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1. INTRODUCTION

The Maritime sector overall characteristics

The MARITIME industries are an important sector of the European Economy. With more than 70% of Earth's surface covered by water, the 'blue' economy is a large and very diverse sector. The waterborne economy is diverse, encompassing different sectors, among which are transport, fisheries, shipbuilding and repair, offshore oil and gas, aquaculture, renewable energy, tourism, etc.¹

According to the Blue Growth strategy of the European Commission, the 'blue' economy as a whole accounts for '5.4 million jobs and generates a gross added value of almost €500 billion a year'.² Globally, about 90% of global trade is done by sea.³ In Europe, about 90% of all external freight trade is carried out by sea and 40 % of intra-EU exchanges in terms of ton-kilometers are done by short-sea shipping.⁴ Waterborne transport is also an important element of the maritime sector with 400 million passengers using European ports, contributing to regional economies. Europe also benefits from a large number of ports handling 3.7 Billion tons in 2012 and employing 1.5 million workers.⁵

In addition to seaborne trade, there are about 37,000 kilometres of waterways connecting numerous European cities and industrial regions.⁶ This makes inland waterways transport an important player with high potential in the transport of goods. A EU white paper from 2011 sets the goal that, by 2050, about 50% of medium distance intercity passenger and freight journeys from road will shift to rail and waterborne transport⁷ and '30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050'.⁸

It is expected that waterborne industries will continue to grow, driven by a number of global trends such as growing population, expectations for satisfactory health safety and security, increasing demand for food and water, economic growth of developing countries, and higher energy consumption.⁹ According to a recent report,¹⁰ climate change and digitalisation are expected to be the

¹ For more see <http://ec.europa.eu/assets/mare/infographics/>;

² http://ec.europa.eu/maritimeaffairs/policy/blue_growth_en

³ 'International Shipping Facts and Figures – Information Resources on Trade, Safety, Security, Environment', Maritime Knowledge Centre 6 March 2012, p. 7

⁴ http://ec.europa.eu/transport/modes/maritime_en

⁵ https://ec.europa.eu/transport/modes/maritime/ports/ports_en

⁶ https://ec.europa.eu/transport/modes/inland_en

⁷ https://ec.europa.eu/transport/themes/strategies/2011_white_paper_en

⁸ 'The implementation of the 2011 White Paper on Transport "Roadmap to a Single European Transport Area – towards a competitive and resource-efficient transport system" five years after its publication: achievements and challenges', Commission Staff Working Document,

Brussels, 1.7.2016, SWD(2016) 226 final, available at: https://ec.europa.eu/transport/sites/transport/files/themes/strategies/doc/2011_white_paper/swd%282016%29226.pdf, p.21

⁹ <http://www.maritime-rdi.eu/media/20004/global-trends-driving-maritime-innovation-brochure-august-2016.pdf>

¹⁰ 'Driving Maritime Innovation Global Trends Driving Maritime Innovation', MESA on behalf of Waterborne TP, 2016, available at: [http://www.maritime-rdi.eu/media/20004/global-trends-driving-maritime-innovation-brochure-august-](http://www.maritime-rdi.eu/media/20004/global-trends-driving-maritime-innovation-brochure-august-2016.pdf)

two major factors to influence the waterborne sector. All these factors will drive the global and European waterborne sectors and will lead to new opportunities.

Research and innovation are essential to ensure the competitiveness and ability of the European waterborne sector to meet the challenges of the future¹¹

The Waterborne Platform

“The WATERBORNE Technology Platform is an initiative that came forth from the Maritime Industries Forum (MIF) and its R&D committee in 2005 and is making significant efforts to regularly update R&D strategy for European competitiveness, innovation and the meeting of regulations.

In the area of Sustainable Waterborne Transport, WATERBORNE has identified the following priorities:

- Assuring security of supply
- Increasing the energy efficiency of ships and vessels
- Minimising the environmental impact of ships and vessels
- Building safer ships and vessels
- Increasing competitiveness
- Recruiting and retaining a skilled workforce
- Developing advanced waterborne infrastructure including e-maritime solutions

In order to achieve the “Europe 2020” objective of smart, sustainable and inclusive growth and to address the dual challenges of societal and economic progress, WATERBORNE has issued a declaration on the aims of research and innovation:

- we will deliver more extensive, integrated, efficient and sustainable waterborne transport systems and infrastructure
- we will provide increased support for the emerging offshore food, energy and minerals sectors
- we will reduce our impact on the environment
- we will play an important role in delivering a more competitive and sustainable low carbon economy
- we will continue to prioritise safety and security within the Waterborne community

The Waterborne medium and long-term Vision is carried by three pillars, as follows:

- Safe, Sustainable and Efficient Waterborne Transport
- A Competitive European Waterborne Industry
- Managing and facilitating the growth in transport volumes and the changes in trade patterns

“¹²

2016.pdf

¹¹ <http://www.maritime-rdi.eu/media/15816/waterborne-newsletter-issue-3-final.pdf>

¹² SETRIS, Deliverable 3.5, p.6

Scope of the evaluation

The objective of this report is to present the results of the assessment of the performance of the Waterborne R&I programme developed by the Waterborne Technology Platform. The main impact of the assessment will be the updating of the Waterborne R&I programme. Together with the results of the MESA project, the assessment will serve as a basis to identify gaps in the current programme and ways to fill them. The review of the Waterborne R&I programme is part of the SETRIS project. The report starts with a short introduction to the Waterborne sector, followed by an introduction of the Waterborne TP. This is followed by a definition of the evaluation scope and a short description of the evaluation methodology. Finally, the results of the evaluation are presented. Within SETRIS, the evaluation is focused on several targets and innovation challenges as described in Deliverable 3.5. In order to structure the evaluation, a list of research projects related to Waterborne R&I was assembled. The list differentiates between projects related to: 1) Transport and interoperability, 2) Green Shipping, and 3) Blue Growth.

Transport and Interoperability:

33 projects were identified to be related to transport and interoperability. These cover a quite varied number of topics, including logistics, interoperability, infrastructure and ports, and safety.

Green Shipping:

Generally speaking, Green Shipping is concerned with the environmental impact of shipping, including air pollution, water pollution, impact of maritime activities and accidental pollution. Even though shipping is relatively more energy and emissions efficient compared to other modes of transport, it is expected that environmental effects will increase with the increase in trade and traffic in seas. Therefore, further research is aiding to ensure that airborne emissions are reduced (through after-treatment technologies, improved propulsion and reduced resistance, as well as alternative fuels). Water pollution includes oil spills, coating pollution, but also noise pollution and combating invasive species.¹³

For the current evaluation of Waterborne TP R&I programme, 6 European, FP7 projects were identified as related to Green Shipping, mainly focussed on emissions to water and air. When it comes to water emissions, past projects dealt with developing guidelines for the reduction of underwater noise (AQUO), and with improvements of environmental performance of antifouling materials (BYEFOULING, LEAF, SEAFRONT). As to air emissions, two projects have been identified - JOULES and TEFLES. While the main objective of TEFLES was to develop and combine after-treatment, hydrodynamics and power-generation technologies for emission reduction in ships, JOULES concentrated on the comparison of candidate technologies focusing on integration of energy saving technology in early design stages.

¹³ http://ec.europa.eu/research/transport/pdf/waterborn_web.pdf

Blue Growth:

There is a need to develop industrial activities at sea in order to meet challenges raised by the scarcity of resources and availability of land. The Waterborne TP Blue Growth Working Group was set up in June 2014 with the aim to provide engineering and technology solutions to support businesses willing to harness the economy of the sea and interested in the new opportunities for sustainable growth. In June 2016, the Waterborne TP Blue Growth Working Group defined key challenges that need to be overcome in order to make the most of the blue economy.¹⁴ Three of these challenges have been identified to reflect the scope of the SRIA as part of the Waterborne research evaluation methodology definition report:

- 1) Technologies and engineering for seaborne and subsea activities
- 2) Smart and adaptive materials and structures
- 3) Specialized vessels

For the current evaluation, 5 FP7 Research Projects were identified as related to Blue Growth: H2Ocean, LEANWIND, MERMAID, NEXOS, TROPOS.

2. EVALUATION METHODOLOGY AND WATERBORNE KPIS

In order to be able to assess the performance of the Waterborne R&I programme, a number of evaluation criteria and corresponding evaluation questions have been defined. For the assessment at hand, the consortium has used the evaluation criteria and questions presented in the table below (effectiveness, efficiency, utility). These evaluation criteria are essential in order to obtain clarity on the merits against which the Waterborne R&I programme should be evaluated.

Table 1: WATERBORNE KPIS and intervention logic

Evaluation criteria	General question	Specific evaluation questions
Effectiveness	Did the intervention lead to the desired effects?	<ul style="list-style-type: none"> • Were the envisaged goals of the programme achieved? • Do projects under the programme generally achieve their goals?
Efficiency	Were the costs involved justified, given the effects which have been achieved?	<ul style="list-style-type: none"> • Where the resources devoted to the research programme justified, given its results? • Can the programme be organized more efficiently?
Utility	To what extent do the obtained research results correspond to the needs of the sector?	<ul style="list-style-type: none"> • To what extent are the obtained research results applied in practice? Do they lead to new business opportunities? Do they promote the commercial success of the sector? • Do industry leaders see the research result as relevant for the sector? • How can the utility of research activities to the sector be further improved?

¹⁴ “WATERBORNE TP contribution to the elaboration of the next work programs 2016: Blue Growth ‘Technology Bricks’ Demonstrators for the Preparation of Offshore Pilot Project(S), Waterborne Blue Growth Working Group, 2016, available at <http://www.maritime-rdi.eu/about/about-waterborne/waterborne-blue-growth-pillar/>

The evaluation criteria and its correlation with the objectives of the programme, the inputs, outputs, outcome and impact are depicted in the figure below. The figure depicts the intervention logic of the Waterborne R&I which also conceptually links the input, output, outcome and impact indicators, thus allowing for the establishment of causality.

