**SEVENTH FRAMEWORK PROGRAMME**  
**THEME 7: Transport (including Aeronautics)**

**Monitoring & Assessment of National RDI results**

**Project Acronym:** CASMARE  
**Project Full Title:** Coordination Action to maintain and further develop a Sustainable Maritime Research in Europe

**Grant agreement n°:** 234252

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**WP 3 - Deliverable D 3.4.2**
**Title:** Monitoring & Assessment of national RDI results  
**Due at M20 by EMEC/CESA**  
**Prepared by:**

*Douwe Cunningham (EMEC)*  
*Lanfranco Benedetti (CESA)*

### Description of the Task:

**Task 3.5 Monitoring & Assessment of RDI results (CESA /EMEC)**

The purpose is to monitor, assess and evaluate the implementation of the WATERBORNE Research Strategy at EU and National/Regional levels and evaluate the RDI results. (Remark: A complete picture requires access to the needed information from the project managers. Transparency and support of the public funding agencies would be necessary).

This task will develop and implement consistent approaches (including parameters and measurements) to monitor and assess:

- the impact of the WATERBORNE Research Strategy documents (highlighting the priorities) on EU and national research programmes by establishing which topics/priorities have been or are being funded;
- the progress of the state of the art to be mapped against the WIRM 2007, establishing the state of advance of the implementation of the WSRA.

These results should provide input for the updating of the WATERBORNE Research Strategy documents.

In this task, **CASMARE** will use the data and information gathered within existing networks and / or initiatives (such as MARPOS or MARTEC) and will link up with them.
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1. Introduction

The WATERBORNE TP’s strategic documents have been released in very recent years; in year 2005 the VISION 2020 has been issued, in year 2007 first the Strategic Research Agenda (WSRA) and then the Implementation Plan (WIRM) have been issued. From that point in time 2 activities have been pursued: (1) efforts to map the funded and running research projects against the WIRM have been made by the WATERBORNE TP; (2) initial ideas to drive the future research needs in accordance with the WSRA have been put in place.

This report presents the status of work to identify the coverage of the WIRM research topics by funded projects. The overall monitoring will be carried out, by CASMARE’s partners in three phases in accordance with the DoW:

(1) REPORT on Monitoring & Assessment of RDI at EU level results Year 1;
(2) REPORT on Monitoring & Assessment of RDI at national level results Year 2;
(3) REPORT on Monitoring & Assessment of RDI progress and mapping against the WIRM 2007 results Year 3.

From the previous schedule the mapping against the WIRM is foreseen for Year 3, but nevertheless some elements of this work will be present in all three reports even if in an early stage of coverage.

This Report will focus on Monitoring & Assessment of national RDI results

2. Methodology and Sources of information

The sources of information which have been used to prepare this work were mainly:

1. WATERBORNE TP MIRROR GROUP and National Contact Points (NCPs);
2. Transport Research Knowledge Center;
3. CASMARE Technical Workshop on National R&I Maritime Programs.

The overall methodology used to analyze the National Research Programs and Projects will be as follows. Primarily the investigation will start from Year 2007; this date is directly related to the publication of the WSRA and WIRM that were issued in Year 2007.

The following paragraphs give background on the information received from each of previous sources.
2.1 WATERBORNE TP MIRROR GROUP and National Contact Points

Through the WATERBORNE MIRROR GROUP Contacts List we have been able to have access to key persons and organizations in the leading seats for the National Maritime Research and Innovation Programs.

2.2 Transport Research Knowledge Center and MARTEC ERA-Net

- The TRKC is a project itself funded by the Directorate of Energy and Transport under FP6. The Transport Research Knowledge Centre (TRKC) gives you an overview of research activities at European and national level. A project database of ongoing and completed European and National is available with several levels of information.

Through the TRKC Website we have been able to have access to basic information related to 114 National Research and Innovation Programs. Out of this 114 only the ones established from 2007 onwards have been analyze.

- MARTEC is a partnership of 17 European ministries and funding organizations responsible for funding RTD in maritime technologies from 13 countries. All together these countries represent more than ¾ of the gross tonnage (GT) of shipbuilding output in Europe. MARTEC is a legal entity that launches calls for tender and therefore on the MARTEC website there are descriptions of projects related to the calls with some level of basic detail present.

2.3 CASMARE Technical Workshop

The CASMARE Technical Workshop was held on the 16th March 2011 in Brussels with main objective to have more in-depth discussion and analysis on initiatives taken at Member States level to identify, where possible, the Research and Technology Gaps. The Member States invited to discuss their National Programs and perspectives were:

3. List of projects under analysis

In the following the list of projects that have been identified under the criteria specified above (funded from Year 2007) to be analyzed in the present report.

Project List:

**MARTEC Website:**

2007

1. **Analysis of fixed and unknown processes of heat exchange in the diving bell**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2007-09-11]

2. **Automation of vessel position determining process using methods of radar navigation**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2007-10-22]

3. **Development of a navigational support system for sea-going ships**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2007-10-23]

4. **Development of navigational decision support system on a seagoing vessel**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2007-10-23]

5. **Development of specific guidelines for designing an integrated navigation bridge of units in the inland sea-river shipping**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2007-11-13]

6. **Maneuverability vessel on Inland water limited**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2007-03-28]

2008

7. **A cluster of marine industries as an organization creating the added value**
   - **Country:** Poland
   - **Research Programme:** Polish Funds for Science
   - **Start Date:** [2008-09-30]

8. **ACOBAR - Acoustic technology for observing the interior of the Arctic Ocean**
   - **Country:** Poland
   - **Research Programme:** ENV.2007.4.1.3.2.
   - **Start Date:** [2008-10-01]
9. An environmentally friendly antifouling system for ships hulls – 187246
   
   **Country:** Norway  
   **Research Programme:** MAROFF  
   **Start Date:** [2008-01-01]

10. Assess the feasibility if multi-agent systems to control a team of autonomous underwater vehicles  
   
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2008-10-29]

11. Cleaning of exhaust from marine engines -187370  
   
   **Country:** Norway  
   **Research Programme:** MAROFF  
   **Start Date:** [2008-01-01]

12. Construction and intervention vessels for Arctic oil and gas operations – 188913  
   
   **Country:** Norway  
   **Research Programme:** MAROFF  
   **Start Date:** [2008-09-01]

   
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2008-10-02]

14. Developing the well boat of tomorrow – 188941  
   
   **Country:** Norway  
   **Research Programme:** MAROFF  
   **Start Date:** [2008-06-01]

15. Development of methods for data integration in the process of conducting navigation  
   
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2008-06-01]

16. Development of new design concepts for large and fast offshore vessels for worldwide operations – 187360  
   
   **Country:** Norway  
   **Research Programme:** MAROFF  
   **Start Date:** [2008-01-01]

17. Developments to Further Enhance Safety of Passenger Ro-Ro Ships  
   
   **Country:** Sweden  
   **Research Programme:** VINNOVA  
   **Start Date:** [2008-01-01]

18. Effect of design and operating parameters of vessel as well as weather conditions on its safety during the ballast operation at sea  
   
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2008-04-30]

19. HAI-TECH - Hydrodynamic efficient surfaces by finish system  
   
   **Country:** Germany  
   **Research Programme:** Shipping and Maritime Technology for the 21st Century  
   **Start Date:** [2008-09-01]

