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Individual Report of the international Mobilisation and Mutual Learning workshop R2

Science Centre AHHAA

Tartu

Estonia

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MML WORKSHOP	DETAILS
Date	17/05/2018
Duration	From 9:45 to 17:00
Location	Estonia, Tallinn
Title of workshop in English	Ships and Ports of the Future are Green
Title of workshop in native language	Tuleviku laev ja tuleviku sadam on rohelised
Marine challenge that the workshop has tackled	Sea Transportation
Number of participants	13
Type of workshop	International
Round	Second
Selected methodology	Structured Democratic Dialogue Process
Language of the workshop	English
Name of the organizing institution	Science Centre AHHAA Foundation
Name of the person in charge	Sander Kask
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1   Purpose of the report

The purpose of this report is to describe the international Mobilisation and Mutual Learning (MML) workshop *Ships and Ports of the Future are Green* that was hosted by Science Centre AHHAA in Tallinn in Estonia on 17th of May 2018. The workshop addressed Responsible Research and Innovation (RRI) actions that should be put in place in order to make ports and ships (sea transportation) environmentally friendly, efficient and sustainable in Europe.

The report describes the results of the workshop and the feedback by the participants. It includes a general outline and international background of the MARINA pan-European MML process of stakeholder engagement in marine and maritime issues and Responsible Research and Innovation; the facilitation methodology; the participant recruitment and the follow-up actions.

The results of the workshop will provide input for the roadmap of Responsible Research and Innovation good practice as well as recommendations about embedding the RRI in the policy-making processes. They will be assembled with the outputs of other international MML workshops in a comprehensive report that will be submitted to the Directorate-General for Research and Innovation of the European Commission.

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3   Executive Summary

On 17th of May 2018 Science Centre AHHAA organized an international Mobilisation and Mutual Learning (MML) workshop *Ships and Ports of the Future are Green* in Tallinn, Estonia. The workshop sought to address Responsible Research and Innovation (RRI) actions that should be put in place in order to make European ports and ships environmentally friendly, efficient and sustainable.

The event was held in the framework of the MARINA project and was part of the Mobilisation and Mutual Learning process composed of two phases of workshops at local and international levels. The workshops have been engaging European civil society, business, research and policy-makers in a participatory debate to examine how Responsible Research and Innovation can help to overcome the current marine societal challenges and unlock the potential for Blue Growth in marine and coastal areas of the European Union.

The day-long workshop was facilitated according to the Structured Democratic Dialogue method. This method allows for integrating contributions from individuals with diverse views, backgrounds and perspectives through a process that is structured, inclusive and collaborative. Thirteen participants were recruited based on their expertise and interest in sustainable and efficient sea transportation and fields that are directly linked to it.

During the workshop they presented 28 ideas of Responsible Research and Innovation actions and developed a roadmap of how innovation in the maritime transport sector and implementation of useful ideas could contribute to sustainable ships and ports in Europe.

The venue of the workshop was the beautiful Estonian Maritime Academy. Science Centre AHHAA was invited to organize the workshop there by participants of the previous (local) MARINA MML workshop, which was hosted by AHHAA in Tartu in February 2018.

The chief message was that any action put in place to ensure environmentally sustainable maritime transport should involve a multitude of stakeholders and be implemented as widely as possible, even globally. Otherwise the transport sector will simply be moving pollution from one place to another. Extensive lowering the carbon footprint of marine transport is well within our reach.

4 Engaging societal actors in Responsible Research and Innovation for smart sustainable and inclusive Blue Growth in Europe

4.1 Mobilisation and Mutual Learning Workshops

The international workshop *Ships and Ports of the Future are Green* was held in the framework of the MARINA project. It was organised by Science Centre AHHAA Foundation in Tallinn, Estonia on 17.05.18. The workshop has been part of the second round of the Mobilisation and Mutual Learning Process composed of two phases of workshops at local and international levels and connected to the international Responsible Research and Innovation practitioner and policy-maker event. The process can be illustrated as follows:

| Local MML workshops | International MML workshops | International RRI practitioner and policy maker workshop | Local MML workshops | International MML workshops | International RRI practitioner and policy maker workshops | High level policy conference |

Fig.1. MARINA Mobilisation and Mutual Learning process

The workshop:

1. Engaged European societal actors in a multi-actor dialogue and in co-creating a participatory roadmap of actions for tackling the marine societal challenge of Sea Transportation and based on Responsible Research and Innovation principles;
2. Started the process of federating Civil Society Organisations (CSOs), citizens, businesses, industry, research, policy-makers and communicators face-to-face and on-line;
3. Set in motion inclusive mechanisms for sharing knowledge and best practice, building common understanding and co-creating solutions to marine societal challenges and based them on the principles of Responsible Research and Innovation;
4. Facilitated federation of communities and networks on the MARINA digital platform.

4.2 How can Responsible Research and Innovation ensure a smart, sustainable and inclusive Blue Growth in Europe?

Europe is facing "innovation emergency": t spends 0.8% of GDP less than the USA and 1.5% less than Japan on Research & Development (R&D) every year. Thousands of European best researchers and innovators have moved to countries where conditions are more favorable[1], despite the support by the European Union to foster research and innovation in terms of networking, funding[2], social business, start-up, dissemination and incubation[3]. Therefore, in 2018, the European Commission will increase the support of smart and inclusive growth with €76.5 billion in commitments and €66.4 billion in payments, i.e. up by 2.1% and 17.5% respectively compared to 2017.

Seas and oceans are drivers of the European economy and have great potential for innovation and growth. They can contribute to achieving the goals of the Europe 2020 strategy for smart, sustainable and inclusive growth.

Accordingly, the European Union has set out the Blue Growth[4] long-term strategy to support sustainable development in the marine and maritime sectors in Europe. This strategy aims to boost growth in areas such as

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[1] http://ec.europa.eu/research/innovation-union
[2] Employment and Social Innovation Programme, Horizon 2020, SME Instrument, Collective Awareness Platforms, EU structural and investment funds - Guide to Social Innovation. Social Challenges Platform.
[3] https://ec.europa.eu/growth/industry/innovation/policy/social_it
[4] https://ec.europa.eu/maritimeaffairs/policy/blue_growth_en

aquaculture, coastal tourism, marine biotechnology, ocean energy and seabed mining. It puts forward three priorities to make Europe a smarter, more sustainable and more inclusive place to live:

- Smart growth, through the development of an economy based on knowledge, research and innovation;
- Sustainable growth, through the promotion of resource-efficient, green and competitive markets;
- Inclusive growth, through policies aimed at fostering job creation and poverty reduction[5].

At a global level, in the 2030 Agenda for Sustainable Development, social challenges are a priority for a sustainable growth[6].

Responsible Research and Innovation is a key cross-cutting instrument to reach these goals, an investment for our future. In practice, it is implemented as a package that includes multi-actor and public engagement in research and innovation, thanks to open access to scientific results, formal and informal science education and the take up of gender and ethics in the research and innovation content and process.

Responsible Research and Innovation (RRI) is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (Von Schomberg, 2011). The European Commission distinguishes 6 key dimensions of RRI: Public Engagement, Science Education, Open Access, Gender Equality, Governance and Ethics.[7]

Public and multistakeholder engagement is a societal commitment to provide encouragement, opportunities and competencies that will empower citizens and civil society organisations to participate in research and innovation. It is also about bringing together a diversity of actors from research community, policy-making, business and industry, who would not normally interact with each other, on matters of science and technology.[8]

Science Education aims at increasing society's appetite for innovation and interest in science, in particular among young people with a special emphasis on girls. It encourages innovative pedagogies to teach science, the involvement of institutions that organize such activities, promotes RRI in higher education curricula and eases access to scientific careers.[9]

Open access and open science intend to make research findings, data, scientific publications and information available free of charge for anyone.

Gender Equality aims at removing barriers that generate discrimination against women in scientific careers and decison-making. It fosters gender balance in research teams and integrates a gender dimension in research and innovation content in order to improve the scientific quality and societal relevance of the produced knowledge, technology and innovation.[10]

Ethics is given the highest priority in the European Union funded research and innovation. It implies the application of fundamental ethical principles and legislation to scientific research and innovation in all possible domains and includes the avoidance of any breach of research integrity and ethics dumping.[11]

Governance is the umbrella for all other dimensions. It addresses the responsibility of policy makers to prevent harmful or unethical developments in research and innovation and developing harmonious models for Responsible Research and Innovation that integrate Public and multistakeholder Engagement, Science Education, Open Access, Gender Equality and Ethics. [12]

[5]http://ec.europa.eu/eurostat/statistics-explained/index.php/Smarter,_greener,_more_inclusive_-_indicators_to_support_the_Europe_2020_strategy
[6] "Sustained, inclusive and sustainable economic growth is essential for prosperity. [...] We will work to build dynamic, sustainable, innovative and people-centred economies, promoting youth employment and women's economic empowerment, in particular, and decent work for all."
[7] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation
[8] https://ec.europa.eu/programmes/horizon2020/node/766
[9] https://ec.europa.eu/programmes/horizon2020/node/795
[10] https://ec.europa.eu/programmes/horizon2020/node/797
[11] https://ec.europa.eu/programmes/horizon2020/node/767
[12]https://ec.europa.eu/research/swafs/pdf/pub_public_engagement/responsible-research-and-innovation-leaflet_en.pdf

The Blue Growth strategy reflects policy priorities. It aims at bringing together resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities by addressing the following challenges:

- Health, demographic change and wellbeing;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, environment, resource efficiency and raw materials;
- Europe in a changing world - inclusive, innovative and reflective societies;
- Secure societies - protecting freedom and security of Europe and its citizens.

4.3   The MARINA workshops and Sustainable Development Goals

The European Union's response to the 2030 agenda of the United Nations Organisation is "The new European consensus on development of 'our world, our dignity, our future". The document highlights that "the EU and its Member States will integrate the respect of human rights, democracy, the rule of law and gender equality into their political dialogue" and that "sustainable development requires a holistic and cross-sector policy approach and is ultimately an issue of governance which needs to be pursued in partnership with all stakeholders and on all levels"[13]. Accordingly, the topics addressed at the MARINA workshops have been related to Sustainable Development Goals[14] such as:

- SD Goal 1: End poverty in all its forms everywhere;
- SD Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- SD Goal 6: Ensure availability and sustainable management of water and sanitation for all;
- SD Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all;
- SD Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- SD Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- SD Goal 11: Make cities and human settlements safe, resilient and sustainable;
- SD Goal 12: Ensure sustainable consumption and production patterns;
- SD Goal 13: Take urgent action to combat climate change and its impacts;
- SD Goal 14: Conserve and sustainably use the oceans, seas and marine resources;
- SD Goal 17: Strengthen means of implementation and revitalise the global partnership for sustainable development.

4.4   The choice of the workshop marine topic

The marine challenges and the topics of the workshops in the second round stemmed from international and national agendas. They have been: marine biotechnologies, sea transportation, deep-sea mining, renewable energy (wind, wave and tidal) and marine changes caused by climate.

The participants of the workshop *Ships and Ports of the Future are Green* in Tallinn, Estonia discussed the marine challenge of Sea Transportation in the perspective of Responsible Research and Innovation. The triggering question to address this issue was *What Responsible Research and Innovation actions are needed in order to make ports and ships environmentally friendly, efficient and sustainable in Europe?* In response to it, they put forth proposals of participatory RRI–driven actions.

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13 https://ec.europa.eu/europeaid/sites/devco/files/european-consensus-on-development-final-20170626_en.pdf
14 https://sustainabledevelopment.un.org

5 Ships and Ports of the Future are Green

5.1 The current situation

According to Valdo Kalm, chairman of the management board of Port of Tallinn, sustainability and smart solutions have become key elements in global marine transport. "Being green" is no longer only an ecological imperative, but the higher efficiency involved with innovative methods makes green operation also an economic standard.

In any case not all shipping companies and harbours can accept these developments with the same ease, either because of the inertia of the existing methods, the economic risks involved or inadequate tax- and incentive policy. And thus, for example, none of the big Estonian cargo ships currently sail under the Estonian flag.

Estonian Maritime Administration is under pressure to devise a sea economy packet that adequately addresses these issues and encourages maritime companies to take the necessary risk. But as the sea is shared by many stakeholders and countries, there is a lot of discussion to be had on how we envision the future of green ports and ships, both locally and internationally.

The commitment to reduce greenhouse gas emissions in the shipping sector by 50% by the year 2050, achieved in London in April, 2018, started a race to find new technologies to achieve this goal. The commitment has been applauded and at the same time criticized by environmental groups, as an unachievable goal. Other reports claim that already known technologies would be sufficient to reach this goal and go beyond. Some examples to reduce the fuel intake and energy consumption would be lighter construction materials, more slender ships, low friction hull coating, two propellers rotating in opposite directions to recover slipstream energy etc.

Port of Tallinn won the Green Port of the Year Award by the DPC Innovation Awards in 2017, by developing a sustainable cruise terminal in the Tallinn Old City Harbour. The port has reported they have taken initiative to protect the Baltic Sea by building a micro-tunnel for better cruise ship waste management.

Sea transportation on the Gulf of Finland (part of the Baltic Sea) is expected to rise by 30% by the year 2030. This concurrently raises the risk of accidents, leakage and pollution in the region.

5.2 The triggering question and clusters: What Responsible Research and Innovation actions are needed in order to make ports and ships environmentally friendly, efficient and sustainable in Europe?

As international cargo and shipping volumes are increasing and the sea is a relatively energy efficient transport route, it is easy to overlook the implications rising traffic on the sea has on the marine and coastal environment. If road transport increases, everybody will notice it quickly, but sea remains an often further away place, that we think is doing OK, if we don't hear about oil spill catastrophes in a while. RRI offers a common ground framework for all marine stakeholders to start a dialogue and keep informing the public about what is happening with the sea, what could be done with the sea better, how to research it further and how can stakeholders and citizens help.