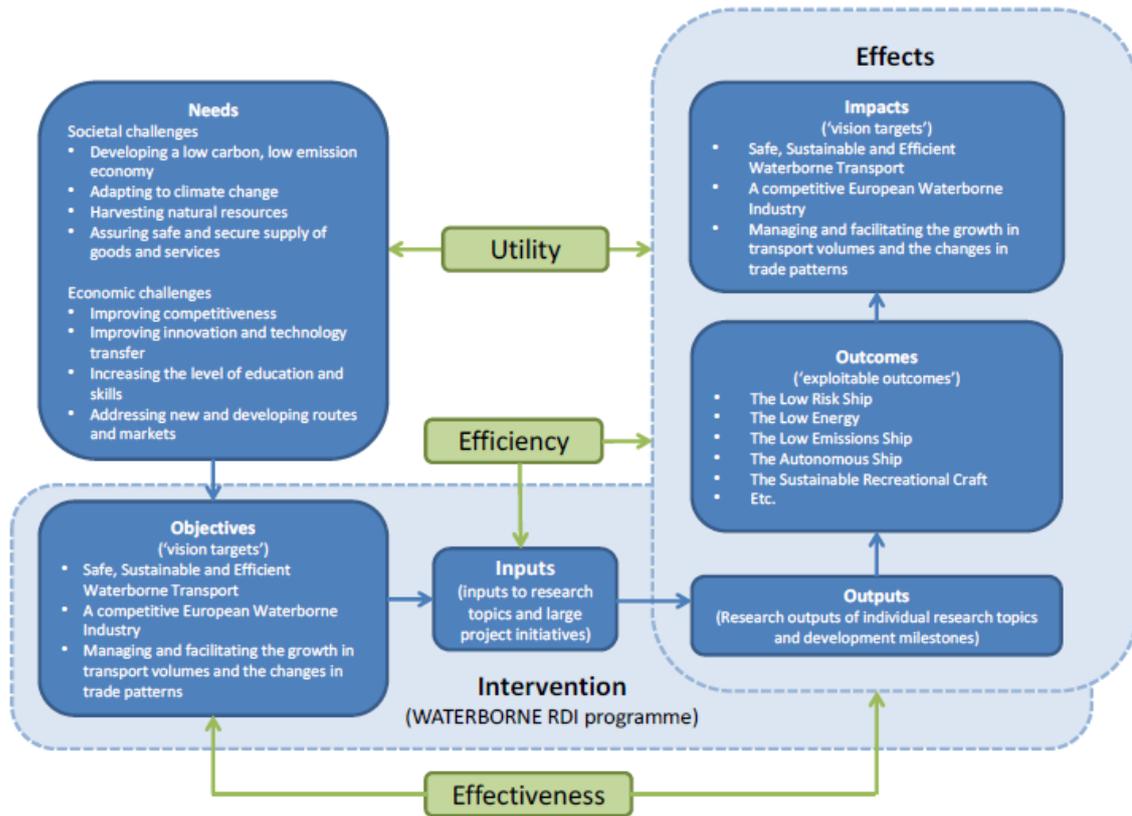


Figure 1: WATERBORNE KPI

The questionnaire followed the intervention logic and the evaluation criteria developed in Deliverable 3.5. In order to make some conclusions regarding the efficiency, effectiveness and utility of the Waterborne R&I programme, the questionnaire collected data on the Input, Output, and Outcome indicators for the projects identified to fall under the umbrella of Waterborne R&I programme. The survey also aimed to establish whether the R&I programme in general and the individual projects under the R&I programme achieve their objectives and generate added value.

The survey was divided in two general parts: part one which collected information on the individual research projects under the umbrella of Waterborne as identified in WP3-Deliverable 3.5; and part two, which collected data on the respondents view regarding the Waterborne R&I itself. For each of these two parts, data on the KPIs was collected.

The input indicators:

Input indicators are the financial, human, material, organisational or regulatory means needed for the successful execution of the individual projects. The input indicators are essential for the evaluation of the efficiency of the project. The survey collected data on the budget and funding of the individual

research projects, as well as on the administrative inputs involved in the projects. This data, together with respondent's opinion on the cost efficiency and administrative complexity involved has been collected through the questions in Section A of the survey (Q15- Q23). The questions and the survey are available in Annex II.

Output indicators:

The output indicators are the direct product resulting from the research projects. Questions 24 to 33 and Q 36, were aimed at collecting data for the output indicators developed in Deliverable 3.5. Data was collected on the patent, publications, science-industry cooperation and achieved objectives by the projects under the Waterborne R&I programme. The research output of the individual research projects can be seen as the outputs for the Waterborne R&I programme.

Outcome indicators:

Outcome KPIs generally depict the immediate changes in a situation and have a clear link with the intervention, while also influenced by external factors.¹⁵ The KPIs related to outcomes have been suggested in Deliverable 3.5 and data on these KPIs relating to the individual research projects collected through survey questions 34 and 35, which focus on whether the project has resulted in new business opportunities, added value to the partners, and if the results can be applied in practice, and what were the impacts for the organization itself. Data on the outcome KPIs in respect to the Waterborne R&I programme has been collected through Q37 (% of respondents aware of the Waterborne R&I), Q38 (usefulness of the R&I programme), Q40 (contribution to achieving long-term goals) of the survey and the conducted interviews.

Impacts indicators:

Generally, it is difficult to establish causal relationships for impact indicators due to the fact that they are further away from the original inputs and are influenced by external factors as well. It should be noted that the impact KPIs can only present an indication of relationship, causality is difficult to establish. Furthermore, as the Waterborne R&I is a long-term agenda and it generally takes time before research is implemented, it can be expected that any results would appear further in the future. Therefore, the proposed KPIs in Deliverable 3.5 should only be taken as indicative. This is also supported by the fact that statistics are usually reported with a few years of delay, meaning that the available statistics do not represent the most recent impacts. However, questions 41 and 42 of the survey on the relevance of the Waterborne R&I programme for the current economic and societal challenges and on further topics to be included, help gather data for impact indicators in relation to the overall Waterborne R&I.

Efficiency:

Efficiency of the individual research projects can be evaluated by gathering information on extent to which the parties of the projects consortia consider the costs involved to be justified given the effect

¹⁵ European Commission 2013, Public consultation on Commission Guidelines for Evaluation, http://ec.europa.eu/smart-regulation/evaluation/docs/20131111_guidelines_pc_part_i_ii_clean.pdf

which have been achieved. Therefore, efficiency is closely related to the input indicators and corresponding questions in the survey.

Effectiveness:

Effectiveness relates to the extent to which desired effects have been achieved. Effectiveness is generally measuring the extent to which objectives are met and is therefore closely connected to the output and outcome indicators. The effectiveness of the Waterborne R&I programme itself was assessed through a number of interviews and the survey which collected data on the extent to which the R&I programme has contributed to the achievement of the long-term goals set by the R&I programme (Q40).

Utility:

In order to determine if the impact of the Waterborne R&I programme and the projects coming under its umbrella, the survey also collected data on the extent to which participating parties in the project consider the results to be applicable in practice and their relevance to the needs of the sector and the parties involved.

When it comes to the overall effect of the Waterborne R&I, Q41 examines the extent to which respondents consider the Waterborne priorities as relevant for addressing the current economic and societal challenges and to indicate if new topics need to be introduced to meet the needs of the sector. The survey also collected data concerning the extent to which the R&I programme has a positive effect on the sector (Q39). Further information on the utility of the Waterborne R&I programme, the extent to which it has progressed and contributed to the achievement of the vision targets has been collected through interviews as well as from statistics on the impact indicators suggested in Deliverable 3.5.

Data collection:

The data collection follows the method proposed in Deliverable WP3-3.5; data was collected through desk research, interviews, workshops, and an online survey.

Survey:

The survey was distributed among the consortia of the 44 projects identified to fall under Waterborne R&I (See ANNEX I for list of projects included). In total 71 responses were received. However, 9 responses were excluded from the analysis as these survey submissions were incomplete and/or duplicate, meaning that the same individual had provided both incomplete and complete survey for the same project. Thus, only one survey filled in by a specific person for a specific project has been considered in the evaluation. Additionally, another 7 responses were excluded from the evaluation as these were incomplete, with only project name, acronym, and status of the project filled in. These responses are thus considered invalid for further assessment as the provided information is insufficient to support evaluation. Out of the remaining 55 surveys, 44 were completed and the remaining 11 were only partially completed. There are a number of reason why a survey might not have been completed, including the length of the survey, loss of interest, respondent's perception

that the survey is not relevant for them, or conflicting with other obligations. The analysis of the survey will therefore refer to the number of responses per question in order to ensure comparability of results. The 55 surveys that are used in this evaluation were submitted by participants from 31 projects. This means that approximately 70.5% of the contacted 44 projects have (at least partially) completed the survey.

The response rate is considered sufficient to provide reliable input for the evaluation of the Waterborne R&I programme. In more detail, (partially) completed surveys have been received for all of the Blue Growth (5 projects) and Green Shipping (6 projects) related projects. Completed surveys for 20 out of the 33 Interoperability projects have also been received. As already mentioned, the 70.5% of the contacted projects have replied to the survey (31 of 44 projects). Out of the 31 projects which generated responses, more than one survey submission was received for 15 projects. A maximum 5 responses per project have been received and these have been submitted by different consortium partners.

Interviews:

In order to gather input on expert's opinion regarding the success, relevance, and possible areas of improvement of the Waterborne R&I, 6 interviews were conducted. The interviews also provided information on the effectiveness and efficiency of the programme.

Workshops:

Three workshops have been organized for respectively Transport and Interoperability/ Logistics (29 September 2016, Brussels), Blue Growth (29 September 2016, Brussels), and Green Shipping (October 2016). The preliminary results of the survey were briefly presented at the workshops and webinar and the discussions were used as input to determine to what extent the effects still address the needs of the sector and point to the identification of certain gaps in the Waterborne R&I.

3. SURVEY RESULTS

The survey was designed to collect data on the past and ongoing projects falling within the WATERBORNE R&I programme. The purpose of the survey was to collect data for the evaluate whether the individual projects have achieved their objectives, delivered the planned results and establish to what extent participants find the Waterborne R&I programme useful and relevant.

General information on the projects:

The survey generated 71 responses, 55 of which will be used in this evaluation. The remaining 16 were excluded in order to avoid duplication of responses and to exclude responses which provided only the name, acronym and status of the evaluated project. Therefore, the rest of the report will only refer to the 55 (at least partially) completed surveys. The 55 (at least partially completed) responses were generated from 31 out of the 44 projects under the umbrella of the Waterborne R&I (70.5% response