20. HTS-Schiff - Shipbuilding specific developments for HTS engines  
   
   **Country:** Germany
Research Programme: Shipping and Maritime Technology for the 21st Century
Start Date: [2008-06-01]

21. HYDROFERT - Impact of production related imperfections in relation to the hydrodynamic performance of selected ship structures
Country: Germany
Research Programme: Shipping and Maritime Technology for the 21st Century
Start Date: [2008-08-01]

22. HYDROS – Load Driven Hydrostatic Radial Bearings for Propulsion Systems
Country: Germany
Research Programme: Shipping and Maritime Technology for the 21st Century
Start Date: [2008-01-01]

23. Innovation in Global Maritime Production 2020
Country: Norway
Research Programme: MAROFF
Start Date: [2008-07-01]

24. Logistic background of broken transport of coal in transport corridor of the Odra River Waterway
Country: Poland
Research Programme: Polish Funds for Science
Start Date: [2008-06-01]

25. Maritime Safety Management in the High North
Country: Norway
Research Programme: MAROFF
Start Date: [2008-06-01]

26. MARLEN – Maritime Logistics Chains and the Environment
Country: Norway
Research Programme: MAROFF
Start Date: [2008-06-01]

27. AGaPaS – Autonomous Galileo-based maritime person overboard rescue system
Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st Century
Start Date: [2008-07-01]

28. MPT – Multiscore conveying systems and installation engineering for hydrocarbons offshore and onshore
Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st Century
Start Date: [2008-09-01]

29. NORTRASHIP - Norwegian Transformations in Shipping: The dynamics and competitiveness of the Norwegian maritime cluster
Country: Norway
Research Programme: The Research Council Norway
Start Date: [2008-01-01]

30. NOx – reduction from marine diesel engines by using exhaust gas recirculation and a cool flame reactor
Country: Norway
Research Programme: MAROFF
Start Date: [2008-01-01]

31. Off Design – Hydrodynamic calculation methods for propulsion and maneuvering systems in off-design
Country: Germany
**Research Programme**: Shipping & Maritime Technology for the 21st Century

**Start Date**: [2008-09-01]

32. **Optifoul Project**  
   **Country**: Norway  
   **Research Programme**: MAROFF  
   **Start Date**: [2008-04-01]

33. **Propulsor / Hull Interaction. Efficiency, Cavitations and Noise**  
   **Country**: Norway  
   **Research Programme**: MAROFF  
   **Start Date**: [2008-01-01]

34. **Reducing Impact from Shipping on the Environment**  
   **Country**: Norway  
   **Research Programme**: MAROFF  
   **Start Date**: [2008-07-01]

35. **Safe Operations of Subsea Systems**  
   **Country**: Norway  
   **Research Programme**: MAROFF  
   **Start Date**: [2008-08-01]

36. **Security of mooring vessels in marine highway system**  
   **Country**: Poland  
   **Research Programme**: Polish Funds for Science  
   **Start Date**: [2008-09-09]

37. **Sollbruchstellen – Predetermined breakzones in the double hull of seagoing vessels**  
   **Country**: Germany  
   **Research Programme**: Shipping & Maritime Technology in the 21st Century  
   **Start Date**: [2008-01-01]

38. **Study of the effects of NOx emissions reductions from ships on fuel consumption and other emissions with emphasis particulates**  
   **Country**: Norway  
   **Research Programme**: MAROFF  
   **Start Date**: [2008-07-01]

39. **SUGAR – Submarine gas hydrate deposits – exploration, mining and transportation**  
   **Country**: Germany  
   **Research Programme**: Shipping & Maritime Technology for the 21st Century  
   **Start Date**: [2008-07-01]

**2009**

40. **A local cluster going international: balancing local and non-local networking?**  
   **Country**: Norway  
   **Research Programme**: MAROFF  
   **Start Date**: [2009-01-01]

41. **ADOPTMAN - ADvanced Planning for OPTimised Conduction of Coordinated**  
   **Country**: Sweden  
   **Research Programme**: MARTEC  
   **Start Date**: [2009-09-01]

42. **An integrated system for assessing the dynamic reserve of water under the keel of ships coming close to the Polish ports.**  
   **Country**: Poland  
   **Research Programme**: Polish Funds for Science
Start Date: [2009-10-01]
43. Application generators for the formation of vortices vortex vessel
   Country: Poland
   Research Programme: Polish Funds for Science
   Start Date: [2009-06-15]
44. Arctic Unmanned Aircraft Systems
   Country: Norway
   Research Programme: MAROFF
   Start Date: [2009-01-01]
45. Best-Rölldämpfung – Development of numerical and experimental methods for estimating the roll damping
   Country: Germany
   Research Programme: Shipping and Maritime Technology for the 21st Century
   Start Date: [2009-11-01]
46. CUSLAM – Localisation and mapping in narrow underwater environments
   Country: Germany
   Research Programme: Shipping and Maritime Technology for the 21st Century
   Start Date: [2009-09-01]
47. CVIew – underwater inspections of ship hulls, piers and docks by autonomous underwater vehicles
   Country: Germany
   Research Programme: Shipping and Maritime Technology for the 21st Century
   Start Date: [2009-05-01]
48. Development of methods and guidelines for safe designs of moon pools – 192895
   Country: Norway
   Research Programme: MAROFF
   Start Date: [2009-02-01]
49. Development of Pilot-Dock System (PNDs) for LNG tankers and marine ferries
   Country: Poland
   Research Programme: Operative Programme Innovative Economy
   Start Date: [2009-10-01]
50. Development of tank support solution and insulation for a ship hull integrated LNG fuel storage system – 192959
   Country: Norway
   Research Programme: MAROFF
   Start Date: [2009-01-02]
51. DNS deepwater - Pressure independent systems for deepwater applications - Pressure independent systems for deepwater applications
   Country: Germany
   Research Programme: Shipping and Maritime Technology for the 21st Century
   Start Date: [2009-10-01]
52. Documented Emissions Reductions from Ships – 192899
   Country: Norway
   Research Programme: MAROFF
   Start Date: [2009-01-01]
53. Dynamic information systems for operational decision support in the coastal zone – 192902
   Country: Norway
   Research Programme: MAROFF
   Start Date: [2009-01-01]
54. **ELKOS - Improvement of crashworthiness in damage stability calculations of modern Ro-Ro passenger ships by integration of structural measures**  
   **Country:** Germany  
   **Research Programme:** Shipping and Maritime Technology for the 21st Century  
   **Start Date:** [2009-08-01]

55. **Evolutionary trajectories without jeopardizing collections ships in resolving situations of conflict at sea**  
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2009-10-01]

56. **Experimental and numerical studies of energy buoy to raise energy wave**  
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2009-10-09]

57. **FormPro - Adjoint shape optimization of vessels with active propulsion**  
   **Country:** Germany  
   **Research Programme:** Shipping and Maritime Technology for the 21st Century  
   **Start Date:** [2009-11-01]

58. **GeneSim - Generic data and model management for the production simulation in shipbuilding**  
   **Country:** Germany  
   **Research Programme:** Shipping and Maritime Technology for the 21st Century  
   **Start Date:** [2009-10-01]

59. **IMPACT – Integrated Maritime Progressive Assessment and Calibration Tool**  
   **Country:** MARTEC  
   **Research Programme:** MARTEC  
   **Start Date:** [2009-09-01]

