



A Programmatic Foresight Process for JPI Oceans

WP 7 – Deliverable 7.2



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Preamble

Before delving into the concrete content of this deliverable, a few explanatory words need to be said in order to put the following paper into the context of the overall work package. The principal aim of work package 7 of CSA Oceans is to design a foresight process to support the development of JPI Oceans. This aim shall be realised through three steps: (i) the review of the major foresight processes and activities in the European marine and maritime field (deliverable D7.1), (ii) the run of a test foresight exercise, and ultimately (iii) the proposal of a framework for identifying the key future themes and challenges related to the healthy and productive development of our seas and oceans.

This deliverable is essentially a proposal for the test or pilot foresight exercise to be conducted in the framework of the CSA, however, it already goes a little further than that. Since this pilot process seeks to test out the procedures for a *JPI Oceans* foresight process, the deliverable develops a general procedure for such a process and subsequently applies this framework to the field of micro-plastics, the topic for the CSA pilot exercise. Hence the deliverable already delineates a first proposal for the final product of work package 7, i.e. the proposal for a JPI Oceans foresight process, which will be tested out in the pilot exercise. The final proposal for a JPI Oceans foresight process will be updated according to the experiences and lessons learned from the pilot exercise.

A needs-based foresight approach

However, it is important to note that the scope of the final proposal is envisaged to be broader than the process outlined below. Ultimately, any foresight process that is being developed should cater to the needs of JPI Oceans. So far, two principal needs have been identified. Deliverable *D7.1 Foresight for JPI Oceans – Definitional Report* has reviewed foresight and foresight-related activities in the European marine and maritime fields. The report asserted that no foresight process exists to date in Europe, which examines future developments and research needs and priorities in a continuous, participatory and integrated manner. While many forward-looking activities have already been and continue to be conducted, the majority of such endeavours have been one-off, drawn on the expertise of a small community, or been confined to specific aspects of marine and maritime RTD. Hence, there is no real forum for critical debate about the long-term strategic orientation of marine and maritime research in Europe, where the research and policy-making communities together with industry and civil society can openly discuss and devise integrated strategies for Europe.

At the same time, there is a strong desire to move JPI Oceans into its implementation phase. In order to accelerate this process, the JPI Oceans Management Board has decided to launch a number of pilot actions to be instigated prior to the availability of the finalised Strategic Research and Innovation Agenda and Implementation Plan, which are not expected

to be developed before late 2014. A procedure for a more targeted foresight process should therefore be developed which can be employed in order to ensure that such pilot actions are embedded in a wider strategic debate, or indeed in order to explore specific topic areas that the Management Board considers to require an engagement of JPI Oceans.

Proposal for a two-pronged foresight process

In order to cater to the above needs, work package 7 is proposing the development of a two-pronged foresight process, which will be fully outlined in the final deliverable of the work package:

The first part of this process is a *strategic approach* which should serve as a forum for critical debate about the future strategic orientation of marine and maritime research in Europe. This inclusive, integrated and thematically open (within the remit of JPI Oceans) process may be used to update the SRIA in the medium-term and could help to place JPI Oceans at the centre of European strategy-making in the marine and maritime fields. JPI Oceans is in a unique position to take on such a role, due to its long-term and integrated nature as well as its capacity to implement any strategy developed in the process. It disposes of such capacity since JPI Oceans is constituted of those national ministries and bodies that make the funding decisions for research and technology development. A full proposal for this strategic approach will be developed in the final deliverable of work package 7.

The second prong consists of a *programmatic approach* that seeks to develop solutions and proposals for actions for specific topic areas. It is a proposal for this process that is developed in the deliverable below. However, it is important that the following proposal is understood as **only one part of** a two-pronged JPI Oceans foresight process.

CSA Oceans D7.2: A Programmatic Foresight Process for JPI Oceans

I. Introduction

Following on from deliverable D7.1 “Foresight for JPI Oceans – Definitional Report”, which provided a definition of the foresight concept as well as a review of existing foresight processes in the European marine and maritime field, the following paper develops a proposal for a JPI Oceans foresight process. The paper is divided into two main parts. The first part outlines a proposal for a programmatic, thematically specific foresight process for JPI Oceans. This proposal describing the structure, governance and procedures of a foresight exercise should serve as a blueprint, which JPI Oceans may apply to any given topic area. By applying this blueprint to the field of micro-plastics, the second part then delineates how this process will look like in practice in the form of a CSA Oceans pilot foresight exercise.