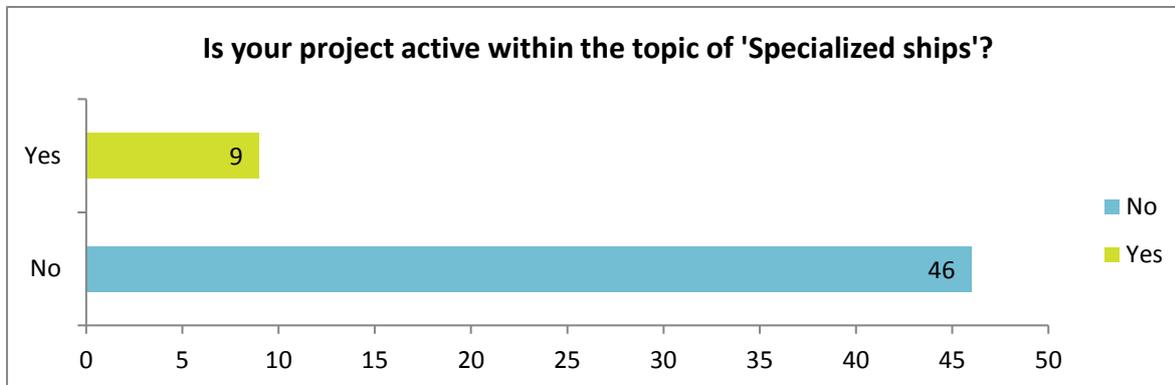
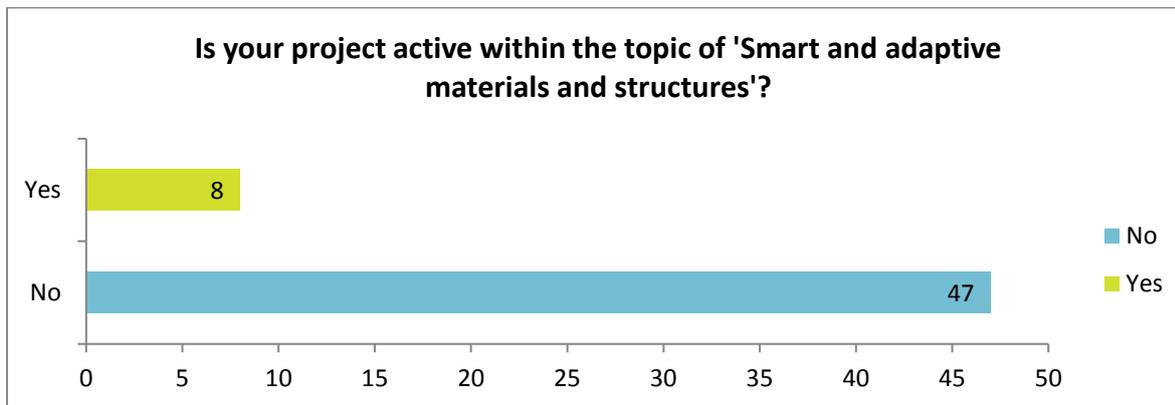
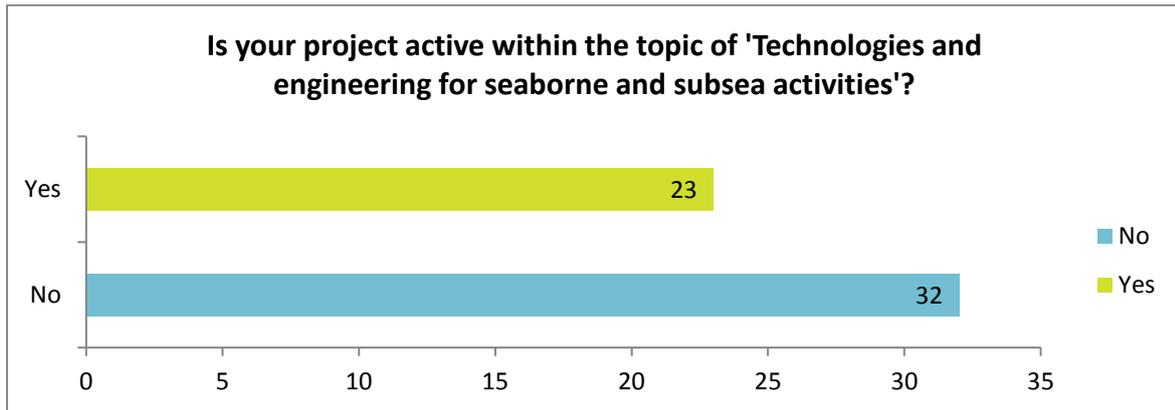
rate). From the 31 projects for which responses have been received, 10 are still in progress, generating 20 of the 55 responses. The rest 21 projects have already been completed and have generated 35 responses in total.

As already mentioned above, the Waterborne medium and long-term Vision is carried by three pillars. In addition, the Waterborne TP Blue Growth Working Group identified six challenges that need to be overcome in order to make the most of the blue economy. Three out of these six challenges have been considered as relevant for the current assessment. The respondents to the questionnaire were asked under which of the 6 topics (the three pillars and three of the Blue Growth challenges) their project is active. The following six tables summarize the results.

In which specific topic within 'Safe, Sustainable and Efficient Operations' is your project active?	Responses %	Responses number
Implementing goal/risk based for cost efficient safety	23.6%	13
Zero accidents Target	9.1%	5
The "Crashworthy" Vessel	3.6%	2
Low emission vessels	32.7%	18
Enhanced Waterborne security	18.2%	10
None	32.7%	18
Total Respondents: 55		

In which specific topic within 'Manage & Facilitate Growth and Changing Trade Patterns' is your project active?	Responses %	Responses number
Accelerated development of new port and infrastructure facilities	7.3%	4
Interoperability between modes	20%	11
More effective ports infrastructure	9.1%	5
Intelligent transportation technologies and integrated ICT solutions	38.2%	21
Understanding environmental impact of infrastructure building and dredging	7.3%	4
Traffic management systems	16.4%	9
None	45.5%	25
Total Respondents: 55		

In which specific topic within 'European Maritime Industry' is your project active?	Responses %	Responses number
Innovative vessels and floating structures	32.7%	18
Innovative marine equipment and systems	49.1%	27
Tools for accelerated innovation	21.8%	12
Next generation production process	10.9%	6
Effective Waterborne operations	32.7%	18
Technologies for New and Extended Marine Operations	29.1%	16
None	21.8%	12
Total Respondents: 55		



Only 53 respondents continued the survey to fill in organization details. Out of those 53 responses, approximately 21% of the received responses came from large companies, 26% from SMEs, 17% from research labs, 17% from universities, and the rest of the responses were generated from other organizations (consulting firms, research institutes, public organizations, innovation centres, etc.). It can therefore be concluded that the responses are representative, covering the majority of the projects considered under the umbrella of the Waterborne R&I programme (70.5%) and receiving input from different types of consortia partners from both ongoing and completed projects.

KPIs Data on the research projects related to Waterborne R&I programme:¹⁶

Input Indicators:

In order to evaluate the efficiency of the project falling within the umbrella of Waterborne R&I, the questionnaire collected opinions on the cost efficiency of the individual projects as a proxy indication on the efficiency of the overall Waterborne R&I. The response rate per question in this section varies per question. While 49 of the initially considered 55 projects responded to questions 15,16, and 17, Questions 19-21 were answer by 44 respondents.

Input indicators are the financial, human, material, organisational or regulatory means needed for the successful execution of the individual projects. Therefore, data was collected on the level the financial needs of the individual research projects were met. The results of the survey show quite positive evaluation. Only a small percentage of respondents, 8 out of the 49 respondents (16%), indicate that their participation in the project was impeded by financial issues. The reasons behind the funding issues included: delays in the payment, insufficient funds for participation in conferences other than the progress meetings, actual internal cost versus maximum declarable cost set by EU.

At the same time, an overwhelming majority of the respondents (91%, 40 out of 44 respondents) indicated that the funding received was sufficient to achieve the objectives of the project. In fact, only 4 out of the 44 respondents (9%) considered that the funding was insufficient. Additionally, 70% of 44 respondents indicate that the cost efficiency of the project to achieve the projects' aim was 'high' or 'very high', with only 5% of the responses indicating low cost efficiency and 18% indicating that they are uncertain on the topic. What is more, the management efficiency for the delivery of the projected results was considered 'high' or 'very high' by 86% (38 out of 44) of the respondents. Other input indicators for which data was collected were administrative complexity and resources needed. The average number of FTEs needed to administer the project was 67,02 as reported by the 44 respondents who filled in this question. However, the number of FTEs needed varies greatly among the respondents.

Despite the positive results relating to funding and management efficiency, the administrative complexity for participating within a European research project still appears to be a problem for the participating partners. Reducing the administrative complexity was mentioned by a few respondents as a point where improvements could be introduced, especially for the project coordinators. Approximately 57% of the 44 respondents considered that the administrative complexity for funding applications was 'high' or 'very high' and only about 23% considered it to be 'low'. Similar results are extracted for the complexity to report to the EU institutions, with 52% of the 44 respondents indicating that the administrative complexity for reporting was 'high' or 'very high'. The results regarding the administrative complexity for collaboration within the consortium are however inconclusive. 48% of

¹⁶ In the presentation of the survey results, it should be noted that in Sections A and B of the survey the respondents were asked to assess the projects in which they have participated. This might generate issues of self-evaluation and possible bias. Therefore, when reviewing the data on the research projects, this issue should be kept in mind for the offered inferences.

the 44 respondents considered that the administrative complexity was 'high' or 'very high', while 43% reported the complexity for collaboration within the consortium to be 'low' or 'very low'.

Outputs:

Data for the output and outcome indicators for the individual research projects was collected through Section B of the Questionnaire. Questions 24-36 were filled in by 44 of the 55 considered surveys. Naturally, questions such as question 25, 26, 27, 29, 32, have different number of answers as these were follow-up questions in case a respondent provided an affirmative answer in a previous question. In order to determine if the Waterborne R&I has led to the desired effects and the projects identified to fall under the R&I umbrella generally achieve their goals, it is necessary to gather data on the outputs generated by the individual research projects. The survey therefore gathered data on the publications, patents, partnerships and delivery of planned results.

When it comes to publications, 84% of the respondents (37 out of 44 in total) indicated that their research project resulted in publications. From those, 33 respondents have submitted the number of publications - 19 on average but with significant variations per respondent, resulting from the research project until this moment. From the 37 respondents whose project resulted in publications, 28 indicated that some of the publications have been published in a peer-reviewed journal.

Unlike publications, a very small proportion of the respondents (9%, or 4 out of 44) indicated that the project resulted in patent applications. The sum of all patent applications was 6 as provided by the 4 respondents who indicated that project resulted in patent applications. Even though patents provide a valuable measure of the exploitation of research results, it should be noted that there are many situations in which patent activity alone does not necessarily reflect innovation and should not be understood as a definitive indicator for effectiveness of a research programme.

This can be confirmed by the fact that 43% of the 44 respondents indicated that 'most' of the objectives envisioned in their implementation plans have been achieved, and 18% (8 out of 44) responded that all of the objectives have been achieved. With 32% of the 44 responses indicating that 'some' objectives in the implementation plan were achieved, it can be concluded that the majority of the respondents consider a considerable proportion of the objectives in their implementation plans have been achieved.

Additionally, a very big proportion of the respondents (91%, 40 out of 44 responses) indicated that the individual research project envisioned science-industry cooperation. According to 75% of the respondents (33 out of the 44 responses), the research project resulted in partnerships across the value chain. From these, 28 respondents indicated that the project resulted in science-industry cooperation, 16 indicated that the projects resulted in business-to-business partnerships, and 13 that the project resulted in public-private partnerships.

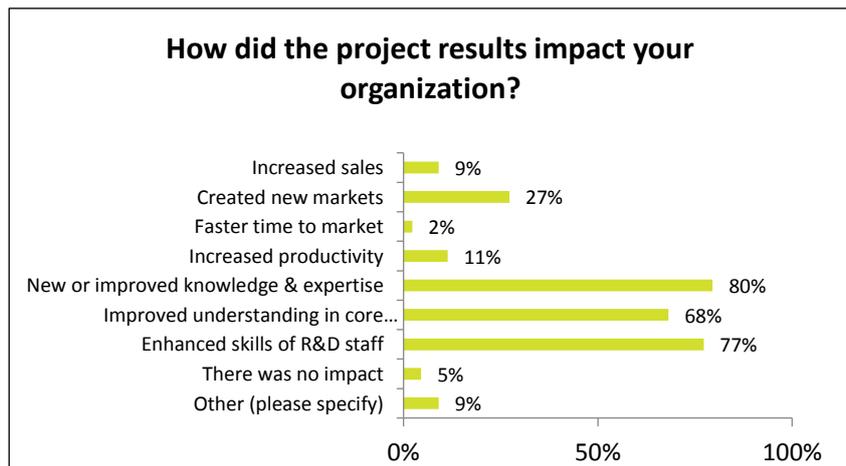
As to the results for the organizations in the consortia, the following table summarizes respondents' perceived results from participating in the projects:

	Yes	No	N/A	Blank	Total
Reinforcing existing partnerships and networks	37 84%	5 11%	1 2%	1 2%	44
New partnerships and networks	41 93%	1 2%	2 5%	0	44
New longer-term business alliances	16 36%	17 39%	9 20%	2 5%	44
Improved cooperation with universities and research lab	34 77%	6 14%	3 7%	1 2%	44
Other	2 5%			42 95%	44

Outcomes:

As already mentioned above, the data for the outcome and output indicators was collected through Section B of the Questionnaire. Questions 34 and 35 were filled in by 44 respondents out of the 55 surveys considered in this assessment. Therefore, the percentages for the outcome indicators are based on 44 responses in total. The outcome indicators are intended to capture the immediate changes in a situation. These indicators are also very relevant for the evaluation of the utility of the projects.

