Available online at www.sciencedirect.com

SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 48 (2012) 1934 – 1947

Procedia Social and Behavioral Sciences

Transport Research Arena– Europe 2012

Is a Marine and Maritime Common Strategy Possible?

Lanfranco Benedetti[a], Willem Laros [a*]

[a]*CESA- Community of European Shipyards' Associations, Brussels 1000, Belgium*
On behalf of EMAR²RES Consortium a FP7 funded project

Abstract

Nearly all significant developments in the marine/maritime area originate from Europe, a true maritime continent. Consequently, the Marine/Maritime Science and Research Communities are among the world leaders in their respective fields, disciplines and sectors.

To maintain its leadership and competitiveness, Europe must take advantage of new market opportunities and address the global challenges by means of focused RDI.

Unfortunately the complexity and intricacy of the marine/maritime area has lead to widespread fragmentation of research efforts and actors. It is therefore important to identify and establish appropriate mechanisms to strengthen the cross-sectoral and interdisciplinary cooperation, key ferment for innovation, between both research communities.

To this effect, the ETP WATERBORNE and the informal Post Aberdeen Marine Interest Group came together as they would benefit from an appropriate and efficient cooperation framework to achieve the Lisbon agenda in a sustainable way. To tackle global issues such as Climate Change and Competitiveness, the different interests and elements affecting such matters need to be integrated in a consistent way. Building on the EU's Maritime Policy and ERA, the key challenge for the EU Policies is to enable sustainable economic expansion, taking into account the environmental, economical and social aspects in a holistic way. This project is identifying and generating a framework of cooperation for the two communities. Its focus is on maritime transport but will form the basis for a wider reflection in the future. Four main areas of common interest, possible synergies and the most promising cooperation/integration structure have been identified and roadmaps are being produced by the two communities:

1. Impact of maritime transport on the marine environment ["biological/chemical" relationships]
2. Impact of maritime transport on the marine environment ["Physical" relationships]
3. Monitoring marine environment and the benefits of meteocean data to maritime transport and climate change
4. Impacts of climate change on maritime transport

* Corresponding author
E-mail address: w.laros@damennaval.com

doi:10.1016/j.sbspro.2012.06.1167

Keywords: maritime transport; marine science; framework cooperation.

1. Introduction

Nearly all significant developments in the marine/maritime area originate from Europe, a true maritime continent. Consequently, the Marine/Maritime Science and Research Communities are among the world leaders in their respective fields, disciplines and sectors. To maintain its leadership and competitiveness, Europe must take advantage of new market opportunities and address the global challenges by means of focused RDI. Unfortunately the complexity and intricacy of the marine/maritime area has lead to widespread fragmentation of research efforts and actors. It is therefore important to identify and establish appropriate mechanisms to strengthen the cross-sectoral and interdisciplinary cooperation, key ferment for innovation, between both research communities.

To this effect, the ETP WATERBORNE and the informal Post Aberdeen Marine Interest Group came together as they would benefit from an appropriate and efficient cooperation framework to achieve the Lisbon agenda in a sustainable way.

To tackle global issues such as Climate Change and Competitiveness, the different interests and elements affecting such matters need to be integrated in a consistent way. Building on the EU's Maritime Policy and ERA, the key challenge for the EU Policies is to enable sustainable economic expansion, taking into account the environmental, economical and social aspects in a holistic way.

An EU FP7 funded project ***EMAR²RES*** Support Action has been initiated the process for this holistic approach by identifying and generating a framework of cooperation for the two communities. The main focus is on maritime transport but is also giving the basis for a wider reflection in the future.

The framework has been built by identifying: the areas of common interest, possible synergies and the most promising cooperation/integration structure; results have been achieved on the base of a consensus method approach by using panels, workshop, associations and wide stakeholders consultation.

2. Objectives

The aims is to provide a forum for interaction between Europe's marine and maritime research communities, so that they can collectively work towards enhanced capability in marine and maritime research. This is essential to ensure that Europe's capability is of internationally acknowledged excellence, and of sufficient scale and critical mass to facilitate, promote and sustain intellectual interchange and discourse between those engaged in international research, fundamental to the principles of the Lisbon Agenda and the ERA.

The specific objectives are summarised as to:

- Support interaction between marine and maritime research communities to assist in the creation of the marine component of the European Research Area (ERA), facilitating the creation of an internal market and quantifying the existing European marine and maritime research capacity.
- Facilitate the networking of marine and maritime research communities in the European Union leading to a more cost effective and efficient use of Member State resources including scientific personnel, specialist infrastructures and planned investments.