II. Proposal for a Programmatic Foresight Process in JPI Oceans

A programmatic foresight process

A programmatic foresight exercise can be employed in order to explore and elaborate a specific topic area and shed light upon the key future needs and challenges associated with it. Such approach can either be used as an accompanying process for a JPI Oceans (pilot) action, or be used to examine new topic areas which JPI Oceans considers to be relevant but that require further analysis.

Essentially, the programmatic approach will be **demand-driven**, i.e. it will be instigated by the JPI Oceans Management Board in topic areas which the MB would like to explore further. It is, therefore, a more **top-down** process in which the MB sets out the general framework and the question to be answered by the foresight process (e.g. “what ought to be the research priorities in topic area X? And what ought to be the means for their implementation?”).

Moreover, the programmatic approach will have a strong **product-orientation**. The principal aim of this type of foresight will be to deliver a sort of roadmap for the topic area in question, in order to develop and support future JPI Oceans actions in the field. Such roadmap should not only outline normative visions of the future with the key future needs and challenges, but also proposals for their implementation in the form of concrete recommendations for actions to be carried out by JPI Oceans. Effectively, this roadmap is thus a proposal for a “joint programme” for the topic area in question. Once this roadmap is developed in the course of the foresight exercise, it will be presented to the JPI Oceans Management Board, which can choose to implement those recommendations it considers to

be valuable. Ultimately, the foresight exercise will thus inform and guide the JPI Oceans decision-making process in a given topic area.

Apart from producing a roadmap to support future JPI Oceans actions, the foresight exercise may also exhibit a number of **process benefits**. Firstly, the exercise will help to build up insights of important developments in the topic area in JPI Oceans consisting not only of science and technology challenges and trends but also of policy drivers, legal frameworks and socio-economic factors. It thereby facilitates the creation of a community of knowledgeable agents around JPI Oceans and potentially at the national level (see section below on member country engagement) and it is thus a direct contribution to mobilising the relevant stakeholder community in advance of possible JPI Oceans activities. Secondly, foresight capabilities will be built up both within JPI Oceans and among the participants, which should help them to better respond to future challenges and needs. And thirdly, a foresight process can also embed any JPI Oceans actions in the field in a wider process in which other aspects of the issue in question (scientific, ecological, socio-economic, technical, legal, etc.) are examined. Such a process could not only contribute to ensure that JPI Oceans acts in a coherent and integrated manner, but also that JPI Oceans becomes part of and shapes the wider political debates on marine and maritime issues in Europe.

