also be considered.** Indicators provide a framework that MSP authorities may use to logically link MSP processes and Blue Growth. At the same time, the study clearly shows that establishing a causal link between specific sectoral and MSP may be challenging.

This study provides tools that could support MSP processes. At the same time, it is important to note that their application should be customised to the specifics of each country and sea-basin. The suggested tools do not offer a one-size fits all solution, but rather pragmatic steps that can be fine-tuned to specific situations.

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ANNEXES

Technical Study 'Maritime Spatial Planning (MSP) for Blue Growth'

Annex I: Handbook for developing Visions in MSP

CONTENT

HOW TO READ THIS HANDBOOK

The purpose of the handbook is to assist planners in developing a vision for their marine space, or initiators in preparing the terms of reference for those that will be facilitating the process.

This handbook is designed to provide quick and easy access to information. Readers are encouraged to skim through the handbook and read about the methods that interest them the most. **The first three chapters set the scene for the content of the handbook**. Chapter one provides the introduction and explains why it may be useful to undertake a vision-making process, as well as including scenarios and forecasting development exercises, action planning and development of roadmaps. Chapter two discusses the relationship between vision making process and MSP, and defines different formats a vision-making process could result in, as well as usefulness of such processes and their outputs for MSP.

The practical part of the handbook starts from chapter four, where a decision-making framework is outlined, with two distinctive parts; 1) first level decisions, to determine the type of vision development processes, and 2) second level decisions, relating to possible building blocks of such processes. Chapter five relates to first level decisions and contains supportive checklists and examples. Chapter six relates to building blocks and describes different tools and methods that can be used in the processes.

1. Introduction

Maritime Spatial Planning (MSP) is not only concerned with minimizing conflicts between ongoing activities in a given maritime space, but is designed to take a future-orientated approach to prevent such conflicts occurring in the first place. It is therefore necessary to understand potential future developments in the marine space in question; whether it is economic, technical or ecological, strategic or externally driven, short or long term. Such multi-objective 'visions' can be developed through visioning exercises, scenarios and forecast development processes, or as part of strategic planning, action planning and developing roadmaps. Often, a combination of techniques is used to set out a framework for the future, or to define relevant options. However, the presentation of visions varies greatly, from philosophical and artistic descriptions of the future to presentations of quantified analyses. Given the complexity of these processes and their often multiple outputs, there can be ambiguity regarding terms, e.g. strategy, vision, roadmap or an action plan.

There are many variations of visions processes, with regard to their purpose, methods used, presenting results, and other aspects. They also differ in their geographical scale, initiating organisations; relationship with MSP and actual decision-making processes.

Purpose of visioning

Visions are employed for different purposes, both as integral parts of MSP processes or separately. In some cases, the process itself is more important than the final document as it presents a mechanism for stakeholder engagement and facilitates dialogue on a joint future. In other instances, the final document is crucial, for example, if it documents statutory norms and principles.

The development of a vision for MSP is especially useful in:

- ✓ raising awareness of emerging issues;
- ✓ enabling co-ordination between different authorities addressing sectors and issues;
- ✓ engaging stakeholders and capacity building, particularly where MSP is a new process;
- ✓ providing a long-term focus for MSP that may exceed political cycles;
- ✓ accounting for future uses not present so far;
- ✓ achieving better land-sea integration of planning.

Drawing up a vision or a strategy for a given marine space (be it at national or sea-basin wide scale) can have several advantages. It can help to communicate the benefits of an MSP process, stimulate public debate and stakeholder dialogues, increase awareness of future trends, define priorities for maritime space and ensure commitment to actions needed to reach a desired future.

The development of scenarios and visions can serve as a 'warm-up' for an MSP process, encouraging stakeholders to start thinking outside of their sectoral interests, to consider longer time scales and to stimulate questions on "what if?". A vision process helps to clarify the focus of MSP and may also provide the basis to derive jointly agreed SMART[44] objectives, towards which a MSP process should lead to. Sometimes the joint development of scenarios or a forecast might be used to help to raise awareness of an emerging issue (i.e. climate change).

[44] Defined as Specific, Measurable, Achievable, Relevant, Time-Bound

Such processes can also provide a basis for cross-border cooperation for MSP. Developing a transnational vision is particularly useful if, for example, the development of maritime sectors in one country influences maritime development in a bordering country whereby consensus is needed. On the other hand, many sectors require cross-border coherence in planning (e.g. shipping lanes, energy corridors, underwater cables), so developing e.g. a joint vision and planning principles can help in this regard. A vision or a strategy can also be an umbrella to better link MSP and coastal zone management objectives as well as territorial development in general, across a specific portion of space.

Purpose of the handbook

The handbook is based on a study of diverse vision processes from around Europe. It draws on detailed analysis of relevant documents supplemented with interviews with those who have developed the process and those who are meant to take up or actively use the process outputs. The handbook presents the collection of methodological approaches that were taken and highlights the lessons learnt from these processes. The purpose of the handbook is to assist planners in developing a vision for their marine space, or initiators in preparing the terms of reference for those that will be facilitating the process.

Despite the range of vision processes studied, it should be noted that there is still limited experience, specifically for MSP related vision processes. Thus, this handbook also presents methods from other relevant fields, such as general management and urban planning.

The handbook was developed taking into consideration:

- The needs of planners that use or refer to visions in their MSP implementation;
- The current questions/knowledge gaps of those who plan to develop visions in the future.

The intention of the handbook is to indicate a range of possibilities for working with visions, showcasing options and ideas, rather than being prescriptive.

2. VISIONING PROCESSES AND OUTPUTS

A visioning process usually starts with some type of investigation of future trends, using methods designed to analyse possible and/or desirable future conditions. The specific drivers of, and situations in which a vision is initiated, determine the purpose or ambition of the process. In other words, to gather stakeholders for the first time as part of the 'MSP warm up', to raise awareness of an emerging issue, or to stimulate local development.

This subsequently defines the geographical scope of the process (i.e. local, national, sea basin/macro regional or EU wide), the thematic scope of the process (i.e. is it one sector oriented or is it integrating number of aspects), and the relationship with MSP and actual decision-making processes (i.e. from autonomous studies to integrated parts of MSP process).

All these variables then influence the selection of an appropriate format(s) the process will result with, such as a vision and/or a strategy, as well as the choice of tools and methods to be used for developing these. The outputs from vision processes vary greatly, from philosophical and artistic descriptions of the future (broad visions) to presentations of quantified analyses (sectoral scenarios and roadmaps). A process often results with a combination of interlinked formats. For example, a document can be called a strategy, but it may also include a vision and/or scenarios. As part of the same process, an action plan could also be developed as an extension of the strategy to better support its implementation.

Some frequently used definitions of possible output formats from visioning processes are presented in Table 1. However, **the understanding and definitions of these formats vary widely among process facilitators and outputs users, and common agreement is scarce.** While literature that defines forecasts and scenarios is in abundance, literature that defines visions, strategies, roadmaps and action plans is limited, or the definitions provided are not applicable in the specific context of MSP. Hence, the following definitions have mainly been adapted on the basis of interviews.

Scenarios [45][46]	Consistent and coherent descriptions of alternative hypothetical futures intended to explore how current and alternative development paths might affect the future, and consider assumptions about the drivers of change and the impact they have.
Forecast[47]	An estimate of a variable of interest at some specified future date by analysis of trends in the past and present status.
Vision	Preferred evolution of maritime developments in the course of a given timeframe, which has been agreed on in general lines, either only among those developing the vision, or together with stakeholders. In some cases, a vision is seen as the preferred agreed scenario, which implies that scenarios must have been developed and discussed prior to the actual adoption of the vision.
Strategy	A strategy outlines various actions, usually in broad terms, necessary to reach the vision. Preferably, it can also define the specific objectives together with the set of actions and responsible bodies for reaching each of the objectives. The timelines and indicators for tracking progress of the objectives are sometimes also defined.
Roadmap	A roadmap defines the steps needed to attain the vision and/or objectives; it is usually underlined by milestones and concrete timelines.
Action plan	Usually defined as complementary to a strategy and a roadmap, an action plan proposes clear actions and responsible actors for the implementation of the roadmap or strategy.

Table 1 Definitions of possible formats of outputs from visioning processes

☞ FURTHER READING:

- Forward thinking platform: A Glossary of Terms commonly used in Futures Studies[48]

[45] ABPme R, ICF International (2016).

[46] Alcamo, J. (2001).

[47] Armstrong J Scott, ed. (2001).

[48] The Forward-Thinking Platform. (2014).

3. RELATIONSHIP BETWEEN VISIONING AND MSP PROCESSES

A maritime vision can be developed as part of MSP processes, but can also be initiated separately. MSP is spatially oriented, often also containing other non-spatial elements such as planning policies, whereas visions, strategies, action plans and roadmaps are not necessarily spatial. While MSP is a medium-term process (revised and adapted normally every 6 years), visions usually have a long-term perspective (beyond 10 years).

MSP extensively uses data-based, analytical, quantitative and spatial techniques. Vision development also provides scope for using more creative, imaginative techniques. Consequently, visions are also less detailed, since their purpose is to define what we would like maritime space to look like in a given timeframe. While development of a maritime spatial plan is a requirement under the EU and national regulation, the development of a maritime vision or a strategy is not an obligation under the EU law and is usually developed on a voluntary basis. Hence, not all outputs of these processes have statutory standing. Nevertheless, a shared vision can supplement an MSP with a long-term perspective by considering the evolution of key maritime sectors beyond the 6-year MSP framework. Spatially mapped visions are usually more useful in an actual MSP process than non-spatial examples, usually because they concentrate on the spatial implications of possible changes or show the spatial consequences of future sea use trends.

The development of a vision or strategy can **define relevant concepts as part of the MSP preparatory phase** (e.g. maritime space and the use of maritime space), **prepare stakeholder input to MSP**, **help prioritise the uses** in maritime spatial plans and **set out general planning principles**. Maritime strategies can also **provide a legal framework and basis for evaluating MSP**. For example, the Portuguese National Ocean Strategy is a legally binding document that needs to be taken into account as it forms part of their legal framework and will be used to evaluate their MSP processes.

The visions and strategies developed as part of the **EU funded projects** proved to be particularly useful in providing **an inspiration for the formulation of initial spatial planning principles** (e.g. developments on sea must not be problematic for terrestrial developments), **guidelines and values in the national MSPs.** The BaltSeaPlan Vision 2030[49], for example, helped countries around Baltic Sea to define relevant concepts at the initial stages of their MSP.

Macro-regional and sea basin strategies and action plans are useful since they set out a vision and related objectives shared by all countries in the macro region/sea basin. This facilitates **more coherent MSP across national borders** based on commonly agreed elements for planning. These long-term processes also serve as a **cross-border cooperation instrument**. For example, the EUSAIR[50] is a relevant cooperation instrument between Adriatic-Ionian countries, and is therefore beneficial for the cross-border cooperation aspect of MSP.

[49] Gee, K., Kannen, A., Heinrichs, B. (2011).

[50] European Commission. (2014).

Local maritime strategies and action plans processes

Usefulness:

- Allows for addressing land sea interactions;
- Allows for concrete problems to be solved in detail;
- Ensures strong links with territorial development – this mainly refers to maritime strategies attracting developments and specifying the policies and actions for development;
- Results of local processes are felt fairly quickly as defined actions are usually legally enforced;
- Extensive engagement increases the sense of ownership and commitment as all involved have the feeling they are in the driver's seat.

Shortcomings:

- History of local planning and possibly lack of connection with other higher-level processes including national MSP;
- Lack of vertical cooperation;
- Possibility of closed local networks.

National maritime strategies, visions and roadmaps

Usefulness:

- Facilitates inter-sectoral coordination as they set out a broader vision for the entire maritime economy;
- Serves as a point of departure for preparing policies in the maritime economy and for developing programmes e.g. for port development.

Shortcomings:

- The risk is that without wider commitment to implementation and/or active use of outputs, these last only as long as the mandate of the government that developed it.

(Sub) Sea basin wide visions and strategies

Usefulness

- Allows for addressing the Large Marine Ecosystem and Areas Beyond National Jurisdiction;
- Improves coherence and data exchange across countries;
- Identifies transnational common priorities, planning principles and agreed actions;
- Reviews whether the national policies/strategies are compatible with each other and where synergies could be enhanced (i.e. energy corridors);
- Identifies topics that need cross border cooperation (or problems that can be solved only by joint transnational effort).

Shortcomings:

- In some cases, there are limited links to statutory MSP process, or limited uptake from such formal processes.

4. DECISION-MAKING FRAMEWORK

To develop a maritime vision, planners need to understand many underlying factors and make a number of interrelated decisions. Planners are usually limited by certain pre-conditions (‘givens’) that are beyond the planner’s control, such as geographical scope of the process or the statutory nature of the process. On the other hand, ‘first-level’ and ‘second-level’ decisions are within planners’ purview, with first-level decisions, such as temporal scope or available skills and resources, possibly directly affect second-level decisions (here: ‘Building blocks’). Building blocks refer to main steps and elements of the process such as background research, stakeholder identification, analysis, and engagement and future trends analysis. However, all visions are different and this handbook uses one possible framework as its structure. Planners can use this framework to determine their own first- and second-level decisions relevant to their process.

Figure 1 Decision making framework for preparing the vision development process

5. First-level decisions: Preparatory Actions

First-level decisions are usually made by planners at the preparatory stages of a vision development process. The following chapters explain each of the five first-level decisions, and present lessons learned from the 40 examined processes.

Second Level Decisions – Building Blocks	
• Structuring the process • Ensuring adaptability of the process • Temporal scope	• Resources • Facilitation team and necessary skills

Figure 2 First-level decisions

Decision I: Structuring the process

SUMMARY:

- How to decide on the scope of the process and establish a link with other relevant processes or high-level policies?
- What methodological approaches can be taken and what outputs can be produced?

Scope

When beginning a process, initiators will ask themselves questions such as 'What issues and policy objectives do we wish to address with this process'? The answer will determine the overall scope of the process. This can either be focused on one aspect, e.g. to answer the question 'How is shipping likely to develop over the next 20 years?' or integrating all aspects in a more holistic approach, e.g. 'What is the shared ideal picture of the planning area in 30 years' time?'.

The vision is usually built upon objectives and priorities that are set out in relevant policy documents. During the initial stages of the process, it is also important to ensure it links to other visions and strategies from the same or relevant thematic fields. Findings from existing processes (e.g. Maritime vision 2050 for the entire sea) can be taken into account when developing another process with a different scope and time horizon (e.g. scenarios for 2030, which cover only a specific portion of the sea).

☞ EXAMPLES:

- The Baltic Sea basin wide **VASAB Long Term Perspective**[51] (VASAB LTP) made a link with the EUSBSR[52] Horizontal Action "Spatial Planning", which is of key importance in ensuring coherence between EUSBSR actions and maintaining an integrated approach.
- The **Maritime Strategy for four municipalities in Sweden – Norra Bohuslän**[53], have a strong land sea interaction and territorial development component, as well as links with other relevant processes.
- The Belgium government is in the process of developing an integrated long-term **vision for their part of the North Sea for 2050**, meant to be included in the

[51] VASAB. (2009).

[52] European Commission. (2009).

[53] Ministry of Enterprise and Innovation. (2015).

new Belgian maritime spatial plan. This long-term vision can also function later as a framework or input for other processes, such as the development of different scenarios on separate sectors (e.g. human resourses, maritime innovation, use of space).

- As part of the **BalticScope project,** the long-term vision on sea use was developed as the strategic part of the **Latvian MSP**[54]**.** The vision was built upon objectives and priorities that are set in relevant policy documents. It was essential to facilitate the exchange of ideas, view-points and proposals of different sectors, local municipalities and civil society to be incorporated in the vision and priorities of the MSP.

Approach to a vision development process

With the purpose of the process and its outputs in mind, it is important to choose the right methodological approach and the format for the outputs. Questions asked at this stage include 'Do we want a process that lets us explore different options, and agree on a particular target or framework?' 'Do we have a vision or target already agreed upon and we now need to understand how to attain it'. There are two main elements to this decision. Firstly, whether the process needs to be exploratory, normative or predictive. Secondly, whether it will make use of, or result in, a vision, scenario, forecast, strategy, action plan and/or roadmap, or a combination of these.

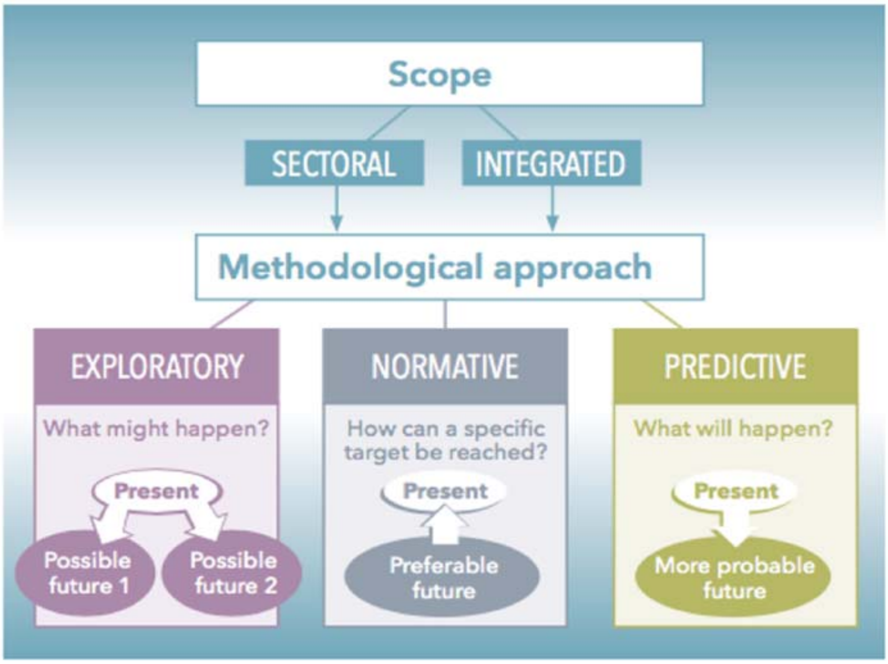

Figure 3 Visual presentation of the content scope and structure of the process

A vision-making process can make use of scenario analysis and/or exploit evidence from forecasts, while strategies are generally based on previously agreed visions and can generate roadmaps and/or actions plans. While forecasts are usually developed as part of the preparatory stages, a wished scenario can be generated within the stakeholder co-visioning process, not necessarily only from the preliminary analysis. There is often a certain degree of visioning often associated with a strategy, and a strategy as such might not be meant to be implemented but rather taken up by relevant actors and actively used.

[54] Kriatina et al. (2017).

Figure 4 General interrelation of process phases and resulting outputs

- **Exploratory approach**

The exploratory approach usually starts from the present state and looks towards one or several possible futures. Often, this is a bottom-up approach where the vision and desired outcomes are being defined through a participatory process. The process focuses on exploring, collectively among stakeholders, desirable future scenarios and the preferred development trajectory. For example, initial scenarios could be developed through desk research and subsequently discussed and refined with stakeholders during a workshop. Depending on the geographical scale and content scope of the process, stakeholder engagement may be resource intensive and require specialist skills e.g. professional facilitation.

☞ FURTHER READING:

- GAUFRE Project[55]

- BaltSeaPlan Vision 2030[56]

☞ TIP:

For an efficient exploratory process facilitators and stakeholders should prepare thoroughly by reading material distributed prior to the workshop.

☞ EXAMPLE:

The GAUFRE project has developed a strategic vision on the desired spatial development of a particular area, represented by structural maps. Apart from being a good communication tool, the benefit of using structural maps is that they contain less detail and are flexible and easy to change to respond to policy or other changes in the given environment. The difference between structural and GIS maps is shown in Figure 5.

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[55] More about GAUFRE project available at: http://www.unesco-ioc-marinesp.be/uploads/documentenbank/a36a8df232f652580832581246 8196ee.pdf

[56] Gee, K., Kannen, A., Heinrichs, B. (2011).

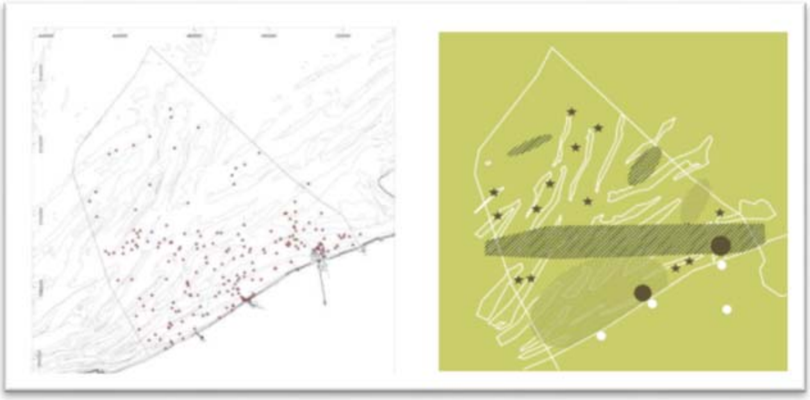

Figure 5 Detailed vs Structural maps in GAUFRE project

☞ TIP:

Visions are not necessarily spatial and even if spatial, may not be depicted on a traditional map. Structural maps are not geographically accurate down to the last detail and are often used in visions for easier presentation.

- **Normative approach**

A normative approach usually sets out a clear direction for achieving a desired outcome. Generally speaking, this approach explores what has to be done to make this desired future unfold and connect to the present. Backcasting[57] scenarios can be used to explore different paths that could be taken to reach the set objectives. Stand-alone, normative approach is often used in top-down processes where a preferred vision has already been agreed on by relevant authorities and the aim is to develop a political strategy, action plan and/or a roadmap. This approach is often used on a wider geographical scale, e.g. at the national, macro-regional, or EU-wide scale.

☞ FURTHER READING:

- VASAB LTP[58]

- National Spatial Development Concept 2030 (Poland)[59]

☞ FURTHER READING for backcasting:

- The Roads from Rio+20[60]

- Exploring social structures and agency in backcasting studies for sustainable development, Technological Forecasting and Social Change[61]

- Participative backcasting: A tool for involving stakeholders in local sustainability planning[62]

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[57] To find out more about backcasting scenarios visit page 35

[58] VASAB. (2009).

[59] Polish Ministry of Regional Development. (2012).

[60] Netherland EAA. (2012).

[61] Wangel, J. (2011).

[62] Carlsson-Kanyama, A. et al. (2018).

- BaltSeaPlan Vision 2030[63]

- **Predictive Approach**

A predictive approach usually uses a forecast[64] to assess what is the most probable situation in the future by using what is known already about the present and the past. This type of process is usually driven by a sectoral or topic related issue. This approach might imply quantitative estimations from the analysis of trends or the numerical modelling and employment of extensive analytical or scientific skills. Forecasts developed for a smaller geographical area usually use geo-referenced spatial information as one component of the analysis. However, depending on the size of the geographical area in question, and the availability of spatially referenced information, different levels of detail and precision may be employed in spatial analysis and mapping-visualisation processes. Depending on the internal expertise and budget available, it is not uncommon for the initiating body to decide to outsource part of the process.

☞ TIP:

If decisions resulting from visioning process are expected to be enforced by law, spatially referenced data used for the analysis and visual presentation should always be as precise as possible, as well as validated and trusted by everyone.

☞ TIP:

To be useful in an actual MSP process, scenarios or forecasts should concentrate on the spatial implications of possible future sea use trends and other possible changes in the environment.

☞ EXAMPLE:

In the **C-SCOPE[65]** project in the coastal zone of the Knokke-Heist, Belgium, impacts that the growing sandbank could have on local maritime businesses and the environment was the major driver for developing predictive scenarios with a forecast element.

☞ FURTHER READING:

- C-SCOPE - Study Case Heist

☞ EXAMPLE:

Different approaches can be taken over the course of process development. The EU wide study on **Blue Growth Scenarios and Drivers for Sustainable Growth from the Ocean, Seas and Coasts** used a normative approach and backcasting scenarios after the exploratory phase. In the first phase, the general background scenarios were developed, taking the exploratory approach, while concurrent development of micro futures was based on the normative approach given that preferred futures were already decided on in the earlier phase. The aim of micro futures was to see how certain sector determinants change if alterations are imposed to other variables.

☞ FURTHER READING:

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[63] Gee, K., Kannen, A., Heinrichs, B. (2011).

[64] To find out more about when to use a forecast visit page 35

[65] More information about the C-SCOPE project available at: http://www.cscope.eu/en/project-activities/marine-management-plan/belgian-marine-management-area/

- Blue Growth Scenarios and Drivers for Sustainable Growth from the Ocean, Seas and Coasts[66]

Decision II: Ensuring adaptability

SUMMARY:

- Why is it important to design an adaptable process?
- What are the questions that planners might use during the adaptation phase?
- What are the SMART objectives?

It is important to have a clear understanding of the purpose of a vision development process, and think of the best ways to monitor changes that could redefine this purpose and resulting outputs. It is relevant to not only have an effective understanding of the variables and their relationships, but also to ask whether these will continue to be important in the future. Perhaps after some time other factors or entirely new contexts need to be explored.

Developing a vision should not be a one-time exercise, but rather a continuous process that is responsive to the internal (within the development team) and external changes (all other changes that could affect the purpose of the process development). New information collected intentionally or opportunistically throughout the process can point out these changes. The purpose of the process and resulting outputs should then be updated to better reflect this new knowledge.

Monitoring can be done in different ways, either by using the checklists, a system of indicators, or any other method that fits the given context. For example, indicators for some changes in the environment could be monitored to ensure these are taken into consideration in the revision[67].

When developing an action plan or a roadmap, the SMART objectives and specific actions should be defined. Points in time should be specified for evaluating if actions have been taken and if objectives have been reached. Defining objectives that follow the SMART criteria allows for easier identification of relevant indicators to evaluate progress towards achievement.

***S**pecific* – objectives should not be too broad, but rather concrete. For example, 'protect the marine environment' would be a very broad objective. A specific objective could be, e.g. 'protect the specific species in a specific place';

***M**easurable* – objectives should be defined in a way that allows their quantification. For example, 'decrease number of shipping accidents';

***A**chievable* – the objectives should be attainable within the relevant time, resources, and contexts;

***R**elevant* – maritime spatial planning should influence the defined objectives, which should be relevant to the identified needs;

***T**ime-bound* – the achievement of objectives should be set in a specific timeframe.

[66] European Commission (2012).

[67] Information collected during the interactive session at the Member States Expert Group in Maritime Spatial Planning

Possible questions planners may ask at this stage are:

- Have actions taken place or have objectives been attained?
- Are actions and objectives still relevant?
- Should timelines be updated?
- Should the list of responsible actors be updated?
- Is our target audience still the same?

☞ EXAMPLE:

The **VASAB Long Term Perspective** has the character of a living document, so new actions and initiatives may result from the evolution of trends and challenges. Based on the established monitoring principles, the Perspective was meant to be periodically reviewed and the implementation progress is to be reported to the ministers responsible for spatial planning in the Baltic Sea Region countries, as well as relevant stakeholders.

☞ FURTHER READING:

- Handbook on MSP Indicators Development
- Marine Spatial Planning Quality Management System[68]
- Quality Indicators: Past and Present[69]
- Programme Frameworks; Objectives and Indicators[70]
- Equal Access Participatory Monitoring and Evaluation Toolkit – Setting Objectives and Indicators[71]

Decision III: Temporal Scope

SUMMARY:

- What temporal horizons are used for different visioning processes?
- What to take into consideration when deciding on the temporal horizon?

There is no hard and fast rule as to what type of vision process outputs should be linked to what temporal horizon. Processes also vary in terms of the frequency of updates. While MSP is a medium-term process (revised and adapted normally every 6 years), a general vision is usually developed for a longer time span (e.g. 20 years). Some of the broader type visions that are not linked to a specific implementation plan, do not even specify the temporal horizon they cover. Strategies and action plans with specific actions and evaluation systems normally have a shorter time span, e.g. every five years. On the other hand, broad background scenarios can be quite long term (e.g. aligning with the vision or a long-term strategy), containing more specific and shorter *micro futures*[72] scenarios.

Preferably, the interim time horizon should also be defined for more specific objectives and actions for implementing the strategy and reaching the desired vision.

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[68] ICES. (2015).

[69] University of British Columbia. (2014).

[70] Save the Children. n.n.

[71] Lennie, J. et al (2011).

[72] To find out more about micro scenarios visit page 39

☞ TIP:

Consider the **planning horizons of sectors**, e.g. duration of offshore wind permitting and project lifespan; and temporal **horizons of high-level policy objectives**, **political mandates and other planning cycles**, e.g. coastal zone and land planning processes.

☞ EXAMPLE:

Processes that used interim horizons include:

BlueMed	(3, 5-10, 10 years)
Our Ocean Wealth	(1, 2-8, 8+ years)
BalticLINes	(13, 33 years)
NorthSEE	(13, 33 years)
VASAB LTP	(5, 10/15, 20 years)

Table 2 Examples of interim temporal horizons

☞ EXAMPLE:

The **ENTSO-E 2030 Visions of TYNDP** are developed as exploratory scenarios regarding generation, demand and pan-EU adequacy of possible futures in the context of deploying grid infrastructure. For these type of scenarios, the time horizon is usually 10 -15 years. As part of the same process, national and regional resolution scenarios were developed that focused on extreme events, such as cold spells, dry years, bad wind / solar years, covering a time horizon of 5 - 10 years (maximum). These scenarios, or rather forecasts, are usually predictive and designed to inform and assess the possible risks. In this sense, they are fundamentally different from visions, which should be understood as more 'exploratory' scenarios without focus on extreme events.

☞ EXAMPLE:

The **VASAB Long Term Perspective** operates with three different time scales starting from the endorsement date of the document. Actions denoted as short time are recommended to be completed within five years (until 2015). The medium time horizon implies completion of the actions within ten to fifteen years (until 2020-2025). Finally, the long-time horizon indicates that the actions will be implemented on a constant basis throughout the whole period (until 2030).

☞ EXAMPLE:

North Sea Policy Document 2016 – 2021 summarizes the Netherlands long term vision (2050) and incorporates a maritime spatial plan. It also aims to look at the broader picture and consider other relevant trends in the region. The document is being officially revised every six years, but given that this is an adaptive process it is also continuously being revised for certain aspects within shorter periods, as soon as new relevant evidence is available. This enables the vision process to adapt to changes in the environment and new technology (i.e. technology readiness and commercialization of floating wind generators).

☞ FURTHER READING

- ENTSO-E. 2016. TYNDP 2016 Scenario Development Report[73]

- VASAB Long Term Perspective for the Territorial Development of the Baltic Sea Region[74]

- North Sea Policy Document 2016-2021[75]

Decision IV: Resources

SUMMARY:

- What questions can help determine the amount of resources?

- What steps might take the most resources?

- How much time was spent on different processes across the EU?

The amount of financial resources that are invested in a process depends on the geographical scope and depth of the analysis, needed expertise, stakeholder engagement, communication and dissemination. Usually, stakeholder engagement is a fundamental part of the development of a process and constitutes a large financial cost.

The following questions might help determine the financial resources needed for the process:

- What is the geographical scope of the process?
- Does analysis of future trends involve development of multiple scenarios and / or analysis of spatial data sets?
- Can the process rely on internal expertise (is there a need for hiring an external expert or for outsourcing some of the work)?
- Who should be engaged in a process and by what means (e.g. a questionnaire versus active involvement)?
- What is the extent of the communication and dissemination strategy (does it require a targeted approach)?
- What data and information is already available?
- Is there already a maritime spatial plan in place?

☞ TIP:

For stakeholder-heavy processes in a wide geographical scale it is useful to plan extra budget for travelling and for contingency actions, especially if stakeholder views are expected to be conflicting.

☞ TIP:

Keep track of budgeting so that these lessons learned can be used in the future rounds of budget planning – e.g. for the process revision and update.

☞ TIP:

Hiring experienced stakeholder engagement leaders can contribute to an efficient process. However, engaging local 'champion' to work pro bono has been beneficial in some cases,

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[73] ENTSOE (2015).

[74] VASAB (2009).

[75] Dutch Ministry of Infrastructure and the Environment (2015).

as this person is not perceived as a spokesperson of any specific agency, and as such is trusted by a wider community.

The budget required for stakeholder engagement will be informed by key considerations such as:

- Whether there are established processes for stakeholder engagement in place;
- The number and location of stakeholders to be involved;
- The method of engagement (e.g. face-face, virtually, written consultation, etc.);
- Whether external support and skills are needed (e.g. facilitators and strategic communicators);
- Whether a contingency budget is needed for unplanned events or extra work.

Alongside decisions relating to the financial resources, it is also vital that facilitators make good estimates of how much time is needed for each step of the vision-making process. Efficiencies may be gained by relating the timeline for the process to the timeline of a national MSP process or the high-level policy objectives. For members of the team, but also for wider stakeholders, investing in a vision process is time-consuming and accurate time-allocation is necessary.

☞ EXAMPLE:

The experience with the **SHAPE** process has shown that although a wider stakeholder engagement would have been beneficial, it is not always possible due to resource constraints; both in terms of budget, as well as the allocation of time for the process as a whole, and time allocated to the separate steps in the process.

☞ EXAMPLE:

The experience from the **Celtic Seas Partnership future trends** process shows that informing the stakeholders involved of the level and timeline of engagement foreseen and the dissemination of results is of key importance, also defined as ***expectation management***, as this is very dependent on the allocated budget, time and other resources. This process example has shown that it is often beneficial to allocate more time for dissemination after the conclusion of the development process, as this is a step in the process that is sometimes overlooked. Also, presenting the engagement timeline to stakeholders allows them to plan in advance which steps is relevant for them to be involved in.

The vision-making processes investigated in Europe have taken between one and a half and three years from beginning to end. Nevertheless, it has been noted that the 'will' or 'need' to develop a forward-looking document must be well in place beforehand. It is often difficult to determine the specific budget for a vision process within wider projects. However, it is important to set a time and budgetary limit for the process or a part of it, and give it a sense of urgency and dedication.

Vision processes[76]	Time spent (months)
VASAB LTP	36

[76] Some of the listed processes also included other aspects apart from developing a vision such as for example developing a pilot MSP. In some cases, it was difficult to distinguish the time devoted solely to the vision development, therefore some of the times listed refer to the whole length of the project.

BaltSeaPlan Vision 2030	18
EU Strategy for the Baltic Sea Region	24
Implementation Strategy for the Baltic Sea	8
Long-term vision for Knokke-Heist West	24
GAUFRE	24
Transboundary Planning in the European Atlantic	18
West Med Strategy	6
BlueMed	24

Table 3 Examples of the time needed for the FLP development

☞ FURTHER READING:

- SHAPE project[77]
- Celtic Seas Partnership Future Trends

Decision V: Facilitation team and essential skills

SUMMARY:

- What skills and expertise are usually required when planning to develop a vision?
- What questions might determine the necessary skills for a vision development process?

For visioning processes, the skills identified are generally aligned with those required for the MSP, although with greater emphasis on graphical and visualization skills and social skills, including moderation and strategic communication. A varied set of skills is an advantage and the Table 4 presents a suggested list of useful skills.

Necessary skills for the facilitation team
Management skills
Comprehensive approach - system thinking
Overall management, time keeping and coordination skills
Social skills
Stakeholder analysis including up-to-date knowledge of policy actors and their mandates, development and implementation of stakeholder engagement strategy
Networking, media and strategic communication skills*
Facilitation skills, diplomacy, active listening and conflict moderation skills
Interdisciplinarity and capacity to cooperate among different regions and with the private sector

[77] More information about the project available at: http://www.shape-ipaproject.eu/Statica.asp?p=project

Technical expertise – sectoral
Knowledge of innovation and investment trends; strategies, financial programming - EU funds
Business development skills
Technical expertise of maritime sectors/fields/topics
Technical expertise – analytical skills
Data collection, database management and analysis; scientific forecasting, modelling, feasibility study, risk assessment, spatial analysis - GIS
Policy and legislation skills
(Integrated Maritime) Policy and legislation expertise and analysis
Communication and visualisation skills
Knowledge of visualization and communication tools
Graphic design*

Table 4 List of essential skills for the vision development process

The following questions might help determine the set of essential skills for the process:

- Is there a history of diverging opinions between the process initiator and target stakeholders?
- Do important agreements need to be made?
- Are vision or scenarios developed as part of the MSP process?
- Is there a plan for a comprehensive communication and dissemination campaign?

In some cases, it is beneficial to have a **neutral external and independent analyst** of sectors or of cumulative impact analysis, as an input to stakeholder workshops. If there is a history of diverging opinions between the process initiator and target stakeholders (i.e. environmental NGO and the maritime business community), the facilitator might opt to hire a **professional communicator** in order to neutralize the process.

If a vision or scenarios are developed as part of the MSP process in order to set the scene and provide a path for the MSP itself, then the development process needs a **specialist with good knowledge of the given policy context and/or good policy analysis skills**. Linking with other relevant visions and high-level policy commitments is important to avoid inconsistencies.

☞ TIP:

Sometimes policies in fields that a first glance do not seem related could be a relevant link, i.e. a food strategy linking with a fishery strategy.

Process outputs along with possible actions, responsible actors and timelines will usually need to be agreed on among various stakeholders, sometimes internationally. Hence, quality **facilitation and moderation of workshops and meetings** is emphasised as sometimes lacking, but highly important. In general, a good facilitator will design workshops that combine learning and information sharing with interactive tools for group work[78].

Effective communication of the process and dissemination of the results is also an important skill needed to ensure involvements of relevant actors in the process, and active use and take up of process outputs. Media can be involved including a short movie, TV, newspaper articles as well as social media content. A vision process can be an opportunity to connect with those who are usually underrepresented as well as for education and outreach. Therefore, the knowledge of appropriate tools and media can ensure effective communication[79]. Having **local opinion leaders** as part of the facilitation team might also be relevant. This includes identification and engagement of those who could promote the process, demonstrate commitment and encourage related civic actions[80]. This could imply connecting with e.g. women's networks, journalists' networks and other relevant networks and associations. So far, this practice has been predominantly used in local contexts, but it could be also useful for processes initiated on a wider geographical scale. Identifying local leaders[81] would also allow for better adaptation to the local context, and contribute to the feeling of ownership[82].

[78] For more information about interactive methods visit Building Block IV on page 52

[79] For more information about communication and dissemination methods visit page 62

[80] Usually defined as defined as citizens working together to make a change

[81] For more information about local leaders visit The Whales We Want example on page 62.

[82] For more information about the Snow Ball effect and the Stakeholder Network Analysis, both applicable in this context, see pages 42 and 44

6. SECOND LEVEL DECISIONS: BUILDING BLOCKS

Following the first-level decisions, planners engaged in a vision development process will need to make second-level decisions, which are defined here as building blocks. The five building blocks are presented in following chapters, each with multiple tools and methods, offering vision developers the flexibility to add, remove or refine tools and methods based on the specific needs, pre-conditions and first-level decisions of their vision process. Each process will contain a different combination of building blocks, depending on the specific needs and questions such as 'Do we need to involve stakeholders and if so, who?' and 'Do we need to analyse future trends and if so, how will we do this?'.

Second Level Decisions – Building Blocks	
• **Background research** • **Methods analysing future trends** • **Stakeholder identification, analysis and engagement strategy**	• **Interactive methods** • **Ensuring continuous commitment and active use**

Table 5 Example of a typology with 5 building blocks

Building Block I Background Research

SUMMARY:

- What sources are often used and what questions are researched in literature?
- What are the means and methods for collecting information from stakeholders and how are these being used?
- What techniques for structuring and analysis information can be used and how?

Desk research

Desk research is usually carried out at the beginning of the process to generate an **information baseline** and ensure links with existing strategic high-level policy visions and objectives.

Questions that may be asked at desk research phase include:

- What is the current situation with respect to sea use in key sectors (including environmental protection)?
- What trends are apparent in maritime sectors and marine environment?
- What policies exist that might influence the development of maritime space?
- Are there any policy targets for sectors that might influence the development of maritime sectors?
- Are there any "burning issues" or conflicts between sectors?

Analysing the existing frameworks, such as general policy priorities, may highlight preferred future development trajectories for the planning area. In order to ensure policy coherence, it is important that the process links to other relevant frameworks. Where there is no national policy framework, supra-national policy frameworks can be used as a basis. This includes the EU policy frameworks, or even global frameworks such as the Sustainable

Development Agenda[83]. Identifying existing (policy or spatial) priorities helps make the vision a useful (complementary) tool in achieving more general objectives for an area. In local contexts, for example, links with territorial development and land sea interaction are relevant to be considered.

Trends in key sectors can be researched to give added information on potential impacts on the space in question. Some of these trends may be actively encouraged by the existing policy and strategic framework, others result from more general drivers at the international or national level.

Some processes have first developed **baseline studies and issues papers** (i.e. Irish Sea Issues and Opportunities) to have a good overview of existing conditions and issues. This presents an inventory step where the rationale for building a vision is developed. Sources of information commonly used include industry reports, or even data baselines such as tax registers or demographic data for more in-depth analysis of certain aspects. Baseline information can also be used to prepare a subsequent stakeholder process and used in communication, i.e. here are the issues we need to think about in order to develop the strategy or plan, what are your views on those issues? The baseline is then used to start off the vision process. In other cases, the collection of information is first done through interviews and workshops and then supplemented by additional desk research.

☞ EXAMPLE:

The following three vision processes – **BaltSeaPlan Vision 2030**, **Implementation strategy for the Baltic Blue Growth Agenda**, as well as the **Irish Seas Issues and Opportunities** - developed short briefing papers based on extensive desk research, which were distributed to workshop participants prior to the workshop. In all three cases the briefing papers contributed to common understanding of relevant concepts and helped to focus discussions of the workshops to already identified issues.

Stakeholders as a source of information

Stakeholders are valuable sources of information and can contribute to the scoping and scenario development phase as well as the verification of the results. They can also connect the process leaders to other relevant stakeholders. There are many methods for obtaining information from stakeholders, including interviews and focus groups or the use of social media. The two main decisions are to be made when planning the stakeholder engagement to collect information. First is the choice of moderator for the workshop and / or the interviewer who needs to have a combination of technical, as well as communication skills. Second is the composition of the working group: the choice of stakeholders and meeting place, the periodicity of the workshops and / or interviews, and the method of invitation are all important factors for success.

Interviews with sector representatives and / or other relevant stakeholders could take place to collect a range of relevant information. Interviews are useful when direct information is being sought rather than a discussion. An example would be to ask sector representatives to rate the speed of developments, or to explain trends.

Apart from individual interviews, **focus groups or workshops** are typical social science methods used in vision development processes. Although they can also be used to obtain information, they are often designed to elicit preferences; a preferred state of the environment or preferred future spatial choices. Focus groups can also provide information on stakeholder perceptions of changes and main issues to be dealt with by policy-makers.

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[83] UN General Assembly (2015).

Focus groups can also be used for participatory mapping, e.g. to map expected future trends in maritime sectors. Focus groups are usually led by a moderator; several focus groups can be organised as part of a larger workshop[84].

☞ EXAMPLE:

The Netherlands North Sea Scenario development process used participatory mapping (Figure 6). A total of 19 GIS base maps were produced and used during the workshop to capture the input from a moderated group of experts.

Figure 6 Participative mapping example

Surveys allow to reach out to a large number of stakeholders. However, it should be noted that response rates may get very low unless the survey is very carefully designed and followed up on. Surveys can only be designed around a limited amount of (often closed) questions and are therefore mainly useful to validate existing findings, rather than to collect new information. Some of the user-friendly software to create online surveys and analyse responses are:

- AddPoll
- Google Forms
- Survey Monkey

Live Q&A and poll software such as sli.do[85] could also be used during events to collect viewpoints from a larger audience.

Webinars are a useful communication tool that can enhance wider public engagement and transparency of the process. While in the US Regional Planning Bodies[86] largely rely on this type of communication (e.g. to present draft documents), webinars are not commonly used in the EU. Webinars can be helpful for processes covering large geographical areas, or when there is a need to engage stakeholders from remote places i.e. islands or mountainous areas. There is a range of webinar hosting software differing in price and payment schemes (free vs monthly vs yearly subscriptions), number of participants, and other features such as live polls or webinar recording.

Finally, **twitter or other social networks** should not be underestimated as a means to create or gather opinions and information. One tool for analysing the data from the social media is **Blurrt[87]**, a social media insights platform. The Wales We Want (The WWW) used Blurrt for collecting and understanding posts in real-time, and picking out what's most relevant, interesting, engaging and fun to make the content that can be used. **Twitter Polls** are now also used to create short polls and the results can be seen instantly.

☞ EXAMPLE:

[84] More on the interactive techniques for moderating **focus groups** can be found in chapter Interactive Methods, page 52

[85] Available at: https://www.sli.do

[86] More information available at: https://www.doi.gov/pmb/ocean/regional-partnerships

[87] Available at: http://blurrt.co.uk

The BaltSeaPlan project hired a team of three external experts to facilitate the process to develop a vision for how the Baltic Sea could look like in 2030 if maritime spatial planning had been carried out by all countries by that time. Rather than taking an entirely 'visionary' approach, the common spatial vision wanted to extrapolate from current reality, taking into account the existing priorities and policies that already set the stage for the development of the wider Baltic Sea Region (BSR).

As a preparatory step to developing the **BaltSeaPlan Vision 2030,** the expert team analysed the international and national policy context that had influence on the Baltic Sea space. The guiding framework was provided by EU policy on the one hand – which is more or less prescriptive – and international strategy documents on the other, which have been agreed as part of international institutions, such as HELCOM or VASAB. In addition, actual trends were analysed to indicate where developments were headed to and which uses of the marine environment were likely to be significant in the mid-term. This wider context also helped the common spatial vision to tie in with other strategic visions, ensuring that they are complementary.

The documents were mainly screened for the following type of information:

- significant driving forces that are considered to have an impact on the Baltic Sea space;
- any specific spatial trends and pressures on the Baltic Sea space;
- specific spatial conflicts or synergies in the Baltic Sea;
- spatial targets;
- non-spatial targets.

Work was mainly desktop research, analysing international documents and national reports. Results from focus groups, moderated as a World Café held at a BaltSeaPlan partner meeting, were also included.

Techniques for structuring and analysing information

In order to structure and analyse the information collected through desk research, interview, and/or workshop, and to prepare them for possible use in a vision development process, some of the techniques described in following chapters can be used.

- **SWOT**

The SWOT technique is used to analyse the internal strengths and weaknesses as well as external opportunities and threats. This technique is usually used to structure qualitative information. The classic SWOT diagram is a two by two matrix. The four quadrants in the SWOT matrix are: strengths, weaknesses, opportunities, and threats. SWOT is seen to have limits when it comes to developing a sea-basin wide vision. This is due to diversity of countries and thus difficulties to generalise strengths and weaknesses as well as opportunities and threats, as these might differ widely across countries.

☞ EXAMPLE:

The four **scenarios for the Latvian MSP** were built to support the formulation of strategic goals, priorities and objectives. The strategic assessment of scenarios by SWOT analysis was carried out during three coastal regional stakeholder workshops. Using the world café setting, the participants provided input for the SWOT analysis of each scenario. Four mixed groups with different representation of sectors were setup to promote varied discussions.

☞ FURTHER READING:

- Baltic Scope project – Development of a Maritime Spatial Plan: The Latvian Recipe[88]

☞ EXAMPLE

During the four interactive workshops for **the Implementation Strategy for the Baltic Blue Growth Agenda**, the facilitators provided a flipchart on which the layout of a SWOT analysis was drawn. During semi-structured roundtable discussions participants jointly decided which elements should be classified as Strengths, Weaknesses, Opportunities or Threats. In a final step, participants than decided on the related priority actions necessary to make use of opportunities and strengths as well as overcoming weaknesses and minimizing threats. The participants were invited to comment on the draft briefing papers before and during the workshops, and were also invited to comment on a second draft that was developed after the workshops, incorporating the input received. During the workshops, emphasis was placed on interactive discussion and documentation using active listening, post-its on flipcharts and a rich picture developed during the visual facilitation session.

- **PEST(LE) and STEEP**

PEST(LE) refers to Political, Economic, Social, Technological, (Legal and Environmental) factors. PEST(LE) is a manual technique commonly used to organise information collected through desk research, interviews and workshops, and to prepare them for use in the scenarios or forecasts. STEEP is another technique similar to PEST(LE), referring to Social, Technological, Environmental, Economic and Policy factors.

☞ WHEN TO USE SWOT, PEST(LE) and STEEP:

- for the written transcripts with small amount of data;

- at initial stages of the process to familiarise yourself with the data;

- to analyse scenarios.

☞ TIP:

SWOT, PEST(LE), STEEP are fairly easy to use, but are time consuming.

☞ EXAMPLE:

For **the Implementation Strategy for the Baltic Blue Growth Agenda**, a stakeholder-heavy process was organized, starting with an online survey and semi-structured interviews with 60 selected stakeholders, concluding with four interactive workshops. During the desk research phase, the process facilitators used the STEEP methodology to structure the information received from the desktop research as well as the information gathered from the survey and the semi-structured interviews. On the basis of this analysis, the facilitators developed a draft briefing paper for each of the defined topics[89], that was sent to the participants before the workshops. In these briefing papers, the STEEP analyses were shown as well as 'opportunity areas' for the Blue Growth sectors in the Baltic Sea Region.

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[88] Veidemane, K. et al (2017).

[89] The analysis focused on four topics: blue bioeconomy, environmental monitoring, tourism and shipping.

- **Q-Method**

Q Method is an analytical method used to investigate patterns of opinion among groups of people. It helps understand what stakeholders perceive as important actions towards future development. The method allows for the generation of statistically significant results and its participant-driven nature minimizes research bias. The Q-method[90] can be used during surveys, interviews and workshops.

☞ EXAMPLE:

The **POLIS Litoral Ria Formosa project**[91] used the Q-method for its action plan development in order to understand what stakeholders perceive as important actions towards future development of the Ria Formosa Coastal Zone in South Portugal.

- **DPSIR – D**rivers, **P**ressures, **S**tate, **I**mpact, **R**esponses

The DPSIR framework is a causal framework and structural aid for describing the interactions between society and the environment, often used in a scenarios development process. In the framework, driving forces (such as industry developments) lead to pressures (e.g. pollution), changes in the state of the environment, impacts (e.g. on human health) and ultimately policy or management responses. For example, the DPSIR framework is used by the European Environment Agency in its reporting activities (Figure 7).[92] This framework is an extension of the pressure-state-response model developed by OECD and is often used in research projects. It can also be usefully linked to concepts such as ecosystem services and their change in line with certain developments.

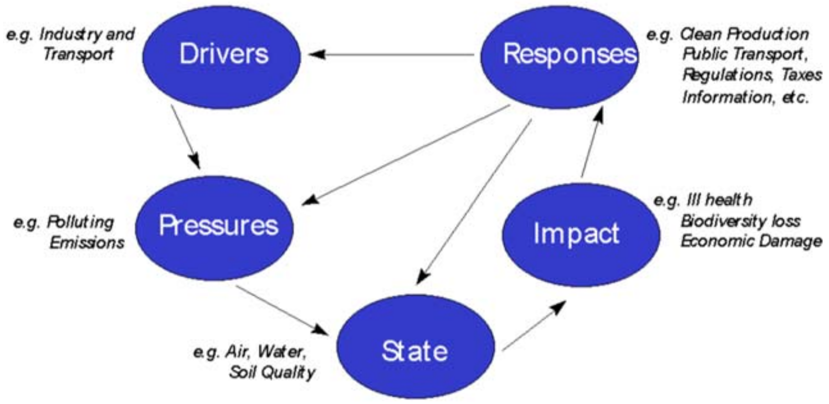

Figure 7 DPSIR template[93]

☞ EXAMPLE:

DPSIR was successfully used as a framework for assessing the added value of specific initiatives for the Western Mediterranean sub-sea basin[94]. It helped to analyse the response capacity of the region, define the ability of actors (businesses, research organisations, authorities and the civil society at large) and the ecosystem to fully address the range of posed challenges.

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[90] For more information about the Living Q used at workshops, visit page 53.

[91] More information available at: http://www.polislitoralriaformosa.pt/polis.php

[92] Peter, K. (2004).

[93] Imbd.

[94] WestMed Maritime Initiative. (2017).

- **Life Cycle Approach**

In order to focus on what is important today, but particularly also on what can be expected tomorrow, it can be useful to apply a Life Cycle Approach. This holds true especially when considering impacts of maritime economic activities. In one of the Blue Growth studies[95], these have been classified according to their development stage as follows:

- *(Pre-) development stage*: In the pre-development stage, inventions have been made, but most promising outputs are still to be defined. Much Research and Design is required. In the development stage, the possible outputs are clear, but commercial viability still needs to be proven;

- *Growth:* characterized by (strong) economic growth and/or employment growth. Smaller sized companies can enter the market, while prices of technologies gradually go down;

- *Maturity:* economic activity remains stable at a big size. Market positions of main players are clear and competition is fierce;

- *Decline*: economic activities are declining, no major innovations are being made, and it is clear which players are dominating the market.

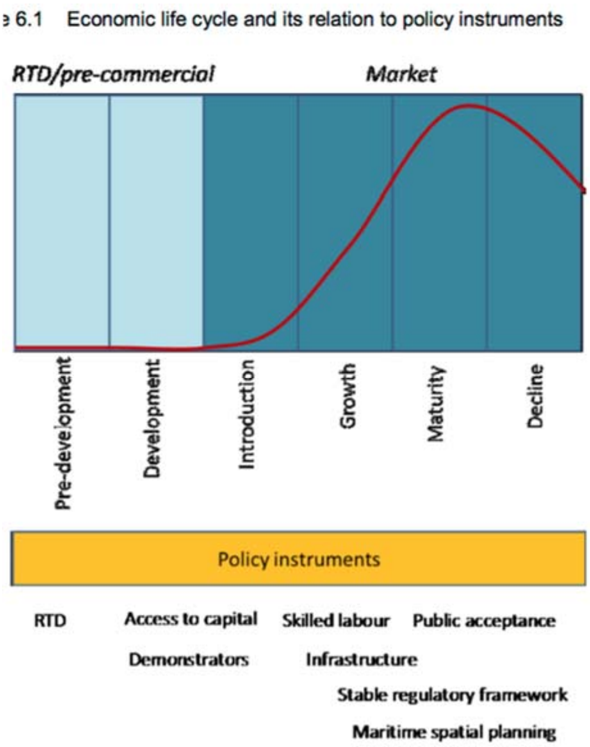

Figure 8 A simplified presentation of the life cycle approach[96]

Evidently, when it comes to future-oriented initiatives such as visioning, as well as MSP, particular focus is to be placed on growing as well as developing or emerging maritime activities. For example, the expansion of offshore wind energy generation (growing sector) is having considerable spatial consequences – which leads to deviations which are much

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[95] Ecorys/Deltares/Océanic Développement. (2012).

[96] Imbd.

more pronounced from today's state, than for mature activities (e.g. fisheries). By the same token, emerging activities, such as wave or tidal energy generation, may not have spatial impacts to be considered in the short-term planning, and therefore could rather be taken into consideration in the vision should this technology break through. However, trends in sectors development, such as declining oil and gas energy production, should also be taken into account (e.g. decommissioning of oil & gas platforms).

- **Objectives and the trends matrix**

Apart from defining the vision, some processes also include the development of more specific objectives and/or actions as part of the strategy, action plan or a roadmap. The maritime trends identified through different sources such as workshops, interviews or desk research, can have varying relevance for individual objectives that are being developed as part of the process. Figure 9 provides an example of how rough indications of the effects of trends could be defined for each of the objectives. Trends that have a negative impact on reaching the objectives more difficult are marked with minus sign (-). Trends pointing to easy gains are marked with the plus sign (+), referring to trends that may support the objectives.

Links between trends and objectives		Objectives			
		O1	O2	O3	On
Trends	T1	-			+
	T2	+		+	-
	T3	-	-		+
	Tn		+	-	+

Figure 9 An example overview of objectives and trends affecting them (adapted simplified example from **Looking Towards 2030**)

☞ FURTHER READING:

- Looking Towards 2030: Preparing the Baltic sea Region for the Future[97]

- **Software-aided techniques**

☞ WHEN TO USE:

- For fairly quick analysis of large amounts of information;
- When including voice and video transcripts as well as written sources.

Some of the popular software for analysis of mainly qualitative data are NVivo, Atlas.ti and Transana. The general characteristics of each of the software are shown in Table 6.

Software	Focus	Description
NVivo	Text analysis software	Supports qualitative and mixed methods research. It is designed to help to organize, analyse and find insights in unstructured, or qualitative data such as interviews, open-ended survey responses, articles, social media and web content.
Atlas.ti	Text, visual, audio and video analysis software	Serves as a workbench for the qualitative analysis of large bodies of textual, graphical, audio and video data. This tool can be used to clarify meanings and relationships between different communication outlets.
Transana	Text, visual, audio and	Also a workbench for different kinds of communication outlets. More specifically, the software is a tool for analysing

[97] Böhme, K. et al (2016).

	video analysis software	video and audio data and to work with complex media data to discover the meaning behind messages.

Table 6 Main characteristics of the popular qualitative data analysis software

☞ TIP

Extra time is needed to familiarise oneself with the function of the software.

☞ EXAMPLE:

Atlas.ti was used for qualitative data coding during development of the **Study on Lessons for Ocean Energy Development[98].** A total of 57 stakeholders were consulted through semi-structured interviews on the critical barriers in ocean energy technology development. By processing the transcripts of these interviews, important differences in perception emerged between several categories of stakeholders (business sector including developers, academic stakeholders and government representatives).

☞ EXAMPLE:

NVivo was used by the **Celtic Seas Partnership future trends** development process where interview transcripts and notes taken during the workshop were entered into NVivo and coded to country, question number, sector, ideal scenario or tool category and combined where appropriate into categories. This resulted in 585 nodes themed into 10 dominant categories spanning all countries and all sectors to form an overview of an ideal scenario.

Building Block II Methods for analysing future trends

SUMMARY:

- When to develop a forecast and scenarios?
- How to develop scenarios?
- When is it useful to develop different types of scenarios as part of the same process?
- How to use 'wild cards' to account for extreme changes?
- What methods can be used for presenting scenarios?

The analysis of future trends is often conducted using scenarios or forecasts. This section clarifies the main difference between the forecasts and the scenarios, and explains in which situations is it useful to employ these. Given that scenarios development is more common in the vision development process, the section goes on to explain the scenario development process and relevant tools and methods used in this regard.

Difference between a forecast and scenarios development

A forecast is usually developed to estimate what the status would be, if the trends will continue without taking any action. Forecasts are useful in order to understand what actions are needed to reach the preferred vision[99] and are often used in vision processes that focus on a specific topic or are driven by a certain issue. Forecasts analyse historical and present data to make an estimate of a variable of interest (e.g. intensity of tourism

[98] Fraunhofer and Ecorys. (2011).

[99] Information collected during the interactive session at the Member States Expert Group in Maritime Spatial Planning

activities) at some specified future date. In comparison to scenarios where additional work is needed to choose a preferred scenario, a forecast is directly usable in decision-making processes. Developing a forecast usually requires strong quantitative and technical skills and is often outsourced to an external expert.

Scenarios are typically used in exploratory approaches to visioning, while forecasts are usually employed in processes driven by a certain issue in order to predict how the future may unfold and what actions might need to be agreed upon. Scenarios can take different forms including a story or "narrative", with maps, graphics, drawings, pictures, etc. Modelling and/or simulations can also accompany scenarios. Scenarios developed in a participative way can help to promote engagement and ownership of the process by stakeholders. If an aim is to build scenarios as a part of the exploratory process, there is no limit to the imagination of participants. Whereas if an aim is to build scenarios as part of the normative process, the participants are limited in their options by the fact that the desired future is already defined and **backcasting scenarios**[100] are used to find the best way to attain that vision.

Scenarios also make it possible to evaluate decision-making processes, actions to be taken, and visions or strategies developed as part of the normative process. Usually, a number of alternative scenarios can be developed in parallel (e.g. 3 to 4) which are then compared with one another in order to illustrate different future developments and to let the consequences of various developments and/or decision-making processes play out against a virtual backdrop. In this way, scenarios serve to test the reliability, robustness, and effectiveness of policies.[101]

☞ WHEN TO USE:

- to predict how the future may unfold and what actions might need to be agreed upon.
- to evaluate visions or strategies developed as part of the normative process.

☞ TIP:

A large number of scenario development processes analysed reveal that a scenario or forecast development requires significant skills in analytical, graphic and communication techniques. The capacity within an organization to undertake the development of scenarios and the expertise it has are important limiting factors that need to be acknowledged from the outset.

Scenario development process

Although there are many different kinds of scenario development techniques, the scenario process always unfolds in a broadly similar manner (Figure 10).

- The first phase of the scenario process deals with the identification of the scenario field by establishing the precise questions to be addressed and the scope of the study.
- The second phase identifies the key factors that will have a strong influence on how the future will unfold.

[100] For more information on backcasting scenarios visit the exploratory approach on page 16

[101] Kosow, H., Gaßner, R. (2008).

- The third phase usually examines what range of outcomes these key factors could produce.

- The fourth phase involves condensing the list of central factors or bundling together key factor values in order to generate a relatively small number of meaningfully distinguishable scenarios.

- The fifth and final phase of the scenario process can be labelled "scenario transfer" and involves applying the finished scenarios for purposes such as strategy assessment[102].

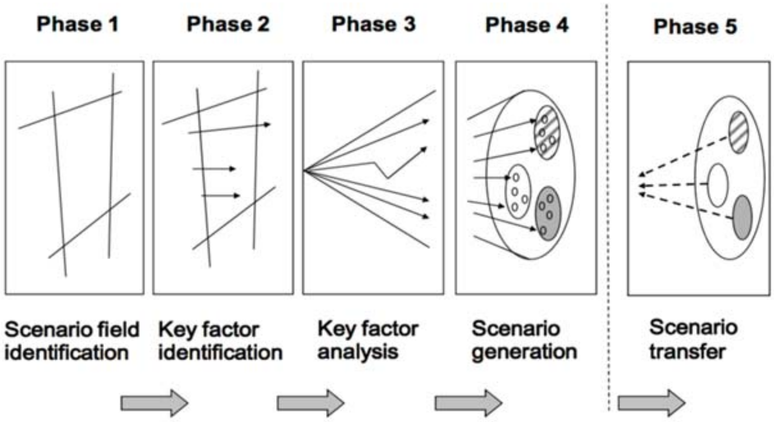

Figure 10 Visual presentation of scenario development phases[105]

The choice of scenario techniques depends on the overall aims of the process, the target audience (e.g. policy makers, industry, or public in general), geographical scale considered and the time and resources available within the responsible organisation. Several techniques can be combined and/or coupled with modelling and simulation using, for example, **InVEST**[103] or **ExtendSim**[104] software.