The projects results impacted the individual organisation participating in the projects differently, as summarized in the figure (based on a total of 44 responses). As it can be observed, the biggest impact is felt with 'enhanced skills of R&D staff', 'new or improved knowledge and expertise', and 'improved understanding in core technology'. While a significant proportion of respondents have noted some of the more commercially relevant impacts such as increased sales and new markets, it appears that the biggest impact of the individual projects participants



is related to knowledge creation. Additional impacts such as new or increased networks, as well as new research activities were also mentioned by the respondents. Naturally, some of the projects are still in progress, implying that the respective respondents have considered only the impacts up until this stage.

The success of the projects and their exploitability and utility for the sector and the involved partners is also depicted in the table below. It can be seen that the respondents have evaluated the research results quite positively. For example, 88.6% agree (including 'agree' and 'strongly agree') that the projects have delivered the planned results, for 88.6% (including 'agree' and 'strongly agree') the results were satisfactory, and according to 86.4% percent of the respondents (including 'agree' and 'strongly agree'), the projects' results have added value to the partners involved.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A	Total
The project delivered the planned results	0	2% 1	7% 3	45% 20	43% 19	2% 1	44
The project results are satisfactory	0	0	9% 4	43% 19	45% 20	2% 1	44
The project results can be applied in practice	0	0	14% 6	45% 20	36% 16	5% 2	44
The project outcomes were successfully integrated into products (or services)	0	5% 2	27% 12	43% 19	11% 5	14% 6	44
The project generated products (or services) relevant to markets	0	0	23% 10	39% 17	34% 15	5% 2	44
The project resulted in new business opportunities for the partners	0	0	20% 9	39% 17	32% 14	9% 4	44
The project results can lead to commercial profit for the parties involved	0	0	23% 10	43% 19	30% 13	5% 2	44
The project results have high added value to the parties involved	0	5% 2	9% 4	43% 19	43% 19	0	44

Data on the WATERBORNE R&I programme:

In order to evaluate the Waterborne R&I programme itself, the survey also collected data on the outcomes of the programme and information regarding the utility of the programme.

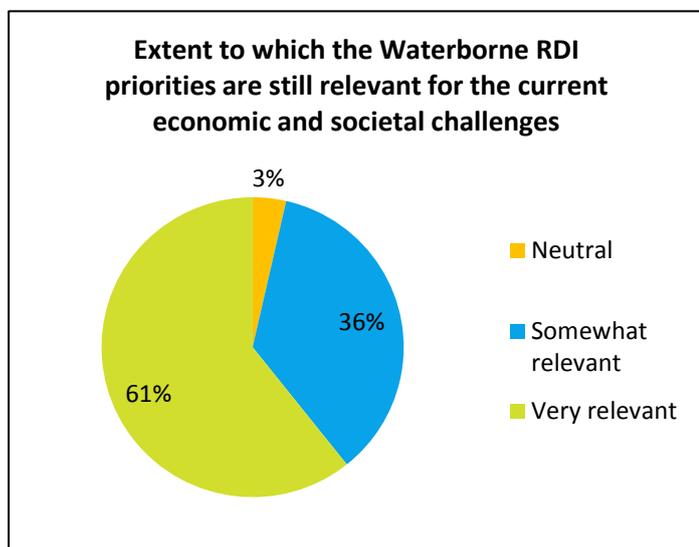
One of the most important outcome indicators is the percentage of respondents aware of the R&I programme. From the 55 surveys used for the current assessment, 44 provided an answer the question 'Are you aware of the Waterborne R&I programme'. From the 44 respondents, only 28 were aware of the Waterborne R&I programme. This means that even though the respondents have participated in a project which is related to the Waterborne R&I programme, 36% of those

respondents did not know of the R&I programme. To a certain extent this is confirmed by some of the interviewees, who mentioned visibility as a point for improvement and that the objectives and results of the Waterborne programme should be further promoted. This is further explored later in the report. Nonetheless, from the 28 respondents who were aware of the R&I programme, an overwhelming majority (93%, 26 out of the 28 respondents) considered that the R&I programme is ‘useful’ (50%) or ‘very useful’ (43%). This is a very positive result, indicating that with further promotion of the R&I programme, its effects could be more substantial in future.

The respondents were also very positive in their evaluation of the effect that the Waterborne R&I has on the European Waterborne sector. According to 93% of the 28 respondents aware of the Waterborne R&I programme, the programme had a positive effect, and only 1 respondent has indicated the opposite opinion, and 1 had no opinion on the issue.

Additionally, as represented in the figure, the majority of the respondents aware of the Waterborne R&I also consider the topics covered to still be relevant for the current situation.

Naturally, some suggestions for topics to be included in the future research agendas have been provided by the respondents. Among the suggestions are: ‘More emphasis on open data exchanges and standards to support further digitalization’, ‘new transport systems’, ‘intermodal transport chains’, ‘Safety/Green/ICT (Robotics)’, including for inland waterway transport, ‘New specialised ship, LNG propulsion’, ‘Efficient manoeuvring’, ‘Potentials of



ITS on IWT-transport logistics’, ‘Wind, wave and solar powered auxiliary propulsion systems for ship’, ‘business and financial innovations’, ‘test facilities to ensure proper testing of safety of new management and big data systems’, ‘RT on offshore aquaculture technologies’, ‘Energy efficiency on ports and ships’, ‘maritime informatics’. These topics will be examined in more detail in the following section.

It can be observed that most of the topics mentioned by the respondents are covered by the current R&I programme. Therefore, it can be concluded that further attention and focused efforts are needed in these areas to meet the needs of the sector. Last but not least, the respondents were asked to evaluate the extent to which the R&I programme has contributed to the achievement of the long-term targets specified in Deliverable 3.5. The following table summarises the responses. It can be observed that generally, the contribution has been evaluated as ‘moderate’. This implies that the areas with predominantly ‘moderate’ or ‘no’ contribution should be reinforced in the future R&I agenda.

	No contribution	Moderate contribution	Strong contribution	No opinion	Total
Serious ship accidents in EU waters and by European vessels globally will become extremely remote.		9	11	8	28
Security will be checked and safeguarded along the entire transport chain without creating extra bureaucracy, cost, congestion or delays.	3	13	5	7	28
The environmental impacts of air and water emissions will be reduced drastically.		10	17	1	28
Efficient and economic techniques will be available for onboard treatment of liquids and solid waste	1	10	8	9	28
The pollution impact of maritime accidents will be reduced to a minimum	2	9	11	6	28
New environmentally friendly techniques will be implemented for dredging of polluted sediments.	2	6	6	14	28
Seamless monitoring, identification, communication and vessel traffic management systems will be operational around Europe to improve the coordination and efficiency of operations.	1	11	10	6	28
The cost for sustainable, safe and secure waterborne transport will continue to be clearly lower than other transport modes.	1	13	9	5	28
Short sea shipping will be fully acting as an alternative transport mode in the supply chain.	2	14	5	7	28
European deep-sea shipping will still be the leader in maritime transport. European short sea shipping and inland waterway transport will be the favourite choice and the backbone of many existing and new logistic transport chains.	2	13	8	5	28
Europe's ship and boat builders as well as the marine equipment manufacturers will work at the world's highest productivity level and will command the shortest lead and delivery times as important elements to defend their competitiveness in a global market.	2	13	6	7	28
Inland waterway transport will be regarded as an efficient, modern, high tech mode	2	16	4	6	28
European ports will be on the leading edge in the use of innovative cargo handling systems and overall efficiency.	1	9	10	8	28
The European dredging industry will remain the world's leading technology provider and operator, offering the most advanced and environment friendly dredging methods.	5	8	3	12	28
EU companies will be world leaders in advanced rapid and low cost site investigation methods.	3	9	3	13	28

Technology tools to cope with trade growth and changed patterns will be developed	3	11	4	10	28
The increased use of unitised cargoes will offer much enhanced streamlined transport operations, avoiding congestion and delays in supply chains.	4	11	3	10	28
Advanced logistic chain management systems and operational tools will be available, facilitating very fast sea land interchange.		13	7	8	28
Technologies and engineering for seaborne and subsea activities will be economically and environmentally sustainable, clean, safe, reliable, maintainable and self-sufficient	1	9	9	9	28
Smart and adaptive materials and structures to improve the vessel or offshore platform's ability to operate in ever-changing environments and conditions will be developed	2	7	5	14	28
Specialized ships will be developed to service new activities		9	9	10	28

4. FUTURE TOPICS IDENTIFIED THROUGH THE SURVEY AND INTERVIEWS:

The last question of the questionnaire addressed possible research gaps and topics to be included in the future research agendas. Based on the replies (see previous section) and some of the topics mentioned by the interviewees, the following table presents the suggestions for topics to be included in the future research agendas by the respondents, accompanied by a short state-of-art analysis. It needs to be noted that as the majority of suggested topics are extracted from a questionnaire, the state of the art analysis is based on the researcher’s understanding of the issues raised. Additionally, many of the topics mentioned are part of an overall research area.

Table 4.1. Contribution to the update of the WATERBORNE SRIA.

<p>Open data exchanges and standards supporting digitalization:</p>	<p>According to a recent state-of-the-art report on the the use of information exchange technologies to establish more efficient, more secure and safer cooperation (e-Maritime),¹⁷ the European applications for exchange of information are state-of-the-art and more advanced when it comes to topics related to logistics and Port Community Systems.</p> <p>The topic of use of Information and Communication Technology (ICT) tools for sharing of information has been addressed by the EU e-maritime initiative and is considered to be a cornerstone of the EU Maritime Transport Strategy 2018¹⁸</p>
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¹⁷ MESA (2016) Deliverable 4.1, “TTG4 e-maritime: Clustered Research Projects”, page2, available at <https://www.waterborne.eu/media/10474/ mesa-d4-1-final-v4-issue-march-2016.pdf>

¹⁸ https://ec.europa.eu/transport/themes/strategies/2018_maritime_transport_strategy_en

	<p>and key for improving the competitiveness of the sector.¹⁹ The aim of the e-Maritime initiative is to ‘achieve standardization, security and interoperability of information exchanges between Administrative and maritime operators in Europe’²⁰ and is in line with the IMO e-Navigation initiative.²¹</p> <p>Even though EU and national research projects have covered a comprehensive list of topics related to e-Maritime, the state-of-the-art report has identified several hurdles for the full exploitation of a digital waterborne transport and logistics system that includes both e-maritime and e-navigation. Among these are (limited) interoperability of existing data systems, (limited) recognition of e-transport documents by all stakeholders, and need of standards for standards of transmission of large data.²²</p> <p>The importance of the topic of European Integrated Transport Systems, including improved interconnectivity and integration between transport modes and established systems, has also been recognized and identified by a recent report as one of the proposed priority research topics for updating the Waterborne R&I Road Map.²³</p> <p>This KPI relates and contributes to SETRIS Deliverable 2.6</p>
<p>Energy efficiency</p>	<p>Energy efficiency is vital both for maintaining competitiveness of the European maritime industry but also in view of the legal requirements for reduced emission levels. There are a number of elements affecting the energy efficiency of ships, including ship resistance, propulsion, prime mover, auxiliary energy, other on-board energy consumers, energy management systems, ship operations.²⁴</p> <p>Energy efficiency has been extensively studied by different European and national projects and progress has been achieved in individual areas. Nonetheless, the state-of-the-art report regarding energy efficiency of ships has already identified a number of technology gaps related to the lack fully integrated energy efficiency solutions, need for more radically new powering technologies, as well as individual technologies where further research is needed to ensure maximum exploitation of research results.²⁵</p>

