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Marine Spatial Planning Quality Management System

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Marine Spatial Planning Quality Management System

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1 Foreword

In the light of increasing demands for using marine space and resources, spatial planning for marine areas has become an important element for implementing policies related to those areas. What needs to be noted is that planning is a social process, which is informed by facts and rules, but also influenced by a wide range of interests, underlying perceptions, attitudes, and worldviews of many different actors.

The aim of this document is to provide a generic structure on how to set up spatial planning processes in marine areas. This structure offers guidance to practitioners developing the planning processes on what should be incorporated when designing and subsequently managing a process of spatial planning. It points to sub-processes and types of information that need to be included at different stages of the process from the perspective of quality management in order to ensure that the process of planning as well as the output of the process, the plan itself, follow a clear and transparent structure. This might also support planners when they have to submit a report to the public or to politicians on the status of the planning at any given moment, on which information and actors have been included, which arguments and assumptions have to be considered, and how and why some issues might have been prioritized. For those involved in the planning process as advisors or stakeholders the document provides guidance on their roles and contributions within this process.

However, though a structure may contain the elements which from the experience of the authors are relevant in the process, it does not make statements about which objectives and outputs the planning exercise should have. From our point of view, defining objectives is part of the planning process itself or predefined by the policies and legislation which the plan is expected to implement.

Having said this, the authors in this document do not make a differentiation between the terms "marine" and "maritime" spatial planning. In our understanding, the abbreviation MSP refers to both; both terms refer to the same area and both can be characterized by the general definition provided by the EU for maritime spatial planning (MSP), in which MSP **"is about planning and regulating all human uses of the sea, while protecting marine ecosystems."** The difference is in the usually more environmental connotation of "marine" spatial planning (referring directly to the marine area) and the more economic connotation in "maritime" spatial planning (referring to maritime industries), as it is explicated in the EU Directive 2014/89/EU (EU, 2014) establishing a framework for maritime spatial planning. In this handbook, the terms are seen as interchangeable. The structure and the underlying quality management objectives provided in this document can be applied to all forms of spatial planning in the sea, whether they are driven by economic, ecological, or social objectives and – as stated above – it is part of the planning process to define the objectives in the context of existing legislation and policies. Furthermore, all definitions of MSP emphasize its role as a tool to balance between economic interests and ecological considerations.

The Authors

2 Introduction

Human activities in marine areas are increasing in number and intensity, with patterns of sea use changing as a result of political, economic, and societal developments. European seas can be seen as a hotspot' of this development. For example, *"The North Sea has some of the busiest shipping lanes in the world and maritime transport continues to increase. Construction activities have also been increasing…, with more coastal structures and wind farms being built and operated, and more tourist traffic"* (OSPAR, 2010). The EU Blue Growth strategy (EU, 2012) assumes that Europe's Blue Economy represents 5.4 million jobs and a gross added value of just under €500 billion per year and that 75% of Europe's external trade and 37% of trade within the EU is seaborne. Marine areas therefore have become contested, but at the same time politically recognized areas, with emerging conflicts rooted not only in different interests, but also different perceptions, values, and attitudes of diverse actors (Kannen, 2012).

These on marine or maritime spatial planning policy contexts, like the Integrated Maritime Policy (EU, 2007) and policy implementation tools such as the framework directive for Maritime Spatial Planning (EU, 2014), reflect the need to extend planning activities and regulations to areas further offshore. This is defined by the EU as *"Maritime spatial planning is about planning and regulating all human uses of the sea, while protecting marine ecosystems."* Therefore, while the maritime spatial planning (MSP) directive, in its main objectives, is oriented towards economic goals, the EU Marine Strategy Framework Directive (EU, 2008) extends environmental policies further offshore, aiming to establish ecosystem approaches to the management of human activities (Rice *et al.*, 2005).

In 2009, the International Council for the Exploration of the Sea (ICES) launched a strategic initiative on area-based science and management to examine the linkages between MSP and the ecosystem approach to management. Two workshops were held to establish the current state of scientific knowledge as well as to identify gaps and scientific limitations through the examination of case studies (ICES, 2011a; HELCOM/VASAB, OSPAR and ICES, 2012). In order to support MSP processes, key scientific needs were identified in terms of vulnerability and ecological risk assessment tools with a focus on pressures and risks. This includes achieving a better understanding of the total and cumulative effects of multiple human activities occurring in the same area, together with methods for setting values to ecosystem services, integrated analysis tools of socio-economic and ecological spatial data, and the mapping of spatial claims of different sectors and their potential effects. Finally, the workshops concluded that MSP should be seen as the practical implementation of the ecosystem approach to management through holistic and integrated analysis of all relevant human activities, pressures, and impacts within the planning area at the ecosystem scale. ICES Working Group on Marine Planning and Coastal Zone Management (WGMPCZM) was subsequently tasked with the responsibility to further discuss and develop the recommendations of the workshops. The WGMPCZM has been examining good practices and gaps in ecosystem risk management and quality management frameworks in marine planning and coastal zone management (ICES, 2011b, 2012a). Although key scientific tools and practices are needed to support MSP processes, the working group also identified the need for decision-making tools and quality management systems to ensure the effectiveness and efficiency of MSP planning and implementation processes.

It is within this context that ICES held a Workshop on Quality Management of MSP Processes (WKQAMSP) in February 2010 (ICES, 2012b). Elements of quality

management were found in a broad range of coastal and marine management processes such as integrated coastal and oceans management, environmental assessments, and existing marine spatial planning initiatives. The workshop also found that quality management is implemented in a somewhat *ad hoc* approach in the various processes. Quality management elements included the assessment of scientific data usability, scientific policy advisory processes, stakeholder consultation processes, conformity auditing procedures, and policy formulation procedures. Given the extensive amount of human and financial resources that are invested in MSP initiatives, the workshop found that MSP processes lacked a comprehensive quality management system that would ensure that these processes result in a plan having high acceptability among regulators, stakeholders, and the public while addressing ecosystem and user needs. In addition, such a system would increase the efficiency of the planning processes, minimizing the number of iterations of a given step of the process. It is always less costly and risky to build quality into a process than to continuously make corrections during the planning processes or after the actual plan is completed. It should be noted that continuous re-iterations, reviews, or corrections can also result in scope creep and disengagement of participants.

Quality management and quality assurance has been practised for several decades with applications in business, manufacturing, and environmental management (Fox, 1994). The International Organization for Standardization (ISO) has produced a suite of quality management standards such as the ISO 9000, ISO 14000, and ISO 17000 (ISO, 2002, 2004, 2005; ISO/IEC, 2006; ISO, 2008, 2009a). The aim of the ISO 9000 quality management standards is to lead an organization to improve its performance (ISO, 2008) in a systematic and transparent manner. For continual improvement within a leadership- and customer-focused setting, these principles highlight the need for a systematic approach to the management of interrelated processes, with a factual approach used in decision-making. The management of systems requires a set of quality policies and quality objectives that describe the desired results for the organization as well as the resources and procedures required to achieve said results. Generally, a quality management system (QMS) provides confidence that the end product consistently meets the quality requirements set out by the process (Hoyle, 2011).

In marine spatial planning processes, such a system would provide confidence in the resulting marine spatial plan and its ability to consistently meet the objectives established at the onset of the planning initiative such as public policy, legislative requirements, ecosystem management objectives, economic and social objectives, as well as stakeholder expectations. It would provide the quality objectives for the resulting plan and the quality management objectives for the interrelated process needed to achieve the quality objectives of the plan in terms of advisory and consultation processes, with outputs that are relevant to the decisions at hand. A QMS would play a key role to demonstrate due diligence and due process for the planning process, confirming expected outcomes and ensuring transparency of decisions during consultations as well as documenting the scientific and technical underpinning of those decisions.

Elliott (2013) argues that successful and sustainable environmental management cannot simply rely on sound ecological knowledge but needs to be focused on a socio-ecological system. The paper outlines *Ten tenets* of marine management, demonstrating the need for a multidisciplinary approach that combines ecological with social sciences, economics, and policy. The *Ten tenets* of marine management can be considered as the elements of quality in the development of a QMS to be applied to a marine spatial plan.

In addition, marine planning and management frameworks have to involve the major elements of:

- defining pressures from which the causes and/or the consequences can be managed,
- the risk assessment and risk management elements,
- the nature of stakeholders and the horizontal integration between them, as well as the vertical integration between levels of governance, and
- the ecosystem services and societal benefits components and the delivery of the ecosystem approach (Elliott, 2014).

It is argued that all of these elements need to be harmonized for successful marine management. In a QMS, these form the basis for the quality policies and quality management objectives that should direct or guide the planning process.

This report combines elements of marine spatial planning processes (Ehler and Douvere, 2009; Schultz-Zehden *et al.*, 2008), concepts of ecosystem management systems (Sardà *et al.*, 2010, 2014), ecosystem approaches to management (Rice *et al.*, 2005), and ecosystem risk management frameworks (Cormier *et al.*, 2013) to design a QMS. Elliott's 10 tenets of environmental management (Elliott, 2013) are used as the quality objective for the plan (QOP) and Hoyle's process principles (Hoyle, 2011) form the basis of the quality management objectives (QMO) of the planning process. In terms of definitions, the report relies on the ISO 9000 suite of standard for quality management systems and the ISO 31000 risk management standard as the systems' approach to managing interrelated processes of the planning process. In addition to providing background context, the report also provides further reading and quality assurance checklists of questions to help the reader design a QMS for their purpose and need. The report does not discuss or compare various QMS approaches as it is aimed at providing guidance for practitioners involved in marine spatial planning.

3 Quality management system

Generally, quality management as related to environmental assessments, integrated coastal and oceans management and, most recently, marine spatial planning, is primarily thought of as quality management of scientific data and advice. Most papers mention quality management from the perspective of monitoring, laboratory procedures, and data management (Gray and Elliott, 2009; Canada, 2010). There are few quality management systems that deal with environmental planning and management processes such as MSP.

A quality management system (QMS) is a systematic set of activities and procedures that are implemented to ensure that the end product or service meets the quality requirement or specifications expected from a given process (Fox, 1994). QMS operates on practices that embody common-sense principles and procedures, providing the means for checking efficiency of activities while being an essential aspect of risk management (Jeffries, 1999). Generally, the two key principles of quality assurance are that the end product should be *"Fit for purpose"* (e.g. suitable for the intended purpose) and that the process should be *"Right first time"* (e.g. designed to eliminate mistakes and avoid costly iterative corrections; Hoyle, 2011; Russo and Schoemaker, 2002). In addition, the required science should be defined on a "need to know" rather than a "nice to know" basis. In MSP, a QMS should be a systematic set of activities and procedures that are implemented to ensure that the marine spatial plan is designed to organize or regulate all human uses of the sea while protecting marine ecosystems (Douvere and Ehler, 2009). A QMS should also provide assurance that the resulting plan will achieve the environmental and socio-economic objectives established at the beginning of the process, while avoiding unnecessary re-iterations at each step of the process. It should support achievement of the goals stated in the plan by increasing acceptance and addressing stakeholder concerns. In turn this will provide transparency about decisions made in the planning process and ensure that the process itself follows agreed quality standards.

Further reading:

ISO 9000:2005(E). (ISO, 2005).

ISO 9001:2008(E). (ISO, 2008).

ISO 9001 (ISO, 2008) stipulates that an organization needs to direct and control quality in a systematic and transparent manner. In doing so, it has to address the needs of all parties involved and should integrate quality management practices in all aspects of the management process and products. The standard provides eight quality management principles to guide an organization towards improving performance.

The following considers each ISO principle within the context of MSP.

- ***ISO 9000 – Customer focus****: Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations.*

Within the context of regulating human uses of the sea while protecting marine ecosystems, the customers are not only the industry stakeholders that use the sea but also communities of interest that have a vested interest in protecting the marine ecosystem because they either depend on or value specific ecosystem components or services. Whoever leads the planning process also needs to respond to political, social, economic, technological, and legal constraints that are defined by the environment of the organizations or institutions involved in the planning process (Elliott, 2013).

Elliott *et al.* (2014) offers a stakeholder typology that groups the stakeholders in those who put materials into the sea and those who remove material and space ('inputters' and 'extractors'), those who control these uses ('regulators'), those affected by the uses

('affectees'), and those who benefit from the users ('beneficiaries'). A final group, the 'influencers', are those stakeholders from academia, politics, NGOs, etc. that provide direction to the management and offer societal views of the marine system. It is emphasized that some participants can fulfil more than one role in this system of stakeholders.

Using the Driver–Pressure–State–Impact–Response (DPSIR)/Driver–Pressure–State–Welfare–Response (DPSWR) (Cooper, 2013) framework of definitions, an industry stakeholder or sectoral use of the system is the **Driver** of human activities that generates the **Pressures** that may cause **State** changes to the integrity of the natural ecosystem. The industry stakeholder is also the one that will likely have to implement management measures (**Responses**) found in the marine spatial plan. In the event of changes in the **State** of the integrity of the ecosystem, **Impacts** may occur to human-based ecosystem components and services that are valued by the communities of interests for conservation, cultural, social, or economic reasons. Such impacts can subsequently have negative consequences to the **Welfare** of society (Cooper, 2013). Given the earlier confusion between the use of I for Impacts, Elliott (2014) further used the term I(W) to clarify the impact of the state changes on the human system.

- ***ISO 9000 – Leadership****: Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.*

The person or organization that has been delegated the responsibility to lead the MSP process is, therefore, responsible for establishing the purpose and direction of the planning process. Under the above stakeholder typology, these can be referred to as the 'influencers'. Delegation may be bestowed in legislation identifying a **Competent Authority** or accorded by all parties involved in the planning process under an agreement (i.e. the 'regulators'). Those having the responsibility to lead the planning process must also create and maintain an environment that engages all parties involved in the development of the marine spatial plan objectives as well as the planning process. Given the broad range of human uses of the sea that will be managed by the marine spatial plan, it is required to include other competent authorities in the planning process as they will be responsible for enforcing the implementation of the management measures developed during the planning process. These authorities will also be responsible for reporting on the implementation of management measures and on monitoring activities. Once implemented, the Competent Authority will be responsible for reporting the result of compliance verifications, performance audits, and environmental monitoring activities to all the participants involved in the planning process and, depending on the requirements, to the public (both the 'beneficiaries' and the 'affectees'). These activities should be conducted in coordination with the other competent authorities and their respective industry stakeholders.

- ***ISO 9000 – Involvement of people****: People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.*

The success of an MSP process depends on the ability of the Competent Authority to integrate ecosystem, cultural, social, economic, and legal considerations in the development of the plan. Competent Authorities may (or usually are) also be subject to the political direction and process. This requires the involvement and contributions from the jurisdictions that regulate the relevant drivers of human activities included in the planning process, the stakeholders of the drivers that will be regulated, the communities of interest that have vested interest in protecting the marine ecosystem,

and the scientific and technical experts that will provide advice in relation to issues raised by participants of the planning process. Activities to facilitate the integration include consultation, communication, feedback, and review procedures.

- ***ISO 9000 – Process approach**: A desired result is achieved more efficiently when activities and related resources are managed as a process.*

MSP is a socio-procedural process (Kannen, 2012) that has to manage activities and resources efficiently and in a timely manner to avoid delays and confusion that can undermine engagement. The planning process should be established at the onset of the initiative and agreed upon by all participants. It should identify expectations and engagement requirements along each step of the process within an established timeline. For example, activities include scientific and technical review and advisory processes, consultation and feedback procedures, as well as communication and work progress reporting.

- ***ISO 9000 – System approach to management**: Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.*

Each step or activity of the planning process has to identify its purpose, required inputs, and expected outputs. Also, each activity has to identify who will deliver or conduct the activity, who will provide the inputs, who will receive the outputs, and who will consider the outputs valid or adequate for the decisions at hand. Although the steps or activities of the planning process may be iterative and occur sequentially or in parallel, their outputs must inform the decision-making processes within the context of a system's approach to management, forming incremental building blocks to be used in the design of the marine spatial plan. Hence, all of the stakeholder types indicated above have a role to play and so, by definition, a spatial planning system will only be successful if all of these types are included.

- ***ISO 9000 – Continual improvement**: Continual improvement of the organization's overall performance should be a permanent objective of the organization.*

MSP has been characterized as an iterative process adhering to adaptive management principles (Ehler and Douvere, 2009). Activities of the planning processes are iterative where the feedback received in relation to technical advice received or decision made can cycle several times until consensus is achieved or a regulatory requirement is met. Record-keeping practices, followed by process evaluations of the activities and procedures used during the planning process provide the basis to improve the efficiency and effectiveness of future planning processes. Once implemented, the plan itself should be reviewed as new information or knowledge becomes available. Improvements to an implemented plan, however, must be based on environmental monitoring and performance audits of the management measures to ascertain the effectiveness and feasibility of the marine spatial plan at meeting objectives and thus, provide the basis for adaptive management approaches. These should be feedback loops which then ensure that the plan is adapted in the light of natural and societal changes, further knowledge and information, as well as the results of an audit trail, showing the success or otherwise of the measures implemented.

- ***ISO 9000 – Factual approach to decision making**: Effective decisions are based on the analysis of data and information.*

The success of any marine spatial planning process needs to integrate a broad range of multidisciplinary data and expert knowledge in the formulation of scientific and technical advice. Such advisory processes have to include data validation procedures

as well as documented methodologies and assumptions used to analyse the data and formulate the advice. Such advisory processes require peer review processes that provide a transparent forum to debate the current knowledge and uncertainties to reach scientific consensus, as well as minimizing potential biases introduced by personal preferences or opinions. This is also true of consultation and feedback processes that involve the other competent authorities, industry stakeholders, and communities of interest. Members of the governance and consultation forums have to present and discuss the views and opinions of the constituency they represent, avoiding personal preferences or opinions. Terms of reference as well as business rules ensure that discussions are kept within the scope and intent of the planning processes. Communication and reporting to the broader constituents of the groups represented ensures transparency and validation of the feedback and information provided during these processes. Any information and knowledge used in the planning process and in decision-making should be traceable to the primary literature or documentation used to generate the above or to reflect consensus.

- ***ISO 9000 – Mutually beneficial supplier relationships****: An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.*

All participants of the MSP process are interdependent in terms of the information and knowledge they contribute towards the development of the plan. The value of the marine spatial plan will be measured from the perspective of each participant in terms of ecosystem sustainability, cultural inclusiveness, social acceptability, economic viability, technological feasibility, as well as meeting regulatory and policy requirements. The process itself should also provide a transparent and respectful forum of discussions where participants understand and recognize the roles, responsibilities, and accountabilities of everyone involved. In addition, the process should provide credibility and performance in the delivery of timely results. Quality management considerations in marine planning and environmental management

In the "Quality Management System" suite of standards, ISO 9000 (ISO, 2005; ISO, 2008) provides guidance regarding the development and implementation of a quality management system (QMS). ISO 9001 (ISO, 2008) is a certification standard that requires QMS documentation and procedures from a quality assurance perspective. For those that would consider ISO 9001 certification, the ISO standards provide detailed requirements.

Although not systematically aligned with ISO 9000 QMS principles, several elements of quality management can be found in existing concepts of MSP, e.g. the step-by-step approaches in Ehler and Douvere (2009) or Schultz-Zehden *et al.* (2008), in existing MSP processes and pilot projects (ICES, 2012b), the ideas of the ecosystem approach (e.g. Rice *at al.*, 2005), ecosystem-based-management systems (Sardà *et al.*, 2011, 2014), and risk management (Cormier *et al.*, 2013). All of these can be used as guidance for the development of QMS for an MSP process. However, none of these documents has been written from a quality management perspective.

The UNESCO–IOC approach (Ehler and Douvere, 2009) sketches MSP as a stepwise process that normally draws upon extensive scientific, technical, and policy resources to produce a marine spatial plan. Although not presented explicitly, the entire step-by-step framework addresses the ISO principle of using a *"Process approach"* where each task provides insight as to the number of interrelated processes that can be considered in relation to the ISO principle *"System approach to management"*. Each step of the process can be linked to the eight quality management principles of ISO 9000 (Table 1).

Actually it should be noted that similar links can probably be made to all variations of such stepwise planning approaches and policy cycles.

Table 1. Quality management considerations of the UNESCO–IOC MSP process.

UNESCO–IOC Framework	ISO 9000 QMS Principles
Step 1 ▪ Identifying need and establishing authority Task 1: Identifying why you need marine spatial planning Task 2: Establishing appropriate authority for marine spatial planning	**Leadership**: Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.
Step 2 ▪ Obtaining financial support Task 1: Identifying alternative financing mechanisms Task 2: Defining the feasibility of alternative funding mechanisms	**Leadership**: Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.
Step 3 ▪ Organizing the process through pre-planning Task 1: Creating the marine spatial planning team Task 2: Developing a work plan Task 3: Defining boundaries and timeframe Task 4: Defining principles Task 5: Defining goals and objectives Task 6: Identifying risks and developing contingency plans	**Involvement of people**: People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit. **System approach to management**: Identifying, understanding, and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.
Step 4 ▪ Organizing stakeholder participation Task 1: Defining who should be involved in marine spatial planning Task 2: Defining when to involve stakeholders Task 3: Defining how to involve stakeholders	**Customer focus**: Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations. **Mutually beneficial supplier relationships**: An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

UNESCO–IOC Framework	ISO 9000 QMS Principles
Step 5 ▪ Defining and analysing existing conditions Task 1: Collecting and mapping information about ecological, environmental, and oceanographic conditions Task 2: Collecting and mapping information about human activities Task 3: Identifying current conflicts and compatibilities	**Process approach**: A desired result is achieved more efficiently when activities and related resources are managed as a process. **Factual approach to decision-making**: Effective decisions are based on the analysis of data and information.
Step 6 ▪ Defining and analysing future conditions Task 1: Projecting current trends in the spatial and temporal needs of existing human activities Task 2: Estimating spatial and temporal requirements for new demands of ocean space Task 3: Identifying possible alternative futures for the planning area Task 4: Selecting the preferred spatial sea use scenario	**Customer focus**: Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations. **Factual approach to decision-making**: Effective decisions are based on the analysis of data and information.
Step 7 ▪ Preparing and approving the spatial management plan Task 1: Identifying alternative spatial and temporal management measures, incentives, and institutional arrangements Task 2: Specifying criteria for selecting marine spatial management measures Task 3: Developing the zoning plan Task 4: Evaluating the spatial management plan Task 5: Approving the spatial management plan	**Customer focus**: Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations. **Mutually beneficial supplier relationships**: An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

UNESCO–IOC Framework	ISO 9000 QMS Principles
Step 8 ▪ Implementing and enforcing the spatial management plan Task 1: Implementing the spatial management plan Task 2: Ensuring compliance with the spatial management plan Task 3: Enforcing the spatial management plan	**Leadership**: Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives. **Customer focus**: Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations. **Mutually beneficial supplier relationships**: An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.
Step 9 ▪ Monitoring and evaluating performance Task 1: Developing the performance monitoring programme Task 2: Evaluating performance monitoring data Task 3: Reporting results of performance evaluation	**Continual improvement**: Continual improvement of the organization's overall performance should be a permanent objective of the organization.
Step 10 ▪ Adapting the marine spatial management process Task 1: Reconsidering and redesigning the marine spatial planning programme Task 2: Identifying applied research needs Task 3: Starting the next round of marine spatial planning	**Continual improvement**: Continual improvement of the organization's overall performance should be a permanent objective of the organization.

Further reading:

Ehler and Douvere (2009)

An **ecosystem approach to management** has been embedded in a variety of policy documents and approaches (Olsen *et al.*, 2009; Borja *et al.*, 2010; Espinosa-Romero *et al.*, 2011). It is also included in all recent approaches to MSP. However, the guidance provided by Rice *et al.* (2005) regarding the application of the ecosystem approach to management of human activities provides some insight as to the quality management elements required to implement an ecosystem approach within an MSP process. The guide

- establishes principles designed to guide the development of a shared vision based on stakeholder engagement and participation,
- highlights the need for unambiguous objectives,
- highlights the need for monitoring and enforcement as well as
- the need for peer-reviewed scientific research and advice.

It also refers to the guiding principle of defining SMART (Specific–Measurable–Achievable–Realistic–Time-bound) ecological and operational objectives and defines properties of indicators. In order to determine whether an ecosystem approach to management is being applied, the guide provides 11 questions. These questions can be

considered as quality assurance questions that – from an ecosystem management perspective - could be used to develop quality management objectives for the planning process as well as in a performance evaluation or even an audit of a planning process. The following are quoted directly from the text:

- *Have management regions with unambiguous boundaries been defined and have responsibilities for the management of all activities at all scales been identified?*
- *Has the current status of the ecosystem been described and contrasted with the Vision?*
- *Have the properties of the ecosystem and the associated threats been fully documented and likely additive or synergistic threats identified?*
- *Have ecological objectives and operational objectives with appropriate properties (SMART) been identified and agreed in all regions, based on an inclusive and consultative process?*
- *Have all incompatibilities of ecological objectives, operational objectives, and scales of management been identified and rectified?*
- *Have indicators, limits, and targets been established for each operational objective and are they inter-compatible?*
- *Have sufficient management tools to support the operational objectives been identified and put in place?*
- *Will all proposed management tools be effective in supporting the ecological objectives and operational objectives of management and are the management methods coordinated and compatible?*
- *Has a process for providing quality-controlled supporting science been established, and is there a clear route by which the science is fed into the decision-making process?*
- *Is the science advice supported by adequate monitoring and assessment and are the monitoring and assessment procedures also quality controlled?*
- *Has a process for management feedback and decision-making been established and will it ensure on-going compatibility of management methods?*

Further reading:

Rice *et al.* (2005)

Given the complexity of planning and management processes related to ecosystem approaches, effective governance structures, support from formalized managerial systems, and transparent decision-making procedures and protocols could be useful to facilitate learning from past practices, developing new skills, gaining fresh insights and leading the way in the development of future management strategies in marine planning. In this context, one of the deliverables of the FP7 project KnowSeas (Knowledge-based Sustainable Management for Europe's Seas) was the development of an **ecosystem-based management system (EBMS)**.

The EBMS proposes a systematic approach for the implementation of an ecosystem approach within a managerial framework divided into three pillars. The managerial pillar, the basis of the system, follows a formal environmental management system (EMS) with the incorporation of a risk management framework. The information pillar and the participatory pillar provide the necessary input required for the functioning and performance of the management system, adhering to different requirements introduced by the ecosystem-based approach. Combined, these three pillars can facilitate a wider use of sustainable development principles such as integration, adaptability, transparency, or participation inside a quality assurance mechanism (Figure 1).