☞ FURTHER READING:
- VALMER scenario toolbox

One of the first steps in a scenario making process is to identify drivers of change and establish key variables. These drivers and variables can be environmental changes, uses and human activities, governance and management contexts, etc. Changes in the system may represent a risk or an opportunity; they can also be influential or be influenced and show high or low flexibility. These variables can be evaluated via a coordinate system according to their degree of unpredictability and their degree of impact[106]:

- High uncertainty/ high impact: Pivotal Uncertainties

These are likely to have a direct impact, but their outcome is uncertain. These are pivotal in the sense that the way they turn out may have strong directional consequences. These are the areas that will determine the shape of different scenarios.

- High uncertainty/ low impact: Potential Jokers

These are pretty uncertain as to their outcome and less relevant. However, it could be dangerous to treat them as mere 'noise'.

- Low uncertainty/ high impact: Significant Trends

These have a more direct impact on the relevant question and it should be possible to anticipate their effect.

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[102] Imbd.

[103] nn. (n.d). InVEST

[104] ExtendSim

[105] Imbd.

[106] Kosow, H., Gaßner, R. (2008).

- Low uncertainty/ low impact: Context Shapers

These are relatively certain and, therefore, will surely shape the future context.
Example of a simplified template for evaluation of variables is provided in Figure 11.

The key uncertainties provide a logical framework for developing scenarios. Each quadrant in Figure 11 represents a different combination of uncertainties and different future outcomes. The challenge is to develop scenarios that describe in more detail the characteristics of each future outcome and show how it could come about. Characteristics for each scenario were developed and formed the basis for the scenarios.

Variables and hypotheses can be identified together with stakeholders and experts during workshops, interviews and/or surveys. At the start of the process, it is advisable to define at the start of the process a maximum number of critical uncertainties (e.g. 5 to 10 maximum). To identify these critical uncertainties, it is useful to ask the following questions: "What determines the evolution of the system? On what can we act? "[107]

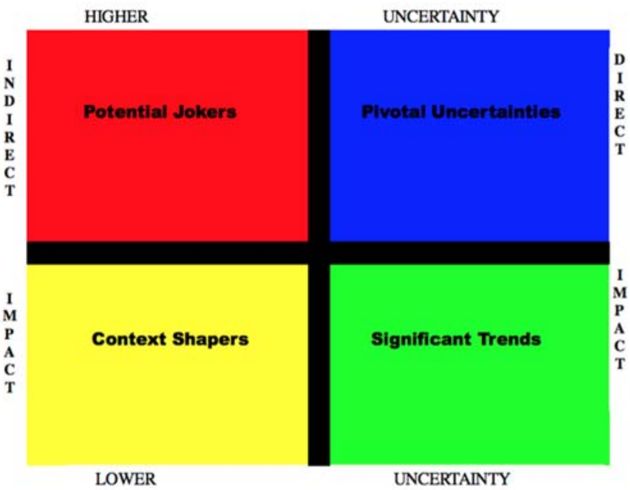


Figure 11 Evaluation of variables according to their degree of unpredictability and their degree of impact[108]

☞ EXAMPLE:

The **BaltSeaPlan Vision 2030**[109] process has analysed the horizontal and sectoral policies and funding programmes, as well as trends in key maritime sectors on a national, sea basin and EU level to identify the impact of policies and trends on the development of sea space. Impacts were categorised according to strength and immediacy (Figure 12)

IMPACT	DIRECT	MEDIUM	INDIRECT
STRONG			
WEAK			

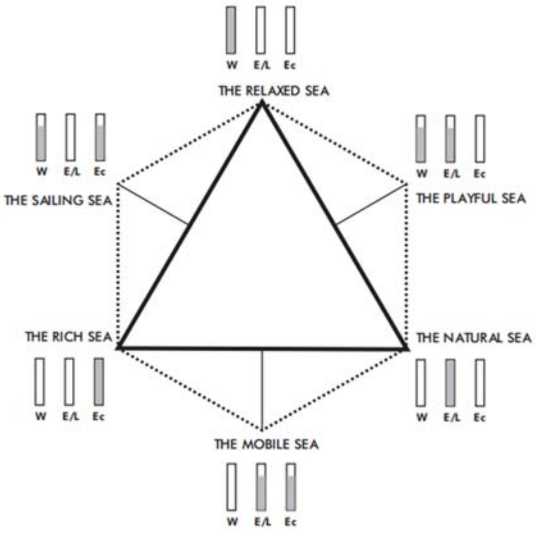
Figure 12 Simplified template for the analysis of strength and directivity

Variables (e.g. ecosystem or economic change as a result of particular drivers) can then be associated with different evolutionary hypotheses, in general between 2 to 4 hypotheses per variable. For example, the development of offshore wind farming may be strong or weak, and lead to large areas of sea space required or less space depending e.g. on the renewable energy policy environment.

☞ EXAMPLE:

[107] Marine Ecosystem Services. (2017).
[108] Branagh, S., Ratcliffe, J. (2002).
[109] Gee, K. et al. (2011)

☞ The **GAUFRE (Towards a Spatial Structure Plan for Sustainable Management of the Sea) project**[110] team has used a software to develop a 'What if' model to potentially be used by decision makers. Modelling allows integrated and interdisciplinary assessments of changes over time in a multitude of causal relationships. They allow for the exploration of different scenarios and policy options. MSP expands beyond the boundaries of a single department and requires collaboration between several departments and agencies on both federal and local levels.



Stella Architect[111], a software for modelling and interactive simulations was used for the GAUFRE project. It offers the ability to create holistic system diagrams that can be simulated over time. The systematic view allows the examination of the system and its behaviour to determine where changes are beneficial and to avoid decisions that have a negative impact. Additionally, modelling allows the realization of interactions that are not so obvious at first sight and allows for clear visual communication of results. Insights should be structured in an engaging way to engage with the target audience.

Figure 13 Example of six GAUFRE project scenarios

Overview of GAUFRE scenario development steps:

- Analyse policy objectives and their spatial claims;
- Identify key values (well-being, ecology and landscape, economy);
- Develop six scenarios (Figure 13) based on these values;
- Agree on a vision balancing all the scenarios.

Background scenarios and micro futures

As part of the same process, two different types of scenarios can be developed inspired by the different issues or different scales. Building two types of scenarios helps to better address important differences per sector or region in what is relevant and uncertain.

☞ WHEN TO USE:

In processes encompassing large geographical region and/or wide content scope.

☞ EXAMPLE:

The 'Blue Growth'[112] project developed two types of scenarios, based on a **DPSR**[113] method: 'general background scenarios and 'micro-futures', which were subsequently combined. The general steps of the process included:

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[110] More about the project available at: http://www.vliz.be/projects/gaufre/

[111] Available at: https://www.iseesystems.com/landing-b.aspx

[112] Wolters, H.A., Gille, J., De vet, J.M., Molemaker, R.J. (2013).

[113] To find out more about the DPSR method visit page 32

I Development of general background scenarios; from a top-down approach, four more or less realistic futures were painted for a timeframe of 10 – 15 years. They were shaped by external drives (exogenous conditions) and were considered therefore to be a given – they could not be altered by policy makers or individual actors alone.

II Development of micro-future scenarios; from a bottom-up approach, depicting likely futures specific to maritime economic activity under investigation for a timeframe of 10 – 15 years, deemed desirable and ambitious, but at the same time realistic. Desirable in terms of Europe 2020 policy goals: smart, sustainable and inclusive. Ambitious and realistic in terms of aiming to achieve above-average estimates, but always rooted in the best available information from literature and interviews. In total, the report includes 11 micro-futures, each structured in a similar format. They have been ordered by their development phase (mature, growing and pre-development). In each of the descriptions they provide:

- **Definition of the activity**, its value chain, main characteristics and the competitive position of the EU;
- **Potential development**: assessment of how the economic activity could develop in terms of focus, size, and impact. Included are the external drivers and the response capacity of the actors;
- **Uncertainties**: if the potential development were to come true, what would be required from the relevant drivers in the outside world? Would they develop in all four background scenarios or is the micro-future specific to one outlook?
- **Synergies and tensions**: what are the potential environmental consequences? What other maritime economic activities are expected to benefit?
- **Framework conditions** that need to be fulfilled in order to reach the future potential of this maritime economic activity.

III Combination of the two approaches – with the aim to review whether the conditions for utilising the future potential is likely to be met. When doing so, it is important to reiterate that the background scenarios cannot be influenced by individual (policy) actors, and that they are acknowledged as a possible future.

Wild cards / Black Swan

Trends and other developments come with a wide range of uncertainties. *Wild cards*, also called *black swans*, could be used to stimulate thinking about possible – though unlikely – events, which may change the development paths. Some of them may actually be not so 'wild' and perhaps could be viewed as emerging trends, so called 'seeds'.

☞ WHEN TO USE:

When it is important to consider unlikely events that can have an extreme impact to the space in question or overall development path (e.g. volcano eruption, tsunami or earthquake, extreme changes in supra-national policy or global economy)

☞ EXAMPLE:

In the report **Looking towards 2030: Preparing the Baltic Sea Region for the future**[114], the wild cards were divided in the four categories: 1) political, 2) societal, 3) environmental, and 4) technological. The examples of the wild cards used in this report, include, 'Globalisation stalls or even moves backwards', 'Privatisation of EU Commission

[114] Böhme et al. (2016).

Services', and 'Breakthrough in nuclear fusion technology changes energy landscape and stops global warming'. These wild cards were largely taken from existing studies. Apart from the general description, the following was provided for each of the wild cards:

- early indications;
- likelihood;
- impact;
- duration;
- geography.

Presentation of scenarios

Depending on their purpose, scenarios may have different formats, from a narrative text to a creative visual presentation; but they are often a combination of the two. The thread of the story is of key importance, as is the tone of narration, which can be positive and uplifting, worrisome, what-if, action-oriented, etc. Some processes opted for fully narrative scenarios while most of them have used narrative as just one of the component of their scenario. On the other hand, visual scenarios can be used to present information in an engaging and easily understandable way, as a means to generate stakeholders' interest and input. Graphic design that is attractive to the reader will increase the level of engagement. Visual scenarios can be developed in many different ways and combinations are widespread.

For decision makers to understand multiple futures to frame decision-making	For wider stakeholder community to understand the impact of future trends and importance of planning	For stakeholders to consider different options when deciding on the preferred vision
Depicted through a brief narrative with eye-catching and easy-to-read graphics and diagrams that are to the point and based on data as accurate as possible;	Videos capturing future activities such as unmanned shipping or multi-use platforms to stimulate forward thinking. Online-based interactive timelines, but also stories, letters, pictures, etc.	Options depicted through role play, postcards, pictures, and drawings produced during workshops.

Table 7 Matching scenario purposes and presentation methods

Building Block III: Stakeholder engagement

SUMMARY:

- How to identify relevant of stakeholders?
- How to analyse stakeholders?
- How to develop a stakeholder engagement strategy?
- What are some common stakeholder engagement challenges and how to overcome them?

Producing a robust process (be it only a vision development process or also associated SMART goals and associated actions) and the necessary coalition of support are typically connected. This is due to the fact that people are likely to feel more ownership of, and commitment to the ideas they helped to develop. In addition to stakeholders' interests being represented, involvement also provides stakeholders with an opportunity to start thinking about the economic, social and cultural value of their sectors as well as other sectors, and to consider in more depth the impacts and synergies with other sectoral interests.

Careful stakeholder identification and analyses can help inform decisions about who to involve in the vision development process, in what ways, when, and for what reasons. Stakeholder identification and analysis techniques are fairly well developed and used in the strategic management field[115], but many of these have not yet been applied in the maritime vision development context.

Methods for identification of stakeholders

In general, a part of the stakeholder identification phase could include the creation of stakeholder lists, which could also be checked with the stakeholders and kept as inclusive as possible. Stakeholder mapping that does not follow a more targeted approach includes the collection of all agencies, NGOs and official institutions that are assumed to have some interest in the process. A quality check and traceability of the stakeholder list is important in order to track who was invited and who actually participated in the process, and to avoid possible complains at the later stages.

- **Snowball**

The *Snowball* is the most commonly used approach in the analysed processes. This approach implies that the first stakeholders engaged in the process will be asked for suggestions on other potentially relevant stakeholders. Stakeholders that were already involved in relevant past processes could constitute the initial list, as they tend to be more interested to be involved again. This way, a list of stakeholders is made rather spontaneously and new stakeholders are added on a continuous basis. This method can also be used as a verification for lists made through other, more structured approaches. The approach is quite useful for identifying stakeholders in a local context, as there is usually a history of well-established networks.

☞ TIP: Prevent biased engagement - some stakeholders important to the process might be missed because those in the existing network might be favoured or there might be a history of negative relationship.

- **Marriage approach**

Stakeholder identification could include *marriage* of vertical and horizontal integration. Horizontal integration is meant to ensure identification of relevant actors across industrial sectors, including sector authorities, sector representatives (i.e. associations and clusters), as well as commercial enterprises themselves. The environment is usually also considered a sector, and apart from public authorities, the environment would also be represented by the environmental NGOs. On the other hand, the vertical integration concerns the identification of different levels of governance, be it local, regional, national, macro-regional, sea basin scale or EU-wide.

- **Quadruple helix approach**

The *Triple helix* approach refers to the identification of stakeholders in three distinctive spheres: academia, industry, and government, each with the ability to contribute according to its institutional function in society. For a more top-down approach, a *Quadruple helix* approach is now also used to include society-at-large as a fourth sphere. Both were

[115] Eden, C. et al (2009).

originally developed and implemented as territorial innovation approaches attempting to exploit the potential of socio-economic systems.

Involvement of *hybrid organisations* is also relevant, but categorizing them by using clearly defined spheres might be challenging. Hybrid organisations are defined as 'multi-sphere' or 'multiple-nature' entities and synthesize features of University, Industry and Government. Organisations more aligned with academia are, for example, interdisciplinary research centres, or technology transfer offices in universities. Those aligned with industry are firms' research labs, industry-university research consortia, business support institutions including science parks, and business/technology incubators. Those aligned with government are publicly funded research or innovation centres.

☞ FURTHER READ:

- Using the Quadruple Helix Approach to Accelerate the Transfer of Research and Innovation Results to Regional Growth[116]

☞ TIP:
Stakeholder identification should first focus on institutions, organisations and informal groups, not individuals. Later on, other methods and criteria are needed to identify relevant people in identified institutions. The Snowball Effect can be helpful in this regard.

Methods for stakeholder analysis

- **Force field analysis**

The *Force field* analysis[117] (Figure 14) is used to assess various forces for and against proposed change. The analysis is conducted by listing, on one side those who oppose, and on the other side those who support proposed changes. Once this is clear, it is easier to determine what engagement strategies need to be employed so that the impact of opposing forces is reduced and driving forces are strengthened. Therefore, the Force field is a particularly useful technique for developing an action plan to attain the vision and/or objectives.

☞ WHEN TO USE:

- To determine if a proposed vision can get support – identifies opponents and allies;
- To suggest actions to reduce the strength of the obstacles;
- To identify obstacles to implementation of actions.

[116] Cavallini, S., et al (2016)

[117] Force Field Analysis is a management technique for diagnosing situations, developed by Kurt Lewin, a pioneer in the field of social sciences.

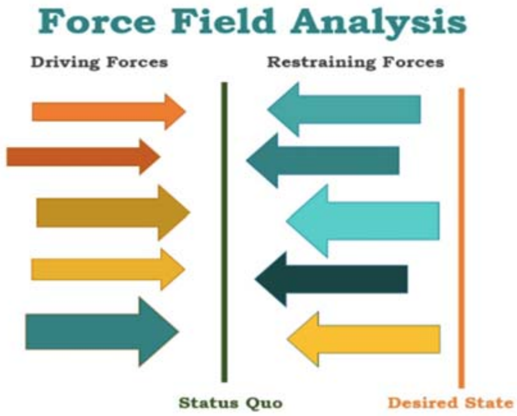

Figure 14 Simplified template for a Force Field Analysis

☞ FURTHER READING:

- MUSES project Analytical Framework[118]

- Resolving Social Conflicts and Field Theory in Social Science. 1997. K. Lewin. American Psychological Association, Washington DC[119]

- NHS Improving Quality[120]

☞ TIP

Build in reminders to check the analysis again. This ensures that you take time out to reflect on the forces, what you've already done, how it has worked, what you should carry on doing, and what you should discontinue

- **Stakeholder Network Analysis**

Stakeholder Network Analysis (SNA) allows for estimation of stakeholder power on the basis of the strength and extent of their network, and their position in it. SNA aims to identify the key stakeholders who hold the network together, i.e. those that are trusted and that can enhance communication for the active use of the vision and/or implementation of a strategy, roadmap, and action plan.

Central actors are usually identified by analysing the demography of the network:

- degree of centrality[121] – the number of ties a stakeholder has, visualised with the size of the node (shape);

- distance among actors - how actors are embedded within the network, visualised with the distance from other stakeholders in the network.

☞ TIP:

118 Zaucha, J. et al. (2016).
119 Lewin, K. (1997).
120 NHS UK (2014).
121 Prell, C. (2012).

Actively engaging stakeholders in the central position of the network can be highly effective as they can promote engagement[122] using the relationships they already have.

☞ FURTHER READING:

- Social Network Analysis in use for Strategic Transboundary MSP: Case of the Adriatic Sea[123]

- MUSES Stakeholder Profiles[124]

☞ EXAMPLE:

The SNA was used in the **MUSES project** to prepare Stakeholder Profiles Report and the Action Plan with the aim to stimulate the practical adoption of the sustainable ocean multi-use concept. The central idea was to understand which stakeholders have the power to influence a wide range of institutional stakeholders, and could best support the implementation of the action plan. Position and network strength analysis was conducted using multi-relational data matrix, analysed using **UCINET**[125] software. The **NetDra**w[126] software was then used to visualize the network structure of identified stakeholders (Figure 15).

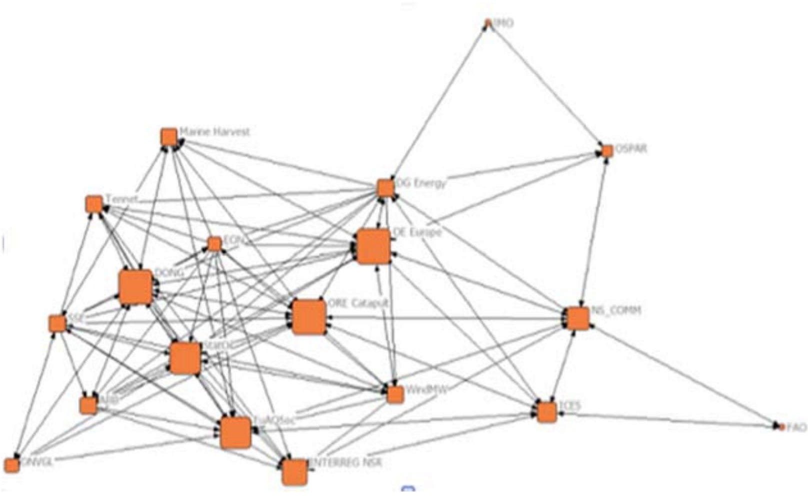

Figure 15 an example of the SNA visualisation sourced from the documentation of the Multi Use in European Seas (MUSES) Action Plan preparation

- <u>**Stakeholder matrix**</u>

A Stakeholder Matrix analysis helps to determine which stakeholders are essential to the process or who is the most affected by the process has the strongest impact and should be engaged even if this entails a significant effort. A number of variations can be used depending on the purpose of the analysis, and what information about stakeholder can help in preparation, implementation or uptake.

☞ TIP:

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[122] Markantonatou, V. et al (2013).

[123] Lazic, M., and Markantonatou, V. (2016).

[124] More information available at: https://muses-project.eu

[125] Borgatti S.P., Everett M.G., Freeman L.C. (2002).

[126] Borgatti SP. (2002).

Mapping of opinion leaders, general public or non-organised groups with this method is complicated, so other more relevant methods (e.g. Stakeholder Network Analysis) are more suitable.

☞ TIP:

Stakeholder characterisation using the matrix (legitimate, powerful, interested, etc.) can be narrowed or expanded depending on the aim of stakeholder involvement.

Four possible models for structuring stakeholder analysis matrix:

I A widely-used model is the analysis of **Power and Interest** (Mendelow's matrix)[127]. In this model, power is placed along one axis and defined as the level of authority a stakeholder has in the project. The 'level of interest' is assigned to other axis and defined as likelihood that a stakeholder will take some sort of action to exercise his or her power.

II Power and Influence model uses the same methodology, but replaces Interest with Influence along one of the axes. The influence is usually defined as the level of involvement the person has, or rather claim, in terms of ownership, rights, or interests. Influence can also be defined as the impact the project has on the stakeholder. Preferably, those who are affected the most and have the greatest power are the ones who should be prioritized for engagement.

III Another model combines **Power and Influence** in the same column and analyses **Interest** separately (Figure 16)[128]. Starting from any of these models, any other intra-group prioritization criteria can be added, if it seems to be appropriate. The analysis by using one of these matrices usually divides the stakeholders into four groups. The specific type of treatment is than defined for each of these groups.

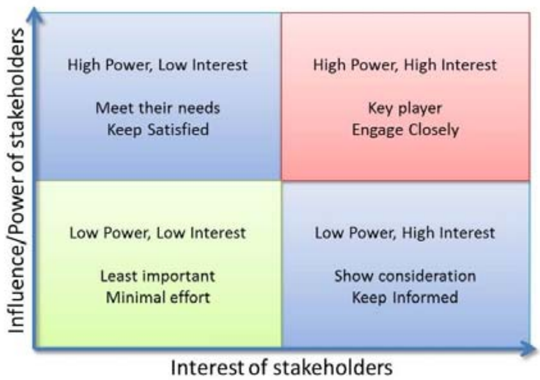

Figure 16 Influence/Power and Interest of stakeholders[129]

IV Power, Legitimacy and Urgency model[130] is often used in business management (Figure 17) and differentiates between legitimacy and power. These two are distinct attributes that can be combined to create authority (defined as the legitimate use of power[131]) but can exist independently as well. Adding the stakeholder attribute of urgency helps move the model from static to dynamic. Urgency exists only when two conditions are met: (1) when a relationship or claim is of time-sensitive nature and (2) when that relationship or claim is important or critical to the stakeholder.

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[127] Mendelow, A. (1991).

[128] Eden C., Ackermann F. (1998).

[129] Retreived from: http://www.projectizing.com

[130] Ronald K. M., Bradley R. A, Donna J. W. (2009).

[131] Weber, M. (1947).

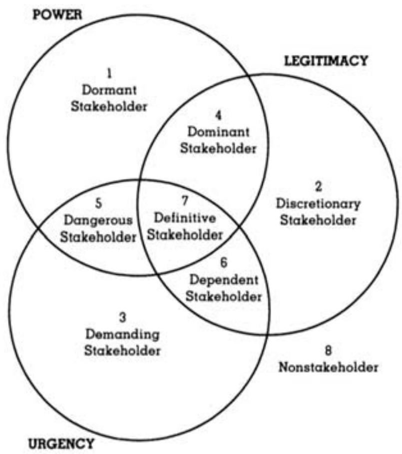

Figure 17 Stakeholder analysis model that combines the power, legitimacy and urgency

☞ TIP:

Stakeholder Identification and Analysis should be performed by a responsible authority and preferably an expert group to justify judgements and bridge the knowledge gaps about the power and expertise of stakeholders.

Stakeholder engagement strategy

Having analysed the stakeholders, a stakeholder engagement plan with specific type of treatment is defined for each of stakeholder groups, and addressed through a communication plan[132]. In communication with stakeholders, pointing out the concrete benefits of involvement could be very useful to attract them to the process. In the invitation letter, some concrete short-term benefits should be listed in bullet points, such as sharing reports from other sectors, joining a new stakeholder forum, sufficient time for networking, etc.

The combination of appropriate methods[133] for stakeholder engagement and making up the stakeholder engagement strategy depends on the purpose of the process, as well as type and number of stakeholders identified as relevant to the process. Some of the key questions also include: how to balance stakeholder inputs? How to ensure that not only those with a loud voice are heard? Stakeholders are usually engaged for the following purposes:

- Collect and validate information[134];
- Point out to, or serve as a link with other relevant stakeholders[135];
- Consent and endorse the proposed outputs such as joint principles, preferred scenario, vision, objectives, and/or actions. In some cases, stakeholders are also already involved in defining purpose of the process;
- Disseminate information about the process and its output and mobilize for the joint action (e.g. through civic actions and conversations)[136].

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[132] Ackermann F., Eden C. (n.d.).

[133] To find out more about engagement methods visit page 52 Interactive methods

[134] To find out more about stakeholders as a source of information visit page 28

[135] To find out more about stakeholder identification - Snowball effect visit page 42

[136] To find out more about ensuring commitment, take up and dissemination practices visit page 64 and 62

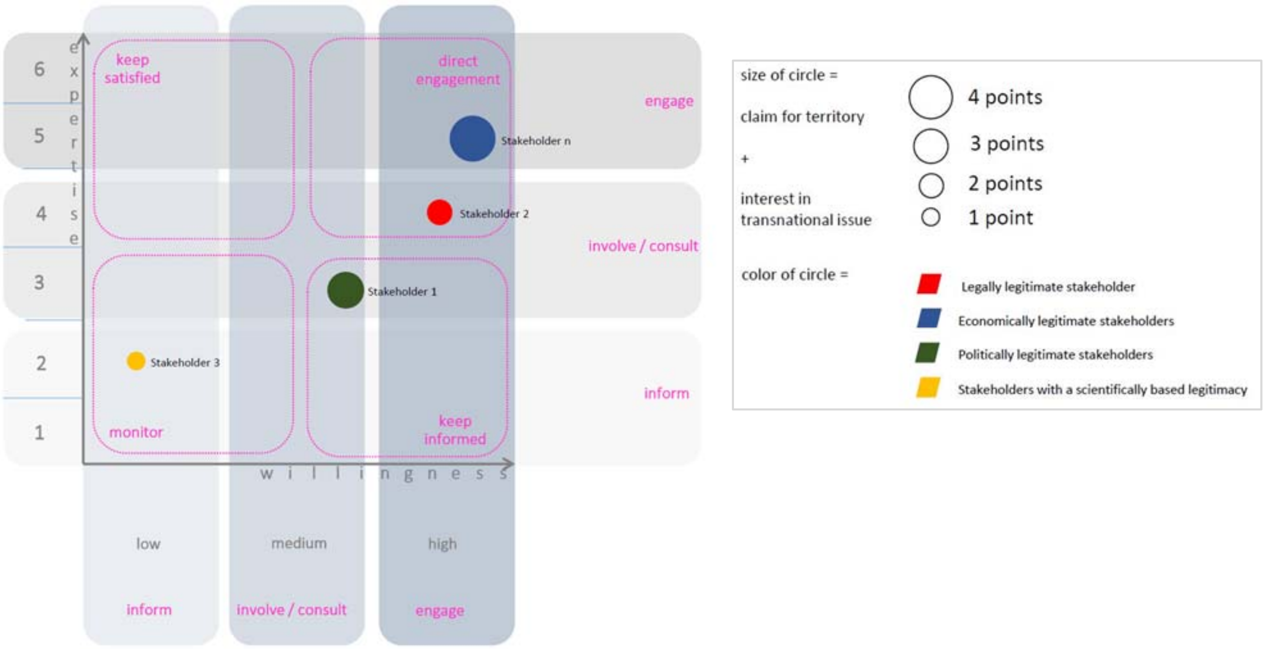
☞ EXAMPLE:

In the **Baltic LINes project**[137], stakeholders have been analysed using the matrix based on the four characteristics (Figure 18).

	Main characteristics				
	Power (high, medium, low)	Relevance from a transnational perspective (high, medium, low)	Willingness to participate (high, medium, low)	Claim for territory (yes, no)	Interest in transnational issues (high, medium, low)
Stakeholder	**Expertise**			**Value**	
Stakeholder 1					
Stakeholder n					

Figure 18 Stakeholder analysis table

The rating per characteristic is translated into scores, i.e. 3 for high, 2 for medium, 1 for low. The indicator “expertise” is the sum of power as well as relevance. Its maximum value is six. The indicator “value” is the sum of claim for space (1 for yes, 0 for no) and interest in transnational issues. Its maximum value is four. The stakeholders are plotted in circles in the matrix (see figure 20) according to their expertise and their willingness to participate. The latter ranking is directly taken from the stakeholder analysis table. The value of each stakeholder is expressed by different sizes of circles (Figure 19). The basis of their legitimacy (legal, economic, political, scientific) is expressed through a colour code. The location of the plotted stakeholders in the matrices quadrants indicates how they should be involved.



[137] More about the project available at: http://www.vasab.org/index.php/balticlines-eu

Figure 19 Stakeholder mapping matrix

☞ TIP:

Visually mapping stakeholders allows to better understand their characteristics, and determine level of involvement needed for each stakeholder group.

☞ EXAMPLE:

As part of **The Wales We Want (The WWW) communication process** a video "I want a Wales where…" was produced and presented on the online platform which was good tool to inspire people during the workshop. The facilitation team also worked with different networks, for example, the Women's Institute, that would hold a workshop for the purpose of the process. Postcards were used in a way that people could fill them in, stating their preference and also ask any questions they might have in relation to the process. The WWW team also tracked the responses received as a result of these conversations from individuals and groups in response to the line "I want a Wales where..." which came in multiple forms from the postcards, online responses etc. There were 6474 recorded responses, which were later categorised by theme (Figure 20).

118 known conversations that happened across Wales from 6 February 2014 to 28 May 2015 are on record. These are a mix of facilitated and self-initiated conversations. These took variety of forms, from presentations in the early stage on what the conversation was about, to workshops, awareness raising at staff and board meetings, The WWW staff speaking at conferences, public engagement and interventions as exhibitions and shows, stand-up comedy and workshops, video interviews and surveys.

Figure 20 TWWW recorded responses categorised by theme

☞ TIP:

Postcards and drawings are particularly useful at a community level or with informal groups. Drawing and playing videos is useful for communicating with children.

☞ EXAMPLE:

The VASAB Long-term Perspective (LTP) for Territorial Development of the Baltic Sea Region 2030[138] was initiated by a regional body (VASAB – Visions and Strategies around the Baltic Sea Region) and employed a predictive forward-looking approach to define important transnational challenges and trends up to 2030. Ahead of the workshops and roundtables, background documents were sent to participants, and were then discussed during the event along with prepared statements and identified challenges. The aim was to ensure a sense of ownership among the workshop participants and to create a 'living' document. The main contribution from stakeholders included verification and validation, and their input was especially valuable during the scoping phase with the suggestions of trends and challenges. Stakeholders engaged came from broad backgrounds, including local and regional governments and businesses.

☞ EXAMPLE:

For the development of the **Maritime Strategy for Västra Götaland in Sweden**[139], several workshops were organised with stakeholders to ensure that they felt ownership throughout the process. To keep them engaged, communication with the stakeholders used a targeted approach, ensuring that they only received information that was of specific relevance to them. Throughout the process, stakeholders were asked about their interests and needs, also related to some specific issues such as funding and legislation. During the workshops, participants were invited to give inspirational talks in an informal setting.

☞ EXAMPLE:

The **Transboundary Planning for the European Atlantic**[140] employed an inclusive stakeholder engagement process with methods such as workshops, information sessions and a final workshop. When certain stakeholders could not be reached, personal contacts and snowball effects were used. A web viewer was also developed to visualize the process and to actively engage all relevant stakeholders. Given the extend of the stakeholder engagement and geographical scope of the process, planning wisely for the travelling budget for the stakeholder engagement was essential in the context of this process. Involving many stakeholders was important, as well as to engage them efficiently and interactively. Visuals were extensively used and documents were written with a type of stakeholders in mind. It was important to take into account different cultures and to prepare stakeholders that are new to the process. Inviting stakeholders well ahead of the meeting was also essential.

☞ EXAMPLE:

Development of the **National Spatial Development Concept (NSDC) 2030**[141], included one year of face-to-face meetings with several stakeholders, including governments and businesses. For each meeting, a draft document was prepared which formed the basis for discussions. The main goal was to verify information and to change the draft document with input from the stakeholders.

The following table list some of the major stakeholder engagement challenges identified in vision development processes.

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[138] VASAB. (2009).

[139] Region Vastra Gotaland. (2008).

[140] TPEA project. (2014).

[141] Polish Ministry of Regional Development. (2011).

Engagement challenges	Good practices
Challenges in involving the maritime business community.	Time is very relevant in the business context. Involving the business community early on and being explicit on anticipated timetables is important. To secure interest, it is also important to clarify how participation and process outputs will benefit them.
Certain individuals are difficult to handle and do not trust the process.	Ensure that all relevant stakeholder groups are engaged early on, and through informed and fair processes. The moderator needs to establish fair ground rules and encourage constructive arguments.
Need for a neutral/unbiased stakeholder engagement process lead and workshop moderator	The characteristics of the stakeholder target groups should be taken into consideration when choosing the lead for the engagement process. For example, if the target stakeholder group is the maritime business community, an agency with a more business oriented or even neutral background could be considered as a better option to present the engagement process than an environmental NGO. An important factor is also the neutral and in some cases, autonomous chairperson of the stakeholder process. To adapt the process to the local context, a person chosen should be someone who knows the area in question well.
Low motivation and interest among stakeholders	Involve local 'opinion leaders' or local 'champions'; who could represent and advocate the process in their networks. Also, involving a known public figure to represent the process often improves engagement. Using means and methods of engagement adapted to stakeholder needs, e.g. webinars for large geographic areas or for those unable attend, interactive workshops with terminology and visuals that everyone present can easily understand, informative materials for research community, substantial time for networking, etc.
Difficult to get the stakeholders to break out of their 'sectoral shell', and to get them to think beyond 5 years.	Prepare a compilation of principles that could surpass the sectoral approach. For example, in Belgium Vision Process 2050, one of the principles was 'no more private ownership at sea', which made for some very lively discussions and this helped to get the stakeholders talking. An unmanned shipping movie was played at the GOUFRE stakeholder workshop to inspire people to think far ahead. Pictures of possible future or even possible extreme unrealistic future scenarios could also initiate a lively discussion.

Table 8 Summary of the stakeholder engagement challenges and selection of advises

Building Block IV: Interactive methods

SUMMARY:

- How to generate information in a structured and interactive way?
- How to jointly organise information?
- How to ensure a feeling of ownership and commitment?

The most often used engagement methods, in analysed vison processes, are workshops, while most processes use more than one engagement method. Choice of interactive methods depends on several questions, such as what is the purpose of the process, what is the content scope and what approach will be used to structure the process. Nevertheless, the geographical scale, as well as the time and budget allocated to the development of the process are also relevant determinants of the engagement approach.

☞ FURTHER READING:

- Multi-Stakeholder Partnership Guide[142] Handbook on Creative Facilitation Techniques. Permaculture Facilitator's Resource Book for Training and Assessment[143]

☞ TIP:

Having thematic workshops can cause stakeholder fatigue. Stakeholders to whom all topics are relevant might find it difficult to attend each of the workshops. Integration of information collected through thematic workshops can also be challenging.

An experienced workshop facilitator would need to have the following skills:

- ✓ The ability to intervene in a way that adds creativity to a discussion rather than leading the discussion and taking away creativity from the group;
- ✓ The ability to understand the group process and dynamics – successfully address these inequalities in the group dynamic;
- ✓ Identify who is dominating in the group and how stop them;
- ✓ Identify who looks bored and how to draw them in to the process.

Used in what context	Method
Generation of information	World Cafe
	Visual facilitation
	Brainstorming
	Living Q method
	In-person or phone interviews
	Microsite
Organisation of input	MSP Challenge game
	SWOT /PEST/STEEP/Living Q
	DELPHI
	ARDI
	Mind mapping
Ensuring feeling of ownership and commitment	Contract game
	Signed letter

Table 9 Overview of interactive methods described under this chapter and their purpose

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[142] Brouwer, H., Woodhill, J. (2015). Interactive online Guide available at: http://www.mspguide.org

[143] Schneider, P., Brown, J. (2006).

Living Q-method used for workshops

The Living Q method is an interactive exercise to investigate the perspectives of participants who represent different stances on an issue, by ranking and sorting a series of statements. It serves as a tool to understand stakeholders' perspectives and values, and to foster discussions in a living, communicative and playful environment. For example, the Q-method has been used during several workshops, including the NorthSEE (Edinburg, 2016), the European Maritime Days (Pool, 2017) and the North Sea Commission Marine Resources Group (2017). The tool can be adapted so that different kinds of questions can be asked, based on the background knowledge of the participants. The tool is easy to implement and allows participants to gain quick understanding about the key aspects.

☞ TIP:

To facilitate the best discussions, thorough preparatory work usually needs to be done (e.g. statistical analysis), and the setup needs to be developed in advance.

☞ EXAMPLE:

Following steps were used for employing Living Q-method at the NorthSEE workshop:

- Choose a table. You will be given 5 coloured, numbered tokens on post-it notes and a questionnaire.
- Please fill in the questionnaire and look at the 5 statements on MSP. Think about how strongly you disagree or agree with them and indicate your initial ranking for each on the sheet.
- Allocate ONE of your five tokens to each statement, from strongly disagree (-2) to neutral (0) to strongly agree (+2) NOTE: Only one statement per category is possible.
- Each statement will be considered in turn. The different rankings are set out around your table. Place your token on the sheet of paper with the ranking you think is appropriate for the statement and stand by it. The facilitator will guide you through the process.
- Explain and discuss your decision. If you want, you can write your views on the coloured post-its and stick them on the sheet of paper with the relevant number for the statement under consideration.
- Change your mind – if you want!
- Repeat from step 4 until all statements are considered or until we run out of time

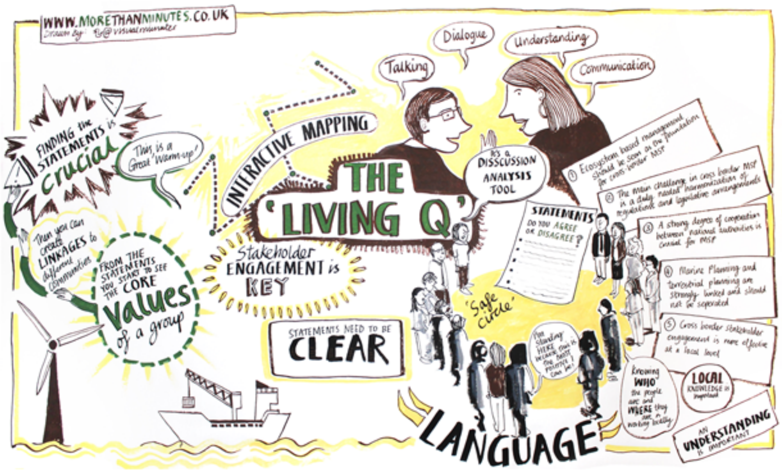

Figure 21 Q-method visualised by MoreThanMinutes.co.uk at the SimCelt final conference workshop

MSP Challenge

MSP Challenge 2050 is a multi-player, computer-based simulation game about Integrated Maritime Spatial Planning. The game is based on spatially referenced data being fed into a simulation model, including a temporal analysis, and results in multidimensional visualizations. It gives insight into the diverse challenges of sustainable planning of human activities in the marine and coastal ecosystem. This is an innovative format to quickly introduce the essence of MSP to outsiders, in particular politicians, decisions-makers and stakeholders from various sectors using the sea space. It aims to cultivate a spirit of collaboration and show what can and cannot be achieved through MSP.

Players design a marine spatial plan according to functional, sectoral and integrated interests within a particular jurisdictional area. Gaming provides a safe environment to explore the consequences of alternative planning options for the space in question (e.g. policy intervention or co-location of activities) with no real-world consequences. It provides better understanding of cause and effect relationships through trial and error. Added benefits include the development of shared language, relationships, and trust among players. The game is also found to contribute to empowerment, ownership and commitment to the actual MSP process.

The MSP Challenge 2050 comes in two formats; as a board game and as a computer supported simulation-game. The MSP Challenge board game is particularly useful in places where the MSP is a new concept as it introduces participants to the MSP concept, while the computer game is more suited for stakeholders with previous experience with MSP.

☞ FURTHER READING:

- Software demonstration webpage[144]
- MSP Challenge software website[145]

World Café

This method is appropriate for smaller groups where there is a need to engage people into dynamic conversation and foster conditions for the emergence of collective intelligence. Main steps include dividing people among different tables and fostering informal 'café atmosphere' discussions.

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[144] Available at Open Channels: https://www.openchannels.org/videos/marine-spatial-planning-challenge-2050-software-demo

[145] Available at: https://www.mspchallenge.info

☞ FURTHER READING:

- theworldcafe.com

☞ WHEN TO USE:

- generate input, such as information on future trends and their spatial implications;
- conduct an in-depth exploration of key challenges and opportunities;
- share knowledge and stimulate innovative thinking;
- engage people who are meeting for the first time;
- learn about each other perspectives;
- deepen relationships and mutual ownership of outcomes in an existing group;
- identify synergies, and solving smaller conflicts among stakeholders.

☞ EXAMPLE:

The World Café method was successfully used during **BaltSeaPlan Vision 2030** partner meetings to discuss the proposed vision and collect additional input on future trends and policy perspectives. The method is also often used during the **Member States Expert Group in Maritime Spatial Planning,** as it allows participants to exchange lessons learned and opinions on topics of shared importance in a more informal environment.

☞ TIP:

- Not useful when there is a need to convey only one-way information or drive towards an already determined outcome.

☞ TIP:

It is helpful to have:

- fewer than 10 participants per table;
- several predefined discussion questions;
- neutral moderator at each table to stimulate, but not influence the discussion;
- note taker to record the possible input.

☞ FURTHER READING:

The Change Handbook: The Definitive Resource on Today's Best Methods for Engaging Whole Systems[146]

DELPHI – an expert based forecasting

DELPHI is a structured communication method to develop a systematic, interactive forecasting that relies on a panel of experts. It is also used for longer-term assessments

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[146] The Change Handbook. Available on SlideShare: https://www.slideshare.net/michaelpupil16/the-change-handbook

where extrapolations are irrelevant. It is designed to avoid domination by particular individuals. The experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymised summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments. It is sometimes criticized for stressing consensus over divergence.

☞ EXAMPLE:

The DELPHI method was used for development of **scenarios for Latvian MSP**[147] and structuring discussion with stakeholders. Scenario-building was based on identifying possible development directions (axes) according to the determining factors (driving forces) that affect the marine resources and spatial use, and the situation in maritime sectors. Each of the four scenarios included the following components: i) a narrative story which describes the policy, economic, technological, social and demographic as well as environmental and climate driving forces; ii) semi-quantitative assessment of trends based on selected indicators; iii) spatial solutions.

☞ FURTHER READING:

- THE FOR-LEARN ONLINE FORESIGHT GUIDE[148]

ARDI - Actors, Resources, Dynamics, and Interactions

ARDI[149] is part of a companion modelling approach that makes it possible to engage a broad spectrum of stakeholders in the design and development of plans commonly used in land and water management fields. It is based on participatory workshops that set out to collaboratively imagine a future open, dynamic management system, capable of adaptation and anticipation, by gathering the various stakeholders in a partnership to examine conservation of the natural resources and promoting sustainable development. Its originality lies in the co-construction of a "conceptual model" of the functioning of the system, according to an overarching, negotiated development question. Ultimately, ARDI creates a graphical representation of how the stakeholders perceive how the system functions, including actors, resources, dynamics and interactions. It focuses on co-construction of the meaning and the sharing of information, and helps to create a shared representation of the whole system.

Micro Site – interactive online platform

A micro-site implies the development of an interactive online platform where the forward-looking process is presented. It can also provide discussion pages structured by different topics or by geographical area. This method is also suitable for engaging and capturing input from the larger society. A micro-site could also contribute to broader commitment to the strategy / vision implementation or uptake / active usage. Interactive online platforms are often used to generate a conversation about possible futures. Platforms often contain easy-to-share elements such as interactive scenario maps or infographics. Some platforms also capture the conversation within the microsite (conversation feed), so that the user can see what others are saying.

☞ EXAMPLE:

The **Celtic Seas Partnership future trends** used an interactive online platform to present their scenarios, as illustrated in Figure 22. This website allows users to manually

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[147] Veidemane, K., Ruskule, S., Sprukta, S. (2017)

[148] Available at: http://forlearn.jrc.ec.europa.eu/guide/0_home/index.htm

[149] Etienne, M., et al (2011)

manipulate the targets, thereby creating different scenarios, encouraging the user to reflect on the process.

The following features are included in the platform:

- interactive maps (created from existing material) with layers that can be displayed or hidden by the user;
- graphics or charts that can be manipulated by the user;
- case studies to bring each scenario to life.

Figure 22 Example of the Celtic Seas Partnership Future Trends online platform micro-site[150]

☞ EXAMPLE:

The **MEDTRENDS** project illustrated and mapped the main scenarios of marine economic performance in the Med-EU countries for the next 20 years. This project also uses an interactive online platform (Figure 23) to show an in-depth analysis of the current situation and future trends in four main marine economic sectors, their drivers and environmental impacts.

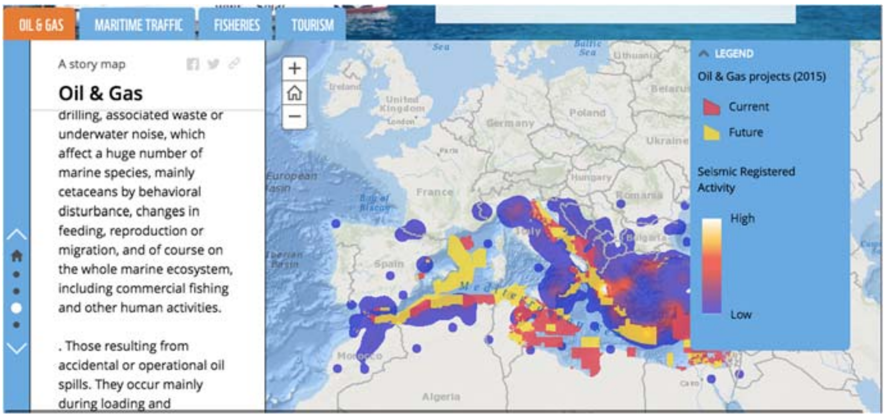


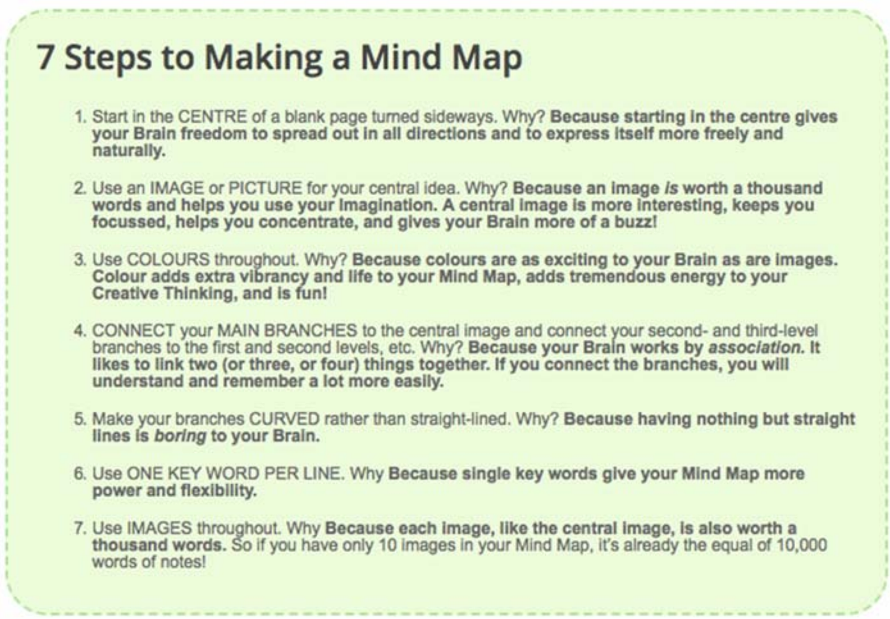
Figure 23 Example of the MEDTRENDS project interactive online platform[151]

Mind maps

[150] Available at: http://futuretrends.celticseaspartnership.eu

[151] Availabe at: http://www.medtrends.org

Mind-mapping is a technique that concerns the development of diagrams to visually organize information. A mind map is hierarchical and shows relationships between different aspects. It is often used to structure and analyse the results of brainstorming sessions with stakeholders. Mind maps can be drawn manually or by using computer aided software. A number of online software are available, such as iMindMap[152], FreePlane (free)[153], Coggle (free basic version)[154].



7 Steps to Making a Mind Map

1. Start in the CENTRE of a blank page turned sideways. Why? **Because starting in the centre gives your Brain freedom to spread out in all directions and to express itself more freely and naturally.**
2. Use an IMAGE or PICTURE for your central idea. Why? **Because an image *is* worth a thousand words and helps you use your Imagination. A central image is more interesting, keeps you focussed, helps you concentrate, and gives your Brain more of a buzz!**
3. Use COLOURS throughout. Why? **Because colours are as exciting to your Brain as are images. Colour adds extra vibrancy and life to your Mind Map, adds tremendous energy to your Creative Thinking, and is fun!**
4. CONNECT your MAIN BRANCHES to the central image and connect your second- and third-level branches to the first and second levels, etc. Why? **Because your Brain works by *association*. It likes to link two (or three, or four) things together. If you connect the branches, you will understand and remember a lot more easily.**
5. Make your branches CURVED rather than straight-lined. Why? **Because having nothing but straight lines is *boring* to your Brain.**
6. Use ONE KEY WORD PER LINE. Why **Because single key words give your Mind Map more power and flexibility.**
7. Use IMAGES throughout. Why **Because each image, like the central image, is also worth a thousand words.** So if you have only 10 images in your Mind Map, it's already the equal of 10,000 words of notes!

Figure 24 Seven steps to making a mind map[155]

☞ EXAMPLE:

The **Celtic Seas Partnership Future Trends** project made use of Coggle software (Figure 25). This was an intermediary step, where all the information from the workshops, were categorised, themed and then visualised using the software to organize the information for the scenario development.

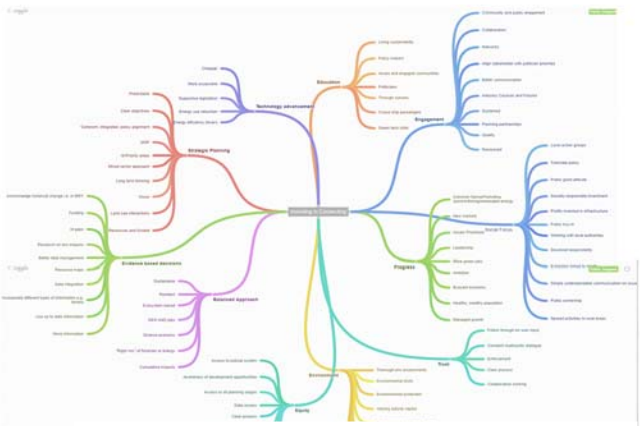


Figure 25 Example of a mind map (WWF for the Celtic Seas Partnership)

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[152] iMindMap App available at: https://imindmap.com/software/

[153] FreePlane App available at: https://www.freeplane.org/wiki/index.php/Home

[154] Coogle software available at: https://coggle.it

[155] Retrieved from: http://www.tonybuzan.com/about/mind-mapping/

Futures Wheel

The Futures Wheel is one form of mind mapping that allows for a more structured brainstorming and questioning about the future. The trend or desired change is written in the middle of a poster and then small spokes are drawn from the centre. Primary impacts or consequences are written at the end of each spoke. Next, the secondary impacts of each primary impact form a second ring of the wheel. This ripple effect continues until a useful picture of the implications of the proposed change is clear. For better visual results, this method can be led by a professional *visual facilitator*[156]. The futures wheel can also be done in a combination with *interactive backcasting*.

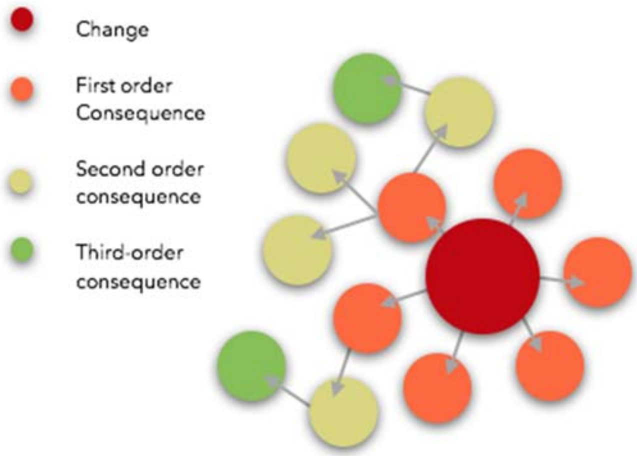

Figure 26 Example of a futures wheel template

Interactive Backcasting

Interactive backcasting is an exercise in which stakeholders choose one or several future images as the starting point for their analysis and subsequently, in working backwards to the present situation, interactively explore which interventions are needed to realise this future. In this exploration, the stakeholders identify milestones to be passed, opportunities to be taken and obstacles to be overcome 'along the way'. The method not only shapes the diversity between the future and the present but also between the many views and perceptions of the stakeholders involved. It provides a meeting – and at times a confrontation – between, for example, scientific and stakeholder knowledge.

☞ FURTHER READ:

- PARTICIPATORY METHODS TOOLKIT – A practitioner's manual[157]

Sketch Match

A Sketch Match is an interactive planning method, involving a series of interactive design sessions lasting up to three days. The Sketch Match session consists in forming work groups that analyse qualities, problems and potentials. Participants analyse and work out the spatial problems in a specific sea area, with the aim to meet a range of different objectives. The result of a Sketch Match is a spatial design, in the form of a map, visual story, model, 3-D GIS[158] visualizations, or whatever form suits the project best.

☞ EXAMPLE:

The Sketch Match was developed by Dutch Government Service for Land and Water management (Dienst Landelijk Gebied, DLG) for the project "Room for the River in Cat's Bend, Romania"[159]. The project aimed to develop a number of spatial draft plans for integrated flood management in the Galaţi–Tulcea region in Romania. The SketchMatch method was applied in Eforie and Sfantu Gheorghe study cases to identify and visualize potential development paths and facilitate the decision-making process for managers,

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[156] For more information about Visual Facilitation visit page 60.

[157] Slocum, N. (2003).

[158] Esri GIS

[159] Nichersu, I. et al. (2010)

policy makers and local stakeholders. The aim of the SketchMatch was to lay the basis for so-called 'spatial development sketches' for integrated MSP in the Black Sea region.

Visual facilitation

Workshops could be accompanied by a 'graphic recorder', who provides a 'live protocol' with key information, discussion topics and results of the workshop. The visual facilitation not only increases cooperation and interaction among participants, but the graphics created during the workshop also contribute to a coherent and engaging documentation which can be used further as part of the implementation of the process.

☞ TIP:

When hiring visual facilitators make sure they have some knowledge about the topic and provide them with substantial reading material in advance.

☞ WHEN TO USE:

- increase cooperation and interaction among participants;
- contribute to a coherent and engaging documentation;
- provide results to be used further as part of the document graphic design and dissemination process.

☞ EXAMPLE:

The **Implementation Strategy for the Baltic Blue Growth Agenda** (Figure 26) made use of visual facilitation. The graphic designer specially versed in maritime topics helped moderate the discussion and in the same time drawing on the large white poster paper. Questions usually used to facilitate the drawing relate to the links between elements including challenges, actions, actors, etc. Visuals produced under the Implementation Strategy for the Baltic Blue Growth Agenda were later also used also in parts for each of the report chapters. This was highly engaging exercise during the workshop where stakeholders were really moved to contribute. Everyone was able to see right away that their input is taken on board and made a piece of the overall picture. This ensured that stakeholders feel they are in the driver's seat and increased overall engagement with the process, and the feeling of ownership.

Figure 27 Example of the visual record for the maritime and coastal tourism team under the Implementation Strategy for the Baltic Blue Growth Agenda[160]

Building Block V: Ensuring commitment and take up

SUMMARY:

- What are the success factors?
- How to best communicate process and disseminate outputs?

Success factors

There are a number of factors influencing the success of the implementation phase. Among others, the benefits that a vision process can yield depends on a country's ability to ensure uptake of the results (e.g. integration of a vision with other strategic documents and processes such as development strategies and the maritime spatial planning), or direct implementation (e.g. of a strategy or action plan) through legally binding implementation mechanisms (i.e. legally enforced actions). Processes will therefore be diverse in character in terms of implementation mechanisms depending on specific political and regulatory context. It is crucial to have an agreement at the beginning of the process on the extent to which a vision is binding, and to ensure **political commitment** and links with policy agendas in other relevant fields (e.g. Food Agenda).

Preferably the whole process and the adoption should be done within one political mandate to ensure that is not affected by the changes in the government. Sustained, **strong overarching leadership**, preferably with a legal basis is crucial. Even if the process does not end with a fully agreed output, it can still identify gaps in the law, and parts could be taken up in decision making process, if there is a strong political support throughout the process. Lessons learned from the Portuguese POEM (Plano de Ordenamento do Espaco Maritimo) project are relevant in this regard, as POEM was never adopted due to a change of government (end of the political mandate).

In countries where no Integrated Maritime Policy is in place, all other political actors on a local and national levels should be involved to **jointly develop and agree on a vision**. Good examples on how this engagement has been organized can also be found outside the EU. Such examples are the Plan for the Gulf Hauraki Marine Park, New Zealand and the Rhode Island Ocean Special Area Management Plan, United States.

The need for **transparency** in vision making processes is also crucial – information on how the process is ongoing and what the next steps are should be available to everyone. This also allows stakeholders to plan their engagement on time.

The **shared enthusiasm** and the joint feeling that the driver is relevant (i.e. importance of the problem covered by vision) are also key factors for success and ability to implement. Resistance to the process, e.g. lobbying against it by certain groups, is an indicator that implementation may be difficult and that further work might be required, e.g. involving the dissatisfied group or explaining the long-term benefits of the vision. A vision may not please everyone, but acceptance is likely to be greater if everyone is involved from the start and there is broad-scale "buy-in" to the process. If the vision is not supported by the larger group of society than when a political mandate changes, the vision as such, or related actions, might be disregarded.

[160] Beyer, C. et al. (2017)

Dissemination and communication methods

Existing vision processes show that for the vision to be effective, it is crucial to have engaged end-users at very beginning and ensure sufficient time to communicate the process and disseminate outputs. The most success in reaching the wider audience was yield in processes where there was a good balance between the written reports and visually strong online presentation (i.e. interactive website).

Nevertheless, in some processes was helpful to have a dedicated person associated with a vision process, ideally with high-level political support. For example, for **The Wales We Want** vision development process, a well-known person - a Welsh actor and political activist, acted as an ambassador to promote work and good coverage on TV and radio. In processes that cover a wide geographical scale, having **local opinion leaders, or dedicated stakeholder engagement teams**, ensured better adaptation to the local context, and contributed to the wider feeling of ownership.

Use of different **social media channels** such as Twitter, Facebook and Instagram for communication during the process and the dissemination of the process outputs allows one to tap into a larger network.

Reaching out to industry actors was the most common challenge in past vision processes. Apart from having conferences, it was also important to approach maritime business community where they are i.e. talk to them during their own conferences/events. Moreover, to address this challenge, a '**vision roadshow**' as a series of conferences with business pitches were organized during the development of **Maritime Strategy for Västra Götaland**[161].

☞ EXAMPLE

The Wales We Want vision development process provided much learning along the way and the open and organic approach was seen as a strength. It was a challenge in capturing and interpreting the responses as they were so varied and unusual and having a robust system in place was essential. Overall, the website had weekly to monthly updates, there was a mailing list and interim reports were produced.

Throughout the campaign there was tracking of the number of Future Champions[162] who were signing up to hold a *conversation* in their community or organisation. Conversations were anything from a local self-interest group, darts team, community group or business. Future Champions were key to the success in promoting the campaign as widely as possible and ensuring that the conversations meant something at a local level.

Through the Future Champions the facilitation team was able to track:

- the number of conversations taking place;
- the number of people participating in each conversation;
- where the conversations were held;
- what was the topic of the conversation.

These conversations were quite varied and included presentations in the early stage on what the conversation was about, to workshops, awareness raising at staff and board

[161] Region Vastra Gotaland (2008).

[162] Term adopted during The WWW process, addressing those registered stakeholders involved in active communication of the WWW.

meetings, The WWW staff speaking at conferences, public engagement and interventions as exhibitions and shows, stand-up comedy and workshops, video interviews and surveys.

Process facilitation team kept a register of all stakeholders defined as:

- Futures Champions – registered;
- Active - unregistered champions;
- Hot leads - people registered as interested in taking part;
- Web signups - people who had submitted an online response.

There was over 200 Futures Champions either registered online or unregistered, at varying degrees of 'activeness'. Process facilitation team also tracked the responses received as a result of these conversations from individuals and groups in response to the line "I want a Wales where...". The responses came in multiple forms from the postcards, online responses, etc. There were 6474 recorded responses. This was an organic and responsive campaign and flexibility was key to enabling the conversation to evolve as new information came to light. This particularly applied to the engagement materials that evolved, moving from a starter pack to an inspiration pack filled with ideas on how to hold a conversation based on real examples from our champions. Throughout the people were at the heart of the campaign and featured heavily through the branding and the Wales We Want film[163]. It was really important to show these were responses from real people throughout the campaign.

[163] The Whales we want (YouTube)

7. SUMMARY OF KEY FINDINGS

There are many different types of vision making processes and ways of organising them. It is important to have the overall purpose of the process and resulting outputs in mind when deciding on the right approach. Vision making process can make use of scenario analysis and/or exploit evidence from forecasts, while strategies are generally based on previously agreed visions and can generate roadmaps and/or actions plans. Added criteria are the geographical scale at which the process is to take place, time and resources available, and the desired inclusiveness of the approach (i.e. the level of stakeholder involvement).

Also, it is important to think about the relationship between the vision-making process and MSP: Is it going to be a stand-alone process (that maybe feeds into an MSP process eventually) or part of an ongoing MSP process? Scenarios and visions, especially spatial scenarios and spatial visions, should preferably be the integral products within the MSP process, which allow for collective thinking about "where we want to be" before we can propose "how do we get there". However, it is important to emphasize that scenarios or visions are not plans. They are simply developed and communicated to get participants in the planning process to think long term and to stimulate questions about "what if".