- Contribute to the evolution of a European Marine Research Strategy, identifying future challenges and opportunities and the priority interdisciplinary research programmes that need to be put in place to address / benefit from them.
- Provide a basis for the sharing of available resources to address priority issues which are beyond the capacities of individual Member States.
- Progress the inter-awareness between Member State and EU marine and maritime RTD Programmes, towards collaboration between programmes, which has been identified as a key objective of the ERA.
- To **initiate a process** of cooperation which leads towards **integration** of the Marine and Maritime Science and Research communities.

This process towards integration is the building block of the **holistic** approach, referred to in the European Maritime Policy and European Research Area, which should help tackle more efficiently and effectively key global challenges such as Climate Change and Competitiveness.
This is essential to ensure international acknowledged excellence, and of sufficient scale and mass to facilitate, promote and sustain international intellectual interchange and discourse, fundamental to the Lisbon Agenda and the ERA.
The following steps have been undertaken:

1. Inventory and Analysis of the Situation : the first objective is to link the medium and long term visions of the two communities using adequate foresight exercises, to identify their Developmental Strategies in terms of Climate Change and the relevance of cooperation towards the ERA and the Knowledge based-Economy and finally to identify the key stakeholders in the relevant industry sectors, marine science fields and disciplines;
2. Identification of Areas of Common Interest – towards a Holistic Approach and Integration: once the situation has been described and analysed, the next objective of the project is to organise appropriate workshops gathering the relevant experts from both Communities and brainstorm on the areas of common interest, research needs and possible synergies focussed on but not limited to climate change, impacts on the marine environment and European competitiveness;
3. Formulating the Structure of Cooperation: building on the analysis and improved understanding of the situation as well as the findings from the workshops' post analysis, the project is to formulate possible structures of cooperation between the two communities and propose the most effective and long lasting one(s) (in terms of added value, synergies and or cross fertilisation) taking into account public and private funding both at National and European level. The relevance of the chosen approach for other areas of potential cooperation in Marine-Maritime Research should be discussed;
4. Validation of Findings: this objective is of paramount importance for the impact of the project. Building on the experience of the elaboration of the WATERBORNE Strategy and the Aberdeen Declaration, the project has established Panels of Experts to validate the results.

3. Mapping the Landscape

A survey was conducted in first place to map the research and innovation landscape in terms of institutes, universities, companies, associations and other bodies, in both Marine and Maritime communities.
Besides the normal deskwork an on-the field survey by using questionnaires was conducted and the main findings are reported in the following.
In the maritime sector the survey was put through the WATERBORNE ETP where all the principal actors are participating.

FEPORT –Federation of European Private Port Operators	**ESPO** – European Sea Ports Organisation
EUROGIF – European Oil and Gas Operation Forum	**EMF** – European Metalworkers Federation
EURACS – European Association for Classification Societies	**EBU** – European Barge Union
CEMT – Confederation of European Maritime Technology Societies	**EMEC** – European Marine Equipment Council
INE – Inland Navigation Europe	**CESA** – Community of European Shipyards´ Association
WEGEMT – European Association of Universities in Maritime Technology and related Sciences	**ECSA** – European Community Shipowners´ Association
EBI – European Boating Industry	**ECMAR** – European Co-operation in Maritime Research
EuDA – European Dredging Association	**OCEAN ENERGY** Association

Table 1. – Maritime Stakeholders

In the marine sector several organizations are covering different aspects in terms of R&D both at Geographical and Topical level. The following organizations and initiatives were consulted.

CIESM – The Mediterranean Science Commission
CPMR – Conference of Peripheral Maritime Regions
EAS – European Aquaculture Society
EATIP – European Aquaculture Technology and innovation Platform
EFARO - European Fisheries and Aquaculture Research Organisation
ECORD - European Consortium for Ocean Research Drilling
EuroGOOS – European Global Ocean Observing System
ICES – International Council for the Exploration of the Sea
IOC/IODE – Intergovernmental Oceanographic Commission of UNESCO / International Oceanographic Data and Information Exchange programme
KDM - German Marine Research Consortium
Marine Board-ESF – Marine Board-European Science Foundation
MARS – European Network of Marine Research Institutes and Stations
OFEG – Ocean Fleet Exchange Group
OGP – Oil and Gas Producers
SEAS-ERA – Towards Integrated Marine Research Strategy and Programmes (FP7 ERA-NET project)

Table 2. – Marine Stakeholders and Initiatives

The results of the survey have been organized in two main strands: (1) **Services offered** and (2) **Research Needs**.