60. **KonKavI – Correlation of Caitaiton effecrs under Consideration of the Water Quality**  
   **Country:** Germany  
   **Research Programme:** Shipping & Maritime Technology for the 21st Century  
   **Start Date:** [2009-11-01]

61. **Managing Complexity in PetroMaritime Operations**  
   **Country:** Norway  
   **Research Programme:** MAROFF  
   **Start Date:** [2009-01-01]

62. **MESCHLAS – Adding of large-format metal foam sandwiches in ship’s structures by means of laser welding**  
   **Country:** Germany  
   **Research Programme:** Shipping & Maritime Technology for the 21st Century  
   **Start Date:** [2009-01-12]

63. **Modeling the properties of selected types of marine vessels in the preliminary design stage**  
   **Country:** Poland  
   **Research Programme:** Polish Funds for Science  
   **Start Date:** [2009-04-15]

64. **MoDeSh – Motion and Deformation of Ships**  
   **Country:** Germany  
   **Research Programme:** Shipping & Maritime Technology for the 21st Century  
   **Start Date:** [2009-02-01]

65. **Multivariate unmanned floating platforms for securing the maritime activities of state departments**  
   **Country:** Poland
**Research Programme:** Polish Funds for Science  
**Start Date:** [2009-07-09]

66. **PBCT – Plasma based catalytic treatment of exhaust emissions of marine diesel engines**  
**Country:** MARTEC  
**Research Programme:** Shipping & Technology for the 21st Century  
**Start Date:** [2009-09-18]

67. **Power – VR – Competitive process orientated developments of a framework concept for virtual reality applications in shipbuilding**  
**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st Century  
**Start Date:** [2009-08-01]

68. **Propseas – Propulsion in Seaways**  
**Country:** MARTEC  
**Research Programme:** MARTEC  
**Start Date:** [2009-01-01]

69. **QuInLas – Quality-3D laser welding process of innovative ship designs**  
**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st Century  
**Start Date:** [2009-12-01]

70. **ROT – RObots in Tanks**  
**Country:** MARTEC  
**Research Programme:** MARTEC  
**Start Date:** [2009-05-01]

71. **ShipLES – LES based calculation of unsteady turbulent circulations around ships**  
**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st Century  
**Start Date:** [2009-02-01]

72. **Analysis and Optimisation of an Autonomous Carrier System for Offshore Oil Recovery**  
**Country:** Germany  
**Research Programme:** Shipping and Maritime Technology for the 21st Century  
**Start Date:** [2009-10-01]

73. **Technological and organizational validation and integration for optimizing the protection and the security of the port chain**  
**Country:** France  
**Research Programme:** Concepts, Systèmes et Outils pour la Sécurité Globale  
**Start Date:** [2009-01-01]

74. **The development of computational methods for modeling of flow around a ships hull – propeller**  
**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** [2009-06-15]

75. **Ulives – Ultralight materials for ice breaking cargo vessels**  
**Country:** MARTEC  
**Research Programme:** MARTEC  
**Start Date:** [2009-04-01]

76. **Ultra Light Cells – Development of ultra light shipbuilding structures in composite and hybrid construction**  
**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st Century  
**Start Date:** [2009-01-01]
77. Development of a protocol for risk assessment of potentially polluting shipwrecks in Scandinavian waters  
Country: Sweden  
Research Programme: Unknown  
Start Date: [2009-01-01]

2010

78. Advanced environmental design optimalisation & control – 200838  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-01-01]

79. Analysis and testing of operational characteristics of active filter for marine applications  
Country: Poland  
Research Programme: Polish Funds for Science  
Start Date: [Unknown]

80. Arctic DP: Safe and Green Dynamic Positioning Operations of Offshore Vessels in an Arctic Environment – 199567  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-01-01]

81. Development of a technology based on advanced oxidation and UV-irradiation for management of ships’ ballast water – 200863  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-01-01]

82. DYPIC - Dynamic Positioning in Ice Covered Waters  
Country: MARTEC  
Research Programme: MARTEC  
Start Date: [2010-08-01]

83. Electric powered outboard engine – 200839  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-07-01]

84. Energy Management in Practice – 200840  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-03-18]

85. Feasibility study for testing of new technology for energy recovery in marine gas engines 200844  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-02-22]

86. FlexShuttle - Direct Shuttle and Loading – 200842  
Country: Norway  
Research Programme: MAROFF  
Start Date: [2010-01-01]

87. Improved analysis of the risk presented graphically for effective environmental emergency response preparation  
Country: Norway  
Research Programme: MAROFF
88. **Improved ship design and operation, by operational data aggregation, key performance uincices and numerical optimization**
   
   **Country:** Norway
   **Research Programme:** MAROFF
   **Start Date:** [2010-01-01]

89. **Integrated Marine Operations, theory for design, simulation, training and evaluation**
   
   **Country:** Norway
   **Research Programme:** MAROFF
   **Start Date:** [2010-01-01]

90. **LeiSe – Lightweight components for shipbuilding elements**
   
   **Country:** Germany
   **Research Programme:** Shipping & Maritime Technology for the 21st Century
   **Start Date:** [2010-01-01]

91. **LNG Fuel Tank for ships and Other Marine Applications, developed on the NLI TS X System**
   
   **Country:** Norway
   **Research Programme:** MAROFF
   **Start Date:** [2010-03-10]

92. **Low Carbon Shipping**
   
   **Country:** Norway
   **Research Programme:** MAROFF
   **Start Date:** Unknown

93. **Maritime Logistics Fleet Size and Mix – development of methods to improve SOT, based on SOR / SOT in other modes of transport**
   
   **Country:** Norway
   **Research Programme:** The Research Council Norway
   **Start Date:** [2010-01-04]

94. **New modes of collaboration in the maritime industry**
   
   **Country:** Norway
   **Research Programme:** The Research Council of Norway
   **Start Date:** [2010-01-01]

95. **PREFUL – Propeller Efficiency in Full Scale (Model tests based assessment of full scale propeller efficiency)**
   
   **Country:** MARTEC
   **Research Programme:** MARTEC
   **Start Date:** [2010-07-01]

96. **Safer Ships Operations**
   
   **Country:** Norway
   **Research Programme:** MAROFF
   **Start Date:** [2010-01-01]

97. **Uncontrolled drifting of ships and large floating objects**
   
   **Country:** Norway
   **Research Programme:** MAROFF
   **Start Date:** [2010-01-01]

2011 & Unknown

98. **AEOLUS – Distributed Control of Large Scale Offshore Wind Farms**
   
   **Country:** Poland
   **Research Programme:** Unknown
99. **DNV Survey Toolbox** - software for automated measurements of vessels based on 3D geometric model  
   **Country**: Poland  
   **Research Programme**: Operative Programme Innovative Economy  
   **Start Date**: [2011-07-10]

100. **Diversification of production in Ostroda Yacht factory through implementation of innovative technology PRISMA**  
    **Country**: Poland  
    **Research Programme**: Operative Programme Innovative Economy  
    **Start Date**: [Unknown]

101. **Implementation of innovative technology of installation of wind turbines and other specialized services for cranes**  
    **Country**: Poland  
    **Research Programme**: Operative Programme Innovative Economy  
    **Start Date**: N/A