Ensure commitment and active use of a vision

If the process is to result in an action plan or a roadmap is meant to be implemented, it is important to ensure a legal mandate where possible. However, many visions are exploratory and really exist to bring together stakeholders and raise the awareness about the given topic. If the process is politically driven, or has political support from the outset, stakeholders usually engage as if they know that the process will end up with actual legally enforced changes. This is due to the fact that stakeholders want to be involved in shaping these changes according to their needs, as they know that if they are not involved, they might lose out when decisions are enforced[164]. In cases where the exploratory vision is being developed dissemination tools have an important role, as well as engagement strategy that involves everyone that the uptake, or active use of the vision depends on. It is also essential to ensure that the process is sufficiently resourced to enable effective and thorough stakeholder engagement.

It is relevant to always consider both the process and the output

The product will only be good (and widely accepted) if the process is inclusive and promotes ownership. Sometimes the process and the indirect outcomes can be more important than the product – e.g. promoting dialogue between stakeholders, getting people to meet.

Ensure identification and engagement all relevant stakeholders and monitor engagement

It is crucial not only to ensure optimal stakeholder engagement but also to monitor/ do a quality check on who was actually engaged and whether the desired level of engagement in terms of representativeness was reached. Answering questions such as: who did we plan to engage? Who we did engage? Who was difficult to engage? Was it worth it? How to balance engaging efforts - for those that have high power and influence and for those that can be strongly affected and whose livelihoods depend the most on these actions? Children and young generations also fall into the last category, and ultimately the future belongs to them. In general, there is a need for better engagement of business sectors and their availability for changing "business as usual" model for a new working approach, aligning with principles defined in the strategy/vision/action plan goals, objectives and identified actions.

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[164] Point made at the MSP4BG Conference

Establish a comprehensive adaptive planning strategy

It is important to keep the purpose and aim of the process in mind throughout the process. If needed, the purpose of the project can be shifted as new findings are revealed. The right tools and methods to achieve the process aims should be chosen (and if necessary adapted). Having a system in place for tracking progress towards the vision and/or objectives as well as for identifying the need for adaptation is also essential. Preferably, a vision process should be a closed loop and a continuous improvement process that can track its progress by making use of indicators. It is also essential to ensure that the process is sufficiently resourced to enable effective and thorough stakeholder engagement as well as process monitoring and adaptations.

Consider the wide range of tools and techniques available to develop an engaging and informative process

General management, social sciences and urban planning techniques may be relevant to the various steps of the development process, and could ensure a more efficient and robust process. A very small number of examined vision processes made use of structured approaches using tools and methods with history of broad application in other policy fields.

Show evidence of concrete benefits, in particular for MSP

Transparent and clear communication of benefits derived from the process and its outputs can improve stakeholder engagement and commitment, as well as foster the continuation of the process.

APPENDICE I Case studies

Scenarios for the Dutch North Sea for 2050

Purpose

In 2016, the Dutch MSP Authorities commissioned the Dutch Environmental Assessment Agency (PBL) to develop scenarios for the Dutch North Sea for 2050. These scenarios will feed into the new Dutch MSP. The drivers for the scenario development do not focus on the MSP solely, but are overarching, aiming to include many new laws and policies as well as assisting stakeholders in reaching their ambition.

Approach

PBL developed prototypes of four different scenarios for the North Sea in 2050. The two axes used for the scenarios come from an overarching national report, 'The Netherlands in 2030-2050: two reference scenarios – Future exploration Welfare and Living environment' (WLO). This report is the basis for many policy decisions related to the physical environment in the Netherlands. This increases to coherence of all spatial policy. The scenarios have been worked out in more detail by using information from literature and research as well as talking to experts. 3 'atelier' sessions have been organized with a small internal working group (WG) consisting of representatives from different ministries. The goal was to check the scenarios, adapt them and further elaborate them.

The different experts in the working group identified stakeholders to contribute to the scenario development. The annual event 'North Sea Days' already provided a list with many possible stakeholders. Also within the ministries, own stakeholder lists had been used. Due to a snowball effect, many more stakeholders became aware of the process.

As the process is ongoing, future steps include organization of two workshops for stakeholders. The first one to sharpen the scenarios and sharing the messages of the prototype scenarios. The second one focuses on elaboration of the key messages. This last workshop will be held in the end of 2017. During the workshop, there will be four sessions, so everybody is able attend one session in the workshop.

Lessons learned

To increase awareness about scenarios for the North Sea and stimulate long term forward thinking, a film was produced during a creative workshop at the International Architecture Biennale Rotterdam (IABR). The film, called 2050 - An Energetic Odyssey[165], focuses on the energy transition.

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[165] IABR (2016)

The Overarching Strategy of Spatial Development of Poland (National Spatial Development Concept 2030)

Purpose

NSDC is the national spatial development strategy adopted by the Polish government. At that time, the strategy was innovative as it for the first time introduced planning for the sea areas in the territorial normative document in Poland. However, now it would be much more specific in terms of what the priorities are for the sea, where are the challenges, etc. The strategy introduced a completely different way of thinking (i.e. that sea areas should also be considered when making territorial plans - e.g. same protection for areas at sea same as for those on land). It served as a basis for all future consideration of sea spaces in regional plans as well as national MSP. Mainly regional and local governments benefited from the strategy when developing their own strategies. However, regional plans are only terrestrial and should take national sea plans into consideration.

Approach

The stakeholder engagement process was very intensive as it included travelling to each Polish big city to discuss the draft prepared by experts. It was important to adapt to the specificities of the region for the stakeholders see that the document understands the local aspects and for them to have a sense of ownership. It was suggested that the spatial strategy should be linked with the economic strategy/consideration but this has not happened yet. It would provide a more comprehensive/holistic approach. It is required by law that regional plans must be consistent with the national strategy. However, the strategy is lacking proactive implementation. Changes in ministerial mandates made it somewhat difficult to advance with previously agreed aims and priorities. The strategy mainly benefited regional and local governments when developing their own strategies. The strategy is not meant to be evaluated.

Lessons learned

- It is important to be specific in terms of what and where the challenges and priorities are on the sea;

- The strategy should be made resistant to changes in ministerial mandates. Think not only few years, one mandate, but long term – sustainable;

- Ensure proactive implementation of the strategy;

- It is important to adapt to the specificities of the region so that the stakeholders see that the facilitation team understands the local aspects and they can have the sense of ownership.

Celtic Seas Partnership future trends

Purpose of the process

The Celtic Seas Partnership (CSP) carried out a study exploring future growth scenarios in the Celtic Seas and the resulting impacts on environmental, social and economic conditions with the purpose to explore the need for integrated marine management for the future environmental integrity of the Celtic Seas and the socio-economic well-being that it supports. The purpose of employing more than one scenario is to demonstrate the extent of potential interactions and impacts under alternative possible futures in order to stimulate debate around the nature of future activities and the trade-offs and solutions that may emerge. Future scenarios were developed and applied to selected marine sectors to demonstrate the different possible changes in the scale and nature of human activities over the next twenty years (2017–2036), and to provide the opportunity for discussion of possible future trade-offs and synergies.

Approach

Stakeholder engagement was central to the project approach, with feedback on the baseline and draft scenarios being a key element. A baseline of the environmental conditions and marine sector activities was established and this baseline information was reviewed by industry experts in one-to-one interviews to verify its accuracy. Three different future scenarios were developed combining information from the workshops and the review of marine activities. One scenario was 'Business as Usual' and two reflected stakeholders' ideal future. These two were based on the National Ecosystem Assessment scenarios 'Nature at Work' and 'Local Stewardship'.

Future scenarios were developed for ten selected marine sectors, and for nature conservation (implementation of marine protected areas and management measures within them) to demonstrate the different possible changes in the scale and nature of human activities over the next twenty years. Interviews were carried out with stakeholders to discuss the scenarios and their consequences. The social, economic and environmental impacts (positive and negative) were assessed for each sector under each scenario, through quantitative (where possible) and qualitative approaches. Maps and written descriptions of the future scenarios were made and presented to stakeholders to check whether the projections were plausible and if they reflected a reasonable expectation of the developments under each scenario. Comments were taken into account and the results were used to look at the interaction between sectors, potential impacts on the environment and hotspots where a number of activities were predicted to overlap in the same space. As part of the conclusion, the study pointed out aspects that are important for marine management in the Celtic Seas: 1) Integrated approach taking into account economic, social and environmental concerns; 2) Transboundary approach; 3) Spatial planning; 4) A robust evidence base; 5) Stakeholder engagement.

Plano de Ordenamento do EspaçoMarítimo(POEM)

Purpose of the process

The vision process was developed 2008-2010 by the Instituto da Agua, Portugal (Water Institute) in parallel with the MSP process that involved the GIS spatial analysis. There were four people on the technical team and two on the environmental assessment team. The idea was to establish the vision but also to also establish a mission for stakeholders to be more focused on what they need to do. Defining a mission is useful if stakeholders are involved in the implementation. This is particularly suitable in the context of small scale plans, for example the water catchment plan, or a small investment for planning certain aspect on the coast.

Approach

The POEM process had series of workshops. It included the EEZ of Portugal together with two autonomous regions. Subjects and themes were divided according to the interest of the region. For example, on the Azores islands, the focus was on science and environment. The vision was then developed in accordance with that theme. In contrast, northern Portugal focused on the industrial theme (incl. shipbuilding), while Algarve region focused on tourism. The themes followed the main economies/aspects driving these regions. The reasoning for taking this focused approach was the fact that not every aspect can be discussed in depth in one workshop.

The Council for all the Ministries involved in maritime issues (CIAM) always followed POEM work, steering, discussing and approving proposals. The Commission, composed of all the representatives from ministries and public agencies, was attended meetings, discussed reports and validated the project results.

In each region and for each of the themes, the members of the Commission were asked to suggest names or an agency to be the organising partner in the workshops. The snow ball technique was used, as organising partners suggested a list of names to be involved. Stakeholders were mainly involved in collecting information but also to collect needed actions. Another aim was to expose stakeholders to other opposing views so that they could start preparing for the fact that the final product (plan) would have to be a commitment between different points of view.

The stakeholder meetings would start with the presentation explaining what is a vision, what is a SWOT analysis and what are the questions. Also, the national situation, including the national policy context, was presented in relation to the given theme. There were no particular moderation techniques applied. Nevertheless, there were rules announced at the beginning of each meeting regarding:

- length of interventions;
- recordings of all suggestions;
- keeping the focus on the themes given.

The workshops lasted one day. First, participants would be divided into the groups of maximum 10 people, normally five groups with a moderator and note taker in each of the groups. One hour would be committed to each of the SWOT aspects (i.e. one hour for strengths, one for weaknesses, etc.), plus one hour for identifying necessary actions. Following the workshop, the facilitation team would use the results to make a vision per theme for each region. The SWOT results from the workshop were than complemented with desk research by experts.

The SWOT analysis was a very useful in this regard as it allowed for organised collection of information and made the content much clearer. On the basis of each of the sectoral

SWOT analysis, a set of actions was defined, as well as the interrelations between actions and timelines. Actions were structured in plain matrices, with actions on one axis and actions or goals on the other to analyse their compatibility and interdependence. A big matrix with all the actions was developed, to combine the actions and to find out if some are interdependent, which ones are precedent, which ones are promoting the others, or cancelling the others. There were three matrices produced:

- Interdependence matrix;
- Compatibility matrix;
- Precedence & Hierarchy matrix.

No software was used to analyse the matrices but final results can be plotted onto Gant charts. The analysis was done using the expert judgement rather than a specific method.

POEM has a monitoring program that would monitor the plan implementation and the results of actions. However, it was difficult to establish a monitoring program to evaluate whether some action had been completed. The idea was to have a monitoring program that allows for changing the strategy – or rather refining the actions. However, the plan was not adopted before the government mandate was over. There is no evidence that this methodology would work if the plan had been adopted. The plan was used in the current MSP as a baseline geographic location description.

Lessons learned

- Stakeholder workshops covered all the relevant stakeholder categories. However, it would have been beneficial and perhaps ensured that the plan was implemented if stakeholders, responsible for implementing the plan, were involved in one more round of workshops. This additional round of workshops would ensure discussing actions with those who should implement them. This would also give them the feeling that they have indeed been listened to.

- It is important to have the methodology in place to cope with questions such as how to weight stakeholder inputs; are all stakeholders equally important; are all inputs acceptable?

- ***Maritime Strategy for four municipalities in Sweden (Norra Bohuslän)***

Purpose of the process

The maritime strategy development process was meant to define what is the preferred future for four municipalities, their goal and the way they should act to promote desired development. The rationale for developing a strategy was based on the fact that municipalities needed a maritime focus in their existing business strategies. Also, there was a need for a more detailed approach to planning for development, including more visibility to small businesses and attracting new ones. This process was meant to enable different combinations of companies and researchers to jointly identify project opportunities and execute them together.

Approach:

The maritime strategy was developed for a sub-region, with the same goal as for the MSP plan. Actions that would enhance economic development have been specified for all municipalities, taking into consideration cultural and environmental aspects as well. One broader strategy concerning political aspects was developed, and one that includes all the background data in four different focus areas: shipping & boating, sea food, energy, tourism and recreation. Each of the focus areas also include sub-areas, goals and actions that the municipality should act upon.

Focus groups for the sub-areas were formed and stakeholder needs were collected through interviews with around 60 companies of different sizes. Questions were e.g. what business are in the area and what are the problems. Competence days were also organised to bring together politicians, civil servants and researchers. It was also pertinent to take into consideration, compare, and possibly align with other relevant EU, national, local/regional strategies and funding programmes. As part of the communication strategy, easily readable dissemination material was produced, as well as a small infographic film on Facebook and the website showing what the strategy entails. Other social media is also extensively used and engagement was continuously tracked.

The process was funded by the county municipal board. Västra Götaland Region also supported this process financially, as well as the EU Interreg programme. The process is continuous and builds on funds from various projects. Business developers (civil servants), environmental specialists and planners as well as sectoral boards (i.e. tourism board) have been involved to develop the strategy. People in businesses were interviewed in order to collect their views on possibilities and different strategies going on already on the EU, sea-basin, and national scales.

The strategy is not spatial but works in parallel with the MSP; it started at the same time with same goals, and includes the same group of people. The political statement is the common strategy for both. Therefore, in this case, MSP and the strategy are seen as two parallel tools applied, where strategy indicates *where do we go with business*, and the MSP, *where do we do what at the sea*.

The Strategy and MSP facilitation teams meet several times per year to discuss the direction and actions taken. A big excel matrix in each focus area has been produced that specifies what needs to be done, and what are the relevant projects to link with. A fairly simple approach was used with excel with different colours, representing focus areas. Goals including 70 actions were clustered into groups and associated to regional projects. It was challenging to decide and structure the way to prioritize actions and identify connections, affections, etc. Some were not project-related but related to municipalities and some more related to regional cooperation. Projects groupings were marine activities, environmental profiles, marine aquaculture, etc. Nevertheless, that is an ongoing, continuous work. Revision is meant to take place with every political mandate, likewise the MSP, every 4 years.

Lessons learned

- Time watching is very important, especially when engaging stakeholders, or aligning the times of vertical political decisions making.
- It is essential to clearly specify what input is needed at the different stages and what are the timelines and responsibilities.
- Revision in the form of yearly evaluation is a good tool for keeping everyone engaged committed to agreed goals.

Metropolitaan Kustlandschap 2100 for the Flemish Government

Purpose of the process

The development of the Metropolitan Coastal Landscape Vision in Belgium is organised by the Flemish Building Masters (public architects), the Policy Field mobility and public works and Policy Field Spatial Flanders. The three partners have the ambition to develop an integrated development vision on the coastal area, which exceeds the current more technical, coastal defence approach. The goal of the 'development vision' is to make it possible for the three partners, as well as other Flemish administrative departments, to use the results to formulate more concrete policy ideas in their fields.

Approach

The entire 'Development Vision' contains three elements:

- The development of an integrated vision, taking into account current problems;
- The development of speculative scenarios for the coast, taking into account climate;
- A study, which fosters the discussion about the future development of the coast. The study does not provide concrete recommendations, but arguments for the discussion.

The entire process of developing the vision contained four phases:

- Exploration: analysis of material available (2012-2013)
- Final design agenda: develop a design agenda based on phase 1 (2013)
- Design research: explore design options using phase 1 and phase 2 (2013-2014)
- Reflection phase: evaluation of design options to practical policy implementation, publication and communication. (2014-2015)

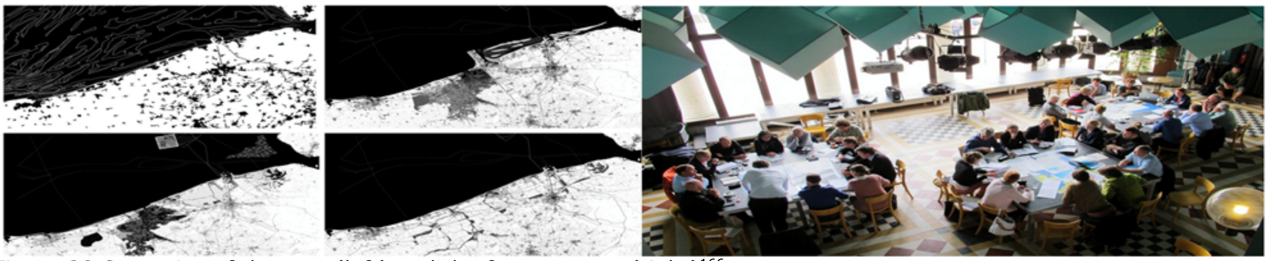

Figure 28 Scenarios of the cost (left) and the focus groups (right)[166]

Belgian Coast: The Future Commons 2070

Purpose of the process

The Future Commons 2070 is a design-based research into an updated concept of commons. The commons are resources that are owned in common or shared between or among communities. The research aims to inject the debate on MSP with a new impetus, stirred by a socially-ecologically inspired basic principle.

Approach

In the vision process, a team of researchers developed a geographical map, showing complex subjects and not evident common problems. The map[167] includes a wider textual and visual elaboration on specific elements mentioned in the text. The broader map has been used as a tool to discuss the future approaches of MSP in research conferences (e.g LITTORAL 2012: Coasts of tomorrow[168] and the 50th ISOCARP Congress in 2014). Also, it has been used to discuss the future of the seas with a broader audience (stakeholders and public) and it has led to opinion papers. In an indirect way, it has stimulated the Belgian MSP developers to think a bit more outside the box and see MSP also as a 'threat' for the sea if not applied correctly.

Figure 29 The maps from the Future commons 2070[169]

[167] Geldof C., Janssens N., Goossens C., Goris E., Pelger D., Labarque P. (2011).

[168] VLIZ. (2012).

[169] Imbd.

WESTMED Maritime Initiative and ASUR Vision

Purpose of the process

The vision is to build an ASUR sea-basin, which stands for four principles guiding this process: 1) attractive and authentic, 2) smart, sustainable and social, 3) unified, 4) resilient and open to renaissance. The 'ASUR' Vision is linked to Maritime Initiative for the Western Mediterranean[170] and the development of a `framework for Action´ for its implementation. The initial vision for the potential strategy was to build on the Blue Growth Concept and to bring sustainable economic development to the sea-basin through an integrated approach. This vision had to be shared with all Western Mediterranean countries in accordance with existing overlapping cooperation agreements (e.g. Barcelona Convention, UfM, 5+5, UMA). The vision contains three goals and some given targets that will be monitored on an on-going basis.

The process was initiated by the European Commission, with an aim to assess the possibility for working towards building an integrated maritime initiative and action plan for the Western Mediterranean Sea basin. In close cooperation with relevant stakeholders, the most promising transnational and cross-sectoral opportunities that foster the economy, environment and security are being identified and elaborated. The initiative aims to better coordinate activities and to more efficiently use existing governance and cooperation frameworks to facilitate implementation of the existing legislative framework at international level and at EU level. It will also be instrumental to implement other strategies and policy initiatives and to better use existing funding instruments and leverage private investment. Improved coordination amongst several sectors and policies should be beneficial also to the investment plan for Europe.

A Task Force will be formed under the umbrella of the Union for the Mediterranean (UfM) and the European Commission which will jointly chair this new body. An assistance mechanism with focal points in the sub-sea basin will also be created in early 2018. The task force will be carefully selected in order to include the most relevant actors from the Member States, the partner countries (south), the European Commission, the European Investment Bank and the blue economy sectors. Implementation is based on full UfM and European Union support (Commission's Communication approved 19 April 2017, endorsed by the Member States Council on Blue Growth on 26 June).

Approach

The facilitation of the process is led by the consultancy Ecorys (Spain). Using a bottom-up approach, extensive consultations with stakeholders were conducted to identify clear needs specific to the region. Those needs have been assessed against existing frameworks relating to the sustainable development of the blue economy to highlight possible gaps. A gaps analysis was carried out, taking into consideration the initial ASUR Vision and the outcomes of the working groups that took place in four occasions (formed by the EU, the 5+5 Dialogue, the UfM and a selected list of stakeholders).

Over 200 institutions were involved in the process: public sector (including national and sub-national level), private sector, academia, sectoral organisations, and clusters. Stakeholder engagement was based on four focus group workshops, a stakeholder conference and online tools for consultation (dedicated website westmed-initiative.eu and twitter account). The consortium, through its various partners, was asked to disseminate the process among all their networks. A communication expert was hired who led the whole process, ensuring a visual identity and a common standard to communicate and to publish all relevant documents and reports.

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[170] More about the Initiative available at: http://www.westmed-initiative.eu

Questions for the workshops were formulated and a non-paper document was circulated beforehand to enable easy aggregation of the results in the discussions. Four different public reports were developed, one leaflet, one stakeholder conference wrap-up document, and videos of the conference, all available on the dedicated project's website.

Lessons learned

- For involving stakeholders from the partners' countries (south), a formal institutional contact through the respective government always had to be used given the different culture of stakeholder involvement for policymaking in those countries.
- Elaborating a Vision or a Strategy that involves territories outside the EU might pose some challenges, and certainly there are grounds for improvement in this respect. It is difficult to say how to overcome this barrier to involve the stakeholders from those countries to a full extent, but probably, more physical presence there would be a plus.

BaltSeaPlan Vision 2030

Purpose of the process

The BaltSeaPlan Vision 2030 was developed as part of the BaltSeaPlan project (2010-2013) lead by the German Federal Maritime and Hydrographic Agency (BSH). It is a regional sea-basin wide scale vision for MSP processes, providing an integrated perspective of sea uses and the Baltic Sea ecosystem. The vision aimed to provide more coherence and certainty to all users of Baltic Sea space. Grounded in existing trends and policy objectives, it tried to anticipate future developments and changes and to place them in a spatial context. The vision is transnational, but linked to national MSP as part of a holistic approach to MSP across scales.

As part of the vision, objectives and spatial implications were highlighted for the very first time for 4 transnational topics: 1) healthy marine environment; 2) coherent pan-Baltic energy policy; 3) safe, clean and efficient maritime transport; 4) sustainable fisheries and aquaculture.

Approach

The BaltSeaPlan Vision 2030 was developed jointly by organisations from seven Baltic countries, making it a reflection of a broad range of different backgrounds and perspectives. Lead authors of the document include researchers and spatial planners. The vision development was not a participatory process but instead developed by the BaltSeaPlan partners in a collaborative process.

General steps of the process included: 1) development of initial joint vision statement 2) analysis of existing strategies 3) development of new project ideas for unsolved issues regarding governance and management 4) involvement of all BSR partners and smaller working group through series of meetings 5) drafting and revision of vision text and graphics. A pre-study was developed on future spatial needs of key transboundary sectors. The pre-study also explored links to sectoral strategies and policies, existing MSP principles (HELCOM/VASAB) and national MSPs. The scenarios were developed as part of the process and discussed at workshops. There were various feedback loops on the final text of the vision.

Take up of the vision was ensured through partners involved in MSP processes. This was the first vision of its kind and is still quoted, although it is less well-known today and not well-known outside the region.

The vision influenced some MSP processes and outcomes in the Baltic; esp. as it developed joint sea-basin wide principles for spatial allocation decisions such as spatial efficiency, spatial connectivity, spatial subsidiarity; which have been used ever since by MS Planners. It also had substantial intangible benefits for those involved by creating a strong sense of common identity between the MSP community throughout the Baltic Sea Region.

Lessons Learned

The BaltSeaPlan Vision 2030 was the first of its kind. Given the advancement of MSP in Baltic countries during the last years, revision or rather further development of the vision would be beneficial. This is partly ensured by the ongoing project 'BalticLINes' – but still needs a more strategic endorsement by all MSP authorities. This would allow to include more specificities and focus on issues and opportunities in the Baltic that need collaborative approach.

Towards an Implementation Strategy for the Sustainable Blue Growth Agenda for the Baltic Sea Region

Purpose of the process

The implementation strategy was developed in order to refresh the Sustainable Blue Growth Agenda for the Baltic Sea Region (adopted by the European Commission in 2014) and support its implementation by all stakeholders. A consultancy (s.Pro-sustainable projects) was the lead facilitator for the process that lasted eight months.

The aim was to have a grounded projection for each of four blue growth sectors - opportunity areas. Four sectoral visions for 2030 are part of the implementation strategy. Hence, each sectoral vision is closely linked to strategic actions proposed for each of the identified strategic opportunity areas. The implementation strategy helps to prioritise and ensure synergies between specific portfolio of actions or (co-) investments in order to achieve a jointly agreed objective; the vision for 2030.

The aim was also to contribute to the strategic transnational cooperation for the maritime economy in the BSR and to raise mutual understanding, creating ownership and buy-in as well as stimulating the systematic interplay between the various actors throughout the region, all that will contribute to kick-starting of the implementation of the Baltic Blue Growth Agenda. The strategy goes beyond individual sectors, and also functions as an awareness raiser for future trends in other sectors.

Approach

The choice of experts for this work was made according to following knowledge and skills categories. 1) Knowledge: country expertise / sector expertise 2) Skills: analytical, survey and mapping, organisational and strategic, facilitation (including logistics), and 3) outreach (networking) skills.

Desk research was a first step and included a review of existing strategies, visions and roadmaps. The desk research also provided an initial overview of existing actors, projects and initiatives to identify the most important development trends and action gaps in each of the chosen opportunity areas. As the second step, surveys were carried out to verify and complement the desk research. The surveys were open to all stakeholders. The third steps were interviews, held with selected stakeholders for further insights in priorities and possible actors. The fourth step included developing four sectoral (opportunity areas) scoping papers to capture the results of three previous steps, and to identify the most important development fields that have the biggest potential for sustainable growth (SWOT analyses). The scoping papers served as a basis for a discussion at four interactive discussion workshops.

The fifth step included four interactive discussion workshops held to discuss and agree on the identified entrepreneurial opportunities, industry challenges and to explore the necessary transformative steps and structures to finalise the strategic transformation maps for each of the chosen opportunity areas. The transformation map provides elements such as actors, coordinators and objectives for each action field. The workshops were an important vehicle to test, as well as to stimulate the commitment and ownership that stakeholders are willing to take, through identifying new collaborations and thus to define the level of ambition that can realistically be set. The workshops themselves were accompanied by a "graphic recorder", who provided a "live protocol" with the key information, discussion topics and results from the workshop. The Visual Facilitation Methods not only increased cooperation and interaction among participants, but the graphics created during the workshop contributed to a coherent and engaging documentation.

The final, sixth step, considered the development of the well-designed, easy-to-read Implementation Strategy document itself containing description of state of play, including main drivers/challenges, vision 2030, strategic action fields including 'bricks to build on' and 'demonstration projects', concluding remarks showing commonalities and, finally, recommendations for the way forward.

It is estimated that around 400 stakeholders have been reached (250 survey, 60 interviews, 130 workshop participants). The main contribution from stakeholders was information on future trends, information on coalitions and developing the vision, and information about other relevant stakeholders. Stakeholder categories were: public authorities - policy makers (local, national, EU or sea basin/macro regional), public authorities - regulators (local, national, EU or sea basin/macro regional), business support (clusters, chambers of commerce and industry, sectoral associations), private enterprises, networks (lobby groups, local, national or transnational associations, NGOs), research (universities, research institutes), others (private citizens).

Lessons learned

- By developing a bottom-up strategy, stakeholders take ownership for their actions and the strategy. Enterprises and business representatives are the multipliers and their job is to be aware of trends in their sector. Industry representatives were easier to engage as their role is to represent and speak for the industry, whilst individual enterprises were the hardest to engage.

- The companies that already have participated in other workshops/conferences were the most pro-active. An incentive for them is that they can present their businesses and potentially get new clients.

APPENDICE II How this handbook was developed

The handbook was developed as one of the three tasks of the Technical Study 'MSP as a tool to support a sustainable Blue Economy' carried out under the European MSP Platform. The first stage of the research for the handbook included a desk review of existing visions documents and current approaches to developing them. The review included documentation from over 30 visions, as well as over 20 handbook-style documents and peer-reviewed articles. The aim of this review was to capture the "state of the art" and scope of vision making process. A wide range of initiatives and projects from Europe and beyond were studied, including statutory MSP processes, MSP projects, and non-MSP visions such as those that might be used in sectoral planning, terrestrial planning or macro-regional strategies. Different spatial scales have also been covered, as well as an understanding of which approaches have been used in which contexts, and for what purposes.

Moreover, the analysis included ongoing and planned processes, such as the current Belgium Vision 2050 process and scenario development by the Dutch MSP authorities; maritime strategies (e.g. West Med Strategy); the Implementation Strategy for the Baltic Blue Growth Agenda; and visions within ongoing MSP projects (such as Baltic LINes and NorthSEE). In the case of planned processes, the aim was to gain a better understanding of the ambitions and thus to focus the handbook on the needs of ongoing processes, so as to provide an immediate service for Member States' MSP initiatives and projects.

The desk research was supplemented by semi-structured interviews with:

- Facilitators – including national / regional authorities, research institutes, consultancies and other organizations that have led the practical work of the development of visions.

- Users - including those who extensively refer to visions in their MSP processes, and who might have been involved in the process as a stakeholder.

Based on the wealth of information revealed by the desk research, a sample of practices was selected, ensuring a representation of different approaches and contexts. Interviews were based on two sets of questions. The first set of questions was intended for facilitators, and focused on the development of the visions, the place of the vision-making process in the MSP process, the role of stakeholder consultation in formulating visions, the impacts and benefits the such processes and their outputs may have had and the lessons learned from the process. The second set of interview questions (Annex III) was intended for vision users, and focused on the awareness of existing vision processes, the perceived quality of their communication and impact, relevance of the vision process for MSP, how the visions were taken up, and, if applicable, the experience of / with stakeholders in the vision development process. The interviews also addressed the current understanding of different visions, including strategies, action plans and roadmaps on the part of MSP authorities as well as related MSP projects, and also used open questions with regards to the purpose or process of drawing up a vision. The MSP authorities were also asked whether they would be interested in developing a vision (what format and for what purpose), what information and / or other resources they might need, what obstacles they might foresee, and whether they were aware of existing visions.

All information was collected in a structured way and analysed by looking at the similarities and differences across interview responses by using the simple word search function. Special attention was given to collection of good practices and lessons learned in relation to using a certain tool or method, that could serve in future endeavours. The advice or conclusion was formed only if backed by multiple responses, or supported by the literature. If responses relating to lessons learned were opposing, then the characteristics of the process were compared to understand how different characteristics affect the applicability of the element.

APPENDICE III List of reviewed EU visions and other relevant literature

Sea-Basin / Transnational Visions

Initiative	Sea-Basin	Short Description
European Union Strategy for the BSR and the Action Plan for the European Union Strategy for the BSR	Baltic	The strategy seeks to provide both a co-ordinated, inclusive framework in response to the key challenges facing the Baltic Sea Region and concrete solutions to these challenges. An Action Plan was developed to provide "an integrated framework that allows the European Union and Member States to identify needs and match them to the available resources by coordinating of appropriate policies, thus enabling the Baltic Sea region to achieve a sustainable environment and optimal economic and social development."
A Sustainable Blue Growth Agenda and The Implementation Strategy for the Baltic Blue Growth Agenda	Baltic	The development of the Implementation Plan for the Baltic Blue Growth Agenda is an eight-month long stakeholder-dialogue process (2016-2017) with the ambition to set out key actions necessary to deliver on the 2030 visions for four key blue growth sectors. The process follows a structured and facilitated 6-step approach incl. desk research, survey, interviews, scoping paper and workshops.
Baltic Sea Action Plan and Baltic Sea Broad Scale MSP Principles	Baltic	Principles were meant to provide valuable guidance for achieving better coherence when developing Maritime Spatial Planning systems in the Baltic Sea Region. The common vision of a healthy Baltic Sea has been defined together with all participating stakeholders – from governments, through industry and NGOs, right down to individual citizens, including older and younger generations, and organisations in both the private and the public sectors.
VASAB Long Term Perspective for Territorial Development of the BSR 2030	Baltic	The LTP identifies the most important assets, development trends and challenges affecting the long-term development of the Baltic Sea Region. It predicts the state of the Region in 15- 20 years as a result of joint efforts of countries and organisations, and presents the most important instruments and actions to guide the development of the Region towards territorial cohesion.
Celtic Sea Partnership – Future trends	Atlantic	The Celtic Seas Partnership (2013-2016) aimed to draw people together from across the Celtic Seas to set up collaborative and innovative approaches to managing their marine environment. The process entailed various outputs / formats – many of which provide practices for vision development.
Comprehensive management plan for Wadden Sea (ARTWEI)	North Sea	The Trilateral Wadden Sea Plan is an agreement of how the countries envisage the coordination and integration of management of the Wadden Sea Area and of the projects and actions that must be carried out to achieve the commonly agreed targets. A joint vision was formulated that guides the implementation of plan.

Initiative	Sea-Basin	Short Description
BaltSeaPlan Vision 2030	Baltic Sea	The BaltSeaplan Vision shows how MSP processes would impact upon the planning of the Baltic Sea by 2030 especially in relation to shipping, fishery, offshore energy and environmental planning. It developed the principles, which should be applied by Baltic Sea states in any MSP process in the future; i.e. pan-Baltic thinking, spatial efficiency, spatial connectivity. The principles and transnational topics identified in the vision have been leading principles for MSP processes throughout the BSR.
Study on perspectives of main grid network interconnection between countries and potential wind parks (POWER)	Baltic Sea	A review on development of electricity distribution systems in Poland, Lithuania and Kaliningrad district (Russia) and OWE development related problems. The study provides visionalised decisions for interconnection of main grid networks and potential wind power parks of target countries including relevant insight to legislative, economical and environment aspects.
Conditions for Deployment of Wind Power in the Baltic Sea Region (BASREC)	Baltic Sea	The study provides for an outline strategy for the integrated economic promotion of wind power in the BSR through regional cooperation based on evaluation of potential production sites, grid integration possibility and appropriate supporting regulatory frameworks.
Vision of Particularly Sensitive Area 2020 (Baltic Master)	Baltic Sea	The vision raises awareness about the Particularly Sensitive Areas (PSSA) framework and aims to increase international cooperation on maritime safety in general and on PSSA in particular. It intends to improve and extend common monitoring, navigational and vessels equipment solutions for the whole Baltic Sea area.
Methodological handbook on MSP in the Adriatic Sea (SHAPE)	Eastern Med	Chapter 4 of the Handbook lays out a preliminary common vision for the future of the Adriatic Sea taking into account environmental, economic, social, government as well as climate change and innovation issues.
Final Recommendations & Conclusions (ADRIPLAN)	Eastern Med	The final report developed a vision on how to proceed with MSP at a trans-boundary scale within the Adriatic Ionian Region making a distinction between areas for coexistence of multiple maritime uses in sensitive environment; intensively used areas as well as areas which are important for the delivery of ecosystem goods and services.
EU maritime strategy and action plan for the Western Mediterranean – WESTMED building an ASUR sea basin	West-Med	Building a Western Med Strategy to integrate aspects related to Maritime Spatial Planning. Intense stakeholder consultation has been carried out.

Initiative	Sea-Basin	Short Description
Bluemed initiative: vision and strategic agenda	Eastern and Western Med	The Bluemed initiative aims to advance a shared vision for a more healthy, productive, resilient, as well as a better known and valued Mediterranean Sea. It fosters integration of knowledge and efforts to develop the Blue Growth in the Mediterranean and promotes joint actions on relevant research and innovation priorities. It developed a Vision Document and a related Strategic Research and Innovation Agenda (SRIA) issued in September 2015. The SRIA goal "Effective Maritime Spatial Planning in the Mediterranean" includes 5 actions dealing with MSP.
TPEA - Transboundary Planning in the European Atlantic	Atlantic	Project aimed to investigate the delivery of a commonly-agreed approach to cross-border maritime spatial planning (MSP) in the European Atlantic region. The work of the TPEA partnership focused on three key aspects of MSP: stakeholder engagement; governance and legal frameworks, and data management. Two pilot sites (east coast Irish Sea: Republic of Ireland-Northern Ireland and the Gulf of Cadiz: Spain-Portugal) were used to trial the approaches and methodologies implemented by the TPEA partnership.
The Atlantic Strategy and the Action Plan	Atlantic	The purpose of this process was to present an EU strategy and an action plan for the Atlantic region in order to address common challenges faced by the countries of the region.
EU Strategy for the Adriatic and Ionian Region (EUSAIR)	Adriatic and Ionian Seas	EUSAIR jointly developed by the European Commission, together with the Adriatic-Ionian Region countries and stakeholders, in order to address common challenges. The general objective of the Strategy is to promote sustainable economic and social prosperity in the region through growth and jobs creation, and by improving its attractiveness, competitiveness and connectivity, while preserving the environment and ensuring healthy and balanced marine and coastal ecosystems. For the implementation of the Strategy, an action alan was defined, structured around four cross-related pillars of strategic relevance: 1) Blue Growth, 2) Connecting the Region (transport and energy networks), 3) Environmental quality, 4) Sustainable tourism.
Bologna Charter and Joint Action Plan on Med Coasts Adaptation to Climate Change	Eastern and Western Med	The "Joint Action Plan on Med Coasts Adaptation to Climate Change" (JAP) can be defined as the operative tool of the Bologna Charter 2012. This aims at strengthening the role of the coastal administrations in the context of European policies and initiatives at the Mediterranean scale referring to coastal protection, integrated management of the coastal and marine systems (including MSP and Blue Growth) and adaptation to climate change. Referring to the Bologna Charter goals and a shared vision, the JAP identifies a number of joint actions (studies, researches, projects, communication actions, dissemination actions, clustering, etc.) clustered in 4 strategic themes

Initiative	Sea-Basin	Short Description
Baltic LINEs	Baltic Sea	Baltic LINes seeks to increase the transnational coherence of shipping routes and energy corridors in Maritime Spatial Plans in the BSR. This will prevent cross-border mismatches and secure transnational connectivity as well as an efficient use of Baltic Sea space. Baltic LINEs will improve access to relevant MSP data needed for the development of strategic plans for shipping lines and energy infrastructures in the Baltic Sea by piloting the first ever BSR MSP data infrastructure.
NorthSEE	North Sea	NorthSEE aims at achieving greater coherence in MSP across the NSR for three transnational topics: environmental aspects, shipping routes and energy infrastructure. Future scenarios are jointly developed by planners and stakeholders in the framework of the "MSP Challenge 2050" simulation. This improved informational basis allows planners to identify current and future synergies and mismatches of national planning solutions and approaches as well as to come to planning solutions for selected sites with incompatibilities.

National Visions

Initiative	Country	Short Description
Strategy: Harnessing Our Ocean Wealth (Ireland CP Integrated Marine Plan for Ireland)	Ireland	The practice sets out a roadmap for the Government's vision, high-level goals and integrated actions across policy, governance and business to enable our marine potential to be realised. Implementation of this Plan will see Ireland evolve an integrated system of policy and programme planning for marine affairs.
Irish Seas Issues and Opportunities (Irish Sea Maritime Forum)	Ireland	The Irish Sea Issues and Opportunities report was intended inform the direction of future Irish Sea Maritime Forum activities and forthcoming maritime planning in the region. A stakeholder workshop provided the basis of a draft paper, focussing on Fishing; Marine Energy; Ports and Shipping; Tourism and Recreation; and the Environment. The draft paper was circulated for further consultation before a final report was produced in May 2013.
Irish 2040 National Ocean Framework: Issues and Choices	Ireland	The purpose of this paper is to set out the main issues and possible choices for the development of Ireland as a place, beyond 100 years of statehood over the next twenty years or more, to 2040. This is the first major step towards the preparation of a national spatial plan for the country, taking into account a range of social, economic and environmental factors, with the term 'spatial', meaning 'space' or 'place'. One of the principal purposes of preparing the NPF will be to co-

Initiative	Country	Short Description
		ordinate all of these specific departmental or 'sectoral' areas into an overall strategy.
Developing a framework for integrating terrestrial and marine planning (C-Scope)	UK and Belgium / North Sea	Development of marine spatial plans for Dorset (England) and Heist (Belgium) and a long-term vision for Heist. The long-term vision development is particularly interesting in this regard. This was an issue driven process and the forecast has also been developed.
A flood of space – Towards a spatial structure plan for sustainable management of the North Sea (GAUFRE)	Belgium / North Sea	The GAUFRE report was the first attempt to deal with the high level of use in the Belgian part of the North Sea in a structural manner allowing the reader to easily move between scientific information and the use of that information, to creatively consider ways in which spatial structure planning might be achieved
Belgium Vision Process 2050	Belgium	The current marine spatial plan was adopted in 2014 and is set to be revised in 2020, so by then a new plan is needed, with a view to 2026. There is a correlation between this revision process with the development of a Vision for the North Sea 2050. The North Sea Vision looks to 2050 from 2018 and three working groups were established on nature, blue economy and innovation, and multi-use. Transversal themes are sustainability, research and development, governance structures, safety, land-sea interactions and cross-border issues.
Scenario study for the North Sea	Netherlands/ North Sea	The scenario study for the North Sea is being developed in a broader context and is expected to provide input not only for the MSP but other high-level policy and strategic documents. The methodology for scenario development is well developed as part of this process.
North Sea 2050 Spatial Agenda (Netherlands - MSP)	Netherlands / North Sea	The report of joint research into the long-term potential of sea and coastal areas, translated into a vision, series of ambitions, opportunities, points of action and maps. The visions and points for action are guiding the 'maritime spatial plan' for 2016-2021.
National Policy *Strategy* for Infrastructure and *Spatial* Planning and National Spatial Strategy	Netherlands / North Sea	The strategy for the terrestrial and marine areas of the Netherlands is a mixture between a vision and a strategy. It contains a comprehensive vision and, at the same time, a so-called strategy for the achievement of developments and ambitions until the year 2040. The central government goals are focusing on enhancing the countries' competitiveness, improving space for accessibility and safeguarding the quality of the living environment. Additionally, maps have been

Initiative	Country	Short Description
		created on step-by-step approaches to achieve the ambitions until 2040.
POEM – Planning and Ordering of Maritime Space	Portugal/ Atlantic	Process for setting up the vision, action plan and the MSP in Portugal.
The overarching strategy of spatial development of Poland (National Spatial Development Concept 2030)	Poland / Baltic Sea	The document presents a vision of spatial development in Poland for the coming 20 years, defines goals and objectives of the national spatial development policy to facilitate its implementation as well as providing for the rules and mechanisms for coordination and implementation of public development policies featuring a significant territorial impact.
Maritime Strategy for Västra Götaland region	Sweden/ Baltic Sea	The maritime sector is dependent on a living, healthy marine environment. To develop the maritime sector further, a strategy is needed that brings together all players around a set of objectives and a vision of the direction that development will take. The region Västra Götaland has taken upon itself the task of drawing up a maritime strategy together with all the stakeholders concerned in the region.
The Swedish Maritime Strategy - for people, jobs and the environment	Sweden	The Swedish Ministry of Enterprise and Innovation initiated the vision document, which was drafted with three other Ministries. It sets out a broad, idealistic future, or at least the criteria to which it should adhere. It is a policy document for socially, environmentally and economically sustainable development in the Swedish maritime sectors. It should also aim to promote Sweden abroad. A competitive, innovative and sustainable maritime sector can contribute to increased employment, reduced environmental impact and an attractive living environment. The plan is to consult with stakeholders in order to achieve the vision.
Maritime Strategy for four Swedish municipalities – Strömstad, Tanum, Sotenäs, Lysekil		Maritime strategy was developed for the sub-region, for four municipalities with the goal same as for the MSP plan. The Strategy was also meant to show the direction (where we all want to go) in terms of development and hence, provide more focus for everyone. The process was mainly funded by the county municipal board. The strategy is not spatial but is in parallel with the MSP. Both are tools that help to define where do municipalities go with business and where do they do what at the sea.

Initiative	Country	Short Description
The Wales we want by 2050 A Welsh society's commitment to a better quality of life for future generations	UK	The Well-being of Future Generations (Wales) Act is about improving the social, economic, environmental and cultural well-being of Wales. It will make the public bodies listed in the Act to think more about the long-term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach. To make sure everyone is working towards the same vision, the Act puts in place seven well-being goals.
SPRS – Spatial Development Strategy of Slovenia	Slovenia	The Spatial Development Strategy of Slovenia that is now being revised provides a broader policy framework that is also relevant for the MSP implementation process in Slovenia. The strategy is being developed as a participatory process, with well-developed methodology.

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Technical Study ‘Maritime Spatial Planning (MSP) for Blue Growth’

Annex II: Sector fiches

Sector Fiche:

Offshore Wind Energy

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
• €36.1billion EU's Gross Domestic Product (GDP) in 2016[1]. • 262,712 jobs created[2]	Growing[3]	• North Sea • Baltic Sea • Atlantic, especially Celtic Seas[4]

Land-sea interaction	Temporal aspect	Lifetime of installations
• Connections to land-based grid systems • Through ports for construction and maintenance.	• Different wind characteristics during seasons.	• Development time: 7-10 years[5] • Economic/technical lifespan: 25-30 years (with possible extension)[6]

Interaction with other uses
• Synergies possibly with aquaculture, nature conservation, fishing and tourism. • Conflicts with shipping, marine aggregates and fishing, and to a lesser extent with tourism and nature conservation.

[1] Deloitte (2017).
[2] Ibid.
[3] WindEurope (2017).
[4] Ibid.
[5] The Crown Estate (2012).
[6] Bouty et al. (2017).

2 Composition of the offshore wind energy sector

Activities of the offshore wind farm sector can be broken down by lifecycle activities.

Lifecycle activities	Development and consenting	65.6 GW of offshore wind projects are in the planning phase. Additional 7 GW are in consenting procedure[7].
	Design and Manufacturing	24.2 GW have already received consent[8]. It can be assumed that the manufacturing process for these project is ongoing.
	Construction and installation	Windfarm projects with a cumulative capacity of 4.8 GW are currently being constructed[9].
	Operation and maintenance	Windfarms currently operated amount to approximately 12 GW[10].
	Decommissioning	In 2017, the first decommissioning of a wind farm took place in Vindeby, Denmark. This wind farm also happened to be the world's first offshore windfarm and was erected in 1991[11].

Figure 1: Composition of the offshore wind energy sector

In addition, offshore wind farm projects can be differentiated by the size of the individual units. An evolution has taken place overtime and wind mills have increased in height, capacity and diameter (Figure 2).

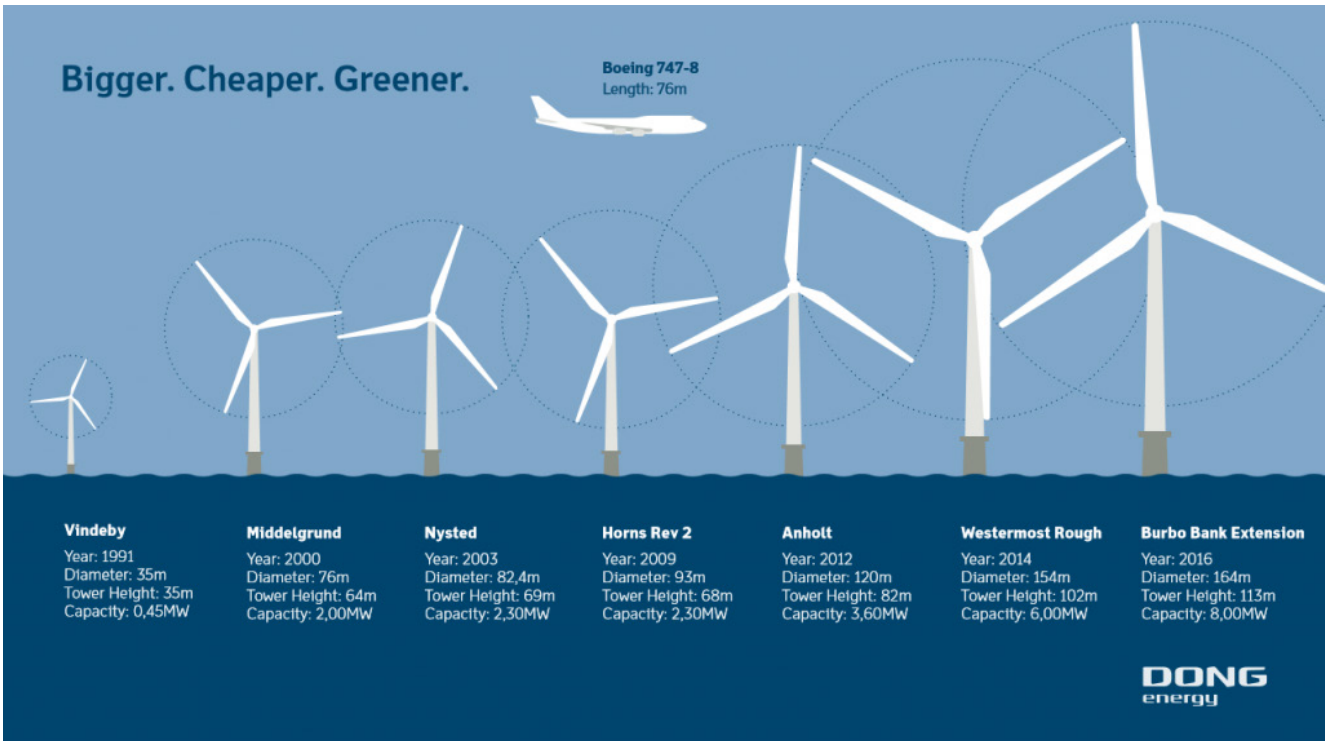

Figure 2: Evolution of wind mill sizes, height, capacity and diameter[12] .

[7] WindEurope (2017).
[8] Ibid.
[9] Ibid.
[10] Ibid.
[11] OpenOcean (2017).
[12] Ibid.

3 Relationship between offshore wind energy and MSP

3.1 What are present spatial needs of the offshore wind energy sector?

The spatial set up of an Offshore Wind Farm (OWF) is important to understand the spatial needs of the sector. An offshore wind farm is a group of wind turbines that are interconnected through a medium-voltage system; the medium voltage is then increased at a substation by using a transformer to send the power to its destination, typically the power grid on land[13].

In locating an offshore wind farm, consideration must be given not only to the turbines themselves, but also the connections between turbines, the substation, and efficient connection to the grid on land .

The spatial arrangement of the individual turbines is also important in the development of an offshore wind farm[16]. Wind turbines extract energy from the wind and downstream there is a wake where wind speed is reduced, affecting the turbines downwind. To maximise energy production, responsible organisations (industry and government) should be aware of these wake effects on other turbines[17], neighbouring wind farms[18] and possible future wind farms.

A dense wind farm with turbines close to each other might seem spatially and economically the best option, but the wake might make the development less profitable.

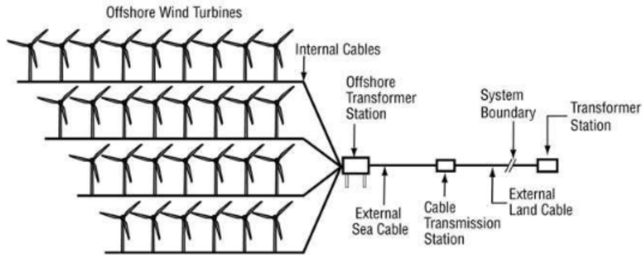

Figure 3: Wind Farm Components and their Layout. Source[14]. Retrieved from[15].

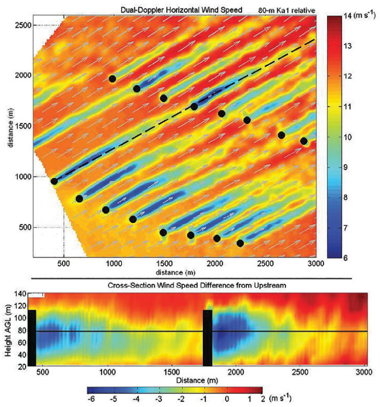

Figure 4: (Above) The color coded wind speeds for a wind farm were generated by a dual Doppler short wave radar developed by Texas Tech University. When the wind is such, wakes from turbines upstream blow to turbines downstream creating turbulence and load variations in their drivetrains. (Below) A side view of one row in the wind farm shows variation in wind speed with altitude.

Two types of development procedures

There are roughly two types of procedures currently used in the development of offshore wind farms[19]: 1) government call for tender procedure (less flexible) and 2) open door procedure (more flexible). In practice, each country has its own policy and processes, differing slightly from these general procedures. The choice of one of the procedures not only influences what kind of zones (search zones, tender zones) are developed in an MSP, but also how the energy transport from OWF to land is arranged[20].

Government call for tender[21] (e.g. NL, DE[22], BE)

1. Following studies, a government authority allocates specific sites for offshore wind farm development
2. Environmental Impact assessments are conducted
3. Government takes responsibility for gridconnections
4. A tender for each site are launched, with development criteria, such as number of turbines, MW production etc.
5. The developers with the best bids win

Open door (e.g. UK[23], DK[24])

1. Large zones are designated as search areas for offshore wind farm development
2. Offshore wind developers approach government with expressions of interest for sites within the zones
3. Government signals its preferred developers
4. Developers conduct environmental assessment, seek consents and organize grid connections

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[14] Malhotra, S. (2007).
[15] Malhotra, S. (2011).
[16] Dvorak, P. (2015).
[17] Emeis et al., (2016).
[18] Nygaard, N.G. (2014).
[19] Koundouri, P. (2017).
[20] Schittekatte, T. (2016).
[21] EWEA (2015).
[22] Watson Farley & Williams (2016)
[23] The Crown Estate (n.d.)
[24] Danish Energy Agency (2015)

3.2 Which anticipated future developments of the industry are relevant to MSP?

Policy developments

Policy developments are an important stimulus for offshore wind development. Renewable energy policy with higher targets, such as the Paris agreement (global), EU energy policy[25] as well as national policy targets will increase the demand of space for offshore energy production. More zones will be allocated for offshore wind. At the same time, policy stimulating fossil fuel production[26], for example by indirect taxes or low risks loans for oil companies, might be decreasing, thereby also improving the position of offshore wind and increasing the demand for sea space. Policy regarding the electricity market[27] related to organisation and distribution of energy in sea and on land could stimulate more as well as other locations for OWF. Sea-basin and regional cooperation, encouraging for example multiple interconnector and the development of a super grid, could lead to new cross-border development zones (e.g. Doggersbank in North Sea) far offshore. Finally, policy to stimulate multi-use[28] of OWF with fishing, aquaculture and nature, could change the planning and design criteria of an OWF and thereby also the location for zoning.

Industry developments

Industry developments increase the potential of offshore wind as a renewable energy production source significantly. Firstly, technological advances enable deeper water installations[29] allowing OWFs to be sited further offshore and in previously inaccessible locations. Secondly, increasing turbine capacity[30] means future offshore wind farms have a different design and set up. The design will be optimised to deal with the wake of individual turbines and to decrease the environmental impact. Bigger turbine capacity will also mean a reduction of costs, thereby increasing the demand of OWFs. Thirdly, the industry will ask for other kinds development areas[31], be it small and more flexible for testing new technologies or bigger for large deployment to decrease the project's costs. New technologies, such as floating[32] wind or 4-rotor turbine[33], will make it possible to deploy new farms in deeper water further from the coast, or on other sites. Technological innovation on energy storage and distribution of energy contribute also to the increased potential of offshore wind. Development of storage capacity[34] overcomes intermittency of supply and energy islands[35] could be used to store energy and help match supply to demand.

Financial developments

Financial developments in the offshore wind energy market also have a spatial impact. Because of reduced development costs and an increased confidence of the economic potential of offshore wind, private equity, pension funds and banks[36], now investing in non-renewables, will go into offshore wind. More profitable business cases, resulting in greater financial security for offshore wind energy projects, will increase the demand of space for offshore wind. New insurance products[37] will come on the market for offshore wind developers, thereby increasing the potential for multi-use of an offshore wind farm[38]. Potential accidents or negative influence from another use will be covered. Industry players will look for new business cases for the development process, by for example by multi-use[39] improving the supply chain and attract new sources of capital[40]. These models might influence the MSP processes, and potentially the planning and design criteria as well as for example the tender processes. Also, a shift in support mechanisms (removing subsidies), for example from fixed feed-in tariffs to competitive tenders[41], potentially will lead to greater private sector influence on design and planning criteria.

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4 Interaction with other sectors

Shipping and ports	Tourism and recreation	Oil and gas
• Synergy: OWFs depend on nearby ports with the capacity to provide logistics services, for example for the construction and maintenance of OWFs[42]. • Conflict: Proximity between shipping routes and OWF lead to the risk of accidents (collisions) that may have a major impact. Also, adequate safety distances need to be maintained, and routes towards ports need to be free of OW[43].	• Synergy: When carefully planned, recreational activities (i.e. kayaking, diving, and other forms of marine tourism) can be carried out near OWFs, and may benefit from the exclusion of activities such as commercial shipping and fishing[44]. • Conflict: the visual impact of OWFs in near shore waters may spoil coastal landscapes and deter visitors[45].	• Synergy: There may be potential to have multi-use OWF and oil & gas platforms[46]. • Conflict: Helicopter landings on oil and gas platforms can be affected by the wake of nearby turbines[47].

Pipelines and cables	Fishing	Marine aquaculture
• Synergy: OWFs may be integrated to marine grid systems including trans border supply. • Conflict: Existing pipeline and cable infrastructure, including the need for their maintenance, may hinder the spatial arrangement of an OWF.	• Synergy: Fish stocks may increase around OWFs, and fishing vessels may be able to exploit this resource within or around OWFs, depending on the regulatory arrangements in place[48]. • Conflict: Fishing gear and anchoring can cause damage to the turbines and the cables between the turbines, and fishing vessels risk collision with turbines.	• Synergy: There is the potential for co-location of aquaculture and OWFs if they are appropriately designed and regulatory frameworks encourage this[49]. • Conflict: aquaculture equipment may hinder access to turbines for maintenance.

Offshore wind and marine renewables	Marine aggregates	Conservation
• Synergy: wind turbines may be integrated with other marine renewables infrastructure as commercially viable technologies develop[50]. • Conflict: spatially-demanding renewables infrastructure, such as for wave energy, may compete with OWFs for space.	• Conflict: Areas licenced for aggregate extraction and OWFs are mutually exclusive, due to potential collisions and damage to the cables.	• Synergy: OWFs may act as de-facto no-take zones and create artificial reefs around their foundations, leading to an increase in biodiversity[51]. • Conflict: potential wildlife impacts include construction disturbance, bird collisions with blades, electro-magnetic disturbance to elasmobranches and encouragement of invasive species on foundations[52].

[42] GTAI (2007/2018).
[43] Raza Mehdi Report. NorthSEE project. (forthcomming)
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[50] Elginoz, N., Bas, B. (2017).
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5 Recommendations for MSP processes in support of the sector

Planning criteria for an OWF[53-54]:

- Water depth: Minimum 20 meters for OWF barge ship to sink, maximum depth is 100 meters, but increasing[55].
- Wind speed: Wind speed is different in different areas and at different heights, but should be relatively strong and consistent.
- Connection to the land-based grid, possibly in conjunction with other OWFs, via an offshore on onshore transformer station, which may need to be newly built[56].
- Seabed: Softer seabeds, such as sediments, are easier for the construction of turbine foundations.
- Proximity to shore: (1) Decreases the required length of cable connections (2) Decreases the travel distance and therefore costs for maintenance vessels (3) Different turbines: Near shore installations requiring more traditional onshore turbines with a maximum capacity of 1-2 MW Deep-sea installations in bigger distance to the shore lines for which offshore turbines with a capacity of 5-10 MW and over are best suited. Distances further from the coastline favour floating wind foundations[57].
- Nearby ports facilities: for maintenance vessels and associated facilities[58].
- Visual range: shorter distances from the coastline are less costly, but increases the visual impact, particularly in scenic coastal areas[59].
- Size of zones: Large OWF zones are less flexible and may have a greater impact, but the planning procedure may be more efficiently.
- Potential competition or conflicts with other uses: shipping, nature areas, aggregates, fishing, munitions, cables and pipelines, underwater cultural heritage, etc.
- Environmental impacts: potential construction disturbance, bird collision, habitat damage, etc[60].

Design criteria for an OWF

- Arrangement of turbines: Reduce wake effects to capture optimum wind power.
- Cable network: Connection of turbine cables and connection to land-based grid and substation[61].
- Turbine height and output: choice of type and MW capacity depend on circumstances such as wind characteristics, water depth and environmental impact. A wind farm generally consists of a single type of turbines[62].
- Environmental impact: Certain set ups can have a more positive effect on the environment than others.
- MW produced: Optimisation of OWF as a whole, and arrangement of individual turbines.
- Possibility of multi-use: Such as fishing allowed, aquaculture, recreation or corners of OWF free of turbines to facilitate navigation.

MSP in support of Offshore Wind Development

- Creating consistency in policy and processes to make sure the new business cases receive enough support and funding[63].
- Two main methods exist for the designation of specific OWF zones: the ‘call for tenders’ method and the ‘open door policy’ method. Using the ‘call for tenders’ method, is a valuable tool for large-scale deployment of Offshore Wind farms on the short term. This method allows the government to make use of their timetable, thereby reaching their renewable energy goals. The ‘open door policy’ method, providing larger search zones for industry to develop their own business cases, fosters innovation and can facilitate wishes by the industry. Using both methods in an MSP will foster both large scale deployment, as well as opportunities for business to work on innovative, market based blue energy solutions.
- Create one stop shops for developers regarding questions, tenders, licencing etc. Examples are found in the Netherlands[64] and Denmark.
- Clearly inform stakeholders what the different zonings on an MSP regarding offshore wind energy mean: A search area for open door initiatives, or an area, which will be tendered later.
- Work together with experts on the tender criteria, so that the most efficient set up is put in place. Possibly include criteria related to multiuse if a policy aim is to increase this.
- Facilitate stakeholder integration processes for offshore wind. This will increase awareness of the offshore wind sector for other uses and potentially foster synergies (multi-use with aquaculture or tourism).
- Decrease the environmental impact of offshore wind, by improving the execution of Strategic Environmental Assessments (SEA) and Environmental Impact Assessments (EIA). This will decrease the environmental (juridical) resistance towards new developments, as well as improving the ecosystem functioning.
- Encourage data collection on the marine environment, thereby increasing the possible use of data by offshore wind developers while developing plans or conducting assessments.