During the Estonian International MML workshop, 28 ideas were generated by the participants in the form of concise action-statements through the "idea generation phase". The participants were requested to state their "ideas" in the form of action statements in order to "push" them to think in practical terms. In fact, the facilitator from the start explained that the ideas-actions must follow the SMART principle (Specific, Measurable, Assignable, Realistic and Time-bound). Once all actions were defined, printed and displayed on the screen and on the walls in the room, the workshop passed to the Clarification Phase where one by one, the participants proceeded with the explanation of their actions. For this activity sufficient time was allocated to the rest of the participants to ask explanatory questions. The premise of the clarification phase is to allow participants to gain the same understanding and interpretation of the action based on the meaning attributed to the action by its own author. Clarification is of the utmost importance for the Clustering Phase that followed, where participants were instructed to categorise the proposed ideas in clusters according to similarities and common characteristics. To achieve this clustering, the participants discussed and compared the ideas in pairs to identify whether they share enough characteristics to be clustered into the same category. The participants mutually and collaboratively identified 4 clusters:

1. **Policy,**
2. **Environmental Technology,**
3. **Local cooperation,**
4. **Money**

The distribution of the actions across the 4 clusters is demonstrated in the below Figure 2:

Cluster 1: Policy

Action 1: To make more ambitious agreements (4 votes)

Action 9: Global implementation of environmental requirements (7 votes)

Action 10: Implementation of existing agreements (2 votes)

Action 16: Waste management in ships and harbors (2 votes)

Action 17: Financing (1 vote)

Action 19: Improvement of planning and information exchange between ports and vessel operators (0 votes)

Action 20: Implementation of global single window (7 votes)

Action 21: Energy transition (2 votes)

Action 23: Find out who has power to change things (1 vote)

Action 26: Disaster response (1 vote)

Action 27: Limits to growth (0 vote)

Cluster 3: Local Cooperation

Action 3: Ports should create their own electricity to be more efficient (1 vote)

Action 8: Port stay use only port electricity (green electricity) (1 vote)

Action 11: Develop waste management system in small ports (2 votes)

Action 14: Ports cooperation with the surrounding cities or regions (2 votes)

Action 22: Food waste and food loss issues on ships (1 vote)

Action 24: More sailing (1 vote)

Action 28: Have speed limits for fast passenger ferries in coastal areas (0 votes)

Cluster 4: Money

Action 12: Change taxing principles for use of the energy (2 votes)

Action 18: Joint commercial activities (6 votes)

Action 25: Reduction of financial impact (5 votes)

Cluster 2: Environmental Technology

Action 2: Environmentally friendly ships are paying less (4 votes)

Action 4: Ships as a possibility to collect environmental data (3 votes)

Action 05: Technological development (3 votes)

Action 15: Better ballast water cleaning system for the ships (0 votes)

Action 06: Implementation of VR technology (0 votes)

Action 07: Use more alternative solutions to produce electricity for ships (1 vote)

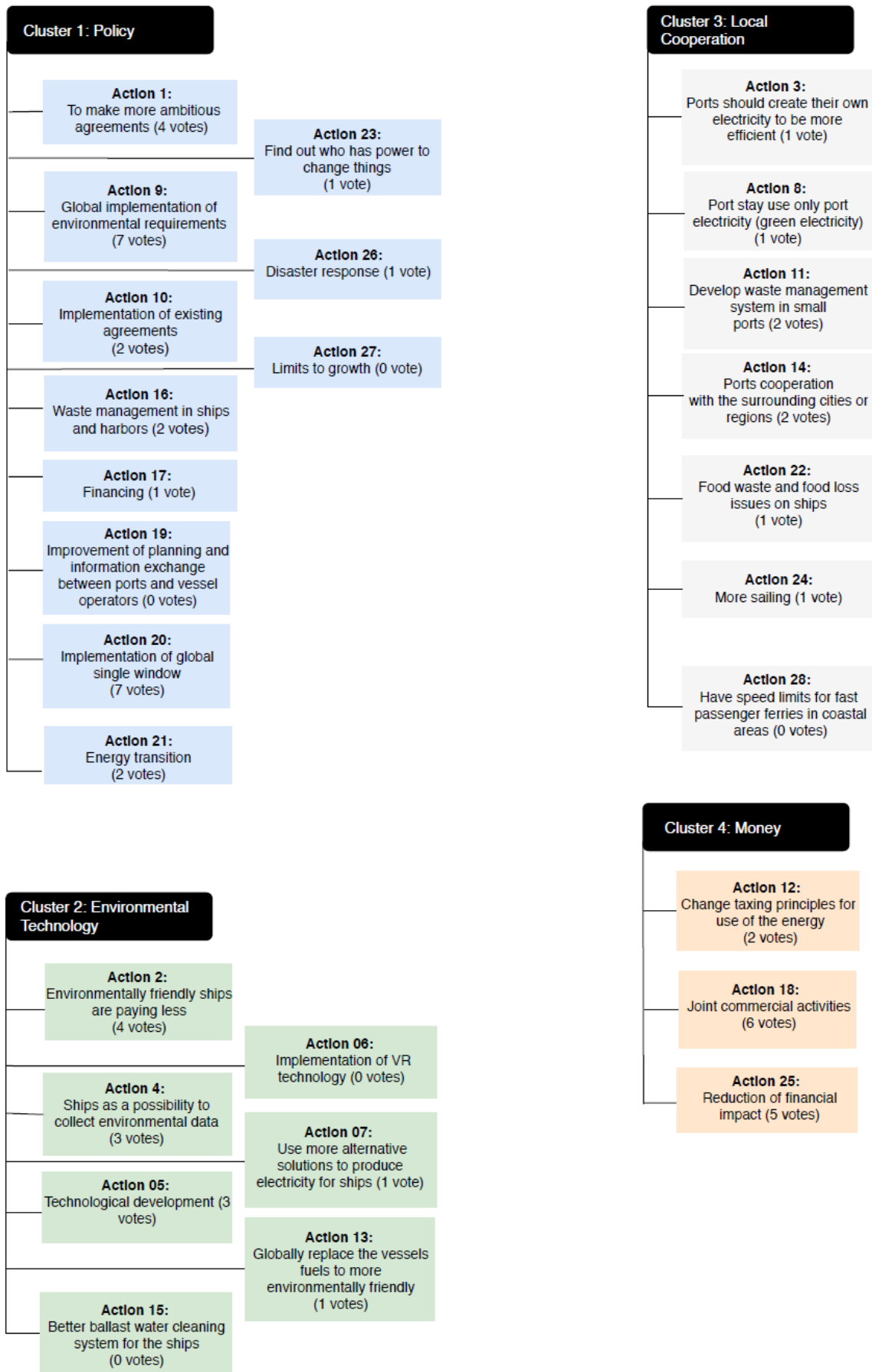Action 13: Globally replace the vessels fuels to more environmentally friendly (1 votes)

Fig.2.   Clusters assembled by the participants of the international MML workshop in Tallinn, Estonia

Overall, "Policy" was the most populated cluster with 11 actions followed by Cluster 2: "Environmental Technology" and Cluster 3: "Local Cooperation" both with 7 actions. A significantly low number of actions were distributed to Cluster 4 on Money, which received 3 actions in particular.

5.3   Synthetic Analysis of the Clusters in order of total votes received

Policy is considered pivotal

Cluster 1 entitled "Policy" is considered the most important in terms of the number of votes received. In particular, 27 votes were distributed across the 11 actions categorised under this cluster with an average of 2,45 votes/action. Seven out of the eleven actions from the Policy Cluster have been included in the Influence Action-Map. The actions emphasise the importance of engaging government and law makers in order to make sustainable change in ports and ship. Different changes in the ways waste, use of energy or disaster avoidance are welcomed by the MML workshop participants, but these are changes that only work if there is legislation that compels ships and ports to implement them. This requires policy maker intervention.

Action 9: "Global implementation of environmental requirements" and Action 20: "Implementation of global single window" both received 7 votes, the highest number of votes during the voting procedure. In particular, Action 9 aims to make all new conventions and all new laws, that are implemented on the sea, global ones, not local ones.

The analysis of the Cluster 1 shows that the successful use of RRI for environmentally friendly, efficient and sustainable ports and ships entails both creating and revising policies, as well as strengthening implementation and enforcement efforts. The cluster addressed multiple sustainable development goals, mainly for example the SD goal 13: *Take urgent action to combat climate change and its impacts.* Policy makers are the main stakeholders of the actions in this cluster, however business stakeholders are also deeply linked with any policies being discussed according to these actions.

Economic laws and strategies should be reconsidered.

The Cluster 4 "Money" received a total of 13 votes positioning itself as the second most important cluster of the Estonian MML workshop with 2.3 vote/action. Specific, measurable and realistic actions, mostly related to the RRI dimension *Engagement*, were generated that aimed to identify specific economic changes that would support the goal of efficient and sustainable ports and ships.

Action 18: Joint commercial activities received the most votes in this cluster. The idea necessitates the further exploitation of economies of scale, consolidating different modes of cargo transport, thus raising efficiency and cutting the chain of different transportation modes shorter.

Actions 12 and 25 both have to do with economic policies, and stress the importance of ensuring that the financial measures that accompany any policy change are sustainable too. This could be achieved, for example, by taxing ships solely according to their energy (fuel) use, instead of size or capacity. The cluster mainly addressed the SD Goal 9: *Industry, innovation and infrastructure.* These actions mainly relate to the work of different industry and business stakeholders, but also policy makers. If the aforementioned action 12 would become a reality, then it would actively affect and bring researchers of alternative energy sources on board also.

Sustainable Marine Environment Technologies

Cluster 2 related to the Environmental technology received 12 votes, which were distributed across its 7 actions, that is, an average of 1.7 vote/action. The cluster was comprised of specific, measurable and realistic actions suggesting ideas on how to successfully implement environmental technology while respecting and protecting the marine environment. As an example, consider Action 13: Globally replace the vessels fuels to more environmentally friendly (1 vote) and Action 2: Environmentally friendly ships are paying less (4 votes). According to the MML workshop participants, it is important to quit using oil-based fuel on the sea because of the continuing danger of even minor oil spills, and ports could enforce this with their differentiated taxes and costs. These ideas succeed in linking the research and innovation process with the RRI dimensions of Governance and Ethics. The actions of this cluster addressed the SD Goal 14: *Life below water*. This cluster involves many stakeholder groups, but compared to other clusters, the focus in more research institutions.

Local cooperation is needed for developing sustainable ships and ports

Finally, Cluster 3: Local cooperation was the least popular, with 8 votes across 7 actions. This cluster focused mainly on specific things each port or ship can do to support environmental efforts. In particular, Action 11 that suggests "*develop waste management system in small ports*" received 2 votes. It was explained that 20% of marine litter is produced on the sea and currently, bringing garbage to the ports (including when fishermen find trash in their nets), is a big hustle and is not supported by waste management infrastructure or incentives to remove trash from the seas. This cluster represents RRI dimensions of Engagement and Governance. The stakeholders involved are mostly local governments and the shipping and port companies. Cluster 3 is connected with the SD Goal 11: *Sustainable cities and communities.*

5.4   Building a roadmap

In order to develop the Roadmap of the Estonian MML workshop, the actions which received more than two votes and above during the voting phase were randomly compared in pairs to identify whether the implementation of the Action A could significantly influence the implementation of the Action B. The phase required a thorough discussion from the participants in order to determine relations of influence between the actions.

The influence map (roadmap) shows the 5 actions as goals at the top Level 1 and the driver actions at levels 5 and 6, and many interrelated actions in the middle (levels 2, 3 and 4). The two actions at the bottom of the map, levels 5 and 6, can be interpreted as the most influential ideas. This means that the implementation of Action 20 would significantly help or influence the implementation of Action 25. The implementation of Action 25 would significantly influence the implementation of Action 2, and so on.

As demonstrated in Figure 3 the roadmap incorporates 6 different levels. The most influential actions are considered the root actions, which are the drivers, and similarly those, which must be implemented first to stimulate the implementation of the subsequent actions considering that the latter rely on the former. These root actions are located at the lower levels of the roadmap and in particular at the levels 6 and 5 as they have the greatest influence among all other actions. Therefore, to enable the development of environmentally friendly, efficient and sustainable ports and ships, it is pivotal that the following actions are implemented first:

·   Level 6: *Implementation of global single window* (A20, C1, V7)
·   Level 5: *Technological development* (A25, C2, V5)

Level 4 is comprised of two actions, Action 4: "*Ships as a possibility to collect environmental data*" (C2, V3) and Action 2: "*Environmentally friendly ships are paying less*" (C2, V4). Note that these actions are the most voted actions from Cluster 2: Environmental Technology.

The two actions positioned at the Level 3, "*Implementation of existing agreements*" (A10, C1, V2) and "*Energy transition*" (A21, C1, V2), are influenced by the previous levels, which implies that in order to have a great advancement on these specific actions, the implementation of the actions identified in the previous levels must precede.

Level 2 has three action, Action 9: "*Global implementation of environmental requirements*" (C1, V7), Action 5: "*Technological development*" (C2, V3) and Action 14: "*Ports cooperation with the surrounding cities or regions*" (C3, V2). Note that Action 9 received the highest number of votes (tied with Action 20 of Level 1). This shows that even though Action 20 and Action 9 both seemed to be equality important in the voting round, they are not equality influential.

The highest level of the roadmap, Level 1, is the most numerous one with five actions: "*Joint commercial activities*" (A18, C4, V6), "*To make more ambitious agreements*" (A1, C1, V4), "*Change taxing principles for use of the energy*" (A12, C4, V2), "*Develop waste management system in small ports*" (A11, C3, V2) and "*Waste management in ships and harbours*" (A16, C1, V2). It is important to observe that the actions 11 and 16 found on Level 1 share the same box unlike action 12 for example, which has a box on its own. This means that the actions 11 and 16 are equally influencing each other and are equally influenced by the actions below it. In particular, the participants agreed that the implementation of Action 11 could significantly influence the implementation of Action 16 and that the implementation of Action 16 could significantly influence the implementation of Action 11. However, the participants answered that the implementation of Action 12 could not significantly influence the implementation of Action 11, therefore Action 12 is not together with Actions 11 and 16.