Results in terms of Services offered by the maritime stakeholders we have results as shown in the following Figure 1.

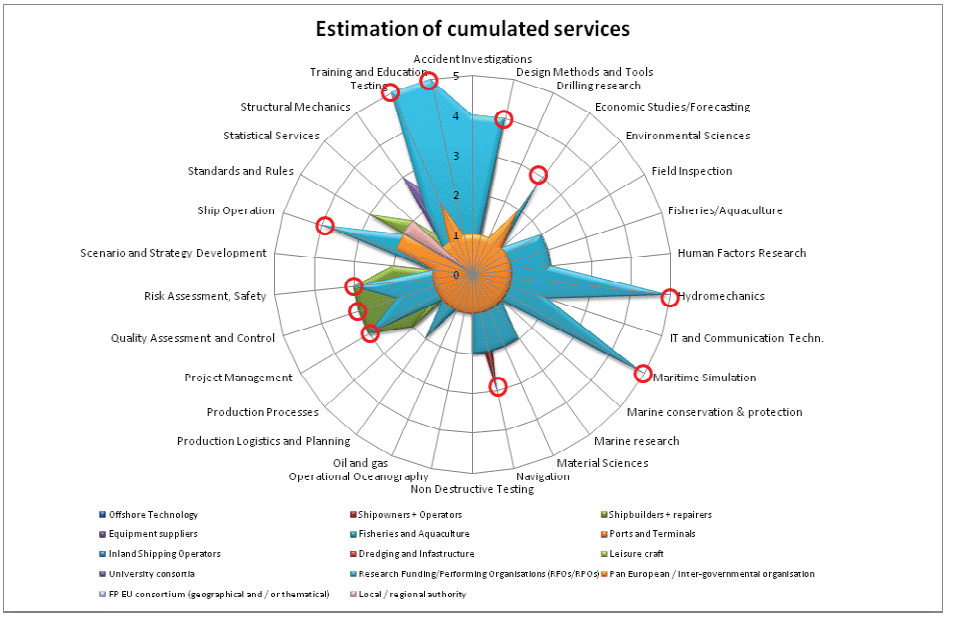

Figure 1. – Estimation of cumulated Maritime Services

The areas for which we find most strong presence are Design methods and –tools, Hydromechanics as well as Training and Education and by enlarging the point of view to the next level of nominations we see also the areas of Maritime Simulation, Ship operation, Standard and Rules as well as Testing.

Results in terms of Services offered by the marine stakeholders we have results as shown in the following Figure 2.

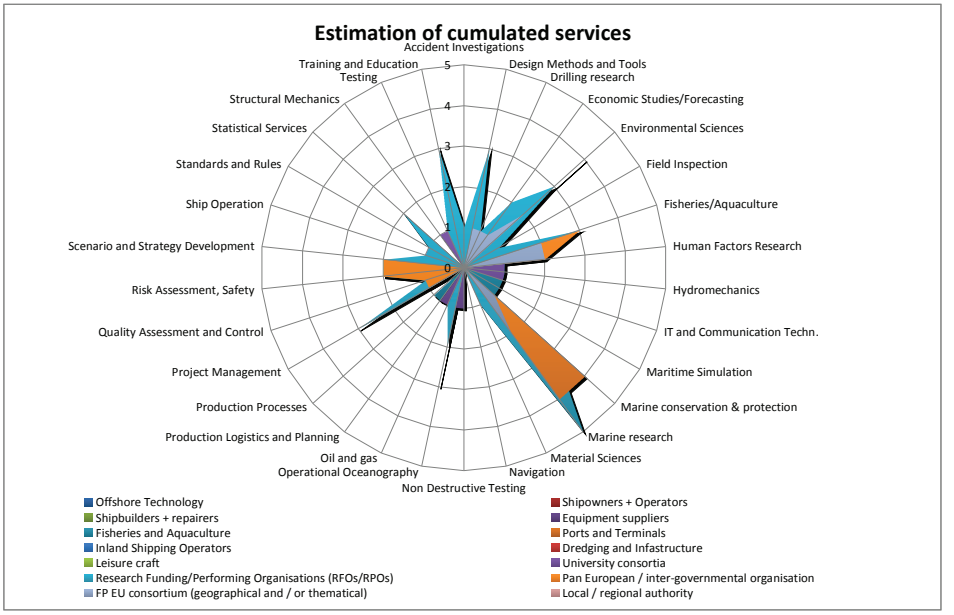

Figure 2. – Estimation of cumulated marine services

The areas for which we find most strong presence are Marine Research and Marine Conservation and Protection and by enlarging the point of view to the next level of nominations we see also the areas of Design Methods and Tools, Training and Education, Fisheries and Aquaculture as well as Non-Destructive Testing.