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6 Resources[65]

6.1 Legal framework

Organisation	Title	Link	Short explanation
United Nations	UNCLOS	http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm	With regard to the construction and operation of wind farms, art. 56(1)(b)(i) UNCLOS in conjunction with art. 60 UNCLOS constitute a lex specialis compared to art. 56(1)(a) UNCLOS.
European Union	Directive on Strategic Environmental Assessment (SEA) 2001/42/EC	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0042	Strategic Environmental Assessment (SEA) assess how environmental protection and sustainable development may be considered in plans, and factored into national and local decisions regarding Government (and other) plans and programmes .
European Union	The Directive on Environmental Impact Assessment (EIA) 2011/92/EU	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052	Environmental Impact Assessment (EIA) assess how environmental protection and sustainable development may be considered in projects, and factored what alternatives, measures and monitoring need to be included before actually implementing a project.
European Union	Environmental Noise Directive 2002/49/EC	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32002L0049	Identify noise pollution levels and to trigger the necessary action both at Member State and at EU level.
European Union	Renewable Energy Directive 2009/28/EC	http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0028	Overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU to fulfil at least 20% of its total energy needs with renewables by 2020 – to be achieved through the attainment of individual national targets.

[65] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.2 Actors

Name	Link	Short explanation
Wind Europe	https://windeurope.org/	The association represents the entire value chain, from utilities/developers to manufacturers, banks, insurance companies an research institutes. Members include the national wind energy associations of all the countries in Europe.
ENTSO-E	https://www.entsoe.eu/about-entso-e/Pages/default.aspx	The network represents 43 electricity transmission system operators (TSOs) from 36 countries across Europe, aiming at further liberalization of the gas and electricity markets in the EU.
Europacable	http://www.europacable.eu/	The organisation represents all European manufacturers of submarine power cables – across all voltages and for both AC and DC.

6.3 Initiatives

Name	Link	Short explanation
Political Declaration on energy cooperation between the North Seas Countries	https://ec.europa.eu/energy/en/topics/infrastructure/north-seas-energy-cooperation	North Seas region countries (Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, the United Kingdom, Norway and Sweden) aim to further strengthen their energy cooperation with regard to offshore wind energy.
Good Practice WiND (Intelligent Energy Europe)	https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/gpwind_good_practice_guide_gp_wind_en.pdf	Addresses barriers to the development of onshore and offshore wind generation, specifically by developing good practice in reconciling objectives on renewable energy with wider environmental objectives and actively involving communities in development and implementation.
The North Sea Grid Project	http://northseagrid.info/	NorthSeaGrid was an Intelligent Energy Europe funded research project on the implementation of a NorthSea offshore grid.
The North Seas Countries' Offshore Grid Initiative (NSCOGI)	https://www.entsoe.eu/about-entso-e/system-development/the-north-seas-countries-offshore-grid-initiative-nscogi/Pages/default.aspx	The North Seas Countries' Offshore Grid Initiative is a regional cooperation of 10 countries to facilitate the coordinated development of a possible offshore electricity grid in the greater North Sea area.

6.4 Selected literature

Author	Title	Link	Short explanation
The Crown Estate	A Guide to an Offshore Wind Farm	https://www.thecrownestate.co.uk/media/5408/ei-km-in-sc-supply-012010-a-guide-to-an-offshore-wind-farm.pdf	Provides a greater understanding of the components and processes involved in the development of an OWF. The focus is on the different development steps, from consent to operations and maintenance. Every step has several fiches, explaining the function, costs, suppliers and key facts.
Sanjeev Malhotra	Selection, Design and Construction of Offshore Wind Turbine Foundations	http://cdn.intechopen.com/pdfs/14804/InTech-Selection_design_and_construction_of_offshore_wind_turbine_foundations.pdf	Provides a good technical overview of the set up of wind farm and its components, mainly focussing on the foundations.
WindEurope	Wind energy in Europe, Scenarios for 2030 & Wind Energy: Outlook to 2020	https://windeurope.org/about-wind/reports/wind-energy-in-europe-scenarios-for-2030/	Provides a good overview of the policy, as well as the economic potential of offshore wind in the future.

7 List of acronyms

Acronym	Full title
AC	Alternate Current
DC	Direct Current
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GW	Gigga Watts
MW	MegaWatt
OWF	Offshore Wind Farm
SEA	Strategic Impact Assessment
TWh	Terawatt Hours

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Sector Fiche:

Tidal and Wave

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
N/A	Emerging but varies per technology.	Predominantly Atlantic, North Sea and East Mediterranean due to available resources.

Land-sea interaction	Temporal aspect	Lifetime of installations
Transmission infrastructure, maintenance traffic.	No seasonal variation. Once installed, present until decommissioned.	According to country-specific licensing process, usually 20-30 years.

Interaction with other uses
Potential for positive and negative interactions, depending on the location. Likely exclusion of fishing and shipping around wave and tidal arrays.

2 Composition of the tidal and wave sector

Development of tidal and wave energy technologies is advancing in Europe and globally, and both sectors are expected to expand significantly in the next decade. Wave energy is dependent on wave height, speed, length and the density of the water, whereas tidal energy is generated by the difference in surface height in a dammed estuary, a bay or a lagoon (tidal range) and the kinetic energy in the currents caused by the tides (tidal stream)[1].

Tidal energy technology is at a more advanced stage due to convergence of technology and involvement of large industrial players and utility companies, with commercial-scale devices currently being tested (notably in Scotland and France)[2]. Wave energy conversion technologies remain at an early prototype phase, with 10 experimental-scale devices of 100 kW or larger deployed at sea between 2013-16, with a total capacity of almost 5 MW[3].

3 Relationship between tidal and wave and MSP

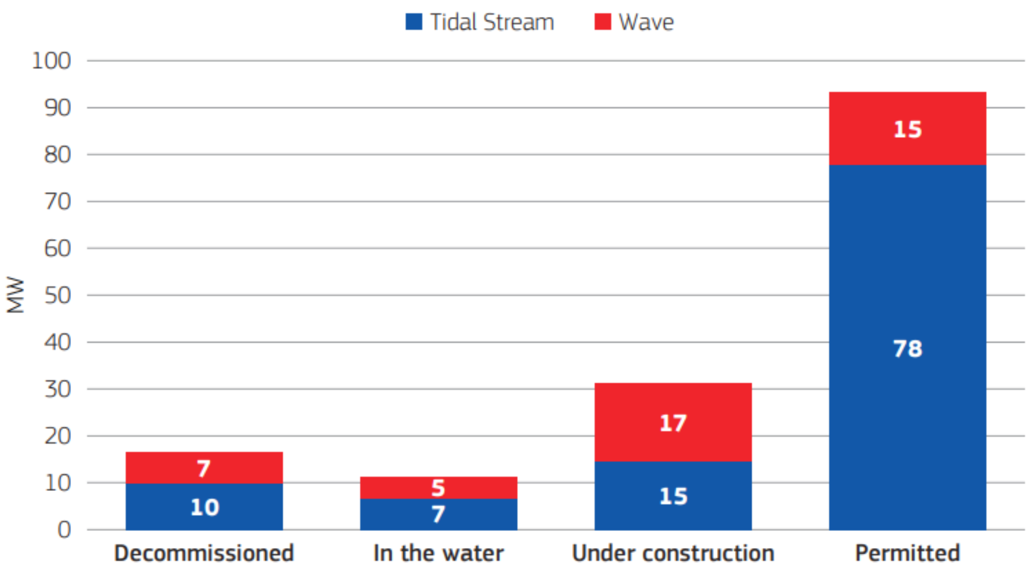
3.1 What are present spatial needs of the tidal and wave sector?

Wave and tidal projects are placement-driven and depend on the resource potential in a given location. While areas with high potential for tidal energy projects have been identified, wave energy conversion includes a broader range of technology types which are adapted to different wave conditions and assessing likely use of future areas therefore remains uncertain given the potential for technological development. Unlike wave energy, tidal resources are not widely distributed and are found in specific areas, limiting the geographical expansion of the tidal energy sector.

The primary locations of tidal stream resource in Europe include areas around Scotland and the Orkney Islands, off the coast of Northern Ireland, off the coast of Normandy and Brittany, between the Greek islands Korfu and Paxi and the Greek mainland, Spain, the Netherlands and Denmark[4]. Key locations for wave energy resources are the Atlantic Ocean (United Kingdom, Ireland, Spain, Portugal and France) and the North Sea (Denmark)[5].

Figure 1.
Deployed tidal stream and wave capacity, capacity under construction and permitted capacity (MW) in Europe in June 2016.

Source: Ocean Energy Forum, Ocean Energy Strategic Roadmap Building Ocean Energy for Europe, 2016, p. 17



[1] DGMARE (2015).
[2] European Commission (2013).
[3] Ocean Energy Europe (2017).
[4] Ecorys (2017).
[5] Ibid (2017).

3.2 Which anticipated future developments of the industry are relevant to MSP?

Increased demand for space	Commercialisation
The ocean energy sector as a whole foresees larger-scale projects of up to 50MW by 2020 in preparation for full commercialisation from 2025[6]. The ambition of the sector is to install wave and tidal energy capacity over the next 35 years at such a scale that it could address up to 10% of the European Union's energy demand[7]. While a number of barriers to the growth of the sector exist, it is anticipated that the demand for space from wave and tidal projects will increase in the coming decade.	Commercialisation of wave energy conversion technology could result in major spatial implications in areas where wave resource is present, both in terms of individual devices and commercial arrays. Demand for space for wave energy projects is expected to be modest in the short-to medium-term, but could drastically change in the longer term, if technological advancements enable upscaling and cost reduction in a way similar to offshore wind[8].

4 Interaction with other sectors

Shipping and ports	Tourism and recreation
• Potential for negative interaction between shipping and wave or tidal energy arrays, if the location of suitable resources overlap with established shipping activity. This depends on the height of the technology in the water column and whether surface-piercing infrastrucuture is required. • Port facilities required for construction of devices, equipment preparation and maintenance, with associated vessel traffic for attending project locations. • Potential for competition for port facilities with other sectors, although synergies may also be possible.	• Potential for concerns regarding visual impacts at areas of scenic value, and for interaction with recreation such as kayaking and diving. • Potential increase in visitors at project locations.

Oil and gas	Pipelines and cables
• Some potential for use of supply chain and infrastructure in the development of wave and tidal energy projects. • Potential competition in demand for space development, although only where the resources are suitable for both types of development	• Ocean energy development will require the development of the submarine cables sector as means to deliver the obtained energy to energy grids.

Fishing	Marine aquaculture
• Potential for displacement of fishing activity from areas of project development, including along the cable routes, and particularly during installation due to vessel presence.	• Potential competition in demand for space development, although only where the resources are suitable for both types of development. • Where suitable and technological and regulatory hurdles can be addressed, co-location of wave energy devices with aquaculture facilities may be possible[9].

[6] Ocean Energy Assocation (2013).
[7] Ocean Energy Europe (2017).
[8] Ocean Energy Forum (2016).
[9] MARIBE (2016).

Offshore wind and marine renewables	Conservation
• Potential competition in demand for space development, although only where the resources are suitable for both types of development, which is not often the case. • Synergies may take place in terms of supply chain services, grid connection and R&D efforts. Conceptual studies indicate potential for co-location of wave energy devices with offshore wind turbines (although this remains to be tested commercially[10].	• Potential for ecological interactions, particularly between tidal turbines and bird / marine mammal species of conservation importance[11].

5 Recommendations for MSP processes in support of the sector

In supporting Blue Growth, MSP can support the development of wave and tidal energy projects, alongside other sectors and interests. However, MSP processes are highly context-specific, and the emphasis placed on ocean energy will be in accordance with policy set out at Member State level. General recommendations for MSP are set out below.

Accurate resource mapping	Differentiate	MSP as information base
MSP should be informed by accurate resource mapping to identify areas of interest for ocean energy development. This should be continually refined based on improved understanding of wave and tidal resources, and in response to continual technological advancement. The location of onshore transmission infrastructure is also important, as a key factor in the feasibility of offshore wave and tidal energy project development.	Wave and tidal energy needs to be considered separately given the different stages of development and sector requirements. There is considerable technological diversity among wave energy converters, and tidal stream / range, which have different spatial demands.	In addressing environmental and social constraints, MSP provides an information base, reducing uncertainty around impacts and can reduce risk in consenting. MSP mechanisms can also be used to facilitate data gathering in relation to environmental impacts, including monitoring the effects of devices and arrays, and particularly on mobile species such as fish, marine mammals and birds[12].
Promoting synergies	**Strategic electricity planning**	**Co-operation between authorities**
MSP provides a framework for managing conflict and promoting synergies between sectors, e.g. co-location with wave energy and/or aquaculture. It can also facilitate dealing with issues around social acceptance, by engaging stakeholders locally in considering multi-sector development scenarios and at an early stage in the planning process.	Given the cross-border aspect of MSP including internationally, and across the land-sea interface, MSP can support planning strategic electricity transmission. This includes promoting transnational initiatives, such as the North Sea Supergrid, and setting policies for effective use of submarine cabling and onshore transmission between projects, and with other technologies such as offshore wind.	Co-operation between authorities responsible for MSP and offshore energy developments is essential to ensure that the changing spatial demands for wave and tidal energy are considered from the outset of planning processes.

[10] Perez Collazo et al. (2014).
[11] ICES (2016).
[12] Ocean Energy Forum (2016).

6 Resources[13]

6.1 Actors

Name	Link	Short explanation
Ocean Energy Europe	www.oceanenergy-europe.eu	EU industry association, representing a members network of 115 organisations and ocean energy professionals, including utilities, industry and research institutes.
Ices Working Group on Marine Renewable Energy	http://www.ices.dk/community/groups/Pages/WGMRE.aspx	ICES Working Group on Marine Renewable Energy (WGMRE) coordinates the flow of science between topic-based science working groups on seabirds, benthic ecology, fish ecology and its application in planning, consenting and regulatory processes in relation to tidal (both in-stream and barrage), wave and offshore wind energy. ICES provides applied scientific knowledge relating to management of this increasingly important and rapidly developing set of activities.

6.2 Initiatives

Name	Link	Short explanation
Ocean Energy Europe	www.oceanenergy-europe.eu	EU industry association, representing a members network of 115 organisations and ocean energy professionals, including utilities, industry and research institutes.
Ocean Energy Forum (no longer active)	https://www.oceanenergy-europe.eu/en/policies/ocean-energy-forum	Stakeholder platform established in 2014 by DG MARE to promote dialogue between all stakeholders (industry, Member States/regions, EC) and make recommendations on how to support growth of the sector.
European Technology and Innovation (ETIP) Platform Oceans	https://www.etipocean.eu	ETIP Ocean is a recognised advisory body to the European Commission, part of the EU's main Research and Innovation policy the Strategic Energy Technology Plan (SET-Plan). ETIP Ocean brings together around 250 experts from 150 organisations covering the entire European ocean energy sector
SEANERGY 2020	http://www.seanergy2020.eu/	Seanergy was an EU funded which ran from May 2010 to April 2012, co-ordinated by the European Wind Energy Association. The project provided an in-depth analysis of the national and international Maritime Spatial Planning (MSP) practices, policy recommendations for developing existing and potentially new MSP for the development of offshore renewable power generation, including from wind, wave and tidal energy.

[13] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.3 Selected literature

Author	Title	Link	Short explanation
DGMARE	Energy sectors and the implementation of the Maritime Spatial Planning Directive	https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/publications/energy-sectors-msp_en.pdf	This report summarises conclusions drawn from the conferences on "Maritime Spatial Planning (MSP) and energy" in Dublin, Ireland (14 June 2013) and "Regional cooperation on energy and Maritime Spatial Planning in the North Sea"(29 January 2015). It informs relevant industries, national authorities and NGOs about the specific characteristics, challenges and benefits of the implementation of the new MSP Directive for the energy sector.
Ocean Energy Forum	Ocean Energy Strategic Roadmap: Building Ocean Energy for Europe	https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/OceanEnergyForum_Roadmap_Online_Version_08Nov2016.pdf	This Strategic Roadmap was commissioned by DGMARE and produced in collaboration with the Ocean Energy Forum. The Ocean Energy Forum was set up to bring together stakeholders to develop a shared understanding of the problems faced by the Ocean Energy sector and to collectively devise workable solutions. The strategic roadmap sets out the vision for the sector, with recommendations across three topic areas: Environment & Consenting, Finance and Technology.

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Ecorys and Fraunhofer. (2017). *Lessons Learnt on Ocean Energy Development.*	https://publications.europa.eu/en/publication-detail/-/publication/03c9b48d-66af-11e7-b2f2-01aa75ed71a1/language-en/format-PDF/source-32210477
European Comission (EC). (2013). *Ocean Energy: Technology Information Sheet.*	https://setis.ec.europa.eu/related-jrc-activities/jrc-setis-reports/ocean-energy-technology-information-sheet
ICES. (2016). *Report of the Working Group on Marine Renewable Energy (WGMRE)*, 12–15 April 2016, Cork, Ireland. ICES CM 2016/SSGEPI:04. 17 pp.	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/SSGEPI/2016/01%20WGMRE%20-%20Report%20of%20the%20Working%20Group%20on%20Marine%20Renewable%20Energy.pdf
MARIBE (2016). *Maribe recommendations for future funding calls in Blue Growth MUS and MUP.*	http://maribe.eu/blue-growth-deliverables/blue-growth-work-packages/
Ocean Energy Association. (2013). *Industry Vision Paper.*	https://www.oceanenergy-europe.eu/en/communication/publications/industry-vision-paper-2013
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Ocean Energy Forum. (2016). *Ocean Energy Strategic Roadmap Building Ocean Energy for Europe.*	https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/OceanEnergyForum_Roadmap_Online_Version_08Nov2016.pdf
Perez Collazo, C., Astariz, S., Abanades, J., Greaves, D., & Iglesias, G. (2014). *Co-located wave and offshore wind farms: A preliminary case study of an hybrid array.* In International Conference in Coastal Engineering (ICCE). October 2014.	

Sector Fiche:

Coastal and Maritime Tourism

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
€183 billion[1]	Mature and growing[2].	Dispersed throughout all sea basins, strong in Mediterranean region and growing around the Baltic Sea and Atlantic Ocean[3]

Land-sea interaction	Temporal aspect	Lifetime of installations
Yes[4].	Strong seasonality[5].	Depends on sub-sector

Interaction with other uses
Semi-compatibility with most uses[6].

[1] European Commission (2014).
[2] Ecorys (2016).
[3] Ibid.
[4] EU MSP Platform (2017).
[5] European Commission (2014).
[6] Ecorys (2012).

2 Composition of the coastal and maritime tourism sector

The following typologies can be distinguished by: i) location and ii) sub-sector[7]:

By location	Coastal tourism	Covers tourism in the coastal area as well as the supplies and manufacturing industries associated to these activities.
	Maritime tourism	Covers tourism in the maritime area.
By sub-sector	Beach-based	Covers beach-based recreation and tourism (e.g. sun bathing, walking in the beach, kite competitions, etc.), and non-beach related land-based tourism in the coastal area (all other tourism and recreation activities that take place in the coastal area for which the proximity of the sea is a condition), as well as the supplies and manufacturing industries associated to these activities.
	Water-based	Covers tourism that is largely water-based rather than land-based (e.g. swimming, canoeing, surfing, wind-surfing, sport fishing, diving, snorkelling, underwater cultural heritage, whale watching, seabirds watching, boating, yachting, nautical sports, etc.), but includes also the operation of landside facilities, manufacturing of equipment, and services necessary for this segment of tourism.

Figure 1: Composition of the coastal and maritime tourism sector

Cruising can be also considered part of coastal and maritime tourism. However, this sector fiche focuses more on above mentioned typologies of coastal and maritime tourism as cruise is covered by the sector fiche on shipping and ports.

3 Relationship between coastal and maritime tourism and MSP

3.1 What are present spatial needs of the coastal and maritime tourism sector?

Depending on the sub-sector, maritime and coastal tourism is both a linear and area based activity. In most cases maritime activities take place along the coastline as well as between the shore and on-water tourism activity areas[8], while for instance diving, snorkelling and underwater cultural heritage are place-based activities. The distance to shore is typically between zero and few km. Water depth depends on sub-sector needs and might be a crucial element for certain activities (e.g. water-based activities such as boating, yachting, nautical sports).

Although mass tourism (characterised by a tendency to target or attract high volumes of visitors with a relative low average spending potential[9]) is likely to stabilize or even decline in the future, the spatial implication of this type of tourism will remain the same: direct use of sea space mainly along the coast, impacts on the sea environment and water quality in particular and environmental pressure on land are among the factors deserving special attention within MSP processes[10].

Demand for additional infrastructure and services/activities is likely to increase with the growing success of high profile tourism, characterised by a relatively high volume of visitors, high level of quality and unique value[11].

Also the growth of so-called niche tourism (characterised by specific added-value services or locations) will strongly depend on holiday accommodation (e.g. accommodation in areas with rare sea birds). In turn, niche tourism is likely to impact areas with limited facilities and of high sensitivity, hence requiring specific infrastructures and innovative, yet spatially limited, solutions in e.g. natural and protected areas[12].

The progressive diversification of coastal and maritime touristic offers and activities (e.g. bathing tourism, swimming, sport fishing, boating, yachting, surfing, sailing, snorkelling, diving, cruising) can lead to conflicts among different tourist segments at the local level[13].

[7] Ecorys (2016).
[8] Ecorys (2013).
[9] Ibid.
[10] Ecorys (2013).
[11] Ibid.
[12] Ecorys (2016).
[13] MMO (2014).

3.2 Which anticipated future developments of the industry are relevant to MSP?

Continued growth

The expected continued growth in coastal tourism, both in terms of nights spent in coastal regions but also in number of tourists, has implications on onshore spatial planning mainly through the construction of new infrastructure and port[14]. To allow all craft to have berthing spots, additional space in existing marinas is required on the longer term (in the short run – 2 to 5 years - marinas still have sufficient capacity to accommodate all craft). It is not likely that many new marinas will be developed, as the marina density is already high (approx. 4,700 salt-water marinas[15] in EU-28 or 1 marina per 14 km coastline). In addition, recreational craft, with the exception of super yachts, will not get bigger due to physical limitations of popular marinas. Nevertheless, it is expected that hotels or other touristic accommodation will be developed along the coastline. This development of the sector combined with its diversification can have possible implications in the context of MSP as connecting different sectors requires mobility between the MSP sectors, and thus needs infrastructure on land to enable mobility, for example, between recreational craft, interesting ecological zones at sea and underwater cultural heritage[16-17].

Environmental impacts of other sectors

The environmental impacts of other sectors may impact coastal tourism; any maritime and land-based activity affecting environmental quality can in principle negatively affect this sector. Co-existence with other MSP sectors not only depends on direct spatial conflicts; even though space is not directly shared between tourism and other sectors, conflicts might arise due to indirect connections also related to land-sea interactions. Coastal and maritime tourism highly depends on good environmental conditions and in particular on good water quality in particular. An example of this are ships that leak oil[18]. This mechanism goes both ways: an example being the trash left behind by beach guests in the water, affecting the water quality and activities depending on it (e.g. the same tourism or even aquaculture).

Adaptation to climate change[19]

Coastal areas might be affected by a number of climate change related impacts (e.g. flooding, erosion, saltwater intrusion, increase in temperatures and periods of dry/drought) that can have direct and indirect effects on coastal and maritime tourism. Coastal defence is of prime importance to counter coastal erosion and flooding and maintain tourism facilities and activities. Depending on its exact location coastal defence solutions may have maritime spatial implications (e.g. conflicts with fishery or shipping) and planning might be required. Plans dealing with coastal vulnerability and protection should be considered to evaluate implications in terms of MSP.

[14] Ecorys (2016).
[15] Formenti, P. (2014).
[16] Ibid.
[17] European Commission (2012).
[18] Ecorys (2016).
[19] Cadiou et al. (2015).

4 Interaction with other sectors[20]

Shipping and ports	Oil and gas	Pipelines and cables
• Tourism and ports are semi-compatible, as arrivals generate wealth and business opportunities but also represent a challenge for ports, reception and urban infrastructure as well as for the environment. Port efficiency for the development of connection gateways for coastal regions remains a crucial requirement for the economic development of coastal and inland areas. • Tourism and shipping are semi-compatible. While cruise shipping is an important vehicle for maritime and coastal tourism development, freight transport can be seen as a conflicting activity in terms of demand for space.	• Tourism and oil and gas extraction tend to create conflicts/tensions: oil and gas extraction infrastructure can impact coastal tourism through changing landscape horizons and may represent a deterrent on coastal tourists. In case of an accident such as an oil leakage, coastal areas may have to bear the environmental consequences which would have an effect on tourism presence in those areas. Social acceptance of offshore oil and gas platforms might be low if these are close to the coasts, in particular in tourist areas. Nevertheless, experiences of coexistence can be observed, proving that oil & gas extraction is not systematically in conflict with traditional and locally-anchored sectors, such as small scale fisheries and coastal tourism.	• Tourism and pipelines and cables appear to be semi-compatible: pipelines and cables are under the ground, while coastal tourism activities are on the coast, on or in the water. However, cables and pipelines may have an impact on underwater cultural heritage as well as conflicts relating to anchoring damages between recreational boating and cables and pipelines might occur[21].

Fishing	Marine aquaculture	Offshore wind
• The compatibility between tourism and fishing depends on the sub-sectors: when sub-sectors of fishing are considered coastal tourism, such as pesca-tourism or sports fishing, the sectors are compatible. However, for commercial fisheries these sectors can hardly be combined spatially. Equally so, in some cases the two sectors do not conflict as there is no spatial overlay between activities, e.g. trawling far from coastal areas does not affect many forms of tourism.	• Tourism and aquaculture are semi-compatible: when practiced far enough offshore, so to reduce visual pollution. However, finfish aquaculture along the coast can impact ecosystem health and environmental quality, which are considered essential assets for coastal and maritime tourism.	• Tourism and wind energy are semi-compatible: wind farms can negatively impact the leisure zone and the aesthetics of the coastal landscape. This in turn can have a negative impact on the tourist demand in these touristic areas, as the recreational value decreases. A critical parameter is the distance to shore, and with growing distances the tension decreases. However, some small-scale initiatives emerge now in the form of excursions to offshore wind parks.

Marine aggregates	Conservation
• Tourism and marine aggregates are semi-compatible: offshore sand formations such as islands can offer tourism opportunities; however exploration and exploitation activities themselves are not considered compatible with tourism.	• Tourism and conservation tend to create conflicts and tensions, especially through mass tourism, as coastal tourism (likewise cruise tourism) can put high pressures on the ecosystem (mostly through waste water, water pollution, and other forms of pollution as well as trespassing). However, synergies may emerge through alternative scenarios, including eco-tourism activities and initiatives developed in collaboration with e.g. Marine Protected Areas.

[20] Ecorys (2012).
[21] Coastal and Maritime Tourism sectors and the implementation of the MSP Directive (2015).

5 Recommendations for MSP processes in support of the sector

Importance Land-Sea Interaction MSP is a tool for implementation of tourism strategies as it ensures sustainability and availability of infrastructure required. In this regard, LSI aspects are highly important, as most of the needed infrastructure is land-based.	**A tool for synergies with other sectors** MSP can be a tool to increase synergies with other marine sectors such as aquaculture and fisheries (e.g. pesca-tourism and angling), conservation (e.g. sustainable forms of niche tourism and environmental conservation of key natural assets), and underwater cultural heritage (e.g. diving and snorkelling).	**Diversification** The tourism and recreation sector can benefit from diversification prompted by MSP through time (ensuring availability and accessibility of intermodal connections throughout the year), space (ensure sustainable number of visits and sustainable effects on ecosystem of new and existing infrastructure and picks of visits and regulate/disincentive peaks of visits) and new activities (provide template for increasing synergies and managing tensions across activities between tourism and other sectors)
Stakeholder involvement As the sector appears to be fragmented, MSP can create opportunities for bringing together different actors. But to be effective MSP should involve the different governance levels and, whenever possible, reach out to local communities and stakeholders.	**Synergies and economic gains for this sector** A sustainable tourism and recreation sector can only thrive within a sustainable environment. The ecosystem is not just a natural resource, but should be seen as an enabler of synergies and a source of economic gains for the sector.	

6 Resources[22]

6.1 Legal framework

Organisation	Title	Link	Short explanation
European Commission	Commission Staff Working Document on Nautical Tourism, Brussels, 30.3.2017 SWD(2017) 126 final	https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/swd-2017-126_en.pdf	The Document analyses actions to be undertaken in the field of nautical tourism and describes possible options to unleash the potential for additional jobs and growth.

6.2 Actors

Name	Link	Short explanation
Cruise Lines International Association (CLIA)	https://www.cliaeurope.eu/	CLIA is the world's largest cruise industry trade association. CLIA Europe promotes the interests of cruise ship operators within Europe.
European Boating Industry	http://www.europeanboatingindustry.eu/	European Boating Industry represents the interests of the European leisure marine industry and its members.
European Sea Ports Organisation (ESPO)	https://www.espo.be/	ESPO represents the common interests and promotes the common views and values of its members to the European institutions and its policy makers.
European Tourism Association (ETOA)	http://www.etoa.org/	ETOA is the leading trade association for tour operators and suppliers with business in European destinations, including tour and online operators, intermediaries and wholesalers; European tourist boards, hotels, attractions and other tourism suppliers.

[22] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.3 Initiatives

Name	Link	Short explanation
AMPAMED	http://www.msp-platform.eu/projects/areas-marinas-protegidas-del-mediterraneo	The Project relies in the role of MPA for the sustainable development of local economic activities like artisanal, fishing and tourism. The main aim has been to use three Mediterranean MPAs, placed in three different regions to show the differences and the similarities in management resources and sustainable development.
BalticRIM	http://www.msp-platform.eu/projects/balticrim-baltic-sea-region-integrated-maritime-cultural-heritage-management	The project analyses the relationship between maritime cultural heritage and maritime spatial planning in the Baltic sea region.
CO_EVOLVE	https://co-evolve.interreg-med.eu and http://www.msp-platform.eu/projects/co-evolve-promoting-co-evolution-human-activities-and-natural-systems-development	The project promotes the co-evolution of human activities and natural systems for the development of sustainable coastal and maritime tourism
Pan-European Dialogue between Cruise operators, ports and coastal tourism stakeholders	https://ec.europa.eu/maritimeaffairs/content/pan-european-dialogue-between-cruise-operators-ports-and-coastal-tourism-stakeholders_en	The European Commission promoted a structured dialogue on cruise tourism to enhance synergies in the sector, targeting best practice sharing in innovation, competitiveness and sustainability strategies. The launching conference took place in Brussels, 5 and 6 March 2015.

6.4 Selected literature

Author	Title	Link	Short explanation
COGEA	Study on the Establishment of a Framework for Processing and Analyzing Maritime Economic Data in Europe	https://webgate.ec.europa.eu/maritimeforum/en/node/4009	The study aimed to cross-check existing numbers defining and measuring the blue economy in the EU and provides additional detail on the sector from other sources.
Cruise Lines International Association	The Cruise Industry: contribution of cruise tourism to the economies of Europe	http://www.cliaeurope.eu/images/downloads/reports/CLIA_2014.pdf	The report demonstrates the role cruise tourism can play in regenerating and rebalancing the European economy.
Ecorys	Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts	https://webgate.ec.europa.eu/maritimeforum/en/node/2946	The project aimed to provide policy-makers at EU and sea basin level with a comprehensive, robust and consistent analysis of possible future policy options to support smart, sustainable and inclusive growth from the oceans, seas and coasts.
Ecorys	Study in support of policy measures for maritime and coastal tourism at EU level	https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/study-maritime-and-coastal-tourism_en.pdf	The study aimed to support the preparation of policy measures for maritime and coastal tourism at EU level.
Ecorys	Study on specific challenges for a sustainable development of coastal and maritime tourism in Europe	https://publications.europa.eu/en/publication-detail/-/publication/ab0bfa73-9ad1-11e6-868c-01aa75ed71a1	The project looked at ways to improve island connectivity and the design of innovative tourism strategies for (remote) islands, the promotion of a diversified tourism offer, and innovative practices for marina development.
Plan Bleu	Seaside tourism and urbanization: environmental impact and land issues	http://planbleu.org/en/publications/tourisme-balneaire-et-urbanisation-impacts-sur-lenvironnement-et-enjeux-fonciers	The report assessed the sustainability of eleven tourist destinations.
S.Pro, Ecorys	Towards an implementation strategy for the sustainable blue growth agenda for the Baltic sea region	https://ec.europa.eu/maritimeaffairs/documentation/studies/towards-implementation-strategy-sustainable-blue-growth-agenda-baltic-sea_en	The report presents the results of a systematic stakeholder dialogue in the Baltic sea region aiming to identify and discuss in greater depth the processes necessary to realize the Baltic Blue Growth Agenda in the coming years.
Stiftung Offshore Windenergie	The impact of offshore wind energy on tourism. Good practices and perspectives for the South Baltic Region	http://www.southbaltic-offshore.eu/reports-studies-the-impact-of-offshore-wind-energy-on-tourism.html	The study shows how offshore wind farms can be integrated into regional tourism concepts by looking at real-world examples from the North Sea and Baltic areas.

7 List of acronyms

Acronym	Full title
CLIA	Cruise Lines International Association
ESPO	European Sea Ports Organisation
ETOA	European Tourism Association
LSI	Land and Sea Interaction
MPA	Marine Protected Areas
MSP	Maritime Spatial Planning

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Coastal and Maritime Tourism sectors and the implementation of the MSP Directive: Information to stakeholders and planners (2015) [Draft version November 2015].	https://webgate.ec.europa.eu/maritimeforum/en/system/files/27112015Tourism%20MSP%20version1.pdf
Ecorys (2012). *Scenarios and drivers for sustainable growth from the oceans, seas and coasts.*	https://webgate.ec.europa.eu/maritimeforum/en/node/2946
Ecorys (2013). *Study in support of policy measures for maritime and coastal tourism at EU level.*	https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/study-maritime-and-coastal-tourism_en.pdf
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European Commission (2012). *EC Communication: Blue Growth opportunities for marine and maritime sustainable growth, Brussels, 13.9.2012 COM(2012) 494 final.*	http://ec.europa.eu/transparency/regdoc/rep/1/2012/EN/1-2012-494-EN-F1-1.Pdf
European Commission (2014). *EC Communication: A European Strategy For More Growth And Jobs In Coastal And Maritime Tourism, Brussels, 20.2.2014 COM(2014) 86 final.*	http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0086&from=EN
Formenti, P. (2014). *Using maritime spatial planning for better nautical tourism*. MSP conference on marine & coastal tourism, Venice 27/11/2014 [Presentation].	https://en.xing-events.com/eventResources/N/C/pZ0wrLrjgD8pgu/2_Formenti.pdf
MMO (2014). *The Provision of Guidance for Marine Licensing Staff to support the implementation of marine planning policies for socio-economics, tourism and seascape*. A report produced for the Marine Management Organisation, 109pp. MMO Project No: 1078. ISBN: 978-1-909452-36-7	

Sector Fiche:

Marine Aggregates and Marine Mining

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
€625 million in Europe (in 2015)[1].	Mature (for marine aggregates extraction)[2]; Growing (for marine mining)[3] and Emerging (for deep-sea mining)[4].	Dispersed throughout all sea basins [5-6-7-8]. Commercially-viable resources spatially limited and linked to the discrete geological processes that formed them[9-10] .

Land-sea interaction	Temporal aspect	Lifetime of installations
Through ports as materials need to be landed after extraction[11].	Activity happening all throughout the year. Due to the presence of ice the activity might be seasonal at some places. The nature of dredging protocol used can affect the recovery time of marine ecosystems following aggregate dredging[12].	Operational activity lasts between 30 to 40 years depending on maintenance and working life of extraction vessels[13].

Interaction with other uses
Conflicts mostly at the extraction phase[14] for example with small-scale fisheries, tourism, recreational activities, conservation measures and aquaculture activities[15-16]).

[1] EEA (2015).
[2] UEPG (2016).
[3] Ahnert, A.; Borowski, C. (2000).
[4] Ibid.
[5] EEA (2015).
[6] Velegrakis et al. (2010).
[7] EMODnet database (2014).
[8] Otay et al. (n.d.).
[9] Velegrakis et al. (2010).
[10] Comment from M. Russell (British Marine Aggregates Producers Association)
[11] Klinger et al. (2018).
[12] Cooper et al. (2008).
[13] Interview with Blue Mining Project coordinators on 02nd August 2017.
[14] See Section 4 of this sector fiche for further information.
[15] Ramirez-Llodra et al. (2011).
[16] BMAPA (n.d).

2 Composition of the Marine Aggregates and Marine Mining sector

The activities of the marine aggregates and marine mining sectors can be broken down by: i) the extracted materials; ii) the location where the activity takes place. Shipping operational and service activities to/from the delivery place (i.e. ports) are not considered in this sector fiche.

Marine Aggregates	By material	Sand and gravel	Considers the exploration, exploitation, extraction and dredging of sand and gravel from the seabed, primarily for the purpose of construction and beach nourishment [17-18-19]. Potential for increasing demand of aggregates also for coastal defense works to safeguard dunes, beaches, coastal areas and even whole islands[20-21] .
Marine Mining	By location	Shallow Mining	Considers the exploration, exploitation and extraction of marine minerals, such as iron ore, tin, copper, manganese and cobalt[22].
			Occurring mostly at shallow depths around 15-60m water depth[23]. Activity at a nascent phase and a continued growth in an effort to meet the demands of high-tech industries for materials[24]. By 2020, 5% of the world's minerals, including cobalt, copper and zinc could come from the ocean floors[25].
		Deep-sea Mining	Occurs in waters depths from 800-6000m where mineral deposits of polymetallic nodules, manganese crust and sulfide deposits might be found[26]. Activity at the exploratory phase.

Figure 1: Composition of the marine aggregates and marine mining sector

[17] EEA (2015).
[18] The Crown Estate (2015).
[19] BMAPA (2014).
[20] The Crown Estate (2015).
[21] BMAPA (2014).
[22] Ahnert, A.; Borowski, C. (2000).
[23] Comment from M. Russell (British Marine Aggregates Producers Association).
[24] Ahnert, A.; Borowski, C. (2000).
[25] European Commission (2015).
[26] Ahnert, A.; Borowski, C. (2000).

3 Relationship between Marine Aggregates and Marine Mining and MSP

3.1 What are present spatial needs of the Marine Aggregates and Marine Mining sector?

The marine aggregates and marine mining sectors are locked in physically to the specific location where geological processes lead to those materials to be extracted. Thus, the spatial aspect is of the greatest importance for these sectors, as the spatial availability of the resource cannot be altered[27]. At the same time, a re-allocation of the activity would therefore not be possible.

The material transport to ports also follows a linear structure connecting the collection point to the point of delivery, which will follow the most direct route in order to minimize shipping costs.

In other to avoid potential spills, during extraction all other uses are to be spatially avoided so that focus remains on a safe exploration (especially for deep-sea mining development). For example, each cargo takes about 3-6 hours to dredge[28].

Maritime spatial plans and mapping can identify potential geological resources allocated zones that are far bigger than the locations where eventually the actual dredging may will take place in the future (through "mineral safeguarding"), but this also means that large areas might appear as being excluded to other uses by the marine aggregates industry[29].

3.2 Which anticipated future developments of the industry are relevant to MSP?

Construction material	Coastal defense[31]	Mineral value
Increasing demand for construction materials to maintain and develop transport, energy and water infrastructures and built environment that society relies upon[30]. The availability of aggregate resources is becoming constrained on land so more people are looking to marine resources.	Climate Change and coastal defense . In a world where most beach and coastal areas are suffering from an increase in erosion due to morphological changes of their environments together with unprecedented sea level rises and climate change impacts, the need for replenishing beaches (beach nourishment)[32] and improving coastal defenses[33] (see Netherlands and the Rijkswaterstaat which have undertaken a strategic planning to forecast the resources required to protect the coast up to 2100[34]). Thus, the marine aggregates sector is likely to become increasingly relevant because of the need for new extraction sites.	The availability and value of minerals such as tin and rare earth minerals are going up[35].

High tech industry	Deep-sea mining	Cost-Benefit Ratio
Marine mining for high-tech metals driven by the increasing demand for materials by high-tech industries. Increasing demand for high-tech metals is driven by technological developments that require precious metals. Thus, global annual turnover of marine mineral mining can be expected to grow from virtually nothing to €5 billion in the next 10 years and up to €10 billion by 2030[36].	The increasing scarcity over the supply of raw and non-living material, tends to push some countries (i.e. UK, Belgium, Netherlands and France) out into deeper waters further offshore to look for new material´s supply zones. This pushes the technological capacity of boats that will have to operate at deeper waters (larger boats) with more powerful equipment. Important technological challenges still exist for marine mining in deeper waters.	For deep-sea minerals, the future remains uncertain regarding to what extent the seabed will be tapped of its resources on a commercial scale. Industry players active in the field are generally confident that it is a matter of time before mining will begin as current technology already allows for extraction up to about 150 meters water depths. However, since the costs are known to be very high while the benefits are still uncertain for some deposits (e.g. seabed massive sulphides), the business case is not always there, there are no commercial activities to date and prospects have been delayed repeatedly.

[27] Comment from M. Russell (British Marine Aggregates Producers Association)
[28] Ibid.
[29] EU MSP Platform (2017).
[30] MPA (2017).
[31] Ibid.
[32] The Dorset Coast Strategy (n.d.).
[33] Ibid.
[34] EU (n.d.).
[35] Zhou, B., Li, Z., Chen, C. (2017).
[36] European Commission (2012).

4 Interaction with other sectors

The resource requirements of the marine aggregates industry can be very specific, depending on the geological characteristics (grain size) and the requirements of the market/end use being supplied. This may mean that the industry isn't always interested in the typical sand bank, but may be often more interested in the resources that are located near to the sandbanks as the sand used for construction purposes needs to be of a certain granularity. Consequently, there are actually many opportunities for combinations with other maritime activities. However, the marine aggregates and marine mining extraction might bring MSP implications with various other marine users of the ocean space such as the followings:

Shipping and ports	Tourism and recreation	Oil and gas
• Additional risk of collision if extraction sites are on/near shipping lanes[37-38]. • Onshore conflict for space with ports.	• Conflicts while beach nourishment and sand extraction. Thus, nature-based solutions to beach nourishment are being researched such as sandscaping-a potential solution as it is an innovative coastal management concept which is designed to use naturel processes (wind, waves and tide) to distribute marine aggregates to nourish and create new beaches (e.g. Netherlands [39]).	• Use of same seabed space[40].

Pipelines and cables	Marine aquaculture	Offshore wind
• No conflicts unless at the extraction site where no cables can be laid[41]. • In order to promote synergies with sand extraction, laying routes could be determined, based on the availability of extractable sand (i.e. routes through areas where extractable sand has been depleted or where sand extraction is less attractive)[42].	• Conflict for use of the same seabed space.	• Can share space with the marine aggregates sector if you consider the multi-use also from a temporal perspective (i.e. a zone allocated to dredging in a plan might also be reserved for the development of an offshore wind park. The marine aggregates industry will only dredge there after the wind park has been decommissioned).

[37] Klinger et al. (2018).
[38] Nordquist et al. (2013).
[39] Hofherr, J., Natale, F., Trujillo, P. (2015).
[40] The Dorset Coast Strategy (n.d.).
[41] Veidemane, K., Ruskule, A., Sprukta, S. (2017).
[42] Government of the Netherlands. (2015).

Fishing	Conservation
• During dredging activity (aprox. 3-6 hours)[43] , conflicts exists in what regards to access to fishing grounds and deployment of fixed fixing gear[44]. However, outside extraction, fishing is not excluded from accessing and using the areas. • Potential for seabed extraction to impact on fish and shellfish populations through disturbing habitats (increased turbidity and fall out of dredged material)[45]. • Synergies may occur with the fishing sector (i.e. after the dredging has taken place, often localised depressions are created, which on land always have to be restored, but in the marine environment it might prove more beneficial to leave these as they are, as it has been noticed that these depressions often attract fish species, which could be interesting for the fisheries sector).	• Marine aggregate extraction has the potential to disturb sites of marine archaeological importance. Aggregates companies have agreed a voluntary code of practice, which requires archaeological assessment of licensed areas, and sets a framework for the protection of remains (see archaeological exclusion zones)[46]. • Marine mining potentially causes environmental damage to the biological diversity and ecosystems. Damage may arise from: contamination (release of metal ions into the water colum either in the benthic plume created by mining vehicles or, following dewatering on the surface vessel, in a mid-water plume)[47], changes in siltation at the seabed, underwater noise and the extraction of species[48]. • Aggregates extraction may exacerbate the erosion that generates the need for nourishment in the first place. Deposited material might be of a different granularity than the original material and biological communities might disturbed in the places where sand is deposited[49]. • Dredging activity liberates the sand from the seabed; there are certain types of worms that are attracted to this and will start to form biogenic reefs, attracting more biodiversity in the dredged area (potential link between the dredging industry and building with nature)[50].

5 Recommendations for MSP processes in support of the sector[51]

Align planning cycles	Multi-use planning	Sustainable extraction
Planning cycle needs to be able to provide operators with sufficient certainty to be able to support investment decisions. An effort must should be made to ensure that the planning cycles of MSP are more aligned with the temporal scope of the sector, i.e. the marine aggregates sector looks towards 30 years based on investment planning cycles and the duration of regulatory permissions, while and MSP cycles are around 6 years. MSP processes could introduce longer term planning perspectives as to accommodate for the sector temporal scale needs.	The marine aggregates sector can be included in multi-use planning, and it can be combined with marine protected areas as well as offshore renewable energy, military activities or the fisheries sector, as long as there is proper assessment and management. Multifunctional layering and combinations that take into account the temporal aspect are possible and welcomed by the sector, but a substantial evidence base must be created.	For the marine mining sector, the greater driver is to ensure that extraction is sustainably managed and minimizes potential effects on the environment and other marine uses[52].

[43] Comment from M. Russell (British Marine Aggregates Producers Association)
[44] The Dorset Coast Strategy (n.d.).
[45] Ibid.
[46] Ibid.
[47] Maritime Executive (2017).
[48] Koss et al., (2011).
[49] European Commission (2015).
[50] Comment from M. Russell (British Marine Aggregates Producers Association)
[51] EU MSP Platform (2017).
[52] Durden et al. (2017).

6 Resources[53]

6.1 Legal framework

Organisation	Title	Link	Short explanation
International Seabed Authority	Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area, ISBA/6/A/18 (13 July 2000), amended by ISBA/ 19/A/9; ISBA/19/A/12 (25 July 2013) and ISBA/20/A/9 (24 July 2014) (Nodules Exploration Regulations), 2014.	https://www.isa.org.jm/files/documents/EN/Regs/PN-en.pdf	In accordance with the United Nations Convention on the Law of the Sea ("the Convention"), the seabed and ocean floor and the subsoil thereof beyond the limits of national jurisdiction, as well as its resources, are the common heritage of mankind, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole, on whose behalf the International Seabed Authority acts. The objective of this first set of Regulations is to provide for prospecting and exploration for polymetallic nodules.
International Seabed Authority	Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area, ISBA/16/A/12/ Rev.1 (15 November 2010), amended by ISBA/19/A/12 (25 July 2013) and ISBA/20/A/10 (24 July 2014) (Sulphides Exploration Regulations), 2014.	https://www.isa.org.jm/files/documents/EN/Regs/PolymetallicSulphides.pdf	In accordance with the United Nations Convention on the Law of the Sea ("the Convention"), the seabed and ocean floor and the subsoil thereof beyond the limits of national jurisdiction, as well as its resources, are the common heritage of mankind, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole, on whose behalf the International Seabed Authority acts. The objective of this set of Regulations is to provide for prospecting and exploration for polymetallic sulphides.
International Seabed Authority	Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area, ISBA/18/A/11 (27 July 2012), amended by ISBA/19/A/12 (25 July 2013), regulation 1(3)(a)-(b) (Crusts Exploration Regulations), 2013	https://www.isa.org.jm/sites/default/files/files/documents/isba-16c-wp2_4.pdf	Draft regulations on prospecting and exploration for cobalt-rich ferromanganese crusts in the Area proposed by the Legal and Technical Commission are attached to the present document.

[53] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

Organisation	Title	Link	Short explanation
International Marine Minerals Society	Code for Environmental Management of Marine Mining, 2011	http://www.immsoc.org/IMMS_downloads/2011_SEPT_16_IMMS_Code.pdf	The Code consists of a statement of Environmental Principles for marine mining, followed by a set of Operating Guidelines for application as appropriate at specific mining sites. These Guidelines are designed to serve industry, regulatory agencies, scientists and other stakeholders, as benchmarks for development, implementation and assessment of environmental management plans and as advice on best fitfor-purpose practices at sites targeted for marine minerals research, exploration and extraction. The Principles and Guidelines set broad directions in a context of shared values rather than prescribing specific practices. It is important to note that this is a VOLUNTARY code which marine mineral companies/entities/other stakeholders are encouraged to strive towards and use.

6.2 Actors

Name	Link	Short explanation
British Marine Aggregate Producers Association (BMAPA)	http://www.bmapa.org/	The representative trade body for the British marine aggregate industry. BMAPA is a constituent body of the wider Mineral Products Association, the trade association for the aggregates, cement and concrete industries.
European Aggregates Association (UEPG)	http://www.uepg.eu/	UEPG stands for "Union Européenne des Producteurs de Granulats" (European Aggregates Association, Europäischer Gesteinsverband). Aggregates are sand, gravel (including marine aggregates), crushed rock, recycled and manufactured aggregates. UEPG represents the European Aggregates Industry in Brussels, now with Members in 27 countries. On behalf of its Members, UEPG actively lobbies the European institutions and other stakeholders on issues key to the industry.
European Dredging Association (EuDA)	https://www.european-dredging.eu/	The European Dredging Association ("EuDA") was founded in 1993 as a non-profit industry organisation for European dredging companies and related organisations to interface with the various European Union's ("EU") Institutions and also some International Organizations (such as IMO, HELCOM or ILO). EuDA members employ approximately 25,000 European employees directly "on land and on board of the vessels" and more than 48,300 people indirectly (through the suppliers and services companies). The combined fleet of EuDA's members counts approximately 750 seaworthy EU-flagged vessels.

Name	Link	Short explanation
European Association of Mining Industries, Metal Ores & Industrial Minerals _ EUROMINES	http://www.euromines.org/mining-europe/main-mineral-deposits-europe	Euromines is the recognised representative of the European metals and minerals mining industry. The association's main objective is to promote the industry and to maintain its relations with European institutions at all levels. Euromines provides services to its members with regard to EU policy and serves as a network for cooperation and for the exchange of information throughout the sector within Europe. The association also fosters contacts with the mining community throughout the world. Euromines represents large and small companies and subsidiaries in Europe and in other parts of the world which provide jobs to more than 350,000 people. Through the activities and operations of these members, more than 42 different metals and minerals are produced. For some metals and minerals, Europe is the world's leading producer.
European Innovation Partnership on raw materials (EIP)	https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en	Its mission is to provide high-level guidance to the European Commission, Members States and private actors on innovative approaches to the challenges related to raw materials. The EIP plays a central role in the EU's raw materials policy framework: • It reinforces the Raw Materials Initiative by translating the strategic policy framework into concrete actions and by mobilising the stakeholder community to implement them; • It has been instrumental in securing R&I funding: while Framework Programme 7 (the R&I funding tool for the period 2007-2013) only included approximately €180 million for raw materials R&I, Horizon 2020 (the R&I funding tool for 2014-2020) reserved €600 million for research on the challenges related to raw materials.

6.3 Initiatives

Name	Link	Short explanation
Blue Mining Project	http://www.bluemining.eu/	The overall objective of Blue Mining is to provide breakthrough solutions for a sustainable deep sea mining value chain. This means to develop the technical capabilities to adequately and cost-effectively discover, assess and extract deep sea mineral deposits up to 6,000m water depths as this is the required range where valuable seafloor mineral resources are found. The control over these three capabilities is the key for access to raw materials, for decreasing EU dependency on resource imports and for strengthening Europe's mining sector and their technology providers.
Irish Sea Marine Aggregate Initiative (IMAGIN)	http://oar.marine.ie/bitstream/10793/277/1/No 36 Marine Environment and Health Series.pdf https://data.gov.ie/dataset/irish-sea-marine-aggregates-initiative	The IMAGIN study has concluded that a number of areas with potential to support marine aggregate extraction exist within the Irish Sea and that marine aggregates can contribute to the sustainable management of demand and future use of aggregates in Ireland.

Name	Link	Short explanation
ERA-MIN (Network on the industrial handling of raw materials for European industries) & ERA-MIN 2	https://www.era-min.eu/system/files/call_text_era-min_joint_call_2017_0.pdf	ERA-MIN 2 aims to support the European Innovation Partnership on Raw Materials, the EU Raw Materials Initiative and further develop the raw materials sector in Europe through funding of transnational research and innovation (R&I) activities. This will be achieved through one co-funded call in 2017, as well as two additional calls in 2018 and in 2019, designed and developed specifically for the non-energy, non-agricultural raw materials sector.
Sustainable Intelligent Mining Systems - SIMS	http://www.simsmining.eu/	Our vision is to create a long lasting impact on the way we test and demonstrate new technology and solutions for the mining industry. With a selected consortium ranging from mining companies, equipment and system suppliers to top-class universities, the SIMS project will boost development and innovation through joint activities aiming at creating a Sustainable Intelligent Mining Systems.
Viable Alternative Marine Operating Systems - VAMOS	http://vamos-project.eu/	To enable the exploitation and rehabilitation of underexploited and abandoned European deposits of mineral raw materials
Marine Aggregates Prospecting and Exploitation - MARE	http://excellence.minedu.gov.gr/thales/en/thalesprojects/375655	The proposed research project aims to investigate the Greek continental shelf, including the Cyclades Plateau, in terms of MA identification, prospecting, dredging, and usage.
The Raw Materials Initiative	https://ec.europa.eu/growth/sectors/raw-materials/policy-strategy_en	The strategy covers all raw materials used by European industry except materials from agricultural production and materials used as fuel. Ensuring sustainable access to these raw materials is crucial to the competitiveness and growth of the EU economy and to the objectives of the Europe 2020 strategy. The Commission also regularly publishes a list of critical raw materials in the EU.

6.4 Selected literature

Author	Title	Link	Short explanation
The Crown State	Marine aggregates: capability & Portfolio 2015 report	https://www.thecrownestate.co.uk/media/389767/ei-marine-aggregates-capability-and-portfolio.pdf	The Capability & Portfolio 2015 report outlines the significant demand and range of uses for marine aggregates in the UK.
BMAPA	16th Annual Report: Marine aggregate extraction	http://www.bmapa.org/documents/BMAPA_16th_Annual_Report.pdf	This report contains summary information relating to The Crown Estate area of seabed licensed, dredged and surrendered during 2013 based on GIS data and from analysis of dredger Electronic Monitoring System records. Information on dredged area and intensity has been derived from variable grid analysis. A set of regional charts has been prepared to show the extent and intensity of dredging operations. Additional facts and figures on marine aggregate extraction activity by region are also presented.
ICES WGEXT	Report of the Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT). ICES WGEXT REPORT 2016	http://www.ices.dk/community/groups/Pages/WGEXT.aspx http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/SSGEPI/2016/01%20WGEXT%20-%20Report%20of%20the%20Working%20Group%20on%20the%20Effects%20of%20Extraction%20of%20Marine%20Sediments%20on%20the%20Marine%20Ecosystem.pdf	ICES Working Group on the Extraction of Sediments from the Seabed. They produce an annual report and 4/5 year summary detailing the status of marine aggregates activities in the North East Atlantic (including the Baltic, but excluding the Mediterranean).
European Commission	EU stakeholder survey on seabed mining: summary of responses	https://ec.europa.eu/info/sites/info/files/consultation-seabed-mining-results-swd-2015-119_en_1.pdf	Results coming from a consultation made by the EU Maritime affairs and Fisheries department. There were 206 replies with a representative selection of private bodies, public authorities, and researchers. Another 515 respondents, rather than replying to the questions, sent individual e-mails.
International Seabed Authority	Recommendations for the guidance of contractors for the assessment of the possible environmental impacts arising from exploration for polymetallic nodules in the Area, ISA Legal and Technical Commission document ISBA/16/LTC/7, Kingston, Jamaica, 2010		

Author	Title	Link	Short explanation
International Seabed Authority	Environmental Management Needs for Exploration and Exploitation of Deep Sea Minerals, ISA Technical Study: No. 10, Nadi, Fiji, 2011.		

7 List of acronyms

Acronym	Full title
MSP	Maritime Spatial Planning

8 List of references

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BMAPA (n.d). *Aggregates Levy.*	http://www.bmapa.org/issues/aggregates_levy.php
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EU MSP Platform (2017). *Maritime Spatial Planning for Blue Growth: How to plan for a Sustainable Blue Economy.* Conference report. Insights comming from Session 3: Marine aggregates and marine mining. 11-12 October 2017. Brussels, Belgium.	http://msp-platform.eu/sites/default/files/20171123_msp4bg_conferencereport_0.pdf
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European Commission (2015). *EU stakeholder survey on seabed mining: summary of responses*. Maritime Affairs and Fisheries consultation results.	https://ec.europa.eu/info/sites/info/files/consultation-seabed-mining-results-swd-2015-119_en_1.pdf
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Sector Fiche:

Shipping and Ports

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
€570 billion EU and Norway in 2015[1]	Mature and growing[2]	Dispersed throughout all sea basins[3]

Land-sea interaction	Temporal aspect	Lifetime of installations
Through ports and hinterland connections	• Peak in cargo demand in winter[4] • Cruise shipping primarily in the warmer months	N/A

Interaction with other uses
Conflicts especially with uses requiring fixed installations[5]

[1] Oxford Economics (2017).
[2] EUNETMAR (2013).
[3] EuroGraphics (n.d).
[4] Stopford, M. (2009).
[5] Medhi, R. (in press).

2 Composition of the shipping and ports sector

The activities of the shipping and port sector can be broken down by: i) the origin/destination of the ships' journey, ii) the purpose of traffic as well as iii) the size of ports.

<table>
<tr><td rowspan="2">By origin/destination of the route</td><td colspan="2">Short sea (SSS) (within Europe)</td><td rowspan="2">EU-wide, the ratio of SSS versus DSS was 59% to 41% in terms of total gross weight of goods transported. SSS distributes cargo between European countries as well as tranships cargo arriving from overseas to other destinations within Europe[6]. SSS competes with other modes of transportation, e.g. road and rail transportation[7]. For MSP, SSS and the European leg of DSS are of relevance.</td></tr>
<tr><td colspan="2">Deep sea (DSS) (intercontinental traffic)</td></tr>
<tr><td rowspan="7">By purpose of the traffic</td><td rowspan="4">Cargo</td><td>Liquid bulk</td><td>Accounts for 38% of total cargo handled in main EU ports (in 2015)[8].</td></tr>
<tr><td>Dry bulk</td><td>Accounts for 23% of total cargo handled in main EU ports (in 2015)[9].</td></tr>
<tr><td>Containers</td><td>Accounts for 18% of the total cargo handled by main EU ports (in 2015)[10].</td></tr>
<tr><td>Ro-ro</td><td>Accounts for 12% of the total cargo handled by main EU ports (in 2015)[11].</td></tr>
<tr><td rowspan="2">Passenger</td><td>Ferries</td><td>In 2015, the number of passengers (dis-) embarking in EU ports amount 382 million[12].</td></tr>
<tr><td>Cruise</td><td>In comparison to ferry passengers, the number of cruise passengers is comparatively low with around 12 million in 2015. However, the cruise shipping has significant growth rates[13].</td></tr>
<tr><td>Service</td><td>e.g. to offshore wind farms, oil and gas platforms, aquaculture installations</td><td>In addition to handling cargo and providing passenger terminals, some ports have specialised to accommodate offshore service traffic. This may also constitute a survival strategy for small ports that find it hard to compete with bigger competitors.</td></tr>
<tr><td>Size of ports</td><td colspan="2">A scale from
very large (hubs)
to small/regional ports</td><td>Ports vary in size and significance of the shipment of goods. There are big ports throughout the EU, but there is an especially dense accumulation of main ports in the North West of the EU[14]. Smalls ports can still be important, e.g. as employment providers in regions and as import or export interfaces for local industries[15].</td></tr>
</table>

Figure 1: Composition of the shipping and ports sector

In this sector fiche, there will be an emphasis on cargo and passenger traffic types as well as on short sea shipping. However, service traffic and the European leg of deep sea shipping will be considered, too. Leisure boats and fishing activities also create traffic. These forms of navigation are not part of this sector fiche, but information can be found in the coastal and maritime tourism and fishing fiches.

[6] Eurostat (2017)
[7] Beyer et al. (2017).
[8] Eurostat (2017).
[9] Ibid.
[10] Ibid.
[11] Ibid.
[12] Ibid.
[13] EUNETMAR (2013).
[14] Eurostat (2017)
[15] Beyer et al. (2017).

3 Relationship between shipping and ports and MSP

3.1 What are present spatial needs of the shipping and ports sector?

Cargo and passenger transport follows a linear structure[16]. This means that they seek to take the direct route between two ports. Detours are possible, but costly, due to higher fuel expenses as well as labour costs[17].

Sufficient space must be secured for overtaking as well as emergency manoeuvres[18]. This means that incompatible uses (especially offshore installations) should be sufficiently far away from the heavier trafficked areas.

In addition, ships can only sail in areas which are sufficiently deep for their draught[19].

When planning for shipping in MSP, it must be ensured that sea traffic can operate safely also under adverse conditions. Heavy weather poses risks in the sense that it limits visibility. Furthermore, ships may need to deviate from the optimal course or even seek refuge in anchorage areas[20].

3.2 Which anticipated future developments of the industry are relevant to MSP?

Increasing freight volumes	Increasing vessel size	Increasing short sea shipping
Increasing freight volumes generally mean an increase in ship traffic[21] and a resulting claim for more sea space. It is important to assess how an increase in freight volumes would play out in a particular geographic context (see increasing vessel size and increase in short sea shipping).	Vessel size is predicted to increase[22] Bigger vessels have a bigger turning circle. If an area is frequently accessed by very large vessels, a wider area should be reserved for shipping in order to ensure safe navigation[23]. Furthermore, water depth in shallow areas (including in ports) limits the accessibility for vessels with a bigger draught. Some ports will adapt their infrastructure to accommodate very large carriers[24]. Canals and locks may also restrict the access of bigger ships to certain waterways. It needs to be assessed how traffic patterns will shift with an increasing number of very large vessels.	Short sea shipping is expected to increase, because feeder vessels will distribute the cargo that is brought to hubs by the very large vessels[25]. In addition, short sea shipping is politically supported at the EU level[26]. A spatial implication of more short sea shipping is an increased demand for space along the coastlines.