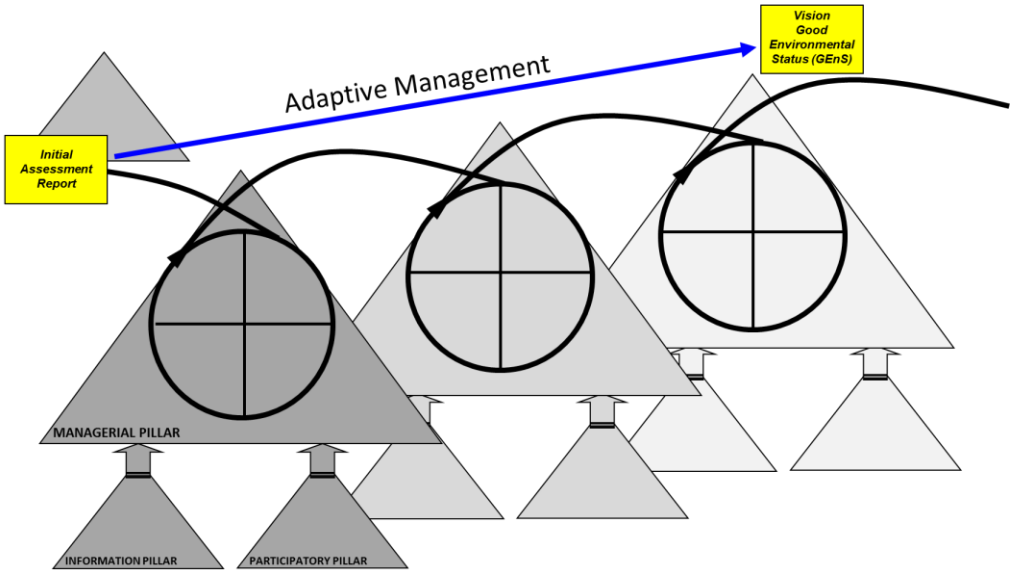


Figure 1. The ecosystem-based management system (EBMS) structure (Sardà *et al.*, 2014).

Although the system was initially designed within a European context to guide the application of the ecosystem-based approach into European coastal and marine policy, it is applicable to any coastal and marine management initiative. It presents different advantages such as scalability (i.e. it can be hierarchically introduced at different spatial scales), quality assurance (i.e. it can integrate quality assurance), a vision-driven process (for example good environmental status [GES; Directive 2010/477/EU] in the EU Marine Strategy Framework Directive [Directive 2008/56/EC; EU, 2008, 2010]), and/or standardization (i.e. using a common set of norms, procedures, tools, and language). The managerial pillar is proposed as the engine of the EBMS, retaining the format of an EMS based on the ISO 14001 environmental management standard (ISO, 2004). In this ISO 14001 structure the planning and implementation phases work with the ISO 31000 risk management standard (ISO, 2009b; Figure 2). The basis of the managerial pillar is thus laid with an initial assessment of the social–ecological system under management ("*status quo*"), proposing the desired vision of the management objectives. Following the cycle of the Plan–Do–Check–Act of ISO 14001, the iterative policy cycle of planning, implementation, checking, and reviewing is then undertaken. The planning area is established, which includes the use of management tools and continuous dialogue with interested stakeholders. Policy identification and prioritization of issues are conducted so as to inform decision-making processes, based on classical risk analysis processes. Likelihood and consequences of potential problems are associated with hazard events and/or activities that would hamper the achievement of the objectives. Based on decision-making protocols, the managerial pillar is implemented using input–output projects, quality assurance of their actions, and management plans; this includes objectives and targets as well as review cycles.

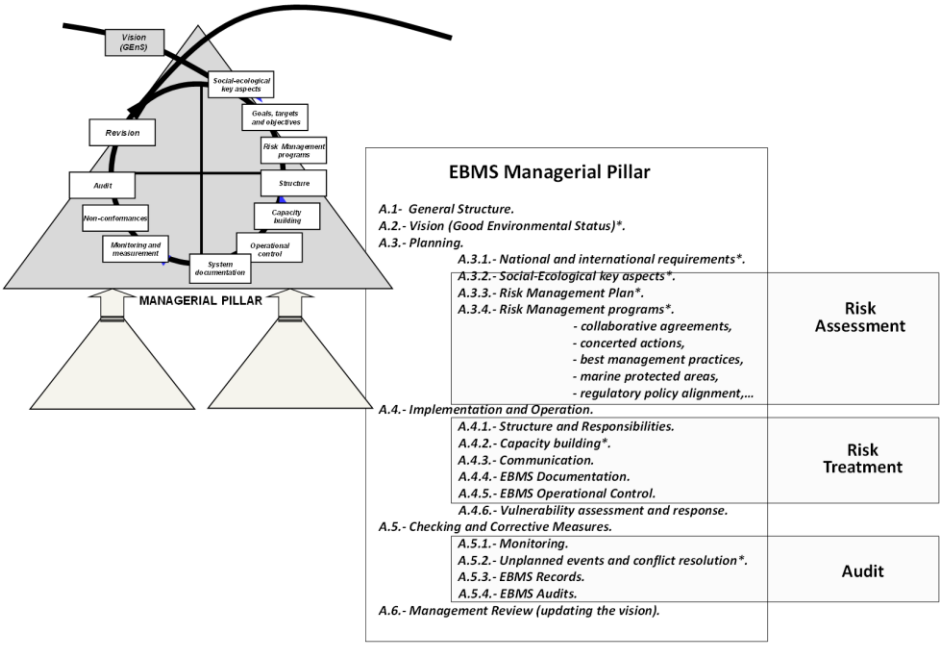


Figure 2. The managerial pillar structure with its associated clauses (Sardà *et al.*, 2010).

Further reading:

Sardà *et al.* (2010, 2014)

Recently, an **ecosystem-based risk management framework** was developed along the lines of the ISO 31000 risk management standard (Cormier *et al.*, 2013; Figure 3). This is a structured risk management framework for the practical implementation of the ecosystem approach to management. It sets the ecosystem management context that integrates the risk assessment function within the scope of the implementation of a risk management plan. In risk management, management strategies and measures are evaluated and selected within the concept that, in practice, risks can only be reduced to a level that is "as low as reasonably practicable" (ALARP). The framework also describes consultation and communication activities as well as reviewing and monitoring requirements as key supporting functions of the ecosystem risk management process.

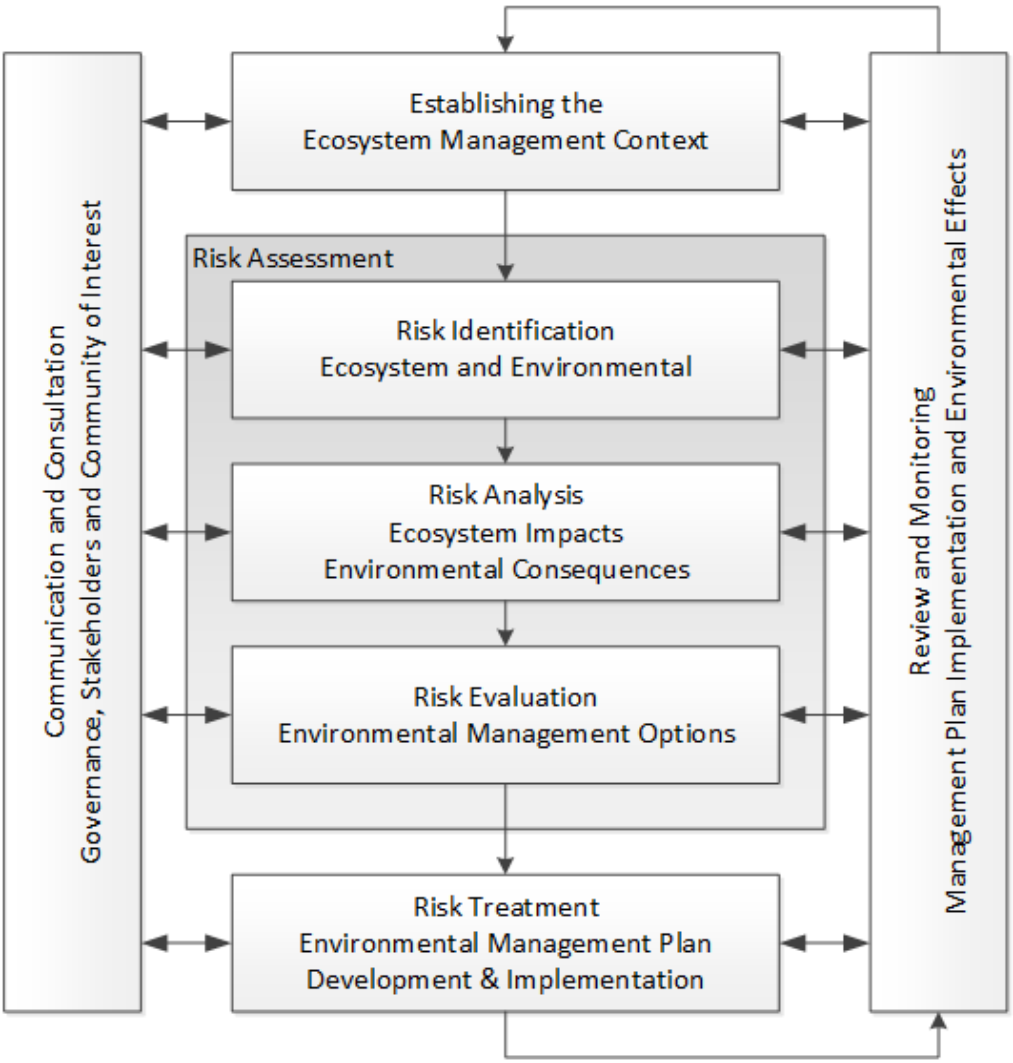


Figure 3. Ecosystem-based risk management framework adapted from ISO 31000 (Cormier *et al.*, 2013).

The elements of the ecosystem-based risk management framework are linked to the ISO 9000 quality management principles in Table 2.

Table 2. Quality management considerations related to the ecosystem-based risk management framework.

Ecosystem-Based Risk Management Framework	ISO 9000 QMS Principles
Establish the ecosystem management context	**Customer focus**: Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations. **Leadership**: Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives. **Involvement of people**: People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.
Risk assessment Risk identification Risk analysis Risk evaluation	**Process approach**: A desired result is achieved more efficiently when activities and related resources are managed as a process. **Factual approach to decision-making**: Effective decisions are based on the analysis of data and information.
Risk treatment	**System approach to management**: Identifying, understanding, and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.
Review and monitoring	**Continual improvement**: Continual improvement of the organization's overall performance should be a permanent objective of the organization.
Communication and consultation	**Mutually beneficial supplier relationships**: An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

Further reading:

Cormier *et al*. (2013)

Altogether, the different concepts and approaches are all relevant for MSP, and all include elements which can be used for the quality assurance of related processes. However, none of them discuss links and approaches towards a systematic quality management system (QMS). Their quality elements remain fragmented and unconnected rather than systematic, coherent, inclusive, and connected with each other. However, they provide a starting point for thinking about quality management in the MSP context and all of them provide details that can be used in developing a comprehensive quality management approach to MSP. This will be done in the following chapters of this report.

4 Quality management system for marine spatial planning and implementation

As discussed in the previous section, quality assurance elements are found in a variety of environmental planning and management contexts. These, however, are not organized into a cohesive system of quality policies, procedures, and objectives. From an applied or practical perspective, a quality management system (QMS) requires a structured process with steps or tasks that have defined inputs and outputs, quality objectives for the end product, and quality management objectives for the interrelated processes. In other words, the structured process and process outputs is the road map on how get there, the quality objective for the plan is what the planning process should achieve, while the quality management objectives for the process reflect how the planning process will achieve the quality objectives for the plan.

Several quality assurance elements are required in a QMS designed to ensure that the MSP process and the resulting marine spatial plan meet the expectations of everyone involved. However, the expectations of those involved as well as the objectives, outcomes, and outputs are determined by the planning process, guided by the quality policies, procedures, and objectives of the QMS, and are not as such part of the QMS. A quality management programme (QMP) lays out the sequences of activities that presents a transparent outline of how the MSP process expects to establish its scope and objectives, identify issues or conflicts, evaluate management options, develop and implement the plan, monitor and review the plan, in addition to establishing who is part of the governance structure, who makes decisions, who will be consulted and provide advice, and how information is managed. The quality objectives of the plan (QOP) is a comprehensive list of the quality assurance elements that should be addressed by the plan in terms of legislation, policies, governance, cultural, social, economic, and technological considerations in its management strategies. The quality management objectives (QMO) are principles upon which the conduct of governance, consultation, advisory, and decision-making will ensure that the process remains within the scope, objectives, and outcomes established at the onset of the planning initiative, that the steps and outputs of the planning process are relevant to achieving the plan, and that the plan addresses the quality assurance elements outlined by the QOPs.

The abbreviations used in this document are as follows:

- QMS: Quality Management System
- QOP: Quality Objectives of the marine spatial plan
- QMO: Quality management objective of the marine spatial planning process
- QMP: Quality management programme of prerequisite elements

This QMS uses the ISO 31000 risk management suite of standards (ISO, 2009b, 2009c) as the structured process for the QMP, defining the inputs and outputs within the context of MSP. It also uses the ISO 9000 (ISO, 2005) quality management system suite of standards to describe the prerequisite elements that support the QMP activities, e.g. governance business rules, administrative functions, and information management. It uses the *Ten tenets* described by Elliott (2013) as the QOPs and the quality management principles described by Hoyle (2001) as the QMOs.

4.1 Quality management programme (QMP) prerequisite

4.1.1 Mandate and commitment

Any organization leading an MSP initiative must have the mandate and commitment from the governance system or governmental political institutions to ensure that the planning process sustains the necessary engagement from the jurisdictions, industry stakeholders, and communities of interest involved in the planning processes and subsequent implementation of the plan. Availability of the human and financial resources required to support the planning and implementation process must also be secured. In MSP, someone is required to lead the planning process within a governance structure that provides oversight and feedback, supported by a secretariat managing the daily operations related to the planning process. The person leading the planning process (e.g. MSP Competent Authority) must be delegated the mandate by legislation or agreement. The MSP Competent Authority and the governance structure will also identify the responsible person who has the authority to ensure that the QMP procedures are established and implemented, and who will also report on the performance of the planning process in relation to QOPs and QMOs.

4.1.2 Communication and consultation

Governance and decision-making in MSP relies on extensive communication and consultation processes carried out throughout the entire planning process and also after implementation of the plan (Elliott, 2014). Such consultation shall include both statutory and non-statutory consultees. From a QMO perspective, these processes are undertaken to acquire an understanding of the inherent risks of the management area, including an understanding of the causes, the consequences, and the measures to manage them. External communication and consultation should take place throughout the planning process. This includes the use of appropriate language, e.g. not excluding some communities or societal groups by using an overly technical language. External participants such as other competent authorities, industry stakeholders, and communities of interest have to ensure that those accountable for implementing the marine spatial plan understand the sustainable development basis upon which decisions were made during the planning process and the reasons for particular management measures of the marine spatial plan being implemented. Internal participants such as planning staff, scientific personnel, and technical advisory bodies must also have the same understanding of the risks involved to ensure that advisory processes are timely and relevant to the questions at hand. Effective communication means knowing the audience, involving the scientific experts if the discussion is of a technical nature, and differentiating between scientific and technical information from value judgments. It should position the elements of information within the marine spatial planning context. Ineffective communication can be perceived as lack of transparency and can lead to a loss of credibility; communication should therefore be phrased appropriately, using appropriate fora and media.

Consultation processes help to:

- establish the context for the planning process;
- ensure that the interests of industry sectors and communities are understood and considered;
- ensure that the risks resulting from conflicts between the activities of the drivers operating in the management area and the environmental effects

resulting from the pressures introduced by the activities of the drivers are adequately identified;
- identify the areas of expertise needed for advice regarding the risks;
- ensure that the different views are considered when defining the risk criteria and evaluating the risks; and,
- ensure that the MSP process and marine spatial plan is endorsed and supported.

Communication and consultation processes are important as decisions made are based on judgements regarding the risks in terms of the participant's perceptions and understanding of the risks. Risk perceptions vary from one person to another because of differences in values, objectives, assumptions, and concerns in the conceptual understanding of the potential causes and consequences. In addition, communication processes are biased by power structures among the participating parties (Flyvbjerg, 1998). Therefore, balancing power and making sure everyone gets a voice is crucial in the processes. The stakeholder typology (Elliott, 2014) indicates the breadth of parties amongst which consultation takes place. In contrast with value judgement such communication and consultation processes facilitate an open exchange of factual information allowing, in particular, the recognition of differences in terms of value judgements and the identification of associated risks that might otherwise generate strong resistance from a particular group against the plan or its measures.

4.1.3 Information and records management requirements

Further reading:

ISO (2008), ISO/TR (2009), Kannen *et al.* (2013)

As part of a QMP, information and records are the *de facto* reference to clarify any confusion or questions that may arise during the planning process, or with the spatial plan design or objectives.

There are two aspects to consider in terms of documentation and record keeping. On the one hand, the QMS documentation itself is required and should include a statement of the quality policy, procedures, and objectives. The QMS policy establishes the scope of the quality policy such as record-keeping procedures, terms of reference, business rules, and decision-making and consultation procedures, thus documenting the requirements for the QMP, QOP, and QMO. On the other hand, it also has to maintain and implement record keeping and control procedures for documents generated during the MSP planning process such as meeting minutes, decisions, deliberation and advice documents as well as budgets, project plans, and evaluations. The maintenance and control of such documents have to be assumed by a secretariat function under the oversight of the governance structure. Therefore, QMS accompanies the complete plan-making process.

ISO 9001 (ISO, 2008) stipulates that a documented procedure shall be established to define the controls needed:

- *to approve documents for adequacy prior to issue,*
- *to review and update as necessary and re-approve documents,*
- *to ensure that changes and the current revision status of documents are identified,*
- *to ensure that relevant versions of applicable documents are available at points of use,*
- *to ensure that documents remain legible and readily identifiable,*
- *to ensure that documents of external origin determined by the organization to be necessary for the planning and operation of the quality management system are identified and their distribution controlled, and*
- *to prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose.*

During the planning process, advice is sought, feedback is received, decisions are made and actions are planned while legal requirements must be met, interests must be identified, concerns must be addressed, opinions must be respected, and privacy must be ensured. Records are kept to provide evidence of conforming to these requirements. Given the current technological aspect of information management, ISO/TR 15801 (ISO/TR, 2009) stipulates that records have to be kept in a format that will be readable now and in the future. In addition, international meta-data standards are also available to classify and document information holdings (e.g., Standard Generalized Mark-up Language (SGML) or XML, Dublin Core Metadata Initiative).

4.1.4 Evaluations and performance assessments

Evaluations of a planning process step or a complete evaluation of the actual marine spatial plan provides insight as to the performance of a given process step or the plan in confirming that outcomes and objectives are being achieved. A QMS, as proposed in this document, provides the basis to conduct an evaluation from several perspectives. An evaluation can be conducted in relation to the planning process and governance procedures to identify improvements from an operational or efficiency aspect. The QMOs can help define the objectives of the evaluation support by the record keeping and information management requirements of the QMP. As another example, the QOPs can also be used to define the objectives of an evaluation of the performance of the plan. Evaluation can assess the conformity of a given output against a requirement; can assess the performance of a process or a procedure, or can evaluate the performance of the plan in achieving management outcomes and objectives. Evaluation, conformity assessments, or the more formal audits are a systematic, and in some cases, independent and documented process for evaluating objectively the extent to which criteria, expected outcomes, or objectives have been met. It should be noted that the questions listed in the "Quality Management Checklist" can be used to structure an evaluation.

Further reading:

Ehler (2014), ISO (2002), ISO/IEC (2006)

The following are examples of evaluations, ranging from the standardized certification processes of ISO to the recently published guide on MSP evaluation by UNESCO.

4.2 Quality Management Objectives (QMO) of the Planning Process

MSP involves a complex set of decision-making interrelated processes that require extensive integration of scientific and technical information in consultation with competent authorities, industry stakeholders, and communities of interest. The planning process can span several years where lack of transparency, scope creep, endless iterations, or inefficiencies can undermine engagement or produce a plan that falls short of the objectives. In addition, the changing political, legal or administrative climate will either undermine the plan or require revision. The QMOs proposed here ensure that governance, consultation, advisory, and decision-making are relevant to the scope, objectives, and outcomes established at the onset of the planning initiative, that the steps and outputs of the planning process are relevant to achieving the plan and that the plan addresses the quality assurance elements outlined by the QOPs. QMOs basically provide the objectives for the planning process itself.

Hoyle (2011) provides a series of process management principles that can be used as quality management objectives for the MSP process steps.

QMO Process

Further reading:

Hoyle (2011)

The following adapts Hoyle's principles within a QMO context of an MSP process with references for further reading where available.

P1 – Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the purpose of outputs of the MSP process steps and the QOPs. When this principle is applied, the outputs of the MSP process step in terms of feedback and advice would have been guided and derived from the feedback, advice, and expectations of the competent authorities, industry stakeholders, and communities of interest.

Further reading:

IEC/ISO (2009), ISO (2009c)

In practical terms, the MSP process, objectives, and expected outcomes should be derived and guided by the governance structures of the competent authorities involved, the concerns of the communities of interest and the engagement of the industry stakeholders that will be implementing the management measures as a result of the planning process. However, the plethora of legislative bodies and overlapping legislation, both sectoral in design and implementation, act as an impediment to spatial planning while purporting to consider all aspects (Boyes and Elliott, 2014).

P2 – Clarity of purpose: Clear measurable objectives with defined outputs for each step of the MSP process establish a clear focus for all actions and decisions and enable the tracking of progress as expected by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, people involved in the MSP process understand what they are expected to provide as feedback and advice and understand what they are trying to achieve and how the plan performance will be measured and reported in addressing the QOPs.

Further reading:

Rice *et al.* (2005), UNEP (2011)

Outputs of a process step is different from the expected outcomes of the management measures that are derived from goals and objectives during the MSP process. Outcomes must also be measurable with management targets defining all actions and decisions while also providing the basis to measure achievement in relation to all having an interest in the marine spatial plan.

P3 – Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process will be those necessary to

deliver the outputs needed to achieve the objectives and no others as stipulated by the QMP.

Throughout the entire process, the governance structure providing oversight and direction must ensure that it can demonstrate clear connectivity between actions and decisions and the management outcomes established at the start of the planning process. Therefore, the planning process will develop the necessary management measures that will deliver the management outcomes that will address expectations. In some cases, this may depend on a suite of spatial, temporal and environmental quality management measures.

Further reading:

DFO (2007), EU (2010), OSPAR (2012)

P4 – Competence and capability: The quality of the MSP process outputs is directly proportional to the competence of the people, including their behaviour. When this principle is applied, people involved in scientific advisory peer review activities and consultation tables should have the competencies that reflect their role at the deliberation tables as well as contribute the view and opinions of the constituency they represent.

Although the quality depends on the relevance of data and knowledge brought together during scientific and technical advisory processes, this also implies that expertise is introduced and advice is sought on the basis of the topics and questions that are being raised during the MSP process.

Further reading:

Canada (2000), DFO (2013), ICES (2013a)

The governance structure also needs the necessary human and financial resources to manage and operate the secretariat and information management functions that will support the planning process as stipulated by the QOP and QMP prerequisites.

P5 – Certainty of results: Desired results are more certain when the output of each step of the MSP process has performance indicators and planned periodic reporting requirements. When this principle is applied, people involved in the MSP process and, in some cases, the public will have the knowledge and understanding of the progress and performance of the planning process as stipulated by the QMP and QOPs.

This would include the alignment of terms of reference, work or project plans that defines when a step is completed. From a transparency and communication perspective, it also includes minutes of feedback received and follow-up actions, reports on the status of work completed and announcements of decisions that explain or provide a rationale as to why and how a given step of the planning process was undertaken. Depending on the quality element, performance indicators may be qualitative or quantitative and hence the need for SMART indicators – so you know when the planning and management process has achieved something.

Further reading:

ICES (2012b), ISO/IEC (2006)

P6 – Conformity to best practice: The performance of the MSP process is greatly optimized and efficient when actions and decisions conform to established and recognized practices. When this principle is applied, MSP process activities are performed in the manner intended providing confidence that it is being performed in the most efficient and effective way as stipulated by the QMP.

This implies that actions and decisions are based on best practices that include harmonized or standardized guidelines, procedures, definitions, criteria applied to decision-making, administrative frameworks, roles, responsibilities and authorities. It also implies that work and activities are based on a set of guidance and benchmarks that ensures, to the best of everyone's abilities, that they are being conducted as efficiently and effectively as possible.

Further reading:

OSPAR (2013)

P7 – Clear line of sight: The MSP process outputs are more likely to satisfy everyone involved when periodic reviews are conducted to verify whether there is a clear line of sight between the QOPs and the requirements and expectations of the competent authorities, industry stakeholders, communities of interest. When this principle is applied, the scope or objectives of the MSP process may have to be periodically changed causing realignment of activities and resources; thus, ensuring continual improvement of the planning process in light of new developments and knowledge. The QMP procedures would inform and provide everyone with a clear understanding of any realignment of work, activities and resources as well as seek approval for any changes to the MSP scope or objectives.

An MSP process can take considerable amounts of time to complete, in some cases years. As the process progresses, the membership representing the competent authorities, industry stakeholders and community of interest may be replaced as representatives of their organizations, may leave the process or may need to be re-introduced to the process. In their oversight function, the governance structure needs periodic reviews to verify that the work and activities are producing deliverables that are in line with the goals and objectives that were established at the onset of the planning process. This avoids the "***scope creep***" problem of long term initiatives where issues are either added or changed over time losing sight the initial goals and objectives. This implies that work, activities and resources are always aligned to the initial goals and objectives that were established at the onset of the MSP initiative.