¹⁹ European Commission “Summary report of the contributions received to the e-Maritime public online consultation”, available at https://ec.europa.eu/transport/sites/transport/files/modes/maritime/consultations/doc/2010_06_27_emaritime_summary_report.pdf

²⁰ Jerzy Mikulski (2016), “Challenge of Transport Telematics: 16th International Conference on Transport Systems Telematics, TST 2016, Katowice-Ustrón, Poland, March 16–19, 2016, Selected Papers”, page 492

²¹ <http://www.imo.org/en/OurWork/safety/navigation/pages/enavigation.aspx>

²² <https://www.waterborne.eu/media/10474/ mesa-d4-1-final-v4-issue-march-2016.pdf>, page 81

²³ MESA (2016), “Deliverable 4.2: TTG4 e-Maritime: Proposals for R&D Road Map”, page 9, available at: <https://www.waterborne.eu/media/20006/ mesa-d4-2-final-issue-june-2016.pdf>

²⁴ MESA (2016) Deliverable 1.1 “TTG 1: Energy Efficiency – Technologies and clustered Research Projects”, page 5, available at https://www.waterborne.eu/media/15815/ mesa_d11_v111.pdf

²⁵ MESA (2016) Deliverable 1.1 “TTG 1: Energy Efficiency – Technologies and clustered Research Projects”, page 80, available at https://www.waterborne.eu/media/15815/ mesa_d11_v111.pdf

<p>Propulsion</p>	<p>As already noted above, propulsion and powering could be considered part of the overall topic of energy efficiency. According to the Global Marine Technology Trends 2030, propulsion and powering is expected to be a major part of technological development and dual-fuel engines portfolio is expected to increase.²⁶</p> <p>Continuously more stringent environmental legislation at both the European and global level has pushed the seaborne and inland waterway sectors to turn towards alternative fuels. In this regard, LNG has gained momentum due to its potential to reduce emission levels and in certain circumstances lower the fuel costs.²⁷</p> <p>The uptake of alternative fuels and more specifically LNG is influenced by a number of factors, including logistics and sometimes even regulatory challenges. For instance, a study has identified the bunkering infrastructure and distribution networks for delivering LNG to inland ships as one of the challenges for LNG use. Additionally, the use of LNG fuel for inland vessels is not yet consistently regulated.²⁸</p> <p>Nonetheless, according to a recent state-of-the art report on energy efficiency, powering of ships will be a key area for R&I to sustain Europe’s position in the global maritime industry. LNG has been widely adopted in Europe²⁹ and the necessary supply infrastructure is presently being set in place.³⁰ There are already bunkering facilities in 8 European countries and 21 new facilities under construction, expanding its availability to 14 countries.³¹</p> <p>The state-of-the-art report noted that “the next big step will be the adoption of even more alternative fuel concepts to be run in a single engine”.</p> <p>When it comes to auxiliary propulsion systems for ships, several different technologies have been studied from the aerodynamic propulsion including prediction methods; fixed wing, sails, kites, Flettner Rotor.³² These auxiliary propulsion methods might have an impact in future and should be considered when modeling arrival times as well as energy consumption.</p>
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²⁶ Lloyd’s Register, QinetiQ and University of Southampton (2015) “Global Marine Technology Trends 2030”, page 64, available at <http://eprints.soton.ac.uk/388628/1/GMTT2030.pdf>

²⁷ MAN Diesel & Turbo (2012), “Costs and Benefits of LNG as Ship Fuel for Container Vessels”, page 16, available at <http://marine.man.eu/docs/librariesprovider6/technical-papers/costs-and-benefits-of-lng.pdf?sfvrsn=10>

²⁸ L. Simmer, S. Pfoser, and O. Schauer (2016), “Liquefied Natural Gas as a Fuel in Inland Navigation: Barriers to Be Overcome on Rhine-Main-Danube” *Journal of Clean Energy Technologies*, Vol. 4, No. 4, page 297-298, available at <http://www.jocet.org/vol4/300-R0009.pdf>

²⁹ MESA (2016) Deliverable 1.1 “TTG 1: Energy Efficiency – Technologies and clustered Research Projects”, page 14, available at: https://www.waterborne.eu/media/15815/ mesa_d11_v111.pdf

³⁰ See also Mathias Jansson (2015) “Answering LNG shipping questions All-in-one”, in *Harbours Review* no. 5/2015 (8) December ISSN 2449-6022, available at <http://harboursreview.com/e-zine-8.pdf>

³¹ “Evolution of Supply, Employment and Skills in the European Maritime Technology Sector”, Final Report of the EU-Funded Project “Creating a European Skills Council for the Maritime Technology Sector” (2014-2016)

³² MESA (2016) Deliverable 1.1 “TTG 1: Energy Efficiency – Technologies and clustered Research Projects”, page 41-47, available at: https://www.waterborne.eu/media/15815/ mesa_d11_v111.pdf

<p>Business and financial innovations:</p>	<p>The maritime industries are quite a diverse sector. As for any other sector, as well as the efforts to preserve the sector’s competitive position, it is influenced by global trends such as the fourth industrial revolution, big data and electronic commerce.³³ Some of the key factors driving the business models innovation are operational Efficiency, data collection, and human resources management.³⁴</p> <p>In the area of Integrated Transport information systems for instance (one of the research priorities for implementation of ICT maritime opportunities identified in the course of the MESA project), more open access to trade and transport data can create or change existing business models.³⁵</p>
<p>Safety:</p>	<p>Safety is a very broad topic which covers a number of issues ranging from safety in ports to prevention of accidents. A recent comprehensive state-of-the-art report on research projects has focused on the following safety issues:³⁶</p> <ul style="list-style-type: none"> • Goal Based Regulation (Safety and Risk Level) including design, operations, maintenance and inspections; • Accident and Data Reporting and Analysis; • System Integration for Safety and Security; • Survivability of Smaller Vessels in Extreme Conditions; • Collision and Grounding; • Failure Mechanism; • Safety of Operations in Ports; • Fire accidents; • Evacuation. <p>Based on the analysis of a large number of projects, six technical outcomes have been identified that require research focus to grasp the 2030 opportunities. The topics are: 1 Accident prevention 2. Safe automation and autonomy, 3. Increased vessel survivability, 4. Fire resistance and prevention, 5. Improved evacuation methods, 6. Occupational casualties. These topics build upon EU research strengths as identified in the current state of the art section, and fill any gaps that have been identified.³⁷</p>

³³ UNCTAD (2016) ‘Review Of Maritime Transport 2016’, Executive summary, available at: http://unctad.org/en/PublicationsLibrary/rmt2016_en.pdf

³⁴ See presentation by G. Dufour (2016), “Financing Innovation In The Maritime Industry”, Japan – Norway Workshop, February 12th, 2016, Oslo, available at: <http://www.mlit.go.jp/common/001121373.pdf>

³⁵ <http://www.maritime-rdi.eu/media/19989/ mesa-d4-5-publication-on-e-maritime-for-shipping-and-port-operations-final-august-2016.pdf>, page 5

³⁶ MESA (2016) Deliverable 2.1 : TTG2 Safety: Clustered Research Projects, available at https://www.waterborne.eu/media/15813/ttg2-safety_clustered-research-projects-final_revisions02.pdf

³⁷ <https://www.waterborne.eu/principal-documents/waterborne-strategic-research-and-innovation-agenda/safety-state-of-the-art/safety-research-priority-areas/>

5. CONCLUSIONS AND RECOMMENDATIONS

The current report is part of the SETRIS project which aims to deliver a cohesive and coordinated approach to research and innovation strategies for all transport modes in Europe. The objective of this report is to present the results from the methodology and assessment of the Waterborne R&I programme and answer the evaluation questions. The main impact of the assessment will be to contribute to the updating of the Waterborne R&I programme. Together with the results of the MESA project, the assessment will serve as a basis to identify gaps in the current programme and ways to fill them.

Overall, the Waterborne R&I programme can be evaluated positively. Both the survey results and the interviews suggest that the R&I is still relevant for the needs of the sector. The R&I programme is quite comprehensive and interviewees considered that a lot of strategic topics have been covered. It has been mentioned that the low emissions vessels topic, in particular, is very well thought through and covers the main relevant strategic issues. Following the evaluation logic and criteria developed as part of Deliverable 3.5, the following sections will synthesise the results of the analysis.

Key performance indicators of Waterborne

Effectiveness evaluation:

When it comes to the effectiveness of the Waterborne R&I, the results are somewhat mixed. While a big proportion of the respondents have indicated that the R&I programme has had a positive effect on the development of the European Waterborne sector, the extent to which the R&I programme has contributed to the long-term targets is mostly considered 'moderate'. In general, this is a positive evaluation, but as it can be seen from the responses, some areas have presented lower results than others. Consequently, it can be concluded that while some of the long-term targets have been effectively addressed, others need further efforts.

This is also supported by some of the interviewees. Overall, interviewees considered that a lot of progress has been achieved in the waterborne sector in a diversity of areas, including efficiency, emissions reductions, etc. Some of the interviewees were not sure to what extent this could be connected to the R&I agenda, while others considered the progress to be a result only of the private initiative of the industry. Additionally, some interviewees considered that the Waterborne R&I is more focused on maritime transport and shipping, while the needs of other relevant sectors are not represented to such an extent.

The effectiveness of the individual projects can also be used as an indicator of the overall Waterborne R&I programme. It can be assessed as high as the respondents of the survey have been very positive

in their evaluation that the projects have delivered their expected results. Looking at the output indicators, it can be summarised that even though the number of patent applications was not high, there have been a number of publications and participation in the projects has resulted in a lot of partnerships (new and strengthened old ones). With most of the objectives of the individual research project having been met, it can be surmised that in most cases the projects have led to their desired effect.

Utility:

As mentioned above, the utility evaluation criteria assess the extent to which the obtained research results correspond to the needs of the sector. Overall, the relevance of the R&I has been positively evaluated by both the survey respondents and the interviewed experts. A significant percentage of the survey respondents consider (93% of the 28 responses) the Waterborne R&I to be 'useful' or 'very useful'. With 61% of the respondents (17 out of the 28 aware of the Waterborne R&I programme) indicating that the R&I priorities are still 'very relevant' for the current economic and societal challenges, it can be concluded that the R&I programme corresponds to the needs of the sector. This is also confirmed by open-ended question on further topics to be included in the future research agenda. As it can be seen from the answers, some of the topics are already covered by Waterborne R&I programme and the Waterborne SRIA. This suggests, that further attention should be paid to the mentioned areas and that these topics appear to be quite urgent and important. The interviews also generated some topics that might need to be further supported in future, including fundamental research in propulsion, real time monitoring, remote control equipment, and generally any innovation connected to efficiency to meet environmental needs.

A significant number of the evaluation questions specified in Deliverable 3.5 can be answered looking at the outcome indicators for the research projects. As the data shows, the respondents agree that the research results can be applied in practice (81.81% 'agree' or 'strongly agree') and lead to new business opportunities for the parties involved (70.45% 'agree' or 'strongly agree'). Another important take-away is that a majority of the respondents consider that the projects generated products (or services) relevant to the markets. Therefore, it can be concluded that research results are relevant to the sector.