Port infrastructure	Autonomous vessels	Climate change
It is important to anticipate, which ports will be frequently accessed by what kind of ships in the future in order to determine which routes ships will use. Existing and planned port infrastructure is a decisive factor[27]. Apart from the ability to accommodate very large carriers, the offer of alternative bunkering technology as well as a port's general service offer may decide about the direction of traffic flows. Some small ports may even decline in importance in the competitive environment.	The spatial implications of autonomous vessels are difficult to foresee. In the trial phase, testbeds will be established that may be closed for conventional ships and other uses. In the foreseeable future, autonomous and manned vessels will coexist. Some experts say that in the beginning, autonomous vessels may require a separate lane. Others argue that autonomous shipping will require less safety distances, because technology will be more reliable than vessels operated by humans[28].	Climate change is expected to result in more extreme weather conditions (including heavier rain and storms)[29]. Ships are obliged to adapt their routes to the weather conditions[30]. Thus, ships may need more space so that they can make detours in case of bad weather on their planned route. In addition, climate change may trigger an opening of the Arctic route during summer, which may alter sea traffic patterns in some areas[31].

[16] Gee, K. , Kannen, A., & Heinrichs, B. (2011).
[17] Rawson, A. & Rogers, E. (2015).
[18] The Ministry of Infrastructure and the Environment & The Ministry of Economic Affairs (2014).
[19] The Nautical Institute (2013).
[20] Ibid.
[21] European Commission (2013).
[22] OECD (2015).
[23] The Ministry of Infrastructure and the Environment & The Ministry of Economic Affairs (2014).
[24] OECD (2015).
[25] European Commission. DG Mobility and Transport (2015).
[26] European Commission, DG Mobility and Transport (2011).
[27] Beyer et al. (2017).
[28] Meyer, N. (2017).
[29] Sarwar, G.M. (2006).
[30] IMO Resolution A.528, 13.
[31] Ibid.

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4 Interaction with other sectors

Tourism and recreation	Pipelines and cables	Fishing	Offshore wind
• Tourism creates traffic (leisure boating and sailing) which is a safety issue for other types of navigation[32]. • Ports are a tourist attraction.	• Deepening of fairways poses a risk to pipelines and cables[33]. • Anchoring vessels can damage pipelines[34]. • Pipelines and cables are laid with special ships[35].	• Fishing entails navigation, too. However, it does not follow the navigational patterns of cargo and passenger transportation[36].	• Offshore wind turbines may interfere with radar operations[37]. • Offshore wind parks may impair sight, especially on smaller boats[38].

Marine aggregates	Conservation	Service traffic to and from fixed installations: Oil and gas	Marine aquaculture	Marine renewables
• Marine aggregates are extracted with specialised ships. • There is usually no synergy between fairway dredging and mining of marine aggregates[39].	• Impacts on air quality and noise may have negative impacts on marine biodiversity[40].	• Installations may compel ships to make detours, which is costly [41]. • The risk for collision increases a) with the structures and b) among vessels themselves, when traffic density increases as navigable space diminishes[42]. • Service traffic follows different navigational patterns than cargo or passenger transportation[43]. They go back and forth between ports and fixed installations. Often times, they need to cross lanes that are frequently trafficked by other vessels. These crossing bring with them risk for collision. • Operators of fixed installations benefit from existing harbours. Some harbours have deliberately occupied the niche of service traffic, e.g. the Danish port of Esbjerg[44].		

5 Recommendations for MSP processes in support of the sector

Free space needed

To support the shipping sector, MSP should keep free space needed for shipping (rather than limiting shipping activities to designated areas) now and in the future. Furthermore, MSP should make sure that safety zones to incompatible activities are sufficient.

Freedom of navigation

The freedom of navigation principle applies [45]. This means that ships are generally free to sail wherever they want. Limitations to this principle are put in place on an exceptional level (see IMO shipping routes). Still, shipping routes can be designated in an MSP, but they do not strictly limit the activities of the sector to this space.

Existing IMO shipping routes

MSP processes may instigated a debate about changing shipping routes. However, changing international shipping routes is a lengthy process[46] and existing IMO shipping routes should be considered in MSP processes.

Three dimensions

Three dimensions need to be taken into account for assessing present spatial claims and estimating future ones:

- The trajectory, i.e. the coordinates of ships' movements
- Width of the space required (depending on traffic density and vessel size)
- Water depth in relation to ships' draught.

AIS data

AIS data a prime source to identify the present spatial needs of shipping. From the data, the requirements of different navigation types (cargo, passenger, service, fishing) can be differentiated[47].

Neighbouring states cooperation

Neighbouring states should cooperate in order to ensure a mapping of shipping lanes designated in MSPs across borders[48].

[32] Meyer, N. (2017).
[33] Ruskule et al. (2014).
[34] Health and Security Executive (2009).
[35] Verfaillie, E. & Van Lancker, V. (n.d).
[36] Meyer, N. (2017).
[37] Rawson, A. & Rogers, E. (2015).
[38] Ibid.
[39] Randall, E., Drake, A. & Cenac, W. (n.d).
[40] World Wildlife Fund (WWF) (2012).
[41] Rawson, A. & Rogers, E. (2015).
[42] Mehdi, R. & Schröder-Hinrichts, J.-U. (2016).
[43] Meyer, N. (2017).
[44] Esbjerg Municipality (n.d).
[45] UNCLOS Article 87, 1a
[46] The Nautical Institute (2013).
[47] Fiorini, et al. (2016).
[48] Gee, K. , Kannen, A., & Heinrichs, B. (2011).

6 Resources[49]

6.1 Legal framework

Organisation	Title	Link	Short explanation
IMO	United Nations Convention of the Law of the Sea (UNCLOS)	http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm	UNCLOS defines rights and responsibilities of states to use the sea. Many of the provisions address navigation. Some very relevant in the MSP context are: • Freedom of navigation (Art. 87(1)a)) • Regulations on artificial installations and their safety in the exclusive economic zone (Art. 60(7)) Traffic separation schemes in the territorial sea (Art. 22) as well as in straits used for international navigation (Art. 41).
IMO	International Convention for the Safety of Life at Sea (SOLAS)	http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx	SOLAS addresses safety issues in construction, equipment and operation of vessels. It provides a framework for establishing routing systems (mandatory and recommended ones) through the International Maritime Organization.
IMO	International Regulations for Preventing Collisions at Sea (COLREGs)	http://www.imo.org/en/About/conventions/listofconventions/pages/colreg.aspx	COLREGS provide navigation rules to prevent collisions,
IMO	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL)	http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx	MARPOL attempts to prevent emissions from ships polluting the marine environment.

[49] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.2 Actors

Name	Link	Short explanation
International Maritime Organization (IMO)	http://www.imo.org	IMO is the global regulatory standard-setting authority for the safety, security and environmental performance of international shipping.
European Community Shipowners' Associations (ECSA)	http://www.ecsa.eu/	ECSA represents the national shipowners' associations of the EU and Norway.
European Sea Ports Organisation	http://www.espo.be/	ESPO is the principal interface between European seaports and the European institutions and its policy makers. Represents the port authorities, port associations and port administrations of the seaports of 23 Member States of the European Union and Norway at EU political level.
Cruise Lines International Association (CLIA)	https://www.cruising.org/	CLIA is the world's largest cruise industry trade association, providing a unified voice and leading authority of the global cruise community.

6.3 Initiatives

Name	Link	Short explanation
NorthSEE and Baltic LINes	http://www.northsearegion.eu/northsee	The projects assess the status quo of shipping activities in the North Sea and in the Baltic Sea, respectively. They identify future tends and their spatial implications and find out how shipping can be taken up in maritime spatial plans to be developed.

6.4 Selected literature

Author	Title	Link	Short explanation
The Nautical Institute (2013)	The shipping industry in marine spatial planning. A professional approach	http://www.natuinst.org/en/forums/mso/	The document provides and introduction into MSP, raises issues to consider and illustrates the interlinkage between MSP and shipping in case studies.
Meyer, N. (2017)	Shipping in the Baltic Sea. Past, present and future developments relevant for Maritime Spatial Planning	http://www.vasab.org/index.php/documents/doc_download/1275-baltic-lines-report-on-shipping-in-the-baltic-sea	The document assesses the status quo and shows expected future developments relevant to maritime spatial planning for the case of the Baltic Sea. The bulk of the information is relevant also for regions beyond the Baltic Sea.
Rawson, A. & Rogers, E. (2015)	Assessing the impacts to vessel traffic from offshore wind farms in the Thames Estuary	http://repository.scientific-journals.eu/bitstream//123456789/772/16-zn-am-43-115-rawson-rogers-org044.pdf?sequence=1	This paper focuses on the safety dimension between offshore wind farms and shipping.
Beyer et al., (2017)	Towards an implementation strategy for the sustainable Blue Growth Agenda for the Baltic Sea Region.	https://publications.europa.eu/en/publication-detail/-/publication/60adf799-4f19-11e7-a5ca-01aa75ed71a1	This study provides an overview on the drivers and barriers of the shipping industry in the Baltic Sea is concerned with. Most of the factors are relevant on a European scale.

7 List of acronyms

Acronym	Full title
CLIA	Cruise Lines International Association
COLREGs	International Regulations for Preventing Collisions at Sea
DSS	Deep Sea Shipping
ECSA	European Community Shipowners' Associations
ESPO	European Sea Ports Organisation
IMO	International Maritime Organization
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
MSP	Maritime Spatial Planning
OECD	Organisation for Economic Co-operation and Development
SOLAS	International Convention for the Safety of Life at Sea
SSS	Short sea shipping
UNCLOS	United Nations Convention of the Law of the Sea

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Esbjerg Municipality. (n.d.). *New Energy: Esbjerg - a natural hub for the offshore and energy technology industries*.	http://www.esbjergkommune.dk/Files/Filer/Engelsk/New_Energy_Esbjerg.pdf
EUNETMAR (2013). *Study on Blue Growth, maritime policy and the EU Strategy for the Baltic Sea Region.*	https://www.sustainable-projects.eu/downloads/Final_Report_Revision_6_Dec_2013NEW_TEMPLATE.pdf
EuroGraphics. (n.d). European Atlas of the Sea [Image].	https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/#lang=EN;p=w;bkgd=5;theme=85:0.75,41:0.75,86:0.75,43:0.75
European Commission (2013). *European Seaports 2030: Challenges ahead.*	http://europa.eu/rapid/press-release_MEMO-13-448_en.htm
European Commission DG Mobility and Transport. (2011). *White Paper on transport: Roadmap to a single European transport area: Towards a competitive and resource efficient transport system.*	http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52011DC0144
European Commission. DG Mobility and Transport (2015). *Analysis of recent trends in EU shipping and analysis and policy support to improve the competitiveness of short sea shipping in the EU.*	https://ec.europa.eu/transport/sites/transport/files/modes/maritime/studies/doc/2015-june-study-sss-final.pdf
Eurostat (2017). *Maritime transport statistics: Short sea shipping of goods.*	http://ec.europa.eu/eurostat/statistics-explained/index.php/Maritime_transport_statistics_-_short_sea_shipping_of_goods
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Mehdi, R. (in press). *Improving the co-existence of offshore energy installations & shipping.*	
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Oxford Economics. (2015). *The economic value of the EU shipping industry-update.*	http://www.ecsa.eu/images/Studies/150220 European Shipping Update.pdf
Randall, E., Drake, A. & Cenac, W. (n.d.). *Improvements for dredging and dredged material handling.*	https://www.westerndredging.org/phocadownload/ConferencePresentations/2011_Nashville/Session2A-AdvancesInDredging/2%20-%20Randall,%20Drake,%20Cenac%20-%20Improvements%20for%20Dredging%20and%20Dredged%20Material%20Handling.pdf
Rawson, A. & Rogers, E. (2015). *Assessing the impacts to vessel traffic from offshore wind farms in the Thames Estuary. Scientific Journals of the Maritime University of Szczecin, 43(115), 99–107.*	https://www.researchgate.net/publication/316460284_Assessing_the_impacts_to_vessel_traffic_from_offshore_wind_farms_in_the_Thames_Estuary
Ruskule, A., Kalvane, I., Veidemane, K., Przedrzymirska, J., Schultz-Zehden, A., Depellegri, D., Blažauskas, N., Askman, P., Nilsson, H., Pålsson J., Käppeler, B. &Veidemane, E. (2014). *Pan-Baltic stakeholders' dialogue on MSP: Synthesis report from PartiSEApate single-sector workshops held in 2013. Riga.*	http://www.partiseapate.eu/wp-content/uploads/2014/08/Syntesis-report-from-pan-Baltic-Dialogues-2013.pdf
Sarwar, G. M. (2006). *Impacts of climate change on maritime industries* (Doctoral dissertation, World Maritime University, Malmö, Sweden).	https://commons.wmu.se/cgi/viewcontent.cgi?referer=https://www.google.de/&httpsredir=1&article=1275&context=all_dissertations
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Sector Fiche:

Oil and Gas

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
N/A	Mature and in decline. More than 80% of current European oil & gas production takes place offshore. Most activity takes place in the North Sea, and to a lesser extent in the Mediterranean, Adriatic and Black Seas. Most of the extraction fields are mature, with declining production and rising costs[1].	Predominantly North Sea, minor activity Atlantic and East Mediterranean.

Land-sea interaction	Temporal aspect	Lifetime of installations
Pipelines for transfer of product, shipping for supply, maintenance and off-loading.	Fixed platforms and pipelines present until decommissioning.	Optimal design life of 25 years, extended as profitable.

Interaction with other uses
Exclusion of fishing from safety zones, some potential for multi-use.

[1] Ecorys (2012).

2 Composition of the oil and gas sector

This sector fiche will focus on hydrocarbon exploration and production. Operating and service vessels as well as connection cables and pipelines are excluded from this sector fiche analysis. Installations can be distinguished by type (see Figures 1 & 2)

Installation type	Conventional fixed platforms (CFP)	These platforms are built on concrete and/or steel legs anchored directly onto the seabed, supporting a deck with space for drilling rigs, production facilities and crew quarters[2]. Fixed platforms are economically feasible for installation in water depths up to about 150 m [3].
	Compliant tower (CT)	The rig consists of narrow, flexible (compliant) towers and a piled foundation supporting a conventional deck for drilling and production operations. Compliant towers are designed to sustain significant lateral deflections and forces, and are typically used in water depths ranging from 450 to 900 m [4].
	Tension leg platform (TLP)	A vertically moored floating structure normally used for the offshore production of oil or gas, and is particularly suited for water depths greater than 300 metres and less than 1500 metres. Use of tension-leg platforms has also been proposed for wind turbines[5].
	Spar	Type of floating oil platform typically used in very deep waters, and is named for logs used as buoys in shipping that are moored in place vertically. A spar platform consists of a large-diameter, single vertical cylinder supporting a deck. The cylinder is weighted at the bottom by a chamber filled with a material that is denser than water[6].
	Semi-submersible platform	A semi-submersible platform is a specialised marine vessel used in a number of specific offshore roles such as offshore drilling rigs, safety vessels, oil production platforms, and heavy lift cranes. They are designed with good stability and seakeeping characteristics. In water depths greater than around 520 meters.
	Floating production, storage, and offloading facility	Is a floating vessel used by the offshore oil and gas industry for the production, processing of hydrocarbons and for the storage of oil. They are divided into: • FSO, Floating Storage and Offloading • FPS, Floating Production and Storage • FPSO, Floating Production, Storage and Offloading • FDPSO, Floating, Drilling and Production, Storage and Offloading • FSRU, Floating Storage Regasification Unit
	Sub-sea completion and tie-back to host facility	Consists essentially of a wellhead assembly and Christmas tree (sometimes referred to as a wet tree), which is basically identical in operation to its surface counterpart, with the primary exception of reliability refinements, to permit operation at the seabed. Subsea wells have been used in support of fixed installations as an alternative to satellite or minimum-facility platforms for recovering reserves located beyond the reach of the drillstring or used in conjunction with floating systems such as FPSOs and FPSs[7].
	Drill ships	A marine vessel that's been modified to drill oil and gas wells. Typically employed in deep and ultra-deep waters, drillships work in water depths ranging from 610 to 3,048 meters[8].

Figure 1: Composition of the oil and gas sector

[2] Pike, J. (2017)
[3] Sadeghi, K. (2007).
[4] Offshore Magazine (n.d.).
[5] Offshore Magazine (2010).
[6] Offshore Magazine (2014).
[7] INTECSEA (2016).
[8] RIGZONE (n.d).

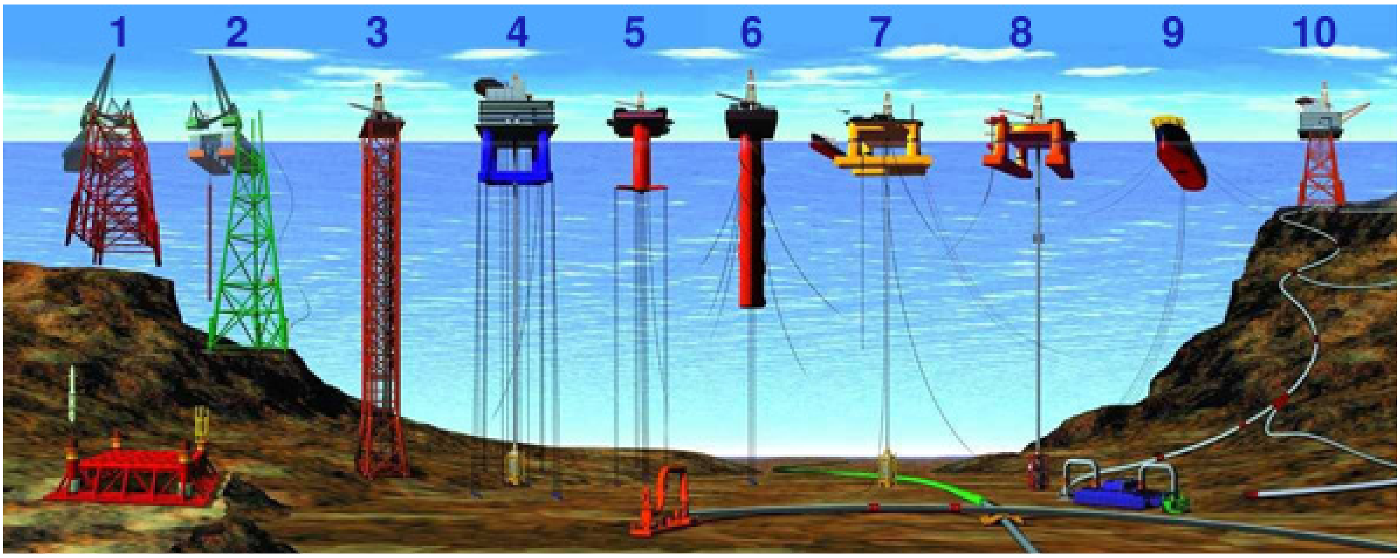

Figure 2: 1 & 2) conventional fixed platforms; 3) compliant tower; 4 & 5) vertically moored tension leg and mini-tension leg platform; 6) spar; 7 & 8) semi-submersibles; 9) floating production, storage, and offloading facility; 10) sub-sea completion and tie-back to host facility[9].

3 Relationship between offshore oil and gas and MSP

3.1 What are present spatial needs of the offshore oil and gas sector?

The oil and gas sector is locked in physically to the specific location where geological processes lead to those materials to be extracted. Thus, the spatial aspect is of the greatest importance for these sectors, as the spatial availability of the resource cannot be altered. At the same time, a re-allocation of the activity would therefore not be possible.

The material transport to ports also follows a linear structure connecting the collection point to the point of delivery (by ship or pipelines), which will follow the most direct route in order to minimize shipping costs.

In other to avoid potential spills, during extraction all other uses are to be spatially avoided so that focus remains on a safe exploration.

At the same time, the advent of directional drilling has reduced the amount of surface structures required for hydrocarbon extraction activities, since many wells can be operated from a single platform, and at a distance of several kilometres[10].

Similarly, extended reach drilling can be used to access offshore reserves from onshore facilities, as is undertaken from the German North Sea coast.

[9] Office of Ocean Exploration and Research (2008).[10] Sadeghi, K. (2007).
[10] WOR (2014).

3.2 Which anticipated future developments of the industry are relevant to MSP?

Declining reservoirs	Moving into deeper waters
Domestic production in Europe is set to decline sharply as existing fields mature and are not replaced, a growing dependence on imported hydrocarbons. In some parts of Europe, namely in the Black Sea and the Mediterranean there is unexploited oil and gas potential, with some exploration potential in Cyprus, Greece, Malta, Bulgaria, Romania and Portugal[11]. In the Mediterranean region, offshore oil production could increase by 60%, and gas production could increase five-fold, between 2010 and 2020[12].	Reservoirs in shallow waters are in decline, and with technological advancements in drilling and extraction, production is moving to deeper waters[13]. Enhanced oil recovery (EOR), injecting water or other substances to maintain reservoir pressure, is increasingly being utilised to access declining reservoirs.

Influenced by geo-political factors and crude oil price	Technological innovation
The activity of the sector fluctuates, influenced by a number of geo-political factors and particularly crude oil price[14], and the location of future exploration is dependent on the acquisition of capital[15]. It can be expected to grow through installation of new offshore structures and pipelines in areas of high resource potential, when economic conditions are favourable, and in others where production is declining, activities will shift to decommissioning (with no associated further demand for space).	Technological innovation and improvements in efficiency and cost-reduction may extend the life of some fields that would have otherwise been uneconomic[16]. However, reserves still exist and new technologies are enabling companies to produce hydrocarbons more cost effectively[17].

Other energy sources	Decommissioning
Development of renewable energy technologies, particularly offshore wind, and increasing emphasis on emissions reductions and alternative sources of clean energy affect the oil and gas sector, although the use of fossil fuels will continue to dominate energy production for the next decades[18].	As the sector ages, decommissioning of oil and gas infrastructure will become increasingly active, with over 200 platforms forecasted for complete of partial removal, nearly 2,500 wells to be plugged and abandoned and 7,8000km of pipeline to be decommissioned in the North Sea between 2017 – 2025[19]. Current requirements under OSPAR Decision 98/3 (1998) requires full removal upon decommissioning of all rigs located in the OSPAR maritime area (which includes the North Sea), unless the structure conforms to specific exemption requirements, in which case permission may be given to leave part or all of the structure in place. While there are some projects investigating the re-use of infrastructure, as artificial reefs or for other uses such as energy generation, tourism and aquaculture, projects are in their infancy hence cost-effectiveness and feasibility is uknown.

[11] JRC (2015).
[12] Piante, et al. (2015).
[13] WOR (2014).
[14] MARIBE (2015).
[15] Oil and Gas UK (2016).
[16] DNV (2016).
[17] WOR (2014).
[18] MARIBE (2016).
[19] Oil and Gas UK (2017).

4 Interaction with other sectors

Shipping and ports	Pipelines and cables	Fishing
• Continuous use of ports and harbours in supply, maintenance and hydrocarbon transfer. • Exclusion of shipping from a safety zone around infrastructure. • Decomissioning activies will require greater shore-based facilities for the dismantling of offshore rigs and platforms.	• Offshore oil and gas production represents the main demand for the installation and operation of pipelines. • Installation of new infrastructure needs to consider existing pipelines and cables to ensure that these aren't affected.	• Displacement of fishing activity from the installation during operation and decommissioning from a 500m safety exclusion zone, and temporary potential displacement during the installation of pipelines.

Marine aquaculture	Offshore wind and marine renewables	Conservation
• Potential competition in demand for space development, although only where the resources are available for both types of development. • Where suitable, and if technological and regulatory hurdles can be addressed, co-location of aquaculture facilities with existing oil and gas infrastructure may be possible.	• Potential competition in demand for space development, although only where the resources are suitable for both types of development. • Potential for installing offshore wind turbines on existing or decommissioned infrastructure[20]. • Synergies may take place in terms of supply chain services, grid connection and R&D efforts.	• Potential for ecological interactions, particularly during seismic use in exploration and associated disturbance of marine mammals. Oil spills are of inreasinglylow risk, but with significant potential ecological consequences, depending on the location and timing of the incident. This includes particularly coastal areas of conservation importance and which may be sensitive, such as saltmarsh. • Offshore installations have the potential to provide protected habitat in the form of artificial reefs, which can support associated biota[21].

5 Recommendations for MSP processes in support of the sector

Engaging with the sector

Despite the spatial requirements for the oil and gas sector are predictable with little expansion of existing activities expected[22], MSP processes should further engage with the sector to ensure their activities, current and future, are yet included. The sector may be established with presence of offshore infrastructure, safety and exclusion zones and maintenance/supply vessel activity and these should be included in the MSP.

Managing decommissioning effects

Decommissioning represents the next significant shift for the oil and gas industry as reserves decline and installations come to the end of their life. The spatial implications for MSP from this are minimal in terms of new demand for space, however, it is relevant to consider the potential increased pressure on ports and harbours for decommissioning activities, and the potential for offshore installations which remain *in situ* to be used for other purposes.

[20] Korpås et al. (2012).

[21] Macreadie et al. (2011).

[22] Oil and gas UK (2016).

6 Resources[23]

6.1 Legal framework

Organisation	Title	Link	Short explanation
OSPAR	OSPAR Recommendation 2003/5 on the Promotion of the Use and Implementation of EMS	www.ospar.org/documents?d=32720	The purpose of this Recommendation is to promote the use and implementation by the offshore oil and gas industry of environmental management mechanisms which are designed to achieve the environmental goals established in fulfilment of the objectives of the Offshore Strategy and continual improvement in environmental performance. These mechanisms should include elements for auditing and reporting.
EU Commission	Prospection, Exploration, and Production of Hydrocarbon Directive (94/22/EC)	http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31994L0022	Regarding Oil and Gas Licensing. National governments have control over the oil and gas in their territories. They determine the areas in which companies can search for and produce these resources. When granting licenses for these areas, they must follow a set of common EU rules to ensure fair competition.

6.2 Actors

Name	Link	Short explanation
World Petroleum Council (WPC)	http://www.world-petroleum.org/	The World Petroleum Council (WPC) is a non-advocacy, non-political organization with charitable status in the U.K. and has accreditation as a Non-Governmental Organization (NGO) from the United Nations (UN). The WPC is dedicated to the promotion of sustainable management and use of the world's petroleum resources for the benefit of all.
International Association of Oil and Gas Producers (IOGP)	http://www.iogp.org/blog/category/eu/	The International Association of Oil & Gas Producers (IOGP) is the voice of the global upstream industry. Oil and gas continue to provide a significant proportion of the world's energy to meet growing demands for heat, light and transport.
Oil and Gas UK	https://oilandgasuk.co.uk/	Industry body for oil and gas producers active on the UK Continental Shelf, where most of Europe's exploration and production activity occurs.

6.3 Initiatives

Name	Link	Short explanation
MERMAID (Innovative Multi-purpose offshore platforms: planning, design & operation)	http://www.vliz.be/projects/mermaidproject/	MERMAID will develop concepts for the next generation of offshore platforms which can be used for multiple purposes, including energy extraction, aquaculture and platform related transport. The project does not envisage building new platforms, but will theoretically examine new concepts, such as combining structures and building new structures on representative sites under different conditions.

[23] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.4 Selected literature

Author	Title	Link	Short explanation
Oil and Gas UK	Economic Report 2016	http://oilandgasuk.co.uk/wp-content/uploads/2016/09/Economic-Report-2016-Oil-Gas-UK.pdf	Oil & Gas UK's Economic Report 2016 has been designed and developed to help our members, from operators through to SMEs, to make informed decisions about the industry and their businesses. Presents a broadened analysis, including in-depth insight on the whole offshore oil and gas supply chain, identifying where progress is being made and challenges remain in UK.
MARIBE	Socio-economic trends and EU policy in offshore economy. Chapter 6 – Offshore Oil and Gas.	http://maribe.eu/blue-growth-deliverables/blue-growth-work-packages/ http://maribe.eu/download/2588/	This report describes the main features of the offshore oil and gas industry along with the opportunities and barriers that it can suppose for the development of Blue Growth and Multi-use and Multi-purpose Platform concepts.

7 List of acronyms

Acronym	Full title
CFP	Conventional fixed platforms
CT	Compliant tower
EOR	Enhanced oil recovery
FDPSO	Floating, Drilling and Production, Storage and Offloading
FPS	Floating Production and Storage
FPSO	Floating Production, Storage and Offloading
FSO	Floating Storage and Offloading
FSRU	Floating Storage Regasification Unit
MSP	Maritime Spatial Planning
TLP	Tension leg platform

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Reference	Retrieved from
DNV GL (2016). *Technology Outlook 2025 – Energy.*	https://www.dnvgl.com/publications/technology-outlook-2025-energy-62666
Ecorys (2012). *Blue Growth Study - Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts: Third Interim Report.*	https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/publications/blue_growth_third_interim_report_en.pdf
INTECSEA (2016). Worldwide Survey of Subsea processing, separation, compression and pumping systems. [Poster]	http://www.offshore-mag.com/learning-center/subsea/subsea-processing-collection/subsea-processing-maps-and-posters.html
Joint Research Centre (JRC) (2015). *EU Offshore Authorities Group – Web Portal: Offshore Oil and Gas Production.*	https://euoag.jrc.ec.europa.eu/node/63)
Korpås, M., Warland, L., He, W., & Tande, J.O.G. (2012). *A case-study on offshore wind power supply to oil and gas rigs*. Energy Procedia, 24: 18-26.	https://www.sciencedirect.com/science/article/pii/S1876610212011228
Macreadie, P. I., Fowler, A. M., & Booth, D. J. (2011). *Rigs-to-reefs: will the deep sea benefit from artificial habitat?.* Frontiers in Ecology and the Environment, 9(8): 455-461.	http://www.esa.org/pdfs/Macreadie.pdf
MARIBE (2015). *Socio-economic trends and EU policy in offshore economy.* Chapter 6 – Offshore Oil and Gas.	http://maribe.eu/blue-growth-deliverables/blue-growth-work-packages/
Office of Ocean Exploration and Research (2008). *Types of Offshore Oil and Gas Structures.* NOAA Ocean Explorer: Expedition to the Deep Slope. National Oceanic and Atmospheric Administration.	http://oceanexplorer.noaa.gov/explorations/06mexico/background/oil/media/types_600.html
Offshore Magazine (2010). *Worldwide Survey of TLPs.*	http://www.offshore-mag.com/content/dam/etc/medialib/platform-7/offshore/maps-and_posters/0210OS-TLP-Poster012510Ads.pdf
Offshore Magazine (2014). *Deepwater Solutions & Records for Concept Selection.*	http://www.offshore-mag.com/content/dam/offshore/print-articles/volume-74/05/1405offdeepwaterposter.pdf
Offshore Magazine (n.d.). *Compliant towers: the next generation.*	http://www.offshore-mag.com/articles/print/volume-59/issue-7/departments/drilling-production/compliant-towers-the-next-generation.html
Oil and Gas UK (2016). *Economic Report 2016.*	http://oilandgasuk.co.uk/wp-content/uploads/2016/09/Economic-Report-2016-Oil-Gas-UK.pdf
Oil and Gas UK (2017). *2017 Decommissioning Insight.*	https://oilandgasuk.co.uk/wp-content/uploads/2017/11/Decommissioning-Report-2017-27-Nov-final.pdf
Piante C., Ody D. (2015). *Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status*. MedTrends Project. WWF-France. 192pp.	http://d2ouvy59p0dg6k.cloudfront.net/downloads/medtrends_regional_report.pdf

Reference	Retrieved from
Pike, J. (2017). *Fixed Platform.*	http://www.globalsecurity.org/military/systems/ship/platform-fixed.htm
RAE (2013). *Decommissioning in the North Sea. A report of a workshop held to discuss the decommissioning of oil and gas platforms in the North Sea*. Royal Academy of Engineering: London. 15 pp.	http://www.raeng.org.uk/publications/reports?q=decommissioning
RIGZONE (n.d). *How Does a Drillship Work?*	https://www.rigzone.com/training/insight.asp?insight_id=306
Sadeghi, K. (2007). *An Overview of Design, Analysis, Construction and Installation of Offshore Petroleum Platforms Suitable for Cyprus Oil/Gas Fields*. GAU J. Soc. & Appl. Sci, 2(4): 1-16.	http://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/ReferencesPapers.aspx?ReferenceID=1552706
World Ocean Review (2014). WOR 3 *Marine Resources – Opportunities and Risks.*	http://wedocs.unep.org/handle/20.500.11822/9553?show=full

Sector Fiche:

Cables and Pipelines

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
N/A	Growing[1-2].	Dispersed throughout all sea basins[2-3].

Land-sea interaction	Temporal aspect	Lifetime of installations
Through their connection to onshore energy and communications terminals.	Non existent. Activity happening all throughout the year.	Between 20 to 50 years (for pipelines) [4-5] ; 40 to 50 years (for grid cables)[6] and a technical lifetime of 25 years for communication cables[7].

Interaction with other uses
Conflicts especially with extractive uses (i.e. marine aggregates, oil and gas extraction, fishing, etc.)[8].

[1] Chesnoy, J. (2016).
[2] Nies, S. (2011).
[3] *TeleGeography Submarine Cable Map (n.d).*
[4] DNV GL (n.d.).
[5] Balticconnector Transnational Pipeline (2016).
[6] Ecofys & RPS (2017).
[7] *TeleGeography (n.d).*
[8] See Section 4 of this sector fiche for further information.

2 Composition of the cables and pipelines sector

In this sector fiche, there will be an emphasis on communication and energy cables as well as oil and gas pipelines. Cable-laying or pipeline-laying vessels are excluded from this sector fiche analysis.

Offshore cables	Communication cables	Cables to carry telecommunication signals across stretches of ocean. Communications are an important part of our nowadays society and submarine cables have become key facilitators of modern life. Today, as little as 3% of global communications are carried through satellite links, which means that 97% of the world's communications are transported around the world via fiber optic submarine cables[9].
	Energy/power cables	Including high voltage alternating (HVAC) and direct (HVDC) current offshore cables which transport electricity at more than 150kV and 100kV respectively[7].
Offshore pipelines	Oil pipelines	Transportation pipelines for oil. In the EU, only a small fraction (20%) of total oil products import and transportation uses pipelines. 80% are transported by vehicles, ships and trains[10].
	Gas pipelines	Transportation pipelines for gas over large distances and under high pressure (over 80 bars). Each Member State has a distinct control and supervision system for handling daily operations of the gas transmission system[10].
	Disposal pipelines	Pipelines for the disposal of chemicals and wastewaters (marine wastewater outfalls).
	Freshwater connection pipelines	Connection pipelines for freshwater supply[11].

Figure 1: Composition of the cables and pipelines sector

3 Relationship between cables and pipelines and MSP

3.1 What are present spatial needs of the cables and pipelines sector?

Pipelines and cables are either locked in physically to a specific location between the field of collection and the point of delivery or seek to take the direct route between two connection points[12]. Re-allocation prior to their laying onto the seabed is possible, but difficult and costly, due to longer distances, need for more material as well as labour costs[13].

As for cables, with respect to offshore wind energy development and also applying to nearshore wave and tidal devices, the International Cable Protection Committee (ICPC) recommends that existing cables in shallower waters (up to a depth of 75m) are given a default 500m exclusion zone on either side. The actual distance will vary between Member States[14]: in the UK, the Marine Management Organisation recommends a 250m exclusion zone either side of existing cables[15]; in Denmark 200m exclusion zone either side is recommended[16]; in the Netherlands there is a maintenance zone of 500m[17]; whilst in Belgium there is a 250m protected area and a 50m reserved area on either side[18-19]. The exclusion zone increases to 750m on either side for telecommunication cables[14].

Similarly, energy cables might require space for their laying[12], bundling (by parallel routing)[17], energy transformation (at the transformer substation platform)[20], interconnection (at grid interconnector sites)[12] and cross connection (at cables crossing areas)[12]. In case of parallel routing, distances of 100 - 200m should be maintained after every second cable system depending on the geological site conditions[12]. As stated in the BSH (2014): "when placing bundling platforms a 500m distance from priority and reservation areas for shipping and all existing and approved uses should be maintained"[20].

[9] APEC (2012).
[10] Bjørnmose et al. (2009).
[11] See "The Turkish Republic of Northern Cyprus Water. Supply Project" as an example.
[12] Bjørnmose et al. (2009).
[13] APEC (2012).
[14] Communications Security, Reliability and Interoperability Council IV. (2014).
[15] UK MMO (2013).
[16] Order on Protection of Submarine Cables and Pipelines (1992).
[17] Government of the Netherlands (2015).
[18] Vanbavinckhove, G., Rumes, B., Pirlet, H. (2015).
[19] Maes et al. (2005).
[20] BSH (2014).

At the same time, when placing a transformer substation an area of 10000m2 must be secured[20] and it should be placed as close to the farm as possible so that the cables connecting to Renewable Energy Systems´ (RES) infrastructure system are as short as possible[20]. Generally, construction in Natura2000 areas/protected biotopes is not permitted, whilst noise mitigation measures should be taken on areas adjacent to protected zones[6].

As for pipelines, a default 500m exclusion / reserved zone on both sides exists[18-21.] Also inside the protected zone (1000m at both sides), no sand extraction may take place and no other pipelines may be placed[21].

3.2 Which anticipated future developments of the industry are relevant to MSP?

Rise in upgrade activities	Development of offshore sectors	New routes and explorations areas
Development of offshore sectors (renewable / oil & gas / aquaculture) & the need to connect to terrestrial infrastructures. Due to the increasing importance of offshore wind turbines, there is a growing demand for submarine power cables for the transport of energy to the mainland. As such, the share of power cables will increase due to the installation of offshore wind turbines[22].	Development of offshore sectors (renewable / oil & gas / aquaculture) & the need to connect to terrestrial infrastructures. Due to the increasing importance of offshore wind turbines, there is a growing demand for submarine power cables for the transport of energy to the mainland. As such, the share of power cables will increase due to the installation of offshore wind turbines[23].	Polar Regions are being selected for new submarine cable builds[24]. Low latency cables are planned to connect the UK to Japan by installing a cable across the Arctic Circle above Canada through the North West passage. The cost of installing such a cable is estimated at £700Million to £1Billion as laying cables in polar regions requires unique technical aspects, especially at landing points[25].

Technology advances in cables	Increase in Hybrocarbon imports	Decommissioning
More projects are being proposed that require longer, deeper, and higher-capacity cables[26]. In addition, Europe is setting out to create an additional direct current grid structure for the future HVDC underground cables can safely transport high power loads over long distances with minimal losses. In addition to this transport efficiency, fewer cables are required to carry the required capacity, hence allowing narrower trenches[27].	The European Union's hydrocarbon energy supply depends heavily on imports. Dependence on hydrocarbon imports will remain not only important, but will increase[28-29]. In this scenario context, oil and gas pipelines ought to increase too[30], especially for gas pipelines as "natural gas remains a fundamental part of the transition to a low carbon economy"[31].	From 2017 to 2025, decommissioning is set to occur on 349 fields across the North Sea. Infrastructure scheduled for decommissioning includes: more than 200 platforms - complete or partial removal; around 2,500 wells; close to 268km of pipelines[32] and in excess of 3,000km of abandoned cables[33]. Removal is desirable as old cables and pipelines can impede other uses of the seabed, such as sand extraction or installation of wind turbines[33]. At the same time, decommissioned oil and gas platform could also be used for CO_2 storage. If it takes place at sea, then extra pipelines might need to be installed.

[21] Verfaillie, E., Van Lancker, V., Maes, F. (2005).
[22] Boston Consulting Group. (n.d).
[23] Vanbavinckhove, G., Rumes, B., Pirlet, H. (2015).
[24] Hsu, J. (2016).
[25] KIS-ORCA (n.d).
[26] Navigant Research (2015).
[27] *Europacable* (2011)
[28] Bjørnmose et al. (2009).
[29] Cambridge Econometrics (2016).
[30] GlobalData. (2016).
[31] IOGP (2016).
[32] Oil & Gas UK. (2017).
[33] Government of the Netherlands. (2015).

4 Interaction with other sectors

Marine aggregates	Offshore wind	Fishing
• No conflicts unless at the extraction site where no cables can be laid[34]. • In order to promote synergies with sand extraction, laying routes could be determined, based on the availability of extractable sand (i.e. routes through areas where extractable sand has been depleted or where sand extraction is less attractive)[35].	• Synergies when developing wind farm clusters and offshore energy grids[36]. • Conflicts may exist when laying cables around RES installations and a proximity agreement might be needed if inside the exclusion zone of the installation[37].	• Potential faults and disruptions caused by fishing entanglements[38]. A potential solution would be to establish cable corridors. • The migration of fishing into deeper waters has obliged the submarine cable industry to develop techniques for protection of its systems also in deeper waters.

Oil and gas	Aquaculture	Tourism and recreation
• No conflicts unless at the extraction site and exclusion zones of oil and gas extraction areas[39].	• Compatibles under certain conditions[40].	• Temporary beach closure due to the installation and burial of submarine cables segments on beaches.

Conservation	Pipelines and cables	Shipping and ports
• Potential whale entanglements with submarine telecommunication cables[41] and potential conflicts between trans-Atlantic and trans-Pacific cables and new extraterritorial marine protected areas[42]. • Potential environmental implications: disturbance of the seabed organisms, re-suspension of contaminants, noise, electromagnetic fields (EMF), thermal radiation and introduction of artificial hard substrate[43]. However, studies[44-45] show that EMF effects are negligible. • Synergies whilst the co-use of sensors on submarine cables (data for monitoring global change, tsunamis, earthquakes, etc.).	• Damage or disturbance to existing cables and pipelines[46]. • Crossing protection measures when cables cross other cables and pipelines as there may be a need to provide crossing protection to avoid abrasion, reduce the slope of the crossing or thermal problems[47]. • Restriction of siting options for other cables and pipelines[48].	• Cables (and safety corridors) and pipelines may restrict shipping anchorage in certain areas[49]. • There can be temporary effects associated with the presence of vessels during installation, although it is acknowledged this would be a temporary effect[50]. • Once laid, shipping, cables and pipelines may co-exist in space[50].

5 Recommendations for MSP processes in support of the sector

More trans-national level MSP coordination

Due to the trans-national character of the sector, more coordination and cooperation between national authorities should be required to increase the existing opportunities for further harmonization over regulations, licensing requirements and data sharing across countries[51].

Integrated offshore energy grid

The cables sector could foresee promoting interconnection, offshore meshed grids and coordinated designs as a first steps towards an integrated offshore energy grid, specially for the more ambitious RES scenarios[52-53].

Parallel routing

As maximum bundling as possible by parallel routing. To promote efficient use of space, electricity cables, telecommunications cables and pipelines should be bundled to the fullest extent possible[54].

Enhance sector synergies

Despite synergies with other maritime uses and the Cables and Pipelines Sector exist, these should be further enhanced (e.g. use of the submarine 3D topographic mapping and surveying data for environmental conservation, archaeological purposes, etc.).

[34] Veidemane, K., Ruskule, A., Sprukta, S. (2017).
[35] Government of the Netherlands. (2015).
[36] Roggenkamp, M. (2015).
[37] See ESCA Guideline No.6.
[38] APEC (2012).
[39] Ecofys & RSP. (2017).
[40] Veidemane, K., Ruskule, A., Sprukta, S. (2017).
[41] Wood & Carter. (2008).
[42] See The BBNJ initiative.
[43] Urātane et al. (2017).
[44] Europacable (2011).
[45] Vanbavinckhove, G., Rumes, B., Pirlet, H. (2015).
[46] Ecofys & RPS. (2017).
[47] Ibid.
[48] Ibid.
[49] Urtaāne et al. (2017).
[50] Veidemane, K., Ruskule, A., Sprukta, S. (2017).
[51] Navarrete, M. (2015).
[52] Gazendam, J. (2015).
[53] EU Comm. (2014).
[54] See ESCA Guideline No.6.

6 Resources[55]

6.1 Legal framework

Organisation	Title	Link	Short explanation
IMO	United Nations Convention of the Law of the Sea (UNCLOS)	http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm	UNCLOS defines rights and responsibilities of states to use the sea. Sector´s essential terms are included here: • UNCLOS, Article 79(4): for archipelagic waters, establishes conditions for cables or pipelines entering these zones. • UNCLOS, Articles 21, 58, 71, 79, 87, 112-115 and 297(1): for outside of the territorial sea, the core legal principles applying to international cables. • UNCLOS also imposes obligations to safeguard and protect submarine cables outside of their territorial seas. • UNCLOS allows naval forces to investigate and take appropriate action against vessels likely to damage submarine cables, either intentionally or by negligence.
IMO	The International Convention for the Protection of Submarine Cables (1884)	https://cil.nus.edu.sg/wp-content/uploads/formidable/18/1884-Convention-for-the-Protection-of-Submarine-Telegraph-Cables.pdf	The treaty that provides the detailed procedures necessary to implement those terms. See: Article 5 special lights and day shapes displayed by cable ships; minimum distances ships are required to be from cable ships; Article 6 minimum distance ships are required to be from cable buoys; Article 7 procedures for sacrificed anchor and gear claims; Article 8 competency of national courts for infractions; Article 10 procedures for boarding vessels suspected of injuring cables and obtaining evidence of infractions; Article 311(2) of UNCLOS recognizes the continued use of these provisions, which are compatible with and supplement UNCLOS.
EU	Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations	https://euoag.jrc.ec.europa.eu/files/attachments/osd_final_eu_directive_2013_30_eu1.pdf	For licensing purposes.

[55] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.2 Actors

Name	Link	Short explanation
European Subsea Cables Association (ESCA)	http://www.escaeu.org/	A forum of national and international companies which own, operate or service submarine cables in European and surrounding waters. Its aim is the promotion of marine safety and the safeguarding of submarine cables from man-made and natural hazards.
European network of transmission system operators for electricity (ENTSO-E)	https://www.entsoe.eu/Pages/default.aspx	ENTSO-E, the European Network of Transmission System Operators, represents 43 electricity Transmission system operators (TSOs) from 36 countries across Europe. ENTSO-E members share the objective of setting up the internal energy market and ensuring its optimal functioning, and of supporting the ambitious European energy and climate agenda.
Europacable	www.europacable.com	Europacable represents the largest cable makers in the world, as well as highly specialized small- and medium sized businesses from across Europe.

6.3 Initiatives

Name	Link	Short explanation
Baltic InterGrid	http://www.baltic-integrid.eu/index.php/home.html	The aim is to optimize transnational coordination of offshore wind energy infrastructure in the Baltic Sea
Baltic LINes	http://www.vasab.org/index.php/balticlines-eu/about	Baltic LINes seeks to increase transnational coherence of shipping routes and energy corridors in Maritime Spatial Plans in the Baltic Sea
NorthSEE	http://www.northsearegion.eu/northsee/	Coordination between countries infrastructure development from point of view of MSP (Maritime Spatial Planning)
Renewables Grid Initiative (RGI)	https://renewables-grid.eu/	RGI is a unique collaboration of NGOs and TSOs from across Europe. We promote transparent, environmentally sensitive grid development to enable steady growth of renewable energy and the energy transition.

6.4 Selected literature

Author	Title	Link	Short explanation
ESCA Guideline No.6	The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters.	http://www.escaeu.org/download/?Id=123&source=guidelines	Establishes guidelines to place offshore cables near renewable energy installations.
BSH- Bundesamt für Seeschifffahrt und Hydrographie / Federal Maritime and Hydrographic Agency	Spatial Offshore Grid Plan for the German Exclusive Economic Zone of the Baltic Sea and nontechnical Summary of the Environmental Report 2013.	http://www.bsh.de/en/Marine_uses/BFO/Spatial_Offshore_Grid_Plan_for_the_German_Exclusive_Economic_Zone_of_the_Baltic_Sea_2013.pdf	The Spatial Offshore Grid Plan takes a sectoral planning approach and is closely linked to the Maritime Spatial Plan for the German EEZ in the North and Baltic Sea. The coordination with other spatially significant types of planning and measures as well as an examination of reasonable alternatives to subsea cable routes, corridors or sites is given serious consideration.
Government of the Netherlands	Policy Document on the North Sea 2016-2021 (printversie): Including the Netherlands' Maritime Spatial Plan appendix 2 to the National Water Plan 2016-2021.	http://www.vasab.org/index.php/documents/doc_download/1275-baltic-lines-report-on-shipping-in-the-baltic-sea	The Central Government's North Sea policy sets frameworks for the spatial use of the North Sea in relation to the marine ecosystem. This document summarizes the Netherlands long term vision (2050) and incorporates a maritime spatial plan which complies with the new EU Directive on Maritime Spatial Planning (Directive 2014/89/EU of July 2014).
Urtāne I., Kedo K., Vološina M., Ruskule A., Ustups D., Āboltiņš R., Aigars J., Sprukta S., Konsap A., Aps R., Kopti M., Kotta J., Kull A., Rosenhall E., Schmidtbauer Crona J., Selnes T.	Towards Coherent Cross-Border Maritime Spatial Planning in the Central Baltic Sea – Case Study Report From the Baltic SCOPE Project.	http://www.balticscope.eu/content/uploads/2017/03/BalticScope_CB_report_WWW-fin.pdf	In the Baltic SCOPE project, Maritime Spatial Planning authorities and Regional Sea Organisations in the Baltic Sea Area came together for the first time to find the planning solutions to transboundary issues and improve the Maritime Spatial Planning processes.
Veidemane,K., Ruskule, A., Sprukta, S.	Development of a Maritime Spatial Plan: The Latvian Recipe.	http://www.balticscope.eu/content/uploads/2015/07/LV-recipe_EN_web.pdf	A draft for the maritime spatial plan for the Republic of Latvia. It describes the methodology used in it to include the internal and territorial waters and Exclusive Economic Zone in the Maritime Spatial Planning. The draft had some key considerations considering the use of the marine space: how to maintain traditional maritime use and at the same time preserve the ecological conditions at least at the current level.

7 List of acronyms

Acronym	Full title
EMF	Electro Magnetic Field
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ICPC	International Cable Protection Committee
MSP	Marine Spatial Planning
NGOs	Non-Governmental Organizations
NSCOGI	The North Seas Countries' Offshore Grid Initiative (NSCOGI)
RES	Renewable Energy Systems
TSOs	Transmission System Operators

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Balticconnector Transnational Pipeline. (2016).	http://balticconnector.fi/en/the-project/
Bjørnmose, J., Roca, F., Turgot, T., Smederup Hansen, D. (2009). *An Assessment of the Gas and Oil Pipelines in Europe.* COWI.	http://www.europarl.europa.eu/RegData/etudes/note/join/2009/416239/IPOL-ITRE_NT(2009)416239_EN.pdf
Boston Consulting Group. (n.d).	https://www.bcg.com/
BSH- Bundesamt für Seeschifffahrt und Hydrographie / Federal Maritime and Hydrographic Agency. (2014). *Spatial Offshore Grid Plan for the German Exclusive Economic Zone of the Baltic Sea and nontechnical Summary of the Environmental Report 2013.*	http://www.bsh.de/en/Marine_uses/BFO/Spatial_Offshore_Grid_Plan_for_the_German_Exclusive_Economic_Zone_of_the_Baltic_Sea_2013.pdf
Cambridge Econometrics (2016). *A Study on Oil Dependency in the EU: A report for Transport and Environment.* Cambridge: UK.	https://www.camecon.com/wp-content/uploads/2016/11/Study-on-EU-oil-dependency-v1.4_Final.pdf
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Sector Fiche:
Fishing

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
Nearly €3.9 and Gross Profit €1.6 billion (excluding subsidies). Generated by EU fishing fleet (excl. Greece) EU and Norway in 2016[1].	• Stable to decreasing. • Overall deteriorated performance due to: - overfishing [2-3-4]. - stock fluctuations[5]. - differences in profitability between sea basins[6]. - low average first sale prices for many commercially important species[7].	Dispersed throughout all sea basins[8]

Land-sea interaction	Temporal aspect	Lifetime of installations
Through ports and hinterland connections along the fisheries value chain (capture, auction, processing, distribution, wholesaler, retail, consumer)[9].	Throughout the year and determined by fished species (e.g. in the North Sea: sandeel, whiting and sprat are the main target species[10]).	Approx. 1% of static gill nets are lost and become ALDFG with substantial adverse ecological and socio-economic effects[11].

Interaction with other uses
The removal or discarding of marine species and the destruction of ecosystems by different tyes of gear is interfearing with conservation interests[12]; future multiple-use approaches with aquaculture or off-shore windfarms[13].

[1] European Commission (2016).
[2] European Commission (n.d.).
[3] OurFish (2017).
[4] STECF (2017).
[5] HELCOM (n.d.).
[6] STECF (2017).
[7] Ibid.
[8] Ibid.
[9] De Silva, D.A.M. (2011).
[10] ICES (2017).
[11] FAO (2016).
[12] The German Federal Agency for Nature Conservation (n.d.).
[13] Stobberup et al. (2017).

2 Composition of the fishing sector

During the fisheries value chain, activities relevant for maritime spatial planning are related to fishing and capture. Recreational fisheries are also linked to the last step of the chain, consumption, as the tourists are paying for the sea tour as well. The activities of the fishing sector can be differentiated into a) the scale of fishing operation b) the type of fishing activity using different types of gear[14-15].

By scale of fishing operation	Small-scale coastal fleet (SSCF)[16]		In 2016, there where around 84,420 vessels as EU fishing fleet of which 74% were active. Out of these active vessels, almost 74% were small-scale, 25% large-scale (and less than 1% were distant water vessels active in waters outside EU)[17].
	Large-scale fleet (LSF)		
	Distant-water fleet (DWF)		
By type of fishing activity	Industrial fishing (LSF)[18]	Type of gear: large trawling nets and dredges; pelagic lonlining and demersal longlining	Accounts for 80% of total catches handled in main EU ports (in 2015)[19]. There is some trend of improvement in the commercial / industrial fishing sector especially in the North Sea, Atlantic Sea and Baltic Sea, whilst the economic performance of certain EU fleets in the Mediterranean and Black Seas continues to stagnate[20]. Positive economic outcomes remain especially for the large-scale (LSF) fisheries due to their greater efforts in achieving better fuel efficiency[21].
	Artisanal fishing (SSCF)	Type of gear: gill and trammel nets, hook and line, nets	Small-scale fisheries, although slightly less profitable, continue to show signs of reduced performance with negative trends due to higher space conflicts with conservation measures (Habitats and Birds Directives requirements) as well as with other coastal marine uses (mainly aquaculture, marine aggregated extraction etc.)[22].
	Recreational fishing	Type of gear: Hook and line, nets, grappling devices	As for recreational fishing, it constitutes a considerable social and economic activity at European level with a total expenditure believed to exceed 25 billion euros a year and the number of sea anglers is estimated to be 8-10 million in Europe[23].

Figure 1: Composition of the fishing sector

[14] For details see STECF (2017).
[15] Stobberup et al. (2017).
[16] In Europe, the Regulation (UE) 508/2014 defines small -scale coastal fisheries as "fisheries carried out by fishing vessels of an overall length of less than 12 metres and not using towed fishing gear as listed in Table 3 of Annex I to the Commission Regulation (EC) 26/2004"
[17] STECF (2017).
[18] In this fiche both, artisanal and small-scale fisheries (family-based, low machining and small size), are called as "artisanal fisheries" as opposed to "industrial fisheries" (corporate companies and large-size). Although there are exemptions where corporate companies operate small fishing vessels and family-based companies operate large fishing vessels, this approach might be the best way to explain differences, please see also http://www.arvi.org/publicaciones/IndustrialFleet_vs_ArtisanalFleet.pdf.
[19] Eurostat (2017).
[20] STECF (2017).
[21] Ibid.
[22] Stobberup et al. (2017).
[23] Jobard et al. (2016).

3 Relationship between fishing and MSP

3.1 What are present spatial needs of the fishing sector?

Historically, fishing (along with shipping) is the sector whose spatial claim has the longest tradition for marine areas[24]. Conflicts over access exist between existing or new marine uses.

Having a highly diversified sector (variety of gear types and specific sea uses, fishing species and types of vessels) could be positive for dealing with potential spatial barriers. However, such fragmentation makes fishers being a weaker party relative to other stakeholders, limiting their ability to influence the process in a MSP stakeholder exchange[25].

Growing MSP relevant data on fisheries, for example by using VMS data systems to control fishing activities, can help to get an overview of what happens in all EU sea basins for improved management[26].

The inreased demand for fish and sea food proteins fosters the application of spatial sensitive decision support tools such as Marxan in order to secure sufficient space for fisheries[27].

To combat overexploitation of resources, the reduction of exploitation rates (e.g. by the reduction of the fishing fleet) to secure spawning grounds and migratory roots in particular for diadromous types of fish is foreseen[28]. These links between threats and new management approaches for different stages of fish life cycles are relevant for MSP planners.

Fisheries is not only an economic sector according to areas with high fishing effort, high catches or high revenues. This approach ignores the broader view of maritime spatial planning which takes economic, social, cultural and ecological dimension of fisheries into account.

Fisheries have an important role in maintaining cultural seascapes which have a spatial aspect. Also other fishing activities currently not or not sufficiently regulated (recreational fisheries) could be included into MSPs.

3.2 Which anticipated future developments of the industry are relevant to MSP?

Technological innovation	Fleet reduction	Shifting use in coastal areas and Exclusive Economic Zones
Technological improvements and innovation allow the reduction of catch costs per unit, taking into account environmental legislation	The reduction of the number of fleets and the related possible positive effect on European fish stocks in a mid-term view may lead to higher GVA of the fisheries sector which can affect the prioritization of the sector positively within planning procedures and in relation to other sectors.	Further negative impacts of overfishing can cause a shift of uses in coastal areas and EEZs of Member States towards specific areas. This can affect common uses of EEZs by different countries as well.

Blue corridors	Extension of fisheries grounds	Multi-function ports
Focus on fish stock recovery under CFP will encourage MSP to put more attention to preservation of the connectivity of important fish habitats and to the preservation of the blue corridors. For the same reason MSP will face the challenge of taking into consideration large temporal and spatial variability of both the spawning and its effects while determining areas with special importance for reproduction of fish species[29].	The implementation of sustainable fisheries management and the accelerated use of selective fishing gear according to the CFP reform in 2014 may support the recovery of fish stocks and the extension of fisheries grounds to areas not in common so far.	Port infrastructure for fisheries can be influenced by reduced landings and marginalise specific ports and up-grade others, including the support of monopols. Many ports should be turned into multi-function ports serving all shipping, sea tourism and fishing.

[24] Hassler et al. (2017).
[25] See DISPLACE model: http://www.msp-platform.eu/node/85
[26] CFP
[27] Kannen et al. (2015).
[28] EU COM
[29] Zaucha et al. (2015).

Multi-use approach	Social-cultural aspects	Climate Change
Multi-use approaches, e.g. with aquaculture, offshore windfarming or new marine uses can change the need for space of fisheries and influence fishers' behaviour and management of fish stocks. Synergies can be used to solve observing future trends in the uses of the seas. For example, an increase in MPA network may reduce the available area for fishing, while also supporting stock recovery (due to improvements in ecosystem health) and bringing back benefits to fishing due to increased fishing stocks and higher income. At the same time, fishers could provide services to aquaculture units, or could become fish farmers in their own rights[30].	Social-cultural aspects of artisanal fisheries could gain more attention through co-management with the touristic sector.	Climate change is expected to result in more extreme weather conditions (including heavier rain and storms)[31]as well as warming waters rapidly and causing acidification. This may cause an alteration of fishery uses to other areas not used intensively so far.

4 Interaction with other sectors

Shipping and ports	Tourism and recreation	Oil and gas
• Shipping lanes may cross fishing grounds; in case of sensitive nursery grounds this may be destructive[32-33]. Oil pollution from ships has negative impact on performance of the fishing sector[34]. Ports are key for the value chain of fisheries[35].	• Artisanal and recreational fisheries can attract tourism[36].	• Negative interference with fishing activities might occure during prospection and exploitation phase in case of offshore oil accidents[37]. • During prospection phase, commercial fish species might be sensitive to sound and larval fish might even be killed by seismic sources[38].

Pipelines and cables	Fishing	Marine aquaculture
• Anchoring and bottom trawling forbidden in areas where cables and pipelines are not submerged. • Potential electromagnetic effects on migrating species. Not sufficiently understood[39].	• Recreational fisheries is a booming economic sector which can cause damage to ecosystems and in many cases competing for fish stock with commercial fishery[40].	• Synergies as may provide common employment and service sector opportunities[41]. • Eutrophication and pollution caused by animal aquaculture can change sensitive ecosystems for fish stocks[42].

[30] Stelzenmüller et al. (2013).
[31] Sarwar (2006).
[32] The Hindu (2010).
[33] Simpson et al. (2010).
[34] De La Rue & Anderson (2009).
[35] Zaucha et al. (2015).
[36] Stobberup et al. (2017).
[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] Strehlow et al. (2012).
[41] Stelzenmüller et al. (2013).
[42] Martinez-Porchas & Martinez-Cordova (2012).

Offshore wind and marine renewables	Marine aggregates	Conservation
• Potential environmental impacts for demersal fish stocks (but recovery is plausible[43]): change in habitats[44]; underwater noise[45]; electromagnetic fields[46-47] . • Synergies through the introduction of hard substrate for fishing species depending on reef or gravel structures[48-49-50].	• Extraction may alter the physical characteristics of sediments and the seabed[51]. • Long-term recovery after the exploitation can occur only where original sediment composition is being restored[52].	• Fisheries can benefit from MPAs and their recovering fish stocks[53]. • Conflicts arise when using destructive fishing methods and gill nets in protected areas causing by-catch of non-target fish species, juvenile undersized target species, sea mammals and sea birds. Bottom trawling is physically disturbing the seabed and have destructing effects on the benthic community, the shift of community structures; lost nets can cause ghost fishing.

43 WWF (2014).
44 Krone et al. (2013).
45 WWF (2012).
46 Ibid.
47 Petersen & Malm (2006).
48 Zhang, M.H. (2015).
49 Langhamer, O. (2012).
50 Wilhelmsson, D., Malm, T., Öhman, C.M. (2006).
51 Stobberup et al. (2017).
52 Boyd et al. (2005).
53 Stobberup et al. (2017).