The programmatic approach in practice: A six phase foresight process

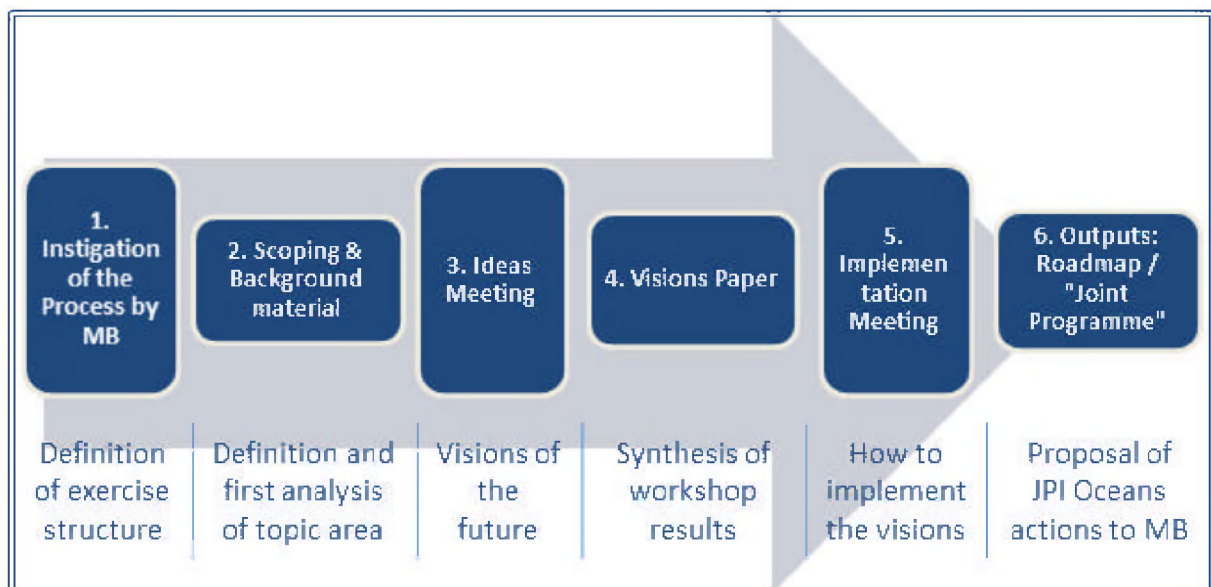


Figure 1 The six phases of a programmatic foresight process

Typically, a programmatic foresight process will pass through six phases, over a time span of approximately 12 to 18 months. After being instigated by the Management Board for a specific topic area (phase 1), background material outlining the main themes and key challenges of the topic area will be prepared (phase 2). This background material will then serve as the basis for a workshop, where normative visions of the future for the topic area will be developed (phase 3). The results of the workshop will be synthesised and presented

in a Visions Paper (phase 4), which will inform a second workshop concerned with exploring ways and steps for implementing the developed visions (phase 5). The results of the workshop will subsequently be developed into a roadmap or “joint programme” with concrete recommendations for JPI Oceans actions to be presented to the Management Board (phase 6). However, the foresight process does not necessarily pass through all six phases in such order, if the Foresight Steering Committee (see below) considers it to be advantageous to modify the proposed the process. The following section outlines each of these phases in more detail.

1. Instigation of the foresight process by the Management Board (Pre-foresight)

As with all JPI Oceans’ activities, it is the prerogative of the Management Board to instigate a foresight process in specific topic areas. Management Board members may propose to launch a foresight exercise on any given topic, however, they will need the support of at least one other member country in order for the process to be launched. The proposing country is also responsible for the funding of the exercise. If the MS in question is unable to provide an adequate budget for the exercise itself, it needs to secure financial contributions from other member countries. If they are unable to do so, the exercise will not be launched.

If the above conditions are met and there is sufficient interest and support in the Management Board, the process will be instigated. Once the interested parties agree on the exact topic in which the exercise is to be conducted as well as on the principal parameters of the exercise, the first step for the participating member countries will be to nominate a Steering Committee for the foresight exercise. This Committee will assume the project management of the exercise, i.e. be in charge of organising and guiding the foresight process as well as ensuring that the exercise stays on time, on budget and fulfils the objectives set out by the Management Board. The Foresight Steering Committee shall regularly report to the Management Board on the progress of the exercise. In order to ensure that the process is sufficiently embedded in the JPI Oceans governance structures, the Steering Committee shall consist of one member of the Management Board and one member of the Strategic Advisory Board whose work will be supported by one dedicated member of the Secretariat. In addition to these individuals, the Management Board, advised by the StAB, shall also nominate one or more external experts who can demonstrate a particular ability to moderate a foresight process as well as experience and/or expertise in the topic area in question.

Here special attention should be paid to process vs. topic expertise. The external expert(s) need to be “socialized” in the area to be addressed, but need not necessarily be a full content expert(s). This content expertise shall be brought to the process through the national contact points of the participating states (see below).

Level of member country involvement

Member countries which are willing to participate in the foresight exercise may choose to have different levels of engagement. The minimum involvement for participating countries is to nominate one national contact point for the duration of one specific foresight exercise. These contact points should be topic experts in the area at hand; however, it is the decision of each member country whether their contact point should have, for instance, a scientific, industry, civil society or public authority background. The contact points will be invited to participate in the foresight workshops. Moreover, they shall assist, together with their respective Management Board member, in the identification of knowledgeable individuals and potential participants in the foresight process at the national level. They shall also support the external expert on the Steering Committee in the collection of inputs for the exercise as well as support the preparation of background material, the visions paper, and the final product of the foresight process, the proposal for a “joint programme”.

It is also conceivable that member countries may want to go beyond this mere nomination and set up a national mirror group to the foresight exercise. Such mirror groups can conduct an accompanying foresight process at national level to feed into the larger JPI Oceans exercise. The advantage of organising such a national mirror process would be to build a national network of experts around the topic, collect information and input from a wide range of national stakeholders and to elaborate and identify the national interests and positions in the European context in a specific topic area. The results of the national process can then inform and provide input to the transnational foresight exercise. In order to achieve this, however, the national mirror group must ensure that its national process is well synchronised both thematically and temporally with the larger exercise.