Efficiency evaluation:

Overall, it can be concluded that the efficiency of the projects studied under the Waterborne R&I programme is perceived as high. Most of the survey respondents have been very positive in their evaluation. The data gathered for the input indicators and cost, administrative and management efficiency, indicate that the inputs involved in the projects were proportional to the effects as represented by the data on the achieved objectives and satisfaction with delivered results. This is an indication that the inputs involved in the projects are justified given the results.

Policy implications

While the substantial progress has been achieved in the waterborne sector, several recommendations based on the conducted interviews and desk research can be summarized. As the overall evaluation is mostly positive, these should be seen as improvements.

Research closely connected to industry needs:

Already in 2010, the Commission has put forward a plan for a sustainable, smart and inclusive growth³⁸, accompanied by the Innovation Union Flagship Initiative³⁹ which stressed the importance of the establishment of better linked up research and innovation systems tackling fragmentation of research and getting more innovation out of research based on stronger links between science and business.

This idea of further exploitation of results was also touched upon in the course of some interviews with experts. Even though the Waterborne R&I programme has mainly been evaluated as relevant, interviews brought up the recommendation that research should be less abstract and more connected to the industry as industry is in position to report on sector needs.

Another recommendation was that research should be built on business cases, take proper account of the status quo and already existing solutions, and provide more pilots to show the applicability of research. Based on interview input, it could be concluded that in order to further support innovation, the needs of the business operators need to be fully understood in order to provide stronger link between research output and industry. In this regard, it should also be pointed out that the maritime sector is quite regulated and issues such as different customs regulations which increase the administrative complexity while pointed out as bottlenecks cannot be resolved solely by research and innovation actions and requires more of a political commitment.

Further attention to sectors other than seaborne shipping:

An important issue raised during the interviews was that the three pillars (1. Safe, Sustainable and Efficient Waterborne Transport; 2. A Competitive European Waterborne Industry; and 3. Managing and facilitating the growth in transport volumes and the changes in trade patterns) are more focused on ships and maritime transport. Thus, the other connected waterborne sectors are perceived to not be covered to the same extent by the strategic pillars and topics. It has been suggested that the needs of all sectors should be captured and topics such as ports of the future and inland water transport should be further addressed.

As European Transport Platforms (ETPs) develop research and innovation agendas and roadmaps for action at EU and national level, it is important that that all sectors connected to waterway transport recognize that their needs are appropriately represented.

³⁸ Communication from the Commission: "EUROPE 2020: A strategy for smart, sustainable and inclusive growth", COM (2010) 2020, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>

³⁹ Europe 2020 Flagship Initiative Innovation Union (COM (2010) 546)

Increasing visibility of activities and impact:

One important conclusion coming from the interviews is that the visibility of the Waterborne R&I and the projects and results connected to it need to be more visible and disseminated. It was noted that industry is not aware of all the actions, progress, and projects connected to the R&I and Waterborne. This is also a valid point when it comes to increasing the visibility of possible cooperation or coordination with other initiatives, such as the Digital Transport and Logistics Forum. Visibility and communication on the research agenda are therefore seen as desirable. This is an important point as it allows industry to follow updates and easily find the information that it needs, thus increasing the utility and usefulness of the Waterborne platform and the R&I programme.

ANNEX I: LIST OF PROJECTS PART OF WATERBORNE (FP7)

Table A1: List of FP7 Research Projects related to Waterborne Transportation & Interoperability

Project Acronym	Project Title	Website
AMASS	Autonomous maritime surveillance system	http://www.amassproject.eu/amassproject/
ARIADNA	Maritime assisted volumetric navigation system	http://www.ariadna-fp7.eu/
CASCADE	Model-based Cooperative and Adaptive Ship-based Context Aware Design	http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&REF=106310
CONTAIN	Container Security Advanced Information Networking	http://containproject.com/
ECCONET	Effects of Climate Change On the inland waterway and other transport NETWORKS	http://econet.eu/
EcoHubs	Environmentally coherent measures and interventions to debottleneck HUBS of the multimodal network favoured by seamless flow of goods	http://www.hubways.eu http://www.transport-research.info/web/projects/project_details.cfm?ID=45365
e-Compliance	Integration and co-operation of regulatory compliance in the maritime domain	http://www.e-compliance-project.eu
EfficienSea 2	Efficient, Safe and Sustainable Traffic at Sea	http://efficiensea2.org/#/
e-Freight	European e-Freight Capabilities for Co-modal Transport	http://www.efreightproject.eu/
EU CISE 2020	EUropean test bed for the maritime Common Information Sharing Environment in the 2020 perspective	http://cordis.europa.eu/project/rcn/192603_en.html
EURIDICE	EUropean Inter-Disciplinary research on Intelligent Cargo for Efficient, safe and environment friendly logistics	http://www.euridice-project.eu/

FAROS	Human Factors in Risk-Based Design Methodology	http://www.faros-project.eu
GREEN EFFORTS	Green and Effective Operations at Terminals and in Ports	http://www.green-efforts.eu/
i-Cargo	Intelligent Cargo in Efficient and Sustainable Global Logistics Operations	http://i-cargo.eu
INCASS	Inspection Capabilities for Enhanced Ship Safety	http://www.incass.eu
INTEGRITY	Intermodal Global Door-to-door Container Supply Chain Visibility	http://www.integrity-supplychain.eu/
Logistics for Life	Logistics Industry coalition of Long-term ICT based Freight Transport Efficiency	http://www.logistics4life.eu/
MOVE IT	Modernisation of Vessels for Inland waterway freight Transport	http://www.moveit-fp7.eu/
MUNIN	Maritime Unmanned Navigation Through Intelligence in Networks	http://www.unmanned-ship.org/munin/
NAVTRONIC	Navigational System for Efficient Transport System	http://www.navtronic-project.eu/
NEWS	Development of a Next generation European Inland Waterway Ship and logistics system	http://www.news-fp7.eu/
OPERAMAR	An Interoperable Approach to European Union Maritime Security Management	http://cordis.europa.eu/project/rcn/86254_en.html
PROPS	Promotional Platform for Short Sea Shipping and Intermodality	http://www.props-sss.eu/
RISING	RIS Services for Improving the Integration of Inland Waterway Transports into Intermodal Chains	http://www.rising.eu/web/guest/home
SEABILLA	Sea Border Surveillance	http://www.seabilla.eu
SEAHORSE	Safety Enhancements in transport by Achieving Human Orientated Resilient Shipping Environment	http://www.seahorseproject.eu

SECTRONIC	Security System for Maritime Infrastructures, Ports and Coastal Zones	http://www.sectronic.eu/
SKEMA	Sustainable Knowledge Platform for the European Maritime and Logistics Industry	http://www.skematransport.eu/ http://www.eskema.eu/defaultinfo.aspx?topicid=85&index=6
SMART-CM	SMART Container Chain Management	http://www.smart-cm.eu/
SUPPORT	Security UPgrade for PORTs	http://www.support-project.eu/
TARGETS	Targeted Advanced Research for Global Efficiency of Transportation Shipping	http://www.targets-project.eu/
TRITON	Trusted Vessel Information from Trusted On-board Instrumentation	http://tritonproject.eu/project.php
SHOPERA	Energy Efficient Safe SHIP OPERAtion	http://shopera.org/

Table A1.2: List of FP7 Research Projects related to Blue Growth

Project Acronym	Project Title	Website
H2Ocean	Development of a wind-wave power open-sea platform equipped for hydrogen generation with support for multiple users of energy	http://www.h2ocean-project.eu/
LEANWIND	Logistic Efficiencies And Naval architecture for Wind Installations with Novel Developments	http://www.leanwind.eu
MERMAID	Innovative Multi-purpose offshore platforms: planning, Design and operation	http://www.mermaidproject.eu/

NEXOS	Next generation, Cost-effective, Compact, Multifunctional Web Enabled Ocean Sensor Systems Empowering Marine, Maritime and Fisheries Management	http://www.nexosproject.eu/
TROPOS	Modular Multi-Use Deep Water Offshore Platform Harnessing And Servicing Mediterranean, Subtropical And Tropical Marine And Maritime Resources	http://www.troposplatform.eu/

Table A1.3: List of FP7 Research Projects related to Green Shipping

Project Acronym	Project Title	Website
AQUO	Achieve QUIeter Oceans by shipping noise footprint reduction	http://cordis.europa.eu/project/rcn/104629_en.html
BYEFOULING	Low-toxic cost-efficient environment-friendly antifouling materials	http://www.sintef.no/projectweb/byefouling/
JOULES	Joint Operation for Ultra Low Emission Shipping	http://www.joules-project.eu
LEAF	Low Emission Anti-Fouling coatings based on the novel discovered post settlement penetration triggered antifouling	http://leaf-antifouling.eu/
SEAFRONT	Synergistic Fouling Control Technologies	http://seafont-project.eu/
TEFLES	Technologies and Scenarios For Low Emissions Shipping	http://tefles.eu

ANNEX II: SURVEY QUESTIONNAIRE

SETRIS WATERBORNE RDI Programme Survey

This survey is part of a study that evaluates the results of the Waterborne RDI programme. Through this questionnaire we would like to obtain information on how effective and efficient you perceive your specific research programme to be.

The questionnaire will take approximately 20 minutes to complete. Your input is highly appreciated and will remain confidential and anonymous. Data from this survey will be reported in aggregate form and without details on specific respondents. No one, other than the researchers, will have access to your individual answers to this questionnaire.

The survey results will be used in the SETRIS project. The SETRIS project is a strategically important project within the European Union's Horizon 2020 research and innovation programme, under the grant agreement No 653739. The official name of the project is Strengthening European Transport Research & Innovation Strategies (SETRIS Project).

For any questions about this survey, feel free to contact Dr Carlos Montalvo per e-mail (carlos.montalvo@tno.nl) or telephone (+31 (0)88 866 83 19).

Thank you for participating in our survey!

DATA

Project Details:

1. Project name
2. Project acronym
3. Current status of the project
 - Complete
 - In progress
4. Until when is your project scheduled to last? (DD/MM/YYYY)
5. In which specific topics within 'Safe, Sustainable and Efficient Operations' is your project active?

- Implementing goal/risk based for cost efficient safety
- Zero accidents Target
- The "Crashworthy" Vessel
- Low emission vessels
- Enhanced Waterborne security
- None

6. In which specific topics within 'Manage & Facilitate Growth and Changing Trade Patterns' is your project active?

- Accelerated development of new port and infrastructure facilities
- Interoperability between modes
- More effective ports infrastructure
- Intelligent transportation technologies and integrated ICT solutions
- Understanding environmental impact of infrastructure building and dredging
- Traffic management systems
- None

7. In which specific topics within 'Competitive European Maritime Industry' is your project active?

- Innovative vessels and floating structures
- Innovative marine equipment and systems
- Tools for accelerated innovation
- Next generation production process
- Effective Waterborne operations
- Technologies for New and Extended Marine Operations
- None

8. Is your project active within the topic of 'Technologies and engineering for seaborne and subsea activities'?

- Yes
- No

9. Is your project active within the topic of 'Smart and adaptive materials * and structures'?

- Yes
- No

10. Is your project active within the topic of 'Specialized ships'?

- Yes
- No

Organization Details:

11. Name of organization

12. Respondent's name

13. Respondent's position within the organization

14. What is the type of your organisation?

- Large company
- SME
- University
- Research lab
- Other (please specify)

Section A:

This section intends to take your opinion on whether the project has received the necessary support and funding.