Further reading:

Ehler and Douvere (2009), Sardà *et al.* (2014)

4.3 Quality Objectives (QOP) of the Marine Spatial Plan

An MSP process should result in a plan that lead to organizing and regulating the human uses of the seas while protecting marine ecosystems and deliver the ecosystem services and societal benefits (Elliott, 2011). As an ecosystems approach to management, the development of the plan should be using the most current and relevant environmental and ecological knowledge, should have addressed socio-economic and regulatory requirements while being feasible and effective in the implementation. The quality of the plan cannot rely only on the quality of the ecosystem science that was used to generate a better understanding of the ecosystem and provide advice. The QOPs is a comprehensive list of the quality assurance elements that should be addressed by the plan in terms of legislation, policies, governance, cultural, social, economic and technological considerations in its management strategies. As stated earlier in this section, QOPs reflect what the MSP process should achieve.

Further reading:

Elliott (2013)

As a proposed set of QOPs, this QMS uses the *Ten tenets* of Elliott (2013) of environmental management are introduced as considerations for the successful and sustainable development of environmental management strategies for the MSP process.

The following discusses the *Ten tenets* within the context of QOPs and with references for further reading where available.

T1 Environmentally/ecologically sustainable*: That the measures will ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded.*

Further reading:

DFO (2004, 2006, 2007), Dunn *et al.* (2014), Spalding *et al.* (2007), UNESCO (2009), Wilkinson *et al.* (2009)

To address this QOP, criteria and scientific advisory processes are needed to obtain and validate data, information and the current knowledge to establish ecosystem boundaries, identify ecologically significant areas and conservation objectives as well as culturally, socially and economically significant ecosystem services and to adequately identify and analyse the risks. In addition, advisory processes are needed to understand the cause and effect pathways linking the pressures resulting from human activities occurring in the management area and pressures introduced within zone of influence (far afield or near field) of the ecosystem boundaries. Ecosystem overview reports are also important inputs as to the status or trends of environmental effects or degradation occurring within the ecosystem boundaries.

T2 Technologically feasible*: That the methods, techniques and equipment for ecosystem protection are available.*

Further reading:

Ontario MT (2006)

To address this QOP requires an inventory of best management practices, guidelines, standard operating procedures, management targets, regulatory action points or decision rules that are directly related to managing the pressures resulting from the activities of the drivers in the management area. It will require a knowledge of the techniques and technologies which are available to achieve the desired aims. In the planning process, it will require engineering and regulatory advisory processes to review and validate effectiveness based on compliance and performance audit reports as well as calibration and performance of specific instruments and analytical methods. Under prevailing conditions this may require BAT (the use of Best Available Technologies) or even, in the current financial climate, BATNEEC (Best Available

Technologies Not Entailing Excessive Costs). This information plays a critical role during the risk analysis to determine the inherent risks of existing management measures in contrast with residual risks of proposed new or enhanced management measures during the risk evaluation step of the planning process.

***T3 Economically viable**: That a cost-benefit assessment of the environmental management indicates viability and sustainability.*

To address this QOP, economic viability falls within two different aspects in marine spatial planning. In term of the cost risks, there is the economic viability of the costs to those that will implement the management measures stipulated in the resulting marine spatial plan and the potential losses to those that depend on ecosystem services for their economic livelihood such as a fishery or tourism enterprise. The first is an evaluation of the cost of implementation in relation to the effectiveness or performance of the management measure within an operational context. The second is the magnitude and likelihood of the economic consequences if the marine spatial plan is not effective at protecting valued ecosystem services. In the planning process, both of these types of costs will need to be offset against the short, medium and long-term benefits accruing both to the planners and to all the sectors not just those incurring the costs. It will require two different economic overview and assessment reports that will be integrating very different economic indicators. This information plays an important role in the risk identification and risk analysis steps identifying the consequences of losing or jeopardizing an economic ecosystem services and in risk evaluation and risk treatment to determine the feasibility of proposed management measures for the marine spatial plan. But balancing that loss or jeopardies against the economic benefits. However, while the costs may be in the short term, the economic benefits may be in the medium or even longer term.

Further reading:

EU (2002), Hanley and Clive (1993), OECD (2006), TBS (2007)

***T4 Socially desirable/tolerable**: That the environmental management measures are as required or at least are understood and tolerated by society as being required; that societal benefits are delivered.*

To address this QOP, the MSP process needs to integrate societal values into the management of the drivers operating in the management area as well as the level of protection accorded to the ecosystem. Social and cultural values are often the most important factors to consider in the planning process, particularly in terms of any trade-offs that may occur during discussions. It may be assumed that if society thinks there is a problem to be addressed then by definition it is a problem even if not proven scientifically and thus society's concerns need addressing. This requires an analysis of the community interests and values that are not necessarily associated to economic values. It requires an understanding and assessment of the public perceptions and concerns from both the perspective of development and ecosystem aspirations. An additional component – linking also to T3 – are regional development perspectives including factors such as employment (including quality of employment) and demographic change (in particular when young well educated people leave the region). Hence it is usually difficult to separate socio and economic concerns. Therefore, socio-economic advisory processes are required focussing on regional development as well as surveys, public consultation forums and studies that draw upon methods and approach of the social sciences and anthropology to identify socially and culturally significant ecosystem services. This information is important during the risk identification and the risk analysis steps of the process to determine

Further reading:

Atkins *et al.* (2011), Gee (2010, 2013), ICES (2013b), Kannen (2014), MEA (2005)

what would be the social and cultural consequences of losing or jeopardizing these ecosystem services.

***T5 Legally permissible**: That there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed.*

To address this QOP, a marine spatial plan has to abide to legislative frameworks and regulatory requirements from international down to supra-regional, national and local levels (Boyes and Elliott, 2014). In Europe, EU directives play a dominant role which often leads national legislation and in many countries there are the legal competencies of subnational regions. This is regardless of the development aspirations, public perceptions or ecological considerations identified during the planning process. Unless the marine planning initiative is conducted as a strategic policy or regulation making exercise similar to a strategic environmental assessment, the planning process cannot entertain legislative amendments or regulatory change if it is expected to deliver an implementable plan in a shorter timeframe than it takes to change legislation. However, during the planning process proposals to the political level to change or advocate change (at international levels) existing legal settings (for example to change IMO shipping route designations) may arise.

In the stakeholder typology described above (Elliott, 2014), the system 'inputters' and 'extractors' usually require legal certainty. For example, if a guideline is offered that suggests that they take a particular measure then they may look at the economic repercussions (e.g. shareholders returns) whereas if the law says an action must be taken they have to comply. For the planning process, this requires an inventory of existing legislation, regulations and policies that are related to the management of the drivers occurring in the management area as well as ecosystem protection and conservation requirements within the ecosystem boundaries (Boyes and Elliott, 2014). For example, these may include laws that bestow public access rights, prohibit activities in a given area or season, regulations that require minimum safety zone around activities, regulatory monitoring and reporting procedures and emergency management as well as marine protection and conservation regulations or marine environmental quality guidelines. This information is especially important during the risk analysis to determine the inherent risk of existing management measures and in risk evaluation to determine the residual risks of the management options being considered.

Further reading:

Akademie für Raumforschung und Landesplanung (Hrsg.) (2013), Boyes and Elliott (2014)

***T6 Administratively achievable**: That the statutory bodies such as governmental departments, environmental protection and conservation bodies are in place and functioning to enable successful and sustainable management.*

To address this QOP, MSP requires management oversight and administrative support for the planning process and subsequent implementation to ensure that the planning process meets the quality management objectives highlighted in the section above. Oversight includes the creation of governance structures under the leadership and accountability of a competent authority that will lead the planning initiative. As the result of a sectoral approach, i.e. with each activity being historically-treated separately, most countries have created a large number of administrative bodies even if there is an increasing demand to harmonize those bodies (Boyes and Elliott, 2014).

The authority to lead such a planning initiative should either have a statutory remit or under an agreement of all parties involved. It includes industry stakeholders and

communities of interest consultative and feedback advisory bodies and procedures including scientific and technical advisory bodies and processes. A mixture of formal and informal mechanisms could be appropriate and agreed upon but the roles of each mechanisms should be clarified from the beginning. Administrative support includes the creation of a secretariat that is responsible for the administration or human and financial resources as well as information management and record keeping. This secretariat also needs sufficient funding and stable staffing, which would create trust among all involved actors during the process and beyond.

To implement the marine spatial plan, additional oversight is needed to monitor compliance, effectiveness and performance of the plan. Administrative capacities are also required by the competent authorities and industry stakeholders that will implement the management measures within their policy framework, programs and operations. These play an important support and management role for the planning process and should be found in the QMP.

Further reading:

Boyes and Elliott (2015), Elliott (2014), Kannen *et al.* (2013)

***T7 Politically expedient**: That the management approaches and philosophies are consistent with the prevailing political climate and have the support of political leaders.*

To address this QOP, an MSP process needs to take into account the public policy agenda of the current government or administration; in the stakeholder typology, the 'influencers' include the political expedient that may be responding to or leading societal demands. Public policy agenda may set development priorities and timeframes for a given industry sector or may set environmental aspirations or ecosystem conservation priorities and timeframes. The planning process has to take these into account if it is to have the support of the political system and leaders. This needs to include all sectors and policies relevant to the planning area including those that only have an indirect effect. These may be found in executive orders, cabinet or commission directives, state of the nation address, speeches from the government, and parliamentary documents. This plays an important role given that the planning process has to mobilize public and private human and financial resources found in government institutions including the public and industry. This also includes transnational cooperation, in particular around Europe's Regional Sea areas. Interests of adjacent countries have to be recognised and accommodated in order to avoid problems at the political level.

Further reading (examples only):

Canada Privy Council (2010), UK (2011), US President (2010)

***T8 Ethically defensible**: That the environmental management measures that allow development at the risk of losing ecosystem services upon which people depend on are ethically defensible.*

To address this QOP, the MSP governance, consultation and decision-making processes will have to abide by existing codes of conduct in terms of equity and ethics. For example, the planning process may be guided by charters of rights, treaties, codes of conduct, codes of ethic that are subsequently enshrined in terms of references and policies and agreements. This plays an important role throughout the planning process to ensure that all views, opinions and contributions are respected and considered equivocally and decisions do not cause undue duress to someone of parts of the society. Transparency has to be provided concerning values and attitudes not formally considered in the plan and how to cope with those if conflicts arise. In addition, the moral and ethical considerations include the financial response measures, such as a willingness to impose fiscal measures on future generations.

Further reading:

ISO (2010)

***T9 Culturally inclusive**: That the environmental management measures also integrate cultural ecosystem consideration that may not have societal or economic value.*

To address the QOP, the MSP process has to integrate traditional and local cultural values attached to areas or activities. There is a wide range of cultural values that may include indigenous traditional values and the interests of local communities, such as seabed rights. While some of these may be enshrined in law, others may merely be traditional rights which may de facto be agreed historically; for example bathing waters may not necessarily be legally sanctioned but rights to their use may be allowed because bathing has always been practised in an area (e.g. EC Bathing Water Directive for beaches where bathing has been traditionally practised and need protection).

This requires criteria and a scientific advisory process that validates data, information and knowledge to establish culturally significant areas and ecosystem services along the lines of uniqueness, cultural reliance, and important feature to the resilience of the social-ecological systems, degree of tradition and level of dramatic cultural change. It also includes physical characteristics such location, spatial extent, temporal scales and the quality of the environment required for the cultural features or practices, and the societal characteristics such as importance attached to space or historical use. This plays an important role when establishing the external context and in the risk identification and risk analysis during the planning process.

Further reading:

Gee (2013), Gee *et al.* (2011), ICES (2013b)

***T10 Effectively communicable**: That the environmental management objectives are communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets.*

To address this QOP, the data, knowledge and expert opinions gathered during scientific and technical advisory processes in the formulation of policy advice have to be communicated to and understandable by all involved in the planning process. Communication is the key to ensure that consultation and feedback process are adequate and productive. The communication of risks should take into account the audience receiving the information and so should be in an appropriate format, medium and style. Scientific and technical advice should include the experts to demonstrate that the information is from credible sources and the limitations of that information, data and advice should be given. The same applies to advice and feedback received from competent authorities, industry stakeholders and communities of interest where representatives are expected to express the view of their organization or members to demonstrate that the information is based on credible sources. Risk should be presented within the perspective and context of the planning initiative and uncertainty. The communication process should ensure transparency and differentiate between science and value judgement. This plays a critical role throughout the entire planning and decision-making processes. These are the prerequisites that should be found in the QMP.

Further reading:

ISO (2009a), USFDA (2011)

4.4 Quality Management System (QMS) for Marine Spatial Planning

As emphasized throughout this analysis, the success of a marine spatial plan depends on the effectiveness of the management framework and measures developed during the marine spatial planning process. As mentioned in Section 4, this QMS uses the ISO 31000 risk management suite of standards (ISO, 2009b; IEC/ISO, 2009; ISO, 2009c) as the structured process for the QMP defining the steps, the inputs and outputs with the context of MSP.

The structure of the ISO 31000 process starts with the *establishment of the external and internal contexts* to ensure that the subsequent risk assessment and risk treatment activities are based on clear MSP management goals and objectives and that the MSP process has the necessary authorities, oversight and administrative capacities to conduct the process successfully. The *risk assessment* process of the standard is further subdivided into *risk identification, risk analysis, and risk evaluation*. The *risk assessment* starts with the *risk identification* related to the operations of the human activities in the management area and the ecosystem vulnerabilities that exist within the boundaries of the ecosystem. This includes pathways of their causes and their effects. To obtain quantitative information to inform decisions-making as to the risks needing management, Risks are then analysed (*risk analysis*) to characterize the likelihood and the consequences resulting from potential human conflicts or safety concerns between the operations of the human activities in the management area and from the ecosystem and ecosystem services impacts in relation to the pressures resulting from the human activities within the boundaries of the ecosystem. The *risk assessment* is concluded after the risks are evaluated (*risk evaluation*) to ascertain the severities of the both the operational and ecosystem risks to determine if the status quo is acceptable or if there is a need for additional or enhanced management measures. Based on the findings of the *risk assessment*, *risk treatment* is the step where *risk management* strategies are selected and developed with expected outcomes to address the QOPs. Based on the QMOs and QMP of the MSP process, *risk communication and consultation* activities, and scientific advisory processes should consistently reflect the management context. *Risk monitoring and review* simply completes the whole management strategy enabling continuous improvement and adhering to the principles of adaptive management.

The following sections describe the inputs and outputs for each of the ISO 31000 risk management process steps. To facilitate interpretation of the QMS framework and processes, pictograms are used in the QMS diagrams linking functions to QMOs (Figure 4). In the following sections, QMP checklists are also provided in the form of questions for insight and consideration by the reader.

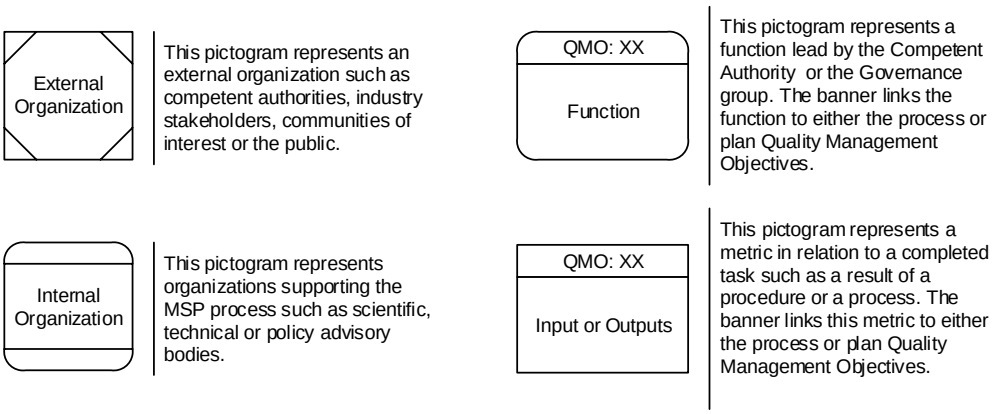


Figure 4. Definitions of the pictograms used in this report.

4.4.1 Establishing the MSP risk management context

ISO 31000 stipulates that the *risk description* is a structured statement of risk usually containing four elements being the *sources of risk*, the *causes* of and undesired event, the undesired *events* and the *consequences* resulting from an the occurrence of an undesired *event*.

In MSP, there are undesired events stemming from the activities of the drivers operating in the management area resulting from conflicts between the activities that have the potential to cause accidents, displacement of existing activities by new ones, encroachment of an activity onto the space used by another driver or simply loss of access to an area. The consequences may be in terms of health and safety concerns, of economic growth performance concerns or loss of development investment and liabilities. There are also undesired events stemming the collective pressures exerted by the activities of the drivers operating in the management area in terms of causing changes in the state of the ecosystem that may result in consequences in term of biodiversity integrity, ecological degradation or sustainability of valued ecosystem services. It is within this risk management context that the QMS in this document has been designed.

From a quality management perspective, the risk management context defines the risk elements to be considered during the planning process. Although there is an extensive list of definitions available in the references below, this QMS has made the following adaptation as a means of establishing the risk management context of a marine spatial planning process.

As a means of organizing and visualizing all of the elements of risk, Bowtie analysis can be used the risks and the pathways of risks linking the risk sources to the causes to the potential undesired event and consequences. The Bowtie analysis is listed as a risk assessment technique of the IEC/ISO 31010 standard (IEC/ISO, 2009) which is part of the suite of standards of the ISO 31000 risk management standard (ISO, 2009b and 2009c). With the development of the ISO 31000 risk management standard, the Bowtie analysis was included as one of more than 25 risk assessment techniques listed in the IEC/ISO 31010 risk assessment standard. It is primarily used to map and evaluate the system of management controls. In MSP, it would be used to evaluate the various spatial and temporal management measures that could be implemented to prevent the undesired events or to mitigate their consequences.

Further reading:

IEC/ISO (2009), ISO (2009b,c)

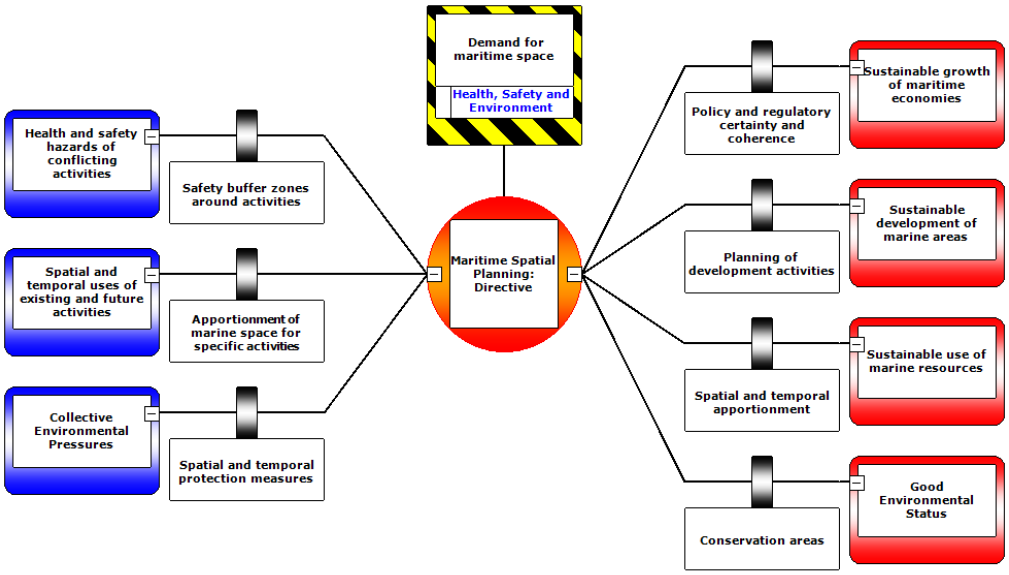


Figure 5: Bowtie diagrammatic representation of the risk, risk sources, causes, event and consequences (Diagram generated by BowTieXP: http://www.cgerisk.com/software/risk-assessment/bowtiexp).

Risk:

- Effect of uncertainty on the quality management objectives of the marine spatial plan based on the Ten tenets of environmental management (Elliott, 2013).

Risk source:

- Activities resulting from the drivers operating inside the marine management area or from outside the area but with consequences inside the area.

Events:

- **Operational events between drivers**: In the management of the conflicts between the activities of the drivers operating within the management area, an event is described in terms of not achieving an MSP management outcome. They can be expressed in terms of an accident, encroachment or displacement events occurring as a result of hazards, conflicts, incompatibilities or security aspects of the activities of the drivers operating in the management area and that can affect features and assets valued by society (Elliott *et al.*, 2014).
- **Environmental events related to driver activity**: In the management of the activities of the drivers that introduces pressures within the marine ecosystem, an event is described in terms of having the potential of not achieving an ecosystem management outcome as they relate to ecosystem components or ecosystem services. It should be noted that not all activities create ecosystem pressures and that activities may not create pressures if the management controls and mitigation are successfully employed. They can be expressed in terms of environmental effects or a negative change to the state of the ecosystem integrity as a result of the pressures introduced by the activities of the drivers occurring in the management area.

Causes:

- Conflicting, incompatible or hazardous activities introduced by the drivers occurring in the management area.

- Pressures introduced in the marine ecosystem as a result of the activities of the drivers occurring in the management area.
- Pressures emanating from outside the management area but whose consequences need addressing.

Consequences:

- Economic consequences due to business disruptions, liabilities or regulatory compliance enforcement.
- Cultural, social or economic consequences due to the loss of a valued ecosystem service.
- Ecosystem level impacts due to the degradation of ecological or biological features and processes.
- Management measures as consequent responses which have to be proposed to deal with the consequences.

Risk profile:

- As a result of the risk identification, a risk profile provides an overview of the risks in terms of the four risk elements being sources, events, causes and consequences. The risk profile is the output of the risk identification and is subsequently used to scope and define the questions for the risk analysis.

Risk matrix:

- As a result of the risk analysis, the risk matrix is an overview of the likelihood of an event and the related magnitude and ranges of the consequences. The risk matrix is the output of the risk analysis. Combined with the risk criteria for severity, the risk matrix is subsequently used to acquire and understanding of the risks and evaluate options for management to address or reduce the risks that cannot be tolerated by the competent authorities, industry stakeholders and communities of interest.

Risk register:

- As a result of the risk evaluation, the risk register outlines the risks that were retained during the risk evaluation combined with the spatial and temporal management measures that will forms the basis for developing the marine spatial plan.

4.4.2 Establishing the MSP external context

ISO 31000 stipulates that the *external context* has to consider factors that can have an influence on the organizations abilities to achieve its objectives. ISO notes that the *external context* includes "*cultural, social, political, legal, regulatory, financial technological, economic, natural and competitive environments*" as well as "*key drivers and trends having impact on the objectives of the organization*" and "*relationship with perceptions and values of external stakeholders*".

In MSP, the *external context* starts with the public policy agendas that scopes or frames present and future economic development aspirations and ecosystem protection and conservation goals. Based on the public policy agenda, it establishes the competent authorities that have relevant legislative and policies needed for the planning process, industry stakeholders that will be implicated in the design of the spatial and temporal management measures of the plan as well as the communities that have vested interest in the protection and conservation of the environment or valued ecosystem services. The current public policy context ensures that the scope and objectives of the planning initiative is in line with public development and environmental aspirations and goals. The *external context* ensures that the governance structures and functions, the scientific and technical advisory process and stakeholder representation and consultation mechanisms will be adequately organized and represented.

Figure 6 provides an overview of what are the quality assurance elements involved with establishing the external context. The initiation of an MSP process stems from the public policy direction and inputs coming from competent authorities, industry stakeholders, communities of interest and the public in the formulation of a marine development agenda and an ecosystem protection agenda.

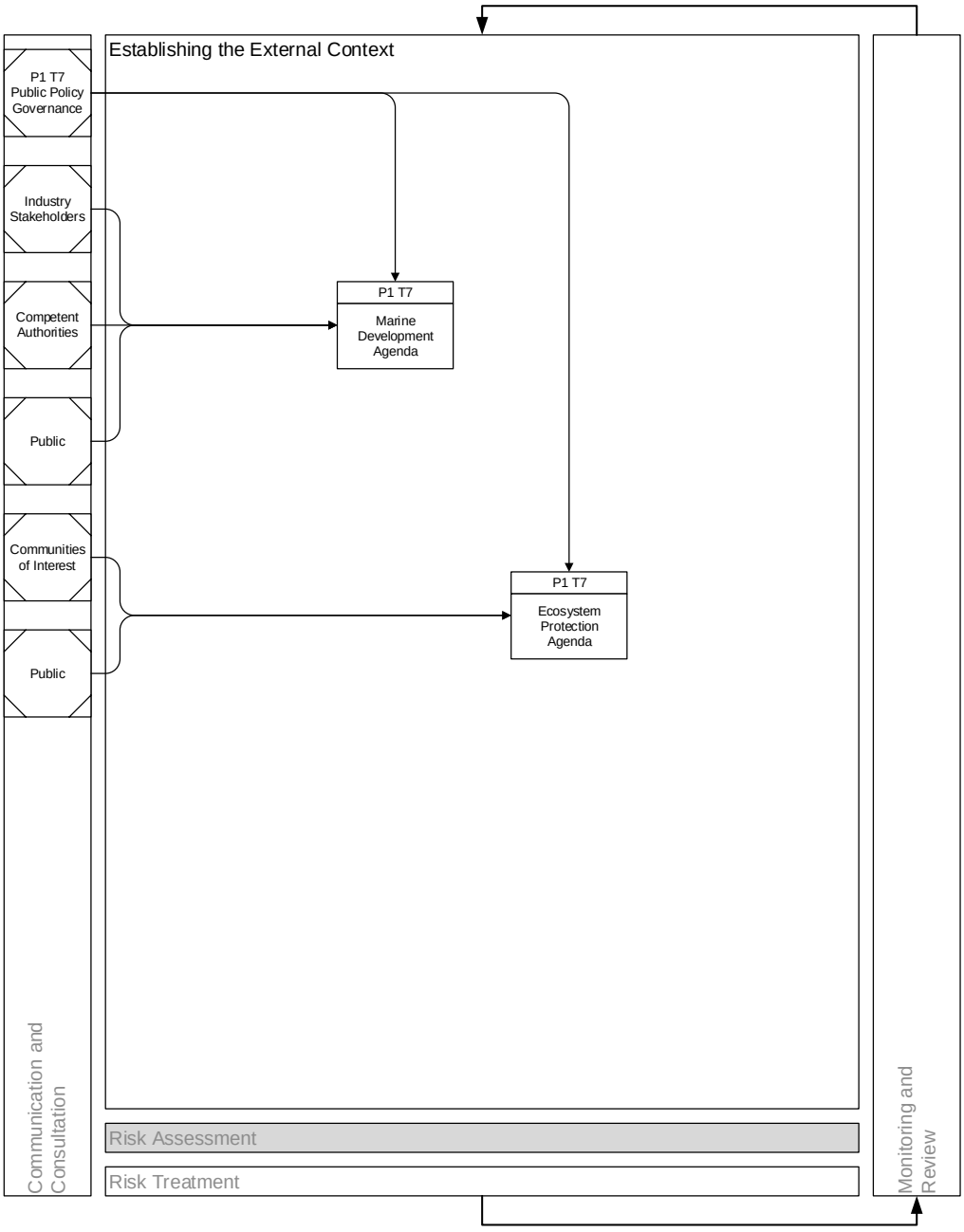


Figure 6. Establishing the external context.