Governance of the foresight process

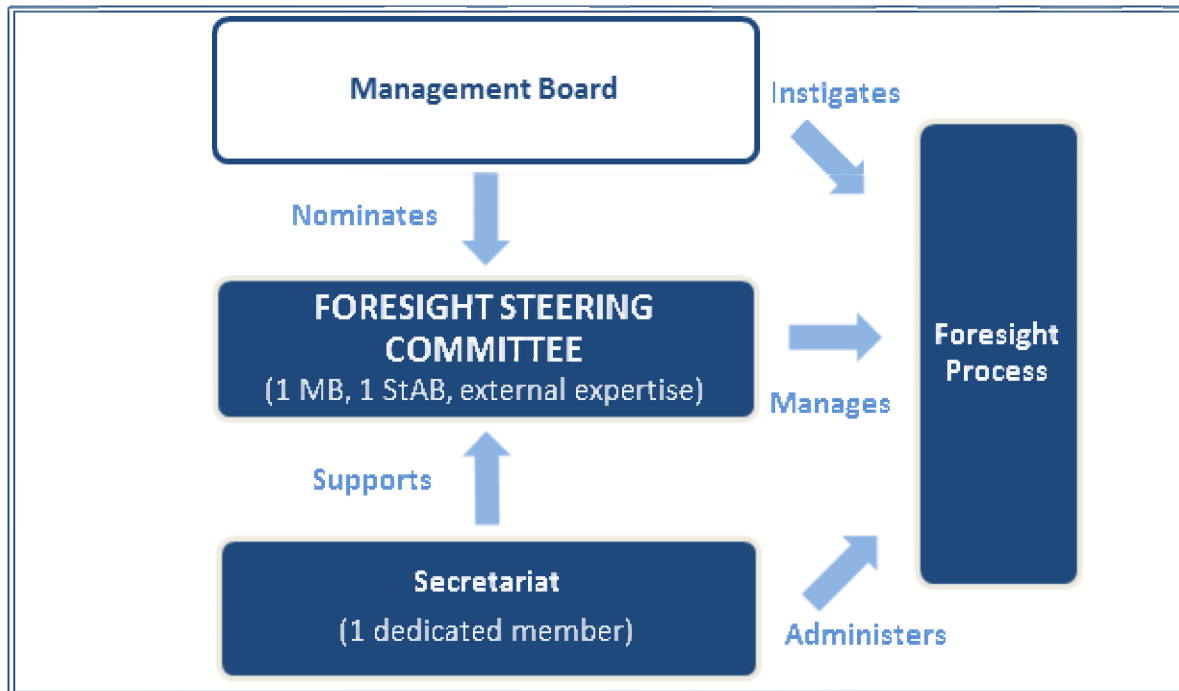


Figure 2 Governance of the foresight process

The following section outlines the governance and management of the foresight exercise and the specific roles of each of the individuals involved. These roles and tasks shall serve as guidelines and may be modified where required.

Role of the MB member on the Steering Committee

The MB member in the Steering Committee will assume the responsibility for the management of the project. She will have to ensure that the process fulfils the agreed objectives and stays on time and on budget. Moreover, the MB member has the task to make sure that the foresight exercise is tailored to the needs and specificities of JPI Oceans – that the exercise is thematically relevant and that recommendations for actions made remain within the scope of JPI Oceans.

Role of the StAB member on the Steering Committee

The StAB representative on the Steering Committee has the responsibility to advise on the scientific and societal relevance of the process. This comprises advising on the participants selected, the methods employed and the questions being addressed.

Role of the external expert(s) on the Steering Committee

The external expert(s) nominated by the MB, will have the responsibility to ensure the quality of the content of the exercise and to follow up on the progress of the project. Specifically, the external expert(s) should:

- assist in tailoring programmatic foresight process design and methodological choices to the contextual specificities of the chosen topic;
- assist in identifying and selecting the relevant experts and workshop participants;

- assist in gathering the strategic intelligence / inputs for the exercise, supported by the national contact points;
- moderate the workshops;
- draft the visions paper, in consultation with the national contact points;
- draft the roadmap, in consultation with the national contact points.

The external expert(s) may need to receive an honorarium for these tasks.

Since the external expert(s) has/have an important role to play, the appointment of the individual(s) is a crucial step of the process. Nominating expertise of international reputation will give legitimacy to the exercise, may help to mobilise support for the process, and ultimately raise the profile of JPI Oceans. It is important that the expert(s) can engage and mobilise the participants and is/are able to maintain a degree of neutrality. It is, therefore, advisable not to nominate individuals for this position who have specific vested interests in the topic area.