Level I

18: Joint commercial activities (6 votes)

1: To make more ambitious agreements (4 votes)

12: Change taxing principles for use of the energy (2 votes)

11: Develop waste management system in small ports (2 votes)
16: Waste management in ships and harbors (2 votes)

Level II

9: Global implementation of environmental requirements (7 votes)

5: Technological development (3 votes)

14: Ports cooperation with the surrounding cities or regions (2 votes)

Level III

10: Implementation of existing agreements (2 votes)

21: Energy transition (2 votes)

Level IV

4: Ships as a possibility to collect environmental data (3 votes)

2: Environmentally friendly ships are paying less (4 votes)

Level V

25: Reduction of financial impact (5 votes)

Level VI

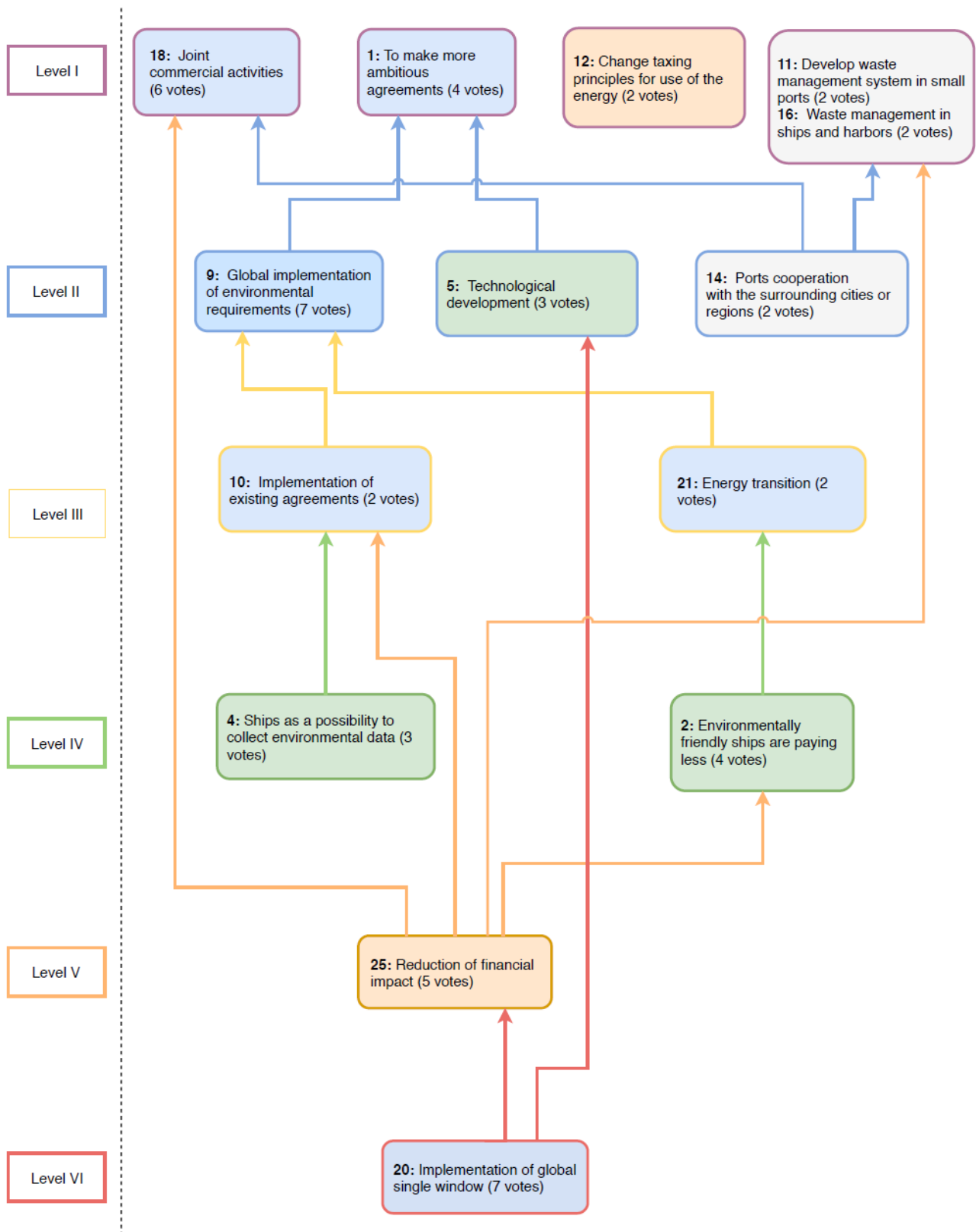**20:** Implementation of global single window (7 votes)

Fig.3.   Final influence map produced by the participants of the international MML workshop in Tallinn, Estonia

6 Sea transportation and Responsible Research and Innovation

6.1 How do the results relate to the RRI dimensions?

This section will analyse the actions suggested by the workshop participants in the framework of six priority dimensions of Responsible Research and Innovation: Public and Multi-stakeholder Engagement, Science Education, Open Access/Open Science, Gender Equality, Governance and Ethics as they have been defined by the European Commission[15]. Two dimensions have been added to the current list, which are not normally considered dimensions of RRI, but they are relevant in terms of the MML workshop in Tallinn. These dimensions are Sustainability and Social inclusion.

The participants had generated 28 ideas of actions from the very general to the very specific. These actions were classified according to the RRI dimensions. Many of them related to several RRI dimensions. The graph below (Fig. 4) takes into account this multidimensional status.

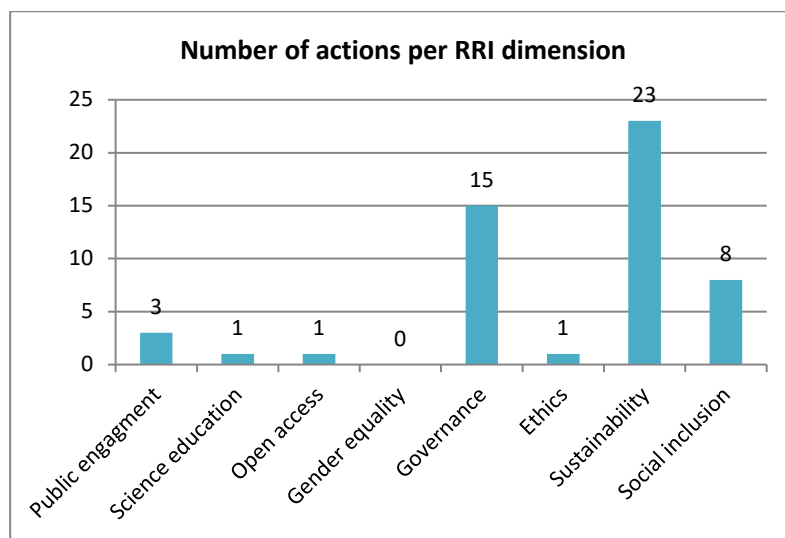**Number of actions per RRI dimension**

Fig.4.   Number of actions per RRI dimension

Sustainability was the most common dimension that appeared in 23 actions. It was followed by Governance (15 actions). Social inclusion came in the third place with 8 actions. Public engagement was associated with 3 actions and the rest (Science education, Open access and Ethics) only had one action. Gender equality was a dimension that was not linked with any sea transport related actions in this MML workshop. The Figure 5 below shows the attribution of the RRI dimensions to every action proposed by the participants during the workshop.

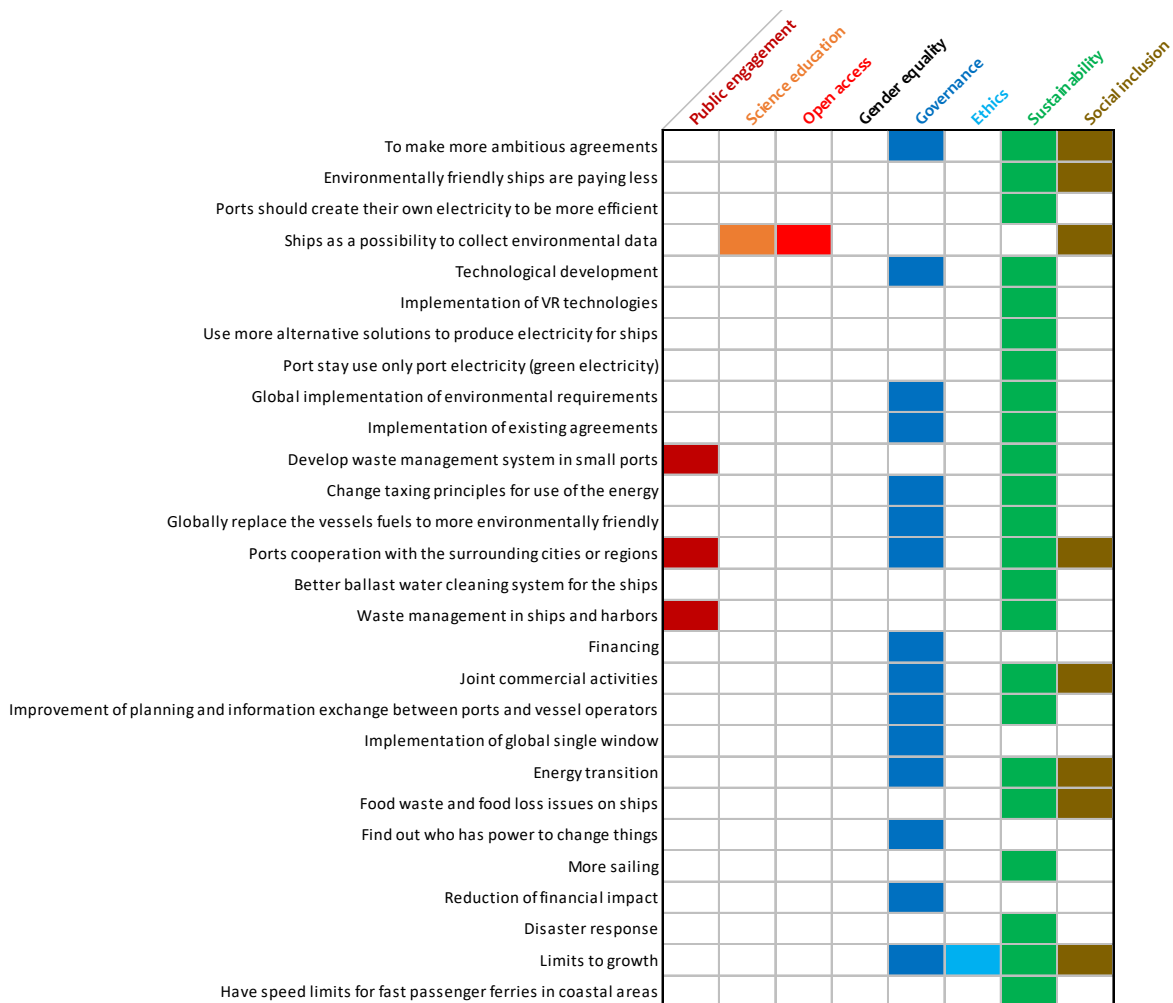---

[15] EU, Regulation No 1291/2013

Fig.5.   Actions and their RRI dimensions

As the MML workshop on Tallinn had its focus on actions that enable environmental sustainability, most of the actions were linked with the RRI dimension of Sustainability. Only 5 actions out of 28 didn't fall under Sustainability. 12 actions were related to only one RRI dimension. 10 actions were characterised by two RRI dimensions, 4 actions were characterised by three dimensions and 2 actions were linked to four RRI dimensions. Actions that in essence demanded more cooperation between different marine stakeholders, such as cooperation between ports and surrounding areas and collecting environmental research data on privately owned cargo ships, were the ones to be more likely associated with multiple RRI dimensions.

The number of RRI dimensions per action was 1,8 on average. These numbers were similar within different clusters also, with the Policy cluster having an average of 1,9 RRI dimensions per action, 1,7 both for the Environmental Technology cluster and Local Cooperation cluster and an average of 2 RRI dimensions per action in the Money cluster. Figure 6 below shows the percentage of the RRI dimensions per cluster. All of the clusters are strongly linked with the Sustainability dimension, but difference can be seen in the relationship between different clusters and the Governance dimension. It is envisioned that Environmental Technology and Local Cooperation can happen without the intervention of policy makers, but in order to divide funding, policy makers must be deeply involved.

The absence of Gender Equality dimension could point to a gap in access to opportunities and resources and decision-making power for women and men.
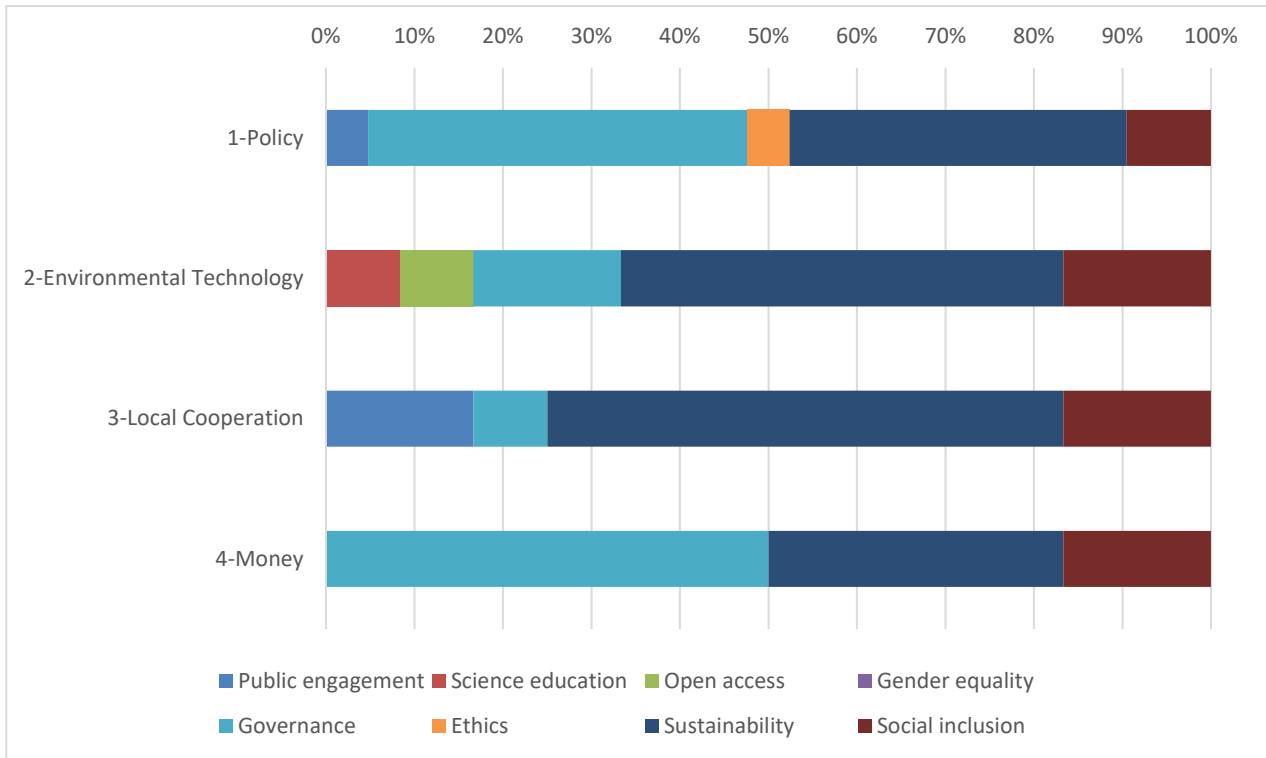
Fig.6.   RRI dimensions (%) per cluster