4.4.2.1 Public Policy Governance (Figure 6)

Quality Management Objectives of the Marine Spatial Planning Process (QMO)

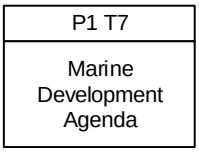
P1 Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the public policy and the external context of the planning area. When this principle is applied, the development and environmental

protection goals would have been guided and derived from the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest.

Quality Objectives of the Marine Spatial Plan (QOP)

T7 Politically expedient: Given that the management approaches and philosophies need to be consistent with the prevailing political climate and have the support of political leaders, the public policy agenda outlines sets the political context for the planning process.

4.4.2.2 Marine Development Public Policy Agenda (Figure 6)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the purpose of the MSP process and the existing marine development agenda in terms of existing and new industry sector activities and aspirations. When this principle is applied, the marine development agenda should guide the expectations of the competent authorities and industry stakeholders of the sectors that operate or plan to operate in the management area.

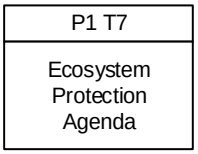
Quality Objectives of the Marine Spatial Plan (QOP)

T7 Politically expedient: Given that the management approaches and philosophies need to be consistent with the prevailing political climate and have the support of political leaders, the marine development agenda sets the goals and expectations for the planning process and may also set expected timeframes or deadlines for completing the MSP process and implementing the marine spatial plan. High level approval and progress reporting may be required by the political governance structure.

Quality management checklist

- *What is the marine development public policy agenda that would trigger or support the need to initiate a planning process?*
- *What are the strategic goals, socio-economic targets and completion timeframes for the proposed planning process?*
- *What are the goals, objectives and timeframes of the industry stakeholders and communities of interest in relation to the planning area?*

4.4.2.3 Ecosystem Protection Public Policy Agenda (Figure 6)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the purpose of the MSP process and the existing ecosystem protection agenda in terms of protection and conservation objectives and as sustainability goals of ecosystem services from an ecosystem approach. When this principle is applied, the ecosystem protection agenda should guide the expectations of the competent authorities and communities of interests that have concerns regarding human activities occurring within the boundaries of the ecosystem.

Quality Objectives of the Marine Spatial Plan (QOP)

T7 Politically expedient: Given that the management approaches and philosophies need to be consistent with the prevailing political climate and have the support of political leaders, the ecosystem protection agenda sets protection and conservation goals for the planning process and may also set expected timeframes or deadlines for completing the MSP process and implementing the protection and conservation measures.

Quality management checklist

- *What is the public policy agenda that sets ecosystem sustainability goals and timeframes for the implementation of protection and conservation measures?*
- *What are the ecosystem management outcome indicators and targets to be achieved?*
- *What are the boundaries of the ecosystem?*

4.4.3 Establishing the MSP internal context

ISO 31000 stipulates that the *internal context* has to consider the factors that may influence its abilities to achieve its objectives. ISO notes that the *internal context* includes governance, organizational structure, roles and accountabilities as well as capabilities in terms of human and financial resources and knowledge. It also involves the need to establish information management and decision-making processes requirements and identify the stakeholders that will need to be consulted.

In MSP, it establishes the roles and accountabilities of the competent authority that will be leading the planning initiative. It also establishes the administrative and operational support function for the MSP process and governance structure. The QMP is established to guide information and record keeping requirements as well as terms of references, business rules, communication and consultation procedures, auditing including scientific and technical advisory and processes to ensure that QMO's and QOPs are consistently addressed. The internal context outlines the oversight functions of the governance body to ensure that the planning and implementation processes are adequately governed and communicated, that human and financial resources are managed efficiently and that scientific and technical advice are relevant to the questions at hand.

Figure 7 provides an overview of the quality assurance elements involved with establishing the internal context. Derived from the marine development agenda and the ecosystem protection agenda (Figure 6), legislation and policies provide the necessary authorities to create a governance body which includes the MSP competent authority who will lead the planning process supported by the ecosystem competent authority, consultations with other external competent authorities and industry stakeholders and communities of interest as well as scientific and technical advisory bodies and an MSP secretariat. Based on the inputs from external members, the governance body ratifies terms of references, business rules, consultation and feedback processes, scientific and technical advisory processes as well as the MSP secretariat functions. In consultation with external members, the governance body establishes the risk criteria, the development and environmental objectives as well as the ecosystem and MSP management outcomes to guide planning process.

Please note that grey shaded pictograms originate from a previous diagram and are explained in a previous section. They are not discussed again in this section.

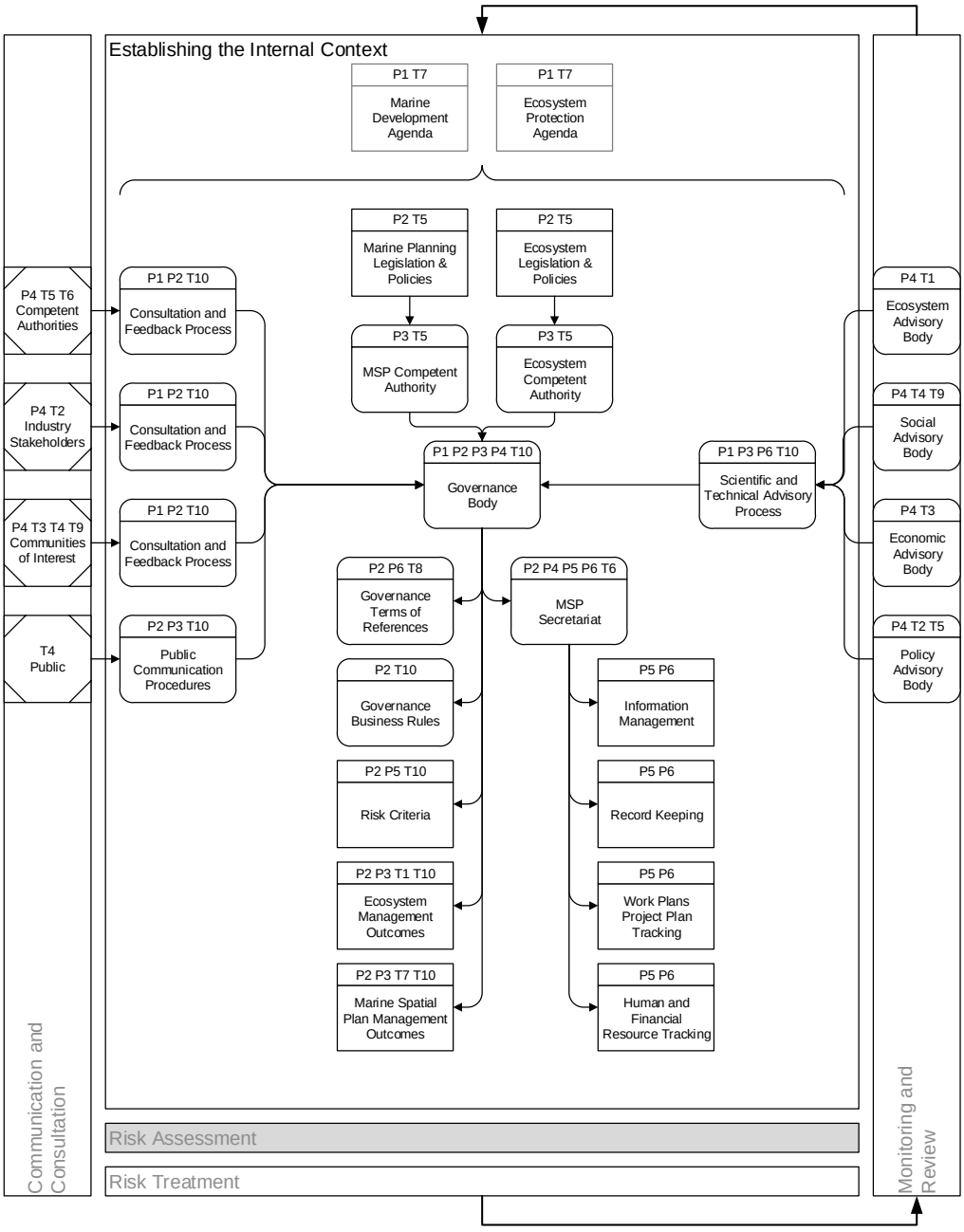
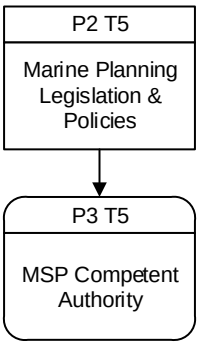


Figure 7. Establishing the internal context.

4.4.3.1 Marine Planning Legislation, Policies and Authorities (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Legislation and policies define the outputs for each step of the MSP process establish a clear focus for all actions and decisions and enable the tracking of progress as expected by the MSP competent authority. When this principle is applied, other competent authorities, industry stakeholders and communities of interest understand the scope of the MSP legislation and policies and how these address the marine development agenda.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the marine development agenda and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process will be those necessary to deliver the outputs needed to achieve the MSP legislative and policy requirements and no others as stipulated by QMP.

The MSP competent authority is accountable to ensure that the process and decisions are in line with to the marine development agenda within the scope of the authorities established in legislation. The MSP competent authority has to abide to decision-making approval processes that may be required by legislation or an agreement. Legislation and policies provide the legal framework and objectives that define the expected outcomes for the planning initiative. The legislation and policies also set the management boundaries of the jurisdictions and implied authorities involved in the planning initiative.

Quality Objectives of the Marine Spatial Plan (QOP)

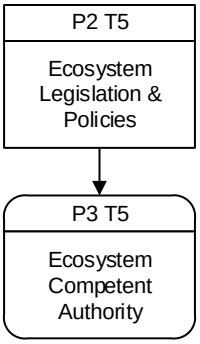
T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed, the legislation and policies sets the scope of the authorities for the planning process as well as the jurisdictional boundaries of the management area. The legislation may also identify the MSP competent authority that is accountable for leading the planning and the competent authorities that will implement and enforce the management measures including the legislative provisions for environmental protection and privacy rights. The MSP competent authority or the person leading the initiative must have a delegation instrument bestowed either by legislation or an agreement and may have to abide to decision-making and approval processes that may be required by legislation or an agreement. The MSP competent authority must ensure that the resulting marine spatial plan meets the legal requirements of the MSP legislation as well as other legislative provisions such as environmental protection and privacy rights.

Quality management checklist

- *What is the marine spatial planning legislative and policy framework that sets the scope of the planning initiative?*
- *What are the agreements and/or statutes needed to develop and implement a marine spatial plan?*
- *What are the local or regional statutes or international agreements that have to be respected within boundaries of the management area being planned?*

- *Who is the MSP Competent Authority that is delegated under the MSP legislation or under agreement from the governance structure?*
- *What is the span of responsibility and accountability of the MSP Competent Authority?*

4.4.3.2 Ecosystem Legislation, Policies and Authorities (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Legislation and policies define the outputs for each step of the MSP process establish a clear focus for all actions and decisions and enable the tracking of progress as expected by the ecosystem competent authority. When this principle is applied, other competent authorities, industry stakeholders and communities of interest understand the scope of the ecosystem legislation and policies and how these address the ecosystem protection agenda.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the ecosystem protection agenda and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process will be those necessary to deliver the outputs needed to achieve the ecosystem legislative and policy objectives and no others as supported by the information requirements of the QMP.

The ecosystem competent authority is accountable to ensure that the process and decisions are in line with to the ecosystem protection agenda as well as the legislative requirements.

Quality Objectives of the Marine Spatial Plan (QOP)

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed, the ecosystem legislation and policies sets the scope of the authorities to establish ecosystem boundaries as well as ecosystem and conservation objectives and priorities. In cases where the MSP competent authority does not have an ecosystem mandate, the legislation may also identify the ecosystem competent authority that is accountable for establishing such priorities. The ecosystem competent authority must ensure that the resulting marine spatial plan meets the ecosystem legislation and policy requirements. The ecosystem competent authority must have a delegation instrument bestowed either by legislation or an agreement and may have to abide to decision-making and approval processes that may be required by legislation or an agreement.

Quality Management Checklist

- *What is the ecosystem legislative and policy framework that sets the ecological context or constraints for the planning initiative?*
- *What are the prohibitions, protection or conservation regulation that have to be met by planning process within the management area?*
- *What are the local or regional statutes or international agreements that have to be respected within the boundaries of the ecosystem?*
- *Who is the Ecosystem Competent Authority that is delegated under the ecosystem legislative or under agreement from the governance structure?*
- *What is the span of responsibility and accountability of the Ecosystem Competent Authority?*

4.4.3.3 Competent Authorities (Figure 7)

Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P4 Competence and capability: The quality of the MSP process outputs is directly proportional to the relevant authorities of the competent authorities related to the spatial and temporal legislative requirements for the management area. When this principle is applied, the other competent authorities involved in governance structure should have the competencies that reflect their role and legislative accountabilities. They have to ensure that the planning process adequately integrates their legislation and policies within the capabilities and mandate of their organizations. They may also have parallel approval and consultation processes that they have to adhere to in relation to decisions being made during the planning process.

Quality Objectives of the Marine Spatial Plan (QOP)

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed, the legislation and policies of the other competent authorities sets the scope of the authorities in managing specific industry sectors or social and economic development. The marine spatial plan has to meet the regulatory requirements of the other competent authorities to ensure that the management measures in the plan are enforceable. This also requires vertical integration through the international to local legislations and agreements.

T6 Administratively achievable: Given that the statutory bodies such as governmental departments, environmental protection and conservation bodies need to be in place and functioning to enable successful and sustainable management, the other competent authorities should have functioning organizations including resources and programs to enable and enforce their accountabilities stipulated by the marine spatial plan. They may also have parallel approval and consultation processes that they have to adhere to in relation to decisions being made during the planning process. The implementation of the marine spatial plan may require formal agreements reflecting

their accountabilities that is required to ensure horizontal integration across the administrative bodies.

Quality management checklist

- *What are the other competent authorities that have legislative mandates related to the activities of the drivers operating in the management area and that will be managed by the marine spatial plan?*
- *Are there any relevant industry agreements/statutes involving external or international organizations that should be included in the planning process?*

4.4.3.4 Industry Stakeholders (Figure 7)

Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P4 Competence and capability: The quality of the MSP process outputs is directly proportional to the competence of the industry stakeholders related to the spatial and temporal needs of their operations. When this principle is applied, the industry stakeholders should have the competencies that reflect their role in the consultation processes representing the views of their industry sector. They have to ensure that the MSP process adequately integrates their industry standards and operating procedures and that the management measures of the marine spatial plan can be integrated efficiently in their operations.

Quality Objectives of the Marine Spatial Plan (QOP)

T2 Technically feasible: Given that the methods, techniques and equipment for ecosystem protection are available, the industry will have to ensure that they have the methods, techniques and equipment to integrate the management measures being developed during the MSP process. Industry stakeholders may have engineering expertise, techniques and technologies and may also provide insight and advice as to the feasibility of the proposed technical solutions as management options are being considered.

Quality management checklist

- *Who are the industry associations or organizations that represent the drivers that are operating in the management area and that will be management by the marine spatial plan?*
- *Under what legislation and policy framework are the implicated industry sectors managed?*
- *How is the industry sector delegate appointed to ensure that they represent the views and concerns of their sector?*

4.4.3.5 Communities of Interest (Figure 7)

Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P4 Competence and capability: The quality of the MSP process outputs is directly proportional to the competence of the communities of interest related to the spatial and temporal needs for the protection and conservation of the environment within the boundaries of the ecosystem. When this principle is applied, the communities of interest should have the competencies that reflect their role in the consultation processes representing the views of their constituency. The communities of interest either depend on or have a vested interest in the integrity of the ecosystem and its services and have to ensure that the MSP process adequately address their interests and aspirations reflected by stakeholder typology (Elliott, 2014).

Quality Objectives of the Marine Spatial Plan (QOP)

T3 Economically viable: Given that a cost-benefit assessment of the environmental management has to indicate viability and sustainability, there are communities of interest that depend on ecosystem services that provide resources for their economic viability. Their participation and feedback provides insight and advice as to the protection and access related to the ecosystem services of concern.

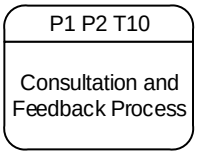
T4 Socially desirable/tolerable: Given that the environmental management measures that are required need to be understood and tolerated by society as being required and that societal benefits will be delivered, the management measures have to be understood by the communities of interest in terms of ecosystem services protection and conservation. There are communities of interest that value the biodiversity of the ecosystem and its integrity. Their participation and feedback provides insight and advice as to the ecosystem or conservation priorities.

T9 Culturally inclusive: Given that the environmental management measures also have to integrate cultural ecosystem consideration that may not have societal or economic value, the management measures have to integrate cultural ecosystem consideration that depend on the integrity of traditional or cultural ecosystem services for non-material benefits such as aesthetics, recreation or spiritual enrichment. Their participation and feedback provides insight and advice as to the protection and access related to cultural ecosystem services or areas.

Quality management checklist

- *Who are the communities of interest that depend on or have a vested interest in the sustainability or integrity of the ecosystem and its services that may be influenced by the activities of the drivers managed under the marine spatial plan?*
- *How is the community of interest delegate appointed to ensure that they represent their constituency?*
- *Are the communities of interest located outside the management area?*

4.4.3.6 Consultation and Feedback Process (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required outputs when there is consistency between the purpose of an MSP process step and the legislative and policy context of the MSP process. When this principle is applied, the outputs of the MSP process step in terms of feedback and advice should be guided and derived from the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest.

P2 Clarity of purpose: Clear measurable objectives with defined outputs for each consultation step of the MSP process establish a clear focus for all actions and decisions and enable the tracking of progress as expected by the competent authorities, industry stakeholders, communities of interest. When this principle is applied, people involved in the MSP process understand what they are expected to provide as feedback and advice and understand how these address the legislative and policy context of the MSP process.

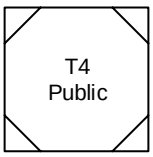
Quality Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, everyone involved must understand that their feedback can only be considered or integrated in the planning process if it falls within the scope of the initiative as prescribed by the public policy agenda as well as MSP legislation and policies. The MSP Competent Authority has to provide follow-up rationale to explain how and why feedback was considered or not.

Quality management checklist

- *What are the consultation procedures for the members of the governance body?*
- *What are the feedback procedures to inform members as to why and how advice was either integrated or not integrated in the planning process?*
- *What are the requirement for record keeping for communication products as well as consultation and feedback documents received by the members of the governance body?*
- *What is the most appropriate language, fora and media for communicating the material and views?*

4.4.3.7 Public (Figure 7)



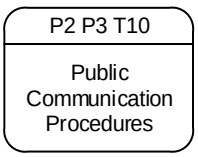
Quality Objectives of the Marine Spatial Plan (QOP)

T4 Socially desirable/tolerable: Given that the environmental management measures that are required need to be understood and tolerated by society as being required and that societal benefits are delivered, the management measures have to be understood by the public in terms of their relevance to the public policies. In combination with the public policy governance requirements and the political system that has established the marine development public policy agenda; the public is informed as to the status of the activities and decisions being made during the planning process.

Quality management checklist

- *What are the public constituencies that should be consulted?*

4.4.3.8 Public Communication Procedures (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear communication objectives with defined outputs for each step of the MSP process informs the public as to the progress being made. When this principle is applied, the public is informed as to how the MSP process is addressing the public policy agenda and is meeting timelines.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence public communication will demonstrate connectivity between the two. When this principle is applied, the public is informed that the actions and decisions of the people involved in the MSP process are those necessary to deliver the marine spatial plan needed to achieve the objectives and no others as supported by the information requirements of the QMP.

Quality Objectives of the Marine Spatial Plan (QOP)

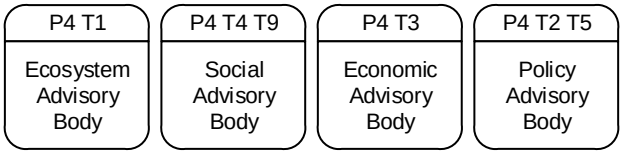
T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, public communication strategies and procedures ensure that everyone is informed as to linkages between the QOPs of the planning process and the public policy agenda.

Quality management checklist

- *What is the communication plan and tools used to communicate key decisions?*
- *Is there an appeal process where a decision is not being understood/accepted/ tolerated by the public?*
- *Who approves the communication plan?*
- *What controls exists on the dissemination of the key decisions and products of the MSP?*

- *How and whom are communication products verified for appropriateness in relation to the targeted audience to ensure they are well understood?*

4.4.3.9 Scientific and Technical Advisory Bodies (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P4 Competence and capability: The quality of the MSP process outputs is directly proportional to the competence of the scientific, technical and policy experts, including their behaviour. When this principle is applied, people involved in scientific advisory peer review activities should have the competencies that reflect their role in providing expert opinion based on the most factual and current knowledge and practices of their given discipline and on the beast available technique and data. The advisory bodies and their processes also needs the necessary human and financial resources of a secretariat to support the advisory processes and information management needs as stipulated by the QOP and QMP prerequisites. During the planning process, expert groups or bodies are brought together to formulate advice based on topics and questions raised by the governance body in relation to the decisions at hand during the planning process.

Quality Objectives of the Marine Spatial Plan (QOP)

T1 Environmentally/ecologically sustainable: Given that the measures has to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, the natural and ecosystem sciences contribute knowledge and advice as to the physical, chemical and biological characteristics of the ecosystem and vulnerabilities to pressures that should be considered during the planning process.

T2 Technologically feasible: Given that the methods, techniques and equipment for ecosystem protection have to be available, the engineering and technical process experts contribute knowledge and advice as to the feasible and available technologies and standard solutions that should be considered during the planning process.

T3 Economically viable: Given that a cost-benefit assessment of the environmental management has to indicate viability and sustainability, the economists and policy analyst contribute knowledge and advice as to the costs and benefits of the management measures as well as the potential economic losses resulting from the risks to economic ecosystem services and the potential conflicts between the drivers that should be considered during the planning process.

T4 Socially desirable/tolerable: Given that the required environmental management measures has to be understood and tolerated by society and that societal benefits be delivered, the social sciences contribute knowledge and advice as to the cultural costs and benefits of the management measures and the potential cultural consequences related to the risks to cultural ecosystem services that should be considered during the planning process.

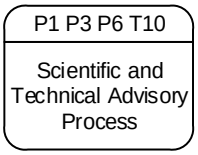
T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed, legal and policy advisors contribute opinions and advice and interpretations related to legislative requirements for the marine spatial plan in terms a due diligence, due process, appeals and compliance that should be considered during the planning process.

T9 Culturally inclusive: Given that the environmental management measures also has to integrate cultural considerations that may not have societal or economic value, the social sciences and aboriginal organizations contribute knowledge and advice related to traditional and cultural activities occurring within the management area as well as the location of significant cultural ecosystem services.

Quality management checklist

- *What are the scientific and technical advisory bodies that the planning process will turn to for advice?*
- *What are the terms of reference or accreditation related to their area of expertise for their organization or association?*
- *What are the Best Available Techniques (BAT) that are internationally recognised and accredited?*
- *Are there any conflicts of interest or link between the experts and the stakeholders impacted by the proposed MSP?*
- *Who are the legal advisors supporting the MSP process?*

4.4.3.10 Scientific and Technical Advisory Process (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The scientific and technical advisory process will deliver the required scientific and technical advice when there is consistency between the purpose of the MSP process step and the QOPs. When this principle is applied, the scientific and technical outputs of the MSP process step in terms of feedback and advice would have been guided and derived from the requirements of the public policy agenda and the expectations of the competent authorities, industry stakeholders, and communities of interest. Depending on the type of advice sought, the processes integrate current data, published literature and, in some cases, expert opinion in the formulation of advice to specific questions generated by the governance body.

P3 Connectivity with objectives: The scientific and advisory processes that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the scientific and technical experts involved in the advisory process will be those necessary to deliver the advice needed to achieve the objectives and no others as supported by the information requirements of the QMP.

P6 Conformity to best practice: The performance of the scientific and technical advisory process is greatly optimized and efficient when actions and decisions conform to established and recognized practices. When this principle is applied, the advisory process activities are performed in the manner intended providing confidence that it is being performed in the most efficient and effective way as stipulated by the QMP. It aims at avoiding judgement and value biases and at being inclusive of evidence presented and interpreted.

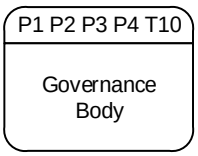
Quality Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, scientific and technical advice has to be communicated and understood by all the stakeholders.

Quality Management Checklist

- *What is the source/reliability of the information used to formulate the advice?*
- *What is the metadata for the data used to validate if it is fit for purpose in the formulation of the advice?*
- *What is the process to set the terms of references and questions to be answered by the advisory bodies?*
- *Who approves the process and who chairs to ensure that advice reflects the questions asked and that the advice is fit for the purpose of planning initiative?*

4.4.3.11 Governance Body (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required outputs when there is consistency between the purpose of the MSP process step and the QOPs. When this principle is applied, the governance oversight and direction ensures that the MSP process steps in terms of feedback and advice has been guided and derived from the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest.

P2 Clarity of purpose: Clear measurable objectives with defined outputs for each step of the MSP process establish a clear focus for all actions and decisions and enable the tracking and reporting of progress by the governance body. When this principle is applied, the governance oversight in the MSP process understands what feedback and advice is required and provide direction as to how these address the QOPs.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence the governance structure ensures that there is demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the governance body involved in the

planning process will be those necessary to deliver the outputs needed to achieve the objectives and no others as stipulated by the QMP.