Role of the national contact points

The national contact points shall support the foresight process by:

- identifying and mobilising relevant national experts and workshop participants;
- supporting the gathering of strategic intelligence / inputs for the exercise at national level;
- participating in the workshops;
- supporting the drafting of background material, the visions paper, and roadmap.

Similarly to the expert(s) on the Steering Committee, the national contact points have an important role to play both nationally and at the European level. As mobilisers of the national community, workshop participants, and supporters of the drafting of background material, the national contact points shall be engaging, demonstrate expertise in the topic area without having vested interests therein.

Role of the dedicated Secretariat member

The member of the Secretariat will assume the responsibility of all administrative and facilitating tasks. This may include the organisation of the workshops, the writing of meeting reports, as well as the drafting of the preliminary background material.

2. Scoping and inputs for the foresight exercise

In this phase, the Steering Committee will have to oversee two principal tasks:

Firstly, to identify the individual expert participants for the exercise, with the support of the national contact points, according to the scope of the topic area as defined by the Management Board. The StAB shall be consulted in this step. Apart from the national

contact points, the Steering Committee shall select a limited number of workshop participants. When selecting participants, the Steering Group should also take into account relevant ongoing JPI Oceans activities in the field, such as pilot actions.

Secondly, to conduct a first analysis of the topic area at hand and collect preliminary information about the major future themes and trends as well as key challenges surrounding the problem, i.e. gathering of strategic intelligence. This strategic intelligence should be multidisciplinary comprising not only science and technology developments but also relevant policy drivers, legal frameworks and socio-economic developments. Assisted by the Steering Committee, the dedicated member of the Secretariat shall conduct this task by means of a desktop study / literature review. This desktop study may be complemented by other methods, such as surveys or social media tools, if considered necessary and beneficial to the exercise by the Steering Committee. The collected strategic intelligence will subsequently be collated and synthesised. This information will serve as input for the remainder of the exercise and will be presented to the participants, particularly in phase 3, the first workshop.

3. The Ideas Workshop

The stakeholders identified by the Foresight Steering Committee will be invited to participate in a foresight workshop, having received the background material prior to the workshop. The workshop will be moderated by an external expert and aims to engage the participants to think creatively about the future in the topic area, e.g. about the key future needs and challenges, about what situations would be desirable to achieve, and about what needs to happen to solve the societal challenge under examination.

Ultimately, the objective will be to develop normative visions of the future for the examined topic. However, the workshop does not necessarily need to conclude with one single common vision. For instance, the topic area may be broken down into different sub-topics, so a multitude of visions may be produced, which may be complementary but may also be conflicting. Since the workshop aims to stimulate the participants to reflect upon the (long-term) goals which JPI Oceans shall pursue in the given topic area, there may be a multitude of perspectives among the participants. However, rather than trying to stifle such critical debates, the workshop seeks to foster such discussions.

In order to develop these visions of the future, a wide range of experts – such as representatives from science, industry, civil society and public authorities – may be invited to participate in the meeting and/or express their views prior to the meeting. Since JPI Oceans seeks to act in an integrated manner and find solutions to societal challenges, this ambition shall also be reflected in the selection of the participants.

4. *Visions paper*

On the basis of a meeting report prepared by the Secretariat member, the external expert with the support of the national contact points will draft a visions paper. This paper shall synthesise the workshop discussions and outline the developed visions. It will thus provide information on key (future) challenges, needs and research gaps, which have been identified as a hindrance to the realisation of the visions. If the topic area has been divided into sub-themes, it is conceivable that individual sections can be drafted by (a group of) other participants.

The visions paper will serve as a basis for the subsequent development of action proposals for JPI Oceans. The paper will be presented and discussed at a second “implementation workshop”, but may also be circulated domestically by the national contact points, in order to collect input and ideas from the national expert community prior to this workshop. Such dissemination and input collection may not only lead to a more active engagement of expertise from the member countries, but also to wider and more diverse ideas for solutions to the identified challenges. Any input collected at national level should be collated and presented at the second workshop.

5. *Implementation workshop*

On the basis of the visions paper and any further input collected, the second workshop will seek to translate the visions into concrete action proposals. The workshop discussions shall focus on the best means for realising the visions, in particular, on how to realise the visions through the JPI Oceans framework. The aim of the workshop will thus be to develop ideas and proposals for concrete actions that the JPI Oceans member countries can implement in order to address the identified challenges and move towards the previously developed visions. Since JPI Oceans does not have a pre-defined toolkit, but its actions rather take on the form of fit-for-purpose solutions, a wide range of activities may be proposed. However, the workshop may want to address issues such as research and technology needs, capacity and infrastructure gaps, policy and legal frameworks, user needs, education gaps, etc.