102. **Inverters for drivers with the return of energy and renewable generators**  
    **Country**: Poland  
    **Research Programme**: Polish Funds for Science  
    **Start Date**: N/A
Transport Research Knowledge Center

1. Green Boat – Development of low energy consumption and low environmental impact vessels provided with innovative systems for energy rationalization and production  
   **Country:** Italy  

2. Innovative ship systems which are efficient and ecological to innovate on-board systems and plants  
   **Country:** Italy  
   **Research Programme:** Industria 2015

3. Development and implementation of efficient environmental friendly technologies to dispose waste of conurbations via inland ships  
   **Country:** Germany  
   **Research Programme:** Logistics and Transport Chains

4. Vessels behaviour on Waterways  
   **Country:** Finland  
   **Research Programme:** MKL – research and development activities of the Finnish Maritime Administration

5. Saving Lives in Severe Weather  
   **Country:** Sweden  
   **Research Programme:** Vinnova SP7 – Innovative vehicles for different transport modes

6. Ships’ Wash Impact Management  
   **Country:** United Kingdom  
   **Research Programme:** EPSRC – The Engineering and Physical Sciences Research Council

   **Country:** United Kingdom  
   **Research Programme:** EPSRC – The Engineering and Physical Sciences Research Council

8. Electronic Failure and Disturbances in Vessels  
   **Country:** Finland  
   **Research Programme:** MKL – Research and Development Activities in Finnish Maritime Administration

9. Telematic Systems of Waterways and water transport  
   **Country:** Czech Republic  
   **Research Programme:** OPTIMISATION – Optimisation of the transport system and its sustainable development

10. Implementation of the information system of the inland navigation with the supply of harbour traffic data  
    **Country:** Hungary  
    **Research Programme:** KOZ – KMUFA – Transport Sub-programme

11. Integrated Passenger Vessels Design and implementation in Hellenic Coastal Shipping  
    **Country:** Greece  
    **Research Programme:** Operational Programme Competitiveness

12. Digital Mapping of Gulf of Talinn for Vessel Traffic  
    **Country:** Estonia  
    **Research Programme:** Transport Development Plan
4. Project Synopsis and Mapping on WSRA and WIRM

In this section all the identified relevant projects will be analysed. For each project the essential information will be provided in manner which will allow it to be mapped against the WATERBORNE strategic documents.
An Environmentally Friendly Antifouling System for Ships Hulls

Country: Norway
Research Programme: MAROFF
Start Date: 01-01-2008
End Date: 31-12-2009

Description:

All surfaces exposed to the marine environment, including man-made structures such as ships, are subjected to biofouling. The current project aims at abolishing detrimental ingredients in antifouling paints and thereby the threat of leakage of toxic substances from ships on the ocean. In addition, this project can potentially improve the problems with increased fuel consumption and corrosion related to biofouling and also decrease the cost correlated with removal of fouling organisms. It is difficult to put a figure on the worldwide cost of combating biofouling, but the fact that the US Navy alone spends about $1 billion every year on the problem hints at the economic scope involved. The principal objective of this project is to elaborate an environmental friendly antifouling paint by incorporating natural or chemical additives into the promising polymer polyurethane. The basic idea is to control the microfouling, settlement of bacteria and single-cell diatoms, to prevent further succession into macrofouling, e.g. settlement of barnacles. The basic method is to make a polyurethane coat with environmental antifouling additives. In this project we are coupling people from two different spheres, maritime industry and marine biotechnology. This project is a continuation of the MAROFF projects, NFR 162073 and 168182, and the results acquired in these preceding projects are the fundament for this project.

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Acronym</th>
<th>Waterborne Vision Pillar</th>
<th>SRA Priority</th>
<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>An environmentally friendly antifouling system for ships hulls</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.4 - ‘Low Emission’ Vessels and Waterborne Activities</td>
<td>2.1.4.2 – Cost Effective Waste Management and Ballast Water Treatment</td>
<td>The Low Energy, Low Emissions Ship</td>
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<td>The Sustainable Recreational Craft</td>
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</table>
Assess the feasibility if multi-agent systems to control a team of autonomous underwater vehicles

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 29-10-2008  
**End Date:** 28-10-2010

**Description:**

The project aims at addressing the application of the idea of multi-agent systems to control work of the team of autonomous underwater vehicles in the implementation of selected underwater tasks.

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<tr>
<th>Project Title</th>
<th>Acronym</th>
<th>Waterborne Vision Pillar</th>
<th>SRA Priority</th>
<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess the feasibility if multi-agent systems to control a team of autonomous</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient</td>
<td>2.2.1 – Innovative Vessels and</td>
<td>2.2.1.2 – New Vessels and Floating Structures for Changing and New Markets</td>
<td>The Autonomous Ship</td>
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<tr>
<td>underwater vehicles</td>
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<td>Waterborne Transport Policy</td>
<td>Floating Structures</td>
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<td>2.2.7.2 – Enhanced Sub-sea</td>
<td>Energy Transport in Extreme Conditions</td>
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<td>Capability</td>
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</table>
Cleaning of Exhaust from Marine Engines

Country: Norway
Research Programme: MAROFF
Start Date: 01-01-2008
End Date: 31-12-2009

Description:

The objective of the project is to develop, install and test a full scale (10 MW) Exhaust Gas Cleaning System (EGCS) onboard a panamax vessel. The project is based on small scale (1MW) tests performed in cooperation with MAN in Hole by 2006-2008. The core technology is an Advanced Vortex Chamber (AVC) which generates a high speed cyclone where the wash water and the exhaust gas meet. The exhaust sources are collected in one common receiver. From that receiver, the exhaust is pulled through one common AVC by a fan. The fan will operate under constant speed and when lowering the engine load the exhaust will be partly recycled through the system for second and third time cleaning. The wash water will be cleaned by a flocculent system after the AVC. Skimmed of PM and flocculants will be collected in a bag filter. Sea water or sea water and NaOH (caustic soda) will be used as wash water. SOx, NOx, COx and PM in the exhaust gas will be measured before and after the AVC. And same goes for pH, turbidity and PAH in the washwater. Unique features are: Independence from engine parameters. One single cleaning unit handling multiple exhaust sources. The AVC which allows operations with small droplets and forceful interaction with the gas. High PM trapping efficiency in addition to pure SOx trapping.

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<tr>
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<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning of Exhaust from Marine Engines</td>
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<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.4 - ‘Low Emission’ Vessels and Waterborne Activities</td>
<td>2.1.4.1 – Minimising Airborne Emissions</td>
<td>The Low Energy, Low Emissions Ship</td>
</tr>
</tbody>
</table>
Construction and Intervention Vessels for Arctic Oil and Gas Operations

**Country:** Norway  
**Research Programme:** MAROFF  
**Start Date:** 01-09-2008  
**End Date:** 31-12-2011  

**Description:**

The expected increased oil and gas activities in cold climate regions will require dedicated designs for future Arctic offshore vessels. Specification, design and development of dedicated vessels should be of major interest for oil and gas companies positioning themselves for safe and cost efficient exploitation of offshore petroleum resources in the High North. Norwegian ship yards have already designed multipurpose vessels with some ice capability. However, it is assumed that dedicated designs for Arctic intervention and construction vessels could be another niche for Norwegian ship yards. The project will start with development of a road map. It will be developed based on Statoil Hydro’s present maintenance standards and will account for possible changes for subsea solutions in cold climate regions with seasonal ice. One work package is dedicated to establishing a design guideline for metocean data for selected Arctic areas where offshore oil and gas exploitation takes/will take place. Impact of climatic changes and quality of metocean forecasts will be discussed. The main part of the project is devoted to design and testing of construction and intervention vessels designed specifically for operations in Arctic waters. Systematic variation of hull parameters, propulsion and control systems will be studied using theoretical tools and different types of model tests. Performance criteria will be developed for different phases of the vessels mission taking into account calm water and sea keeping performance, ice performance and DP performance in open water and ice. As emission profile is especially important for vessels operating in Arctic waters the project includes a work package studying ways of defining an environmental footprint. The selected method will be used to compare footprints for a new design with existing designs for selected missions. External experts will be invited to take part in a reference group that will be invited to project workshops.