5 Recommendations for MSP processes in support of the sector

Tools, models and methods for fisheries management A range of these are available or under development[54] (despite some still not directly applicable by MSP managers). Models allow to analyse changes in species distribution, assess the effects of competing human activities, address socio-economic challenges and explore the potential benefits of MSP for fisheries. Research is starting to economically valorize sea space in relation to fishery and its implication for MSP[55].	**Relevant life-stage areas for fishing and fish species** MSP processes have to distinguish between relevant areas for fishing and for fish species according to life stages. Fish shows extensive variability in their behaviour, ecology, physiology and they vary in their abilities to detect and utilise sounds. Fish eggs and larvae should be separated for special consideration by planners because of their vulnerability, reduced mobility and small size[56].	**Co-management** Using synergies in terms of co-management, or spatially allocating areas within fishing grounds to reduce conflicts, and through the co-existence of fisheries with other existing or new marine uses[57].
Engaging and cooperating with fishermen Having an early and permanent engaging and cooperating environment with fishermen is essential in order to allow their participation in MSP processes[58]. Planners should communicate with the sector via stakeholder engagement processes or via conversations within regional fisheries bodies like the General Fisheries Commission for the Mediterranean (GFCM) Secretariat or the BALTFISH FORUM[59] in the Baltic Sea.	**Neighbouring states cooperation** Neighbouring states should cooperate in order to take the needs of fish (and fisheries) into account as they move across national jurisdictions and live in shared ecosystems[60]. The development of cross-border (pilot) MSPs could foster these processes[61].	**Fisheries integration in MSP** MSP is not the only instrument for the spatial management of fisheries. As such, currently fisheries are usually not or not fully integrated into marine spatial plans. Those existing inshore or offshore maritime spatial plans taking into account the fisheries sector are not coming up with spatial designations but pass the issue to subsequent licensing procedures[62]or focus on sectorial fisheries management[63]. Reconsidering the global scale of fisheries will be important for a better integration of fisheries in MSP's in all EU sea basins.

[54] See Section 6 "Initiatives" of this fiche for more information.
[55] Mytlewski, A. (2017).
[56] Popper et al. (2014).
[57] E.g. Stelzenmüller et al. (2013).
[58] Hassler et al. (2017).
[59] http://helcom.fi/action-areas/fisheries/management/baltfish/
[60] Gee et al. (2011).
[61] Käppeler et al. (2011).
[62] H. M. Government (2014).
[63] NME (2011).

6 Resources[64]

6.1 Legal framework

Organisation	Title	Link	Short explanation
UN	UNFSA	http://www.un.org/depts/los/convention_agreements/convention_overview_fish_stocks.htm	Agreement for the Implementation for the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
UNCLOS	United Nations Convention on the Law of the Sea	http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf	The United Nations Convention for the Law of the Sea became effective from 16th November 1982 and is the currently prevailing law of the sea. The convention is binding complTetely for the 160 member states. The IMO plays a vital role in the operation of UNCLOS. Part XI of UNCLOS deals with the aspect of the minerals found on the seabed on the EEZ. The International Seabed Authority was established on the basis of this part of the nautical law and called for equitable distribution of the proceeds of such seabeds.

[64] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.2 Actors

Name	Link	Short explanation
GFCM	http://www.gfcm.org/about/	General Fisheries Commission for the Mediterranean
HELCOM	http://www.helcom.fi/	BALTFISH
ICCAT	http://www.iccat.es/en/	International Commission for the Conservation of Atlantic Tunas
ICES	http://www.ices.dk/Pages/default.aspx	International Council for the Exploration of the Sea
Marine Management Organization (MMO)	https://www.gov.uk/government/organisations/marine-management-organisation	Provides services and information regarding maritime uses in the UK.
NASCO	http://www.nasco.int/	North Atlantic Salmon Organization
NEAFC	https://www.neafc.org/	North East Atlantic Fisheries Commission
OSPAR	https://www.ospar.org/	The Convention for the Protection of the Marine Environment of the North-East Atlantic
STECF	https://stecf.jrc.ec.europa.eu/	European Commission's Scientific Technical and Economic Committee for Fisheries

6.3 Initiatives

Name	Link	Short explanation
Adriplan Data Portal	http://www.northsearegion.eu/northsee	Fishery information and maps are included.
Baltic Sea data and map service	http://msp-platform.eu/practices/baltic-sea-data-and-map-services	Fishery information and maps provided by HELCOM.
BaltSeaPlan	http://msp-platform.eu/node/480	Produced a report "Towards integration of Fisheries into Maritime Spatial Planning", which suggests, amongst other things, that reservation areas may be established where special weight is given to fishing interests and only compatible uses are permitted.
European Maritime and Fisheries Fund (EMFF)	https://ec.europa.eu/fisheries/cfp/emff_en	Five European Structural and Investment Funds1 support the economic recovery of the EU until 2020. One of them, the European Maritime and Fisheries Fund (EMFF), is specifically tailored to Europe's seas and coasts. Its EUR 6.4 billion budget is focused not only on underpinning the new Common Fisheries Policy (CFP) and making fisheries and aquaculture more sustainable and profitable.
Marine Management Organisation's Management Information System	http://mis.marinemanagement.org.uk/	Shows the density of fishing vessels in different areas over time. This allows fishing information to be seen in conjunction with layers of information for other maritime activities and marine conditions.
Polish Study of Conditions of Spatial Development of Polish Sea Areas		Contains entire chapter devoted to fishery and during preparation of the Polish maritime spatial plan a special study was conducted devoted to detection of the places of the greatest importance for Polish artisanal fishery.
Portuguese MSP study (POEM)	http://msp-platform.eu/practices/plano-de-ordenamento-do-espaco-maritimo-poem	Involved the participation of representatives of the fishing industry and their concerns were incorporated into the study.

6.4 Selected literature

Author	Title	Link	Short explanation
Bergstrom, L., Korpinen, S., Bergstrom, U.,Andersson,A.	Essential fish habitats and fish migration patterns in the Northern Baltic Sea. BALANCE Interim Report 29	http://balance-eu.org/xpdf/balance-interim-report-no-29.pdf	The report summarizes the current state of knowledge on essential fish habitats (EFH) and patterns of fish dispersal within a Baltic archipelago area. Additionally, a preliminary analysis is presented, where breeding and feeding areas of herring are described and discussed for connectivity and representativity with respect to the Finnish Natura 2000 network.
EUMOFA, 2017.	The EU fish market	www.eumofa.eu Retrieved 2017-12-06.	
ICES. 2016	CM 2016/SSGIEOM:10. 76 pp.	https://www.ices.dk/publications/our-publications/Pages/ICES-Advice.aspx	
Janßen, H., et al., 2017.	Integration of fisheries into marine spatial planning: Quo vadis? Estuarine, Coastal and Shelf Science	http://www.sciencedirect.com/science/article/pii/S0272771417300070	The relationship between fisheries and marine spatial planning (MSP) is still widely unsettled. While several scientific studies highlight the strong relation between fisheries and MSP, as well as ways in which fisheries could be included in MSP, the actual integration of fisheries into MSP often fails. In this article the state of the art and latest progress in research on various challenges in the integration of fisheries into MSP has been reviewed.
Lamp, J., 2014	Towards integration of Fisheries into Maritime Spatial Planning. BaltSeaPlan Report 26	http://www.baltseaplan.eu/index.php/Reports-and-Publications;809/1	The report provides an overview of results and solutions found within the BaltSeaPlan project on these various aspects and should therefore offer guidance, inspiration and recommendations for Maritime Spatial Planners on how to better deal with the important topic of fishery in MSP.
Meaden, G.J., Aguilar-Manjarrez, J., Corner, R.A., O'Hagan, A.M. & Cardia, F., 2016	Marine spatial planning for enhanced fisheries and aquaculture sustainability – its application in the Near East. FAO Fisheries and Aquaculture Technical Paper No. 604 Rome, FAO	https://www.researchgate.net/publication/311649850_Marine_spatial_planning_for_enhanced_fisheries_and_aquaculture_sustainability_Its_application_in_the_Near_East	This document provides a clear and comprehensive account for the application of marine spatial planning (MSP) within the Regional Commission for Fisheries (RECOFI) region. It builds on regional technical workshops, held under the auspices of the Food and Agriculture Organization of the United Nations (FAO), aimed principally at improving the prospects for fisheries and aquaculture in the Near East.

7 List of acronyms

Acronym	Full title
ALDFG	Abandoned, lost or otherwise discarded fishing gear
BALTFISH	Baltic Sea Fisheries Forum
BSRAC	Baltic Sea Regional Advisory Council
CFP	Common Fisheries Policy
DWF	Distant-water fleet
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
GFCM	General Fisheries Commission for the Mediterranean
GVA	Gross Value Added
IBSFC	International Baltic Sea Fishery Commission
ICCAT	International Convention for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organization
LSF	Large-scale fleet
MPAs	Marine Protected Areas
MSY	Maximum sustainable yield
NEAFC	North East Atlantic Fisheries Commission
RFMO	Regional fisheries management organisation
SSCF	Small-scale coastal fleet
TACs	Total Allowable Catches
UNFSA	Agreement for the Implementation for the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
VMS	Vessel monitoring system

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Sector Fiche:

Marine Aquaculture

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1 Basic Facts

Gross Value added	State of the sector	Presence across sea basins
€ 3.357 billion European (EU) marine aquaculture in 2014[1].	Mature and decreasing (overall EU production, excluding Norway)[2].	Established, with different potential for development, specific for each sea basin[3].

Land-sea interaction	Temporal aspect	Lifetime of installations
• Through access to ports. • When developed in coastal waters, two-ways interaction through the quality of waters.	• Seasonality of production. • Variable development time, depending on production cycles of different species.	Variable between 5 – 30 years.

Interaction with other uses
Conflicts for access to space mostly occur with beach tourism, shipping, oil and gas extraction and marine aggregates and marine mining sectors. Synergies can be developed with tourism, renewable energy production and environmental protection[4].

[1] DCF (2014).
[2] AQUASPACE project (2016a).
[3] STECF (2016).
[4] See Section 4 of this sector fiche for further information

2 Composition of the marine aquaculture sector

The marine aquaculture sector can be broken down by: i) main farmed species and ii) technology deployed

Main farmed species	Finfish		Atlantic salmon (UK as main producer); Seabream, Seabass (Greece as main producer).
	Shellfish	Molluscs	Oysters (France as main producer); Mussels production (Spain as main producer); Clams (Italy as main producer); Scallops.
		Crustaceans	Shrimp; Lobster.
		Equinoderms	Sea urchin
	Algae	Microalgae	Algae aquaculture activities are currently at a very low scale in Europe although some algae products are widely used in the food industry (i.e. agar, carrageenan and alginates)[5].
		Macroalgae	*Laminaria digitata*
Technology deployed	Marine fish farming		
	Extensive brackish water farming		Traditional extensive fish farming in lagoons and coastal ponds is one of the most ancient aquaculture methods. Depending on their geographical situation, lagoons and coastal ponds provide seabass, eels and different species of seabream, mullets, sturgeons, crayfishes and shellfish. Production in extensive farms is generally low (less than 1 t/ha/y).
	Intensive sea farming	Sea cages	Sea cages hold fish captive in a large net anchored to the bottom and maintained on the surface by floating framework. They are used for rearing salmon, sea bass and sea bream, and to a lesser extent trout, in coastal and open waters, in areas sheltered from excessive wave action, with sufficiently deep water and relatively low current speeds.
		Recirculation systems	Recirculation systems on land can also be used for the farming of marine species.
	Shellfish farming		
	Bottom farming		It is practised in shallow coastal or estuarine areas, up to ten metres deep
	Inter-tidal shellfish farming		It is practiced in areas between high and low tide
	Floating systems		They are used in open sea or estuarine environments. They can be • rafts (solid floating platforms supporting the farmed shellfish) • floating lines (anchored at both ends, on which shellfish are suspended - either directly or on dropper lines).
	Algae farming		
	Seaweed can be cultivated on big ropes or nets in coastal area, protected from the winds and strong currents where they can be constantly immerged underwater.		
	Microalgae or cyanobacteria can be cultivated in photobioreactor. A variety of methods are available with various materials (plastic, glass, PVC, etc.) and shapes (vertical, horizontal, Christmas tree, etc.)		
	Integrated aquaculture		
	Integrated multi-trophic aquaculture (IMTA) includes organisms from different trophic levels of an ecosystem (e.g. fish, shellfish, algae), so that the by-products of one become the inputs of another. MTA may reduce the environmental impacts directly through the uptake of dissolved nutrients by primary producers (e.g. macroalgae) and of particulate nutrients by suspension feeders (e.g. mussels), and through removing the nutrients from the location.		

Figure 1: Composition of the marine aquaculture sector

[5] DG MARE (2012).

3 Relationship between marine aquaculture and MSP

3.1 What are present spatial needs of the marine aquaculture sector?

Depending on the type of finfish or shellfish cultivated, marine aquaculture activities need areas with specific features (water depth, water quality, currents, etc.); in addition operational activities require easy access to ports and to other coastal facilities.. The selection of the spatial area designated for aquaculture development and careful selection of farm sites are essential first steps to ensure the success and sustainability of aquaculture[6].

From a quantitative point of view, only limited analyses have been carried out to evaluate the present spatial demand of European marine aquaculture[7]. Based on information available from FAO, as little as 630ha have been estimated to be used in the production of 95% of European marine aquaculture[8-9] . Given that most marine aquaculture occurs in inshore waters, the amount of coastline impacted by marine aquaculture has been estimated to range between 0.5% and 3% of national coastlines (10 EU countries evaluated), although is higher for small island states (e.g. Malta) or those with very short coastlines (e.g. Slovenia); and that production most often occurred in distinct clusters or areas[10].

Considering the very low figures of occupied surface, it seems difficult to imagine that the expansion of marine aquaculture in the EU would be constrained by a lack of space in absolute terms[11]. Limitations to growth may be better explained by the competition for space which takes place at the local level with more established coastal economic activities and by possible conflicts with environmental protection needs[12].

3.2 Which anticipated future developments of the industry are relevant to MSP?

Future market demands	New tools
European aquaculture production has declined over the last 10-15 years, but there is almost universal acceptance that, at a strategic level, aquaculture production must increase within Europe[13]. in order to satisfy the increasing demand for sea food, couple with reduced catches, decrease the dependence from importation, boost economic development and job creation, reduce pressure on fish stocks, As a consequence, in the context of spatial planning, most EU Member States need to improve spatial planning for aquaculture, and some propose how this might be achieved, e.g. through better mapping, use of technologies, such as GIS, or through undertaking studies to identify potential new areas. Few (if any) countries commit to increasing the amount of space allocated to aquaculture in any definitive way[14].	New tools for siting, analysis of spatial interactions, cost-benefit analysis, environmental impact analysis[15]. New aquaculture national plans will be able to identify most suitable areas for this sector developments. Presently, inappropriate spatial site selection of aquaculture is a major constraint to sustainable development and expansion of the industry. A poor location of an aquaculture farm or zone results in poor production and might create environmental problems; it may also generate a broader impact on environmental, social and economic aspects, such as conflicts with other human activities over the use of inland and coastal zone resources[16].

New cultivated species	Co-existence	Moving offshore
Increasing demands are calling for an expansion of the European aquaculture industry and therefore pushing for the introduction of new cultivated species. The biological and socio-economic potential of new/emerging candidate fish species are being explored[17]. Their cultivation will demand new, specifically suitable areas.	Growing maritime activities in coastal seas[18] will definitively increase the need for this sector to solve the conflicts with other activities and define options for co-existence[19].	The opportunity to move offshore is challenging the sector[20] and will generate modifications in its spatial requirements, in some cases leaving free space in coastal waters, in others expanding the activities also offshore[21]. Offshore expansion could be facilitated by synergies with other offshore maritime sectors, in a Multi-Use context [22-23], but also could possible profit from synergies between coastal and offshore aquaculture (e.g. by sharing services or inland infrastructures)[24].

[6] FAO & World Bank (2017).
[7] AQUASPACE project (2016a).
[8] Ibid.
[9] Hofherr, J., Natale, F. Trujillo, P. (2015).
[10] Ibid.
[11] Hofherr et al. (2015).
[12] Ibid.
[13] AQUASPACE project (2016a).
[14] Ibid.
[15] AQUASPACE project (2016b).
[16] IUCN (2009).
[17] DIVERSIFYFISH project (2013-2018).
[18] SOER (2015).
[19] Stelzenmüller et al. (2013).
[20] Gentry et al. (2017).
[21] EU MSP Platform (2017).
[22] Jansen et al. (2016).
[23] Buck, B. H., Langan. R. (2017).
[24] EU MSP Platform (2017).

4 Interaction with other sectors

Shipping and ports	Tourism and recreation	Oil and gas
• Aquaculture devices pose risk to navigation and therefore their installation is forbidden in the vicinity of commercial or military shipping lanes[25]. • Recreational sailing and boating activities challenge aquaculture for coastal space, particularly in areas where both operate from local ports[26]. • Possible spillage of hazardous products from ships pose environmental and health risks to coastal aquaculture[27].	• Aquaculture could contribute to eutrophication of coastal waters, thus indirectly impacting beach tourism[28]. • Aquaculture installations (including land based facilities) could impact aesthetics of seascapes and coastal territories. Thus, tourism, with the desire for uninterrupted ocean views, may block aquaculture development[29]. • Synergies can be developed by including aquaculture-related activities as part of the touristic offer in coastal areas[30-31].	• Possible spillage of hazardous products from oil extraction sites could pose environmental and health risks to farmed organisms (mortality) and human health (contamination). On-shore devices can also be impacted by dispersed oil. Damage may also result from measures taken to combat an oil spill (chemical dispersant)[32].

Pipelines and cables	Fishing	Marine aquaculture
• Their laying could have potential impacts on aquaculture: re-suspension of sediments, release of contaminants (associated with disturbance of sediments). Interdiction of other maritime activities (including aquaculture) are generally imposed in the vicinity of the area where cables and pipelines are located[33].	• Aquaculture can negatively impact the health of fish stocks[34] by introducing diseases and escapees that can interbreed with wild stocks[35-36] , by affecting food webs[37], and by degrading water quality and habitats via farm effluents[38]. • Aquaculture can potentially benefit wild fisheries[39] by creating structures that could be utilized as habitat by target species or their prey, and by adding food and nutrients to the ecosystem, which could increase productivity or be consumed directly by target fishes[40-41-42-43] .	• Synergies between different aquaculture productions are available through Integrated Multi-Trophic Aquaculture, with potential for increasing the production and reducing the environmental impact[44].

Offshore wind and marine renewables	Marine aggregates	Conservation
• Opportunities for developing aquaculture activities in combination with offshore wind farms, provided the existing barriers are overcome [45-46-47].	• Potential impacts: obstruction of routes to licensed aggregates extraction sites, increased vessel traffic (coinciding when and where dredging operations are taking place), re-suspension and physical abrasion of seabed sediments, releases of contaminants (associated with disturbance of sediments)[48].	• Measures targeting nature conservation can impact the sector by constraining the expansion of existing farms, the establishment of new farms or through applying restrictions on types of farmed species[49]. • Opportunities for developing sustainable aquaculture activities within or in the vicinity of marine protected areas[50].

[25] Dempster, T., Sanchez-Jerez, P. (2008).
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] MARIBE project (2015-2016a).
[31] MUSES project (2017).
[32] ITOPF (2014
[33] NIRAS (2015).
[34] Gentry et al. (2017).
[35] Hoagland, P., Jin, D.I., Kite-Powell, H. (2003).
[36] Tisdell, C. (2003).
[37] Gibbs, M.T (2004).
[38] Naylor et al. (2000).
[39] Gentry et al. (2017).
[40] Arechavala-Lopez et al. (2011).
[41] Hehre, E.J., Meeuwig, J.J. (2016).
[42] Pitta et al. (2009).
[43] Bacher, K., Gordoa, A. (2016).
[44] Hughes et al. (2016)
[45] Buck & Langan Eds. (2017).
[46] MARIBE project (2015-2016b).
[47] MUSES project (2017).
[48] MMO (2014).
[49] Ibid.
[50] IUCN (2017).

5 Recommendations for MSP processes in support of the sector[51]

Identify high potential areas	Guarantee marine data availability
Within MSP process, identification of the areas with higher potential for aquaculture development should be considered, thus supporting better siting and expansion of the aquaculture sector to new areas (also offshore), including those areas suitable for introduction of new cultivated species, at present and also looking to future commercial trends.	MSP should guarantee the availability of relevant marine data, available for the MSP process, to aquaculture practitioners. Availability of regularly up-dated spatial oceanographic data and data concerning other maritime activities is crucial for the sector, in order to define the location and the type of different productions. Given the small size of aquaculture companies and the fragmentation of the sector, the opportunity to access to collected data, systematized and elaborated, would be a great contribution to the development of the sector.
Solve critical issues	**Support cyclic assessments**
In the framework of the aquaculture strategies developed at national level, MSP should contribute to solve critical issues at local and transnational levels (cross-border) through the identification of conflicts and suggesting co-location strategies with other maritime uses. In doing this MSP can make available to the sector its specifically developed tools.	MSP should support in the longer term the spatial planning of the sector, through the introduction of cyclic assessments that could modify the spatial characteristics of the sector. In such a way major challenges like those due to new emergences of diseases in the marine environment and potential changes in environmental parameters due to climate change (temperature, ocean acidification, etc.) could be better faced. All of which will have consequences on future aquaculture production and on the economic results.
Stimulate farm clusters	**Streamline licensing procedures**
MSP can support the aquaculture sector by stimulating the creation of clusters of farms, each within a management area (Aquaculture Management Areas – AMAs; or Allocated Zones for Aquaculture - AZAs[52]), which look at the specificities (social, economic and environmental) of their spatial area and manage to reduce those risks that might happen whilst optimizing farm production.	MSP can represent a way to encourage national governments to overcome licensing barriers through providing clarifications, shortening and harmonizing procedures for licensing. In fact, limited success in obtaining licenses and time required for licensing procedure are perceived by the operators as major barriers to the sector's development.
Improve social acceptance	**Communicate potential MSP benefits**
MSP can support the aquaculture sector by improving its social licensing. By bringing the sector into a multi-stakeholder debate, including the civil society, MSP can bring significant benefits to aquaculture, improving public perception and social acceptability. Key aspects for public perception are environmental impacts, especially those associated with marine fish farming, and access to and use of coastal resources. Specifically: • improving public perception by highlighting placement decisions in relation to possible environmental concerns, such as migrating fish routes, currents circulation alterations, degradation around aquaculture sites, eutrophication, and fisheries and other coastal uses displacement, etc. is to be encouraged. • in order to secure better possibilities of success for potential new licences, the possibility of earmarking suitable spaces for aquaculture activities (decided amongst all stakeholders) should be encouraged.	Since MSP can provide several benefits to the sector, when appropriately taking up some critical points during the plan preparation/revision process, it is crucial to communicate these potential benefits to the sector and get it fully engaged into MSP processes at national and sub-national level.

[51] EU MSP Platform (2017).
[52] Sanchez-Jerez et al. (2016).

6 Resources[53]

6.1 Legal framework

Organistion	Title	Link	Short explanation
European Parliament and Council	Regulation (EU) No 1380/2013 of the European Parliament and the Council of 11 December 2013 on the Common Fisheries Policy	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R1380	Contains the basic provisions of the EU's new Common Fisheries Policy (CFP). The CFP shall ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies (Article 1) EU countries must prepare multi-annual plans to boost aquaculture and ensure compliance with environmental, social and economic standards in this sector (Article 34)
European Commission	Strategic Guidelines for the sustainable development of EU aquaculture (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the regions -2013)	http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1477555805378&uri=CELEX:52013DC0229	Presents common priorities and general objectives at EU level for the aquaculture sector. Four priority areas are identified in order to unlock the potential of EU aquaculture: administrative procedures, coordinated spatial planning, competitiveness and a level playing field.
European Parliament and Council	Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund (EMFF)	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.149.01.0001.01.ENG	Establishes the European Maritime and Fisheries Fund contributing to the Europe 2020 strategy and supporting the implementation of CFP. Support is given to the development of environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture (priority 2).
European Parliament and Council	Regulation (EU) No 708/2007 of the European Parliament and of the Council amended by Regulation (EU) 304/2011 of 9 March 2011 concerning use of alien and locally absent species in aquaculture	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32011R0304	Establishes a framework governing aquaculture practices in relation to alien and locally absent species to assess and minimise the possible impact of those species and of associated non-target species on aquatic habitats.

[53] The information provided under this section is non-exhaustive. The intention is to provide the reader with basic information on the sector.

6.2 Actors

Name	Link	Short explanation
EAS - European Aquaculture Society	http://www.aquaeas.eu	EAS has four principal objectives: To promote contacts between all involved or interested in marine and freshwater aquaculture; To facilitate the circulation of aquaculture related information; To promote the sponsorship of multi-disciplinary research concerning aquaculture; To enhance cooperation among governmental, scientific and commercial organizations and individuals on all matters dealing with aquaculture.
EATiP - European Aquaculture Technology and Innovation Platform	http://www.eatip.eu	It aims to develop measures and structures that will improve the research, development and innovation conditions so as to support the sustainable development of European aquaculture. The activities of EATIP will provide the foundations for technical and economic excellence which will be the basis of the leadership potential of European aquaculture at the global level.
Aquaculture Advisory Council	https://ec.europa.eu/fisheries/cfp/aquaculture/aquaculture-advisory-council_en	In the framework of the Common Fisheries Policy, an Aquaculture Advisory Council (AAC) has been established. This stakeholder-led organisation has as main objective to provide the European institutions and the Member States with recommendations and advice on issues related to the sustainable development of this sector
AquaTT - The European Network for Training and Technology Transfer in Aquaculture	http://www.aquatt.ie	AquaTT is an SME, with a not-for-profit mandate. It was founded in 1992 under the EU COMETT programme as the University Enterprise Training Partnership (UETP) for the European aquaculture industry, to coordinate the training requirements of the industry through a single body.
GFCM - General Fishery Commission for the Mediterranean	http://www.fao.org/gfcm/en/	The General Fisheries Commission for the Mediterranean (GFCM) is a regional fisheries management organization (RFMO) established under the provisions of Article XIV of the FAO Constitution. The GFCM is currently composed of 24 members (23 member countries and the European Union) who contribute to its autonomous budget to finance its functioning and 3 Cooperating non Contracting Parties (Bosnia and Herzegovina, Georgia and Ukraine). Among its committee the Scientific Advisory Committee on Aquaculture (CAQ) is comprised.

6.3 Initiatives

Name	Link	Short explanation
PERFORMFISH	performfish.eu	On-going (2017-2022) H2020 project aiming at ensuring sustainable growth of the Mediterranean aquaculture industry, based on consumer perceptions and real market requirements. Aiming also to support fish farms that operate not only in ideal economic and environmental conditions but also in a socially and culturally responsible manner.
MedAID	http://www.medaid-h2020.eu	On-going (2017-2021) H2020 project aiming at increasing the overall competitiveness and sustainability of the Mediterranean marine fish-farming sector, throughout the whole value chain. Its objectives will be achieved: • through a holistic assessment to identify the main technical, environmental, economic and social challenges which may condition the sustainability of the sector, • by addressing those technical, environmental, economic and social challenges that the sector currently faces, • by developing innovative knowledge and tools to improve the performance of the production systems, creating and fostering added-value products and socially acceptable business plans. • by developing innovative knowledge and tools to improve the performance of the production systems, creating and fostering added-value products and socially acceptable business plans.
TAPAS	tapas-h2020.eu	On-going (2016-2020) H2020 project aiming at promoting and consolidating the environmental sustainability of the European aquaculture.
CLIMEFISH	http://climefish.eu	On-going (2016-2020) H2020 aiming at supporting sustainable fisheries, enabling an increase in European aquaculture production, facilitating employment and regional development in the sectors, and developing forecasting and management tools for adapting to climate change; all in co-creation with stakeholders.
AQUAEXCEL2020	http://www.aquaexcel2020.eu/	This on-going (2015-2020) H2020 Research and Infrastructure project aims to further support the sustainable growth of the European aquaculture sector. AQUAEXCEL2020 will integrate a large group of leading European aquaculture research facilities and aims to advance aquaculture research and innovation in Europe. One of its key aspects will be to provide subsidized access to top-class aquaculture facilities, as well as numerous highly pertinent services for researchers from academia and industry.
AQUASPACE (Making Space for Aquaculture)	http://www.aquaspace-h2020.eu	On-going (2015-2018) H2020 project aiming at providing increase space for aquaculture by identifying key constraints limiting development. It uses a case study approach in order to identify constraints to aquaculture in a wide range of contexts, scales and production types.
Bluemed Research and innovation initiative for blue jobs and growth in the Mediterranean area	http://www.bluemed-project.eu/wp-content/uploads/2016/12/Bluemed-SRIA_A4.pdf	The BLUEMED initiative offers a shared strategic framework for working towards a healthy, productive and resilient Mediterranean Sea. It is designed to tap the full potential of the marine and maritime sectors, structuring transnational cooperation to create new 'blue' jobs and to promote and improve social wellbeing, sustainable prosperity and the environmental status of the region and its surroundings. Ecosystem-based management of Mediterranean aquaculture and fisheries is included among the key sectoral enablers in the Mediterranean.
Baltic Blue Growth	http://www.balticbluegrowth.eu	On-going (2016-2019) Interreg Baltic Sea Region project examining siting criteria for mussel aquaculture
SUBMARINER	http://www.submariner-project.eu	Public-private network examining different types of maricultures and other uses of sea resources in the Baltic Sea region

6.4 Selected literature

Author	Title	Link	Short explanation
EU Commission –Scientific Advice Mechanism	Food from the Oceans - How can more food and biomass be obtained from the oceans in a way that does not deprive future generations of their benefits? (2017)	http://ec.europa.eu/research/sam/pdf/sam_food-from-oceans_report.pdf	This report provides a number of evidence-based policy recommendations on increasing the amount of food harvested from the ocean while maintaining healthy marine and coastal ecosystems.
IUCN	Aquaculture and marine protected areas: exploring potential opportunities and synergies (2017)	https://portals.iucn.org/library/node/46692	In order to feed the world's growing human population, attention will need to increasingly focus on where the protein needs of the world will be supplied from. In addition, there is a need for increased ocean protection and the preservation and/or restoration of marine ecosystem health. The establishment of Marine Protected Areas (MPAs) is a key tool essential to meeting the Aichi targets. Acknowledging that both aquaculture and MPA may benefit from each other in striving for global sustainable development, the report explores synergies and joint opportunities.
IUCN	Guide for the Sustainable Development of Mediterranean Aquaculture - Interaction between Aquaculture and the Environment (2004-2005)	https://www.iucn.org/content/guide-sustainable-development-mediterranean-aquaculture	Most of the potential environmental impacts of aquaculture can be managed and minimized through the understanding of the processes, responsible management and the effective siting of farms. Therefore, sustainable management guidelines are essential tools for policy makers, administrators, aquaculture producers and other stakeholders. The guide deals with domestication, introduced marine species, capture of wild stocks, feed ingredients, pathogens, effects on local flora and fauna etc.
Scientific, Technical and Economic Committee for Fisheries - STECF	Economic Report of the EU Aquaculture Sector (EWG-16-19); Publications Office of the European Union, Luxembourg (2016)	http://publications.jrc.ec.europa.eu/repository/handle/JRC104210	Aquaculture data for 2008-2014 are analyzed and summarized in the report. Beside the updated description of the data the report provides also an evaluation of the effect of public support to the aquaculture sector under the EFF programme 2007-2014 using the DCF data collected from 2018-2014

Author	Title	Link	Short explanation
Stelzenmüller et al. - COEXIST project	Guidance of Better Integration of Aquaculture, Fisheries, and other Activities in the Coastal Zone (2013)	http://www.coexistproject.eu/images/COEXIST/Guidance_Document/Best%20practices%20guidelines_FINAL.pdf	The purpose of this guidance document is to promote the better integration of aquaculture, fisheries and other activities in the coastal zone by the identification and application of appropriate spatial management tools. The conclusions drawn and the recommendations in this document are largely based on the experience of applying a set of methods and technical tools to address a number of key questions in spatial management in six COEXIST case studies (Hardangerford, NO; Atlantic Coast, IE; Atlantic Coast, FR; Algarve Coast, PT; Adriatic Sea Coast, IT; Coastal North Sea, DE, NL, DK; Baltic Sea, FI)
GFCM	Developing site selection and carrying capacity guidelines for Mediterranean aquaculture within aquaculture appropriate areas" (SHoCMed)	http://www.fao.org/gfcm/activities/aquaculture/projects/shocmed/en/	The objectives of SHoCMed were to: i) produce site selection criteria in order to enhance the integration of aquaculture in coastal zone management through the use of allocated zones for aquaculture (AZA); and ii) to provide a basis for the harmonization of standards, aquaculture policies and legal frameworks across the Mediterranean region to ensure equal terms of competition and minimal environmental impact.
European Commission	Guidelines on the integration of Aquaculture in Natura 2000 sites	http://ec.europa.eu/environment/nature/natura2000/management/docs/Aqua-N2000%20guide.pdf	The guidelines aim to facilitate the knowledge and implementation of EU legislation underpinning Natura 2000 in relation to aquaculture activities. They are designed to contribute to a better understanding of the conservation objectives of the sites, promoting best practices which illustrate how nature protection provisions can be compatible with sustainable aquaculture development.
European Commission	Commission Staff working document on the application of the Water Framework Directive (WFD) and the Marine Strategy Framework Directive in relation to aquaculture	http://ec.europa.eu/environment/marine/pdf/SWD_2016_178.pdf	The document is intended as a practical guidance which would facilitate the implementation of the Water Framework Directive and Marine Strategy Framework Directive in the context of the development of sustainable aquaculture. It provides good practices, suggestions and information about sustainability of EU aquaculture production and its compliance with relevant EU environmental legislation.

7 List of acronyms

Acronym	Full title
AAC	Aquaculture Advisory Council
AMAs	Aquaculture Management Areas
AQUATT	The European Network for Training and Technology Transfer in Aquaculture
AZAs	Allocated Zones for Aquaculture
EAS	European Aquaculture Society
EATIP	European Aquaculture Technology and Innovation Platform
EMFF	European Maritime and Fisheries Funds
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GFCM	General Fishery Commission for the Mediterranean
GIS	Geographic Information System
ha	hectare
IUCN	International Union for Conservation of Nature
ITOPF	The International Tanker Owners Pollution Federation limited
MSP	Maritime Spatial Planning
SAPEA	Science Advice for Policy by European Academies.
UK	United Kingdom

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AQUASPACE project (2016b). AQUASPACE Ecosystem Approach to making Space for Aquaculture. EU Horizon 2020 project grant no. 633476. Deliverable 3.1 Tools and methods supporting EAA: Finding the gap towards an environmental Cost Benefit Analysis.	http://www.aquaspace-h2020.eu/wp-content/uploads/2017/10/Tools-and-methods-supporting-EAA.pdf
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Technical Study ‘Maritime Spatial Planning (MSP) for Blue Growth’

Annex III.1: ‘Handbook on MSP Indicators Development’

(short version)

INTRODUCTION

Indicators are usually defined as the measurement of an objective to be met, a resource mobilised, an effect obtained, or a context variable (EVALSED 2013[171]). They provide qualitative and quantitative information with a view to helping actors concerned with public interventions to communicate, negotiate, or make decisions. MSP indicators must fit the planning context, i.e. the needs addressed by MSP in a given country and national targets. This is the reason why indicators may vary across different countries and why one-size-fits-all solutions should be avoided.

Linking MSP and Blue Growth via indicators is not straightforward. MSP needs and processes are location-specific, so indicators should be tailored to the national or regional objectives. Furthermore, indicators are just one small part of complex MSP decision-making systems. They are only meant to support aspects of decision-making and should not become an end in themselves, or a policy "accessory" with limited added value.

The next sections describe the indicator development steps and provide examples and checklists that MSP authorities may apply. The indicators have an exemplary character and their main objective is to provide MSP authorities with a tool for 'self-reflection' on the extent to which their objectives are achieved. Indicators are not meant to provide comparisons between countries on their progress in implementing MSP.

INDICATOR DEVELOPMENT STEPS - OVERVIEW

The standard process of indicator development starts with the definition of objectives both for the planning process and for the outcomes of this process. The selected indicators should measure the progress in reaching these objectives. The indicator development process includes the definition of: baselines and related target values as well as the given sources of information, including the analysis of data coverage and gaps. Both during the preparation of maritime spatial plans, and once the maritime spatial plans are in place, progress in reaching the objectives is monitored with the help of the defined indicators. Depending on the progress of achievement of the targets and objectives, the objectives are likely to be redefined, which would trigger also a revision of the indicators. These steps are presented in the graph below and explained on the next pages:

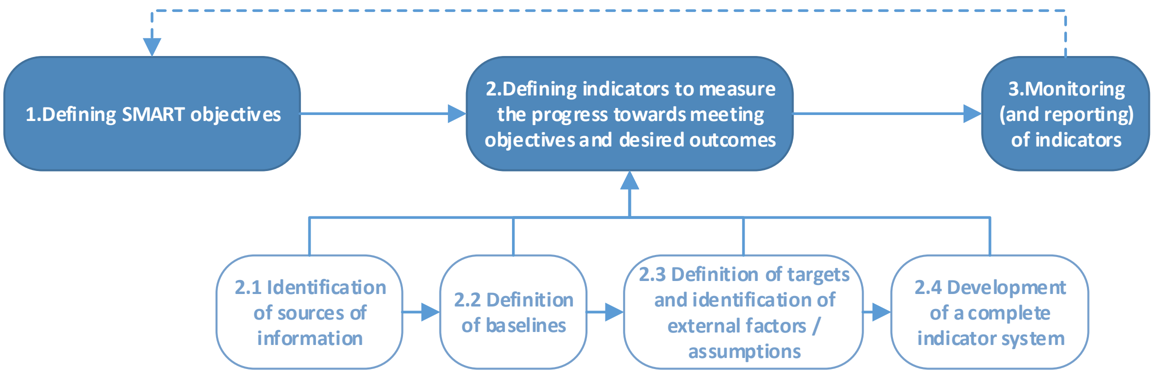

Figure 7 Indicator development process

[171] EVALSED (2013).

Step 1: Defining SMART[172] objectives

Defining clear objectives allows development of appropriate indicators, intended to measure their level of achievement. The table below presents possible types of objectives and examples. It also indicates when they should be developed.

Type of objective	Examples of Objectives	When to define?
Overarching Blue Growth objectives	• Create jobs • Increase growth • Safeguard biodiversity and protect the marine environment • Reduce greenhouse emissions	Already defined by the EC and national/regional strategies, to be considered from the start of maritime spatial planning
Global objectives	• Increase wind power generation at sea • Exploit stocks at maximum sustainable yield rate • Increase aquaculture production	Usually defined in national/ regional strategies, to be considered when developing the MSP vision
Immediate objectives	• Increase wind power generation capacity at sea • Increase / maintain oil and gas production capacity at sea • Decrease shipping accidents	This is an intermediate level between the global and operational objectives. Some of these objectives may already be defined in national/regional strategies. Others may be defined as a part of the development of MSP vision. Either way, they should already be clear before developing solutions to MSP issues.
Operational objectives	• Ensure maritime space for wind energy at sea • Ensure maritime space for the offshore oil and gas industry • Designate marine protected areas (MPAs)	When developing solutions to the identified spatial conflicts.
MSP process objectives	• Ensure coherence with plans of neighbouring countries • Ensure stakeholder input/involvement • Disseminate information	At the start of the maritime spatial plan development

Table 4 Possible types of objectives

As mentioned, the above levels of objectives are illustrative and could be simplified, e.g. by merging the levels of immediate and global objectives, or the levels of global and Blue Growth objectives. The choice of a structure that links the objectives depends on the hierarchy of the identified problems. For example, if a country has plenty of installed capacity for gas extraction, but it is not fully used, the immediate level objectives would be redundant.

It is noteworthy that only the MSP process objectives and the operational objectives are within the control of MSP authorities. All other levels show objectives that may be influenced by MSP, but are also affected by external factors. In the planning process, it is nevertheless worth considering these higher-level objectives as they are usually linked to regional, national and EU strategies and policies, which set the MSP context.

[172] Specific, Measurable, Achievable, Relevant, Time-bound

Step 1 checklist:

Question	
Have you considered the **Blue growth** (jobs, growth, safeguarding biodiversity and protecting the marine environment) objectives in your planning?	☐
Have you identified relevant objectives in **national** strategies/policies/action plans? Are the relevant objectives SMART and if not, have you transformed them into SMART objectives for the purposes of your maritime spatial plan?	☐
Have you identified relevant objectives in **regional and local** strategies/policies/action plans? Are the relevant objectives SMART and if not, have you transformed them into SMART objectives for the purposes of your maritime spatial plan?	☐
Have you defined **sectoral** objectives (in the different Blue Economy sectors)?	☐
Have you defined **environmental/biodiversity** objectives (e.g. on the designation of marine protected areas)?	☐
Have you defined objectives related to the **MSP process** (e.g. on stakeholder involvement)?	☐
Have you defined objectives **at different levels** (linked to the identified problems to be solved) and have you arranged them in a logical **structure**?	☐
Are your objectives specific? (Objectives should not be too broad, e.g. 'Ensure a proper MSP process' is a very broad objective, which could be split in more specific objectives like the ones presented in the above table)	☐
Are your objectives measurable? (Objectives should be defined in a way that allows their quantification. For example, decreasing shipping accidents is an objective that can be quantified)	☐
Are your objectives achievable? (Objectives should be attainable within the relevant time and maritime contexts, i.e. the economic and environmental conditions in the specific sea-basin. For example, the targets for increasing MW of tidal energy should consider the installed and planned capacity, otherwise they would not be realistic)	☐
Are your objectives relevant? (Maritime spatial planning should have influence on the defined objectives and they should be relevant to the identified needs)	☐
Are your objectives time-bound? (The achievement of objectives should be set in a specific timeframe)	☐
Are your objectives discussed and agreed with stakeholders, as appropriate? The type of stakeholders depends on the type of objectives. For example, the objectives within the control of MSP authorities should be discussed with all relevant stakeholders. The high-level objectives are usually set and discussions with all stakeholders do not bring high value, but it would be useful to discuss them with the authority that set them on national/regional level)	☐

Step 2: Defining indicators

Step 2.1 Definition of the links to objectives and the indicator structure

The second step after defining the MSP objectives is the identification of indicators, which can measure the progress in their achievement. The different levels of objectives require different levels of indicators. It is important to note that MSP can create spatial preconditions for Blue Growth, but other policies are also necessary to complement MSP efforts. Thus, MSP authorities should pay particular attention to the extent to which they can influence different socio-economic and/or ecological benefits, i.e. **their control area**. It is logical that MSP authorities focus on objectives and indicators, which are within their control area.

Another important notion that MSP authorities should consider in the design of their indicator systems are the different **MSP dimensions** that indicators have: MSP process, socio-economic (reflecting socio-economic benefits of human activities), and ecological indicators (monitoring key characteristics of the marine environment). The table below provides possible indicator levels, their MSP dimension, rationale, and examples.

Objective level	Indicator level	MSP dimension	Rationale and examples	Within the control of MSP authorities
Overarching Blue Growth objectives	Overarching Blue Growth indicators (long-term impacts)	Socio-economic / Ecological	Indicators linked to overall Blue Growth objectives such as sustainable job creation, economic growth (gross added value), and greenhouse gases (GHG) reduction. These indicators are affected by a host of factors, which are external to the MSP processes, which is why they are mostly useful as an element of the context. As explained above, the definition of these objectives and their corresponding indicators is usually a responsibility of higher-level government bodies.	Outside MSP processes control area
Global objectives	Impact	Socio-economic / Ecological	Usually these are longer-term results, which are linked to global objectives. For example: • MW of wind power generated at sea • Tonnes of live weight of aquaculture production • Yield per NM^2 (square nautical miles) • Million cubic meters of aggregates extracted per year	Outside MSP processes control area
Immediate objectives	Outcome	Socio-economic / Ecological	Results sought by authorities, which are directly or indirectly linked to output indicators. For example: • MW of wind power generation capacity installed at sea • Capacity of oil / gas installations at sea • Length and/or capacity of pipelines operated • (decrease in the) Volume of accidental oil spills due to shipping accidents • (decrease in the) Time required to take decisions on maritime construction permits • (decrease in the) Maritime area with intense spatial conflicts out of the overall maritime space	(partially) outside MSP processes control area
Operational objectives	Output	Socio-economic / Ecological	Output indicators should be a direct product of the MSP processes, which can have effects in different socio-economic and ecological dimensions. For example: • NM^2 (square nautical miles) assigned to specific sectors (e.g. wind energy)	Yes

			• Maritime space assigned for tidal energy installations out of the suitable (in economic and ecological sense) space • Space assigned for marine protected areas (MPAs) • Maritime space assigned for multi-use out of the overall maritime space (and/or out of the assigned maritime space) • Policies / statements developed intended to ensure cross-sectoral integration – qualitative • Extent to which development criteria are set out - qualitative	
MSP process objectives	MSP process	MSP process	These are indicators, which capture the main MSP processes. They can be both quantitative and qualitative, for example: • Consultations with key stakeholders held during all MSP stages (planning, development, implementation, Monitoring and Evaluation) – qualitative (yes/no), or quantitative (number of) • Consultations held with neighbouring countries, which are relevant to Blue Economy sectors – qualitative (yes/no), or quantitative (number of) • Consultation across government departments intended to integrate policy concerns – qualitative (yes/no), or quantitative (number of) • Consultations across different sectors held – qualitative (yes/no), or quantitative (number of) • Stakeholder satisfaction level - quantitative • Outreach of stakeholder communication activities - quantitative • Maritime space covered by a regional planning register (inventory) of coastal and maritime uses and pressures - quantitative • Maritime space mapped and showing coastal and maritime uses (and pressures) - quantitative • (various) Sectors/uses covered by MSP – qualitative (yes/no), or quantitative (number of) • Financial resources assigned for MSP processes – qualitative (yes/no), or quantitative (Euro) • Availability of sufficient staff assigned to MSP processes – qualitative	Yes

Table 5 Overview of the indicator structure

The examples above show that indicators can be defined for specific sectors and across specific sectors. At the level of the MSP process and overarching Blue Growth, indicators are cross-sectoral, while at the level of impact, indicators are sectoral. The other two categories (output and outcome) are a mix of both sectoral and cross-sectoral indicators. The logic in this presentation is that MSP processes affect all sectors and Blue Growth is a combined effect of all Blue economy sectors.

There may be particular ecological objectives identified in the MSP processes (for example, designate marine protected areas and decrease oil spillages), but typically they are broader and can be considered as horizontal objectives, which are linked to other Blue Economy sector objectives. Such broad ecological objectives are defined in the framework for community action in the field of marine environmental policy included in the Marine Strategy Framework Directive (MSFD). It establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status (GES) in the marine environment by the year 2020. The descriptors, referred to in the MSFD can be used as indicators, which provide summary information on relevant ecological parameters that are usually affected by Blue Economy sectors.

Step 2.1 checklist:

Question	
Have you identified indicators that are corresponding to the objectives defined in Step 1, which you would like to monitor, i.e. are they **relevant**?	☐
Are your indicators **specific**? (e.g. Improved conditions for fishing is an abstract indicator)	☐
Are your indicators **measurable**? (Even though measurability is desired, it is not always possible. However, even if qualitative indicators are used, e.g. Consultations with key stakeholders held during all MSP stages, authorities should be able to define their level of achievement through a specific scale, or through a simple binary yes/no answer, or via a questionnaire)	☐
Are your indicators **simple**? (Indicators should be as simple and easy to understand as possible. Having indicators, which are too complex is usually counterproductive. For example, an indicator like ecological valorisation of sea space includes many variables and must rely on a number of assumptions)	☐
Is the **number of indicators** reasonable? (The general objective is to have a limited number of indicators, ideally stemming from a limited number of objectives.)	☐

Step 2.2 Identification of sources of information

The availability of information is a key factor to be considered by the MSP authorities in the process of selecting indicators. Even in the case of specific and relevant indicators, if there is no information to support the definition and monitoring, they would not be measurable. The table below provides typical sources available for the different types of indicators:

Indicator level	Usual sources of information
Overarching Blue Growth indicators (long-term impacts)	National statistics institutes and Eurostat provide information on: - Employment in coastal regions - Gross Added Value in coastal regions Another source of information on indicators related to growth and employment could be macroeconomic models (e.g. HERMIN-based models) to the extent that their inputs and outputs can be customised to the MSP needs. Since MSP authorities are not expected to gather such information themselves, they could use reports with results of such modelling exercises produced by other institutions. Reports on GES and the MSFD descriptors can provide insight into the ecological dimension of Blue Growth.
Impact	Impact indicators should rely as much as possible on **official statistics**:

	- National statistics institutes, e.g. on 'MWh of wind power generated at sea' - Eurostat, e.g. on 'Nights spent at tourist accommodation establishments in coastal areas' In case official statistics are not identified, some **studies** may also provide information for impact indicators. In addition, Strategic Environmental Assessments (SEA), Territorial Impact Assessments (TIAs)[173] as well as Environmental Impact Assessments (EIAs) may also provide information on specific impacts. Ideally, TIAs should link output, outcome, and impact indicators in a systematic way, which is why planners are encouraged to use this tool.
Outcome	Typical sources of information for this type of indicators are **a mix of official statistics and information from authorities/other stakeholders**: - Official statistics – e.g. 'Number of establishments, bedrooms and bed-places in coastal areas' (Eurostat), or 'Gross tonnage of fishing fleet' (Eurostat) - Stakeholders – the input of stakeholders is rather important with respect to the identifying the number, area, and intensity of spatial conflicts - Information from other authorities, e.g. on the number of 'Legal claims related to conflicting permits', or on the number of 'Shipping incidents' - Units within the MSP authorities and/or other authorities, e.g. on the 'Time required to take decisions on maritime construction permits' - EIAs; SEA; TIAs where available - Studies – e.g. a study on the million cubic meters of aggregates extracted per year
Output	The sources of information for this type of indicators are expected to be **mostly the MSP authorities**: - MSP plans – on indicators showing the assigned areas, e.g. 'Maritime space assigned for wind farms' - MSP inventories, maps, registers – on indicators, which also take into account the available space, e.g. 'Maritime space assigned for wind farms out of all the available maritime space' - Information from other authorities – on indicators that consider land-sea interactions, e.g. 'Level of availability of grid connections' - Information/studies from stakeholders – this could be, for example, a study on the space needed for wind farms, which will inform the development of an indicator on 'Maritime space assigned for wind farms out of the needed space for X number of wind farm installations'.
MSP process	The source for these indicators are the **MSP authorities themselves**, as they have information on the stakeholder consultations, involvement of national/regional institutions, neighbouring countries, and communication activities. This information is usually contained in: - Minutes of meetings and participant lists - Website statistics (e.g. on number of visits) - Brochures, newsletters, flyers - HR statistics Stakeholder satisfaction surveys (if performed by MSP authorities) during and/or after the consultations also provide information for the MSP process indicators.

Table 6 Indicator sources

[173] TIAs are an assessment tool, which is usually applied at the planning stage of large-infrastructure projects (e.g. pipelines, offshore wind farms) and includes an assessment of alternative locations.

For the higher level indicators (outcome, impact, Blue Growth) the information should be largely available from official statistics. For the indicators, which are within the control of MSP authorities (process and outputs), the sources of information are expected to be input from stakeholders, existing studies, and the authorities themselves.

Step 2.2 checklist:

Question	
Are the indicators **cost-effective**? (The cost of retrieving data should be justified and commensurate to the available resources for monitoring)	☐
Have you considered **all available sources** of information for the selected indicators? Are you mostly relying on official (validated) data and information?	☐
Do the sources provide data/information that is at the right geographical level, up-to-date, and available at the desired frequency?	☐

Step 2.3 Definition of baseline values

After linking potential indicators with objectives and having identified sources of information for the indicators, MSP authorities need to define the baseline values of these indicators. A baseline is the initial value against which indicators are subsequently measured. The objective of baselines is to put the objectives and targets into perspective, thus facilitating the interpretation of the achievements. For example, if a maritime spatial plan aims at decreasing the number of shipping accidents, identifying the baseline value would provide information on the severity of the problem and the positive effect that MSP is expected to bring. It is not always possible or necessary to have a baseline for each indicator. This table explains for which types of indicators they are needed.

Indicator level	Baselines
Overarching Blue Growth indicators (long-term impacts)	Baseline values for these indicators are recommended and should be based on the latest available information.
Impact	
Outcome	
Output	Baselines can be taken from a preceding generation of MSPs. It is possible that for some countries there is no preceding MSP and/or there are no similar indicators in previous plans. In such cases, the baseline could either correspond to the current use of the sea, or it could be set at '0', if such information is not available.
MSP process	Some baselines can be taken from a preceding generation of MSPs, but only after careful due consideration. For example, an indicator like 'Consultations held with representatives of specific Blue Economy sectors', might have been used during a previous planning process. However, previous MSP processes may not be relevant for an indicator like 'Different ministries attending consultations with neighbouring countries' in case there has been an institutional reshuffling. Setting a baseline of '0' is also possible for MSP process indicators, but this depends on the choice of indicators. For example, a baseline for 'Stakeholder satisfaction level' set at '0' does not provide meaningful information. Thus, it is better not to include a baseline for this indicator, or to use a value from a previous maritime planning process.

Table 7 Indicators – baselines

Step 2.3 checklist:

Question	
Have you identified **baselines** for all indicators? If not, is it justified to set a baseline of '0', or not to have a baseline?	☐
Is the **baseline year** as close as possible to the year in which the MSP is adopted?	☐

Step 2.4 Definition of target values and identification of external factors and assumptions

The definition of targets is one of the most challenging tasks in establishing an indicator system. Ideally, it should be aligned with the defined objectives and it needs to be performed on the grounds of well-defined baseline values (where applicable). Target values may have:

- Interim targets – e.g. midway to the end date of the validity of the specific MSP and/or midway to a specific timing of an indicator
- Final targets – targets at the end of the period of validity of the MSP and/or a specific year defined for an indicator

Suggestions on what to consider when defining targets are included in the table below.

Indicator level	Target values
Overarching Blue Growth indicators (long-term impacts) Impact Outcome	For these three levels of indicators, time series combined with a clear understanding of external factors can become the basis of an extrapolation, which takes into account the outputs of the MSP processes. Targets could also be predetermined by other strategies (e.g. an overall strategy on renewable energy may set the target for energy produced by offshore wind, ocean, and tidal installations). **NB**. If no objectives are defined at this level of indicators, there is no point in including them in maritime spatial plans. If such indicators are included in plans, it should be noted that singling out the effects of MSP on them is extremely challenging. Thus, ex ante quantification is a process that will include a great number of **assumptions**, which take into account the interplay of external factors.
Output	Defining target values would depend on factors like: - Priorities defined in the plan - Availability of suitable maritime space - Needs of Blue Economy sectors
MSP process	Target values should take into account the specific MSP context in the countries / sea-basins, e.g.: - Number and interest of stakeholders representing specific Blue Economy sectors - Number and interest of bodies, which have responsibilities with regards to MSP and Blue Growth - Number and interest of neighbouring countries - Available budget for communication activities - Quality of available maritime / coastal data

Table 8 Indicators – definition of target values

External factors grow in significance from outputs to impacts (and overarching Blue Growth indicators), which is why the control of planners over the achievement of target values also decreases. Planners need to clearly state the **assumptions**, which need to hold true in order for the expected values to be reached. In other words, in addition to monitoring the reaching of target values, planners should also take into account, if the assumptions are still valid after the adoption of the plan.

Overall, for **MSP process indicators** and **outputs** the influence of external factors is expected to be much smaller when compared to the other levels of indicators, marginal unless they are affected by political events and institutional changes (e.g. merging of ministries or agencies or low interest of stakeholders). **Outcomes** are only partially within the control of planners. For example, the intensity of spatial conflicts may change over time, due to factors like the increase in trade or the increase in investor interest in renewable energy due to new legislation. This would consequently affect the achievement of target values of indicators measuring expected decreasing of the number of conflicts, or conflicted areas. Expected increases in capacity in a certain Blue Economy sector depend on the maritime space assigned, but mostly on the willingness of public/private companies to invest in infrastructure, which is influenced by factors like technological advances and overall economic and legislative frameworks. This is also the case for **impact indicators**, because they depend on the actual demand for a specific yield/production of a certain Blue Economy (e.g. the demand for gas or fish). The overarching **Blue Growth indicators** (gross added value and employment) are affected mostly by the economic cycles of countries.

Step 2.4 checklist:

Question	
Are your indicators **achievable**? (Same as the objectives, the target values should be attainable within the relevant time and maritime contexts)	☐
Are your indicators **time-bound**? (Are the targets linked to a specific intermediate and/or final year of achievement)	☐
Have you considered the main **external factors** that could affect the reaching of the target values?	☐
Have you described the **assumptions** that need to hold true in order to reach the expected targets?	☐
Are the baseline values and target values in the same **measurement unit** (e.g. NM^2)? Do they have the same calculation methodologies/sources?	☐

Step 2.5 Development of a complete indicator system

Selecting indicators, defining their sources of information and the values does not yet mean that the indicator system is established. A complete indicator system should also: determine the bodies responsible for data collection and reporting; provide a methodological description of the selected indicators; specify the links between different indicators; determine the frequency of collection and reporting of data; and identify the typical users of indicators.

Step 2.5 checklist:

Question	
Have you assigned **responsibilities** about collecting data/information and reporting on indicators?	☐
Have you identified a reasonable (aligned to data availability and reporting needs) **frequency** of data collection and reporting on indicators?	☐
Have you clearly defined the **methodology** for calculation of baselines, targets, and actual values?	☐
Have you specified **the links between the different indicators**?	☐
Have you identified **all users of the indicators**, i.e. bodies and stakeholders that will produce and use the information on indicators?	☐

Are your indicators discussed and agreed with **stakeholders**? (The criterion has three dimensions: quality, ownership, and provision of information. Stakeholders should be involved in the design of indicator systems from the outset of the MSP process in order to ensure an additional quality check from their side. Furthermore, involving stakeholders ensures their recognition of the selected indicators and guarantees the involvement of stakeholders in their monitoring. A third argument for involving stakeholders in the definition of indicators is to address the likely need that some of them would need to provide information to feed in the definition of baselines, targets, and their monitoring throughout the MSP processes.)	☐

Step 3: Monitoring and reporting of indicators

Monitoring means observing whether the intended processes, outputs, results, and impacts are delivered. The indicators included in the plans should be monitored throughout their implementation and information on their changes should be communicated to the relevant multilevel stakeholders. The monitoring and reporting arrangements should be defined in Step 2.5 described above. The results of monitoring should be communicated to the indicator users and they could lead to changes in the indicator systems and to redefining the objectives. Furthermore, the information on indicators should feed into evaluations on MSPs.

For illustration purposes, the graph on the next page provides an example of an indicator framework in a specific Blue Economy sector (Wind energy). As seen on the graph some of the indicators are sector-specific, but most of them are cross-sectoral.

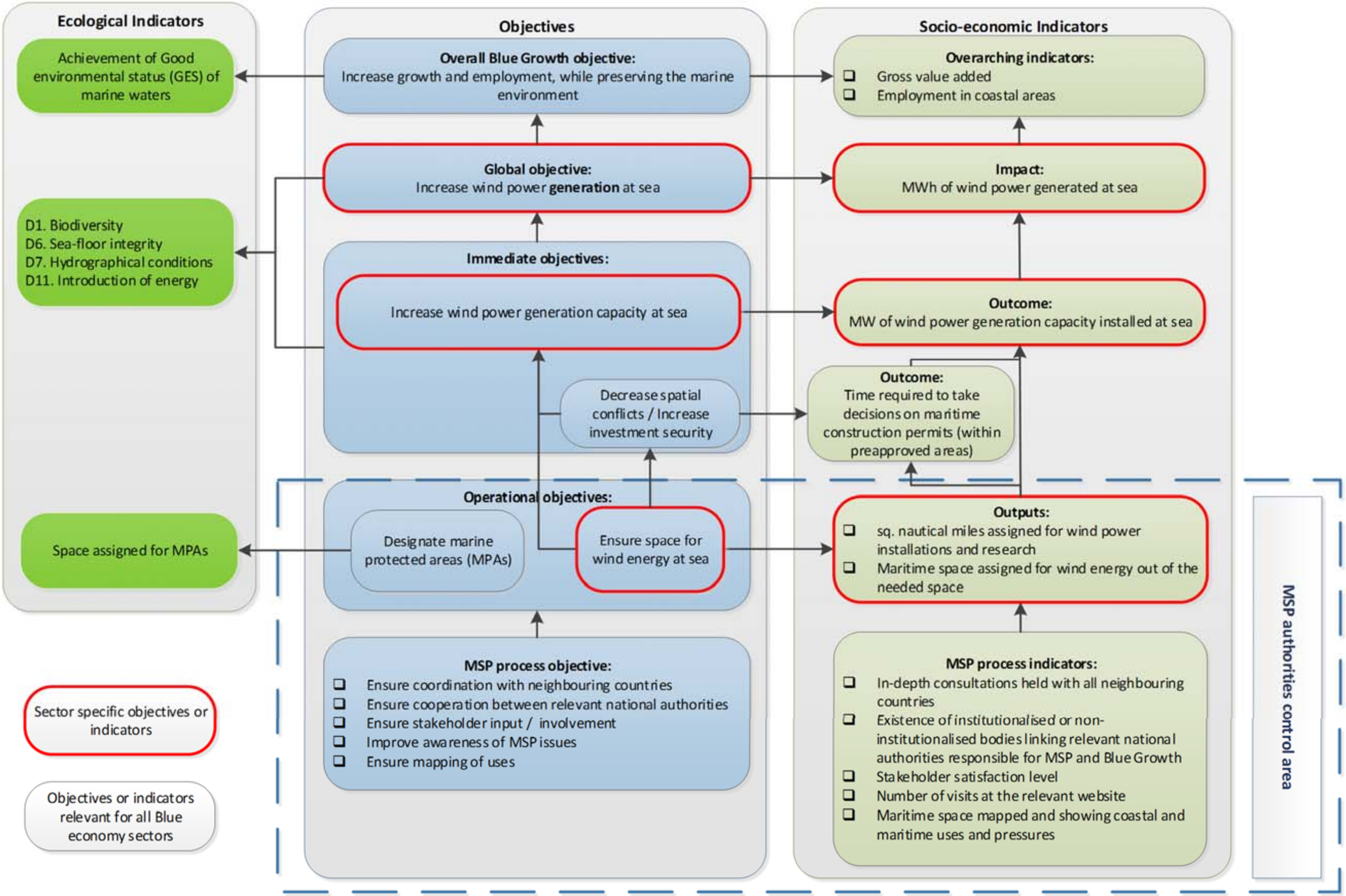

Figure 8 An example of an indicator framework in the Offshore wind energy sector

REFERENCE LIST

EVALSED (2013). *The resource for the evaluation of Socio-Economic Development.* Version: September 2013.