Since the workshop focuses on the implementation and solution side, it is likely to be of a more technical nature. Hence the composition of the participants group shall also reflect this need. Science and industry representatives as well as public authorities shall be strongly represented in this workshop, as they are the most likely to be the ones implementing any of the solutions identified.

6. *Roadmap or “Joint Programme”*

On the basis of a meeting report prepared by the dedicated member of the Secretariat, the external expert(s) together with the national contact points will develop a roadmap for the topic area at hand. This roadmap is effectively a proposal for a “joint programme” for this

topic area. Once again it is conceivable that individual sections of the roadmap are drafted by working groups. This roadmap will not only include the developed visions, but also an implementation plan with concrete recommendations for JPI Oceans' actions. Drafts of this roadmap may also be circulated for comments among the workshop participants or to a wider community by the national experts.

Once this roadmap is finalised, it will be presented to the JPI Oceans Management Board, which can choose to adopt and implement any of the recommendations made in the roadmap.

III. Applying the Programmatic Foresight Process: A Pilot Exercise in Micro-plastics

Introduction

Marine litter consists primarily of plastic (Browne et al. 2011), a material that degrades very slowly and whose concentration in the oceans is increasing from year to year due to a rising production (Plastics Europe 2006) and bad waste management on land and sea (Ribic et al. 2010). Bigger pieces of marine litter pose problems for animals like birds, seals, fishes and turtles as they can get entangled and wounded or accumulate it in their stomachs (Derraik 2002). But smaller fragments of plastic debris – so called micro-plastics – also stress the marine ecosystems worldwide.

The term “micro-plastic” is generally used for plastic particles with diameters of less than 5mm (Arthur et al., 2009) and it can be found at the sea surface, the sea column and at the seabed. There are mainly two formation ways for micro-plastics. Primary micro-plastic is produced as such, for instance, for cosmetics as a peeling or as pellets for further processing and is transported into the ocean through the sewage systems. Secondary micro-plastic emerge by fragmentation of larger pieces into smaller ones through mechanical processes triggered by wind, waves or by sunlight. One common source of secondary micro-plastics are fibers from synthetic clothes which break away during the washing process and find their way into the sewage system and ultimately the oceans.

Ingestion by animals is one of the principal threats emanating from micro-plastics in the marine environment. As micro-plastic pieces are comparable in size to plankton, they can enter the food chain at the bottom and may reach higher levels (Thompson et al. 2004), thus, potentially ending up in the human food chain. During this process, micro-plastics may operate as transport vectors for toxins (Gregory 2009) since plastic is able to absorb persistent organic pollutants (POPs) which include toxic substances. Once a plastic particle is ingested by an organism, toxins and ingredients like plasticizers may be released thereby harming the animal, as the substances accumulate in its cells and tissues (Moos et al. 2012). Furthermore animals may be (fatally) harmed by sharp edges on freshly fragmented pieces or due the fact that plastic cannot be excreted by many animals leading to an accumulation in the stomach and finally to starvation.

Since micro-plastics pose a real threat for both the marine ecosystem and potentially human beings, it is a societal challenge that is widely recognised to require action. Yet our understanding of the scope of the problem and possible solutions is still underdeveloped. Therefore, innovative research and technology development are needed to address this issue. As micro-plastics in the marine environment constitute a global problem that calls for cross-cutting and long-term approaches, international cooperation is required in this field.

The Management Board of JPI Oceans has therefore decided to tackle this problem area, a decision that is reflected in two ways. On the one hand, the Management Board has launched a pilot action in the field, which proposes to standardise monitoring methodologies, to determine and quantify micro-plastics in the marine environment, to investigate sources and sinks for micro-plastics as well as mechanisms for their release, transport and deposition, and to look at possible remediation measures. The pilot action thus principally aims to improve our understanding of the problem area at hand. While such an understanding is absolutely necessary to grasp the problem, there is a range of further ecological, socio-economic and technological issues which need to be addressed in order to move towards a solution of the problem. The Management Board has therefore endorsed the instigation of a programmatic pilot foresight process on the topic of micro-plastics in the context of the Coordinating and Support Action (CSA Oceans). A proposal for such a foresight process is outlined in the following sections on the basis of the six-phase programmatic foresight proposal developed in part II.