In terms of Research needs for the maritime sector we have the following:

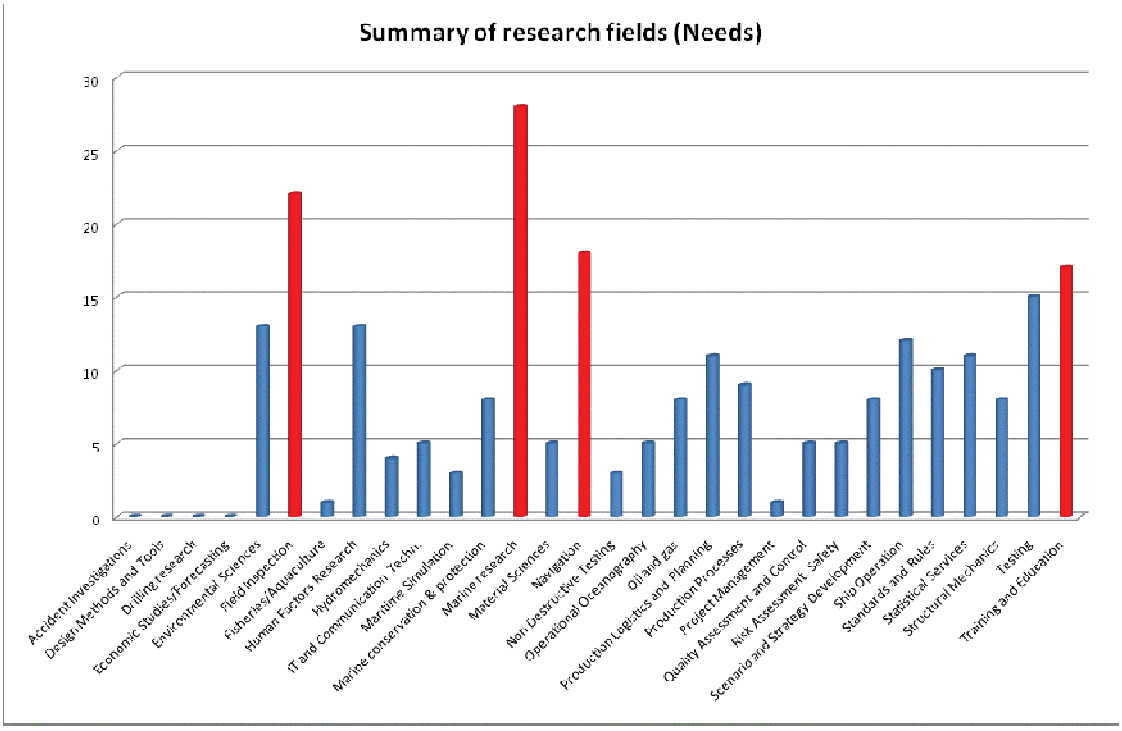

Figure 3. – Maritime Research needs

The areas for which we find most strong needs are therefore Maritime Research, Navigation, Field Inspections and Training and Education.

In terms of Research needs for the marine sector we have the following:

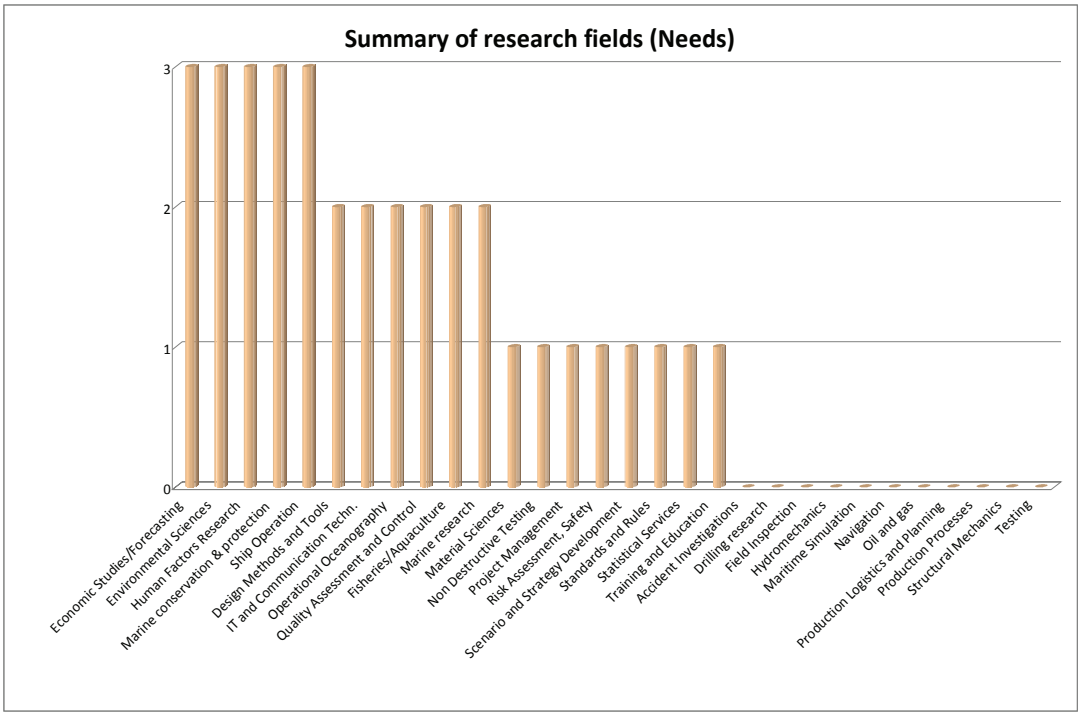

Figure 4. – Marine Research needs

The areas for which we find most strong needs are therefore Economic Studies, Environmental Sciences, Human Factors, Marine Conservation, Ships Operation.

4. Identifying the Common Challenges

Moving from the previous results and building on the existing networks of experts, the consensus process came into its operative phase; to respond to the question whether or not there are common research issues for the marine and maritime communities, panels and workshops have been established. the main These were attended by more than 50 well known scientists, researchers, professionals.
Four main streams were identified and analyzed in detail by the experts:

1. Impact of maritime transport on the marine environment [biological and chemical impacts]
- Treatment of ballast water
- Accidental and operational emissions to the sea
- Accidental and operational emissions to the air
- Development of hull coatings/anti‐fouling

2. Water as a common medium ["physical" relationships]
- Resistance and propulsion
- Underwater noise and vibration
- Impact on seabed morphology in restricted waters

3. Monitoring climate change and the benefits of operational oceanography to maritime transport, e.g.

- Collection of meteorological and oceanographic data [ship to scientists] o Sensors o Telemetry
- Provision of end user information services through the o Integration of measurement, modeling, and prediction, using meteorological and oceanographic data.
- Marine core information services to support o e ‑ maritime, e ‑ navigation, traffic management, weather routing, arctic navigation, weather and sea state (tides, currents, waves) forecasts, oil spill monitoring, ballast water dispersion and global ship routing etc.

4. Relationship between maritime transport & climate change, e.g.

- Impacts on operations on ports & harbors o navigation & routing
- Impacts on vessel design o Consequences of extreme weather o Low carbon objectives

Impact of maritime transport on the marine environment [biological and chemical impacts]
is concerned with reducing the potentially negative biological and chemical impact of maritime transport on the marine environment, including pullutants and transfer of non-native species. The following areas were covered in this workshop:

- Treatment of ballast water, including sediments.
- Alternatives to utilisation of traditional ballast water as a method of providing ship stability
- Reducing the risk of discharging non-native species into coastal waters
- Treatment of ballast water and sediments
- Development of new hull surfaces
- Improved hull and tank coatings that do not have an adverse effect on the marine environment, whilst reducing both ship resistance and corrosion
- Improved processes for removing and apllying coatings.

Towards of a 100% efficient, low cost & effective ballast water treatment system in Europe:
The marine and maritime research communities felt that there is an urgent need to:

- Agree, develop and implement common integrated frameworks regarding the different phases of processing systems (from detection to treatment);
- Develop sensor technologies in support of such processing systems: facilitate transferability methods between the maritime and marine research communities, establish a European market;
- Implement the “Water” footprint concept of human activities including transport (e.g. including cost/benefit analysis of actions/no actions in preventing and mitigating biological pollution);
- Achieve a full categorisation of the environmental impacts of maritime transport, to be disseminated to the general public;

Towards the implementation of an integrated antifouling management system in Europe:
The marine and maritime research communities felt that there is an urgent need to:

- Develop completely environmentally friendly and hydrodynamically more efficient anti-fouling technology using for instance “Bio-mimetic” science;
- Develop dedicated sensors for accurate measurements of hull surfaces including fouling affects and ship performance monitoring for fouling control.
- Design new and effective antifouling agents;
- Address commonly the challenge of bio-fouling on sensors;
- Develop common tools (e.g. combined marine/maritime models) to reduce the biological growth in particular areas of the hull;
- Monitor and analyse the sediment in ports to see the affects of antifouling (e.g. identification of the most vulnerable species)
- Develop and test new alternative paint striping media and equipment

A Vision statement can be drawn for this topic on the base of the previous considerations:

Vision Statement

Create synergies between maritime and marine RTD communities:

- To reduce the impacts of maritime technologies and practices

- To improve sustainability and competitiveness of the maritime transport and

- To contribute to the Good Environmental Status of the Marine Environment

Water as a common medium ["physical" relationships]

is concerned with reducing the physical impact of the maritime transport on the marine environment. The following areas were covered in this workshop:

- Impact on the Sea.
  Noise genetared from ships, including engines, propellers that has a potentially detrimental impact on marine life
  Vibration
  Wash (including impact on the seabed and river/canal banks) created as a result of waves generated by ships movement through the water
  Interaction between hull and the water, i.e. the boundary layer
- Operational atmospheric emissions
  Nox, Sox, Noise, CO_2, Particulates

and mitigation of hazards such as noise and air emissions on the marine ecosystem. The RA framework helps to rationalise the scientific research effort with a goal to best manage the risks and to support the decision-making processes (see Ref. Marine Board-ESF PP 13).

The proposed approach is as follows:

- Generic (based on a standardised framework)
- Adaptive (mitigation feedback loop)
- In line with the Precautionary Approach (MSFD/GES)
- Structuring (in support of a decision-making process).

The Risk Assessment framework aims to establish a robust research program allowing clear identification of research activities and actions with regards to noise and emission reductions.

The RA Frameworks for the impact of noise emissions is given in the following:

1. Need for a common standardized protocol/definitions of noise for marine/maritime communities;
2. Exposure assessment (assess the "*Noise Signature*");
3. Effect assessment (quantitative Impacts on the marine life: dose-response relationships for sensitive species);
4. Impact Risk A.ssessment (Establish a "*Noise Budget*");
5. Mitigation

A Vision statement can be drawn for this topic on the base of the previous considerations:

Vision Statement

Create synergies between maritime and marine RTD communities:

- To establish new scientific knowledge of the physical impacts on the marine environment of maritime technologies and practices;

- To ensure the sustainability and competitiveness of EU maritime transport;

- To develop the means to obtain Good Environmental Status of the Marine Environment using Best Available Technology;
- To promote socio-economic benefit of maritime and marine RTD.

Monitoring climate change and the benefits of operational oceanography to maritime transport, e.g.
is concerned with the development and application of measurement sensors and systems and the rapid transmission of the data to predict the weather conditions for the safe and efficient operations of marine vessels throughout the world, for the safety of mariners, and for the protection of the marine environment from oil pollution. Ships and mariners at sea not only benefit from these developments but are an essential source of metocean observations for meteorological organisations. The following areas were covered in this workshop:

- Development and application of sensors and systems
- Provision of an ICT service infrastructure
- Intelligent management of metocean and ship data
- Integration of measurement, modelling, and prediction
- Provision of end user information services (e.g. traffic management, weather routing, Arctic navigation, weather and sea state, forecasts, oil spill monitoring, ballast water dispersion and global ship routing.

1. **Data collection**
Set-up collaborative research projects to target specific topics, e.g. changes to major currents, utilising the data collection capability of the maritime industry over 4-5 year time-scale.
2. **Sensor system development, deployment and data communications**
Initiate an audit of state-of-the art of sensor systems and services to identify gaps to focus effort in the development of future sensor systems and services.
Initiate a feasibility study on the capacity to make water-column measurements from moving maritime platforms.
3. **Data management: Data availability, Data processing, Data-based services**
Implement generic knowledge-based tools and services for decision support for improved ship operations; Evaluate the state-of-the art of data exchange in Europe, overcoming barriers to information flow, to address practical problems.
4. **Marine and maritime long-term collaboration**
In order to develop improved knowledge-based tools and services for safer and more sustainable and efficient ship operations, there will need to be close collaboration between the marine science and maritime communities, to determine the requirements of the industry and the potential contribution from the marine science community. An on-going forum for such an exchange should be established and maintained.