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<tr>
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<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
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<tr>
<td>Construction and Intervention Vessels for Arctic Oil and Gas Operations</td>
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<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.2 – The “Zero Accidents” Target</td>
<td>2.1.2.3 Enhanced Vessel Operations under Severe Conditions</td>
<td>Energy Transport in Extreme Conditions</td>
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<td>2.2.1.2 – New Vessels and Floating Structures For Changing and New Markets</td>
<td>Low Risk Ship</td>
</tr>
</tbody>
</table>
**Corrosive – cavitational and hydrogen – cavitational wear of materials in construction of modes of transport**

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 02-10-2008  
**End Date:** 01-10-2010

**Description:**

Corrosive - cavitational and hydrogen – cavitational wear of materials applied in construction of modes of transport are the main goal of project.

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<thead>
<tr>
<th>Project Title</th>
<th>Acronym</th>
<th>Waterborne Vision Pillar</th>
<th>SRA Priority</th>
<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
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<tbody>
<tr>
<td>Corrosive – cavitational and hydrogen – cavitational wear of materials in</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable,</td>
<td>2.2.4 – Next</td>
<td>2.2.4.4 – New Materials and Production</td>
<td>Leading Shipbuilding technology</td>
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<tr>
<td>construction of modes of transport</td>
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<td>Efficient Waterborne Transport Policy</td>
<td>Generation Production Processes</td>
<td>Methods</td>
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<td>Autonomous Ship</td>
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<td>The Cruise Ship</td>
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</tbody>
</table>
Developing the Well Boat of Tomorrow

Country: Norway
Research Programme: MAROFF
Start Date: 01-06-2008
End Date: 31-05-2011
Project Coordinator: Cflow Fish Handling AS

Description:

A two-dimensional approach will be used to reach the project’s main goal of increasing the Norwegian well boat industry’s competitive strength. 1) Situation description and scenario building Today’s well boats have to follow a strict set of regulations related to discharges and hygiene. In addition, the fish farmers require their fish to be handled carefully and at the same time efficiently. Different technological solutions are currently available to assist the well boat operators in following the requirements. However, choice of technology and operation procedures depend on different factors, such as transporting distance, available systems at the processing plants. As a basis for further work, a detailed overview of currently performed operations, equipment in use, and technology requirements will be documented. Based on information search activities, scenario techniques will be applied to predict changes in the well boats’ external conditions, This activity aims to give the project consortium a better foundation for future strategic decisions. 2) Technology development Technology development focusing on new innovations is the primary activity in the project. Three thematic areas have been chosen: a) Vessel This activity will develop a new vessel concept. The concept should satisfy current and future requirements related to transporting capacity, design, speed, energy efficiency etc. b) Fish handling The activity will develop technology and methods that satisfy current and future requirements for efficient and careful fish handling. c) Disease prevention and water quality The activity will develop technology and methods that improve on-board water quality, increase transport capacity and reduce the risk of spreading diseases during transport. Appropriate development methodology will be applied to aid the progression of the activities

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<tr>
<th>Project Title</th>
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<th>Waterborne Vision Pillar</th>
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<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
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<tbody>
<tr>
<td>Developing the Well Boat of</td>
<td>N/A</td>
<td>Pillar 1 – Safe,</td>
<td>2.1.4 - ‘Low</td>
<td>2.1.4.1 – Minimising Airborne Emissions</td>
<td>Leading Shipbuilding</td>
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<td>Sustainable, Efficient</td>
<td>Emission’</td>
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<td>Waterborne</td>
<td>Vessels and</td>
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<td>Transport Policy</td>
<td>Waterborne</td>
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<td>Activities</td>
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<td>2.2.5 Effective Waterborne Operations</td>
<td>Autonomous Ship</td>
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<td>2.2.5.2 – Minimising Energy Consumption</td>
<td>The Low Energy, Low</td>
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<td>Emissions Ship</td>
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</tbody>
</table>
Development of new design concepts for large and fast offshore vessels for worldwide operations

Country: Norway  
Research Programme: MAROFF  
Start Date: 01-01-2008  
End Date: 31-03-2010  
Coordinator: Wärtsilä

Description:

The main project goal is to develop new ship concepts for larger, faster and more flexible offshore vessels than vessels of today. The new vessels shall have possibility to perform heavy lifting operations, and have speed and bollard capacities which are far beyond what is common for existing vessels. In order to achieve such goals, the following subprojects are undertaken:

- Development of hull forms with extreme breadth and low resistance and good sea keeping qualities
- Integrated hull forms and propulsion systems for optimum propulsive efficiency at transit speed as well as zero speed (DP)
- Reduction of motions in heavy seas when in dynamic position mode (DP) in order to avoid downtime due to weather conditions
- Improve the safety and efficiency of complex offshore operations
- Development of prototype simulator as a design and training tool for future vessels

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<tr>
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<th>Acronym</th>
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<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of new design concepts for large and fast offshore vessels for worldwide operations</td>
<td>N/A</td>
<td>Pillar 2 - A competitive European Waterborne Industry</td>
<td>2.2.1 – Innovative Vessels and Floating Structures</td>
<td>2.2.1.2 – New Vessels and Floating Structures for Changing and New Markets</td>
<td>Autonomous Ship</td>
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<td>2.2.1.3 – Design Innovative and Systems Optimisation</td>
<td>Energy Transport in Extreme Conditions</td>
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</tbody>
</table>
Developments to Further Enhance Safety of Passenger Ro-Ro Ships

Country: Sweden  
Research Programme: VINNOVA  
Start Date: 01-01-2008  
End Date: 24-10-2008  
Coordinator: SSPA Sweden

Description:

The study and final report is a reflection of the results from the “Research Study of Sinking Sequence of MV Estonia” and the DESSO project with the focus on the course of events leading to accidents on Ro-Ro passenger ships. The main task of the DESSO project was to develop a conceptual Ro-Pax ship using known technology and conclusions from previous accidents. Two of these accidents, the capsizing of the Herald of Free Enterprise and Estonia initiated several changes to the safety rules for Ro-Ro passenger ferries. In the study existing rules at the time of the Estonia accident and which new rules that were developed in the aftermath, were investigated trying to find out if there are gaps in the present legislation regarding Ro-Ro passenger ship safety. In the study the following main points were brought up with regard to recommendations of improving existing safety rules: • A brief survey of rules introduced after the Herald of Free Enterprise and Estonia accidents • Applicable rules for Estonia at the time of the accident • Possible chain-breakers in the course of events in the Estonia accident • Human factor contribution • The ISM code • Recommendation

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<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developments to Further Enhance Safety of Passenger Ro-Ro Ships</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.2 The “Zero Accidents” Target</td>
<td>2.1.2.2 – New Systems and Procedures for Safe Waterborne Operations</td>
<td>Autonomous Ship</td>
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<td>2.2.5 – Effective Waterborne Operations</td>
<td>The Low risk Ship</td>
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<td>The European Cruise Ship</td>
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</table>
Effect of design and operating parameters of vessel as well as weather conditions on its safety during the ballast operation at sea

Country: Poland  
Research Programme: Polish Funds for Science  
Start Date: 30-04-2008  
End Date: 25-10-2010  
Coordinator: West Pommeranian University of Technology  

Description:

Effect of design and operating parameters of vessel as well as weather conditions on its safety during the ballast operations at sea is the main goal of this project.