15. What was the total budget allocated to the * project (in €) ?

- Private funding
- European Union funding
- National public funding

16. Please indicate the amount of funding from:

17. Was your participation in the project impeded by funding issues?

- Yes
- No

18. If yes, in what way?

19. How many FTEs were needed to administer the project?

20. Do you think that the funding dedicated to your research project was sufficient to achieve its objectives?

- Yes
- No

21. Please rate the following factors:

	Very low	Low	Uncertain	High	Very High	N/A
The cost efficiency of this project to achieve the project aims was	<input type="radio"/>					
The management efficiency for delivery of project results was	<input type="radio"/>					
The administrative complexity for funding application was	<input type="radio"/>					
The administrative complexity for reporting to the EU institutions was	<input type="radio"/>					
The administrative complexity for collaboration within the consortium was:	<input type="radio"/>					

22. Do you have any specific comments on funding issues?

23. Do you have any specific comments on administrative issues?

Section B:

This section intends to take your opinion on the level of success achieved in the project:

24. Did your research project result in publications?

- Yes
- No

25. What is the total number of publications resulting from the research project so far?

26. Were any of the reports/articles/papers published in peer- reviewed journal?

- Yes
- No

27. How many of the reports/articles/papers were published in peer-reviewed journals?

28. Did the project result in patent applications?

29. If yes, how many patent application have been submitted so far?

30. Did the research project envision science-industry cooperation?

- Yes
- No

31. Did the research project result in partnerships across the value chain?

- Yes
- No

32. If yes, please select the nature of the partnerships.

- Science – Industry cooperation
- Business to Business
- Public – Private
- Other (please specify)

33. Did participating in the research project lead to any of the following results for your organization?

	Yes	No	N/A
Reinforcing existing partnerships and networks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New partnerships and networks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New longer-term business alliances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved cooperation with universities and research lab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<input style="width: 500px; height: 20px;" type="text"/>		

34. Please indicate to what extent you agree with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A
The project delivered the planned results	<input type="radio"/>					
The project results are satisfactory	<input type="radio"/>					
The project results can be applied in practice	<input type="radio"/>					
The project outcomes were successfully integrated into products (or services)	<input type="radio"/>					
The project generated products (or services) relevant to markets	<input type="radio"/>					
The project resulted in new business opportunities for the partners	<input type="radio"/>					
The project results can lead to commercial profit for the parties involved	<input type="radio"/>					
The project results have high added value to the parties involved	<input type="radio"/>					

35. How did the project results impact your organization? (please tick the relevant boxes)

- Increased sales
- Created new markets
- Faster time to market
- Increased productivity
- New or improved knowledge & expertise
- Improved understanding in core technologies
- Increased sales
- Created new markets
- Enhanced skills of R&D staff
- There was no impact
- Other (please specify)

36. Please indicate how many of the objectives envisioned in your Implementation Plan have been achieved

- None
- Some
- Most
- All
- I don't know

Section C:

This section intends to take your opinion on the overall Waterborne RDI programme

37. Are you aware of the Waterborne RDI programme?

- Yes
- No

38. To what extent is the RDI programme useful in your opinion?

Not useful at all	Somewhat useful	Neutral	Useful	Very useful	N/A
<input type="radio"/>					

39. Do you think that the RDI programme has had a positive effect on the development of the European Waterborne sector?

- Yes
- No
- No opinion

40. In your opinion, to what extent has the RDI programme contributed to the achievement of the following long-term targets?

	No contribution	Moderate contribution	Strong contribution	No opinion
Serious ship accidents in EU waters and by European vessels globally will become extremely remote.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Security will be checked and safeguarded along the entire transport chain without creating extra bureaucracy, cost, congestion or delays.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The environmental impacts of air and water emissions will be reduced drastically.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Efficient and economic techniques will be available for onboard treatment of liquids and solid waste	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The pollution impact of maritime accidents will be reduced to a minimum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	No contribution	Moderate contribution	Strong contribution	No opinion
New environmentally friendly techniques will be implemented for dredging of polluted sediments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seamless monitoring, identification, communication and vessel traffic management systems will be operational around Europe to improve the coordination and efficiency of operations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The cost for sustainable, safe and secure waterborne transport will continue to be clearly lower than other transport modes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Short sea shipping will be fully acting as an alternative transport mode in the supply chain.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
European deep-sea shipping will still be the leader in maritime transport. European short sea shipping and inland waterway transport will be the favourite choice and the backbone of many existing and new logistic transport chains.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Europe's ship and boat builders as well as the marine equipment manufacturers will work at the world's highest productivity level and will command the shortest lead and delivery times as important elements to defend their competitiveness in a global market.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	No contribution	Moderate contribution	Strong contribution	No opinion
Inland waterway transport will be regarded as an efficient, modern, high tech mode	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
European ports will be on the leading edge in the use of innovative cargo handling systems and overall efficiency.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The European dredging industry will remain the world's leading technology provider and operator, offering the most advanced and environment friendly dredging methods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EU companies will be world leaders in advanced rapid and low cost site investigation methods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology tools to cope with trade growth and changed patterns will be developed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The increased use of unitised cargoes will offer much enhanced streamlined transport operations, avoiding congestion and delays in supply chains.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced logistic chain management systems and operational tools will be available, facilitating very fast sea land interchange.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologies and engineering for seabome and subsea activities will be economically and environmentally sustainable, clean, safe, reliable, maintainable and self-sufficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	No contribution	Moderate contribution	Strong contribution	No opinion
Smart and adaptive materials and structures to improve the vessel or offshore platform's ability to operate in ever-changing environments and conditions will be developed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Specialized ships will be developed to service new activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

41. In your opinion, to what extent are the Waterborne RDI priorities still relevant for the current economic and societal challenges?

Very irrelevant	Somewhat irrelevant	Neutral	Somewhat relevant	Very relevant	N/A
<input type="radio"/>					

42. What further topics should be included in the future research agendas?

This is the end of the questionnaire.
Thank you for participating in our study!

ANNEX III: INTERVIEWS PROTOCOL

Email:

Dear Sir, Madam,

As part of our evaluation of the results and utility of the Waterborne RDI programme, we would like to kindly invite you for a short interview about your opinion of the results delivered by the Waterborne RDI programme so far. As an expert on the waterborne sector, we would highly value your opinion and ideas on the effectiveness of the programme and how it can be improved in the future.

Time and channel of communication:

The interview will be conducted via phone and will take approximately 20 minutes.

If you are willing to participate in the interview, please suggest to us a date and time that suits you well (if possible *before 10 September 2016*) and we will try to accommodate this.

Background to the study:

The SETRIS project is a strategically important project within the European Union's Horizon 2020 research and innovation programme, under the grant agreement No 653739. The official name of the project is *Strengthening European Transport Research & Innovation Strategies (SETRIS Project)*.

The SETRIS project developed at the European Commission's initiative, and is a unique initiative in transport research coordination, since it is the first time that all five European Technology Platforms (ETPs), i.e. ERTRAC (road), ERRAC (rail), ACARE (air), WATERBORNE and ALICE (logistics), have agreed to collaborate, in order to produce joint recommendations and integrated plans. The potential impact of SETRIS for the transport sector is extremely significant and its successful outcome is essential for Europe's transport research and innovation. In identifying synergies between the transport ETPs strategic and research and innovation agendas (SRIAs), SETRIS will define comprehensive, credible and realistic implementation plans for joint SRIAs. Consequently, the evaluation of certain relevant aspects of the Waterborne RDI programme is part of the SETRIS project, including ports and logistics, and inland waterways.

Kind regards,

Interview Guide SETRIS Project – questions to experts

Introduction:

The interview is part of a study that evaluates the results and utility of the Waterborne RDI programme. Through interviews with 20 experts, we would like to obtain information on how effective and efficient you perceive the research programme to be and how the Waterborne RDI programme can be improved and updated.

Time and place: The interviews will take approximately 20 minutes and will be conducted via phone/skype. In total 20 interviews with experts will be conducted by 19 August 2016.

Use of data: Following the interview, a transcript of the conversation will be provided for the interviewee to revise. The information obtained from the interview will be used in the analytical part of the assessment report. Names and function of the interviewee might be used in the report.

About the project: The SETRIS project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement No 653739. The official name of the project is *Strengthening European Transport Research & Innovation Strategies (SETRIS Project)*.

SETRIS is a unique initiative in research coordination since it is the first time that all 5 transport European Technology Platforms (ETPs) have agreed to collaborate to produce joint recommendations and integrated plans. The potential impact of SETRIS for the transport sector is extremely significant and the successful outcome of SETRIS is essential for Europe's transport future. In identifying synergies between the transport ETPs strategic and research and innovation agendas (SRIAs) SETRIS will define comprehensive, credible and realistic implementation plans for joint SRIAs in a coordinated framework of running ETPs. This is a leap forward in cooperation between the ETPs and has been fully supported by the ETPs.

Questions:

General information on to the interviewee:

- Name:
- Position:
- Organization:
- Contact details:

1) The previous WATERBORNE Strategic Research Agenda aimed to address 3 key priorities for RDI:

- Safe, Sustainable and Efficient Waterborne Operations
- A Competitive European Maritime Industry
- Manage and Facilitate Growth and Changing Trade Patterns

How would you evaluate the progress made in these 3 pillars so far?

Do you think that the RDI programme has delivered satisfactory results in the mid-term? If not, what further measures should be taken?

- 2) Do you think the RDI programme has had a positive influence on the development of the European waterborne sector?
- 3) What are the main successful elements of the RDI programme?
- 4) What are the main barriers for the RDI programme?
- 5) What are the key challenges in delivering 'exploitable outcomes'?
- 6) Do you think that the priorities of the RDI programme are still relevant to the current challenges of the maritime sector? (See the list of Strategic Research and innovation Agendas attached to the invitation email)
 - a. What other priorities do you think should be included in the RDI programme?
 - b. What priorities do you think should be removed from the project agenda?
- 7) As part of the evaluation, we will propose updates to the Waterborne RDI programme. Do you have any recommendations regarding further focus of the programme?
- 8) What further resources/enablers are needed to support RDI in the priority areas?
- 9) Do you think that the resources devoted to the RDI programme are proportionate given its effects?

ANNEX IV: SEA EUROPE CONTRIBUTION TO THE ELABORATION OF THE NEXT WORK PROGRAMMES

H2020 Feedback

Introduction

In the Frame of the Mid-Term Review of the H2020 Programme, the Shipyards' and Maritime Equipment Association (SEA Europe) – representing the interests of the Maritime Technology industry in Europe (comprising both maritime equipment manufacturers and commercial and naval shipyards) – would like to share its experience with the H2020 Programme of the past three years.

SEA Europe has identified several improvements as well as difficulties and would like to suggest the below-mentioned improvements and recommendations on behalf of the maritime technology industry.

SEA Europe would also like to reiterate that it is still in charge of the secretariat of the WATERBORNE Technology Platform.

General H2020 feedback and recommendations

Stability in budget and funding rules

Lesson learned

Compared to the previous framework programmes, available funding in H2020 has increased from 50 to 77 Billion Euros. This reflects the importance of research and innovation in the strategy “Europe 2020”.