A Vision statement can be drawn for this topic on the base of the previous considerations:

Vision Statement
By 2020, there will be greater integration between the marine science and maritime communities in order to improve knowledge of the marine environment.
This will contribute to sustainability and the competitiveness of European maritime transport, in the context of global change, through:
- A significant increase in appropriately instrumented vessels on representative shipping routes;

- Establishing robust mechanisms for Europe-wide and global open access to, and sharing of, data, including real-time data;
- Improved knowledge-based tools and services to enable decision support for safer and more efficient ship operations.

Relationship between maritime transport & climate change, e.g.
is concerned with the climate change variables and their impact on the maritime transport, infrastructure and navigation. The following areas were covered in this workshop:

- impact on operations
  Ports & harbours, Navigation & routing
- impact on vessel design
  Consequences of extreme weather, Low carbon objectives

1. **Sea-level rise**
   - Support new and joint infrastructure design studies drawing from common Marine & Maritime knowledge.
   - Design adapted defence plans in appropriate places; design retreat/relocation plans.
2. **Arctic ice melting**
   - Support, develop and adapt new safety and security frameworks to operate in extreme environments;
   - Develop integrated assessments of ice melting impacts on the natural, social and economical components in the Arctic region;
3. **Sea State**
   - Foster the collection/access of oceanographic data to generate the most suitable information for improved marine knowledge and effective maritime operations;
   - Support and improve marine data acquisition and collection in time and space outside the EEZ.
4. **Sediment patterns/river basins/floods**
   - Support the realisation of models on sedimentation processes at the European scale;
   - Support the elaboration of scenarios and adaptive management strategies for the assessment of flow changes and sedimentation patterns at the local/regional scales;
   - Carry out environmental impacts assessments in response to changing sedimentation patterns;
5. **Biota**
   - Study the interactions and impacts of blooms on maritime transport operations.
6. **Marine and maritime long-term collaboration**
   - In order to develop improved knowledge-based tools and services for safer and more sustainable ship operations in a climate change context, there will need to be close collaboration between the marine science and maritime communities, to determine the requirements of the industry and the potential contribution from the marine science community. An on-going forum for such an exchange should be established and maintained

A Vision statement can be drawn for this topic on the base of the previous considerations:

Vision Statement

Climate Change will result in challenges and opportunities for the Maritime Transport community at large.

Greater synergies between Marine & Maritime Research can result in knowledge and tools to better predict the rate, scale and potential impacts of Climate Change and hence the capacity to adapt to, and benefit from, a changing marine environment.

5. Shaping the Future Collaboration Structure

In order to establish a sustainable cooperation model and to streamline a way forward strong collaboration between two EU-FP7 funded projects was established: MARCOM+ and EMAR2RES.

MARCOM+ is looking into whole marine/maritime value chain trying to establish forms of cooperation between the two communities while EMAR2RES as discussed is looking into the area of Transport only. MARCOM+ forum identified 7 macro areas (among those Transport, Energy, Raw Materials, Pharma). Future collaboration should build on the following basic principles:

- The cooperative structure can properly work only if is built on actual common research needs in which both communities see benefit and advantages in collaboration;
- The work done in EMAR2RES should be preferably encapsulated in the MARCOM+ Forum;
- The identified form of cooperation should be as light as possible in terms of structure and administrative governing bodies;
- The identified structure is suitable for the Transport stream in EMAR2RES and could be also applied for other Streams such as Energy and Raw Materials;
- The Scientific Themes to be fed in the proposed structure of cooperation should stem from the themes identified in the EMAR2RES workshops;
- No fees in the short term.
- Not all the 7 macro-areas identified in MARCOM+ should be activated at the beginning of the cooperation;
- A number between 2 or 3 is believed to be suitable in the short term;
- One f those would be the Transport macro-area;
- In the Transport macro-area not all the 5 identified research themes should be activated at the launching of the cooperative structure;
- 2 or 3 research themes in the Transport macro-area are believed to be suitable in the short term.

On the base of the basic principles and the previous two organized forms of cooperation in the field of marine hydrodynamics and ships structure the following considerations can be made:

- the EMAR2RES results are part of the greater picture of MARCOM+;
- the most of the EMAR2Res research topics can be accommodated in the Transport area of MARCOM+;
- part of the EMAR2RES have relationships with other areas of MARCOM+ such as Energy and Raw Materials and can be accommodated in that areas too;
- the cooperative form has to focus in the first place on the identified areas in the EMAR2RES project;
- these areas should be organized in Technical Committees;
- the conference should be every 3 years