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</thead>
<tbody>
<tr>
<td>Effect of design and operating parameters of vessel as well as weather conditions on its safety during the ballast operation at sea</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborn e Transport Policy</td>
<td>2.1.4 Low Emission Vessels and Waterborne Activities</td>
<td>2.1.4.2 Cost Effective Waste Management and Ballast Water Treatment</td>
<td>Autonomous Ship</td>
</tr>
</tbody>
</table>

The Low Energy, Low Emissions Ship  
The European Cruise Ship
HAI-TECH - Hydrodynamic efficient surfaces by finish system

Country: Germany
Research Programme: Shipping and Maritime Technology for the 21st Century
Start Date: 01-09-2008
End Date: 31-08-2011
Coordinator: Fraunhofer Institut für Fertigungstechnik and Angewandte

Description:

Objective is the development of a cost-efficient process for the application of micro structured coatings on hulls to reduce the flow resistance (“shark-skin effect”). Results gained from this project should primarily serve to lower the fuel consumption of ships significantly and to contribute to the reduction of greenhouse gases. The project structure formed by the participating partners will assure the entire coverage from the basic research up to the proof of capability for the practical application.

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<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAI-TECH - Hydrodynamic efficient surfaces by finish system</td>
<td>N/A</td>
<td>Pillar 2 – A competitive European Waterborne Industry</td>
<td>2.2.4 – Next Generation Production Processes</td>
<td>2.2.4.4 – New Materials and Production Methods</td>
<td>The European Cruise Ship</td>
</tr>
</tbody>
</table>
HTS-Schiff - Shipbuilding specific developments for HTS engines

**Country:** Germany  
**Research Programme:** Shipping and Maritime Technology for the 21st Century  
**Start Date:** 01-06-2008  
**End Date:** 31-05-2010  
**Coordinator:** Siemens AG

**Description:**

Ship propulsion systems based on the High-Temperature-Superconducting (HTS) Technology offer several benefits like outstanding compactness and highest efficiency. Thus, besides a significant reduction of fuel consumption and e.g. CO2 emissions, it offers the opportunity to enable new and innovative ship designs. Though the benefits of the HTS-Technology have been proven by first demonstrators, the application of HTS-Technology to shipbuilding still requires further development steps to prepare for ship application. This project engages the challenge to develop the new HTS-Technology to withstand the harsh environmental conditions onboard seagoing vessels.

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</thead>
<tbody>
<tr>
<td>HTS-Schiff - Shipbuilding specific developments for HTS engines</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.2 – The ‘Zero Accidents’ Target</td>
<td>2.1.2.1 – Improving Vessel Usability and Maintainability</td>
<td>The Low Energy, Low Emissions Ship</td>
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<td>2.1.4 – “Low Emission” Vessels and Waterborne Activities</td>
<td>2.1.4.1 – Minimising Airborne Emissions</td>
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<td>2.1.4.3 – Minimising Wash, Noise and Vibration</td>
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</table>

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HYDROS - Load driven hydrostatic radial bearings for propulsion systems

Country: Germany
Research Programme: Shipping and Maritime Technology for the 21st Century
Start Date: 01-01-2008
End Date: 31-12-2011
Coordinator: Blohm + Voss Industries GmbH

Description:

The objective of the development project is the conception and experimental verification of hydrostatic journal bearings for heavy ship’s shafts in propulsion systems subject to static and dynamic loads as well as turbulent and laminar flows.
MARLEN - Maritime Logistics Chains and the Environment

Country: Norway  
Research Programme: MAROFF  
Start Date: 01-08-2008  
End Date: 1-04-2010  
Coordinator: Det Norske Veritas AS

Description:

The principal objective of the project is to: Obtain and systematize facts and knowledge regarding the main operational and organizational conditions that may influence the energy efficiency and environmental profile/performance of alternative maritime logistics chains, and thereby reduce the probability of introducing sub-optimal solutions. Top competence and a substantial base of facts concerning these conditions and relationships is a prerequisite for being able to suggest appropriate measures for improving energy efficiency throughout the logistics chain. The effect of this will be two-fold; in the first place, it will contribute to meeting the ambitious goals for reducing global energy consumption and emission of greenhouse gases; in the second, it will maintain the capacity of the transportation sector required for global trade. The main research challenge addressed in this project is the question of ensuring that energy efficiency and environmental improvement initiatives in parts of a maritime logistics chain are not negatively compensated for through changed behavior in other parts of the chain. That is, we wish to seek global energy efficiency and environmental improvements in the maritime logistics chain and avoid sub-optimization, through better understanding of the operational and organizational parameters that take effect in a maritime logistics chain. This study will help both to improve the general understanding of trade-off analyses in global improvement initiatives in supply chains, with a special focus on energy efficiency and environmental improvements in maritime logistics chains, and to develop more in-depth knowledge of these relationships for some defined business cases.
AGaPaS - Autonomous Galileo-based maritime person overboard rescue system

Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st century
Start Date: 01-07-2008
End Date: 30-06-2011
Coordinator: MarineSoft Entwicklungs- und Logistikgesellschaft

Description:

An interdisciplinary research team will develop a semi-autonomous, GALILEO supported, rescue craft for the rescue of person overboard.

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<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous Galileo-based maritime person overboard rescue system</td>
<td>AGaPaS</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.5 Enhance waterborne security</td>
<td>Semi autonomous rescue craft</td>
<td>Autonomous ship</td>
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<td>Low risk ship</td>
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</tbody>
</table>
MPT - Multi-phase conveying systems and installation engineering for hydrocarbons offshore and onshore

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-09-2008  
**End Date:** 31-01-2011  
**Coordinator:** Johann Heinrich Bornemann GmbH

**Description:**

Due to the use of multi-phase technology in the transportation of crude oil and natural gas, high requirements for the devices, systems and services used must be met. This laborious, cross-discipline research and development cannot be achieved by a medium-sized company alone. As a result, other scientific companies and research institutes of the universities must be included in the network for this purpose. For the use of multi-phase pumps, the limit ratings must be developed in a feed chain with extended use of the multi-phase pumps for secondary feed measures and waste disposal; they must be state of the art in terms of producibility, safety and efficiency. The market launch of the systems must be facilitated with a manageable level of technical risk. In the coming years, sustainable economic feed units with multi-phase technologies and better performances will be in demand, the limit ratings of these units will need to be developed. The scientific and technological findings that are needed for this purpose can only be achieved through constant research work and technical developments.