Technical Study ‘Maritime Spatial Planning (MSP) for Blue Growth’

Annex III.2: ‘Handbook on MSP Indicators Development’

(long version)

CONTENT

1 INTRODUCTION

This Handbook was developed under the Technical Study 'Maritime Spatial Planning (MSP) for Blue Growth'. It aims to assist MSP authorities in their planning processes by providing suggestions on the use of MSP indicators. **It is additional to a short and operational version of the Handbook. This version is aimed at MSP stakeholders with interest in the overall theoretical framework of indicators, whereas the short version provides ready to use checklists and guiding questions.**

The purpose and limitations of the Handbook are presented in Section 1. Section 2 presents the role of indicators in the MSP cycle and an overview of the indicator development process. This process is followed step-by-step in Section 3 and in Section 4 the Handbook offers some examples of possible indicators. Section 5 provides references to further sources that may support the development of MSP indicators. Annex 1 presents examples of possible frameworks of indicators for key maritime sectors. As repeatedly highlighted throughout the text, the majority of these indicators extend beyond the control of maritime spatial planners, but are provided as an illustration of the 'Blue Growth' context to which MSP can contribute.

1.1 Purpose of the Handbook

The main objective of this Handbook is to provide suggestions on how to link MSP processes and Blue Growth through an indicator framework. In particular, the Handbook aims to provide the maritime spatial planning community with suggestions on the use of spatial indicators that could support the consideration of Blue Growth in MSP processes. The Handbook reveals both the opportunities and challenges of MSP in this regard. Specifically, MSP should not be considered as the only way of supporting Blue Growth and indicators should be seen as just one of the vehicles facilitating MSP process. **Linking MSP and Blue Growth via indicators is not straightforward** and may only be done with consideration for a number of limitations (presented in section 1.2) and in line with national, regional and even local context in each country.

The key maritime sectors, which are covered by this Handbook are listed below:

- Offshore wind energy;
- Tidal and wave energy;
- Coastal and maritime tourism;
- Marine aggregates;
- Ports and shipping;
- Oil and gas production;
- Pipelines and cables;
- Fishing;
- Marine aquaculture.

1.2 Limitations in the use of indicators

The indicators provided by the Handbook are designed to have an exemplary character. The indicators used will vary by Member State since they have to be adjusted to any national Blue Growth and MSP targets. Further limitations on the use of indicators in a MSP context include:

- Indicators are just one small part of complex MSP decision-making systems. They are only meant to support aspects of decision-making and should not become an end in themselves, or a policy "accessory" with limited added value. Furthermore, there are little one-on-one matches between the MSP and the achievement of an objective. This makes it difficult to select indicators that really indicate whether the MSP has been successful or not. Most objectives depend on much more than on the decision to assign space for a certain activity, which creates an 'attribution' problem;

- Indicators should be customised to the specific Member State needs. In each country, the situation is different when it comes to MSP needs and processes, therefore indicators offer support to MSP authorities only if interpreted against agreed country-specific objectives and targets (e.g. level of ambitions of involving stakeholders or neighbouring countries in the planning process);

- MSP indicators are not tools for external evaluation. Instead, the main objective of the indicators presented in the Handbook is to provide MSP authorities with a tool for 'self-reflection' on the extent to which their objectives are achieved. The indicators can also help start the debate on achieving targets and subsequently adjust the targets, if considered unrealistic or out-dated due to changes external to the MSP process.

Indicators are useful as a decision-making support tool, but considering that they should be country specific, they are not meant to provide comparisons between countries on their progress in implementing MSP. The use of indicators for cross-country comparisons and external evaluations could lead to false conclusions and would negatively influence the MSP process in its function of encouraging debate between sectors and stakeholders.

2 ROLE OF INDICATORS IN THE MSP CYCLE AND OVERVIEW OF THE INDICATOR DEVELOPMENT PROCESS

2.1 MSP cycle and the potential role of indicators

Before presenting the indicator development steps, it is important to position indicators in the MSP cycle. This is a complex cycle, which is different in the various country/sea-basin contexts, but generally it starts with an analysis of the context, continues with definition of vision, further analysis, developing of solutions and drafting of a MSP, which is then implemented, evaluated, and adapted.[174] The table below provides a description of the role indicators can play in these typical MSP steps:

MSP step		Role of indicators
Step 1	**Assessing the context** and establishing the general framework – review of the existing policies affecting the coast and the sea	During the review of existing policies, look for objectives and targets that have already been set out for the specific coast and sea-basin. If specific enough, in the next MSP steps these can then be easily transformed into indicators, which could show long-term results of the MSP processes. Such existing objectives could be linked for example to nature conservation, or renewable energy production. An example of an overarching document at EU level is the Blue Growth communication, which sets the overall objective of harnessing the potential of Europe's oceans, seas and coasts for jobs and growth.[175]
Step 2	Drawing up **a guiding vision and objectives** – description of what is desired in the specific	The vision guides the overall MSP development process. At this stage, it is usually still early to define indicators. However, if the MSP process has

[174] Schultz-Zehden A. et al. (2008).

[175] European Commission (2012).

	area, i.e. the vision provides the preferred spatial use scenario	already resulted in defining broad (global) objectives, maritime spatial planners should consider if these can be linked to (impact) indicators. An example of such a global objective could be 'increasing wind power generation at sea'. In addition, since the vision should be agreed with stakeholders, indicators assessing the level of interaction with stakeholders and neighbouring countries at this stage can also play a role in the MSP process. It is important to note that both for Step 1 and for Step 2, the MSP objectives should be aligned to objectives that are already defined in other relevant policy documents, e.g. broader sea-basin strategies, terrestrial spatial plans, strategies for MPAs, relevant sectoral policy documents (for example in the sectors of transport and energy). **Indicators helping to reflect on the quality of interaction with stakeholders and neighbouring countries are also relevant for all further steps (2-8) of the MSP cycle.**
Step 3	**Refining the stocktake** – analysis of specific marine and coastal data	The objective of this step is to ensure use of all available and relevant data in the planning process. Thus, indicators may be used to gauge the quality and availability of MSP data.
Step 4	**Identifying issues and problems** – creating a map of spatial uses and conflicts	Indicators can be used at this step to self-assess the extent to which maritime uses and key (for the MSP process) characteristics of the sea are mapped. More importantly, indicators can be used to identify the severity of maritime conflicts and issues, e.g. by reflecting on the conflicted area and the intensity of conflicts or time required to take decisions on maritime construction permits. This analysis can provide baselines for the indicators, which are selected in Steps 5 and 6.
Step 5	**Developing solutions** – specification of objectives and application of analytical tools	At this stage, the global objectives that have been defined at Step 2 need to become more specific and operational. Once these objectives are defined, their corresponding indicators should also be defined, including specific targets, e.g. on limiting current or preventing future conflicts and reduction of time required to take decisions on permits. To a large extent, the definition of specific objectives is the first step in identifying indicators. If at this MSP step the objectives are still too broad, this would probably not allow identification of appropriate indicators.
Step 6	**Drawing up a plan** – setting out general criteria / policies for maritime uses, allocation of space and drafting of a specific planning document and map	Depending on the identified issues problems/solutions and their corresponding indicators, at this stage planners can determine indicators that should measure the assigning of space for specific purposes and the extent to which development criteria are set out. Indicators that correspond to all levels of objectives, included in the MSP, should also become a part of the plan itself.
Step 7	**Implementation and monitoring**	Indicators are the key tool for monitoring the progress of achieving objectives. Furthermore, stakeholder engagement is crucial, which is why,

		as mentioned above, indicators measuring dissemination of information and stakeholder engagement could also be useful.
Step 8	**Evaluation** – assessment of appropriateness of the MSP and the extent of achievement of its objectives	The monitoring of indicators in Step 7 provides key input for the evaluation of the achievement of MSP objectives. These are indicators, which are usually not within the control of MSP authorities, but are nevertheless useful in determining the expected and actual outcomes and impacts of MSP, i.e. the socio-economic and environmental benefits of planning.

Table 9 Link between MSP cycle steps and indicators

In the figure below, these steps are linked in a logical, but linear way, which does not always reflect the actual MSP development. Nevertheless, they offer a good framework that can be used to illustrate the link between MSP cycle and the indicators, which can be considered by MSP authorities.

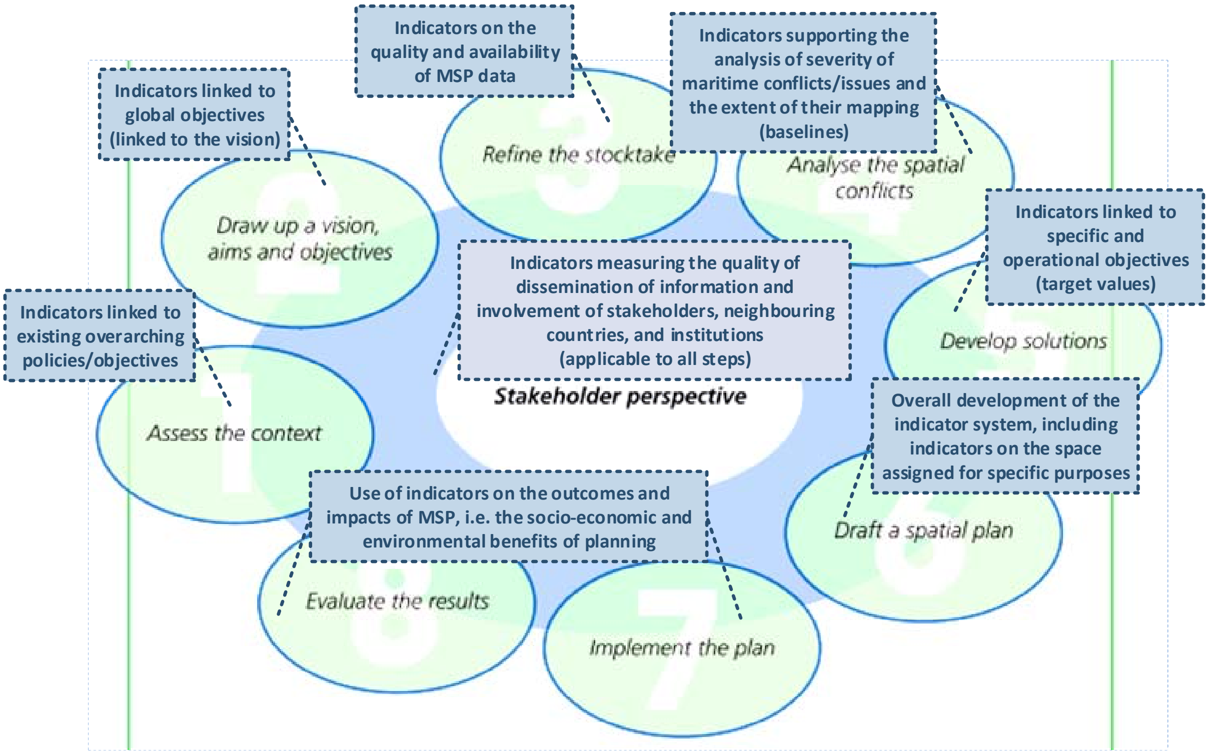

Figure 9 Link between indicator role and MSP cycle (adapted from Schultz-Zehden, Gee, Ścibior 2008[176])

2.2 Overview of indicator development steps and quality criteria

Indicators are usually defined as the measurement of an objective to be met, a resource mobilised, an effect obtained, or a context variable (EVALSED 2013[177]). They provide qualitative and quantitative information with a view to helping actors concerned with public interventions to communicate, negotiate, or make decisions. They should be relevant to

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[176] Schultz-Zehden A. et al. (2008).

[177] EVALSED (2013).

policy objectives, based on reliable data, and SMART (see below). Indicators are not meant to measure all planning processes and outcomes, but rather the most important ones, which can (ideally) be quantified. Their number and diversity should neither exceed what can be managed, nor be less than what is necessary for a comprehensive system[178].

MSP indicators must fit the planning context, i.e. the needs addressed by MSP in a given country and national targets. This is the reason why indicators may vary across different countries and why one-size-fits-all solutions should be avoided.

The standard process of indicator development starts with the definition of objectives both for the planning process and for the outcomes of this process. The selected indicators should measure the progress in reaching these objectives. The indicator development process includes the definition of baselines and related target values, as well as the given sources of information, including the analysis of data coverage and gaps. Both during the preparation of maritime spatial plans, and once the maritime spatial plans are in place, progress in reaching the objectives is monitored with the help of the defined indicators. Depending on the progress of achievement of the targets and objectives, the objectives are likely to be redefined, which would trigger also a revision of the indicators. These steps are presented in the graph below and explained in Section 3:

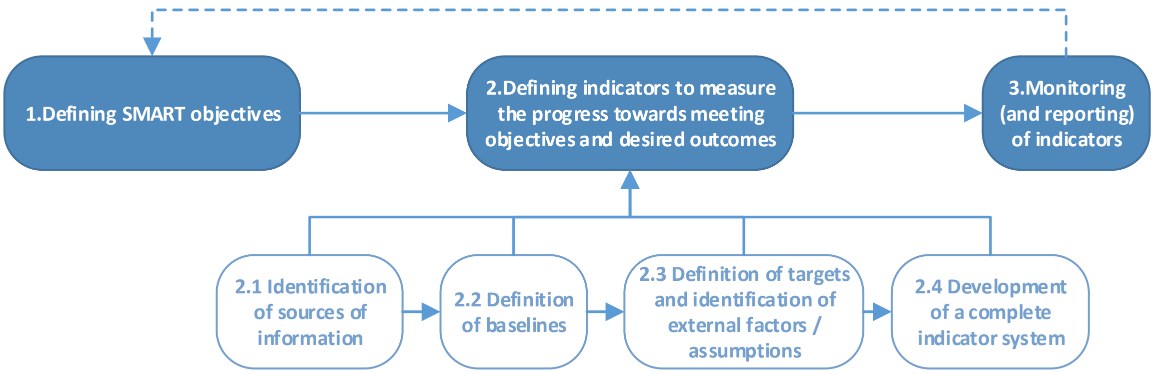

Figure 10 Indicator development process (adapted from Ehler 2009[179] and EC 2004[180])

There are diverse quality criteria, which may be applied when selecting indicators. These include:

- **SMART criteria** – indicators should be **S**pecific, i.e. concrete rather than abstract; **M**easurable through monitoring systems and ideally by existing tools; **A**chievable within the set time limits; **R**elevant to objectives; and **T**ime-bound, i.e. there should be a clear expectation on when the defined targets are expected to be achieved. These criteria are often used also for objectives (see Section 3.1)
- **Cost-effectiveness** – the cost of retrieving data should be justified and commensurate to the available resources for monitoring;
- **Normativity** – there should be a clear direction in which the indicators are expected to move should the planning be successful. In other words, what direction (increase, or decrease) would be considered as a success.
- **Agreement by stakeholders** – the criterion has three dimensions: quality, ownership, and provision of information. Stakeholders should be involved in the

[178] Carneiro, G. (2013).

[179] Ehler, Ch. and F. Douvere. (2009).

[180] European Commission. (2004).

design of indicator systems from the outset of the MSP process in order to ensure an additional quality check from their side. Furthermore, involving stakeholders ensures their recognition of the selected indicators and guarantees the involvement of stakeholders in their monitoring. A third argument for involving stakeholders in the definition of indicators is to address the likely need that some of them would need to provide information to feed in the definition of baselines, targets, and their monitoring throughout the MSP processes.

- **Simplicity** – indicators should be as simple and easy to understand as possible. Having indicators, which are too complex is usually counterproductive, because if stakeholders do not understand the meaning of indicators, they cannot contribute to their development and communicating them during MSP implementation has limited value.

3 INDICATOR DEVELOPMENT PROCESS

3.1 Step 1: Defining SMART objectives

Defining objectives is one of the steps in the MSP cycle and plays a critical role in improving MSP[181]. It is also inherently linked to the selection of indicators. Defining clear objectives allows easier identification of appropriate indicators, which should measure the level of achievement of the objectives. Thus, defining adequate objectives is the first step in identifying good indicators. Measurable objectives should ideally be linked to specific indicators at each step of the MSP cycle.[182]

In general, objectives should meet the SMART[183] criteria:

- **S**pecific – objectives should not be too broad, but rather concrete. For example 'protecting the marine environment' would be a very broad objective;
- **M**easurable – objectives should be defined in a way that allows their quantification: this criterion is directly linked to indicators;
- **A**chievable – the objectives should be attainable within the relevant time and contexts. The 'attainability of stated objectives must be considered in the light of the functions and role of planning in the broader context of marine management'[184];
- **R**elevant – maritime spatial planning should have influence on the defined objectives and they should be relevant to the identified needs;
- **T**ime-bound – the achievement of objectives should be set in a specific timeframe.

Notwithstanding the general requirement that objectives should be specific, it should be noted that they may have different levels, e.g. *operational*, *immediate*, and *global*. A representation of the different levels of objectives is presented in Fig. 3. It also includes *process* objectives, which are directly linked to the MSP processes. The overarching Blue Growth objectives, which are stemming from the Blue Growth communication[185] may also be included in this hierarchy, or alternatively, they can be considered at the level of global objectives. This is not to suggest that plans should have all the represented levels, but

[181] Ehler, Ch. (2014).

[182] Jay, St. (2017).

[183] Cormier, R., et al. (2015).

[184] Carneiro, G. (2013).

[185] European Commission (2012).

rather point out that MSP might refer and contribute to a wider framework. The choice of a structure that links the objectives depends on the hierarchy of the identified problems.

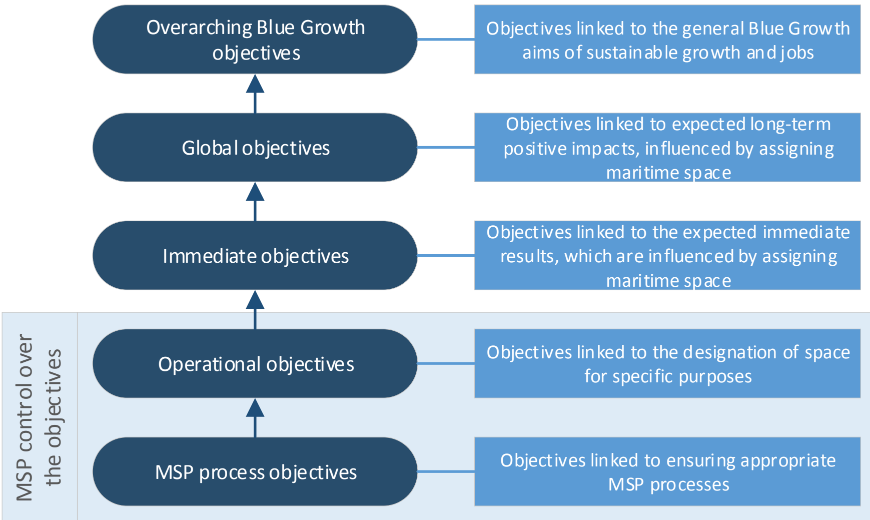

Figure 11 Links between objectives

It is noteworthy that only the MSP process objectives and the operational objectives are within the control of MSP authorities. All other levels show objectives that may be influenced by MSP, but not in a direct way. In the planning process, it is nevertheless worth considering these higher level objectives as they are usually linked to regional/national/EU strategies and policies, which set the MSP context. In the next sections, we provide examples of objectives at the different levels and their rationale, which may be considered by MSP authorities in their planning processes.

3.1.1 Overarching Blue Growth objectives

Blue Growth is 'an initiative to harness the untapped potential of Europe's oceans, seas and coasts for jobs and growth'[186]. It aims at creation of jobs and new sources of growth, while at the same time safeguarding biodiversity and protecting the marine environment. Thus, the Blue Growth objectives have two key dimensions: socio-economic (Increase jobs and gross value added) and environmental (Protect the marine environment and reduce greenhouse gas emissions). As mentioned above, these objectives may also be considered at the level of global objectives (described above). The definition of these objectives and their corresponding indicators is usually a responsibility of higher-level government bodies.

3.1.2 Global objectives

Global objectives are usually linked to long-term positive impacts. They extend beyond the scope of MSP, but they are useful nonetheless, because they show what kind of impacts may be influenced by MSP. Thus, the global objectives and impacts should also be considered during the planning process.

The global objectives would be different for the specific Blue Economy sectors, so below we provide a few general examples:

- Increase wind power generation at sea;

[186] European Commission (2012).

- Increase/maintain sustainable tourism in coastal and sea areas[187];
- Exploit stocks at maximum sustainable yield rate;
- Increase aquaculture production;
- Increase freight and passenger traffic via sea;
- Increase/maintain oil and gas production at sea;
- Increase/maintain marine aggregates extraction;
- Increase transportation of X through pipelines/cables.

As already mentioned, increasing yield/production/freight is an objective linked to effectiveness, but not to potential efficiency gains that MSP can deliver. For example, instead of increasing aquaculture production, or freight, authorities may aim at decreasing their costs through better use of maritime space. Increasing output and decreasing costs are of course not conflicting objectives and can be pursued in parallel.

3.1.3 Immediate objectives

These objectives stem directly from the operational objectives. They show the immediate results of assigning maritime space for specific purposes or setting out criteria for specific uses. Thus, it is important to note that immediate objectives already extend beyond the reach of MSP authorities. In general, they aim at decreasing incidents/conflicts and increasing capacity in a specific Blue Economy sector. Depending on the sector, increasing capacity is not always possible and/or desirable, e.g. in the sectors of Fishing or Oil and gas production. In those cases, maintaining, or even reducing[188] capacity can also be considered as a specific objective.

Examples of Objectives	Rationale
Increase / maintain positive outcomes in [Blue Economy sector X] to a sustainable level	These objectives are specific to the particular Blue Economy sectors. For example: • 'Increase wind power generation capacity at sea' • 'Increase / maintain oil and gas production capacity at sea'
Decrease spatial conflicts	This objective stems from another underlying need addressed by MSP – decreasing spatial conflicts. These conflicts may be between current, but also future human activities and nature.
Increase investment security	This objective targets the need to reduce project-planning time and to provide assurance to potential investors that certain areas are assigned for a specific Blue Economy sector.
Decrease shipping accidents	This objective is linked to the standard need to always increase safety of shipping.
Decrease oil spillages	Need to reduce pollution from oil spillages from shipping accidents.
Decrease project planning time	Need to reduce the time required to take decisions on maritime construction permits and

[187] It should be noted that this is a general objective. In practice, planners may prefer to encourage sea tourism rather than coastal tourism, or vice versa.

[188] E.g. a MSP plan could include target aiming to reduce oil and gas extraction in areas prone and vulnerable to subsidence or reduction of fishery activities if pressure on fish stock is particularly high and to ensure stocks are exploited at the maximum sustainable yield

	the number of legal claims related to conflicting permits

Table 10 Immediate objectives (examples)

3.1.4 Operational objectives

The operational objectives are linked to the outputs of the MSP process, i.e. they deal with the actual designation of space for specific purposes, which is performed in the maritime spatial plans.

Examples of Objectives	Rationale
Ensure maritime space for [Blue Economy sector X[189]]	Need to assign space for specific Blue Economy sectors, depending on their technical requirements and policy direction of the MSP. For example: • 'Ensure maritime space for wind energy at sea' • 'Ensure maritime space for the offshore oil and gas industry'
Establish criteria for sustainable development of [Blue Economy sector X]	Need to set out constraint / conditions / criteria for specific sectors, to ensure their integration with other sectors and environmental assets
Designate marine protected areas (MPAs)	Need to meet the obligations linked to the Convention on Biological Diversity, the Habitats Directive, and the Marine Strategy Framework Directive
Ensure multi-use of marine space in line with national targets	Multi-use can overall be considered as an underlying objective, but it also depends on the national contexts and targets.
Create the conditions for future generations to meet their own MSP needs	This is another underlying objective as when assigning maritime space it should be done in a way that considers also the potential needs of future generations.
Safeguard access to natural, historical, archaeological, religious, spiritual, and cultural sites	MSP processes should not lead to obstructing sites, which represent significant interest in terms of natural and/or cultural heritage.
Consider the availability of grid connections needed for offshore energy installations	Installing renewable energy installations (e.g. wind arrays) *at sea* should also take into account the availability of the necessary energy infrastructure *on land*.

Table 11 Operational objectives (examples)

3.1.5 MSP process objectives

These objectives are not classical policy/planning objectives. Instead, they are linked to ensuring appropriate MSP, i.e. planning process that is based on interaction between sectoral stakeholders and sufficient information.

Examples of Objectives	Rationale
• Ensure cooperation between relevant national authorities (national	Need for coherent planning at national level, i.e. need to ensure national policy coherence

[189] The table includes typical indicators, which can be further customised to particular sectors

governance dimension) • Disseminate information	
• Ensure coherence with plans of neighbouring countries • Disseminate information	Need for coherent planning at cross-border level
• Ensure stakeholder input / involvement • Disseminate information	Need to develop processes that engage a range of stakeholders and to allow them to express potentially conflicting interests in a timely manner
Ensure use of available / relevant data in MSP	Need to follow a multi-disciplinarily and robust science-based approach to support MSP decision-making
Ensure mapping of uses and key characteristics of the sea	Need to support the analysis of compatibility and conflicts between different current and future uses through maps showing: • important areas for each use, key interest for uses, suitable areas for uses, areas with diverse and potentially incompatible uses • the key characteristics of the sea include ecological, environmental and oceanographic specifics, e.g. mapping of sea habitats or nursery areas.
Take stock of the resources assigned to MSP processes	Need to make sure that there are sufficient financial / staff resources assigned to the planning process.

Table 12 MSP process objectives (examples)

The dissemination of information/awareness raising is considered as a standard (horizontal) objective that contributes to the transparency of the entire MSP process.

3.2 Step 2: Defining indicators

3.2.1. Step 2.1 Definition of the links to objectives and the indicator structure

The second step after defining the MSP objectives is the identification of indicators, which can measure the progress in their achievement. The different levels of objectives require different levels of indicators and the figure below (Fig. 4) presents a structure of indicators, which provides a generic structure linking MSP objectives and indicators. There is no uniform understanding on the structure and definition of indicators. For example, the Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management (Belfiore et al. 2006[190]) makes a distinction between the following **levels**: inputs, processes, outputs, and outcomes. Due to the difficulty of discerning between inputs and processes and in alignment with other standard indicator guidance (World Bank (2013)[191] and EC guidance (EVALSED[192]), this Handbook suggests merging input and process indicators. The visualised structure has five levels, but in case MSP authorities choose a hierarchy of objectives with just 2-3 levels, than the indicator structure should

[190] Belfiore, S. et al. (2006).

[191] World Bank (2013).

[192] EVALSED

also mirror this choice.

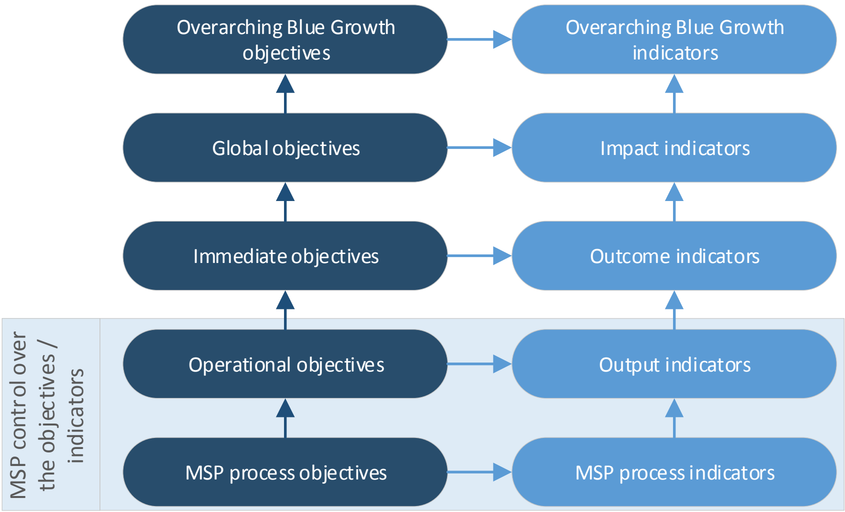

Figure 12 Link between indicators and objectives

It is important to note that MSP can create spatial preconditions for Blue Growth, but other policies are also necessary to complement MSP efforts. Thus, MSP authorities should pay particular attention to the extent to which they can influence different socio-economic and/or ecological benefits, i.e. **their control area**. It is logical that MSP authorities focus on objectives and indicators, which are within their control area. The progress in reaching the overarching Blue Growth objectives/indicators should not be entirely and directly attributed to MSP. The progress in reaching the global and immediate objectives and their corresponding indicators is also outside the control of MSP. The control of MSP authorities over the objectives and their relevant indicators is limited to the MSP processes and their operational objectives/outputs. These considerations are important when MSP authorities develop their indicator systems. This is why they are also reflected in the table below.

Another important notion that MSP authorities should consider in the design of their indicator systems are the different **MSP dimensions** that indicators have. Building on previous work by Ehler (2014)[193], they can be organised into three types: MSP process (following key MSP stages)[194], socio-economic (reflecting socio-economic benefits of human activities), and ecological indicators (monitoring key characteristics of the marine environment). It is noteworthy that these dimensions are not strictly delineated, i.e. they could partially overlap. For example, this is the case with the indicator "Shipping accidents", because the objective of decreasing accidents at sea has both socio-economic and environmental dimensions. It should also be mentioned that accidents indicators do not only apply to shipping, planners may also have objectives and corresponding indicators on reducing accidents in mining, oil and gas extraction, or on any offshore installation.

The table below provides possible indicator levels, their MSP dimension, rationale, and examples.

[193] Ehler, Charles (2014).

[194] The MSP governance indicators suggested by previous studies are a broad group that includes inputs, process, and outputs, which could be confusing. This is why instead of broad governance indicators, we propose MSP process indicators, which include only inputs and do not include the outputs of the planning process.

Objective level	Indicator level	MSP dimension	Rationale and examples	Within the control of MSP authorities
Overarching Blue Growth objectives	Overarching Blue Growth indicators (long-term impacts)	Socio-economic / Ecological	Indicators linked to overall Blue Growth objectives such as sustainable job creation, economic growth (gross added value), and greenhouse gases (GHG) reduction. These indicators are affected by a host of factors, which are external to the MSP processes, which is why they are mostly useful as an element of the context. As explained above, the definition of these objectives and their corresponding indicators is usually a responsibility of higher-level government bodies.	Overarching Blue Growth objectives
Global objectives	Impact	Socio-economic / Ecological	Usually these are longer-term results, which are linked to global objectives. For example: • MW of wind power generated at sea • Tonnes of live weight of aquaculture production • Yield per NM^2 (square nautical miles) • Million cubic meters of aggregates extracted per year	Global objectives
Immediate objectives	Outcome	Socio-economic / Ecological	Results sought by authorities, which are directly or indirectly linked to output indicators. For example: • MW of wind power generation capacity installed at sea • Capacity of oil / gas installations at sea • Length and/or capacity of pipelines operated • (decrease in the) Volume of accidental oil spills due to shipping accidents • (decrease in the) Time required to take decisions on maritime construction permits • (decrease in the) Maritime area with intense spatial conflicts out of the overall maritime space	Immediate objectives
Operational objectives	Output	Socio-economic / Ecological	Output indicators should be a direct product of the MSP processes, which can have effects in different socio-economic and ecological dimensions. For example: • NM^2 (square nautical miles) assigned to specific sectors	Operational objectives

			(e.g. wind energy) • Maritime space assigned for tidal energy installations out of the suitable (in economic and ecological sense) space • Space assigned for marine protected areas (MPAs) • Maritime space assigned for multi-use out of the overall maritime space (and/or out of the assigned maritime space) • Policies / statements developed intended to ensure cross-sectoral integration – qualitative • Extent to which development criteria are set out - qualitative	
MSP process objectives	MSP process	MSP process	These are indicators, which capture the main MSP processes. They can be both quantitative and qualitative, for example: • Consultations with key stakeholders held during all MSP stages (planning, development, implementation, Monitoring and Evaluation) – qualitative (yes/no), or quantitative (number of) • Consultations held with neighbouring countries, which are relevant to Blue Economy sectors – qualitative (yes/no), or quantitative (number of) • Consultation across government departments intended to integrate policy concerns – qualitative (yes/no), or quantitative (number of) • Consultations across different sectors held – qualitative (yes/no), or quantitative (number of) • Stakeholder satisfaction level - quantitative • Outreach of stakeholder communication activities - quantitative • Maritime space covered by a regional planning register (inventory) of coastal and maritime uses and pressures - quantitative • Maritime space mapped and showing coastal and maritime uses (and pressures) - quantitative	MSP process objectives

				• (various) Sectors/uses covered by MSP – qualitative (yes/no), or quantitative (number of) • Financial resources assigned for MSP processes – qualitative (yes/no), or quantitative (Euro) • Availability of sufficient staff assigned to MSP processes – qualitative	

Table 13 Overview of the indicator structure and examples

The examples above show that indicators can be defined for specific sectors and across specific sectors. At the level of MSP process and overarching Blue Growth, indicators are cross-sectoral, while at the level of impact, indicators are sectoral. The other two categories (output and outcome) are a mix of both sectoral and cross-sectoral indicators. The logic in this presentation is that MSP processes affect all sectors and Blue Growth is a combined effect of all Blue economy sectors.

The objectives and indicators, presented above, follow a logic, which in the MSP and Blue Growth contexts may have the following elements:

(1) Comprehensive and engaging **MSP processes** result in
(2) **Assigning maritime space**, which may lead to
(3) **Increasing, or maintaining the capacity** in a certain Blue Economy sector within sustainable limits[195], which in turn may result in
(4) **Increasing, or maintaining** yield/production in a certain Blue Economy sector within sustainable limits, which is expected to contribute to
(5) **The overarching Blue Growth objectives (growth and jobs)**, while
(6) Ensuring **environmental protection**

These elements and the links between them and the objectives/indicators are visualised below.

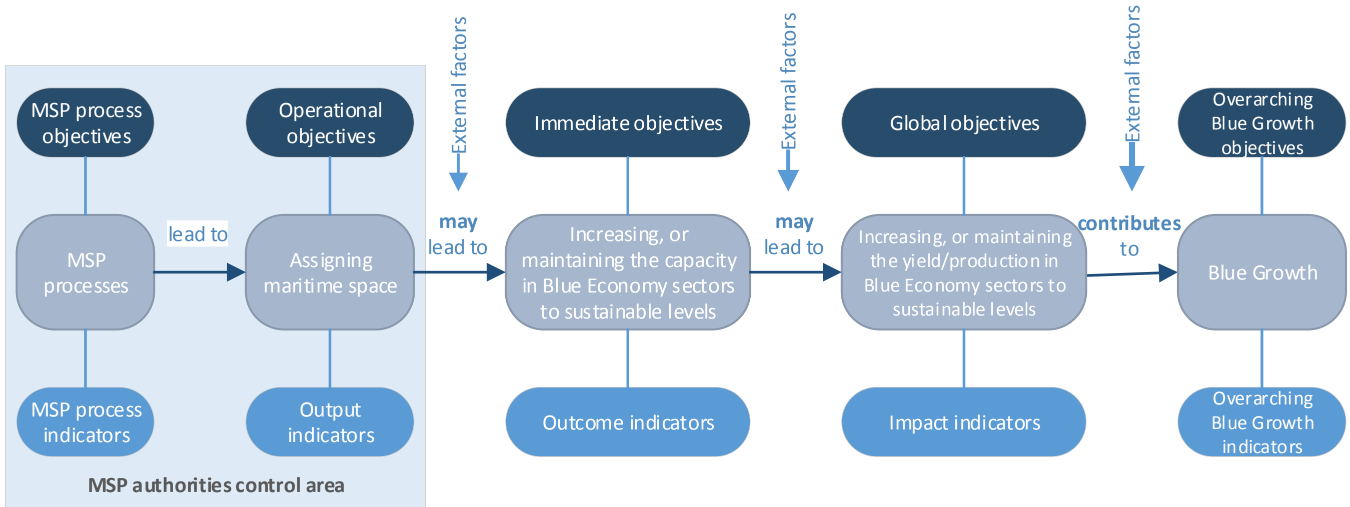

Figure 13 Objectives and indicator chains in the MSP context

The figure above follows a linear logic, which aims at simplifying the complexity of MSP. It is meant to provide an overall framework that supports MSP authorities in selecting a

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[195] As mentioned above a target considering a sector reduction might be in principle possible within MSP for environmental reasons, i.e. increasing, or maintaining capacity is not always applicable.

structure of indicators that fits best to their needs. As mentioned, the choice of indicator levels is linked to the levels of objectives identified in the MSPs. For example, if they do not have global objectives, then there is no point in including impact indicators.

It is important to note that the presentation on the figure focuses on effectiveness (i.e. increasing production), but does not show the efficiency element of MSP (i.e. decreasing costs for planning and production). At the level of outcomes, this can be considered, for example, through an indicator measuring the reduction of time needed to issue construction permits. There could be increased yield/production (impact) without increase in capacity (output), if more suitable space is assigned, for example for marine aquaculture. This is why MSP authorities may also consider efficiency indicators, e.g. yield per nm^2, or MWh offshore wind energy generated per nm^2 covered by installations. Usually monitoring and consequently indicators, which are its main tool, focus on effectiveness rather than efficiency. Instead, efficiency is assessed through additional analysis/evaluations that may also consider alternative use of space instead of relying solely on indicators.

The figure also shows the MSP authorities control area. It comprises the first two steps, i.e. the MSP process objectives/indicators and the operational objectives/output indicators. The immediate and global objectives and the indicators linked to them are influenced by MSP decisions, but are also affected by many external factors. For example, assigning space for wind farms may lead to the installation of wind farms (depending on investment priorities of different public/private stakeholders), which is expected to result in increasing the overall wind power generation (even though the link between installed capacity and increased power generation may not be straightforward). The increase in renewable electricity production is expected to contribute to the sustainable growth of the coastal areas. The graph and the example show that the further one goes up the objectives/indicators chain the higher the influence of external factors becomes.

Tips:

- Aim for a limited number of indicators, ideally stemming from a limited number of objectives.

- Ideally, indicators should be based on a logical model (as the one presented on Figure 5), but MSP authorities should not create 'a false model or false relationships amongst the indicators'[196].

- Avoid indicators, which are too costly to monitor.[197]

3.2.2. *Step 2.2 Identification of sources of information*

The availability of information is a key factor to be considered by the MSP authorities in the process of selecting indicators. Even in the case of specific and relevant indicators, if there is no information to support their definition and monitoring, they would not be measurable. As a general rule, MSP authorities should aim to use secondary, i.e. existing, sources of information for the indicators. As mentioned in section 2.2., in some cases MSP authorities will be dependent on data from stakeholders, which is why securing their active participation in the process would facilitate subsequent data collection efforts[198].

The table below provides typical sources available for the different types of indicators:

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[196] Belfiore, S., et al. (2006).

[197] World bank (2013).

[198] Ehler, Charles (2014).

Indicator level	Usual sources of information
Overarching Blue Growth indicators (long-term impacts)	National statistics institutes and Eurostat provide information on: - Employment in coastal regions - Gross Added Value in coastal regions Another source of information on indicators related to growth and employment could be macroeconomic models (e.g. HERMIN-based models) to the extent that their inputs and outputs can be customised to the MSP needs. Since MSP authorities are not expected to gather such information themselves, they could use reports with results of such modelling exercises produced by other institutions. Reports on GES and the MSFD descriptors can provide insight into the ecological dimension of Blue Growth.
Impact	Impact indicators should rely as much as possible on **official statistics**: - National statistics institutes, e.g. on 'MWh of wind power generated at sea' - Eurostat, e.g. on 'Nights spent at tourist accommodation establishments in coastal areas' In case official statistics are not identified, some **studies** may also provide information for impact indicators. In addition, Strategic Environmental Assessments (SEA), Territorial Impact Assessments (TIAs)[199] as well as Environmental Impact Assessments (EIAs) may also provide information on specific impacts. Ideally, TIAs should link output, outcome, and impact indicators in a systematic way, which is why planners are encouraged to use this tool.
Outcome	Typical sources of information for this type of indicators are **a mix of official statistics and information from authorities/other stakeholders**: - Official statistics – e.g. 'Number of establishments, bedrooms and bed-places in coastal areas' (Eurostat), or 'Gross tonnage of fishing fleet' (Eurostat) - Stakeholders – the input of stakeholders is rather important with respect to the identifying the number, area, and intensity of spatial conflicts - Information from other authorities, e.g. on the number of 'Legal claims related to conflicting permits', or on the number of 'Shipping incidents' - Units within the MSP authorities and/or other authorities, e.g. on the 'Time required to take decisions on maritime construction permits' - EIAs; SEA; TIAs where available - Studies – e.g. a study on the million cubic meters of aggregates extracted per year
Output	The sources of information for this type of indicators are expected to be **mostly the MSP authorities**: - MSP plans – on indicators showing the assigned areas, e.g. 'Maritime space assigned for wind farms' - MSP inventories, maps, registers – on indicators, which also take into account the available space, e.g. 'Maritime space assigned for wind farms out of all the available maritime space' - Information from other authorities – on indicators that consider land-sea interactions, e.g. 'Level of availability of grid connections' - Information/studies from stakeholders – this could be, for example, a study on the space needed for wind farms, which will

[199] TIAs are an assessment tool, which is usually applied at the planning stage of large-infrastructure projects (e.g. pipelines, offshore wind farms) and includes an assessment of alternative locations.

	inform the development of an indicator on 'Maritime space assigned for wind farms out of the needed space for X number of wind farm installations'.
MSP process	The source for these indicators are the **MSP authorities themselves**, as they have information on the stakeholder consultations, involvement of national/regional institutions, neighbouring countries, and communication activities. This information is usually contained in: - Minutes of meetings and participant lists - Website statistics (e.g. on number of visits) - Brochures, newsletters, flyers - HR statistics Stakeholder satisfaction surveys (if performed by MSP authorities) during and/or after the consultations also provide information for the MSP process indicators.

Table 14 Indicator sources

For the higher level indicators (outcome, impact, Blue Growth) the information is largely available from official statistics. For the indicators, which are within the control of MSP authorities (process and outputs), the sources of information are expected to be input from stakeholders, existing studies, and the authorities themselves.

Tips:

- In the identification of sources, consider if they provide data/information that is at the right geographical level, up-to-date, and available at the desired frequency.

- The sources of information on indicators should be cost-effective. If the information is not readily available and its retrieval is expected to be costly, there should be a very good case for using additional resources to retrieve this information. Keeping a contingency budget for retrieval of additional information can be considered a good practice.

- In general, indicators should be based on official (validated) data and information as much as possible. This increases their trustfulness, also within a stakeholder consultation process.

3.2.3. Step 2.3 Definition of baseline values

After linking potential indicators with objectives and having identified sources of information for the indicators, MSP authorities could define the baseline values of these indicators. A baseline is the initial value against which indicators are subsequently measured. There are two main concepts of baselines[200]:

- Static – a value of an indicator at a certain reference point in the past, or in the present;
- Dynamic – a value based on a baseline scenario, which requires a projection on how the value of the selected indicator would develop without MSP.

If feasible, the MSP authorities could aim at identifying dynamic baselines, but in most cases, it is expected that they would follow the static approach and the baselines will be measurements of the current/past state of a particular indicator in a specific country/sea-basin.

The objective of baselines is to put the objectives and targets into perspective, thus facilitating the interpretation of the achievements. For example, if a maritime spatial plan aims at decreasing the number of shipping accidents, identifying the baseline value would provide information on the severity of the problem and the positive effect that MSP is

[200] European Commission (2006).

expected to bring.

It is not always possible or necessary to have a baseline for each indicator. This table explains for which types of indicators they are needed.

Indicator level	Baselines
Overarching Blue Growth indicators (long-term impacts)	Baseline values for these indicators are recommended and should be based on the latest available information.
Impact	
Outcome	
Output	Baselines can be taken from a preceding generation of MSPs. It is possible that for some countries there is no preceding MSP and/or there are no similar indicators in previous plans. In such cases, the baseline could either correspond to the current use of the sea, or it could be set at '0', if such information is not available.
MSP process	Some baselines can be taken from a preceding generation of MSPs, but only after careful due consideration. For example, an indicator like 'Consultations held with representatives of specific Blue Economy sectors', might have been used during a previous planning process. However, previous MSP processes may not be relevant for an indicator like 'Different ministries attending consultations with neighbouring countries' in case there has been an institutional reshuffling. Setting a baseline of '0' is also possible for MSP process indicators, but this depends on the choice of indicators. For example, a baseline for 'Stakeholder satisfaction level' set at '0' does not provide meaningful information. Thus, it is better not to include a baseline for this indicator, or to use a value from a previous maritime planning process.

Table 15 Indicators – baselines

Tips:

- The process of quantification of a baseline is a quality check on the measurability of an indicator

- A baseline of '0' is preferable to a baseline that is not properly defined. If the concrete value cannot be determined, ranges may also be used.

- The baseline year should be as close as possible to the year in which the MSP is adopted.

- It should be clearly stated, if a baseline is '0', or it is 'Not applicable' / 'Not available'

- Baseline values and target values should be in the same measurement unit.

3.2.4. Step 2.4 Definition of target values and identification of external factors and assumptions

It is challenging to measure the achievement of objectives without quantified target values of indicators. Target values may have:

- Interim targets – e.g. midway to the end date of the validity of the specific MSP and/or midway to a specific timing of an indicator
- Final targets – targets at the end of the period of validity of the MSP and/or a specific year defined for an indicator

For example, if there is a final target for achieving MW of electricity generated from offshore wind farms by 2025, an interim target may be set for 2022. Interim targets are meant to ensure that the planning process is on track in achieving the expected final targets. They are also a key tool, in case of performing interim evaluations of MSPs.

The definition of targets is one of the most challenging tasks in establishing an indicator system. Ideally, it should be aligned with the defined objectives and it needs to be performed on the grounds of well-defined baseline values (where applicable). Suggestions on how to define the targets are included in the table below.

Indicator level	Target values
Overarching Blue Growth indicators (long-term impacts) Impact Outcome	For these three levels of indicators, time series combined with a clear understanding of external factors can become the basis of an extrapolation, which takes into account the outputs of the MSP processes. Targets could also be predetermined by other strategies (e.g. an overall strategy on renewable energy may set the target for energy produced by offshore wind, ocean, and tidal installations). **NB**. If no objectives are defined at this level of indicators, there is no point in including them in maritime spatial plans. If such indicators are included in plans, it should be noted that singling out the effects of MSP on them is extremely challenging. Thus, ex ante quantification is a process that will include a great number of **assumptions**, which take into account the interplay of external factors.
Output	Defining target values would depend on factors like: - Priorities defined in the plan - Availability of suitable maritime space - Needs of Blue Economy sectors
MSP process	Target values should take into account the specific MSP context in the countries / sea-basins, e.g.: - Number and interest of stakeholders representing specific Blue Economy sectors - Number and interest of bodies, which have responsibilities with regards to MSP and Blue Growth - Number and interest of neighbouring countries - Available budget for communication activities - Quality of available maritime / coastal data

Table 16 Indicators – definition of target values

External factors grow in significance from outputs to impacts (and overarching Blue Growth indicators), which is why the control of planners over the achievement of target values also decreases. Planners need to clearly state the **assumptions**, which need to hold true in order for the expected values to be reached. In other words, in addition to monitoring the reaching of target values, planners should also take into account, if the assumptions are still valid after the adoption of the plan.

Overall, for **MSP process indicators** and **outputs** the influence of external factors is expected to be much smaller when compared to the other levels of indicators, marginal unless they are affected by political events and institutional changes (e.g. merging of ministries or agencies or low interest of stakeholders). **Outcomes** are only partially within the control of planners. For example, the intensity of spatial conflicts may change over time, due to factors like the increase in trade or the increase in investor interest in renewable energy due to new legislation. This would consequently affect the achievement of target values of indicators measuring expected decreasing of the number of conflicts, or conflicted areas. Expected increases in capacity in a certain Blue Economy sector depend on the maritime space assigned, but mostly on the willingness of public/private companies to invest in infrastructure, which is influenced by factors like technological advances and overall economic and legislative frameworks. This is also the case for **impact indicators**, because they depend on the actual demand for a specific yield/production of a certain Blue Economy (e.g. the demand for gas or fish). The overarching **Blue Growth indicators** (gross added value and employment) are affected mostly by the economic cycles of countries.

Tips:

- Target values and baseline values should have the same calculation methodologies/sources. Otherwise, the monitoring information would not show properly the achievements of MSP

- Interim targets should not be set mechanically midway from MSP adoption to the date of the final target. They should also take into account what and when is feasible in terms of expected achievements.

- There is no 'golden rule' stating what percentage of deviation from the interim target values would require changes in planning, because the quality of target-setting varies. However, if there is a deviation higher than 20% from the interim target a review of the targets and the reasons for the gap/overachievement would be advisable.

- Setting targets should not be a speculative process. If no credible targets can be defined in the process of MSP drafting:

(a) their definition should be subject to additional studies, which can be performed after MSP adoption;

(b) they can be used as context indicators, i.e. monitored as a part of the MSP context, but without attributing their progress directly to MSP processes;

(c) MSP authorities should reconsider their use, even if they are relevant to the specific objectives.

- It is not possible to consider all external factors in advance, so planners can focus only on the most significant ones.

3.2.5. Step 2.5 Development of a complete indicator system

Selecting indicators, defining their sources of information and the values does not yet mean that the indicator system is established. A complete indicator system should also: determine the bodies responsible for data collection and reporting; provide a methodological description of the selected indicators; determine the frequency of collection and reporting of data; and identify the typical users of indicators.

The **MSP authorities are expected to be the main bodies responsible for data collection, analysis, and reporting.** However, depending on the selected indicators and the agreed arrangements during the stakeholder engagement process, other bodies may also have data collection responsibility. For example:

- Coastal/regional authorities, e.g. on indicators linked to land-sea interaction;
- National statistics institutes – on high-level socio-economic indicators;
- Environmental authorities at national, regional, local level – on environmental indicators;
- Institutes, associations – for specific indicators agreed in the selection process.

The indicator system should clearly define the units within authorities that are responsible for data collection, analysis, and reporting.

The **typical users of MSP indicators** may include:

- MSP authorities;
- Other national/regional authorities;
- Stakeholders from various sectors;
- Wider public, including civic organizations.

A **methodological description** of the selected indicators should include as a minimum:

- Definitions of the selected indicators;
- Detailed description of the data sources;
- Methods of calculation of the baselines and target values;
- Limitations of the indicators vis-à-vis their objectives;

- Frequency of data collection;
- Frequency of data reporting.

In case of complex indicator systems with a large number of indicators, the overall system can be described in a short and simple MSP indicator document. The description may include the indicator development process, the indicator context (e.g. strategic documents), overall indicator structure, arrangements for adjusting the indicator system, key assumptions and external factors affecting the achievement of target values, and ways of communicating the achievement of target values. For some indicators, planners may develop also an indicator fiche:

Indicator fiche element	Description
Indicator title	Full title of the indicator
ID	For example, P1 (process indicator #1)
Measurement unit	For example 'number', 'level on a scale'
Indicator level	Depending on the selected indicator structure, e.g. an output indicator
MSP dimension	Socio-economic, environmental, process indicator
Indicator type	Quantitative, or qualitative
Link to specific objective	Description of the link to a relevant MSP objective
Baseline year	Year selected as a baseline
Baseline value	Value of the indicator in the baseline year
Interim target	(if any)
Final target value	Expected value of the indicator at a pre-defined moment
Source of information	For example, MSP authority, Eurostat
Definition of the indicator	A definition explaining what the indicator includes and aims to measure.
Method of calculation	The way the indicator values should be calculated
Data storage and format	Description on where the data is stored and in what format
Reporting arrangements	Reporting frequency and means
Communication arrangements	Way in which the indicator will be communicated to stakeholders

Table 17 Indicator fiche structure

Tips:

- The frequency of data collection and reporting should not be too ambitious, but should be aligned to the data availability and reporting needs.

- Developing indicator fiches for each indicator requires additional time and effort, but they are a very useful tool for ensuring consistency of data gathering and calculation of target values.

- If a certain indicator relies on information from surveys, the sampling, indicative questions, and manner of holding the surveys should be clearly described.

- A good indicator provides information that both the MSP authorities and the indicator users can easily understand.

- Lack of a specific document describing the selected indicators leaves room for interpretation, which usually leads to poor quality and consistency of monitoring. If such a document is available it would allow stakeholders to have the same level of common understanding. At the same time, a heavy indicator Manual would be counterproductive and would inflict additional burden on planners.

3.3 Step 3: Monitoring and reporting of indicators

Monitoring means observing whether the intended processes, outputs, results, and impacts are delivered. The indicators included in the plans should be monitored throughout their implementation and information on their changes should be delivered to the relevant multilevel stakeholders.[201] The systematic collection of data on the selected indicators provides managers and stakeholders with indications of the extent of progress toward the achievement of the set objectives.[202] Indicators 'form the basis for measuring performance and determining the effectiveness of the MSP process'.[203]

The monitoring and reporting arrangements should be defined in Step 2.5 described above. The results of monitoring should be communicated to the indicator users and they could lead to changes in the indicator systems and to redefining the objectives, thus closing the loop visualised on Fig. 2. Furthermore, the information on indicators should feed into evaluations on MSPs.

Tips:

- Indicators do not provide a full picture of performance. This is why evaluations are usually needed to explain why and how objectives have been achieved or not.

4 SUGGESTIONS ON CHOOSING SPECIFIC INDICATORS AND EXAMPLES OF POSSIBLE INDICATORS

In this section, the Handbook provides further suggestions on how MSP authorities may choose specific indicators. The proposed indicators in this section serve an illustrative purpose only (i.e. they might inspire planning authorities to search for similar ones adjusted to the needs of their MSP process). All indicators can be interpreted only in the context of country-specific tasks, targets, goals and objectives. Such targets and goals can evolve over time, so also information provided by the given indicator to the planning process might change its meaning accordingly.

4.1 Overarching Blue Growth indicators

In the Blue Growth context, jobs, added value, and GHG reduction can be considered as **overarching indicators**, which are also considered in the Blue Growth Communication. More specifically, these indicators are:

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities
Maintain a productive economy in the coastal regions	Gross value added in coastal regions (Eurostat - mare_10r_3gva)	million Euro	☐

[201] Matczak M., et.al. (2014).

[202] Ehler, Ch. and F. Douvere. (2009).

[203] TPEA. Transboundary Planning in the European Atlantic. Evaluation Process Report

Increase employment in coastal regions	Employment rates by sex, age and coastal regions (Eurostat - mare_lfe3emprt) or Employment by NACE Rev. 2 activity and coastal regions (Eurostat - mare_10r_3emp)	%	☐
Reduce greenhouse gas (GHG) emissions	Greenhouse gas emissions reduced	million tonnes of CO_2 equivalents	☐

Table 18 Overarching Blue Growth indicators (examples)

The above indicators combine input for all Blue Economy sectors. However, depending on the MSP objectives, MSP authorities may also choose to have them customised to a specific Blue Economy sector, e.g. employment in Aquaculture. A specific example is the East Inshore and East Offshore Marine Plans, which consider the national gross value added and employment among different sectors (e.g. oil and gas).[204] The more recent Economic baseline assessment for the North East, North West, South East and South West marine plans contains very specific figures on employment and GVA in more than 10 marine sectors.[205] To an even greater extent than with the impact indicators, these indicators are mostly useful as context indicators rather than indicators of MSP success.

4.2 Impact indicators

Impact indicators are linked to global objectives and take stock of the developments of Blue Economy sectors. Outputs and outcomes have influence over these indicators, but they extend fully beyond the control of MSP authorities. If MSPs include high-level objectives linked to the overall economic development of Blue Economy sectors, authorities may consider including indicators, which are similar to the ones presented below. However, the following considerations need to be taken into account:

- the trends of economic development in the Blue Economy sectors is heavily influenced by factors, which are external to maritime spatial planners, such as technological development and overall economic trends
- only evaluations (further analyses) could potentially disentangle the potential link between assigning maritime space and the trends in Blue Economy sectors, e.g. in terms of MWh of energy generated, or number of tourists
- MSPs should be very clear on the limits of attribution of plans to the economic trends and should also include an analysis of the external factors that affect them.

As a whole impact indicators are mostly useful as context variables rather than as indicators showing the success of MSP.

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities
Increase wind power generation at sea	MWh of wind power generated at sea	MWh	☐

[204] MMO (2014a).

[205] MMO (2016).

Increase tidal and wave energy generation	MWh of tidal and wave energy generated at sea	MWh	☐
Increase/maintain tourism in coastal and sea areas	Nights spent at tourist accommodation establishments in coastal areas	Number	☐
Increase/maintain marine aggregates extraction	Million cubic meters of aggregates extracted per year	Millions of m^3	☐
Increase freight and passenger traffic via sea	Passengers transported to/from main ports Gross weight of goods transported to/from main ports	Number of passengers / millions of tonnes	☐
Increase/maintain oil and gas production at sea	Tonnes of oil per day extracted Cubic meters of gas per day extracted	Tonnes / m^3 per day	☐
Increase transportation of X through pipelines/cables	Tons of oil transported Cubic meters of gas transported Terabits per second transmitted Megawatts connected to the grid	Depending on the concrete indicator	☐
Exploit stocks at maximum sustainable yield rate	Catches	tonnes live weight	☐
Increase aquaculture production	Production from aquaculture excluding hatcheries and nurseries	tonnes live weight	☐

Table 19 Impact indicators (examples)

Similarly to the outcome indicators, MSP authorities may also take into account the efficiency of production/yield by linking it to the size of space assigned. For example, a potential indicator could be 'MWh of wind power generated at sea per nm^2 used' or 'Marine aquaculture yield per nm^2 used'.

4.3 Outcome indicators

Outcome indicators are one level above output indicators. They should also be linked to the relevant Blue Economy sectors and have both socio-economic and ecological dimensions. As shown in Table 12, some of them are only partially within the control of MSP authorities, while most are beyond their control.

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
Horizontal indicators, i.e. indicators not linked to specific Blue Economy sectors				
Decrease spatial conflicts / Increase investment security	Spatial conflicts (between current / future human activities and nature)	Number	partially	The rationale of this indicator is to show potential decreasing number of spatial conflicts as a result of MSP. However, MSP authorities should take

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
				into account that it may be challenging to reach an agreement on a precise number of conflicts due to different understanding on what a conflict is. This is especially relevant for future (planned) human activities. Furthermore, this indicator also has an important qualitative dimension – intensity of conflicts. It is likely to be unrealistic to strive towards zero conflicts, but rather to have the acute ones solved.
	Conflicted maritime area out of the overall maritime space	%	partially	This indicator has similar limitations to the above one, but may be useful as an approximation of the conflicted maritime area and the potential decrease of this area as a result of MSP.
	Maritime area with intense spatial conflicts out of the overall maritime space	%	partially	The above indicator may provide an approximation of the percentage of conflicted area, but does not consider the qualitative dimension (intensity of conflicts). This is why planners may also add an indicator on the percentage of the maritime area with intense conflicts. A difficulty with such an indicator would be to have a common understanding on what an intense conflict is. Nevertheless, similarly to the above indicator, it can provide an approximation of the potential decrease in the maritime areas with acute spatial conflicts as a result of MSP.
Decrease project planning time	Time required to take decisions on maritime construction permits (within	Days	partially	The rationale of these two indicators is to show potentially decreasing time for decisions on maritime construction

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
	preapproved areas)			permits and number of legal claims related to conflicting permits as a result of MSP.
	Legal claims related to conflicting permits	Number	partially	
Decrease shipping accidents	Shipping accidents	Number	☐	Decreasing shipping accidents is an underlying objective of MSP, which is why authorities may consider including such an indicator in their plans. At the same time it should be taken into account that there are many factors affecting this indicator, e.g. weather conditions and types of accidents.
Decrease oil spillages	Volume of accidental oil spills due to shipping accidents	m^3	☐	This is an indicator, which is linked to the number of shipping accidents and it adds an environmental dimension to shipping accidents.
Indicators linked to specific Blue Economy sectors[206]				
Increase wind power generation capacity at sea	MW of wind power generation capacity installed at sea[207]	MW	☐	It is clear that all of these indicators are already way beyond the influence of MSP authorities. The rationale for monitoring or considering such indicators is their usefulness as an indication of changing capacities in the specific sectors. Capacity is a middle step between assigning maritime space (outputs) and actual expected positive production, yield, etc. (impacts).
Increase tidal and wave energy generation capacity	MW of tidal and wave energy generation capacity installed	MW	☐	
Increase/maintain sustainable tourism in coastal and sea areas	Number of establishments, bedrooms and bed-places in coastal areas	number	☐	
Increase / maintain shipping capacity	Gross tonnage of vessels in the main ports	Gross tonnage	☐	

[206] No suitable examples of objectives have been identified for this level for the Marine aggregates sector.

[207] For instance the German Renewable Energy Sources Act (2014) specifies binding trajectories for the several individual technologies of production of energy from renewable sources stating among others that offshore wind energy should have by 2020: 6.5 GW and by 2030: 15 GW of installed capacity at German marine waters.

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
Increase / maintain oil and gas production capacity at sea	Capacity of oil / gas installations at sea	Capacity (measured in Tonnes of oil per day or Cubic meters of gas per)	☐	As repeatedly mentioned, however, for certain sectors and sea-basins increasing, or maintaining capacity may not be objectives defined in plans. It could even be an objective to decrease tourism activities, or gas production, for example. Objectives and indicators should always consider what is the sustainable level of capacity.
Increase / maintain capacity of cables and pipelines	Length and/or capacity of pipelines operated Length and/or capacity of cables (IT, electricity) operated	Meters and/or capacity	☐	
Ameliorate the fishing fleet capacity to exploit stocks in a sustainable way	Gross tonnage of fishing fleet	Gross tonnage	☐	
Increase / maintain aquaculture capacity	Number / capacity of aquaculture farms on the coasts	Number / capacity	☐	

Table 20 Outcome indicators (examples)

MSP authorities may also take into account the efficiency of capacity by linking it to the size of space assigned. For example, a potential indicator could be 'capacity of oil/gas installations per nm^2 used' or 'MW of wind power generation capacity per nm^2 used'.

4.4 Output indicators

As mentioned, output indicators should be a direct product of the MSP processes, which can have effects in different socio-economic and ecological dimensions. Thus, MSP authorities might consider the Blue Economy sectors, if appropriate in a given country. At the same time, they should be linked to operational ecological objectives (e.g. on designating marine protected areas). Another aspect that needs to be considered is that land-sea interactions, which is a requirement of the MSP Directive. These interactions are difficult to translate into indicators, but to a certain extent this can be done through the use of qualitative indicators (e.g. on availability of grid connections needed for offshore installations). Suggestions for possible output indicators are presented in the table below.