6.2   Who are the main target stakeholder groups of the actions?

The Figure 7 below shows the percentage of desired involvement for each stakeholder group: the civil society (citizens/CSOs/NGOs), business/industry, researchers and policy makers. The figure doesn't include overlapping involvement, if an action requires involvement by multiple stakeholder group, then multiple sectors in Figure 7 will be influenced. The engagement of the business and industry sector was the most sought for as all actions required businesses to be involved in some way. This goes in line with the overall character of the marine challenge addressed by the theme of the workshop: marine transportation, a field operated by private companies.
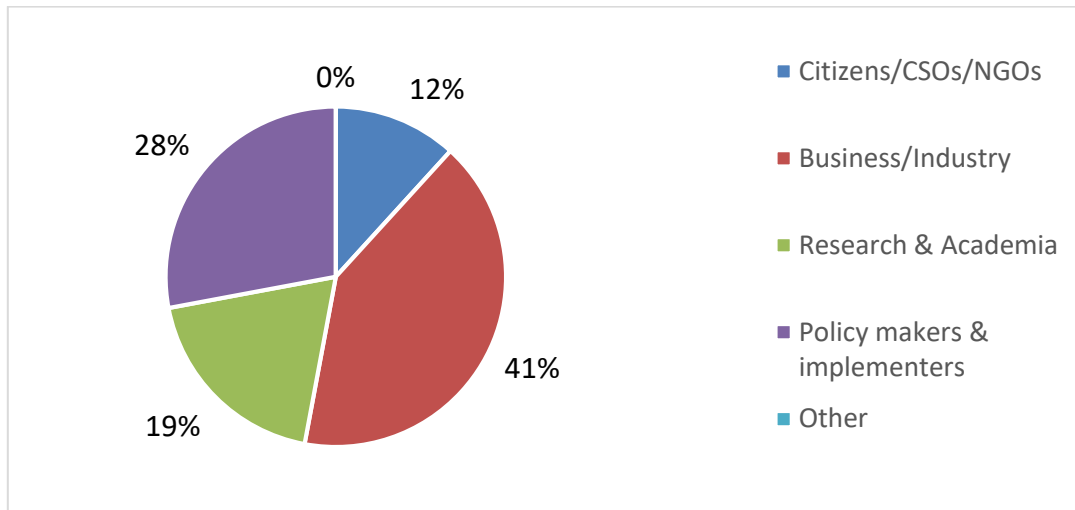
Fig.7.   Percentage of actions per stakeholder group

Only 5 actions are envisioned to involve only one stakeholder group – business and industry. In those cases, however it is foreseen that many companies should work together. Other stakeholder groups are not targeted alone, they are always involved alongside other groups, most likely business and industry. 5 actions target all four stakeholder groups (to make more ambitious agreements, technologic development, waste management systems in ports

which is mentioned twice and finding out who has the power to implement change). Figure 8 below shows how individual actions target different stakeholder groups.

To make more ambitious agreements
Environmentally friendly ships are paying less
Ports should create their own electricity to be more efficient
Ships as a possibility to collect environmental data
Technological development
Implementation of VR technologies
Use more alternative solutions to produce electricity for ships
Port stay use only port electricity (green electricity)
Global implementation of environmental requirements
Implementation of existing agreements
Develop waste management system in small ports
Change taxing principles for use of the energy
Globally replace the vessels fuels to more environmentally friendly
Ports cooperation with the surrounding cities or regions
Better ballast water cleaning system for the ships
Waste management in ships and harbors
Financing
Joint commercial activities
Improvement of planning and information exchange between ports and vessel operators
Implementation of global single window
Energy transition
Food waste and food loss issues on ships
Find out who has power to change things
More sailing
Reduction of financial impact
Disaster response
Limits to growth
Have speed limits for fast passenger ferries in coastal areas
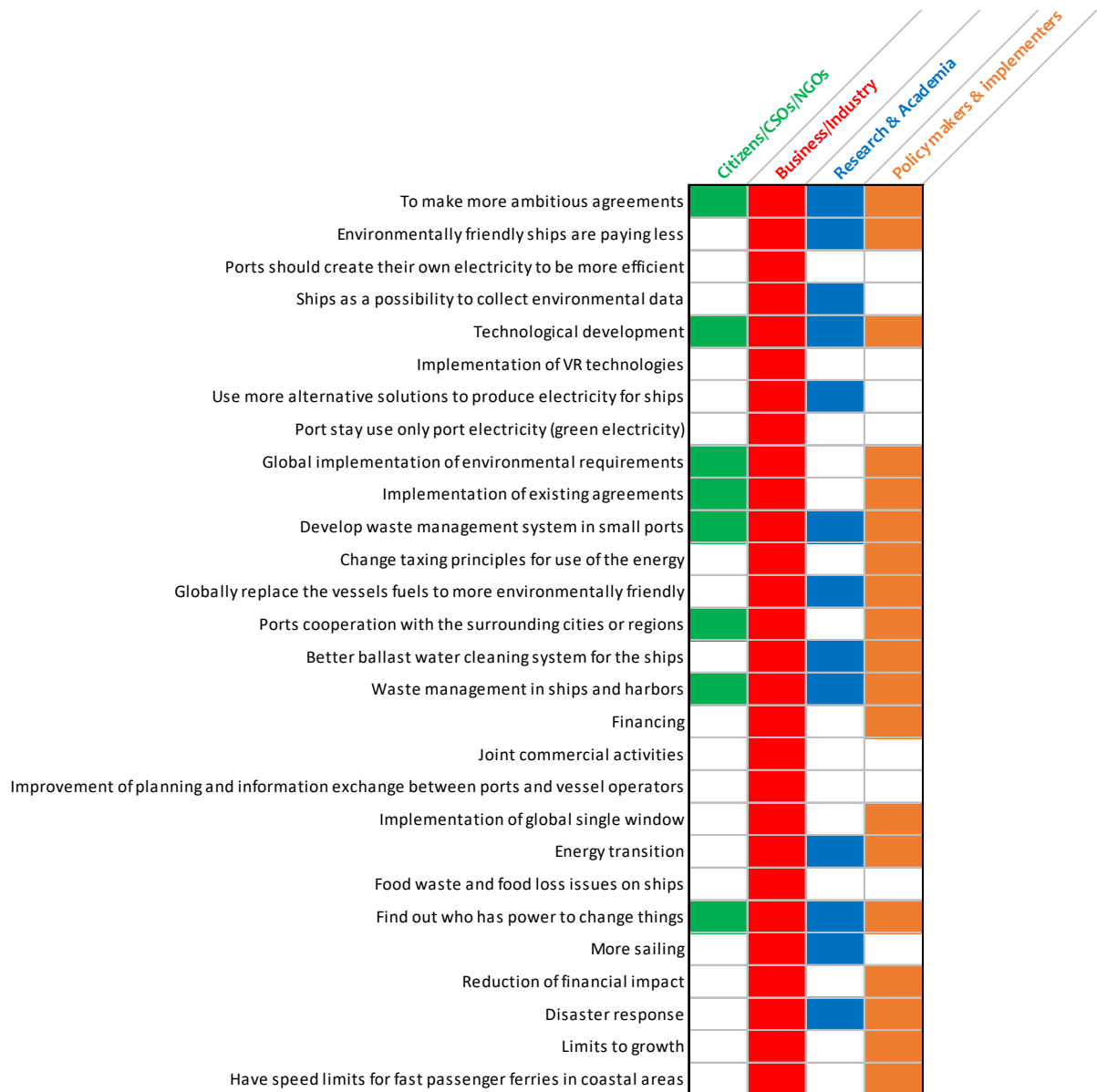
Fig.8.   Which stakeholders are targeted by individual actions

The Figure 9 below presents the percentage of engagement of the stakeholder groups in clusters. It confirms the prominent role of the business and industry in the implementation of sustainable marine transportation. Researchers are seen as key stakeholders dealing with the development of environmental technology. In the cluster of actions relating to policy, all stakeholder groups are seen as important players with a more even representation than in other clusters.
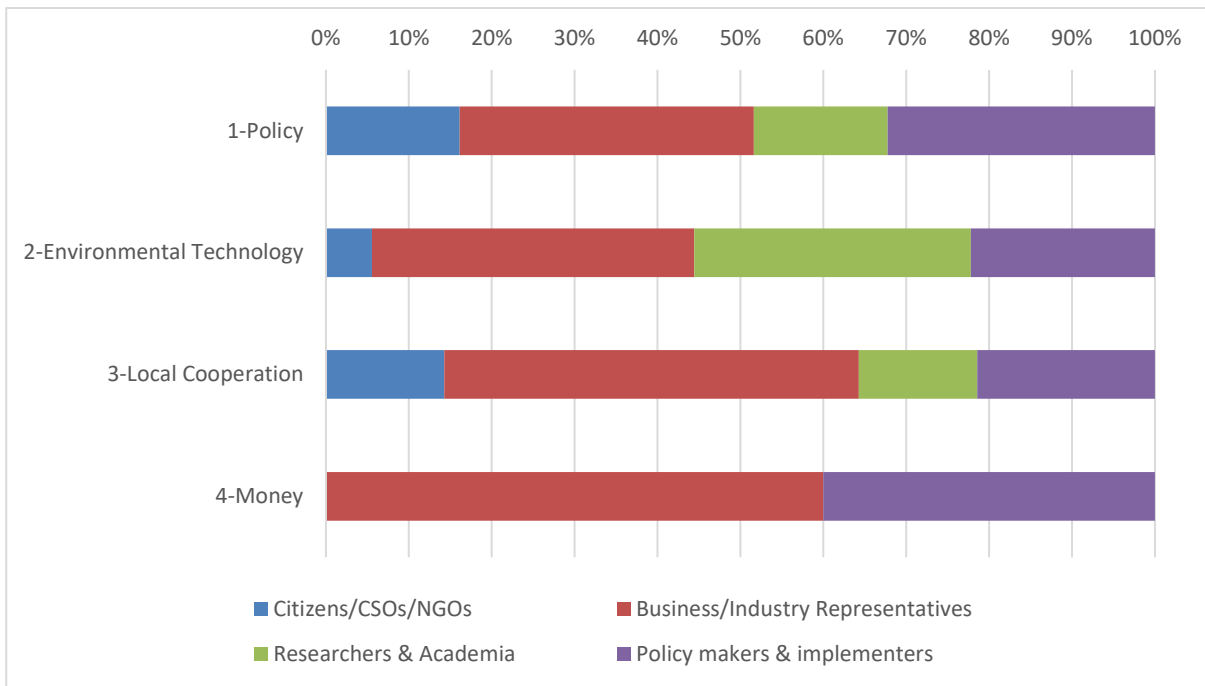
Fig.9.   Stakeholder groups (%) per cluster and roadmap

It can be seen from the workshop results that either these participants were working on jobs that often deal with policy issues linking government organizations and businesses, or that the involving academia and citizens in decision making is of a minor concern for the participants. In either case this leaves a lot of room for the continuing uptake of RRI values in the marine transport sector.

6.3   Public Engagement

Developing green marine transport solutions must be conducted with the participation of very different stakeholders, such as universities and science institutions, private companies, policy makers (of which there are many in the marine sector) and the citizens who inhabit coastal areas. This allows adopted policies and solutions to be as relevant as possible, resulting in more support to implement the changes by all sides.

Public Engagement was not a very well represented RRI dimension in the proposed actions. Each action, however, ended up on the final roadmap.

N°	CLUSTER	ACTION	VOTES
ACTIONS ON THE ROADMAP			
11	3	Develop waste management system in small ports	2
14	3	Ports cooperation with the surrounding cities or regions	2
16	1	Waste management in ships and harbors	2

The actions suggested by the participants were linked with developing new ways of cooperation in ports and around them. Action 14 concentrated on removing traffic and thus pollution from the often congested port areas, which are in city centers. Actions 11 and 16 both called for a unified and subsidized system that enables sailors, such as fishermen, to easily and profitably get rid of garbage that they found on the sea.

6.4   Science education and Open access

Effective and eco-friendly port and ship requires an evolution in the corresponding fields of science also. In addition to engineering, architecture and environmental studies, a field in the process of change is also ship operation.

A potential effort to share sea environment measuring data can lead to further acceptation and implementation of citizen-conducted measurements. This can help to find new problematic areas in the sea environment that would otherwise go unnoticed.

One action related to both of the RRI dimensions of science education and open access was proposed by the workshop participants. This action was also voted to go on the final roadmap. The action envisioned to start measuring and collecting marine scientific data on board different non-scientific vessels. As there are thousands of ships on the sea, these ships could be converted into thousands of data gatherers, exposing potentially important results about the seas in a big-data spirit.

N°	CLUSTER	ACTION	VOTES
ACTIONS ON THE ROADMAP			
4	2	Ships as a possibility to collect environmental data	3

6.5   Gender equality

Gender equality is an issue in many European states. It manifests also in the marine transport sector, with few of the upper management positions in different stakeholder groups being filled by women and generally more men working in this field.

Gender equality didn't come up as a topic of discussion in the MML workshop held in Tallinn. Only two participants out of 13 were women so the point of view of women was under-represented in the workshop anyway.

6.6   Governance

Governing and managing the growth of the sea transportation sector in a sustainable way is of critical importance. Balancing economic profit and a competitive market with the goal of preserving the natural environment of our seas cannot generally be left to the private companies themselves, but must be limited in one way or another by national and international organizations and discussed with all key stakeholders who are connected with both or either the economic activities and the sea environment.

Governance was a significant RRI dimension for 15 actions proposed in the MML workshop in Tallinn, making it the second most popular RRI dimension. Only five of those weren't voted into the final roadmap.