1. *Instigation of the foresight process (Pre-foresight)*

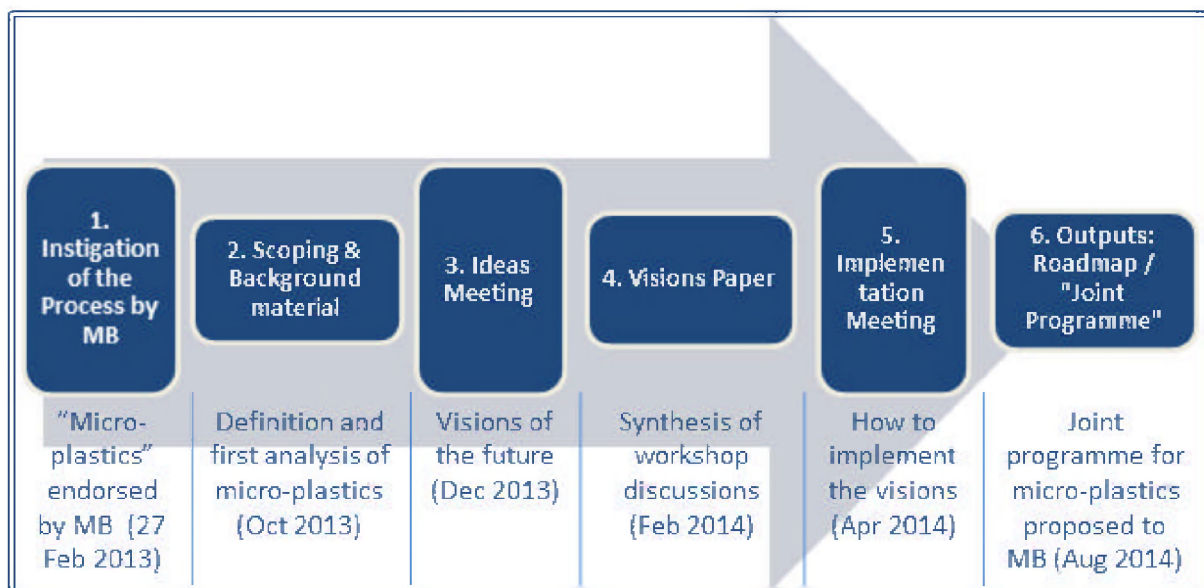


Figure 3 A programmatic foresight process for micro-plastics

Since the pilot foresight exercise is conducted in the framework of *CSA Oceans*, there are a few particularities that differentiate this exercise from the proposal for a *JPI Oceans* foresight process. However, these differences are mainly related to the administration and steering of the exercise, rather than the content and procedures.

Firstly, the exercise has been launched by the CSA – rather than by the MB, albeit, the topic for the exercise has its endorsement – and will thus be financed through this project.

The Steering Committee of the pilot foresight will consequently have a slightly different composition. The Management Board is invited to nominate one MB member as well as a member of the Strategic Advisory Board to join the Steering Committee¹. External expertise will be provided, amongst others, by Mr Totti Könölä (*Impetu Solutions*, Finland/Spain), a foresight expert who has experience in the Joint Research Centre's Institute for Prospective Technology Studies and who has been involved in several European transnational foresight exercises. Since the pilot exercise principally aims to test and develop a procedure for a JPI Oceans foresight process, it is essential to acquire such procedural expertise. Apart from these individuals, the CSA Oceans Work Package 7 will also be represented on the Steering Committee, and will assume the project management. Furthermore, Work Package 7 will also assume all administrative tasks of the pilot foresight process, i.e. the work foreseen for the dedicated member of the Secretariat in the foresight process. The Steering Committee shall seek to ensure that the foresight exercise is developed in complementarity to the JPI Oceans pilot action "ecological aspects of micro-plastics".

All Management Board members interested in participating in the foresight exercise are also encouraged to nominate a national contact point. This individual will be invited to participate in the workshops and should assist in the identification and mobilising of stakeholders at the national level. Moreover, the national contact points will be invited to contribute towards the background paper, visions paper and the final roadmap. National contact point should preferably be experts on micro-plastics, e.g. scientists or industry representatives, so that content expertise is brought into the exercise.

2. Scoping and inputs for the foresight exercise

In phase two, the Steering Committee needs to identify a limited number of experts in the field of micro-plastics – e.g. scientists and industry representatives, members of civil society or of public administrations – that will be invited to participate in the workshop(s). The national contact points should also be consulted in this selection process. Please note that the participants in both workshops do not need to be identical (see below).