P4 Competence and capability: The quality of the MSP process outputs is directly proportional to the competence of the members of the governance structure, including their behaviour. When this principle is applied, the governance body ensures that scientific advisory activities and consultation tables reflect the roles and responsibilities as outlined in the terms of reference and follow established business rules and that the governance structure has the necessary human and financial resources for a secretariat, provide direction as to the secretariat activities, and ensure that information management is conducted as stipulated by the QMP prerequisites.

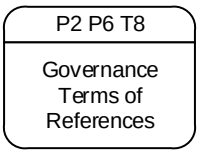
Quality Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, the governance body ensures that the marine spatial planning objectives are communicated and that the planning process is understood by all the stakeholders and advisory bodies.

Quality management checklist

- *What is the governance structure needed to address the legislative implications, ecological considerations, development priorities and community concerns as part of the scope of the planning initiative?*
- *What are the agreements or memorandum of understandings needed to create the governance structure?*

4.4.3.12 Governance Terms of References (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear roles and responsibilities linked the management of the MSP process establish a clear focus for all actions and decisions as expected by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, members of the governance structure understand their oversight function and their responsibilities in providing direction and managing the process and consultations. The terms of references define the roles and responsibilities of the governance body members as well as the relationship between members. It also specifies who is responsible or, rather, the chair and how information is managed and shared.

P6 Conformity to best practice: The performance of the MSP process is greatly optimized and efficient when actions and decisions conform to established and recognized practices. When this principle is applied, MSP process activities are guided by the terms of references of the governance structure in the manner intended

providing confidence that it is being performed in the most efficient and effective way as stipulated by the QMP.

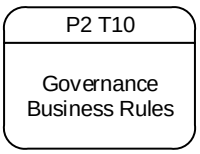
Quality Objectives of the Marine Spatial Plan (QOP)

T8 Ethically defensible: Given that the spatial and temporal management measures may allow development at the risk of losing ecosystem services upon which people depend on have to be ethically defensible, the terms of reference may include a code of conduct and ethics or have to adhere to rights enshrined in statutes and legislation to ensure that the marine spatial plan do not cause undue disadvantage or harm.

Quality Management Checklist

- *How many members are required to form a quorum for decision-making or to reach a consensus on recommendations?*
- *How do members communicate within the governance structure?*
- *What is the expected response timeframe of the governance structure?*
- *How does the governance structure communicate with senior MSP management?*
- *How does the governance structure connect with the political leaders to demonstrate support from political leaders?*
- *What are the competent authorities identified in the Terms of References for the planning process?*

4.4.3.13 Governance Business Rules (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of Purpose: Clear measurable objectives with defined business rules and procedures for each step of the MSP process establish a clear focus for all actions and decisions and provide transparency as to who is accountable for decision-making, how decisions are made, and what is the decision based on. When this principle is applied, people involved in the MSP process understand when and how their feedback and advice will be integrated in decisions and how these address the QOPs and are documented in the QMP.

Business rules are the procedures to be followed to conclude a decision based on advice received, feedback given and legislative requirements. Depending on the terms of references and the authorities of the governance body, decisions may be referred to the chair of the body or the MSP Competent Authority in the form of recommendations.

In some cases, business rules are entrenched in legislation or policy. Business rules may require a quorum to make and ratify decisions or recommendations. They may identify who has the authority to make a decision via a delegation instrument. The decision may be non-binding or binding and may also have appeal processes. Decision-making can be:

- **Authoritative**: The MSP Competent Authority makes all the decisions.
- **Consultative**: The MSP Competent Authority makes the decisions after obtaining input from those who will likely be affected and/or from those who have the necessary expertise.
- **Democratic**: Everyone involved makes the decision together, usually by voting where the decision is based on the majority rule.
- **Consensual**: Everyone involved makes the decision together, usually by a guided process in which all viewpoints are heard and the decision is made against a default policy position or decision rules.
- **Delegated**: Individuals or small groups are given the right to make the decisions unilaterally within their span and scope specified by the terms of references.

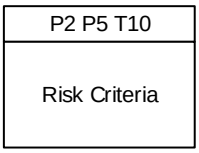
Quality Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, business rules play a key role in communicating who and how decisions are made in relation to the marine spatial plan management objectives.

Quality management checklist

- *How is the advice and feedback from the industry stakeholders and communities of interest taken into consideration in the governance and oversight of the planning initiative?*
- *Do the recommendation(s) follow the established decision-making protocols and rules in accordance with the terms of reference?*
- *Are the recommendations aligned with the public policy agenda of the mandated government?*
- *Where and when in the recommendation process is the approval from political leaders sought and by whom?*
- *What are the delegation instruments for the MSP Competent Authority and the other competent authorities?*

4.4.3.14 Marine Spatial Planning Risk Criteria (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear risk criteria for the evaluation of the risks during MSP process establish a common understanding of the severity of the risks being considered by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, people involved in the MSP process understand how risks are defined within the scope and context of the planning initiative.

P5 Certainty of results: Desired results are more certain when the severity of the risks being considered in each step of the MSP process is based on pre-established and agreed upon risk criteria. When this principle is applied, people involved in the MSP process and, in some cases, the public will have a common understanding of the operational and ecosystem services vulnerabilities in relation to the current and planned activities of the sectors operating in the management area.

The risk criteria play a key role in comparing consequences and impacts in setting priorities. In *risk evaluation*, they are used to compare the inherent risks of existing management measures and residual risks of proposed management options during the risk evaluation. The risk criteria are documented in the QMP.

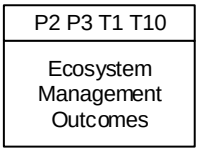
Quality Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives have to be understood by all to achieve the vertical and horizontal integration of the other 9 Tenets, the risk criteria are technically the terms of reference against which the severity of the risks can be evaluated and communicated. The criteria help differentiate scientific and technical information from value judgments. Risk criteria are used to ensure that participants have a common understanding and interpretation of the risks.

Quality management checklist

- *What are the criteria used to assess the severity of impacts?*
- *How were these criteria established and validated?*
- *What are the risks being perceived by all participants involved in the planning process.*
- *Are the risk criteria described in plain language to ensure that they will be understood by all participants?*

4.4.3.15 Ecosystem Management Outcomes (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear measurable objectives with defined ecosystem objectives and environmental management outcomes for the MSP process establish a clear focus for all actions and decisions and provide the necessary level of specificity to guide the planning process. When this principle is applied, people involved in the MSP process understand what the expected management ecosystem outcomes are and how these address the objectives of the planning initiative as guided by the QOPs. Spatial and temporal management measures to avoid ecosystem level impacts are developed from the ecosystem management outcomes.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve ecosystem management outcomes and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process will

be those necessary to deliver the ecosystem management outcomes needed to achieve the ecosystem protection and conservation objectives and no others as stipulated by the QMP.

Quality Objectives of the Marine Spatial Plan (QOP)

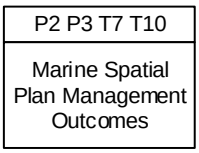
T1 Environmentally/ecologically sustainable: Given that the measures need to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, environmental management outcomes are the expected outcomes of the management measures that will be developed during the MSP process to achieve acceptable levels of ecosystem protection and conservation. The outcomes must be SMART (Section 3.2) in order to form the basis for any ecosystem monitoring.

T10 Effectively communicable: That the environmental management objectives are communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, the environmental management outcomes are key in communicating and understanding how the expected outcomes are linked to ecosystem objectives.

Quality management checklist

- *How are the ecosystem management outcomes aligned with the ecosystem boundaries and significant ecosystem features and ecosystem services to be safeguarded?*
- *Can the ecosystem management outcomes be achieved from the marine spatial plan within the management area?*
- *Are some of the ecosystem management outcomes dependent on management measures or marine spatial plans that are outside the management area?*
- *Are the ecosystem management outcomes described in plain language that will be understood by all participants?*

4.4.3.16 MSP Management Outcomes (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear measurable objectives with defined development objectives and operational management outcomes for the MSP process establish a clear focus for all actions and decisions and provide the necessary level of specificity to guide the planning process. When this principle is applied, people involved in the MSP process understand what the expected operational management outcomes are and how these address the development objectives as guided by the QOPs. Spatial and temporal management measures to avoid conflicts between the activities of the drivers operating in the management area are developed from the operational management outcomes.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve operational management outcomes and

hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process will be those necessary to deliver the operational management outcomes needed to achieve the development objectives and no others as supported by the information requirements of the QMP.

Quality Objectives of the Marine Spatial Plan (QOP)

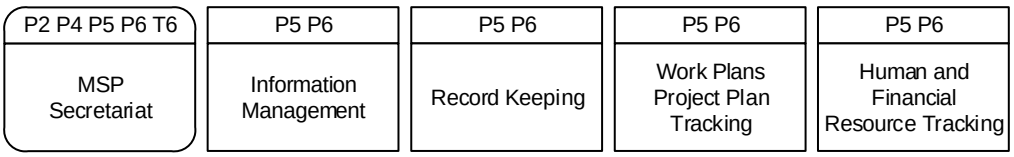
T7 Politically expedient: Given that the management approaches and philosophies need to be consistent with the prevailing political climate and have the support of political leaders, the marine spatial plan operational and environmental management outcomes and philosophies will have to be consistent with the prevailing development objective should be linked to the political expectations and timeframe of the expected start-up of the development activities. The outcomes must be SMART (Section 4) in order to be enforced and provide the scope for compliance verification and auditing activities.

T10 Effectively communicable: Given that the environmental management objectives are communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, the operational management outcomes are key in communicating and understanding how these are linked to the development objectives including the integration the environmental management outcomes.

Quality management checklist

- *How do the MSP management outcomes align with the industry sector development priorities of the management area?*
- *How do the MSP outcomes reconcile the needs of industry with the public and the communities of interests?*
- *Can the MSP management outcomes be achieved with the marine spatial plan of the management area?*
- *Are some of the MSP management outcomes influenced by activities outside the management area or by other jurisdictions or policies?*
- *Are the MSP management outcomes described in plain language that will be understood by all participants?*

4.4.3.17 MSP Secretariat (Figure 7)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear measurable objectives with defined outputs for each step of the MSP process establish a clear focus for all actions and decisions and enable the tracking of progress as provided by the MSP Secretariat. When this principle is applied, people involved in the MSP process understand the role of the secretariat in

terms of reporting, task management and information management as stipulated in the QMP.

P4 Competence and capability: The quality of the MSP process outputs is directly proportional to the competence and capacities of the secretariat in supporting the MSP process. When this principle is applied, the staff of the secretariat understand their role in supporting the activities of the MSP process. The secretariat also has the necessary human and financial resources to manage and operate the secretariat and information management functions that will support the MSP process as stipulated by the QMP prerequisites.

P5 Certainty of results: Desired results are more certain when the output of each step of the MSP process has performance indicators and planned periodic reporting requirements. When this principle is applied, the secretariat supporting the MSP process tracks and manages the necessary documentation and reports so that the governance is informed of the performance and progress of the MSP process as stipulated in the QMP.

One of the primary functions of the MSP Secretariat is to maintain the historical context and chronology of the planning and implementation processes. Information management must, however, balance the record keeping needs of the planning process with the level of expediency and involvement to support planning process. Typically, record keeping involves the maintenance of the governance, consultation and decision-making processes ensuring transparency, due process and evidence. Given the vast amount of scientific and technical information used in the planning process, it also plays an important role in keeping records of the data, literatures and reference documentation that were used in the various peer-review advisory processes. The following are examples of what would form records:

- Terms of References
- Governance Business Rules and Records of Decisions
- Records of Discussions and Feedback
- Peer-Review Data and Documents
- Scientific or Technical Policy Advice
- Project Plans and Performance Reports
- Communication Plan, Reports and Press Release
- Consultation and public participation records

P6 Conformity to best practice: The performance of the MSP process is greatly optimized and efficient when actions and decisions is supported by established and recognized administrative practices. When this principle is applied, MSP process activities are monitored to ensure that the MSP activities are conducted in the manner intended providing confidence that it is being performed in the most efficient and effective way as stipulated by the QMP.

Quality Objectives of the Marine Spatial Plan (QOP)

T6 Administratively achievable: Given that the MSP process needs support for the governance, consultation, planning and management activities, the MSP secretariat tracks progress of activities and project plans in relation to time frames and deadlines. The secretariat also tracks human and financial resources dedicated to the coordination

and delivery of the planning process. Reporting to the governance body, the secretariat plays a key role in ensuring that the planning process is administratively achievable.

Quality management checklist

- *How and where is information (e.g. data, records, advice) stored?*
- *What is the information and document management system?*
- *How are versions maintained and controlled?*
- *What are the security requirements to access and safeguard information?*
- *Who, from the MSP secretariat, is responsible for managing the information?*
- *Is the MSP Secretariat included in terms of references of the Governance Body?*
- *What are the copyright or proprietary requirements of the data and information submitted to the advisory processes?*
- *What are the filing plans for all documents produced during the planning and implementation process?*
- *What is the file retention period and requirements for the documents produced during the planning and implementation process?*
- *What are the privacy and accesses to information requirements for the documents on file?*
- *What is the financial system used to track the human and financial resources?*

4.4.4 Risk identification

ISO 31000 stipulates that *risk identification* is the process of finding, recognizing and describing the risks. It includes the identification of the risk sources, the events and their causes and potential consequences. *Risk identification* provides the basis for *risk analysis* use to identify the likelihood of the events and the magnitude of the consequences.

The MSP process has to identify all relevant *risk sources* and related *events* resulting from the activities of the drivers operating in the management area in terms of operational events (e.g., encroachment, health and safety), and environmental events (e.g., changes in sedimentation, nutrient, pollution effects) (Section 4.4.1). Based on the risk sources, the *causes* of the *event* and the resulting *consequences* are also identified in terms of ecological, cultural, social, economic *consequences* and legal repercussions in terms of the operational and environmental management expected outcomes (Section 4.4.3) and objectives (Section 4.4.2). From a QMO perspective, the results of the risk identification is the *risk profile* which is the input to the *risk analysis* that will estimate likelihoods and magnitudes for all risks identified. It is critical to generate a comprehensive *risk profile* because a risk that is not identified at this stage would not be considered in the subsequent *risk analysis* and planning process.

Risk Identification should include all risks whether or not their source is under the control of the competent authorities or even though the sources of the risk or causes are uncertain. It is again emphasized that the measures will then be aimed at tackling the causes and/or consequences of the risks. Risk identification should include the synergistic, cascading and cumulative effects of all the potential pressures and conflicts related to the activities of the drivers operating in the management area. It should consider a comprehensive range of consequences in terms of ecological, cultural, social, and economic consequences as well as legal and policy repercussions. Cause and effect pathways are also part of the risk identification step as these will play a role in understanding the risks and, later, in evaluating management options. Risks that are found to be outside the management area and that have the potential to cause ecosystem level impacts may then form the basis for inter-jurisdictional negotiation in order to have them addressed.

As an exemplar tool, the Bowtie analysis (ISO 31010:2009) is used to document and diagrammatically illustrate the pathways of risk from the causes to the consequences (Section 4.4.1). It is also used to create an inventory of activities (*risk sources*) of the drivers, resulting pressures (*causes*), potential environmental effects (*environmental events*), driver conflicts (*operational events*) and potential impacts to ecosystem components as well as cultural, social and economic ecosystem services (*consequences*). As the output of the risk identification, the Bowtie analysis of the pathways is used to produce the risk profile that will be used in risk analysis to estimate likelihood and magnitude using either quantitative or qualitative methods.

Risk Identification relies significantly on the scientific and technical advisory processes as well as communication and consultation processes with stakeholders. It is this step that also relies on a knowledge based of data and information to ensure that risks are adequately identified, are relevant to the scope of the planning initiative and are manageable within the legislative, administrative and stakeholder capabilities in the management area.

Figure 8 provides an overview of the quality management elements involved in risk identification. Based on the operational and environmental management outcomes (Figure 7), scientific and technical advisory processes are initiated by the governance body to identify the relevant risks. During these processes, ecosystem boundaries and the management area are established, significant ecosystem and socio-economic vulnerabilities and legislation frameworks are identified and validated by the consultation and feedback processes with other competent authorities, industry stakeholders and communities of interest. Depending on the legislation and policies and business rules (QMP), the MSP Competent Authority may have to obtain approval of the Risk Matrix upon on the recommendation of the Governance Body. Please note that grey shaded pictograms originate from a previous diagram and are explained in a previous section. They are not discussed again in this section.

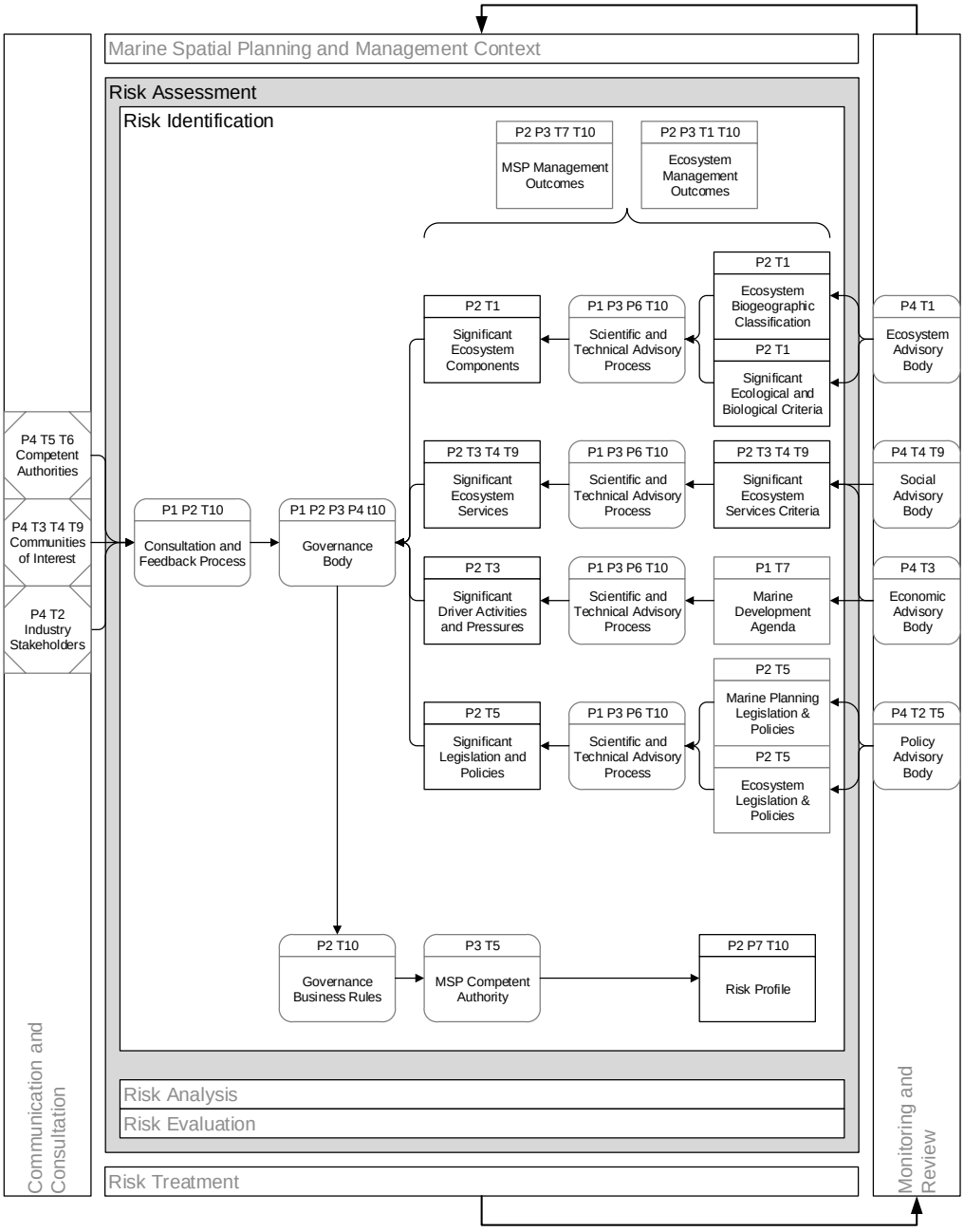
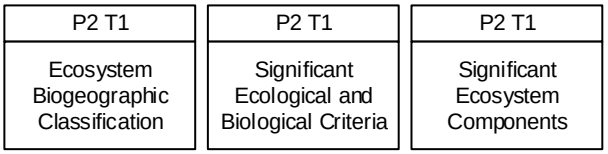


Figure 8. Marine Spatial Plan Risk Identification.

4.4.4.1 Significant Ecosystem Components (Figure 8)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear ecological objectives with defined criteria for each step of the MSP process establish a clear focus for the identification of ecological risks and the subsequent monitoring of ecosystem integrity. When this principle is applied, people involved in the MSP process understand what are the ecosystem vulnerabilities and understand how these affects the QOPs.

Ecosystem risk should be based on ecological criteria avoiding value judgement in the analysis of the data and information. Normalized ecosystem classification systems and criteria ensure that data and knowledge are consistently integrated and analysed in the identification of significant ecosystem components. From a risk identification perspective, the concept of "significance" implies that perturbations of these ecosystem features and processes are likely to have ecosystem level consequences. These play an important role in identifying ecosystem vulnerabilities for areas, features or even species found within the boundaries of the ecosystem.

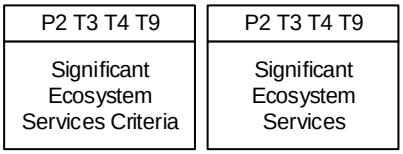
Quality Objectives of the Marine Spatial Plan (QOP)

T1 Environmentally/ecologically sustainable: Given that the measures have to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, ecosystem biogeographic classification systems forms the basis to establish the boundaries of the ecosystem. Ecologically and biologically significant criteria for the areas and species form the basis for identifying physical, chemical and biological vulnerabilities within the boundaries of the ecosystem in relation to the pressures resulting from human activities in the management area. In terms ecosystem risks, management measures should be designed to address the vulnerabilities of the ecologically and biologically significant components.

Quality management checklist

- *What criteria are used to establish the ecosystem boundaries?*
- *Are the boundaries drawn by topographical or process-related criteria?*
- *What are the criteria to identify the significant ecosystem features and processes that need to be safeguarded to avoid ecosystem level consequences?*
- *How were these criteria established and validated?*
- *In terms of ecosystem integrity, what is the zone of influence of the activities of the drivers operating the management area?*
- *In terms of ecosystem integrity, what is the zone of influence of the activities of drivers operating outside the management area?*
- *What are methods used to conduct the risk identification?*

4.4.4.2 Significant Ecosystem Services (Figure 8)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear ecosystem services objectives with defined criteria for each step of the MSP process establish a clear focus for the identification of ecosystem service risks and the subsequent monitoring of ecosystem service sustainability. When this principle is applied, people involved in the MSP process understand what are the cultural and socio-economic vulnerabilities and understand how these affects the QOPs.

Ecosystem services risks should be based on traditional, cultural, social and economic criteria to avoid possible value judgement in the analysis of the data and information. As described above, the ecosystem services are provided by the ecosystem but then require the addition of human capital (complementary assets) such as time, money and skills to become societal benefits. Hence the availability of those assets will dictate the ultimate use of the ecosystem services. The separation of ecosystem services into cultural, provisioning and regulating services thus influences the management and delivery of these. Normalized classification systems and criteria ensure that data and knowledge are consistently integrated and analysed during the scientific advisory process. From a risk identification perspective, the concept of "significance" implies that changes to these ecosystem services would have unacceptable consequences to the traditional and cultural fabric of a community or to the socio-economic prosperity of those that depend on the service. Significant ecosystem services play an important role in identifying traditional, cultural, social and economic vulnerabilities.

Quality Objectives of the Marine Spatial Plan (QOP)

T3 Economically viable: Given that a cost-benefit assessment of the environmental management has to indicate viability and sustainability, the identification of significant ecosystem services forms the basis to identify key vulnerabilities and dependencies of resource based economic sectors especially for the provisioning ecosystem services in the management area. The ecosystem services may have spatial and temporal considerations required to access the resource or may have marine quality characteristics that have to be maintained to ensure the sustainability of the resource. These requirements should form the basis in the risk analysis of the consequences and risk evaluation of the management options to ensure that the marine spatial plan addresses them adequately.

T4 Socially desirable/tolerable: Given that the environmental management measures are required or at least are understood and tolerated by society as being required for that societal benefits delivered, the identification of significant ecosystem services forms the basis to identify key vulnerabilities and dependencies of cultural and social ecosystem services in the management area. The ecosystem services may have spatial and temporal aspects required to access the area or may have quality characteristics that have to be maintained to avoid unacceptable alteration to the cultural integrity of

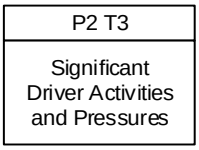
the community or societal values. These requirements should form the basis in the risk analysis of the consequences and risk evaluation of the management options to ensure that the marine spatial plan addresses them adequately.

T9 Culturally inclusive: Given that the environmental management measures also needs to integrate cultural considerations that may not have societal or economic value, the identification of culturally significant ecosystem services forms the basis to identify key vulnerabilities and dependencies of traditional values within the management area. This is particularly the case with the cultural ecosystem services. The ecosystem services may have spatial and temporal aspects required to access the area or may have quality characteristics that have to be maintained to avoid unacceptable alteration to the integrity of the traditional values and uses. These requirements should form the basis in the risk analysis of the consequences and risk evaluation of the management options to ensure that the marine spatial plan addresses them adequately.

Quality Management Checklist

- *What criteria are used to identify the significant traditional, cultural, social and economic ecosystem services?*
- *Are the ecosystem services vulnerabilities related to the activities of the drivers occurring within the management area?*
- *Are the ecosystem services vulnerabilities related to the activities of drivers occurring outside the management area?*
- *Does the human capital (complementary assets) exist to produce societal benefits from ecosystem services?*
- *What was the process to validate the findings of the significant ecosystem services with the relevant communities of interest?*

4.4.4.3 Significant Driver Activities and Pressures (Figure 8)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear marine development objectives considered for each step of the MSP process establish a clear focus for the identification of the significant pressures resulting from relevant activities of the existing and future drivers operating in the management area as well as the potential conflicts that may arise between the activities of the drivers. When this principle is applied, people involved in the MSP process understand which activity contributes the most to the pressures within the ecosystem boundaries and the nature of the conflicts between the drivers as well as how these affects the QOPs.