N°	CLUSTER	ACTION	VOTES
ACTIONS ON THE ROADMAP			
1	1	To make more ambitious agreements	4
5	2	Technological development	3
9	1	Global implementation of environmental requirements	7
10	1	Implementation of existing agreements	2
12	4	Change taxing principles for use of the energy	2
14	3	Ports cooperation with the surrounding cities or regions	2
18	4	Joint commercial activities	6
20	1	Implementation of global single window	7
21	1	Energy transition	2
25	4	Reduction of financial impact	5
OTHER ACTIONS			
13	2	Globally replace the vessels fuels to more environmentally friendly	1
17	1	Financing	1
19	1	Improvement of planning and information exchange between ports and vessel operators	0
23	1	Find out who has power to change things	1
27	1	Limits to growth	0

The ideas ranged from more abstract to more concrete. One topic raised multiple times was the general idea of making and actually enforcing more ambitious agreements among different stakeholders, different nations and even globally, as simply moving pollution from one part of the world to another doesn't fulfil our environmental goals, as the ocean is shared by all.

Another themed explored in numerous actions was more efficient models of cooperation. This includes cooperation between different modes of transport and standardization of cargo, better information sharing between ports and vessels so that ships wouldn't move at full speed in order to stay stationary for days, and implementation of a global single window for trade.

More environmentally focused actions cannot be called into action without thinking through ethical governance, such as implementing global environmental requirements for shipping or switching out fossil fuels on ships globally.

6.7   Ethics

The ethical challenges relate to respect of fundamental rights and conditions at work in the entire supply chains, to the rights of local communities to prosper and to the rights of future generations to have healthy seas and oceans with abundant resources available to all.

Only one action related directly with the RRI dimension of Ethics, which was the difficult question wether we should have a limit to growth in the marine transport sector. Right now the limit is economic (no need for more ships than there is cargo), but this might prove to be ill suited for the future, as the shipping sector is still growing by large margins globally. This action was not, however, voted to be on the final roadmap.

N°	CLUSTER	ACTION	VOTES
OTHER ACTIONS			
27	1	Limits to growth	0

It could be argued, however, that many other actions were also more loosely connected with Ethics. As future generations have a right to clean oceans and as most of the actions were connected with sustaining those oceans environmentally, most of the actions were a little bit about Ethics.

6.8   Other dimensions – Sustainability

Human pressures on the sea can have dire results for marine and coastal ecosystems, resulting in worsening living conditions for people in those areas. Furthermore, global sustainability could be at risk also, as the seas carry contamination, oil spills and waste far away, resulting in unexpected pockets of polluted areas, waste buildup and in the worst case decimation of entire remote ecosystems that play an important role in the oxygen cycle and CO_2 mitigation. Sustaining a healthy marine environment is on the counterbalance for economic growth, but there could be a middle ground. Since the MML workshop in Tallinn was about finding this middle ground with the title "*Ships and ports of the future are green*", most of the actions were concentrated on Sustainabilty.

Only 5 actions out of 28 were not connected with Sustainability. Out of the 23 Sustainability-related actions 11 were voted to the final roadmap.

N°	CLUSTER	ACTION	VOTES
ACTIONS ON THE ROADMAP			
1	1	To make more ambitious agreements	4
2	2	Environmentally friendly ships are paying less	4
5	2	Technological development	3
9	1	Global implementation of environmental requirements	7
10	1	Implementation of existing agreements	2
11	3	Develop waste management system in small ports	2
12	4	Change taxing principles for use of the energy	2
14	3	Ports cooperation with the surrounding cities or regions	2
16	1	Waste management in ships and harbors	2
18	4	Joint commercial activities	6
21	1	Energy transition	2
OTHER ACTIONS			
3	3	Ports should create their own electricity to be more efficient	1
6	2	Implementation of VR technologies	0
7	2	Use more alternative solutions to produce electricity for ships	1
8	3	Port stay use only port electricity (green electricity)	1
13	2	Globally replace the vessels fuels to more environmentally friendly	1
15	2	Better ballast water cleaning system for the ships	0
19	1	Improvement of planning and information exchange between ports and vessel operators	0
22	3	Food waste and food loss issues on ships	1
24	3	More sailing	1
26	1	Disaster response	1
27	1	Limits to growth	0
28	3	Have speed limits for fast passenger ferries in coastal areas	0

Some examples of actions related to Sustainability involved making ports into hubs of sustainability. It was mentioned multiple times that ports should more actively help ships of all sizes to responsibly dump their waste and waste caught on the seas. Also, ports generating energy from renewable sources and requiring ships to use that energy while docking was thought and discussed multiple times.

6.9   Other dimensions – Social inclusion

Social inclusion is a generally uncommon RRI dimension. For marine transport it means involving all of the stakeholders and taking into account the wishes of even the most under-represented groups, giving them equal opportunities.

8 actions were connected with Social inclusion and only 2 of those were not voted for the final roadmap. It seems that generally a more diverse and socially inclusive perspective gave actions a higher chance to leave an impression and get voted.

N°	CLUSTER	ACTION	VOTES
ACTIONS ON THE ROADMAP			
1	1	To make more ambitious agreements	4
2	2	Environmentally friendly ships are paying less	4
4	2	Ships as a possibility to collect environmental data	3
14	3	Ports cooperation with the surrounding cities or regions	2
18	4	Joint commercial activities	6
21	1	Energy transition	2
OTHER ACTIONS			
22	3	Food waste and food loss issues on ships	1
27	1	Limits to growth	0

7   Workshop impact and implications for the future

7.1   Actions that can be implemented in the framework of the MARINA project

The following actions proposed by the participants can be taken up by the MARINA consortium:

Stakeholder engegement

Organize a series of local stakeholder meetings to explore possible cooperation options and understand each other's needs on how to best implement the following actions:

- Action 11: Develop waste management system in small ports
- Action 14: Ports cooperation with the surrounding cities or regions
- Action 16: Waste management in ships and harbors
- Action 18: Joint commercial activities
- Action 19: Improvement of planning and information exchange between ports and vessel operators
- Action 22: Food waste and food loss issues on ships

Many others would suit for further discussion also, but these were the ones that concretely require a dialogue between different kinds of stakeholders, in a true RRI spirit.

7.2   Emerging topics

During the workshop discussion the following topics emerged:

1. Full energy transition in the shipping sector – is it necessary or not (compared to other modes of transport).
2. The infrastructure and benefits of ships using (renewable) port energy while docked.
3. Ships running on fossil gas fuel – is it really such a big improvement?
4. Small scale environmental requirements vs global requirements, what are the economical implications
5. In the case of starting to tax ships only according to their fuel consumption – what to actually measure?
6. Does ballast water cleaning mean systematic killing of marine lifeforms by the tonnes?
7. How can transport companies cooperate in order to ensure full shipments instead of half-full ships?
8. Implementation of single window – who are lagging behind?
9. How big of a problem is food waste and food loss on ships really?

7.3   Policy implications resulting from the workshop

The main marine subjects discussed during the workshop were energy sources for ships, waste management in ports, global implementation of different agreements and cooperation between different transport companies.

The actions suggested by the participants referred strongly to the one month old (at the time of the MML workshop) international agreement made during the 72nd session of the IMO Marine Environment Protection Committee to halve greenhouse gas emissions by 2050 (compared to 2008).

This goal was well adopted by the participants and it even though criticism was raised towards some proposed actions or well-known measures, such as the importance of energy transition in the shipping sector or the holistic usefulness of LNG fuel, this criticism was only motivated by the desire to seek and discuss solutions that actually work.

8 Workshop follow-up in my organisation

The MML workshop held in Tallinn allowed Science Centre AHHAA to evaluate how to better involve diverse stakeholders in future engagement and dialogue projects and activities.

8.1 Actions that can be implemented

Actions that could be implemented in Science Centre AHHAA are the same actions that could be implemented in the framework of the MARINA project, specified in part 7.1. They emphasize inter-stakeholder dialogue that Science Centre AHHAA could facilitate. However, as our organization is distant from marine institutions, both figuratively (not cooperating in their day-to-day work) and literally (distance from the shore), these actions are better suited to be implemented by other organizations.

Public engagement

- Action 11: Develop waste management system in small ports
- Action 14: Ports cooperation with the surrounding cities or regions
- Action 16: Waste management in ships and harbors
- Action 18: Joint commercial activities
- Action 19: Improvement of planning and information exchange between ports and vessel operators
- Action 22: Food waste and food loss issues on ships

9 Participants of the MARINA local workshop

9.1 Participant profile

Thirteen participants attended the international MML workshop in Boulogne sur Mer. A fourteenth participant came for the beginning of the workshop with his colleague and left very early. At the end of the workshop the participants were given a workshop evaluation questionnaire. Twelve participants completed the questionnaire on the spot and one of them sent his answers by e-mail, so all of the actual participants completed the survey. The results of this survey are presented in the graphs here below.

- Participants per stakeholder group and gender
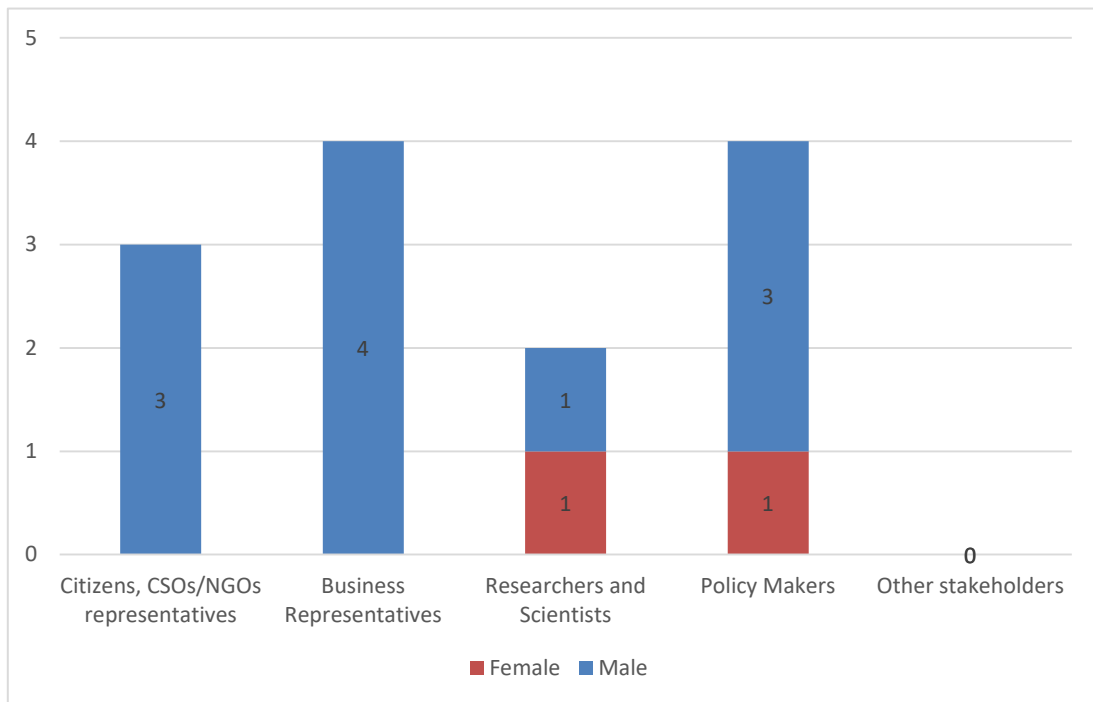
Fig.10.   Participant profile breakdown

- Participant activity sector
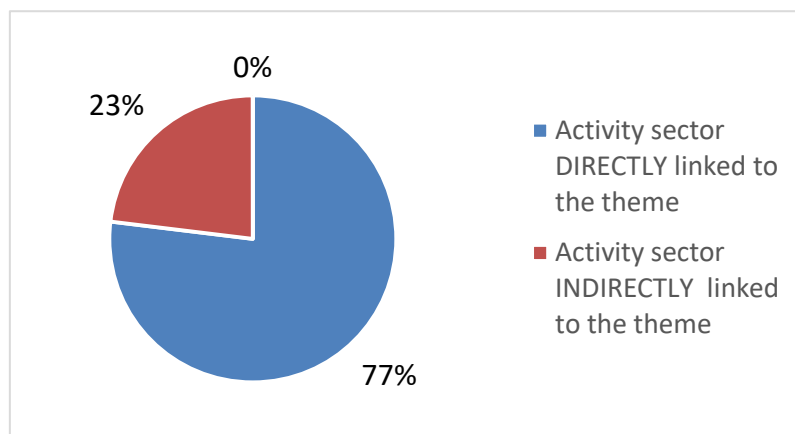
Fig.11.   Participant activity sectors in relation to the hot topic