Secondly, background material, which will serve as input for the ideas workshop, will have to be prepared. This material will provide a first analysis of the micro-plastic topic area and will take on the form of a report or reports. Specifically, the report(s) should give a definition of micro-plastics and provide a sort of literature review. They should highlight the main challenges and problems of micro-plastics in the marine environment, that is, inform about the main sources of micro-plastic, delineate why micro-plastics pose a problem and threat, and give an overview of the principal obstacles to solving the problem in terms of

¹ Nominating these two individuals is not strictly necessary given that the process is conducted in the CSA, however, such involvement would help to ensure that the foresight process stays closely connected to JPI Oceans.

research, technology, the legal and policy framework and socio-economic factors. It is envisaged that a report will be drafted by Aleke Stöfen (*University of Trier*), a law researcher on micro-plastics, and Heather Leslie (*VU Amsterdam*), ecotoxicologist, who will be engaged by Work Package 7. This report(s) will be circulated among the national contact points for comments, and will subsequently be distributed to all workshop participants prior to the workshop in order to create a basic common understanding of the micro-plastics challenge and to provide a basis for the workshop discussions. Moreover, national contact points may further disseminate the paper and collect input from domestic expert communities.

3. *The Ideas Workshop*

The selected stakeholders will be invited to participate in a one-day workshop. The principal objective of this workshop is to analyse the challenges associated with micro-plastics in the ocean and to develop normative visions of the future for this topic area. It might address such questions as: by how much should we reduce the amount of micro-plastics in the marine environment, for instance, by 2035? What do we need to know about the effects of micro-plastics on marine ecosystems and human beings? What kind of technological advances do we require in order to prevent plastics from reaching the oceans, and what technology would be needed and desirable in order to clean up the seas?

In order to get the participants to think and debate creatively about desirable futures, a range of foresight methods will be employed. Moreover, the selection of workshop participants shall reflect the aim of developing visions of the future. At this stage, the participants do not necessarily need to have detailed technical knowledge of micro-plastics and the scientific challenges surrounding it, knowledge that national contact points will bring into the process. Instead, the workshop should have a slightly wider range of participants in order to foster critical debate and alternative thinking among the individuals.

4. *Visions paper*

Work package 7 will prepare a visions paper, based on the discussions of the ideas workshop. This report will synthesise the workshop results and outline the visions developed. It will thus delineate, for instance, the key future challenges and needs in research and technology development in the field of micro-plastics that have been identified and provide an overview of the obstacles or needs for changes in the policy and legal frameworks.

This paper will be drafted by Work Package 7, with input from both external experts and national contact points. The paper will be circulated among the workshop participants for comment and will be presented at the implementation workshop, thus serving as a basis for discussion and for the development of JPI Oceans' action proposals. National contact points may want to circulate this paper among domestic expert communities with a view of gathering ideas and input for the implementation workshop.

5. Implementation workshop

Building on the visions developed, the aim of this workshop is to develop proposals of how JPI Oceans can address the challenges of micro-plastics in the marine environment. The workshop participants will be encouraged to come up with suggestions of how the previously developed visions can be realised and how the challenges and needs that were identified can be addressed. Specifically, the workshop will seek to extract recommendations of how the visions can be translated into concrete actions in the JPI Oceans framework.

The composition of workshop participants should reflect this ambition. Since this workshop focuses on the implementation of solutions, the participants should primarily comprise those groups that are likely to be implementing any recommendations made, i.e. scientists, industry representatives and JPI Oceans Management Board members. There may thus be a difference in participants compared to the ideas workshop.

6. Roadmap or “Joint Programme”

The final product of this foresight process will be a JPI Oceans roadmap for micro-plastics, which will effectively be a proposal for a “joint programme”. This roadmap will outline the challenges associated with micro-plastics as well as the developed visions and make recommendations of how to implement these through JPI Oceans, thus bringing together all elements of the foresight process. The joint programme should comprise concrete proposals for JPI Oceans’ actions also taking into account ongoing activities, such as the pilot action “ecological aspects of micro-plastics”.

The roadmap will be drafted by Work Package 7 with assistance from external experts and the national contact points. Drafts of this roadmap may be circulated among workshop participants for comment as well as among domestic expert communities through the national contact points. The final draft will then be presented to the JPI Oceans Management Board, which may choose to implement any of the actions proposed.

IV. Bibliography

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