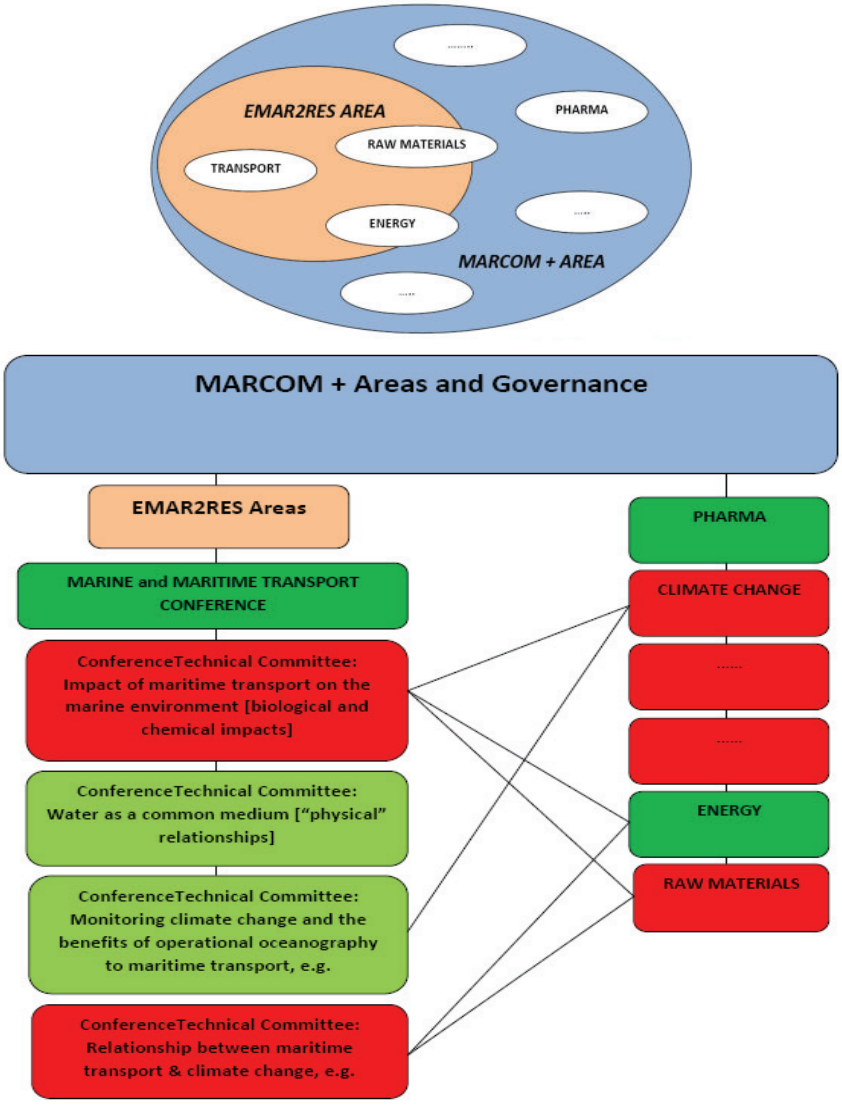

Figure 5 – Functional relation among EMAR2RES and MARCOM+

6. Conclusions

It has been shown and demonstrated as a purpose driven cooperation between the Marine and Maritime communities in the area of Transport is feasible. At least four inception areas for this cooperation have been identified and a cooperative model has been also discussed.

7. Acknowledgements

This work has been possible thanks to the members of the EMAR2RES consortium (CESA, Marine Board, EMEC, WEGEMT, ECMAR).

EMAR2RES is a Support Action funded under FP7.

8. References

WATERBORNE TP VISION2020, 2007
WATERBORNE TP Strategic Research Agenda, 2011
WATERBORNE TP Implementation Plan, 2011
Marine Strategy Framework Directive (2008/56/EC) (MSFD)
COMMISSION DECISION of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters
Frank Roland, Markus Hollwedel D2.1 Report on Stakeholders Identification – ECMAR, 2011
Atilla Incecik, D2.2. Report on a joint Vision for the Marine and Maritime Science and Research - - WEGEMT, 2011
Aurelienne Carbonniere, Lanfranco Benedetti, D2.3 Report on the initialisation of a structured dialogue CESA-MB, 2011
Atilla Incecik, D3.3.Post analysis report WS1, WS2, WS3,WS4 – WEGEMT, 2011
Cliff Funnel, Douwe Cunningham, D4.1 Report on identified forms of cooperation and pilot cooperation structure – EMEC, 2011
Lanfranco Benedetti, Nial McDonough, Maud Evard, Atilla Incecik,D4.2 Report on proposed structure of cooperation CESA-MB-WEGEMT, 2011