- Age
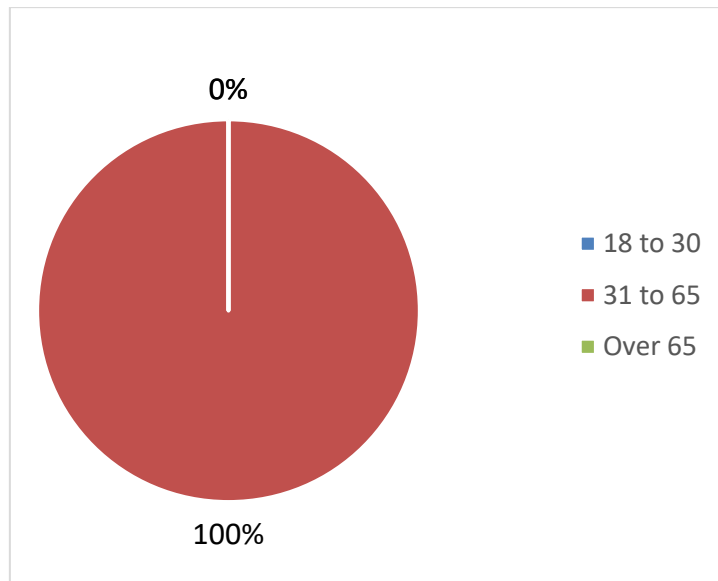
Fig.12.   Participant age groups

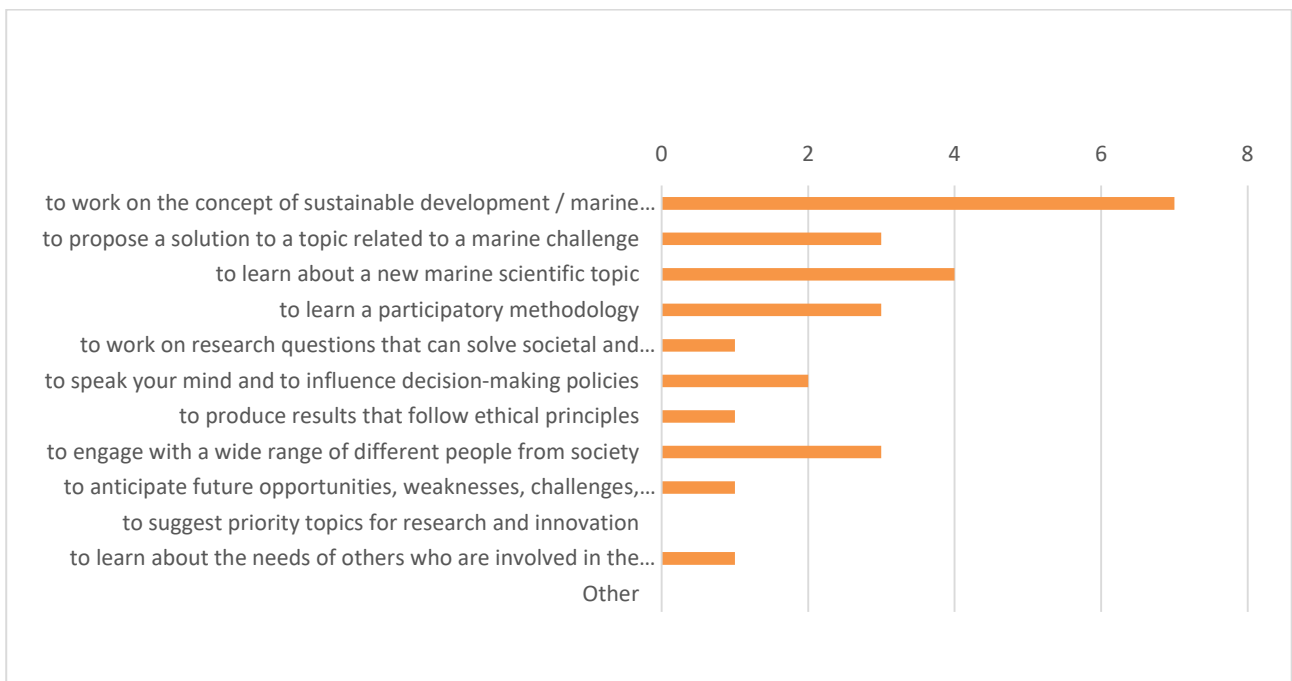## 9.2   Participants' personal aims to attend the workshop

Fig.13.   Participants' personal aims to attend the MARINA workshop in Tallinn, Estonia

9.3 Participant knowledge of the RRI

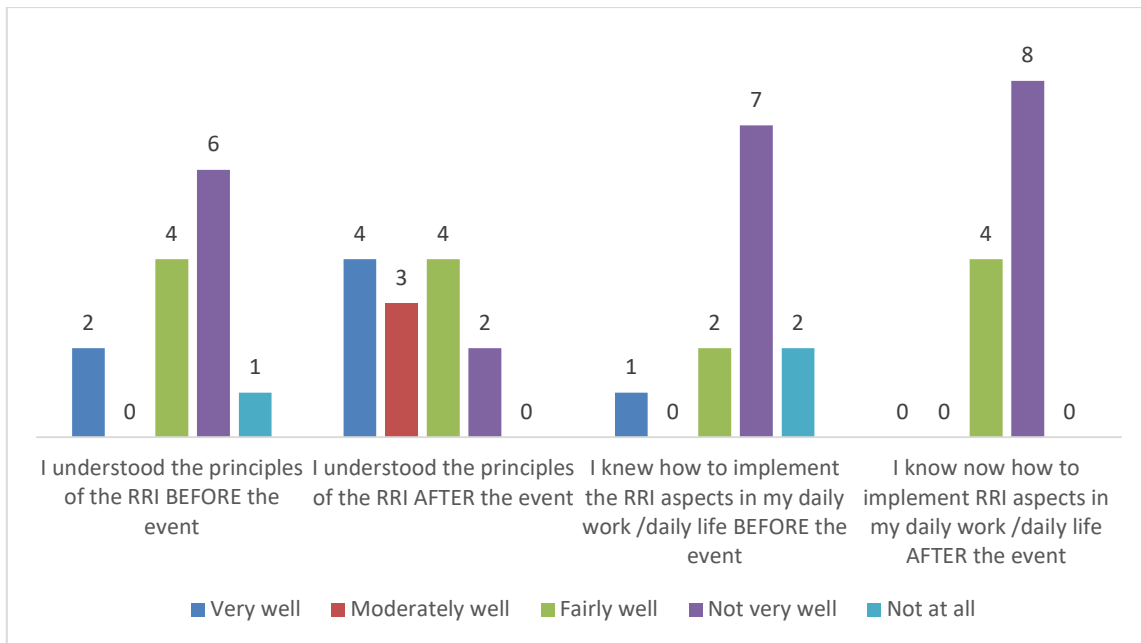- Participants' understanding of RRI before and after the MML workshop

Fig.14. Participants' understanding of RRI before and after the workshop in Tallinn, Estonia

Only two people out of 13 answered that they will apply RRI principles in their daily work, the rest either said that they will not or left the question unanswered. An argument in favour of RRI was brought out: search for environmentally friendly solutions. Arguments against RRI were mostly that this strategy is too complicated or that it doesn't work in a research institution.
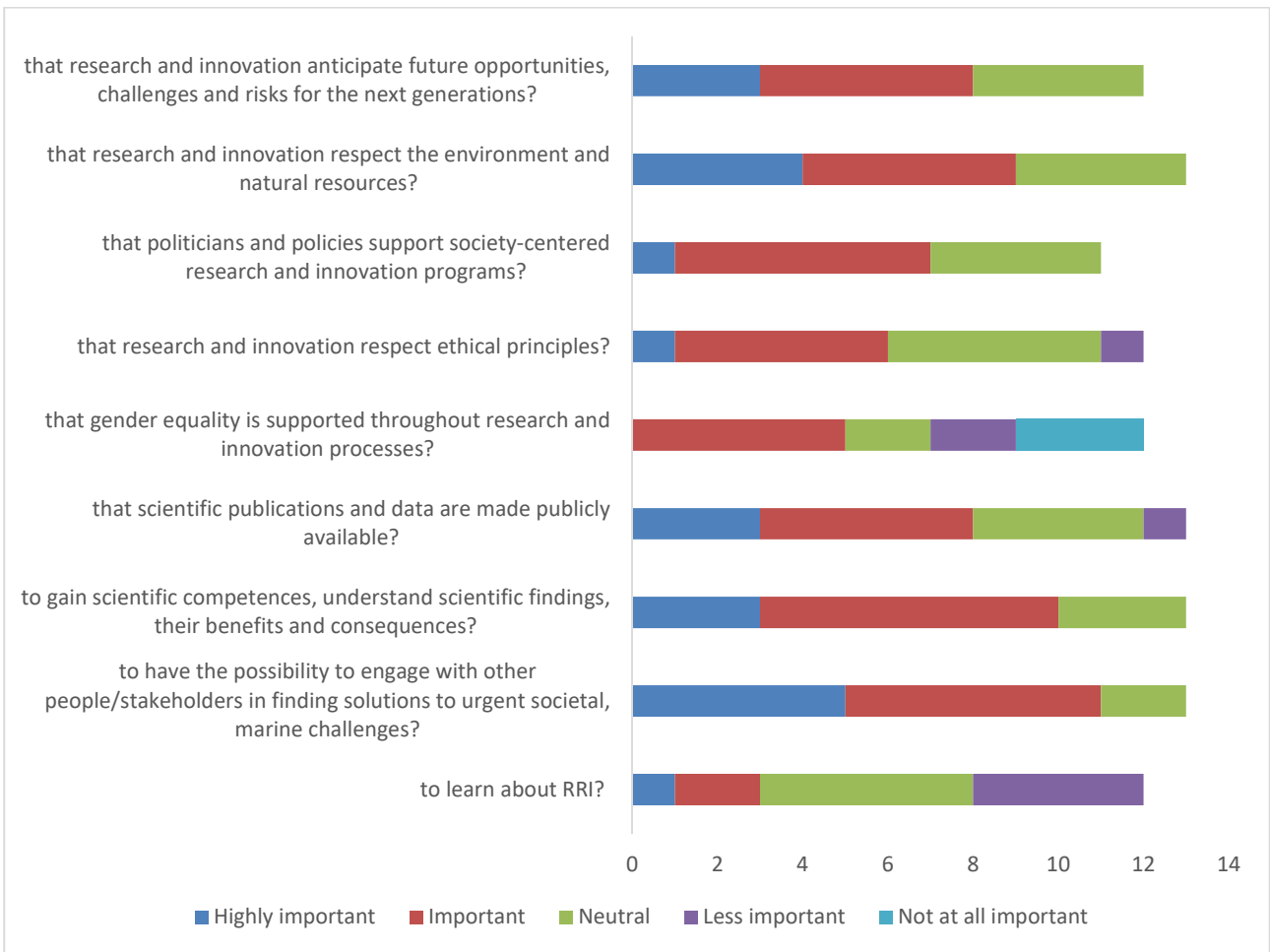
- Importance of RRI dimensions for workshop participants

Fig.15.   Importance of RRI dimensions for participants of the workshop in Tallinn, Estonia

9.4 Participant assessment of the workshop

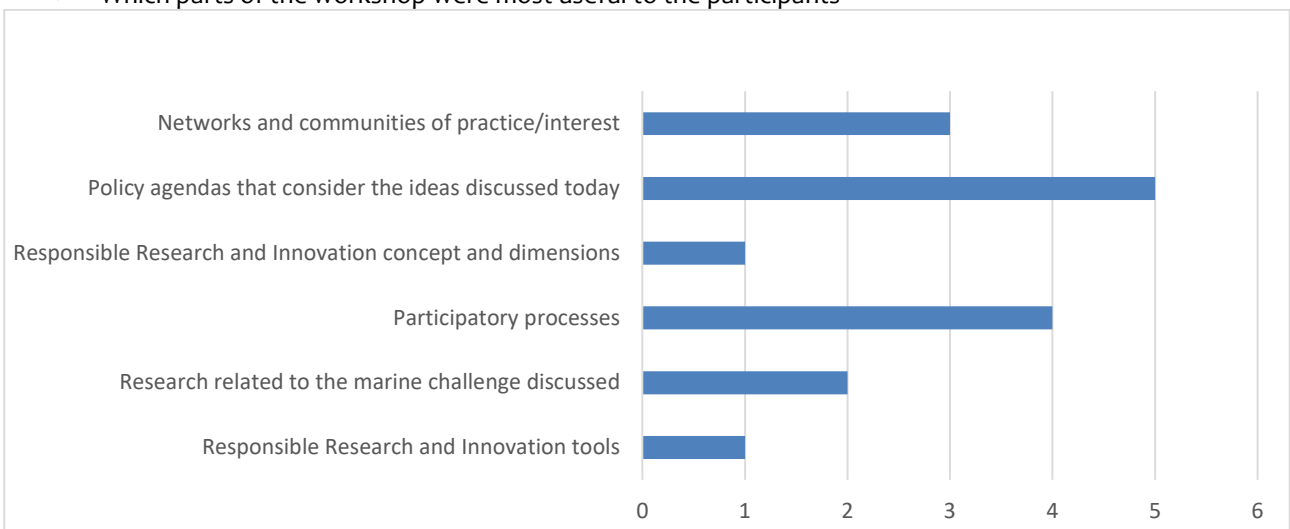- Which parts of the workshop were most useful to the participants

Fig.16.   Which parts of the workshop were most useful to the participants of the workshop in Tallinn, Estonia

- Future plans that the participants have regarding information gained during the MML workshop
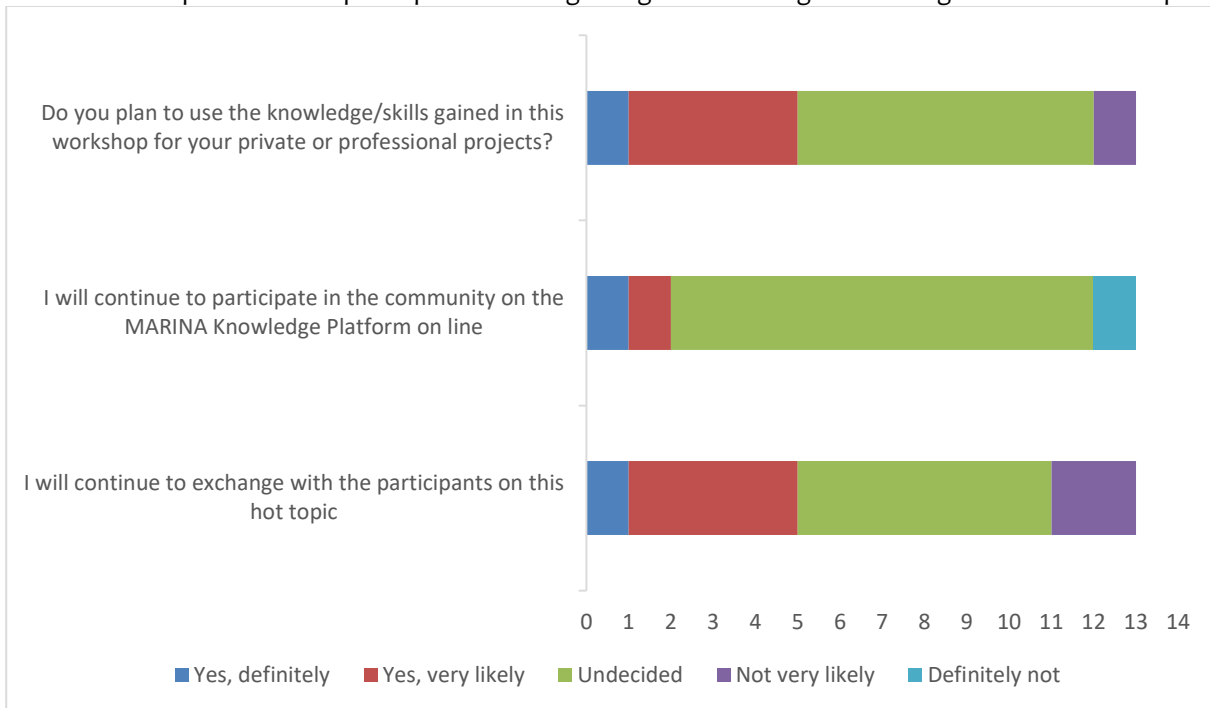
Fig.17. Future plans that the participants have regarding information gained during the workshop in Tallinn, Estonia

Participants added two comments for their future plans. A person who doesn't plan on using the knowledge and skills acquired doesn't think that they are applicable. Another person, who plans on using them, states that he or she will use the participatory method used in the workshop.