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
Ensure maritime space for [Blue Economy sector X[208]]	Maritime space assigned for [Blue Economy sector X]	nm^2	☒	The purpose of this indicator is to show how much space has been assigned to a particular Blue Economy sector, e.g.

[208] The table includes typical indicators, which can be further customised to particular sectors

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				for wind farms, or tidal energy installations. MSP authorities need to consider that the indicator may not be applicable to all Blue Economy sectors, e.g. it may have limited applicability for the Tourism and Marine aggregates sectors. Multi-use should also be taken into account.
	Maritime space assigned for [Blue Economy sector X] out of all the available maritime space	%	☒	This indicator goes a step further than the above one as it considers the share of space assigned for a particular Blue Economy sector out of all available maritime space. Thus, it could show relative prioritisation among the different Blue Economy sectors. However, the analytical value of this indicator is limited, because it does not consider how much space is suitable for this specific sector. It should also be considered that the sum of the different values of the indicator (for the different sectors) is not expected to be 100%, because multi-use should also be taken into account and also because some sea space might be kept empty, i.e. for future uses of to preserve the seascape.
	Maritime space assigned for [Blue Economy sector X] out of the suitable (in economic and ecological sense) space for the [Blue Economy sector]	%	☒	The indicator has a bigger analytical value as compared to the above ones as it also takes into account the suitable space for the actual Blue Economy sector. Its limitations are:

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				- It may be difficult to assess how much is the suitable space. Input from stakeholders may be valuable in this regard. - Suitable space is not the same as needed space, which is why MSP authorities may also consider adding the indicator below.
	Maritime space assigned for [Blue Economy sector X] out of the needed space for the [Blue Economy sector]	%	☒	The logic of this indicator is to show to what extent the space assigned meets the needs in the specific sector. For example, if the space assigned for wind farms is more than 100% of the space needed for installing an X MW capacity, then it shows that there is potentially even more room for growth in the particular sector or that there may be a planning failure.
	Overall maritime space assigned out of all available maritime space	%	☒	The indicator may be used to indicate how much space is available for potential future uses or to preserve the seascape and its tangible and un-tangible values.
	Maritime space assigned for immovable uses[209] out of the overall maritime space	%	☒	This indicator may be used to indicate the extent of flexibility of the planning process, i.e. the smaller the percentage assigned for immovable uses,

[209] These are uses that require a very specific area and cannot be moved to alternative locations, e.g. NATURA 2000 sites and ports

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				the bigger the flexibility.
Establish criteria for sustainable development of [Blue Economy sector X]	Extent to which development criteria are set out	Level on a scale	☒	This is a qualitative indicator, which can be used in case the MSP does not explicitly assign maritime space for [Blue Economy sector X]. A level on a scale can consider, e.g. the specificity, rigidity, quantification of the criteria. A binary Yes/No indicator may also be used.
Designate marine protected areas (MPAs)	Space assigned for MPAs	nm^2	☒	The indicator shows how much space has been specifically designated for MPAs, thus taking into account the ecological dimension of MSP. In addition to assigning space for MPAs, having a working plan for management of the MPA is also rather important and may be considered as a qualitative element of the indicator.
	Space assigned for MPAs out of the overall maritime space	%	☒	The indicator may be used to show what is the relative weight attributed to MPAs as compared to uses for Blue Economy sectors. What is important to consider is that the indicator also has a qualitative dimension – the contribution to environmental protection of different zones is not the same. In other words, it is not only a matter of the amount of space reserved for MPAs, but it is rather a question of protecting the most important (from ecological perspective) areas.

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
Ensure multi-use of marine space in line with national targets	Maritime space assigned for multi-use out of the overall maritime space (and/or out of the assigned maritime space)	%	☒	This indicator may show the relative weight of the space assigned for multi-use, which is an indication of efficiency.
Create the conditions for future generations to meet their own MSP needs	Maritime space unassigned and maintained for future generations[210]	%	☒	It should be noted that space for future generations might be maintained also if all the marine space is currently assigned to uses. If marine space is currently used in a sustainable way, without exceeding carrying capacity and regeneration rate and therefore without spoiling the environment and the ecosystem functions, future generation could continue using the space we are currently using. This interpretation of the "future-generation" principle of sustainability is very important for those countries with limited marine area. Both perspectives (unassigned space and current sustainable use of the marine space enabling future generation use of the same space) shall be somehow considered when developing indicators. Maritime space unassigned may not be a relevant indicator, if the space unassigned could be a 'dead zone', which does not contribute to

[210] An example can be one of the drafts of the Polish MSP in which the biggest part (55,3%) of the planned Polish sea space (18 027,37 km^2 out of 32 601 km^2) was reserved for the decisions of future generation – only mobile and reversible uses are allowed there.

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				environmental protection.
Safeguard access to natural, historical, archaeological, religious, spiritual, and cultural sites	Level of access to coastal and marine natural, historical, archaeological, religious, spiritual, and cultural sites Scale of use, e.g.: no access, low accessibility, high accessibility, full access	Level on a scale	☒	This is a qualitative indicator relevant to land-sea interactions. Its main limitation is the aggregation of different coastal and marine sites, which may not always be possible. For example for a historical coastal site there may be full access, while for a natural underwater site there could be low accessibility due to introduction of installations.
Consider the availability of grid connections needed for offshore installations	Level of availability of grid connections Scale of use, e.g.: no availability, low availability (grid connections capacity cover a part of the installation needs), sufficient availability (grid connections capacity cover all of the installation needs), excellent availability (grid connections capacity is higher than the planned installation needs)	Level on a scale	☒	This is also a qualitative indicator, which considers another element of land-sea interactions – availability of grid connections.

Table 21 Output indicators (examples)

4.5 MSP process indicators

There are two possible approaches concerning MSP process indicators: qualitative and quantitative. **Qualitative indicators** may take the form of binary (Yes / No) indicators like the ones suggested in other studies (see Ehler, 2014), e.g. presence of legislative framework, institutional set-up, evaluations performed, or availability of an evaluation plan. They could also have appropriate scales, e.g. measuring the quality of stakeholder consultations. **Quantitative indicators**, on the other hand, focus on measurable elements of the MSP processes (stock-taking, coordination, securing resources, stakeholder perspective) and quantify them as much as possible. The pitfall of using qualitative indicators is that they are simplistic in nature and in essence provide only a basic 'checklist' that may support MSP processes. The main disadvantage of quantitative indicators for MSP processes is that they may be mechanical and could disregard the quality of the processes. That is why a combination of qualitative and quantitative indicators should ideally be considered by MSP authorities. If feasible, for the scoring on the scales of qualitative indicators, planners may also involve external experts and stakeholders.

Some examples of possible MSP process indicators are presented below. It is important to note that these indicators are not limited to specific Blue Economy sectors, but to the overall MSP process as a whole.

Objective	Quantitative Indicator	Measurement unit	Qualitative indicator	Yes / No and / or Scale	Within the control of MSP authorities	Rationale
Ensure cooperation between relevant national authorities (national governance dimension)	Institutionalised or non-institutionalised platforms/fora linking relevant national authorities, which have responsibilities with regards to MSP and Blue Growth (e.g. cross sectoral MSP expert working groups, advisory boards)	Number	Existence of institutionalised or non-institutionalised platforms/fora linking relevant national authorities responsible for MSP and Blue Growth	Yes/No Scale of frequency/quality of interaction e.g. (1) High; (2) Medium; (3) Low	☒	These indicators have the objective of indicating, whether the relevant national bodies are involved in the MSP processes. Preferably, this should be indicated via qualitative indicators on the frequency and/or quality of interaction between the national bodies.
Ensure coherence with plans of neighbouring countries (cross-border governance dimension)	Consultations[211] held with neighbouring countries, which are relevant to Blue Economy sectors (e.g. bi- and multilateral meetings, workshops, conferences)	Number	• In-depth consultations held with all neighbouring countries, which are relevant to Blue Economy sectors (e.g. meetings, workshops, conferences, bi-	Yes/No	☒	The quantitative indicator can show, if all neighbouring countries have been consulted, which is an important aspect in the MSP processes. However, it does not show whether their input in the planning process is taken into account,

[211] Establishing informal contacts prior to and outside the formal consultation is also considered rather important, but it cannot be captured through the indicator system.

			lateral meetings, calls) • Reactions of neighbours have been taken on board			which is a problem that can be amended by using a qualitative indicator.
	Different ministries attending consultations with neighbouring countries	Number	All relevant ministries attend and contribute to the consultations with neighbouring countries	Yes/No	☒	This indicator goes further than considering whether all neighbouring countries have been involved. It is meant to indicate whether the level of discussions is sufficiently high, i.e. whether the key ministries are involved in the discussions with neighbouring countries. In most cases, mechanically counting the number of ministries attending these discussions would not provide meaningful information, which is why a qualitative indicator would be preferable.
Ensure cooperation with sub-national authorities (sub-national governance	Institutionalised or non-institutionalised platforms/fora linking relevant sub-national authorities, which	Number	Existence of institutionalised or non-institutionalised platforms/fora linking relevant sub-national (e.g. regional) authorities responsible for MSP and	Yes/No Scale of frequency/quality of interaction e.g. (1) High; (2) Medium; (3) Low	☒	Same as above, but at the level of sub-national authorities, e.g. counties, municipalities, regions.

dimension)	have responsibilities with regards to MSP and Blue Growth (e.g. County Administrative Boards)		Blue Growth			
Ensure stakeholder input / involvement	Consultations held with representatives of specific Blue Economy sectors (e.g. bi- and multilateral stakeholder meetings, workshops, conferences, seminars) during all MSP stages (planning, development, implementation, M&E)	Number	• Consultations with key representatives of specific Blue Economy sectors, i.e. public authorities, private business, NGOs, general public • Consultations with key stakeholders held during all MSP stages (planning, development, implementation, M&E) • Response provided to all comments received • Stakeholders provided relevant data.	Yes/No Scale of coverage/frequency/quality of interaction e.g. (1) High; (2) Medium; (3) Low (Questions to support this qualitative assessment - Did we reach across society? Are we reaching everyone we should reach? Have we missed anyone?)	☒	The number of consultations held and the number of stakeholders involved provides an overview of the level of participation in consultations. However, these indicators do not measure the quality of the consultation process and whether they have been started at the early stage of planning to avoid sunk cost fallacy (i.e. the tendency to stick to planning decisions due to unwillingness to make changes in the plans). The quality can be measured either quantitatively through a survey, or via qualitative indicators, which take into account whether the key stakeholders were
	Stakeholders from various stakeholder	Number	-	-	☒	

	groups (i.e. public authorities, private business, NGOs, general public) involved in consultations during the development of the MSP					involved and when.
	Stakeholders from various stakeholder groups (i.e. public authorities, private business, NGOs, general public) providing feedback / comments after the adoption of the MSP	Number	-	-	☒	
	Stakeholder satisfaction level (surveys during and/or after the consultations would be needed for defining the value of this indicator)	% of respondents expressing satisfaction with the consultation process	-	-	☒	
Improve awareness of MSP issues	Outreach of stakeholder communication activities (newsletters,	Number of people (potentially) reached Number of	Use of diverse communication channels to disseminate MSP-related information	Yes/No	☒	Quantifying awareness is always a challenge. One way to assess the outreach of communication activities

	flyers, exhibitions and fairs, websites and media cooperation)	visits at the relevant website				is, for example, by counting recipients of newsletters and participants in events. A relatively easy way of assessing the number of people reached is through the visits of a webpage that contains the MSP, its draft, and/or key elements that need to be consulted with the stakeholders. The transparency of MSP updates and the diversity of communication channels can be followed through qualitative indicators.
	-	-	Transparency of the plan updates	Scale e.g. (1) fully transparent – published online and disseminated to stakeholders; (2) transparent – published on the website/portal; (3) partially transparent - upon request; (4) not transparent – available only internally	☒	
Ensure use of available / relevant data in MSP	Maritime space covered by a regional planning register (inventory) of coastal and maritime uses and pressures	%	Availability of MSP relevant information on coastal and maritime uses and pressures High quality of MSP relevant information on coastal and maritime uses and pressures	Yes/No Scale of coverage, e.g. (1) High – coverage of most coastal and maritime uses and pressures; (2) Medium - coverage of some coastal and maritime uses and pressures; (3) Low - coverage of a limited number of coastal and maritime uses and pressures Scale of quality, e.g. (1) High – availability of up-to-date detailed information; (2) Medium – information,	☒	Having a database containing spatially relevant information on a wide range of uses and pressures is a useful tool for structuring MSP data. The marine space covered by such a database can be measured quantitatively. The availability and quality of the MSP data can also be assessed qualitatively by using scales on coverage/quality.

				which is not up-to-date, or not detailed enough; (3) Low – lack of up-to-date detailed information		
Ensure mapping of uses and key characteristics of the sea	Maritime space mapped and showing coastal and maritime uses (and pressures)	%	Availability of maps showing coastal and maritime uses (and pressures)	Yes/No Scale of coverage, e.g. (1) High – maps of most coastal and maritime uses, characteristics, and pressures; (2) Medium - maps of some coastal and maritime uses, characteristics, and pressures; (3) Low - maps of a limited number of coastal and maritime uses, characteristics, and pressures Scale of quality, e.g. (1) High – availability of up-to-date maps with proper scales; (2) Medium – maps, which are not up-to-date, or not in proper scales; (3) Low – lack of up-to-date maps with proper scales	☒	Obviously, maps are another key tool in the MSP processes. Similarly to the above indicator, the coverage of the maps can be assessed quantitatively and qualitatively. Equally important is the quality of the maps, which can be considered through a scale like the one suggested in this table.
			Level of use of existing instruments and tools for data collection (such as those developed in the context of the Marine Knowledge 2020 initiative e.g. EMODNET data portals and Directive 2007/2/EC of the European	Scale of use, e.g.: no use, low, medium, significant use	☒	MSP authorities should make the best use of existing instruments and tools for data collection. A qualitative indicator on this use can be developed, in case considered useful, but to a large extent this also

			Parliament and of the Council e.g. INSPIRE geoportal).			depends on how applicable the existing instruments/tools are.
Take stock of the resources assigned to MSP processes	Financial resources assigned for MSP processes[212]	Euro	• Availability of sufficient financial resources assigned for MSP processes • Diversity of financial resources assigned for MSP processes (e.g. national funds in combination with EU funds)	Yes/No	☒	The rationale for this indicator is to inform MSP authorities on the adequacy of financial resources assigned for MSP. The quantitative indicator may provide the actual available budget, while based on previous experience and expert judgement, MSP authorities may determine, if these resources are expected to be sufficient (qualitative indicators). Having a diversity of financial resources provides further reassurance that the MSP processes have the necessary resources.
	Staff assigned to MSP processes	FTE (full time equivalent)	• Availability of sufficient staff assigned to MSP processes • Availability of a	Yes/No	☒	Human resources are another element of the inputs assigned to MSP processes in addition to financial resources (see

[212] All financial resources channelled into the MSP process at its various stages from public and private sources including also EU funds and EU projects if used directly for MSP purposes, e.g. for training MSP staff, for making cross-border consultations etc.

			multi-disciplinary team (e.g. planning, data management, GIS, marine science)			the previous indicator). They can be monitored quantitatively through the number of full time equivalents assigned to MSP processes. The judgement on whether the staff is sufficient is, however, also important and can be based on previous experience (if existent) and expert judgement.

Table 22 MSP process indicators (examples)

4.6 *Additional Ecological indicators*

There may be particular ecological objectives identified in the MSP processes (for example the objectives reviewed in the previous sections - Designate marine protected areas and Decrease oil spillages), but typically these are broader and can be considered as horizontal objectives, which are linked to other Blue Economy sector objectives.

Broad ecological objectives are defined in the framework for community action in the field of marine environmental policy included in the Marine Strategy Framework Directive (MSFD)[213]. It establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status (GES) in the marine environment by the year 2020 and refers to an ecosystem-based approach (Art. 1), which is also included as a minimum requirement for MSP in the EU MSP Directive (2014/89/EU). Thus, a clear link can be established between the proposed MSP ecological indicators, good environmental status and the descriptors referred to in the MSFD.

The descriptors can be used as indicators, which provide summary information on relevant ecological parameters that are usually affected by Blue Economy sectors, as shown in Table 15. The list is not exhaustive per sector, but instead indicates the descriptors, which are typically influenced the most by the particular sectors. It is important to note that **the link between concrete descriptors and specific Blue Economy is country-specific**.

Descriptors / sectors	Renewable energy (wind, tidal, wave)	Coastal and maritime tourism	Fishing	Marine aquaculture	Ports and shipping	Oil and gas production	Marine aggregates	Pipelines and cables
D1. Biodiversity	☒	☒	☒	☒	☒	☒	☒	☒
D2. Non-indigenous species	☐	☒	☒	☒	☒	☐	☐	☐
D3. Commercial fish / shellfish	☐	☐	☒	☐	☒	☐	☐	☐
D4. Marine food webs	☐	☐	☒	☒	☐	☐	☐	☐
D5. Eutrophication	☐	☒	☒	☒	☒	☐	☐	☐
D6. Sea-floor integrity	☒	☐	☒	☒	☒	☒	☒	☒
D7. Hydrographical conditions	☒	☐	☐	☐	☒	☒	☒	☐
D8. Contaminants	☐	☒	☐	☐	☒	☐	☐	☐
D9. Contaminants in seafood	☐	☐	☐	☐	☒	☐	☐	☐
D10. Marine litter	☐	☒	☒	☒	☒	☐	☒	☐
D11. Introduction of energy	☒	☒	☐	☐	☒	☒	☐	☒

Table 23 Blue Economy sectors / descriptors (possible links)

Table 15 could serve the purpose of providing umbrella indicators on general objectives such as reducing climate change impacts, zero eutrophication, decreasing toxicity, increasing / maintaining biodiversity, etc., if such objectives are envisaged in the MSP Plans. In addition to the GES descriptors, indicators for air quality can also be applied, e.g.:

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213 European Commission (2008).

decreasing greenhouse gases (GHG) from shipping and / or decreasing GHG through measures in renewable energy. The difficulty would be to link these to MSP processes.

5 FURTHER SOURCES ON INDICATORS

The guidance on indicators can be divided into two main categories: guidance on MSP indicators and general indicator guidance.

Further MSP indicator guidance

Several studies provide detailed guidance on the development and use of MSP indicators. One of the most widely used guides was developed by Charles Ehler[214]. It provides a description of several steps of monitoring and evaluating the performance of marine spatial plans, including the identification of indicators, establishing baselines, defining targets, monitoring indicators.

Another detailed guide is the Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management (ICOM). [215] It offers a step-by-step guide on developing, selecting and applying governance, ecological and socioeconomic indicators to measure, evaluate and report on the progress and outcomes of ICOM interventions.

The Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness[216] provides a good overview of the process of selecting MPA indicators. The importance of choosing specific indicators for the control variables to monitor changes in ecosystem models is discussed also in the study on 'Planetary boundaries for a blue planet' by Nash, et.al.[217]

In addition to the studies mentioned above, there are also some projects, which provide tools that may support the development of MSP indicators. For example, the BONUS BaltCoast project designed a tool to measure the sustainable development in coastal areas and to evaluate the success of different ICZM 'best-practice' examples applied throughout Europe through indicators. The spreadsheet tool, developed under the project includes a set of 45 indicators that are grouped into four categories: Environmental Quality, Economics, Social Well-Being, Governance (Process indicators).

The Transboundary Planning in the European Atlantic (TPEA) project provides a checklist for assessing transboundary MSP processes. This checklist also offers a list of indicators, which may contribute to defining MSP process indicators. The Baltic Scope Collaboration also provides a list of evaluation criteria and indicators to support evaluation and monitoring of transboundary collaboration in MSP.

General indicator guidance

The EVALSED[218] guidance provides a good overview on how to create indicators and indicator systems and includes a definition of indicators, main types of indicators, and tips on selecting indicators. Another good source of general guidance on indicators is the

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[214] Ehler, Charles (2014).

[215] Belfiore, S., J. et al. (2006).

[216] Pomeroy, R., J. et al. (2004).

[217] Nash, K. et.al. (2017).

[218] EVALSED (2013).

Results Framework and M&E Guidance Note of the World Bank[219]. It provides a description of a results chain, quality checks and types of indicators

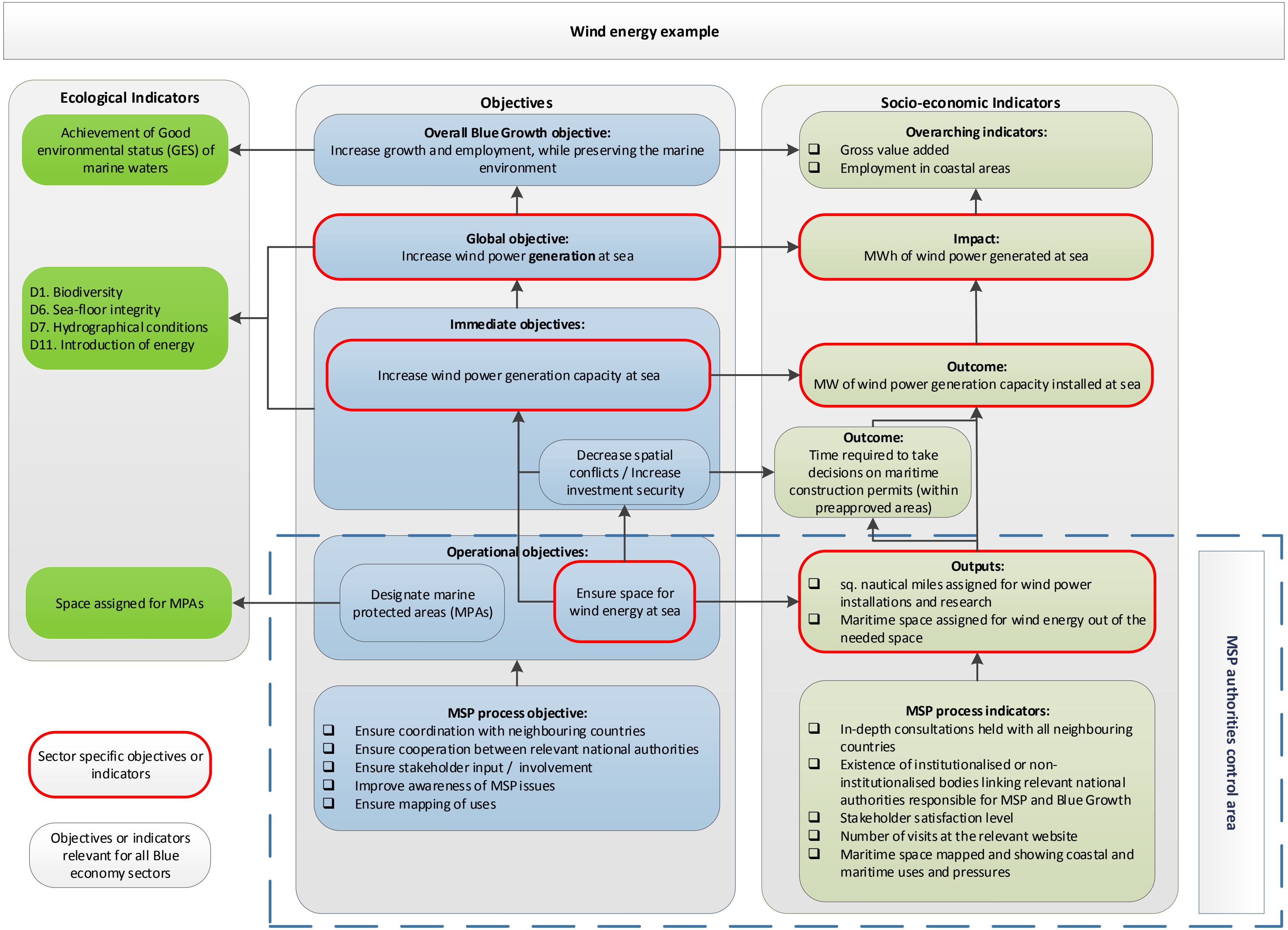
The Monitoring and Evaluation Indicators Guidance documents of the European Commission for the 2007-2013[220] and for the 2014-2020[221] period offer a good introduction into the methodology of indicator systems and provide practical guidance for the authorities and stakeholders in Member States that are responsible for Structural and Cohesion Fund programmes, in particular for the creation of indicator systems.

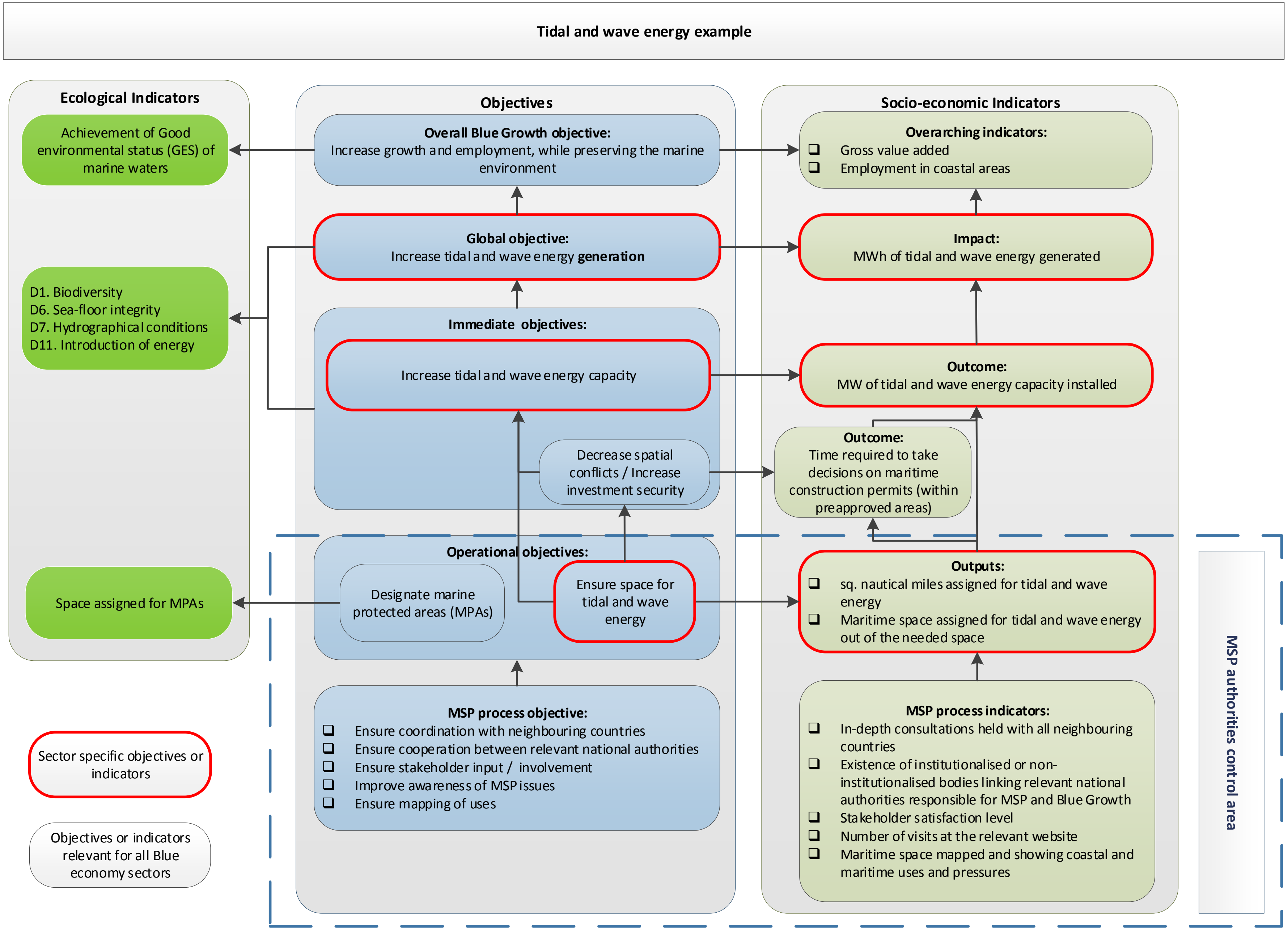
[219] World bank (2013).

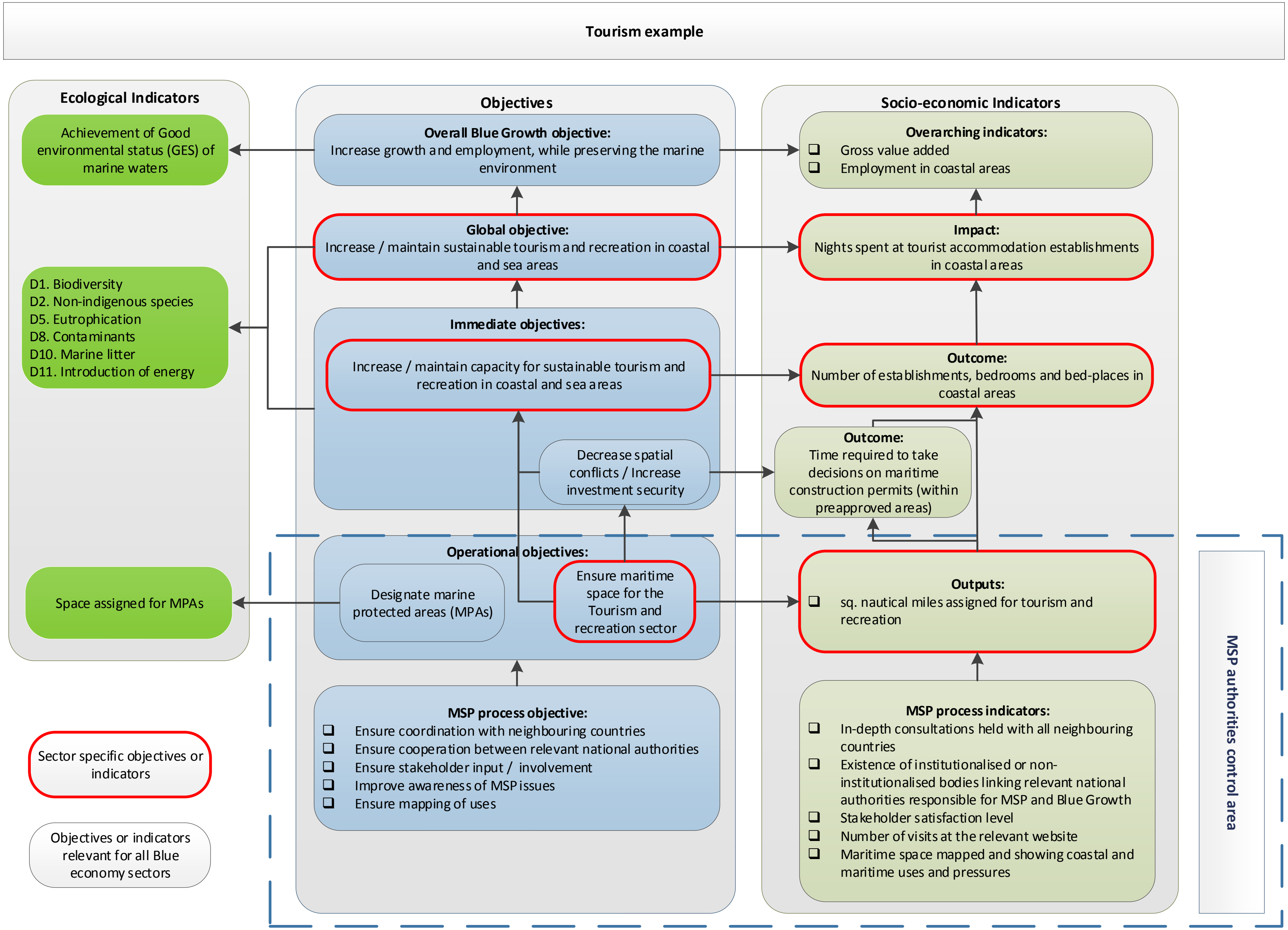
[220] European Commission (2006).

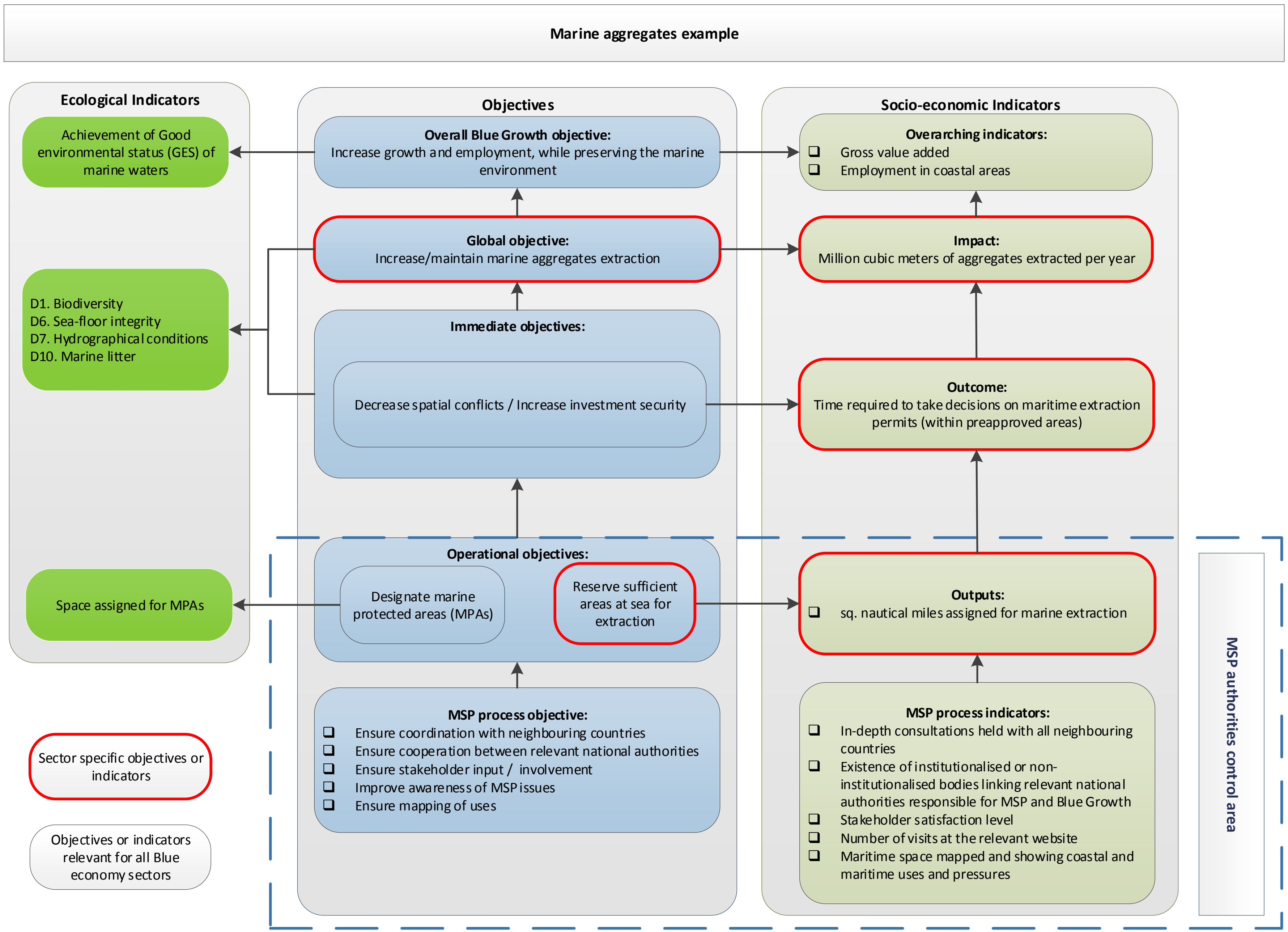
[221] European Commission. (2014).

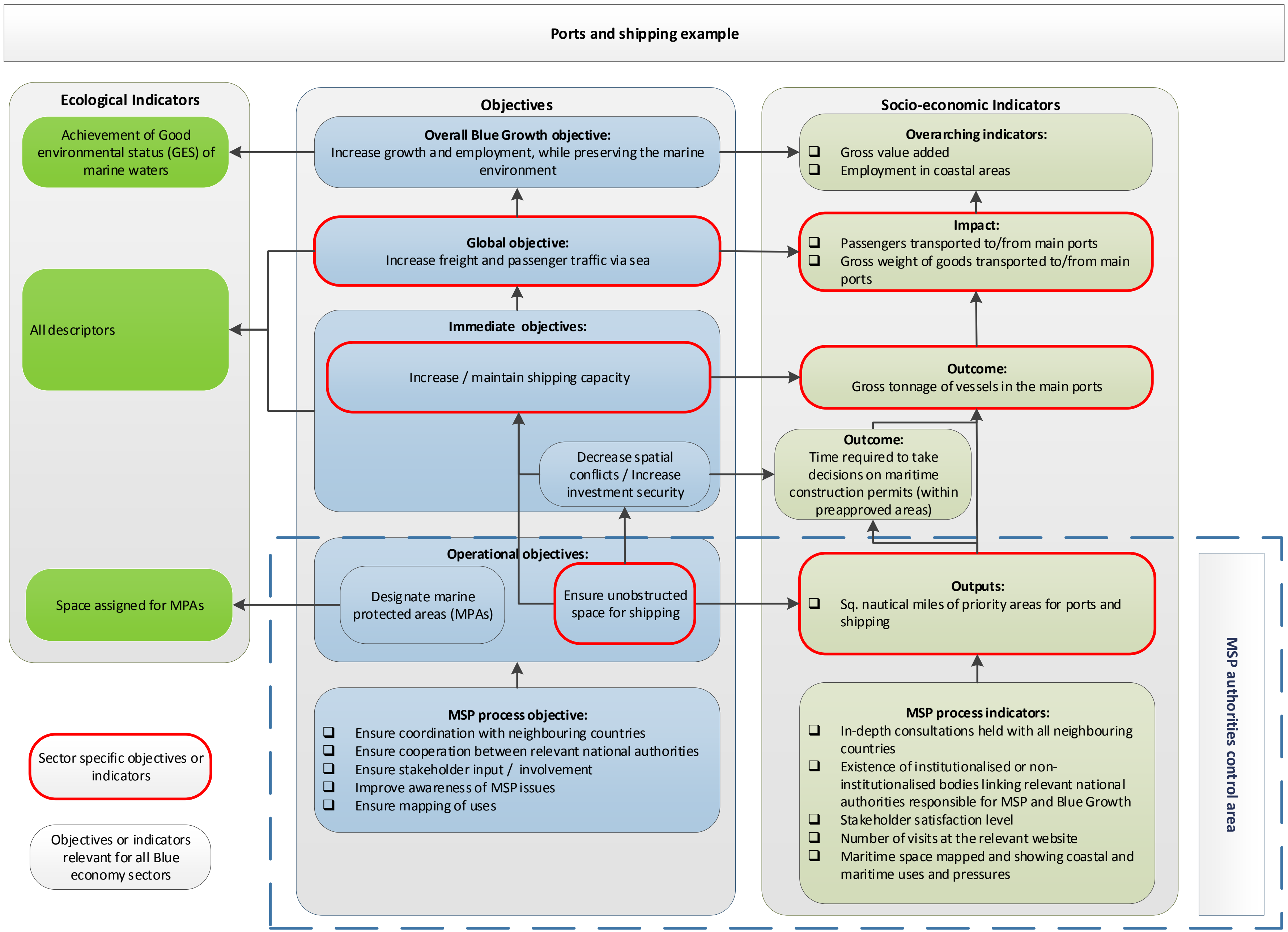
APPENDICE 1: EXAMPLES OF FRAMEWORKS OF INDICATORS PER SECTOR

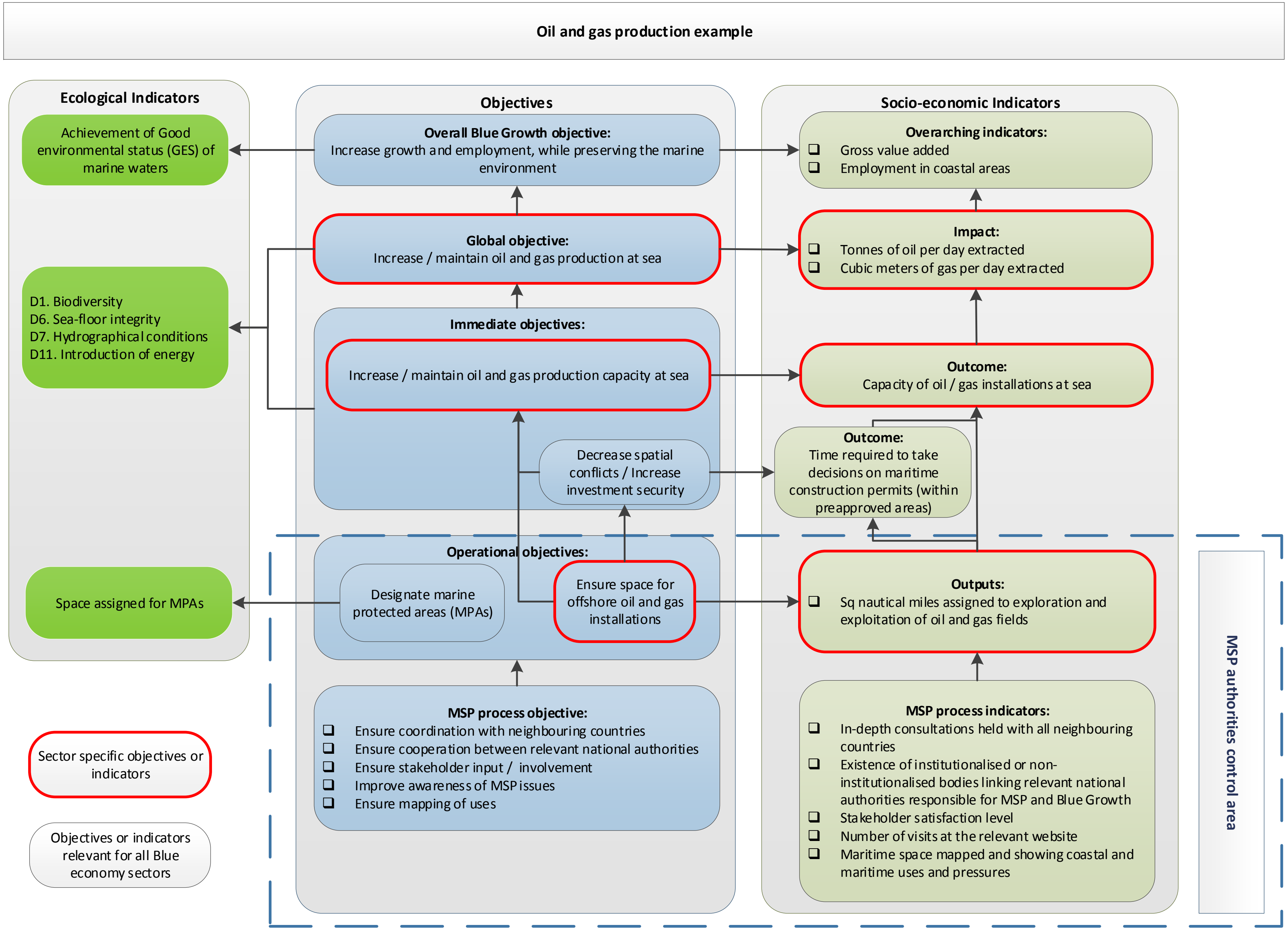

Wind energy example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D11. Introduction of energy
Space assigned for MPAs
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase wind power generation at sea
Immediate objectives:
Increase wind power generation capacity at sea
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for wind energy at sea
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
MWh of wind power generated at sea
Outcome:
MW of wind power generation capacity installed at sea
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for wind power installations and research
Maritime space assigned for wind energy out of the needed space
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area

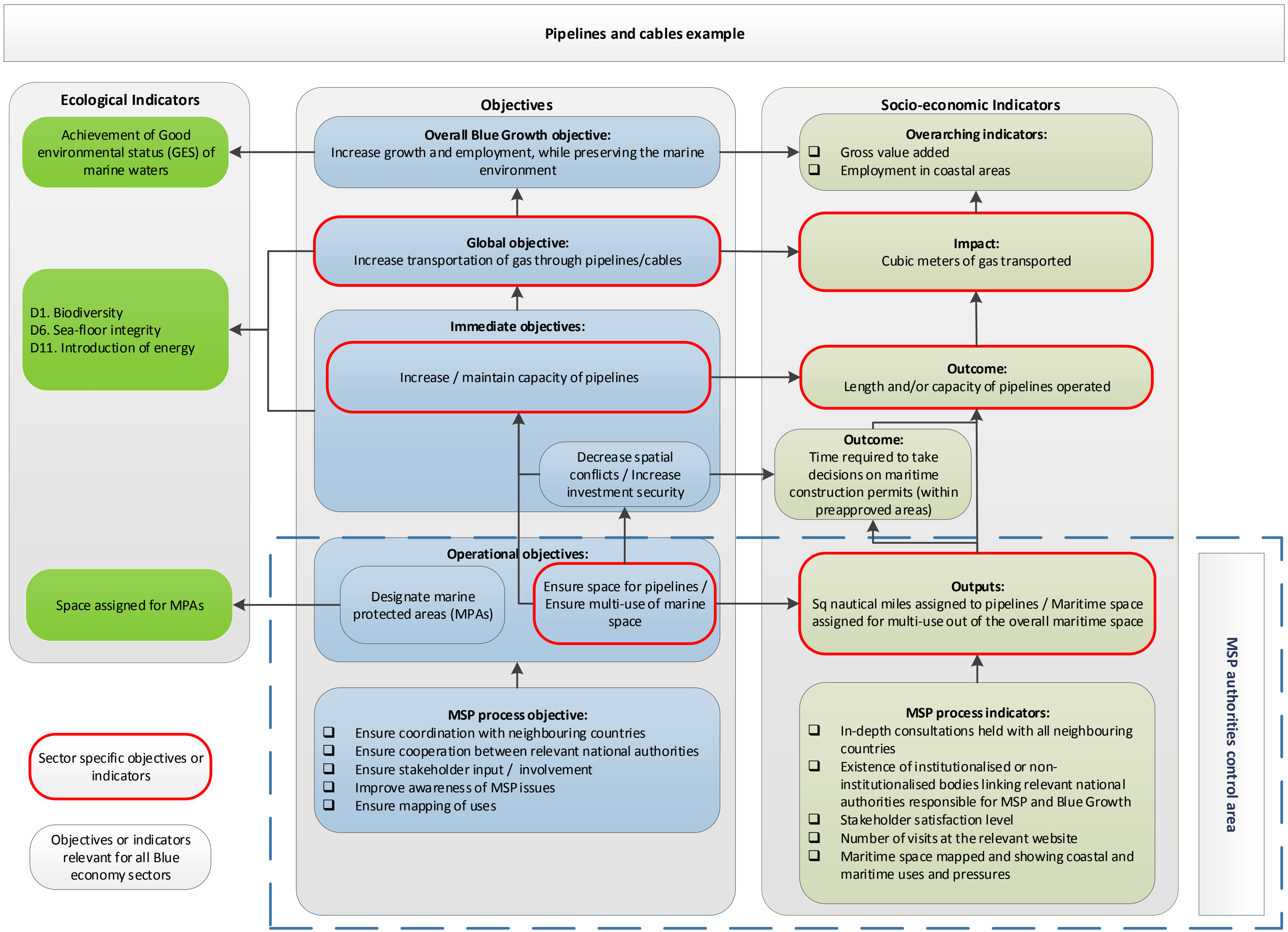

Tidal and wave energy example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D11. Introduction of energy
Space assigned for MPAs
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase tidal and wave energy generation
Immediate objectives:
Increase tidal and wave energy capacity
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for tidal and wave energy
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
MWh of tidal and wave energy generated
Outcome:
MW of tidal and wave energy capacity installed
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for tidal and wave energy
Maritime space assigned for tidal and wave energy out of the needed space
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area

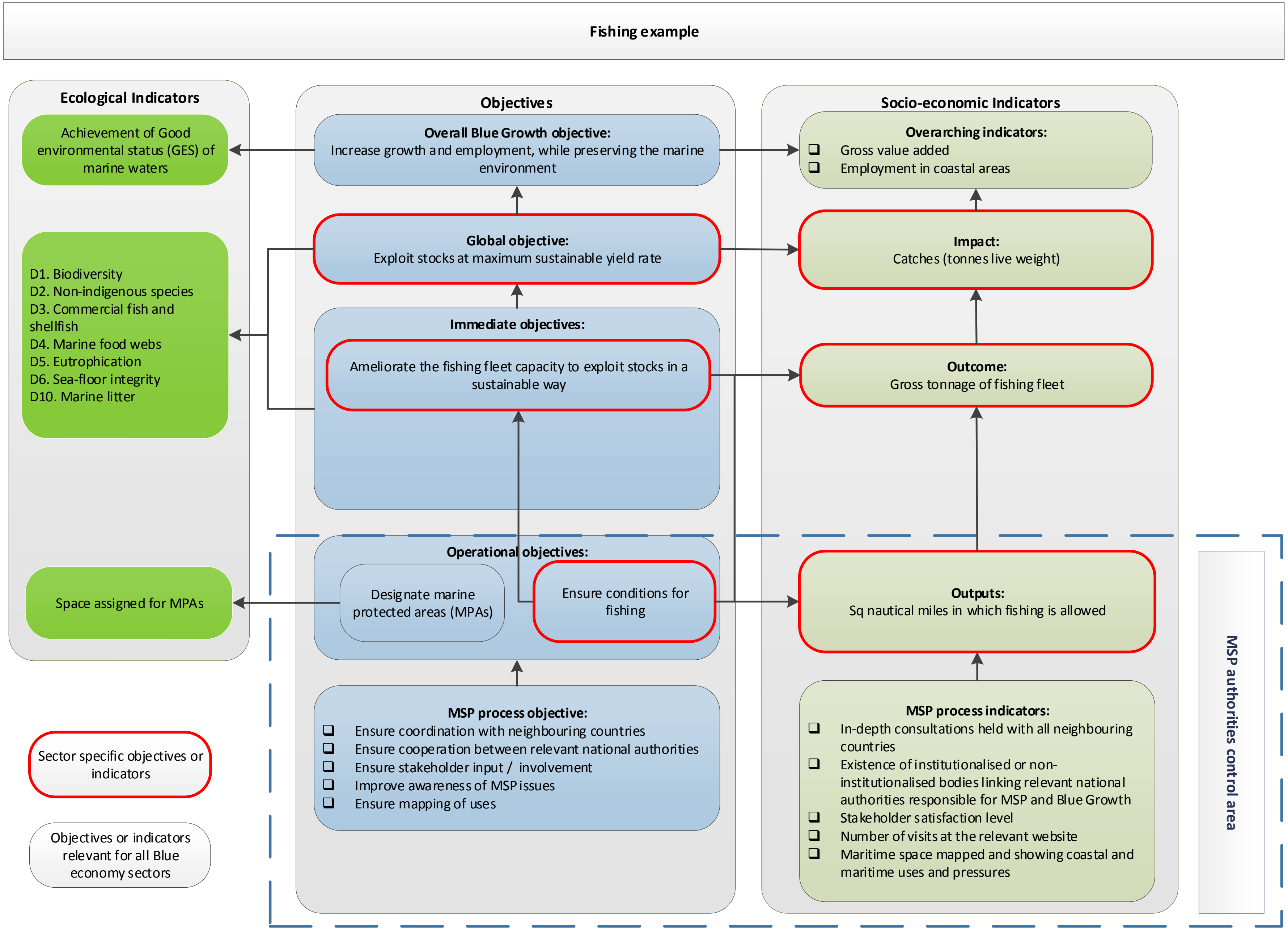

Tourism example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D2. Non-indigenous species
D5. Eutrophication
D8. Contaminants
D10. Marine litter
D11. Introduction of energy
Space assigned for MPAs
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors
Objectives
Overall Blue Growth objective: Increase growth and employment, while preserving the marine environment
Global objective: Increase / maintain sustainable tourism and recreation in coastal and sea areas
Immediate objectives:
Increase / maintain capacity for sustainable tourism and recreation in coastal and sea areas
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure maritime space for the Tourism and recreation sector
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact: Nights spent at tourist accommodation establishments in coastal areas
Outcome: Number of establishments, bedrooms and bed-places in coastal areas
Outcome: Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for tourism and recreation
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area

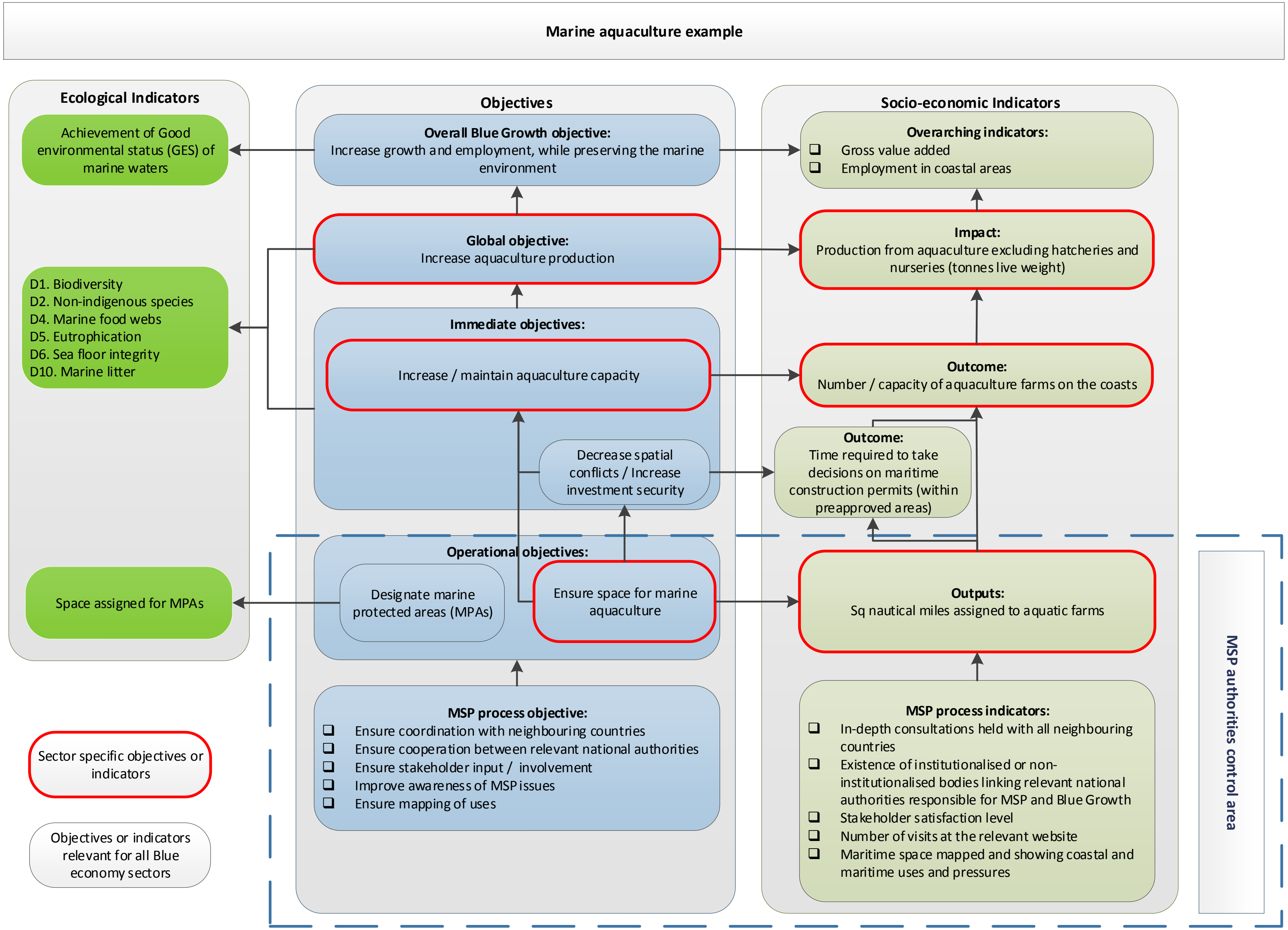

Marine aggregates example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D10. Marine litter
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase/maintain marine aggregates extraction
Immediate objectives:
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Reserve sufficient areas at sea for extraction
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Million cubic meters of aggregates extracted per year
Outcome:
Time required to take decisions on maritime extraction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for marine extraction
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Ports and shipping example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
All descriptors
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase freight and passenger traffic via sea
Immediate objectives:
Increase / maintain shipping capacity
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure unobstructed space for shipping
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Passengers transported to/from main ports
Gross weight of goods transported to/from main ports
Outcome:
Gross tonnage of vessels in the main ports
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq. nautical miles of priority areas for ports and shipping
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Oil and gas production example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D11. Introduction of energy
Space assigned for MPAs
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase / maintain oil and gas production at sea
Immediate objectives:
Increase / maintain oil and gas production capacity at sea
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for offshore oil and gas installations
MSP process objective:
❑ Ensure coordination with neighbouring countries
❑ Ensure cooperation between relevant national authorities
❑ Ensure stakeholder input / involvement
❑ Improve awareness of MSP issues
❑ Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
❑ Gross value added
❑ Employment in coastal areas
Impact:
❑ Tonnes of oil per day extracted
❑ Cubic meters of gas per day extracted
Outcome:
Capacity of oil / gas installations at sea
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
❑ Sq nautical miles assigned to exploration and exploitation of oil and gas fields
MSP process indicators:
❑ In-depth consultations held with all neighbouring countries
❑ Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
❑ Stakeholder satisfaction level
❑ Number of visits at the relevant website
❑ Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area


Pipelines and cables example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D11. Introduction of energy
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase transportation of gas through pipelines/cables
Immediate objectives:
Increase / maintain capacity of pipelines
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for pipelines / Ensure multi-use of marine space
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Cubic meters of gas transported
Outcome:
Length and/or capacity of pipelines operated
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq nautical miles assigned to pipelines / Maritime space assigned for multi-use out of the overall maritime space
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Fishing example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D2. Non-indigenous species
D3. Commercial fish and shellfish
D4. Marine food webs
D5. Eutrophication
D6. Sea-floor integrity
D10. Marine litter
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Exploit stocks at maximum sustainable yield rate
Immediate objectives:
Ameliorate the fishing fleet capacity to exploit stocks in a sustainable way
Operational objectives:
Designate marine protected areas (MPAs)
Ensure conditions for fishing
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Catches (tonnes live weight)
Outcome:
Gross tonnage of fishing fleet
Outputs:
Sq nautical miles in which fishing is allowed
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Marine aquaculture example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D2. Non-indigenous species
D4. Marine food webs
D5. Eutrophication
D6. Sea floor integrity
D10. Marine litter
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase aquaculture production
Immediate objectives:
Increase / maintain aquaculture capacity
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for marine aquaculture
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Production from aquaculture excluding hatcheries and nurseries (tonnes live weight)
Outcome:
Number / capacity of aquaculture farms on the coasts
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq nautical miles assigned to aquatic farms
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors

APPENDICE 2: REFERENCE LIST

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ANNEX IV: STUDY METHODOLOGY

Overall, the study provides methodological guidance based on **desk research** and **interactions** with the MSP community and maritime sector representatives. The desk research includes a review of good practices (e.g. on developing visions), maritime spatial plans, maritime strategies, projects, and scientific literature. The interactive process included: semi-structured interviews with experts involved in drawing up current MSP visions as well as experts from various Blue Growth sectors, contacts with MSP authorities, feedback at MSEG meetings and at the Blue Growth conference.

The specific methodology for each of the tasks is presented in more detail below.

Methodology for developing MSP relevant visions

The first stage of the research for Task 1 included a desk review phase of existing vision documents and current approaches to developing them. The **review** included documentation from over 30 maritime vision development processes, as well as over 20 handbook-style documents and peer-reviewed articles. The latter mainly refers to the theoretical studies in relevant fields such as scenario or strategy development. The aim of this review was to capture the "state of the art" of vision development process, for the purpose of which a wide range of initiatives and projects from Europe and beyond have been studied. Moreover, the review also included on-going and/or planned processes, such as the current Belgium Vision 2050 process and scenario development by the Dutch MSP authorities; maritime strategies (e.g. West Med Strategy); the Implementation Strategy for the Baltic Blue Growth Agenda; and vision processes within on-going MSP projects (such as BalticLINes and NorthSEE).

The desk research phase was supplemented by **semi-structured interviews with:**

- **Facilitators** – including national and regional authorities, research institutes, consultancies and other organisations that have led the practical work of the development of maritime visions;

- **Users** - including those who extensively refer to maritime visions in their MSP processes, including those who have been involved in the development process.

Investigating current and future potential spatial demands of key maritime sectors

Extensive **desk research** has been performed, at the EU level, in order to complete the Sector fiches. Following the in-depth review of literature and secondary sources of information, **interviews** were conducted per Sector fiche. A series of interviews with project managers, and experts from the maritime sectors (such as industry experts or sectoral authorities) were carried out during the months of June and July in order to confirm and discuss the results of the desk research phase of the study.

Then the preliminary draft Sector fiches were presented as "Roundtable discussion papers" at the Maritime Spatial Planning for **Blue Growth Conference** of 11/12 October 2017 in Brussels. During the conference, roundtable discussions, moderated by sector representatives, were dedicated to the Sector fiches. Two round of discussions per sector took place, allowing stakeholders to discuss their views on current and future spatial challenges. The papers were made available to the conference participants a week in advance and a number of handouts were distributed to the participants of the 14 round tables that took place on the various sectors: Offshore wind energy, Tidal and Wave, Coastal and Maritime Tourism, Marine aggregates and Marine Mining, Shipping and Ports, Oil and Gas, Cables and Pipelines, Fishing and Marine aquaculture.

Following the received feedback at the conference and from the Commission, the Sector fiches were restructured and redrafted in order to focus more on the spatial implications of the developments in the maritime sectors, incorporating some practical recommendations for MSP as derived from the Conference's results.

Handbook on indicators

The **in-depth literature review** that was performed as a part of Task 3 included a review of MSP plans, scientific literature on indicator development and specific manuals on indicators. The objective of this research was to seek in the literature suggestions on different purposes and categorisations of indicators, and also examples of MSP indicators, which can be instrumental for the study.

During the **meeting of the Member States Expert Group** on MSP in June, the on-going work for Task 3 of the study was discussed in more detail during designated interactive roundtable discussions, including a targeted discussion of the conceptual framework and the first list of indicator suggestions. All suggestions of the participants received during and after the meeting were taken into account, leading to a fine-tuned conceptual framework. The draft of the Handbook on indicators, which was prepared after the MSEG, was further discussed with MSP practitioners.

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