Based on the marine development agenda and the existing drivers operating in the management area, the drivers and their resulting activities are identified in terms of the risks that their activities may have to other drivers operating the management area or to the risks that their pressures may have on the integrity of the ecosystem in terms of environmental effects. Given that the activities from the drivers are the risk sources

and that the pressures emanating from those activities are the potential causes of events, these play a pivotal role in risk analysis and risk evaluation of management measures to reduce the risks.

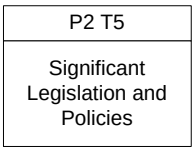
Quality Objectives of the Marine Spatial Plan (QOP)

T3 Economically viable: Given that a cost-benefit assessment of the environmental management has to indicate viability and sustainability, the economic viability of an industry sector depends on the efficiency and feasibility of the activities needed to conduct and maintain their operations. The viability of their operations is very much related to the safety needs that the planning process should address while the feasibility is mostly related the costs of implementing the operational and environmental management measures of the plan.

Quality management checklist

- *How are the current and future activities of drivers being identified and kept current?*
- *What criteria are used to select the "significant" drivers in terms of the risks they introduce in the management area in relation to other drivers and the ecosystem?*
- *How is the marine development agenda used to inform the marine spatial planning process and its plan of new / emerging drivers?*
- *What are the activities emanating from those drivers and, subsequently, the pressures generated from those activities?*

4.4.4.4 Management Area Regulatory Requirements (Figure 8)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear legislative mandate with defined jurisdictional boundaries for the MSP process establish the legal scope for all actions and decisions in respect to the legislation and policies of the competent authorities. When this principle is applied, people involved in the MSP process understand the legislative and policy context of the planning process and the legislative requirements to be met by the marine spatial plan as stipulated by QOPs.

The boundaries of the management area should reflect the drivers' area of operation that falls under the respective legislations and policies of the competent authorities involved in the planning process. In some cases, the management area may simply reflect the boundaries of the EEZ or territorial jurisdictions exercised by national, regional or local legislation and authorities. It may also reflect geopolitical boundaries such as regional seas, especially where management is based on the Regional Seas Conventions/Commissions (e.g. OSPAR, HELCOM). Based on the management outcomes established at the onset of the planning initiative and the legislation and policy context, significant legislation and policies are inventoried to identify the existing management measures in the management area. These may manage the

drivers, their activities, the pressures as well as address ecosystem protection and conservation requirements. These play an important role in risk analysis of the likelihood and magnitude of potential consequences and in risk evaluation of management options.

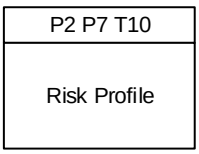
Quality Objectives of the Marine Spatial Plan (QOP)

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed, the marine spatial plan will have to abide to legislation and regulatory requirements for the area being implemented. The inventory of significant legislation and policies ensure that the management measures will be enforceable as well as ensure that the activities can take place in compliance with existing legislation. The governance framework will also involve agreements and treaties as well as formal legislative instruments such as acts and directives.

Quality management checklist

- *What are the legislative statutes or agreements that are used to manage the activities of the drivers operating in the management area?*
- *What is the occupation rate and location of the drivers operating in the management area?*
- *How is the inventory of legislation and policies maintained current and up-to-date?*
- *Are transnational issues handled and what is the relationship to regional bodies such as Regional Seas Commissions?*

4.4.4.5 Risk Profile (Figure 8)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear and defined pathways or risk for this step of the MSP process establishes the scope of the risk that will be analysed. When this principle is applied, people involved in the MSP process understand what are the sources of the risks, their causes and potential ecosystem and socio-economic consequences and understand how these may have an effect on the QOPs. They also understand that only the risks described in the risk profile will be considered for the risk analysis.

P7 Clear line of sight: The MSP process outputs are more likely to satisfy everyone involved when periodic review are conducted to verify whether there is a clear line of sight between the QOPs and the requirements and expectations of the competent authorities, industry stakeholders, communities of interest. When this principle is applied, the risk profile provides the basis for the review and to make changes or realignment of activities and resources including priorities to be considered in the risk analysis. Thus, this ensures continual improvement of the planning process in light of a better understanding of the risk, new developments and knowledge. The QMP procedures would inform and provide everyone with a clear understanding of any

realignment of work, activities and resources as well as seek approval for any changes to the MSP scope or objectives.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve an understanding of the risks and their vertical and horizontal integration with the other 9 Tenets, the risk profile is used to confirm that the risk identification exercise identified the risks that are relevant to the objectives and management outcomes and that are within the scope of the planning initiative.

Quality management checklist

- *What were the consultation and feedback processes to ensure that competent authorities, industry stakeholders and communities of interest concur with the description of the risks in the risk profile?*
- *What verification is being done to ensure that the risk profile is linked to the MSP management outcomes and the ecosystem management outcomes?*
- *Is the language, media and techniques used to describe the risk profile adapted to the audience?*

4.4.5 Risk analysis

ISO 31000 stipulates that the *risk analysis* is the process to comprehend the nature of the risks and to determine the level of risk in terms of the magnitude of a risk or combination of risks, expressed in combination with the consequences and their likelihood. *Risk analysis* provides the basis for *risk evaluation* to ascertain the severity of the risks and setting priorities for the *risk treatment*.

In MSP, risk analysis is used to determine the likelihood of the *operational events* and the magnitude of the *consequences* resulting from the conflicts of the activities of the drivers operating in the management area (Section 4.4.1). It is also used to determine the likelihood of the *environmental events* and the magnitude of the *consequences* resulting from the activities of the drivers operating within the boundaries of the ecosystem (Section 4.4.1). From a QMO perspective and building upon the *risk profile*, the results of the *risk analysis* is the *risk matrix* which is the input to *risk evaluation* that will ascertain the severity of the risks and determine if they are either managed adequately or need enhanced or additional management. It should be noted that an event may have multiple *consequences* that may result in multiple management implications.

Depending on the availability of data and information, *Risk analysis* can be qualitative (based on "best professional judgement), semi-quantitative or quantitative, or a combination of these depending on the risk sources, the *events* they may *cause*, and the *consequences* of the *events*. Quoted from the standard and very relevant to MSP, ISO 31000 stipulates that "*Consequences and their likelihood can be determined by modelling the outcomes of an event or set of events, or by extrapolation from experimental studies or from available data. Consequences can be expressed in terms of tangible and intangible impacts. In some cases, more than one numerical value or descriptor is required to specify consequences and their likelihood for different times, places, groups or situations*".

The Bowtie analysis (ISO 31010:2009) was initially used to inventory the pathways of the risks as the risk profile in *risk identification*. In *risk analysis*, the Bowtie analysis is then used to identify the likelihoods of the events and magnitudes of the consequences in light the inherent risks of existing management measures (*prevention and mitigation controls*) (Section 4.4.1). It differentiates the pressures which are within the management area that can be controlled or mitigated by the legislation and policies of the management area from the pressures that are within the broader boundaries of the ecosystem and that can only be controlled or mitigated by external legislation or transnational agreements.

Figure 9 provides an overview of the quality management elements involved in risk analysis. Based on the *risk profile* generated in *risk identification* (Figure 8), scientific and technical advisory processes are initiated by the Governance Body to analyse and characterize potential ecosystem impacts, ecosystem services consequences, economic consequences, conflicts between activities of the drivers and legal repercussions based on a cause and effect analysis of existing and future activities of the drivers operating in the management area. Depending on the legislation and policies and business rules (QMP), the MSP Competent Authority may have to obtain approval of the Risk Matrix upon on the recommendation of the Governance Body.

Please note that grey shaded pictograms originate from a previous diagram and are explained in a previous section. They are not discussed again in this section.

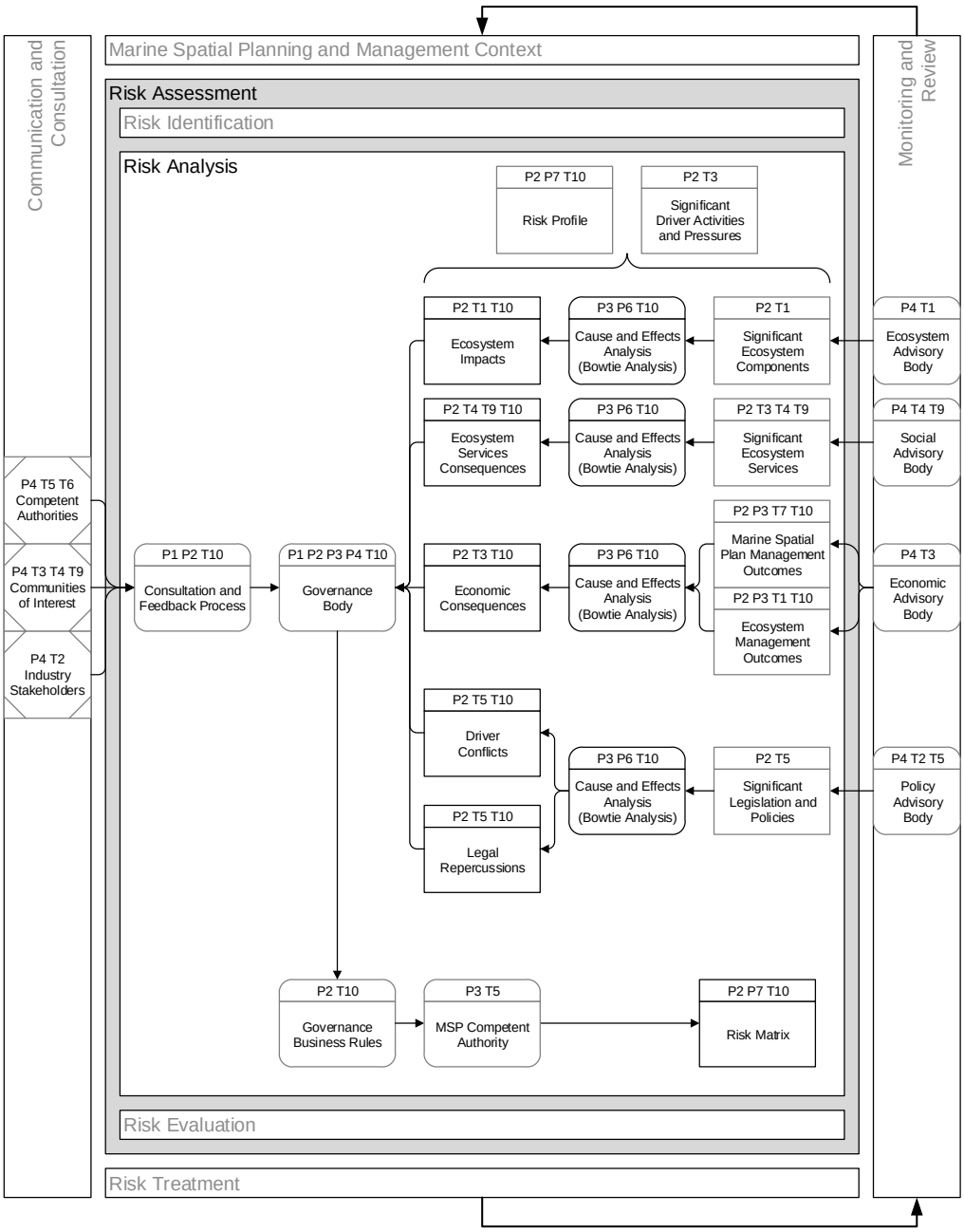
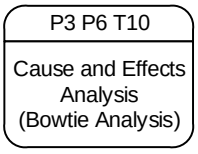


Figure 9. Marine Spatial Planning Risk Analysis.

4.4.5.1 Cause and Effect Analysis (Figure 9)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the cause and effect pathways and risks of not achieving the QOPs. When this principle is applied, actions and decisions of the people involved in the planning process will be those necessary to integrate prevention measures needed to manage the causes of the risks and mitigation measures needed to manage the consequences if the risks are manifested.

P6 Conformity to best practice: The performance of the MSP process is greatly optimized and efficient when actions and decisions conform to standardized practices. When this principle is applied, normalized tools, such as the Bowtie analysis (ISO 31010:2009), ensure that the analysis will be conducted consistently to identify the most relevant cause and effect pathways of risk within the context of the management outcomes.

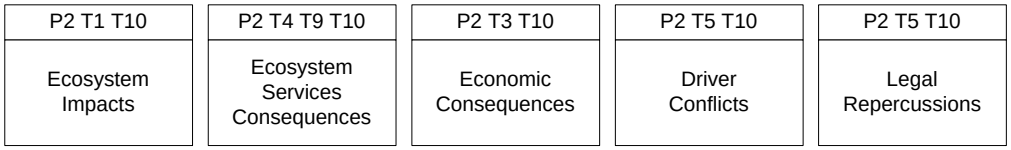
Quality Management Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve an understanding of the risks and their vertical and horizontal integration with the other 9 Tenets, the Bowtie analysis provides valuable graphical representations of all the cause and effect pathways of risk being considered within the scope of the planning initiative.

Quality Management Checklist

- *What are the ecosystem components or processes that would be altered or degraded as a result of the pressures occurring from the activities of the drivers?*
- *Has the pressure-activity-state change–impact chain been defined for relevant developments?*
- *What would be the duration and trajectory or trajectories of the recovery?*
- *What is the feasibility of the mitigation or restoration strategies that could be implemented if natural recovery is not possible?*
- *What method was used to conduct the cause and effect analysis?*

4.4.5.2 Impacts Consequences and Repercussions (Figure 9)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear and well defined risks establish a clear focus for all actions and decisions ensuring that all risks are being considered throughout the planning process by the competent authorities, industry stakeholders, communities of interests. When this principle is applied, people involved in the MSP process understand and have the knowledge of the risks that will be considered during the risk evaluation and how these address the QOPs.

The risk analysis integrates the entire range of impacts, consequences and repercussions ensuring equity between the contributing activities while contributing to the understanding of the risks.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T1 Environmentally/ecologically sustainable: Given that the measures have to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, the risk analysis provides an overview of the likelihood and magnitude of the environmental impacts to ecologically and biologically significant components within the boundaries of the ecosystem. In some cases, the impacts may occur at an ecosystem scale that is larger or outside the jurisdictional configuration of the management area. In such cases, the planning process will have to include the competent authorities that have jurisdiction over the vulnerable area via transnational cooperation. It would be costly and futile to effectively manage the pressures from within the planning area of jurisdictions given that the ecosystem vulnerabilities are situated outside the management area.

T3 Economically viable: Given that the cost-benefit assessment of the environmental management has to indicate viability and sustainability, the risk analysis provides an overview of the likelihood and magnitude of the potential economic losses resulting from a loss of sustainability to ecosystem services that support resource sectors as well as the potential business losses and liabilities related to hazards and accidents as a result of conflicting activities between the drivers operating in the management area.

T4 Socially desirable/tolerable: Given that the environmental management measures are required or at least are understood and tolerated by society as being required to deliver societal benefits, the risk analysis provides an overview of the likelihood and magnitude of the potential cultural and social vulnerabilities resulting from a the loss of cultural ecosystem service integrity that have non-material benefits such as aesthetics or recreation.

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, needed to enable and/or force the management measures to be performed, the analysis provides an overview of the likelihood and legal repercussions of the existing management measures within the legislative context resulting from the existing management measures as well as liabilities that may arise if these do not perform as expected.

T9 Culturally inclusive: Given that the environmental management measures also need to integrate cultural ecosystem consideration that may not have societal or economic value, the risk analysis provides an overview of the likelihood and magnitude of the potential vulnerabilities to the traditional values resulting from a loss

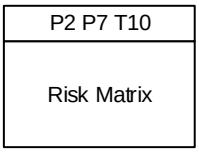
of ecosystem service integrity that have traditional and cultural non-material benefits such as aesthetics, recreation or spiritual enrichment.

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve an understanding of the risks and their vertical and horizontal integration with the other 9 Tenets, the impacts, consequences and repercussions of the risk analysis are the basis for communicating and understanding the risks to all participants involved in the planning process. It particularly helps in understanding the risk to others during consultation process.

Quality management checklist

- *What are the ecosystem features and process that may be altered or degraded as a result of the pressures introduced by the activities of the drivers operating in the management area?*
- *What are the traditional, cultural and social consequences if a given ecosystem service is impacted by pressures or changes introduced by the activities of the drivers operating in the management area?*
- *What societal benefits would be impeded or impacted by the ecosystem alteration and loss or reduction of ecosystem services?*
- *What is the size of the community or electorate that would react to the consequences?*
- *What are the potential economic losses or liabilities if activities are displaced or encroached on by the activities of other drivers occurring in the management area?*
- *What strategic or international repercussions could occur if the ecosystem management outcomes are not achieved?*
- *Is there a conflict resolution / appeal process when management outcome is not being achieved?*

4.4.5.3 Risk Matrix (Figure 9)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear and well defined risks in line with the QOPs establish a clear focus for all actions and decisions and ensures that all risks are understood by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, people involved in the MSP process have a common understanding of the cause and effect pathways of risk and the severity of the consequences in terms of the QOPs.

In combination with the risk criteria, the risk matrix classifies the levels of risk by combining the likelihood and the magnitude of the consequences with severity criteria. It provides clarity by ensuring that all participants acquire a common understanding of the risks that are relevant to the management outcomes. Used in the subsequent risk evaluation, the risk matrix informs decisions regarding the risks that can be tolerated

as well as what are the risks that can be managed to a level as low as reasonably practicable (ALARP).

P7 Clear line of sight: The MSP process outputs are more likely to satisfy everyone involved when periodic review are conducted to verify whether there is a clear line of sight between the QOPs and the requirements and expectations of the competent authorities, industry stakeholders, communities of interest. When this principle is applied, the risk matrix provides the basis for the review and to make changes or realignment of the activities and resources including priorities to be considered in the risk evaluation. Thus, this ensures continual improvement of the planning process in light of a better understanding of the risk, new developments and knowledge. The QMP procedures would inform and provide everyone with a clear understanding of any realignment of work, activities and resources as well as seek approval for any changes to the MSP scope or objectives.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T10 Effectively Communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve an understanding of the risks and their vertical and horizontal integration with the other 9 Tenets, the risk matrix plays an important role in transparently communicating and in gaining a common understanding of risks ensuring equity among stakeholders.

Quality management checklist

- *How are the contributions of the various causes integrated to determine management priorities?*
- *Are the risk criteria integrated in the classification of the likelihood and extent of the events and consequences?*
- *How was the likelihood and severity of a risk occurring described and validated with the participants?*

4.4.6 Risk evaluation

ISO 31000 stipulates that the *risk evaluation* is the process of comparing the results of the *risk analysis* with risk criteria to determine whether the severity of the risks is acceptable or tolerable by all involved in the planning process. Risk evaluation provides the basis for setting priorities for the *risk treatment* (or management) of the causes and their consequences.

In MSP, the purpose of the risk evaluation informs and supports the consultation and decision-making processes in deciding which risks will need to be addressed by the marine spatial plan including the implementation priorities. Risk evaluation involves comparing the level of risk found during the *risk analysis* with risk criteria established when the planning process was initiated. From a quality management perspective, the *risk evaluation* can identify the need for further analysis as well as further consultation or advisory processes. It may also lead to a decision that existing management measures are adequate and that they should simply be integrated a marine spatial plan (Figure 10) or that new and enhanced measures must be developed. Decisions regarding the risks priorities should take into account the public policy context established at the start of the planning initiative as well as third party legislative and policy frameworks that will be influenced by the marine spatial plan. This step evaluates the severity of the inherent risks of the existing management measures in contrast to the severity of the residual risks in consideration to enhanced or additional management measures. It should be noted that existing management measures may also include no management measures.

The Bowtie analysis (ISO 31010:2009) and the risk matrix are used as the tools to evaluate options and make decisions as to risks that should be managed as well as the risks that will not be managed. The Bowtie and the risk matrix become the risk register of those decisions showing which risk should be managed and how should it be managed in the marine spatial plan. The risk register subsequently underpins the *risk treatment* step guiding the development of the spatial and temporal management measures that will included in the marine spatial plan.

Figure 10 provides an overview of the quality management elements involved in risk evaluation. Using the risk matrix resulting from the risk analysis (Figure 9) and the risk criteria (Figure 7), the Governance Body ascertains the risks of the existing management measures in consultation with the policy advisory body, other competent authorities, industry stakeholders and communities of interest. Based on the risk criteria, the MSP Competent Authority may have to obtain approval of the decision that existing management measures are adequate at reducing risk as low as reasonably practical or that new or enhances management are required to reduce the risk to acceptable levels. All risks including existing and proposed management measures are maintained in the risk register informing the development of spatial and temporal management measures and implementation of the marine spatial plan in *risk treatment*. The risk register is also used to design monitoring and reporting activities related to the performance of the implemented marine spatial plan.

Please note that grey shaded pictograms originate from a previous diagram and are explained in a previous section. They are not discussed again in this section.

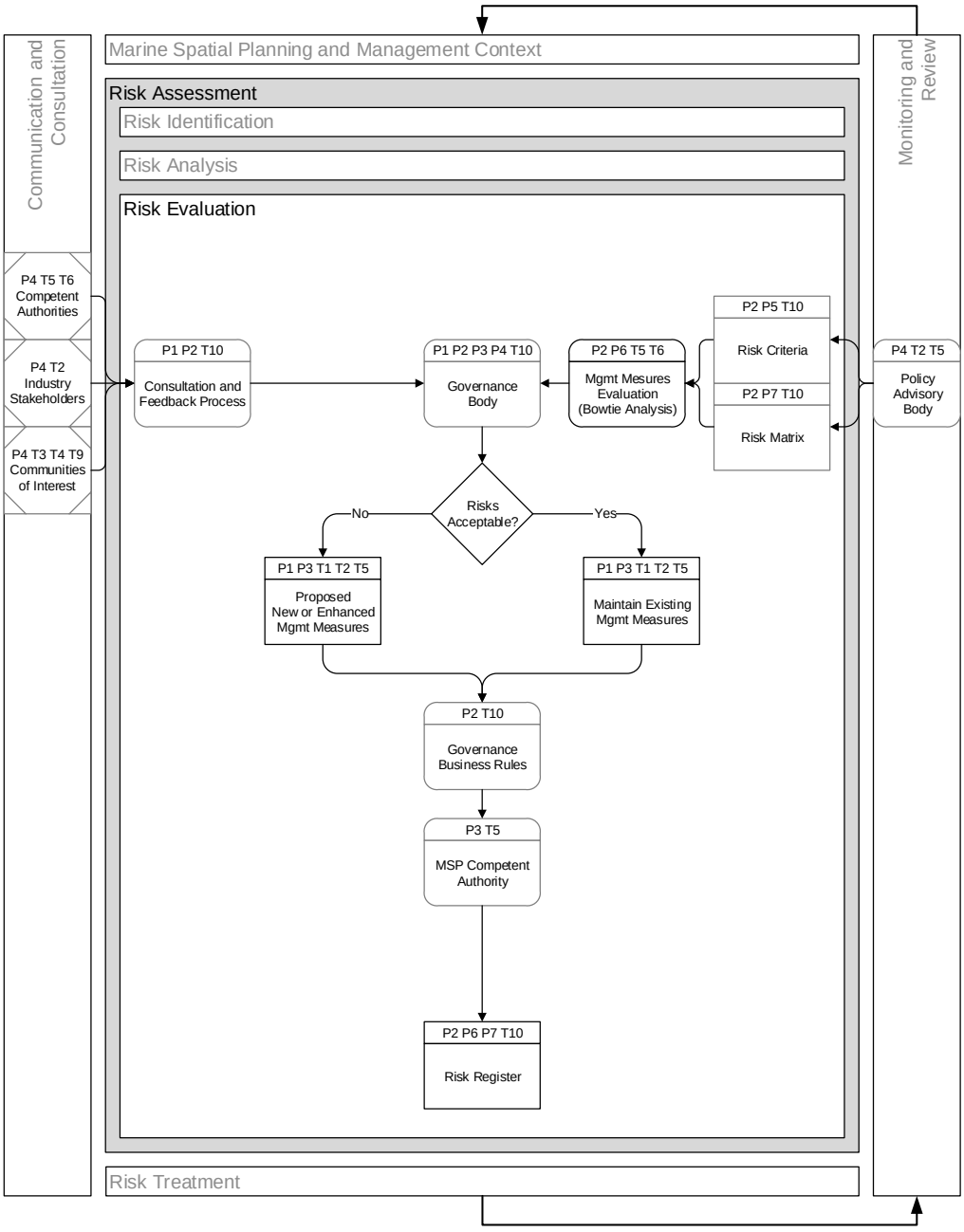
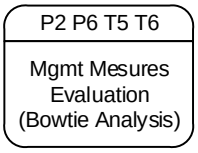


Figure 10. Marine Spatial Planning Risk Evaluations

4.4.6.1 Management Measures Evaluations (Figure 10)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear and common understanding of the severity of risks for each step of the MSP process establish a clear focus for all actions and decisions in relation of management options being considered by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, people involved in the MSP process understand how the various management options being considered can reduce the risks of not addressing QOPs.

Based on the risk criteria and the risk matrix, the evaluation of the existing management measures provides an understanding of the risks in terms of existing management effort and their effectiveness. It avoids jumping to a decision regarding the implementation of additional management measures without considering what is already in place and understanding their basic risk factors. To illustrate this, a new measure might not provide better risk reductions if it has the same basic risk factor related to enforcement capacity of the existing one.

P6 Conformity to best practice: The performance of the MSP process is greatly optimized and efficient when actions and decisions conform to standardized practices. When this principle is applied, normalized tools, such as the Bowtie analysis (ISO 31010:2009) and the risk matrix, ensure that the evaluation of the management options will be conducted consistently to set priorities regarding the need to manage specific risks in *risk treatment*.

Quality Management Objectives of the Marine Spatial Plan (QOP)

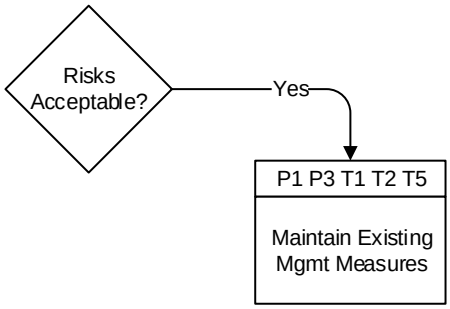
T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes that will enable and/or force the management measures to be performed, the Bowtie analysis of the inventory of existing management measures ensures that decisions regarding management options and priorities are supported by existing legislation, policies, guidelines and standards.