Nonetheless, SEA Europe heavily regrets the absence of any validation of a “Blue PPP” (as referred to in the European Commission’s LeaderSHIP 2020 Strategy) within the framework of H2020. As it has been observed for other sectors, such as Cybersecurity or Rail, a quick implementation of the decision to launch such an instrument is possible.

Recommendations

Given the added value of PPPs demonstrated for Europe R&D and worldwide sectoral leadership, SEA Europe and the Waterborne Community regret being the only sector in transport without such an important tool. The next Framework Programme should therefore be the opportunity to launch an enlarged *Blue PPP*, which integrates shipbuilding activities along with e.g. blue growth activities (such as Marine Renewable Energies (MRE), Multi-use Offshore Platform, desalination, etc.), to secure a dedicated budget for maritime calls for proposals, as it was recommended in the Leadership 2020 Strategy adopted by the European Commission in 2013.

The preservation of the EU investment in Research Programmes, based on grant funding covering the whole value chain, is essential for the European competitiveness, growth and jobs. It is adapted to the specificities of the maritime sector, which is characterized by long-term research cycles, a specific

supply chain of systems integrators who coordinate a large range of SMEs and OEMs and a growing international competition that threatens Europe's global leadership. It also gives an incentive to the necessary collaborative research and the investment in actions that contribute to societal needs and to EU policies. It is the only way to support the financial and technology risks taken by our industries on programmes, with a very long-term return on investment.

Continued support to each sector (Maritime, Ocean Energy, Security, Cyber), with an adapted specific approach and complemented by support to transversal approaches, is the right way to ensure a balanced progress and to face the fierce international competition.

Similarly, the Preparatory Action for Defence Research and the future European Defence Research Programme proposed by the European Commission should take into account the specificities of the Defence sector, especially as regards funding levels, rules of operation, rules of participation, terms and conditions.

Increased industrial participation in H2020 comitology and preparation

Lesson learned

By gathering all relevant stakeholders and establishing shared strategic research road-maps, European Technology Platforms (ETPs) such as WATERBORNE, have proven their ability to contribute to the framework programme preparation. Moreover, they are legitimate representatives of a whole sector through their membership, including SMEs.

Industry is a major player and investor in research, and implements the research results. However, industry representation in the Advisory Groups (AG) is currently well below 20%⁴⁰, which does not represent the weight of industry in R&T. As a direct consequence, AG recommendations often do not reflect the industry's perspectives (e.g. needs and visions). This is especially the case when it comes to the definition of the TRL and the type of action (as RIA or IA).

Recommendations

The next Research Framework Programme should continue to rely on the strategic agendas, representing the agreed consensus between all R&T stakeholders, weighted according to their market representativeness and their overall weigh in R&T, to steer and define R&T plans. In the Advisory Groups, the rules for participation and the selection process should be more transparent, and enable wider industry participation.

It should be acknowledged that SMEs join sectorial national associations to make sure that their voices are heard and industry associations and European Technology Platforms are representatives of SMEs and defend the SME's positions.

⁴⁰ According to ASD, industry participation to Advisory group:

- Horizon 2020 Advisory Group for the Societal Challenge 4 on Smart, green and integrated transport 2014-2020 (E02969): 6 members coming from private sector (among them: 3 from Industry) out of 30 members
- Horizon 2020 Advisory Group Space (E02982): 1 member coming from Industry out of 22 members
- PASAG: Horizon 2020 Protection And Security Advisory Group (E03010) 7 members coming from Industry out of 30 members

Work programme compatible with industrial requirements (IPRs, Theme, etc.)

Lesson learned

Most topics addressed match both industrial sectors and EU policy interests, such as decarbonisation & energy efficiency, autonomous vessels, blue growth activities. But budget allocation leaves broad areas of development uncovered. The absence of TRL 4-5 type projects in H2020, notably in the Blue Growth area, was detrimental to the pre-competitive research.

The industry understands that the open science policy, particularly the open data access, can stimulate and promote research and innovation. Nonetheless, only a sound protection of intellectual property rights and confidential information of private parties will enable the Framework Programme to support projects with strong impact on growth and others EU societal challenges.

Also, sectors with specific markets have proven that applying the normal Framework Programme process deteriorates its attractiveness. For instance, this can be observed for the security work programme, which lacked to deliver the expected results.

End-users' involvement is a must to ensure proper impact and coherence between the project and market needs. Still, in case a project is supposed to develop institutional-related technologies (e.g. Security, Cyber, etc.), the end-users are public bodies, which are quickly submerged by requests. After an initial phase of enthusiasm, this overflow led these public institutions to stop supporting projects and they awaited with supporting the winning consortium thereby making it difficult to establish a good quality committee for the evaluation phase. This is especially true for companies based in small countries and this was particularly observed with regard to Borders and External Security (BES) calls for proposals.

Recommendations

The Work Programme should ensure that all areas in a given call are consistently addressed. Budget allocation should ensure that all critical topics in the call are covered. H2020 should address all product maturity levels from TRL 1 to 6, with a balanced mix of project maturity and sizes. This is especially true for Blue Growth in which TR 4-6 weigh no more than 15% of the budget.

The new emerging 3Os policy will need to be flexible to allow industry participation rather than being a disincentive. In particular, "open access" should not apply by default to research data from private-sector research, nor from public-sector research performed in collaboration with industry. Public and private partners should decide on a case-by-case basis, without any need for administrative justification, which data they can disseminate and share without diminishing their asset developed during the R&T projects. In order not to hamper the chances of proposals during the evaluation process, the decision to operate or not a project under the open-data policy should only be made after the results are known.

A dedicated approach, such as Pre-Commercial Procurements (PCPs), must be considered for specific themes, such as Security, where customers and end-users are public Institutions and Governments. For Defence, which is capability-driven and not market-driven, if PCPs would be the best tool H2020 could provide, it should also be envisaged to create a dedicated parallel framework programme as it is the only way to manage all the challenges raised by its specificities.

In this respect, SEA Europe supports ASD's position regarding the creation of a special report, the rule of participation and governance for the future EDRP.

For calls requesting an involvement of public bodies or institutions, an "Institutional End-User Committee" should be created by the European Commission to be made available to the winning consortium. This would ensure equal treatment between participants and guarantee the involvement of relevant bodies, directly with the winning proposal.

Less oversubscription, higher success rate, proposal preparation workload diminution

Lesson learned

The number of subscriptions increased in H2020⁴¹. It led to an overall low success rate, dropping below 15%⁴². With the large oversubscription and low success rates in H2020's 2014 and 2015 calls (outside JTIs and PPPs), a large number of high quality proposals, although very well evaluated, were left unfunded. Consequently, some R&T stakeholders are discouraged by the high preparation and submission workload involved, for only a low probability of success. In this sense, the "*Label of Excellence*" created by the European Commission failed to deliver any tangible results.

The success rate has been particularly poor for industry, which has been under-represented in the winning consortium proposals⁴³ for collaborative research: H2020 funding allocated to the private sector is roughly one quarter of the overall H2020 budget⁴⁴. Also, some consortium bidding on high TRL calls have been awarded grants while they were lacking any significant industry partner, which dramatically decreased the added-value and sound implementation of the results.

For collaborative research, the two-stage call process was introduced in H2020 for the sake of simplification. This led to two main drawbacks:

- A long period (18 to 20 months) between the launch of the call and the real start of the activities, incompatible with an R&T stakeholder strategy and
- An increase in the proposal preparation workload: as the success rates at the first stage have been too high, the majority of proposals were prepared for both steps.

Recommendations

To limit as much as possible oversubscription, topics in the work programme should be prescriptive and more specified, resulting in less numerous but more focussed proposals.

When coming to proposals for projects with TRL 4+ aiming at having a strong impact, lacking industry stakeholders representing a significant part of the market should be considered a major weakness and a shortcoming.

When the call describes a prescriptive and detailed topic, the first stage process should be preferred. The two-stage process should only be envisaged for low TRL projects, which are not impacted by a long starting delay and be adapted, with a more selective 1st stage evaluation (e.g. 50% success rate targeted at second step). The final proposal should already be requested for the first stage; even though it is evaluated in two phases (e.g. first Excellence and Impact, then Implementation).

It would avoid "last minute" proposals and make the work easier by preparing a **single document**.

⁴¹ Increase of subscription: 33792 eligible proposals were received in 2014 (H2020) compared to 20739 in 2013 (FP7). "H2020 monitoring report 2014"

⁴² Overall Success rate: 1 proposal out of 7 is funded in the first years of H2020 (13.39%) against 1 out of 5 in average in FP7 (19%) FP7: 19%. In addition, some inequalities among domains exist: the success rate in Security sector is below 10%. "H2020 monitoring report 2014"

⁴³ Industry success rate: industry success rate 14.41% when research centres are 18.35%. SME particularly experiment low success rate (12.97%). "H2020 monitoring report 2014"

⁴⁴ Industry participation: only 26.22% of global EU contribution is allocated to private companies. "H2020 monitoring report 2014". In addition, some topics are dedicated to industry as COMPET to boost competitiveness, but in 2016, 17 M€ are allocated to private sector when 35M are allocated to academia and RTO. "Eurosbase database"

Optimized and more transparent evaluation process

Lesson learned

Experts coming from industry are under-represented among the evaluators⁴⁵. Having insufficient industrial background, evaluators do not consider or understand industrial constraints enough. In research activities involving large demonstrators and close to the market, evaluation panels cannot be relevant without industry representatives. It leads to low value for money proposals, sometimes not adequate to the actual situation of the market.

It is anomalous that winning consortia based their proposals on solutions excluded by the European Commission in its communications and studies.

The Evaluation Summary Report (ESR) is short and does not always enable the coordinator to understand the weaknesses of the proposal.

Recommendations

A balanced representation between industry, academia and end-users in evaluation panels should be achieved. Selection rules should be clarified and made transparent.

Evaluation criteria should be clear, precise to ensure homogeneity in the evaluation process and limit room for interpretation. The European Commission and Agencies should ensure that evaluators take into consideration past projects as well as priorities set up by the European Commission.

Value for money should be introduced as a criterion, especially for consumable items, in order to guarantee the most efficient use of resources possible.

Project implementation and administration burden

Lesson learned

In H2020, the introduction of a funding rate of direct costs at 70% or 100% and a flat rate of indirect costs at 25% helped simplifying cost declaration. Information on calls, access to documents and administrative tasks have also been improved by using the participants' portal as single point of entry for all H2020 related aspects. Rules in the H2020 Annotated Model Grant Agreement (AMGA) are more numerous than in previous programmes and added new possibilities for cost declaration.

Despite clear simplification efforts in H2020, reimbursement rules and cost declarations remain complex in particular for SMEs where the usual accounting practices in place in companies often mismatch with the Framework Programme AMGAs one's.

Synergies between different funds (e.g. H2020 and Regional Funds), having different rules for participation, different selection processes, and different levels of funding, are still difficult to be implemented.

Recommendations

Cost declaration rules should be adapted to the majority of beneficiaries' accounting practices.

The AGMA rules should be made more precise and prescriptive to avoid any room for interpretation. The European Commission should continue to share lessons learned from previous projects.

Simplification of processes and tools must be continued and gradually implemented when it leads in decreasing red-tape which hampers the added value created by projects.

13.1.2017

⁴⁵ One fifth only of the evaluators (21.8%) are coming from the private sector "Horizon 2020 Monitoring report 2014: p50"