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<th>WIRM Exploitation Outcomes</th>
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<tbody>
<tr>
<td>Multi-phase conveying systems and installation engineering for hydrocarbons offshore and onshore</td>
<td>N/A</td>
<td>Pillar 2 – A competitive European Waterborne Industry</td>
<td>2.2.2 innovative Marine Equipment and Systems</td>
<td>2.2.2.1 More efficient propulsion</td>
<td>Leading Shipbuilding</td>
</tr>
</tbody>
</table>
NOx- reduction from Marine Diesel Engines by using Exhaust Gas Recirculation (EGR) and a Cool Flame Reactor.

Country: Norway  
Research Programme: MAROFF  
Start Date: 01-01-2008  
End Date: 31-12-2009  
Coordinator: Energy Conversion Technology

Description:

EGR: The well proven and well functioning EGR system for NO-x reduction for cars, trucks and busses has been used with great success for years using standard diesel. By using the EGR system, you lower the temperature in the engine cylinders and therefore a reduction of the NO-x emissions. Because of the high quality of the fuel used there is no problem by regeneration of the particle filter used in the EGR loop. Challenge: By Marine Diesel engines you have lots of impurities in the diesel and the lubricating oil. These impurities have the impact that they will tighten the pores and channels in the particle filter more heavily than by stand cars using very clean fuels. By trying to regenerate the filters in the same way used by cars, you will find that the mineral impurities in the filters for Marine Engines, will be clogging and destroy the filters used after a certain period of time. Cool Flame Reactor: Energy Conversion Technology AS is in a project funded by the Norwegian Research Council trying to regenerate filters for Marine Engines by using the gas from their Cool Flame Generator. The effect was first stated in small scale laboratory test. The project is ongoing and the final tests are not yet being exercised. Patents: The Cool Flame Generator is patented. System: Patent pending

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<tr>
<td>NOx- reduction from Marine Diesel Engines by using Exhaust Gas Recirculation (EGR) and a Cool Flame Reactor</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy Pillar 2 – A competitive European Waterborne Industry</td>
<td>2.1.4 –“Low Emission” Vessels and Waterborne Activities 2.1.4.1 – Minimising Airborne Emissions</td>
<td>The Low Energy, Low Emission Ship</td>
<td></td>
</tr>
</tbody>
</table>
Optifoul Project

**Country:** Norway  
**Research Programme:** MAROFF  
**Start Date:** 01-04-2008  
**End Date:** 30-11-2011  
**Coordinator:** Det Norske Veritas AS

**Description:**

The roughness of the surface of the hull is one of the major factors that contribute to the overall fuel consumption of the vessel. Measurements of the hydrodynamic drag of different commercially available antifouling coatings have shown that surface roughness between different antifouling systems does not vary to a large extent. However, the different antifouling systems on the market do not perform equally over time. The slime will be different over different antifouling, or biocide free surfaces. Growth of slime and macro organisms will change the condition of the surface. Slime will start to build up as soon as the surface is immersed into water. It is not always visible for the eye but its existence can be recognized measuring the drag of the surface. Factors influencing the amount of growth on the surface are the climate the vessel is travelling in and the speed of the vessel, the time the vessel is not moving due to loading and unloading procedures, and incidents that cause damage on the surface. Ship owners that chose the wrong antifouling solution for their needs or postpone necessary cleaning or repair of the hull may have to pay a higher price on fuel costs later due to a higher fuel consumption caused by a high surface drag. Higher fuel consumption also means higher emissions of CO2, SO2, NOx and particles to the environment. The idea behind the OPTIFOUL project is to develop a holistic approach to give ship owners recommendations on which type of antifouling system they should use on their vessel depending on the speed the vessel is travelling in and the climate zone the vessel is operating in. Recommendation for optimized cleaning procedures and repair procedures will be developed which opens new possibilities for saving fuel, reducing emissions from shipping and hence reducing the effects of shipping on the world climate.

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<tbody>
<tr>
<td>Optifoul Project</td>
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<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.4</td>
<td>Antifouling systems to reduce emissions of CO2</td>
<td>The Sustainable Recreational Craft</td>
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</table>
Propulsor/Hull Interaction, Efficiency, Cavitation and Noise

**Country:** Norway  
**Research Programme:** MAROFF  
**Start Date:** 01-01-2008  
**End Date:** 30-07-2011  
**Coordinator:** Brunvoll AS

**Description:**

With continuously increasing requirements with respect to reduced emission and environment friendly deliveries the industrial sector of shipbuilding is facing ever more stringent market demands for the accurate prognosis and good documentation of fuel consumption, emission, reliability, cavitation, vibration and noise characteristics of propulsion systems. At the same time, new types of propulsion and maneuvering systems are developed, these ranging from azimuthing thrusters with open and ducted propellers, via contra-rotating propellers, to integrated propeller/rudder arrangements. Experience with design and operation of such systems reveals significant gaps in knowledge about physics of the flow involved, especially as far as scale effects, dynamics loads and cavitation on propulsors and their interaction with ship hull are concerned. In the new "Propellkamaratene" project we will continue the successful cooperation from the last 3-4 years in order to fill the gap and enable us to design propulsion systems adapted to the given ship hulls, and predict their hydrodynamic, vibration and acoustic characteristics in a wide range of operation conditions. The solution to these problems is seen in rational combination of advanced experimental techniques and numerical methods, especially those offered by Computational Fluid Dynamics (CFD) which is a fast developing area with remarkable potential for modeling full scale flows dominated by viscosity. International cooperation with outstanding R&D institutes in China, Russia and Italy is established.

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<tr>
<td>Propulsor/Hull Interaction. Efficiency, Cavitation and Noise</td>
<td>N/A</td>
<td>Pillar 2 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.4.1 – “Low Emission” Vessels and Waterborne Activities</td>
<td>The Sustainable Recreational Craft</td>
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<td>2.1.4.3 – Minimising Wash, Noise and Vibration Innovation</td>
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<td></td>
<td>2.1.4.1 – Minimising Airborne Emissions</td>
<td>The Low Energy, Low Emission Ship</td>
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</tr>
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</table>
Reducing Impact from Shipping on the Environment

Country: Norway  
Research Programme: MAROFF  
Start Date: 01-07-2008  
End Date: 30-06-2010  
Coordinator: Det Norske Veritas AS

Description:

The project will encompass three activities. Ship emission indicator today's serious concern is on global climate and local air pollution in densely populated areas. This proposal will concentrate on ship emissions to the air. Special focus is on following items: - Decision on emission components to be included, based on study regarding prioritized components by IMO, UN IPCC and EU. - Alternative methodology regarding component specific indicators will be evaluated and discussed, based on session papers from IMO MEPC and similar by EU Com. - Relevant weighting factors will be evaluated and decided in communication with Norwegian Pollution Control Authority. - For the selected test ships, baseline emission indicator will be suggested. - Ship emission index will be suggested and tested, defined as accumulated registered emission indicator compared to proposed baseline figures. Performance indicators for 4-stroke engines As far as convenient the project will make use of the models and experience from the TOCC activity for 2-stroke main engines. Special focus is on following items: - Means to make the models more robust regarding erroneous cylinder pressure indication will be analysed. - Means to make models robust also regarding instable test conditions to be investigated and tested. The activity covers development of guidelines to obtain acceptable test conditions. - Based on the above development the models and guidelines will be implemented and tested on a limited number of selected ships. Methods and infrastructure. This activity enables the use of the environmental indicator and the 4-stroke engines in the infrastructure that provide decision support to improve performance. Methods to validate measurement data and to test reliability in registrations will be extended. Guidelines that repair for missing knowledge / competence and that are essential to provide quality input to models will be developed.