T6 Administratively achievable: Given that the statutory bodies such as governmental departments, environmental protection and conservation bodies need to be in place and functioning to enable successful and sustainable management, the Bow-diagramof the inventory of existing management measures ensures that decisions regarding management options and priorities are supported by competent authorities programs, accountabilities and administrative capacities.

Quality management checklist

- *What are the criteria used to evaluate and classify the effectiveness and feasibility of the management options, given that information obtained from competent authorities on the effectiveness of selected management measures may be confidential?*
- *Were the management measures derived from the inputs of all relevant players?*
- *What are the existing legislations, regulations, directives, policies, best management practices, standard operating procedures that may need to be implemented for each management option being considered?*
- *How is the evaluation of the management measures being conducted (e.g. technique, qualifications of assessors, etc.) and documented?*

4.4.6.2 Existing management measures acceptable for the marine spatial plan (Figure 10)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the purpose of the outcome of a MSP process step and the QOPs. When this principle is applied, the decision to maintain existing management measures is based on a common understanding of the level of risk in terms of the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process understand and concur that the existing management measures are adequate to achieve the objectives as supported by the information requirements of the QMP.

When a decision is made that the risks are acceptable and existing management measures are considered adequate, monitoring of the trends in the activities and development of the drivers operating in the management must still be conducted. In addition, monitoring of the status and trends of the state of the ecosystem within the ecosystem boundaries must also be conducted. This provides the baseline for future reviews of the plan as a means to confirm that the existing management measures are reducing the risk as low as reasonably practicable.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T1 Environmental/Ecologically sustainable: Given that the measures ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, monitoring the status and trends of the ecologically and biologically significant areas and species provides insight as to the effectiveness of the management measures in reducing the risks to the integrity of the ecosystem and ecosystem services. The monitoring plan and indicators must be able to detect changes that are attributable to the management measures from those influence by natural variability within the ecosystem boundaries.

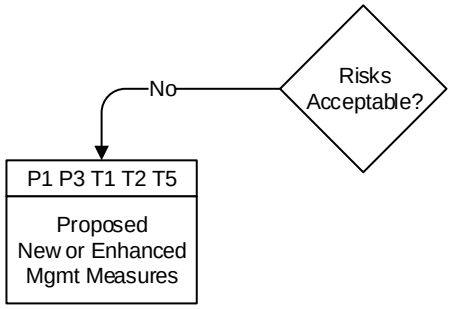
T2 Technologically feasible: Given that the methods, techniques and equipment for ecosystem protection should perform as expected, monitoring the frequency and type of incidents occurring between the activities of the drivers operating in the management area provides insight as to the effectiveness and performance of the management measures at reducing the risks of conflict between the drivers.

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes that enable and/or force the management measures to be performed, verifying the compliance and auditing the performance of the implemented management measures provides insight as to the level of compliance of those implementing the management measures as well as their capacity to implements the measures consistently

Quality management checklist

- *What could be the legal and policy liabilities and repercussions arising from not achieving the MSP or ecosystem management outcomes?*
- *What could be the strategic or international repercussions if the MSP or ecosystem management outcomes are not achieved?*
- *What are the monitoring plans needed to evaluate the effectiveness of the existing management measures?*

4.4.6.3 New or enhanced management measures needed for the marine spatial plan (Figure 10)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the purpose of the outcome of a MSP process step and the QOPs. When this principle is applied, the decision to enhance existing management measures or introduce new management measures is based on a common understanding of the level of risk in terms of the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest.

P3 Connectivity with objectives: The actions and decisions that are undertaken in the MSP process will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the two. When this principle is applied, the actions and decisions of the people involved in the planning process understand and concur that the new or enhanced management measures are required in addition to existing management measures in order to achieve the objectives as supported by the information requirements of the QMP.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T1 Environmental/Ecologically sustainable: Given that the measures ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, monitoring the status and trends of the ecologically and biologically significant areas and species provides insight as to the effectiveness of the management

measures in reducing the risks to the integrity of the ecosystem and ecosystem services. The monitoring plan and indicators must be able to detect changes that are attributable to the management measures from those influence by natural variability within the ecosystem boundaries.

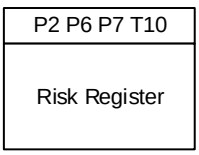
T2 Technologically feasible: Given that the methods, techniques and equipment for ecosystem protection should perform as expected, monitoring the frequency and type of incidents occurring between the activities of the drivers operating in the management area provides insight as to the effectiveness and performance of the management measures at reducing the risks of conflict between the drivers.

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes that enable and/or force the management measures to be performed, verifying the compliance and auditing the performance of the implemented management measures provides insight as to the level of compliance of those implementing the management measures as well as their capacity to implements the measures consistently

Quality management checklist

- *What could be the legal and policy liabilities and repercussions arising from not achieving the MSP or ecosystem management outcomes?*
- *What could be the strategic or international repercussions if the MSP or ecosystem management outcomes are not achieved?*
- *What are the monitoring plans needed to evaluate the effectiveness of the existing, enhanced or additional management measures?*
- *What criteria were used to evaluate the tolerability of the risks?*
- *Who is involved in that evaluation from the competent authorities, the industry stakeholders and the communities of interest?*

4.4.6.4 Marine Spatial Risk Register (Figure 10)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear measurable objective with defined outcomes for the management measures of the marine spatial plan establish a clear focus for all actions and decisions and enable the tracking of the implementation and progress towards the objectives as expected by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, people involved in MSP process understand which existing, enhanced and new spatial and temporal management measures will be considered in *risk treatment* to address the QOPs.

The risk registers maps the management measures along the cause and effects pathway of risk that should be developed within the context of the operational and environmental outcomes within the context of the marine spatial plan. The risk register

play an important role in identifying where and how management measures could contribute to reducing the risks.

P6 Conformity to best practice: The performance of the MSP process is greatly optimized and efficient when actions and decisions conform to standardized practices. When this principle is applied, normalized tools, such as the Bowtie analysis (ISO 31010:2009) and the risk register, ensure that the development and implementation of the marine spatial plan will be consistent with the priorities set by the governance body regarding the need to manage specific risks in *risk treatment*.

P7 Clear line of sight: The MSP process outputs are more likely to satisfy everyone involved when periodic review are conducted to verify whether there is a clear line of sight between the marine spatial plan and the QOPs based on the requirements and expectations of the competent authorities, industry stakeholders, communities of interest. When this principle is applied, the risk register provides the basis for the review and to make changes or realignment of the spatial and temporal management measures including priorities to be considered in the *risk treatment*. Thus, this ensures continual improvement of the planning process in light of a better understanding of the risk, new developments and knowledge. The QMP procedures would inform and provide everyone with a clear understanding of any realignment of work, activities and resources as well as seek approval for any changes to the MSP scope or objectives.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, the risk register plays an important role in transparently communicating and understanding risks from each of the perspective of the competent authorities, industry stakeholders and communities of interests.

Quality management checklist

- *Where is the risk register maintained and filed and how is its access controlled?*
- *How is the risk register made available to all participants for communication purposes?*
- *Who reviews and keeps the risk register up-to-date as decisions to develop new or enhanced management measures are made?*

4.4.7 Risk treatment

ISO 31000 stipulates that *risk treatment* is the process of modifying risks by avoiding the risk, eliminating the sources of risk, reducing the likelihood of a risk through prevention or mitigating the consequences. *Risk treatment* is the process of developing and implementing of management strategies or actions to address the risk or accepting the risks through informed decision-making.

In MSP, *Risk treatment* involves the review of the management options identified in *risk evaluation* and documented in the *risk register*. It is the processes of developing spatial and temporal management measures considering the costs, benefits and feasibilities of implementation. From a quality management perspective, the marine spatial plan also has to identify the competent authorities that are accountable to implement the measures in the management area, the administrative processes and programs that will be manage by the plan, the spatial and temporal management measures for the each of the activities and their respective drivers operating in the management area, the performance management framework of the plan, the environmental effect monitoring and reporting requirements. This step also includes the approval processes that the MSP Competent Authority has to follow to have the plan endorsed and to ensure that it is in line with the public policies that were in place at the onset of the planning initiative. *Risk treatment* and minimization is the practical intervention and management of human activities that will help to reduce the risks identified through planning the process. The output of the *risk* treatment is the marine spatial plan. Without the implementation of the plan, the marine spatial plan is only a conceptual or strategic document.

A management measure can eliminate the risks by controlling a driver's access to the management area; can change the likelihood of the events by controlling the activities of the drivers operating in the management area; or, can change the magnitude or extent of the impacts, consequences or repercussions by mitigating the effects of the event, if it occurs. It should be noted that new management measures should not generate new risk somewhere else in the management area or within the ecosystem boundaries.

In *risk evaluation,* the Bowtie analysis (ISO 31010:2009) is used as the tools to evaluate options and make decisions as to risks that should be managed as well as the risks that will not be managed. The Bowtie itself becomes the *risk register* of those decisions showing which risk being managed by the marine spatial plan as well as how they are managed. The risk register subsequently underpins the ecological, cultural, social, economic, and legislative framework and objectives that the marine spatial plan addresses.

Figure 11 provides an overview of the quality management elements involved in *risk treatment*. Based on the management options identified during the risk evaluation and documented in the *risk register* (Figure 10), the governance body initiates scientific and technical advisory processes to determine the costs, benefits and feasibilities of the proposed management options in contrast to the existing management measures and their risk reduction expectations. Based on the advice received, *risk treatment* is completed once the MSP Competent Authority has obtained approval for the implementation of the marine spatial plan in consultation with the other competent authorities, the industry stakeholders and the communities of interest.

Please note that grey shaded pictograms originate from a previous diagram and are explained in a previous section. They are not discussed again in this section.

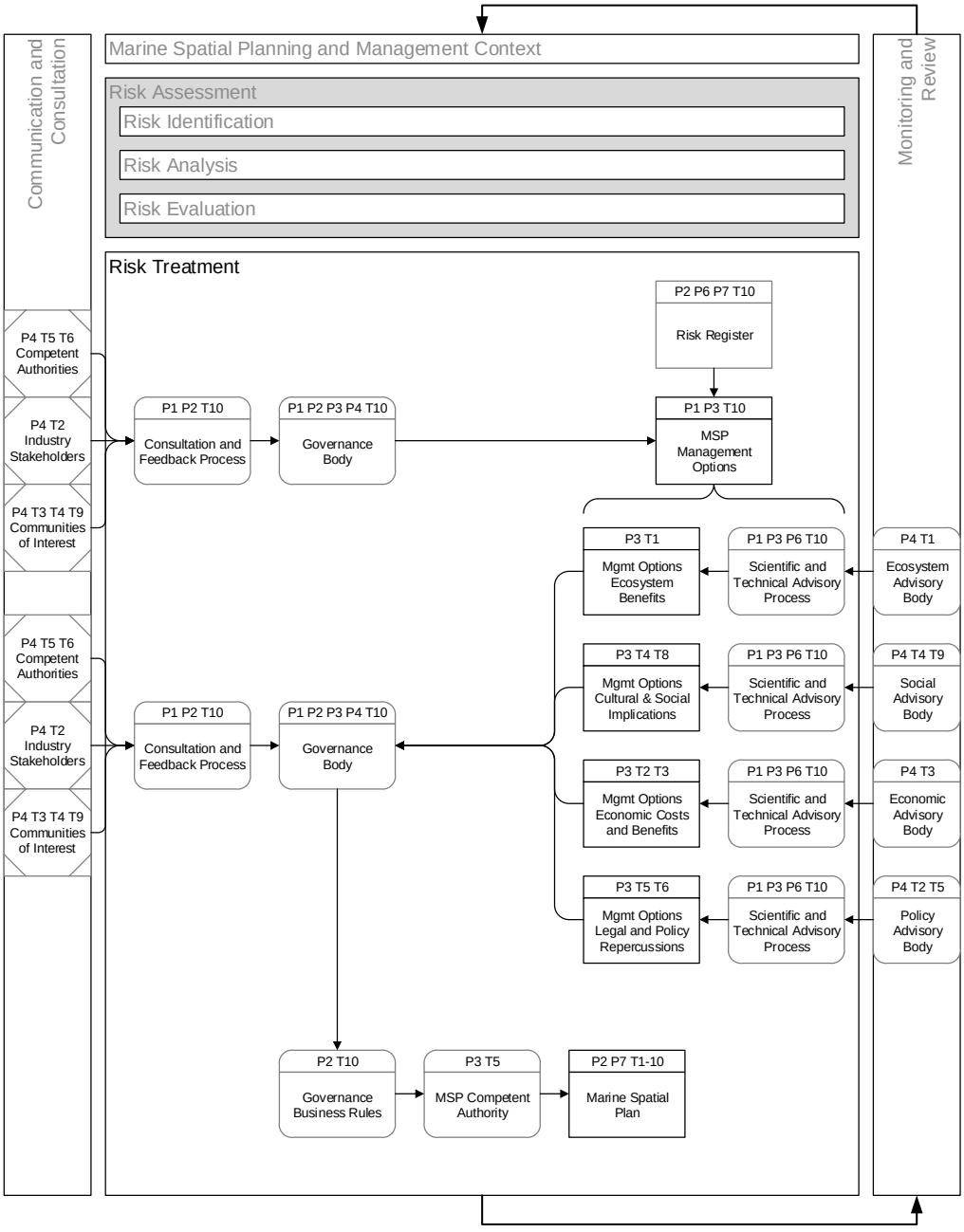
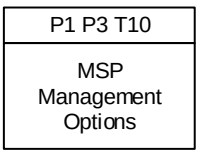


Figure 11. Marine Spatial Planning Risk Treatment

4.4.7.1 Spatial and Temporal Management Options (Figure 11)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P1 Consistency of purpose: The MSP process will deliver the required marine spatial plan when there is consistency between the management options selected and the QOPs. When this principle is applied, the management options selected would have been guided and derived from the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest.

The management options identify the management measures considered to be relevant at reducing risks to acceptable levels. All management measures to be included in the marine spatial plan have to be considered equitably to ensure that the relevant and pertinent measures are adequately integrated in the marine spatial.

P3 Connectivity to objectives: The management options that are selected will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the two. When this principle is applied, the selected management options will be those necessary to deliver the outputs needed to achieve the objectives and no others as supported by the information requirements of the QMP.

The management options must enable development and protect the ecosystem based on the goals and objectives in the public policy agenda. The marine spatial plan must abide to existing legislation and policies and the management outcomes that were established at the onset of the planning initiative.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T10 Effectively communicable: Given that the environmental management objectives are communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, risk management options play a key role in understanding how the risks will be managed by the marine spatial plan.

Quality management checklist

- *Are the proposed management options able to reduce the risks of not achieving the MSP and ecosystem management outcomes to a level as low as reasonably practicable (ALARP)?*
- *What is the economic and technical feasibility of the proposed management options in terms of implementation, enforcement and integration into operational activities?*
- *Are the management measures SMART?*

4.4.7.2 Management Options Costs, Benefits and Feasibility (Figure 11)

P3 T1	P3 T4 T8	P3 T2 T3	P3 T5 T6
Mgmt Options Ecosystem Benefits	Mgmt Options Cultural & Social Implications	Mgmt Options Economic Costs	Mgmt Options Legal and Policy Repercussions

Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P3 Connectivity to objectives: The management options selected for the marine spatial plan will be those necessary to achieve the QOPs and hence there will be demonstrable connectivity between the two. When this principle is applied, the management options

selected for the marine spatial plan will be those necessary to deliver the expected objectives and no others as supported by the information requirements of the QMP.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T1 Environmentally/ecologically sustainable: Given that the measures have to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, the ecological benefits should be in terms of the risk reduction to ecosystem features and processes to levels that are within the thresholds of indicators related to the integrity of the ecosystem within the boundaries of the ecosystem.

T2 Technologically feasible: Given that the methods, techniques and equipment for ecosystem protection will have to be available, the economic benefits should demonstrate that the management options are compatible with existing industry operations and standards.

T3 Economically viable: Given that cost-benefit assessments of the environmental management requirements have to indicate viability and sustainability, the economic costs should demonstrate that the management options are cost effective in terms of implementation and maintenance.

T4 Socially desirable/tolerable: Given that the environmental management measures that are required are understood and tolerated by society as being required and that societal benefits are delivered, social implications should demonstrate that the management options reduce the risks to valued ecosystem services to levels that are as low as reasonable practicable.

T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes that will enable and/or force the management measures to be performed, the legal repercussions should demonstrate that the management options are implementable under existing legislation and regulations and should not create regulatory compliance issues under other regulatory requirements.

T6 Administratively achievable: Given that the statutory bodies such as governmental departments, environmental protection and conservation bodies are in place and functioning to enable successful and sustainable management, the policy repercussions should demonstrate that the management options can be integrated within competent authorities or institutional programs and activities.

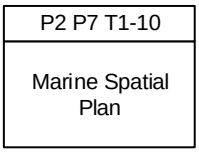
T9 Culturally inclusive: Given that the environmental management measures need to integrate cultural ecosystem consideration that may not have societal or economic value, traditional and cultural implications should demonstrate that the management options reduce the risks to traditional and cultural ecosystem services to levels that are as low as reasonable practicable.

Quality management checklist

- *What are the indicators and thresholds used to forecast the ecosystem benefits as a result of implementing the management options?*

- *What are the operating procedures and standards that will need to be updated as a result of implementing the management options?*
- *What are the costs of implementation as a result of implementing the management options in terms of training, equipment acquisition, changes to procedures, and impacts on production efficiency?*
- *What are the criteria used to assess and classify the level of social demand, acceptance and/or tolerance?*
- *What is the legislative and regulatory framework under which the management options would be implemented?*
- *What are the policy and program of the competent authorities that will need to be updated or changed as a result of implementing the management measures?*
- *What are the criteria and consultation processes used to demonstrate how the management measures reduce risks to traditional, cultural, social, and economic ecosystem services?*

4.4.7.3 Marine Spatial Plan (Figure 11)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P2 Clarity of purpose: Clear measurable objectives with defined spatial and temporal management requirements for each risk establish a clear focus for all actions and decisions and enable the tracking of progress as expected by the competent authorities, industry stakeholders, communities of interest and scientific experts. When this principle is applied, people involved in the MSP process understand the expected outcomes of each spatial and temporal management measures and how these address risks in relation to the QOPs.

P7 Clear line of sight: The marine spatial plan is more likely to satisfy everyone involved when periodic review are conducted to verify whether there is a clear line of sight between the QOPs and outcomes of the spatial and temporal management measures of the plan. When this principle is applied, the marine spatial plan may have to be periodically changed causing realignment of spatial and temporal management measures and resources; thus, adhering to adaptive management principles in light of new developments and knowledge. The QMP procedures would inform and provide everyone with a clear understanding of any realignment of work, activities and resources as well as seek approval for any changes to the marine spatial plan.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T1 Environmentally/ecologically sustainable: The marine spatial plan has the necessary spatial and temporal measures to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded.

T2 Technologically feasible: The marine spatial plan implements methods, techniques and equipment for ecosystem protection.

T3 Economically viable: The marine spatial plan is providing a benefits at costs that are as low as reasonably practicable.

T4 Socially desirable/tolerable: The marine spatial plan has the spatial and temporal measures that provide social benefits and ecosystem safeguards to levels that are as low as reasonably practicable.

T5 Legally permissible: The marine spatial plan has the required regional, national or international agreements and/or statutes, to enable and/or enforce the spatial and temporal measures to be performed.

T6 Administratively achievable: That the statutory bodies such as governmental departments, environmental protection and conservation bodies are in place and functioning to implement and sustain the administration of the provisions of the marine spatial plan in their programs and funding envelops.

T7 Politically expedient: The marine spatial plan is consistent with management approaches and philosophies of the prevailing political climate and has support of political leaders.

T8 Ethically defensible: The provisions of the marine spatial plan are ethically defensible in term of reducing the risk to ecosystem services as a result of development to levels that are as low as reasonably practicable.

T9 Culturally inclusive: The marine spatial plan integrates traditional and cultural ecosystem consideration that may not have societal or economic value.

T10 Effectively communicable: The marine spatial plan, goals, objectives and outcomes are communicated and understood by all the stakeholders.

Quality management checklist

- *What is the process that the MSP Competent Authority must follow to obtain approval for the implementation of the marine spatial plan?*
- *What is the process that the other competent authority must follow to obtain approval for the implementation of the marine spatial plan?*
- *What is the type of agreement needed to implement the marine spatial plan to ensure accountability of the competent authorities and industry stakeholders?*
- *Who is accountable for reporting on the implementation of the marine spatial plan?*
- *What are the human and financial resource implications for the implementation of the marine spatial plan from the perspective of the governance structure, secretariat, competent authorities and industry stakeholders?*
- *What are the complaints and feedback procedures once the marine spatial plan has been implemented?*

4.4.8 Monitoring and review

ISO 31000 stipulates that *monitoring and review* is the process of continuous checking, supervising, critically observing the implementation of the risk management plan, the risks, and the controls to identify changes in the performance of the plan in terms of meeting requirements and expectations. Review activities need to be conducted to determine if the plan is still suitable, adequate and effective in achieving objectives.

In MSP, the *monitoring and review* processes should encompass all aspects of the marine spatial plan implementation, objectives, scientific assumptions, and expectations of the competent authorities, industry stakeholders, and communities of interest. Although ecosystem monitoring is the usual monitoring activity that comes to mind, each of the QOP (*Ten tenets*) should have some form of monitoring as a means to tracking changes in objectives or policies, changes in the industry sectors operating within the management area, changes in the values that communities may have as well as new knowledge being generated by scientific research. From a quality management perspective of the specific spatial and temporal management measures of the marine spatial plan, monitoring activities should be designed to ascertain the performance of the plan in terms of the compliance of implementation, operational feasibility of the measures and effectiveness of the plan in achieving both development and environmental objectives. Periodic reviews and evaluations are needed to analyse the information and knowledge being generated by the various monitoring activities to determine if changes are needed to the marine spatial plan.

Figure 12 provides an overview of the quality management elements involved in monitoring and review. Based on the requirements of the marine spatial plan, the competent authorities that are signatories to the plan are responsible to implement the measures as well as monitor compliance and conformity to the requirements of the plan. They are also responsible to report the results of these activities to the governance body. In some jurisdictions, compliance and conformity reports may have to respect privacy requirements associated with third party information. In parallel, the ecosystem competent authority is responsible monitoring the environmental effects that are being managed by the marine spatial plan and may also conduct research activities to acquire a better understanding of the ecosystem. The ecosystem competent authority is also responsible to report the results to the governance body. In this framework, the monitoring of cultural and social trends as well as economic performance is assigned to the MSP competent authority. This may vary depending on the governance structure, roles and responsibilities. Subsequently, the governance body is responsible for reporting the monitoring results to the other competent authorities, industry stakeholders and communities of interest as well as to the public. Upon recommendations of the governance body or as per agreed review time frames, the MSP competent authority can initiate a review of the marine spatial plan that may start an entire marine spatial planning process.

Please note that grey shaded pictograms originate from a previous diagram and are explained in a previous section. They are not discussed again in this section.

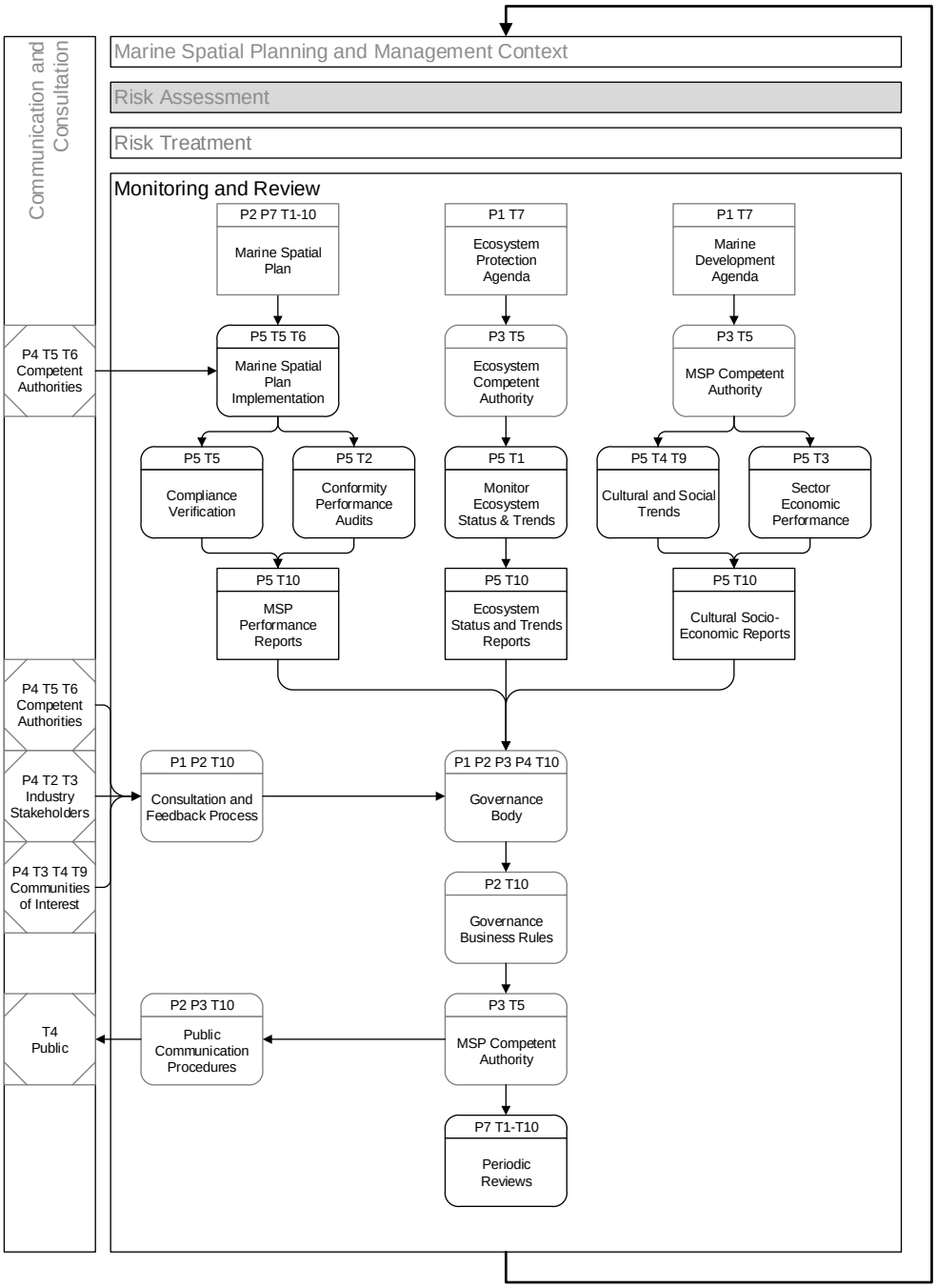
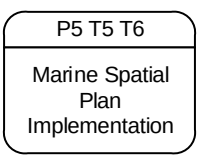


Figure 12. Marine spatial plan monitoring and review.