10 Conclusions

The RRI dimension that scored the biggest number of actions was sustainability. This may be due to several factors such as the nature of the hot topic and the composition of the group. Enivronmental sustainability was also the part of the hot topic that was communicated the most to the participants before the workshop, interest in it was the common thread that the participants shared.

The chief message was the importance of inter-stakeholder and international cooperation to improve the environmental situation of the world oceans and seas. A cosmopolitan view was shared that moving pollution simply from one region to another is not the solution. It was also apparent that economic and environmental benefits often go hand-in-hand, making marine transport systems more efficient cuts costs, fuel and energy consumption and the emitted greenhouse gases.

Good practice

During the discussions, the participants suggested good practice initiatives worth replicating such as:

1. Scandinavia: enforcing speed limits for ships and boats near the coast in order to avoid shoreline erosion and to protect swimmers.
2. Estonia: food banks. Cooperation with food banks in order to alleviate food loss on ships.
3. Europe: single window. The current single window for Europe was actually brought up as a bad implementation of a good idea, which creates additional brokerage costs and administrative burden – the things that single window is actually supposed to reduce.
4. Estonia: Rail Baltic connection in port of Muuga. A direct connection between railway transport and sea transport.
5. Norway: collective fundraising framework to implement marine actions.
6. Baltic Sea: increasing use of LNG fuel.
7. Estonia: using transport ships to also capture environmental data.
8. Sweden: strict environmental requirements regarding which fuels ships use.

11 Appendices

11.1 Appendix 1: A list of actions and their clarifications

N	ACTION	CLARIFICATION	VOTES
1	To make more ambitious agreements	Lots of countries' governments are fighting to have less constricting agreements in using CO2, using fossil fuels, everything and anything. But some countries have been accepting the more stricter rules, for example Sweden. They are forerunners for others because having more stricter rules enhances the investments into R&D, into new tech, also by governments and also by public sector. New innovation, to find solutions and then it can become also an asset to sell others the new technologies. It is everything port-related, shipping-related, everything.	4
2	Environmentally friendly ships are paying less	The port has the chance to influence ships being environmentally friendly, using environmentally friendly fuels etc.	4
3	Ports should create their own electricity to be more efficient	Ports cover a large area and they can use solar panels, they can use wave energy etc. And where there are cruise ships or ferry ports, there is a possibility to use energy producing panels, similar to asfalt. As the port can use their own energy, they don'r rely on the national level energy and they can be self-funded and do their own thing.	1
4	Ships as a possibility to collect environmental data	There are thousands of ships doing regular cruises every day and there is a possibility to get environmental data during these voyages. This is to make the use of ships more efficient. It is measurable by how many ships are equipped with these different sensors or equipment. It is assignable, has actually been tested and has been implemented in Estonia already. We are using this, but it can be used more globally.	3
5	Technological development	It is a hot topic to reduce all kinds of emmissions and even decarbonization. But I dare to say that our technology hasn't developed so much and so far to enable these kinds of developments. So we can basically increase the efficiency but there are certain limits to that. So we are talking about low-carbon fuels or alternative fuels or even biofuels but still we are using the combustion engine. So this is basically chemistry. But we don't have too many of those alternatives to the combustion engine, especially in international shipping. So basically it needs to be done. This is relatively hard to measure. But at least few alternatives to combustion engines would be nice to have in the near future. It needs to be a cooperation of the financing part of the shipping companies, of the scientists and etc. So it is a very wide area of´people involved. It is relevant and it would be nice to have in the near future. In 10 years, 20 years?	3
6	Implementation of VR technologies	The idea is to be right before finding out that you are wrong at the end. And VR projection gives us that possibility to actually visualize capital intensive investment projects in ports, in terminal buildings. While planning those things to actually virtually project and then you can with 3D models go inside it, go through the processes, put everything in place, play them through. And see, how much manpower you might need, how much technology you can implement and links between them. Practically you can practice it through before you put money in that sub-building. So I believe that it reduces costs, probably time and you probably will be able to get smarter decisions at the end of the day.	0
7	Use more alternative solutions to produce electricity for ships	We know that population in the world is growing while at the same time we need more energy. And that's why use more alternative solutions to produce electricity for ships is maybe one option. We can find maybe emission-free solutions, have to start testing projects to find the best alternative solution. So we wouldn't be using local grid connections or perhaps not zero-emission fuels. As we know, the EU is trying to reduce the emission to 50% of what we have right now in 2050, so we don't have so much time left.	1
8	Port stay use only port electricity (green electricity)	When the vessels are in port they switch off their main engine anyway and they switch to auxiliary engines usually to produce the electricity that they need. This can be changed to just using the port electricity so there could be no exhausts and no burning of fuels on the vessel during	1

the stay in port. It's economical if the port charges little bit less than the vessel would by itself, generating that electricity. And the local area, the city, the people, they have less noise pollution and less air pollution. The time of implementation shouldn't be pushed too far into the future. Vessels have these capabilities already. It's the ports that would need some time if they don't produce green energy yet. That would improve the plan even more so 5, 7 years to get the process started.

9	Global implementation of environmental requirements	We have quite many local initiatives concerning the environment. For example Baltic Sea air, Nordic Sea air, the same story in the US coast. But what we are actually doing is we are just changing the location of the pollution. Just taking the pollution from here in the Baltic Sea to Mediterranean, from US coast to South America. But actually we are producing pollution the same. All conventions and all new things which are implemented should be global ones, not local ones. My advice: from now on, all new legislation in the pipeline shall be global ones.	7
10	Implementation of existing agreements	I fully agree that we need more ambitious agreements and also agree that we need to go global with lots of regional agreements. But still, first and foremost, we need to implement existing agreements. Both global like ballast water convention and also regional rules under global conventions. Like sewage water management. Rules that have been agreed for the Baltic and have their own time schedules. I don't remember by heart but I don't need to, it is agreed in the documents. All these requirements come quicker for new ships etc. But especially with the sewage. But they have to be implemented according to the agreed schedule and this is for the national authorities to carry out. So it is also clear who has to own it. It is not in the pipeline, but something that needs to be done.	2
11	Develop waste management system in small ports	Today 20% of marine litter comes from the activities that are made on the sea. Either from fishermen, from passenger ships, from cargo ships. So 20% of the marine litter comes from the sea-based activities. Today fishermen and recreational fishers from time to time find trash from their nets, for example coast nets, tires and so on. But today they are not motivated to bring that back to the ports. That's why we need this waste management system to be in place that fishermen who find some marine litter can bring that back to the ports. And this should be globally and regionally agreed. Or there should be a legislation that small ports also have waste management system in place.	2
12	Change taxing principles for use of the energy	As a representer of small harbors I think a little out of the box here, because of the impact of small vessels and hobby seagoing is not as huge as the shipping business. But my idea is to change the tax system this way that pollution would become more expensive and sustainable management would be cheaper. That is the only way how to make businesses to behave more sustainably and that's why my idea should be relevant. And change of tax system should be made this way that the consumption of energy should be taxed. So any kind of energy you use should carry some tax money and all other taxes would be removed on behalf of that energy tax. Energy is very easy to measure. Each tonne and each kilowatt can be measured. Both on board and in the ports. So that's why it should be quite easy to implement. I think it is also doable, because it is in the power of european comission and the timeframe could be within the remaining year of EU, so i think it is possible to do. And actually if we could implement it in Europe, it would have a global impact also because Europe is still one of the biggest markets, which has influence on global markets and global shipping also. At the moment we are moving pollution away from Europe, but when we could prove that this tax system makes both ships and ports more sustainable, other regions could implement the same also.	2
13	Globally replace the vessels fuels to more environmentally friendly	Small vessels collisions that happened sometimes, every time there is risk of fuel leaking to the sea. Especially in the Baltic Sea, but generally, globally, small amounts of fuel on the sea - 5 tonnes, 10 tonnes - it is a big problem for us. We have maybe two times per week some kind of balance what is coming, something happens in the Baltic Sea on this instance, two or three times per week something's coming. By this way	1

		if we replace the fuel to the non-oil-based fuels like LNG or something else, that is very helpful for the environment. In this case we know that it is technologically possible because in the Baltic Sea particularly this energy technology is in use. It is possible to implement, it is measurable, because it is very clear what kind of engines are in use, what kind of fuel they use. Of course it needs time, because these kind of big changes are economically very hard. But we started in the Baltic Sea and it is possible generally. And it is understandable also for people, I think. I talked about sea pollution but on the other hand air pollution too, the emissions are better than for the oil based.	
14	Ports cooperation with the surrounding cities or regions	Shipping, especially cargo shipping, but also passenger shipping that takes cars on board, it generates additional traffic, which is increases the transport on the city or regional roads at one time. They create traffic jams, they create CO_2 because the engines are running, the cars are standing. For example, in the case of Tallinn and Helsinki, the main ports for passengers and also trucks and lorries are in the city centers. And for example, a cruise ship produces 2 kilometers of traffic, 4 kilometers in the case of Megastar or something like that. And if you decide to release that to city center traffic, it can cause problems and additional pollution. If institutions in cooperation just use planning measures, use some green-way measures when ships come in.	2
15	Better ballast water cleaning system for the ships	Especially in the Baltic Sea we have a problem with alien species and they are impacting our natural ecosystem. In the future ships should have a newer cleaning system for the ballast water. Like UV light or something that is additionally added to the outlet of ballast water. Or some special microfilters that is added to the tubes that cleans them and holds the alien organisms in the vessel itself, where they can be killed or destroyed somehow. Probably the ships that are now in use, they are not so easily replaced or renewed, but in the future there will better newer materials for them. If there are double layered ships, then the cleaning system should be better.	0
16	Waste management in ships and harbors	In some cases the waste management on board of ships is not very clear, especially for the passenger ships, for the passengers, how is this organized. This can be improved quite significantly, because waste is raw material.	2
17	Financing	All good initiatives are related to money, but who is going to pay for it? I think this needs to be our mutual concern. Everybody needs to take their part in this. There are maybe in the world examples of how money is gathered and divided afterwards, for instance in Norway. But I think it should be considered that all of these global ideas are very nice to have and of course we know that we need to do it, but somebody has to pay for it. It should be somehow solved, the financing issue.	1
18	Joint commercial activities	Commercial activities are one answer where to get the money. It is logical to think that if there are no cargo or passengers, there are no ports. The idea of joint commercial activities is crucial, if we think about the logistics chain. The idea behind joint commercial activities is the economy of scale. My business side is the direct link of railway logistics too. If we talk about efficiency, then there are involved normally three different parts of it. These are the cost, the volume and the resources. Consolidation is linked to logistics and when I think of a concrete example of Rail Baltic, which is now quite a real project, and the terminal, which is planned to Muuga, this is a connection between ports and railway. If we could consolidate the cargo, then it makes sense in quite many ways. From the environmental part there are less cars, we could even take small vehicles out of the chain. And from the financial part, if there is more business, we could develop answers to these very costly solutions that we want to do. And to go one step further on, talking about Single Window, this is a very important issue in terms of joint commercial activities, because if you think is global, there are many players, railway, expeditors, terminals, ports, governments, sellers, buyers etc. This Single Window for Estonian strategic logistics business is very good.	6

19	Improvement of planning and information exchange between ports and vessel operators	It has already been implemented but not enough. It is basically cargo vessels and their operators to get better information exchange and planning with the ports so that vessels don't proceed with full speed to anchorage and stay there. They could reduce their speed, reduce their consumption, air pollution and financially they benefit from this. It's been done already but there is a lot of room for improvement.	0
20	Implementation of global single window	At the moment we are having Single Window being implemented in the EU based on the EU variates. It is not working at all as it was planned. It is actually costing additional broker's fee and additional administrative burden. So I raise that we should have actually a completely new setup of Single Window for Europe, actually for the entire world and it has to be across all modes of transport, including shipping railroad, road and aviation.	7
21	Energy transition	This is an visionary measure that has been also proposed by several others. It is clear that in order to solve a lot of different pressing environmental challenges and first and foremost, the climate change, we need a full energy transition for all sectors. And shipping can't be an exception, even though shipping probably won't be the first one, because it is already relatively efficient use of energy we have now. But by 2050 we need a full energy transition to all sectors in order to avoid a world climate catastrophe. It is not that much a SMART objective as it is a goal. But it is not that distant, several people here might be alive at that time, I probably will not be alive anymore, but my kids definitely will. It can't be very SMART at this moment, because there are several possible solutions that are already there, but we don't know which one is the most cost efficient. Whether it is hydrogen from a wind farm, whether it is biogas, synthetic gas from biological material, whether it is some high-tech sails, whether it is electric motors, we don't know. Maybe it is something new that we don't know, but probably it is one of those that we know already now.	2
22	Food waste and food loss issues on ships	Food loss is the food that is edible but is thrown away because you make it too much, it is stored badly and so on. It is food lost that we could have eaten. If you imagine a crew ship, a passenger ship, there is a lot of food that is wasted, because either it is done much, there are not enough people who can eat, or it is just made too much. There should be food cooperation between ships and organizations, for example in Estonia there is a food bank that takes food that is edible and gives to the other people who don't have enough food to eat. There should be good cooperation between ships and food banks that can collect the food from the ports and the ship is arriving to port. Now the problem is that there is not clear legislation, it is not easy to give away food to the food bank or another organization. There should be a change in the regulation so it should be more easy to give edible food away.	1
23	Find out who has power to change things	Even here we have 8 ideas that are addressed to somebody. So the question is why do we make any plans if we are not sure if anybody can ever implement them or of the 8 I mentioned there are at least 3 which include a problem that we already have an existing plan, an existing agreement, existing rules for, which are not being implemented. Why are we doing plans if we know that they are likely not going to be implemented.	1
24	More sailing	We can take a step back in some ways and start small, like passenger travel or tourism to small islands, in Estonian case. Kihnu, Ruhnu, Aegna, we can implement more sailing. It needs some financial support of course and if won't be cost efficient, but we take small steps and maybe it brings on other developments for the future. We have to start somewhere but it is difficult to measure. If we could get during summer time maybe some capacity working on the main passenger lines, for example going to touristic islands, the boats so far are overcrowded, so I think there is an option that it is possible. It should be assigned to the private sector, I suppose.	1
25	Reduction of financial impact	We are having more and more new legislation coming from different, for example, UN authorities, so there is always the question who will cover all relevant costs. And that is why I would say people are so	5

		reluctant to implement new things because they are costly. When we have established new requirements, we are not elevating the cost itself. So in the shipping sector, we are proposing always some kind of compensation in order to motivate shipowners to take over new requirements. Otherwise we would be sending cargo off from shipping or we are just sending pollution somewhere else, but we are not reducing pollution itself.	
26	Disaster response	There have been major improvements in shipping safety. But still we have grown the amount of shipping. There is always a risk of various disasters. And especially as ships are running on oil, there is always the risk of an oil disaster. There always needs to be constant improvement to prepare us for various disasters. Including response to oil spills, both major, that happen relatively seldom, but have significant impacts, and minor, that still happen a lot. There is a welcome downward trend, but it is still going on. So we need to work constantly with these developments to combat oil spills and to wash the ducks, as they say, rehabilitate animals from oil contact. These things tend to develop as other things, just after we have had major disaster there are major efforts to improve. And now we have fortunately not had major accidents in a long while, so they tend to be forgotten. We need to work with them as long as we have oil in our ships and that is still for quite some time.	1
27	Limits to growth	Shipping is a growing sector and it obviously can grow some time yet. But nothing can grow endlessly on this planet. Maybe shipping in space can grow endlessly, I don't know. But our Baltic Sea is finite and even the big ocean is finite. We need to think at some stage how big shipping can grow at all. It doesn't mean that we can give a definite answer because with improvements some numbers might appear obsolete and then things can grow a bit more. But still, nothing can grow endlessly.	0
28	Have speed limits for fast passenger ferries in coastal areas	A popular idea, it has been on the table for me at least 10 years. At least on the Estonian side we have sandy shores and limestone. And waves made by fast boats erodes the shoreline quite a lot and pose a problem for small ships docket at small open ports on small islands. Waves made by fast boats are breaking those boats and are dangerous to swimmers. At the same time I am stabbing my own back because I also want to go to Helsinki quicker, every 10 minutes, and that is a win. But even on the Finnish side there is granite, which is much harder and still they are protecting their archipelago, I think, much more because their speed limits are lower than on the Estonian side. There isn't a body that can be prohibiting the speed, we don't have legislation for that. And I have heard that there have been problems in the Mediterranean, they also have issues with boat speed volumes.	0

11.2 Appendix 2: Workshop implementation

Recruitment of participants

Market research was carried out to identify stakeholders whose work or interests related to marine transportation and the marine environment. This research was already carried out for the previous marine transport related workshop, the local MML workshop held in Tartu in February, 2018, but for the May event the list of contacts was developed further A significant part of developing a list of potential participants was the recommendations that people gave when they were contacted by phone or email – a snowball effect. Care was taken to personally invite the right people, but when the website of an organization didn't show their employees or if the organization is too big and complex (universities and ministries, for example), a more general invitation was prepared and sent to them.

These contacts were contacted via a personalized email that emphasized either marine transport or marine environment (or in some cases other fields, such as interconnected transport, oil spill cleaning or European marine projects) that could be discussed in the MML workshop. The email also had the uniform PDF invitation attached. Close to 200 people were contacted, but as the snowball effect promted quick connections, diverted phonecalls, ad hoc teleconferences etc. the final number is hard to say.

As the initial emails had very little traction, most of the time a follow-up phone call was necessary. A lot of passive resistance was felt in the phone calls, where people almost always agreed that the topic is important and interesting and they will find somebody in their organisation to participate, but many of them never did.

One participant showed his interest to attend the Tallinn workshop through the MARINA network. He participated in the international workshop in Cyprus and he was arranged to be an ambassador, visiting the workshop in Estonia also. However, he couldn't finally make it, because he fell ill at the last moment.

During the phone conversation participants were directed to confirm their attendance by registering to the workshop online. A week before the workshop an email was sent to all participants asking them to send ideas for actions, via email. 23 actions were sent before workshop, a number close to the final amount of actions (28).

Workshop facilitation method

The MARINA workshop "*Ships and ports of the future are green*" in Tallinn, Estonia was was facilitated according to the Structured Democratic Dialogue (SDD) method.

SDD participatory method has been developed by the Cyprus Neuroscience and Technology Institute. Assisted by software, the method enables a democratic and structured dialogue among a heterogeneous group of stakeholders in a limited amount of time. It is effective in resolving multiple conflicts of purpose and values, in identifying obstacles as well as generating action plans to sufficiently respond to complex questions. The SDD[SM] was chosen as the facilitation method for the workshops because it allows for integrating contributions from individuals with diverse views, backgrounds and perspectives through a process that was structured, inclusive and collaborative.

Generating, clarifying and merging ideas of action

The participants who registered for the were requested to submit up to three ideas of actions in reply to the triggering question that was stated in the invitation to the workshop, the event website and in different emails. As it was heard from other workshop organizers that participants might be reluctant to do homework prior to the workshop, the submission of ideas was kept as simple as possible: participants were invited to simply send up to three written short action ideas and longer clarifications via email. However, even these instructions were rarely followed, as usually different ideas and clarifications were merged together into a long text. An online submission form (that is not connected with the registration form, because the ideas might come up days or weeks after the registration) would probably work better in the future. 23 actions were sent before the workshop and during the workshop 28 actions were presented. It is noteworthy that not all of the actions submitted prior were not brought up in the face-to-face workshop.

Each individual action was audiovisually recorded as it was being clarified and uploaded in the Idea Prism smartphone/IOS free application.

The ideas of actions revolved around the central theme of marine transport (and related) solutions to mitigate the environmental footprint. No ideas were merged because if they were similar they were still explained from a slightly point of view.

Building a roadmap

The mapping process consisted of comparing two actions at a time and deciding by a vote whether an action would significantly help to achieve another one. The process was assisted by software and, as a result, an influence map was produced, printed and handed out to the participants.

The elaboration of SMART action plans was supposed to be the last phase of the workshop. However, as different parts of the workshop took longer than expected (the clarification of ideas, for example), there was no time for this and participants were tired and anxious to leave.

Workshop organisation

The hot topic of the workshop was chosen from the list of marine themes suggested for the MARINA project and was connected with the previous local MML workshop, held in February in Tartu. As there was another big sea transportation international conference taking place at the Estonian Maritime Academy at the same time, care was taken to choose a hot topic that is sufficiently different from the theme of that conference, in order to avoid competing for the same participants. The international conference was about digital port solutions of the future, MARINA workshop was about green technologies and environmental impact.

The sunny classroom of the Estonian Maritime Academy where the workshop was held in was a large and beautiful one, with direct access to the balcony and a view to the sea. Snacks and lunch was offered at a separate room, to incentivise moving around and networking, which the participants engaged in on every opportunity.

Two specialists from CNTI came to Tallinn to facilitate the workshop because of the complexity of the custom-made software. The facilitators were charismatic and their Mediterranean positive attitude often sparked smiles and laughter in the participants. As the only English speaking participant cancelled his attendance at the last minute, only Estonians were left, but they almost always spoke in English, which can be accounted to the charisma of the Cypriot facilitators.

Nevertheless, the SDD participatory method was not well received by the participants (even though one of them stated otherwise in his or her feedback form). People didn't receive sufficient explanation why they were audiovisually recorded and what will happen with the recordings later. It could be noted that this was the moment when participants started to challenge the method, as in an unfortunate manner the first (camera shy) person to step up to the camera vigoriously protested against it. Participants received instructions that they shouldn't argue or discuss actions in the clarification phase. Some of them complied with this requirement, but others tested the limits of the facilitators and found out on which conditions they are allowed to critizise ideas. These few people hijacked the clarification process, while others remained silent, waiting for the discussion part that was supposed to arrive later. This created a strong imbalance in the voices being heard, which ultimately (due to the erroneously wasted time) lead to the omittion of the SMART action planning and overall a less effective event.

Participants said that they don't understand where the SDD method is leading up to and why they are discussing, voting, clustering etc. on multiple occasions. These protests were managed by the facilitators, but it took time to do so and it influenced the pace of the workshop negatively. It was clear that this participation method doesn't work for this group of people, as they were high level experts who are used to free-form discussions instead of a highly limited, organized, hierarachised participation method. The energy and motivation of the participants was totally depleted by the time they were discussing wether the implementation of one action supports another.

In the end it could be said that very interesting ideas were being discussed, but at the wrong time. Since the discussion took place at the wrong time (clarification phase), it was often limited and it made participants feel that this method is not used to support discussion, but instead to hinder it.

It is a very good lesson on the importance of expectation management.

Workshop follow-up with participants

The workshop initial results and photographs were posted on the Facebook page of Science Centre AHHAA and the MARINA Knowledge Sharing Platform under the correct event.

Workshop implementation challenges

Convincing stakeholders to participate in the event was a challenge. The reason could be that because Science Centre AHHAA is not dealing with marine issues on a daily basis, people wouldn't expect them to organize a relevant high level marine discussion event. Science Centre AHHAA is generally viewed as a recreational and educational centre targeting younger audiences and families.

11.3 Appendix 3: Invitation and agenda of the workshop

MARINA MOBILISATION AND MUTUAL LEARNING WORKSHOP

Invitation

Discuss, Explore, Propose and Network

SHIPS AND PORTS OF THE FUTURE ARE GREEN

17th May 2018
Estonian Maritime Academy | Tallinn | Estonia

Dear Madam, Dear Sir,

We are pleased to invite you to the international Mobilisation and Mutual Learning Workshop

Ships and Ports of the Future are Green

that will take place on the 17th **May 2018 in Tallinn, Estonia**.
The venue is **Estonian Maritime Academy** of **Tallinn University of Technology**.
Workshop agenda has been attached to this invitation.

The workshop will take place within the framework of the MARINA project funded by the European Commission's Horizon 2020 programme and is organized by Science Centre AHHAA – an internationally recognized science communicator and educator, the biggest science centre in the Baltic States.

The workshop will bring together Estonian and European representatives from shipping and harbor industry, researchers, policy makers, civil society and citizens. It is aimed at exchanging knowledge and expectations and proposing a sustainable and integrated roadmap of recommendations based on Responsible Research and Innovation (RRI) dimensions: public engagement, gender balance, open access, science education, governance and ethics, in response to triggering question:

What actions are needed in order to make ports and ships environmentally friendly, efficient and sustainable?

In order to make the workshop process smoother, as soon as you have registered using the web form on the Science Centre AHHAA website you will be invited to submit your ideas in response to the triggering question by e-mail.

This workshop is the eighth one in a series of MARINA international workshops. It will be carried out by professional facilitators from the Cyprus Neuroscience and Technology Institute (CNTI) according to an innovative Structured Democratic Dialogue (SDD) method that was designed to give everybody a chance to participate in different ways all along the day and to reach a common vision.

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www.marinaproject.eu | *www.ahhaa.ee*
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The workshop results, together with the results of other MARINA workshops across Europe, will be:

- Freely accessible on the MARINA Knowledge Sharing Platform for anyone interested in marine and coastal issues and Responsible Research and Innovation (RRI);
- Shared with other collaborative projects and likeminded initiatives;
- Presented and discussed at related marine and RRI national and international events;
- Taken forward to shape the further work of the project and to inform future policy and research;
- Reported to the European Commission.

As space is limited, your confirmation of attendance will be greatly appreciated using the web form on the Science Centre AHHAA website.

If you have any further questions or need more information, feel free to write in English or Estonian to the e-mail address sander.kask@ahhaa.ee or call +372 55567880.

As a key stakeholder in the domain, your opinions are considered to be vital to the discussions and the outcomes of the workshop.

We very much look forward to hearing from you and hope that you would be willing to accept our invitation.

Yours sincerely,

Sander Kask
MARINA project local coordinator,
Science Centre AHHAA Foundation external funding assistant

IMPORTANT: The workshop will be conducted in English and broadcasted on the MARINA Knowledge Sharing Platform

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AGENDA

Before arrival	In order to best define the roadmap, you, as participants, are invited to digitally submit ideas in response to the triggering question. As soon as you have registered, we will contact you by email with instructions.
Triggering question	*What actions are needed in order to make ports and ships environmentally friendly, efficient and sustainable?*

17th May 2018	Estonian Maritime Academy, Tallinn
09:45 – 10:00	Welcome coffee
10:00 – 10:10	Introduction to the MARINA project, RRI and the goals of the workshop
10:10 – 10:20	Triggering Question
10:20 – 11:20	Generation and clarification of ideas and actions
11:20 – 11:35	Coffee break
11:35 – 13:00	Clustering of actions
13:00 – 13:10	Voting
13:10 – 14:00	Lunch
14:00 – 15:30	Mapping of actions
15:30 – 15:50	Discussion of the map of influence
15:50 – 16:00	Coffee break
16:00 – 16.40	SMART actions
16:40 – 17:00	Wrap-up

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VENUE

TO REACH THE VENUE

Estonian Maritime Academy
Kopli 101, Tallinn 11712
Estonia

Google Maps Link

Photo by Jaanus Dartšašvili

TRAM

The venue is easily reachable by **Tram lines 1 and 2**.

Ride in the direction of **Kopli** and exit the tram at the final stop (Kopli).

Trams can be reached at the Tallinn Train Station (Balti jaam),
Tallinn Bus Station (Bussijaam), City Center (Hobujaama) etc.

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WORKSHOP CONTACTS

Science Centre AHHAA Foundation

Sander Kask
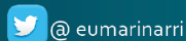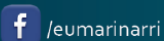sander.kask@ahhaa.ee
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11.4 Appendix 4: A list of communication materials about the workshop

1. [Hot topic brochure](#)
2. [Invitation (full quality)](#)
3. [Event website and registration form](#)

11.5 Appendix 5: A list of audio-visual material about the workshop

1. [Photographs](#)