4.4.8.1 Marine Spatial Plan Implementation (Figure 12)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P5 Certainty of results: Desired results are more certain when the implementation of the marine spatial plan is endorsed by the competent authorities with the support of industry stakeholders and communities of interest. When this principle is applied, the competent authorities in the MSP process formally agree to implement the spatial and temporal management measures within their legislative authorities and policies and program and understand how these measures address the QOPs.

Quality Management Objectives for the Marine Spatial Plan (QOP)

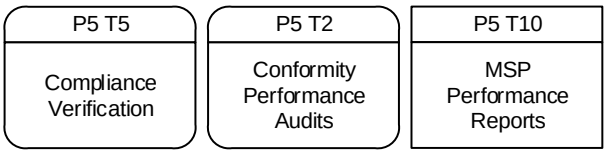
T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed, the competent authorities have to link the spatial and temporal measures of the marine spatial plan to their legislative and regulatory authorities.

T6 Administratively achievable: Given that the statutory bodies such as governmental departments, environmental protection and conservation bodies need to be in place and functioning to enable successful and sustainable management, the competent authorities have to incorporate the marine spatial plan into their administrative and policy processes such as licensing of activities and environmental impact assessments.

Quality management checklist

- *What is the work plan for the implementation of the marine spatial plan?*
- *Who is responsible for oversight, direction and reporting as to the implementation of the marine spatial plan?*

4.4.8.2 Compliance Verification and auditing (Figure 12)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P5 Certainty of results: Desired results are more certain when the compliance and conformity of the marine spatial plan requirements is verified and reported. When this principle is applied, the competent authorities that are accountable to implement and enforce the spatial and temporal management measures of the plan have the knowledge and understanding of the level of compliance stipulated by the QMP and QOPs.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T2 Technologically feasible: Given that the methods, techniques and equipment for ecosystem protection need to be effective and feasible, conformity audits provide assurance that the management measures are feasible in terms of design and implementation. An audit is a planned, independent, and documented evaluation to determine whether or not agreed-upon management measures conform to regulatory requirements, standards or guidelines. When non-conformities are found, corrective actions are then identified between the competent authority and the industry sector.

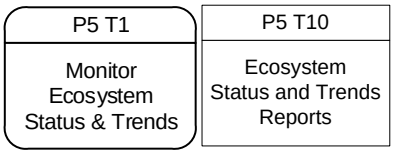
T5 Legally permissible: Given that there are regional, national or international agreements and/or statutes, that enables and/or force the management measures to be performed, compliance verification ensures that the legislative or agreed upon requirements of the marine spatial plan are implemented within the regulatory requirements of the competent authority.

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, compliance verification and joint audits play an important reporting and communication role regarding the implementation of the marine spatial plan. A history of non-conformity or non-compliance may lead to enforcement action as stipulated by legislation or may be an indication that the design of the given management measures is not optimal or feasible. The report content, however, must respect any privacy legislation or policies.

Quality management checklist

- *What are the compliance verification procedures to determine compliance of the regulated parties?*
- *Who are the competent authorities that have the necessary jurisdiction to conduct compliance verification?*
- *What are the regulated activities of the drivers that are regulated under the marine spatial plan?*
- *Who is accountable for initiating conformity or performance audits?*
- *How are joint audit process initiated and under what agreement?*
- *What is the conformity and performance audit framework?*
- *Who is accountable for preparing the audit report and responding to the findings?*
- *What is the formal approval process to initiate an audit and request corrective action plans?*
- *Who is accountable for preparing the audit report and responding to the findings?*
- *How will the MSP performance report be communicated and made available to all participants of the MSP plan?*

4.4.8.3 Ecosystem Status and Trends Monitoring (Figure 12)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P5 Certainty of results: Desired results are more certain when the ecosystem status and trends is monitored in relation to the spatial and temporal management measures of the marine spatial plan and that planned periodic reports are produced. When this principle is applied, people involved in the MSP process and, in some cases, the public will have the knowledge and understanding of the performance of the marine spatial plan in meeting ecosystem outcomes by the QMP and QOPs.

Quality Management Objectives of the Marine Spatial Plan (QOP)

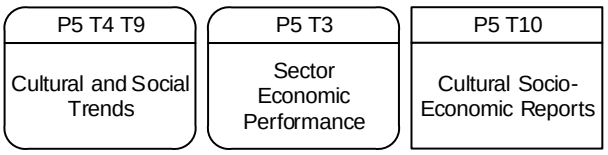
T1 Environmental/ecologically sustainable: Given that the measures have to ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded, monitoring of the ecosystem status and trends provides insight as to the effectiveness of the marine spatial plan at reducing the risks to the integrity of the ecosystem and its valued services within the ecosystem boundaries. The monitoring plan and indicators must be able to detect changes that are attributable to the marine spatial plan measures outside natural variability.

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets ecosystem status and trend reports play an important reporting and communication role regarding the effectiveness of the marine spatial plan.

Quality management checklist

- *Who is accountable for implementing the ecosystem monitoring program and conducting the data collection and analysis?*
- *How are the management measures of the marine spatial plan linked to the ecosystem monitoring activities?*
- *What are indicators used to monitor the environmental effects occurring at the ecosystem level?*
- *What are the threshold and criteria to ascertain the effectiveness of the management measures of the marine spatial plan at achieving the management outcomes?*
- *What resources are available to conduct the ecosystem monitoring program?*
- *Are the results biased by other sources of risk not covered by the marine spatial plan or are they biased by ecological change?*
- *Who is accountable for preparing the ecosystem status and trends report and responding to the findings?*
- *How will the ecosystem status and trends reports be communicated and made available to all participants of the MSP plan?*

4.4.8.4 Cultural and Socio-economic Monitoring (Figure 12)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P5 Certainty of results: Desired results are more certain when the cultural and social trends and economic performance is monitored in relation to performance indicators or targets and that planned periodic reports are produced. When this principle is applied, people involved in the MSP process and, in some cases, the public will have the knowledge and understanding of the performance of the marine spatial plan in meeting the marine spatial plan management outcomes as stipulated by the QMP and QOPs.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T3 Economically viable: Given that a cost-benefit assessment of the environmental management should indicate viability and sustainability, monitoring of the economic performance of sectors that are being managed by the marine spatial plan provide insight as to the plan's contribution to economic development and growth. Monitoring would also include the sustainability of the resource industry that depends on ecosystem services for their viability. The analysis of the monitoring result also needs to take into account economic shifts in performance that are outside the realm of control of the marine spatial plan.

T4 Socially desirable/tolerable: Given that the environmental management measures that are required or at least understood and tolerated by society as being required and that societal benefits are delivered, monitoring of the trends in cultural and societal values provides insight into the relevance of the ecosystem services that are being protected by the marine spatial plan. Monitoring itself and any changes in cultural and societal values would have to be validated through consultation processes with the relevant communities of interests.

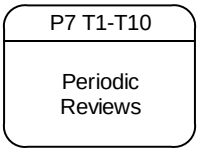
T9 Culturally inclusive: Given that the environmental management measures need to integrate cultural ecosystem consideration that may not have societal or economic value, monitoring of traditional uses and cultural values that have non-material benefits such as aesthetics, recreation or spiritual enrichment provides insights into the relevance of the cultural ecosystem services that are being protected by the marine spatial plan. It should be noted that such monitoring activities would be conducted in collaboration and consultation with the relevant communities of interests.

T10 Effectively communicable: Given that the environmental management objectives need to be communicated and understood by all the stakeholders especially to achieve the vertical and horizontal integration of the other 9 Tenets, ecosystem status and trends report play an important reporting and communication role regarding the effectiveness of the marine spatial plan to the competent authorities, industry stakeholders and communities of interest that have a vested interest in the marine spatial plan.

Quality management checklist

- *Who is accountable for monitoring the cultural and socio-performance of the marine spatial plan?*
- *What are indicators used to monitor the cultural trends and the socio-economic performance of the marine spatial plan?*
- *What human and financial resources are available to conduct these analyses?*
- *Who is accountable for preparing the cultural and socio-economic reports and responding to the findings?*
- *How will these reports be communicated and made available to all participants of the MSP plan?*

4.4.8.5 Marine Spatial Plan Periodic Review (Figure 12)



Quality Management Objectives of the Marine Spatial Planning Process (QMO)

P7 Clear line of sight: The performance of the spatial and temporal management measures is more likely to satisfy everyone involved when monitoring reports of the marine spatial plan assumptions, design and implementation is reviewed to verify whether the plan still meets the requirements and expectations of the competent authorities, industry stakeholders, and communities of interest. When this principle is applied, the objectives, management outcomes or the spatial and temporal management measures of the marine spatial plan may have to be modified or adjusted in order to adapt to changing policies, changing uses of the marine area or new scientific and technical knowledge adhering to principles of adaptive management.

Periodic reviews can identify new knowledge that should be integrated in the revised marine spatial plan. New data and knowledge regarding the ecosystem, social, cultural, and economic components and services may be identifying new vulnerabilities. New technologies or management strategies may have emerged to better manage the risks. New drivers or existing drivers may be generating new conflicts, pressures or environmental effects not anticipated in the original planning process. Changes may have occurred in the legislative and regulatory frameworks or governance mandates. Changes in public policies may have identified the need for new development of ecosystem protection and conservation aspirations.

Quality Management Objectives of the Marine Spatial Plan (QOP)

T1 Environmentally/ecologically sustainable: A review can determine if the management measures of the marine spatial plan can still safeguard the ecosystem features and processes given new knowledge and understanding of the ecosystem at the time of the review. The review may also identify gaps or misalignment in the ecosystem monitoring program.

T2 Technologically feasible: A review can determine if the methods, techniques and equipment used are feasible or should be changed given the latest technologies and practices.

T3 Economically viable: A review can determine if the marine spatial is still cost effective taking into account changes in the economic sectors operating in the management area.

T4 Socially desirable/tolerable: A review can determine if the management measures of the marine spatial plan is still providing the social benefits and ecosystem services safeguards to levels that are still desirable or tolerable.

T5 Legally permissible: A review can identify any changes in regional, national or international agreements and/or statutes that may require changes to the marine spatial plan.

T6 Administratively achievable: A review can determine if the statutory bodies such as governmental departments, environmental protection and conservation bodies are in a position to continue supporting the administration of the marine spatial plan.

T7 Politically expedient: A review can determine if there are changes in the public policy agenda that should be considered by the marine spatial plan in terms of new developments or ecosystem sustainability aspirations.

T8 Ethically defensible: A review can identify inequities that may have been inadvertently introduced in the initial planning process.

T9 Culturally inclusive: A review can identify gaps in traditional and cultural considerations introduced in the initial planning process.

T10 Effectively communicable: A review may identify gaps in communication and consultation during the initial planning process. A review is also used to communicate the continued relevance of the marine spatial plan, goals, objectives and outcomes.

Quality management checklist

- *What is the schedule for the review of the plan?*
- *Is the MSP competent authority accountable to initiate and perform the review?*
- *What is the formal approval process to initiate the review?*
- *Who has the authority to make changes to the marine spatial plan?*
- *What is the selection process to identify a review team? What are their qualifications?*
- *Are the reviewers "independent" from the approvers?*

5 EU Maritime Spatial Planning Directive

As a means of providing an MSP policy context to this QMS, this section discusses the recent EU maritime spatial planning policy setting as a means of providing a policy context to this QMS. Earlier in this document, we highlighted the strategic EU definition of maritime spatial planning:

> *«Maritime spatial planning is about planning and regulating all human uses of the sea, while protecting marine ecosystems.»*

In July 2014, the EU announced its Maritime Spatial Planning Directive (Directive 2014/89/EU (EU, 2014). This Directive on MSP is expected to support the Europe 2020 Strategy for smart, sustainable, and inclusive growth (*'the Europe 2020 Strategy'*) and the related communication of the Commission entitled *'Blue Growth: opportunities for marine and maritime sustainable growth'* (COM(2012) 494 final) (EU, 2012). In this communication, the Commission has identified a number of ongoing Union initiatives which are intended to implement the *Europe 2020 Strategy*, as well as a number of activities on which blue growth initiatives could focus in the future and which could be adequately supported by greater confidence and certainty for investors provided through maritime spatial planning.

The umbrella for all these strategies is formed by the Integrated Maritime Policy for the European Union ('IMP', COM(2007) 575 final) (EU, 2007). The objective of the IMP is to support the sustainable development of seas and oceans and to develop coordinated, coherent, and transparent decision-making in relation to the Union's sectoral policies affecting the oceans, seas, islands, coastal and outermost regions and maritime sectors, whilst achieving good environmental status as set out in the Marine Strategy Framework Directive (Directive 2008/56/EC) (EU, 2008).

Further reading:

EU (2008, 2014)

Given this context and working from the definition above, the main trust of the Directive on MSP provides the basis for the temporal and spatial planning and regulation of human uses of the sea while delegating the protection of the marine ecosystem to the EU Marine Strategy Framework Directive and its related Habitat and Bird Directives. Although the Directive on MSP sets a framework, Member States remain responsible and competent for designing and determining the format and content of such plans, including institutional arrangements and any apportionment of maritime space to different activities and uses. The following are a few extracts from the Directive showing how the analysis of such legislation can provide quality management elements to be considered in designing a QMS.

In paragraph (18) of the preamble, the Directive highlights the need for a structured planning process. As part of the *"full cycle"* approach, *"decision-making, implementation, revision or updating, and the monitoring of implementation"* highlights the need for a process that not only focuses on *"problem and opportunity identification, information collection, planning"*. It highlights the need for a process that will evaluate spatial and temporal management measures within a decision-making process that will lead to implementation accompanied by monitoring and review.

In paragraph (14) of the preamble, the Directive refers to the *"Marine Strategy Framework Directive"* to highlight the need for an ecosystem approach to maritime spatial planning to ensure that *"collective pressures"* are kept within *"the capacity of marine ecosystem to respond to human-induced changes"*. It also highlights the need to address *"specific ecosystems and other specificities"* of the *"marine regions"* setting the policies for establishing the boundaries of the ecosystem being considered for the

planning initiatives. It also introduces the concepts of the *"precautionary principle"* and *"preventive action"* to be taken into account in the design and development of *"spatial and temporal distribution of relevant existing and future activities and uses in their marine waters"* as specified in Article 8(1).

Article 1(1) of the Directive establishes the context for the planning initiative focused on *"promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources"*. However, the scope of the planning initiatives is set by Article 2 specifying the elements that will not be part of the planning activities such as town and country planning, defence and national security as well as Member State marine waters, sovereign rights and jurisdiction including international law.

Article 4 specifies the need to establish a formal planning process and within existing institutional and governance structures of the member states considering *"existing and future activities and uses and their impacts on the environment"*, *"natural resources"* and *"land-sea interactions"*.

Article 5 of the Directive set the objectives of maritime spatial planning activities within the context of environmental, economic and social aspects applying an ecosystem-based approach including preservation, protection and improvement of the environment as well as resilience to climate change.

Article 6 of the directive sets the minimum requirements for maritime spatial planning with the need to consider land-sea interactions, to include safety considerations in addition to environmental, economic and social aspects, to promote coherence between maritime spatial planning, to involve stakeholders and to ensure trans-boundary cooperation. It also sets a time frame for having the maritime spatial plan reviewed every 10 years.

Article 13 further specifies the need to designate a *"Competent Authority"* and in Article 14 the need for *"Monitoring and reporting"* of the maritime spatial planning activities and implementation. Article 15 specifies the need to comply with the Directive by "18 September 2016" and that the maritime spatial plans be *"established as soon as possible, and at the latest by 31 March 2021"*.

As a means of linking the new EU Maritime Spatial Planning Directive to the quality management system described in this document, relevant paragraphs of the preamble and articles of the Directive were linked to the various sections of the risk management process (Figure 13).

Reflecting the quality management elements found in the Directive, the *"Blue Growth"* strategy, is key in establishing the context. As part of establishing the context, the Articles 1 and 2 set the scope and subjective matter for the planning initiative where Articles 4 provides the direction to establish a planning process lead by the MSP Competent Authority as specified in Article 13 within the legislative context of the Member State as specified in Article 15. The environmental scope for the planning initiative is provided by paragraph (14) in the preamble of the Directive delegating authorities for environmental considerations to the Marine Strategy Framework Directive (MSFD) under the lead of an MSFD Competent Authority as specified in Annex II of the MSFD to ensure that the plan will contribute to the "good environmental status" as specified in Annex I of the MSFD. Stakeholder engagement and public communication requirements as specified in Article 9 of the MSP Directive.

Based on the management context, risk identification elements are found in Article 8(1) with the need to consider the spatial and temporal distribution of existing and future

activities while considering economic, social and environmental aspect for the planning of activities as specified in Article 5. Land-sea interactions are also introduced in the risk identification step because potential links to existing integrated coastal management initiatives as specified in Article 8. The "collective pressures" described in paragraph (14) of the preamble of the MSP Directive is based on the list of characteristics, pressures and impacts of Annex III of the MSFD.

The risk analysis is based on the minimum requirements considerations of Article 6 and the analysis of the interactions between activities and uses highlighted in Article 8(2). The analysis of environmental concerns is supported by the need for environmental targets as described in Annex IV of the MSFD.

The risk evaluation of the allocation of spatial and temporal management measures is derived from the need of *"apportionment"* of marine spaces as described in paragraph (8) and (11) of the preamble. In the risk evaluation, land-sea interactions of concern would be relegated to the land-based integrated coastal management processes as described in Article 6(2c) given that the MSP Directive does not have the authority to plan for land-based activities as specified in Article 2. Environmental spatial and temporal management measures would be established within the specification of the program of measures described in Annex VI of the MSFD.

In risk treatment, there is a need to produce a maritime spatial plan by 2021 as specified by Article 15(3) and, where warranted, in collaboration between Member States and Third Countries as specified in Articles 11 and 12. As described in paragraph (23) of the preamble, the MSP Directive also reminds planners that there may be need to conduct an environmental assessment in cases where the maritime spatial plan is likely to have significant effects on the environment.

Monitoring and report of the implementation of the MSP Directive is specified in Article 14 while a review of the plan would need to be initiated every 10 years as described in Article 6(3). Environmental monitoring requirements are relegated to the need for a monitoring program as described in Annex V of the MSFD.

This somewhat high level analysis demonstrates how one can find quality management elements for the planning process and the plan within legislative instruments such as the MSP Directive and even the MSFD and how the QMS described in this document can be used to implement MSP along the frame provided by the MSP Directive of the EU.

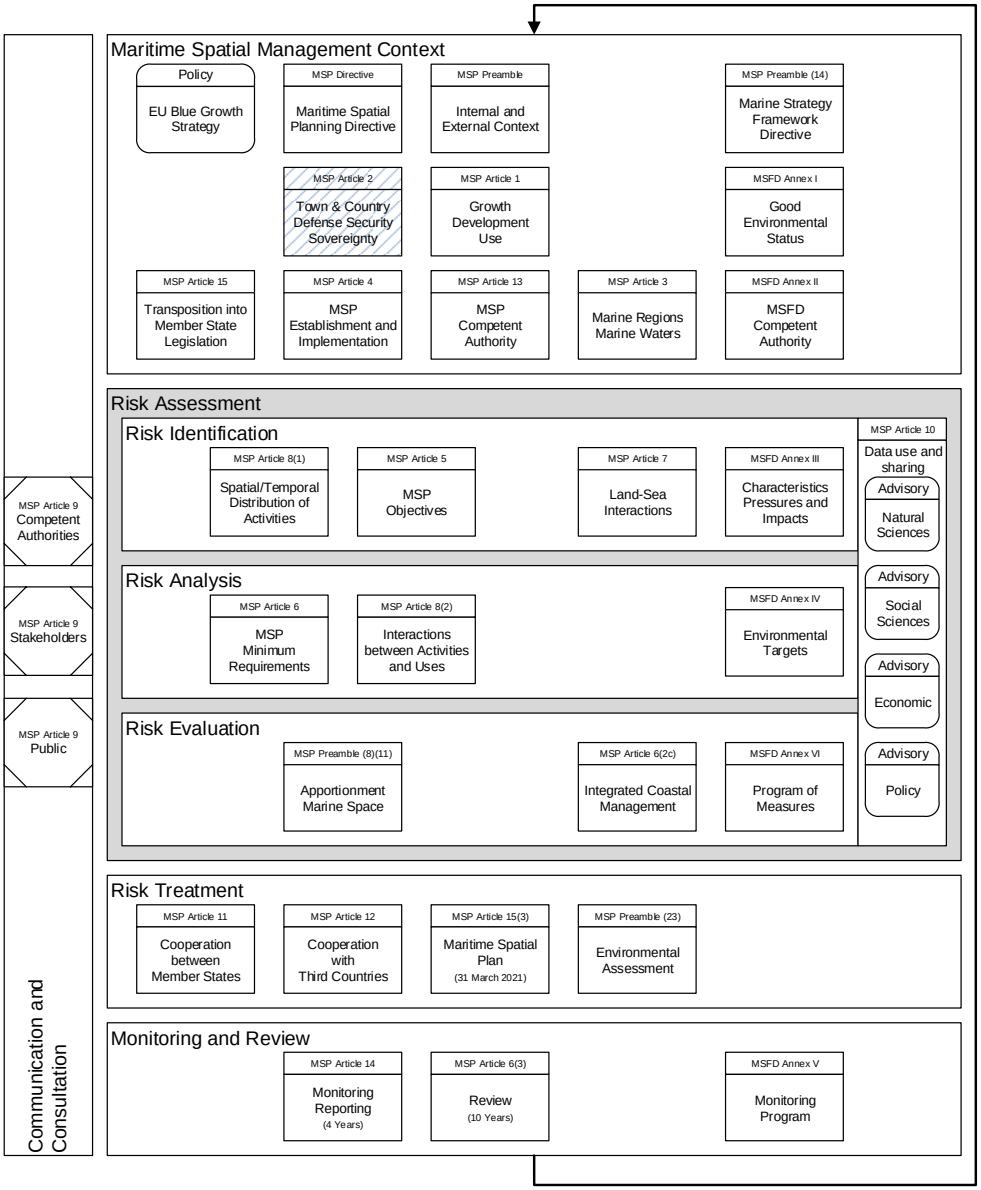


Figure 13. Alignment of the EU Maritime Spatial Planning Directive with the QMS.

6 Concluding remarks

A quality management system (QMS) should support and enable the MSP process but not become the goal of the MSP process. QMS outlines the **process** and the **outputs** of each process step; it identifies **who** is accountable for decision-making; it describes **who** will be consulted for advice, input and feedback; it describes **how** decisions are made and it also describes **what** the plan should address and integrate. It creates the basis for transparency and equity and, given the supporting documentation requirements, also provides traceability in terms of **why** and **how** a decision was made. The quality management objectives (QMO) for the planning process ensure that the quality objectives of the plan (QOP) will be addressed by the MSP process in consultation with competent authorities, industry stakeholders and communities of interest. The quality management programme (QMP) integrates the quality policies and quality processes and documents how the governance body in consultation with competent authorities, industry stakeholders and communities of interest will plan, implement, and assess the effectiveness and quality of the MSP process and of the marine spatial plan itself.

As mentioned in Section 2, a QMS operates on practices that embody common-sense principles and procedures providing the means for checking efficiency and relevance of the activities to the MSP process. Based on Hoyle (2011) quality management principles, QMOs are used to ensure ***due process*** of the MSP process to get it "***right first time***". The QMP encompasses these activities and procedures such as the planning framework and process with defined inputs and outputs, governance terms of reference and decision-making business rules. In addition are included consultation, advisory and feedback procedures, code of ethics and confidentiality requirements that are managed by a governance and advisory organizational structures. As a prerequisite, the QMP also includes secretariat functions with human and financial resources, project management and reporting requirements, as well as record keeping and information management. QMO and the QMP are not focused on environmental objectives and management, they simply provide the quality assurance procedures to ensure that the MSP process delivers a plan that consistently meet the quality objectives of the plan. They also provide the analysis framework according to the questions being answered.

The quality objectives of the plan (QOP) are used to ensure that all quality aspects for a successful and sustainable plan were considered and integrated during the MSP process to ensure that the resulting marine spatial plan is "***fit for purpose***". Given that the quality of the plan does not simply rely only on the quality of the ecosystem science, the QOPs ensure ***due diligence*** for having adequately integrating the ecological and socio-economic objectives and legislative requirements during the MSP process. QOPs are also used to define the "***need to know***" questions for scientific and technical advice instead of "***nice to know***" responses from science.

This QMS uses ISO standards extensively to define the framework of the process as well as the quality policies and quality objectives. Although some of the standards are for certification purposes, this QMS shows that ISO standards can be adapted to marine spatial planning reducing the start-up costs of any environmental planning initiative in having to develop processes, frameworks and definitions. Developing processes and procedures from scratch stifle limited resources allocated for the MSP process and can undermine engagement because of lengthy development work that does not produce tangible results. Using ISO standards provides a certain level of objectivity in

terms of framework and definitions. Using ISO standards also facilitates the sharing of information and lessons learned from one planning to another.

Managing quality within a quality management system that is based on quality policies, procedures and objectives provides clarity and consistency of purpose to everyone participating in the MSP process. The quality objectives provides assurance and confidence that the MSP process is focused and being conducted as effectively and efficiently as possible.

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8 Abbreviations and acronyms

DPSIR Driver–Pressure–State–Impact–Response

DPSWR Driver–Pressure–State–Welfare–Response

EAM ecosystem approach to management

EBMS ecosystem-based management system

EMS environmental management system

MSP maritime spatial planning

QMO quality management objective

QMS quality management system

QOP quality objective for the plan

RM risk management

SMART Specific–Measurable–Achievable–Realistic–Time-bound

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