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</thead>
</table>
Safe Operations of Subsea Systems

Country: Norway
Research Programme: MAROFF
Start Date: 01-08-2008
End Date: 31-07-2012
Coordinator: SINTEF Fiskeri og havbruk AS

Description:

Recent history has shown that the handling of subsea systems involves significant operational risk. Fishermen are, in fact, exposed to higher risk levels than most other occupational groups in Norway. The safety level in the offshore sector is in general higher, but better procedures and training are still desirable. Handling of subsea systems are often characterized by a combination of heavy loads, rough environmental conditions and complex interplay between the vessel stability and the forces from the subsea system. Accomplishing the operations with acceptable levels of safety may pose big demands on continuously analyzing the operational risk of the seamen. The present project will contribute to increased safety by development of tools and procedures for such operations. Simulators for training purposes are well known tools for training of personnel operating in situations with potential risks, such as pilots, navigators, surgeons, and military combat groups. Simulators for training of seamen performing offshore operations have recently become available. Modeling subsea systems is a major challenge, and numerical issues make it even more challenging to simulate in real-time. Nevertheless, reliable models are needed for subsea system operational training, and this project will contribute to this. Particular challenges are the modeling of anchor chains and towing wires, environmental loads, fishing gear and all devices that have interaction with the seabed. The latter will be a major activity in the project, and considerable effort will be put into studying forces acting from the sediments to the subsea systems. Reliable models in combination with measurements render possible development of decision support systems able to provide the necessary information to such systems will be developed in the project. This will provide on-line information to the operator about important subsea system states, making him able to predict and avoid dangerous situations.
Security of mooring of vessels in marine highway system

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 09-09-2008  
**End Date:** 08-07-2010  
**Coordinator:** Maritime University in Gdynia

**Description:**

Security of mooring of vessels in marine highway system is the main aim of this project. No more data provided.

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<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
</table>
| Security of mooring of vessels in marine highway system | N/A     | Pillar 3 – research topics to Manage and Facilitate the Growth and Changing Trade Patterns | 2.1.5 Enhanced waterborne security  
2.3.3 More Effective Ports & infrastructure | 2.3.4.2 Cargo logistic management | Intelligent Integrated Transport Network |
**Project Title**: Sollbruchstellen - Predetermined break zones in the double hull of seagoing vessels

**Country**: Germany

**Research Programme**: Shipping & Maritime Technology for the 21st century

**Start Date**: 01-01-2008

**End Date**: 30-06-2011

**Coordinator**: LINDENAU GmbH Schiffswerft & Maschinenfabrik

**Description**: n/a

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<tr>
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<tr>
<td>Sollbruchstellen - Predetermined break zones in the double hull of seagoing vessels</td>
<td>N/A</td>
<td>Pillar 2: A competitive European Waterborne Industry</td>
<td>2.2.1 Innovative Vessels and Floating Structures</td>
<td>2.2.1.3 Future Advanced Hull Structures</td>
<td>The Low Risk Ship</td>
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</table>
Study of the Effects of NOx Emissions Reductions from Ships on Fuel Consumption and other Emissions with Emphasis Particulates

Country: Norway
Research Programme: MAROFF
Start Date: 01-07-2008
End Date: 31-12-2012
Coordinator: MARINTEK (Norsk Marinteknisk Forskningsinstitutt AS)

Description:

The literature study concentrates on particle formation from internal combustion engines especially after the combustion process. Emphasis will be put on how NOx and their reduction measures influence particle formation. The formation of particles in the nuclei mode, i.e. after the combustion process, is investigated under the specific conditions relevant for ship engines and their exhaust system. Special attention will be paid on how NOx reduction measures influence particle formation. Technical concept for particulate removal will be identified and tested and adopted or developed for this application. Experimental studies of engine emissions reductions documenting effect on and formulating theories for the effect on particulate emissions when applying the following emission reduction technologies to a medium speed engine fuelled by heavy fuel and distillates in the engine laboratory: Catalytic after treatment solutions and Liquefied Natural Gas (LNG). The particulate emissions will be investigated with respect to size, number and the composition of the various size fraction. Methodology for measurement of particulate emissions to enable the above investigation, it will be necessary to adapt methodology for advanced PM characterization from automotive sector (PMP protocol) to residual fuel use in laboratory based on ELPI technology. Subsequently, it will be necessary to measure particulate emissions from ships to establish emissions factors for particulate and other relevant emissions. There is a very strong link between fuel composition (sulphur in particular) and particulate mass. The link between fuel characteristics and other particle characteristics is less known, and this should be investigated theoretically and by parametric studies. Also of relevance are fuel effects on the long term effectiveness of NOx reduction technologies.

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<tbody>
<tr>
<td>Study of the Effects of NOx Emissions Reductions, etc</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.4 Low Emission Vessels and Waterborne Activities</td>
<td>2.1.4.2 Fuel Supply and fuel Systems</td>
<td>The Low Energy, Low Emission Ship</td>
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<tr>
<td></td>
<td></td>
<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>2.2.2 Innovative Marine Equipment and System</td>
<td>2.2.2.2. Prime mover development</td>
<td>The Sustainable Recreational Craft</td>
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</table>
SUGAR - Submarine gas hydrate deposits - exploration, mining and transportation

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-07-2008  
**End Date:** 30-06-2011  
**Coordinator:** Leibniz-Institut für Meereswissenschaften an der Christian-Albrechts-Universität zu Kiel (IFM-GEOMAR)

**Description:**

In summer 2008, the SUGAR project (Submarine Gas Hydrate Reservoirs) was launched in Germany. The project aims to produce natural gas from marine methane hydrates and to sequester carbon dioxide (CO2) from power plants and other industrial sources as CO2-hydrate in marine sediments. This large-scale national project is funded by two federal ministries and German industries. The total funding is 13 Mio € over an initial funding period of three years. The project has 30 institutional partners from academia and industries and is coordinated at the Kiel-based Leibniz Institute for Marine Sciences (IFM-GEOMAR).

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<tr>
<td>- Submarine gas hydrate deposits - exploration, mining and transportation</td>
<td>SUGAR</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.2.2 Innovative Marine Equipment and System</td>
<td>2.2.4.6 Innovative material and systems.</td>
<td>The Low Energy, Low Emission Ship</td>
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</tbody>
</table>
CView - Underwater inspections of ship hulls, piers and docks by autonomous underwater vehicles

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-05-2009  
**End Date:** 30-04-2012  
**Coordinator:** ATLAS ELEKTRONIK GmbH

**Description:**

The R & D collaborative project CView has the aim to detect and localize abnormalities of future autonomous underwater inspections of shipping lanes, harbor structures, offshore wind, water and energy supply systems.

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<tbody>
<tr>
<td>CView - Underwater inspections of ship hulls, piers and docks by autonomous underwater vehicles</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.3 The Crashworthy Vessel, Offshore Traffic Safety and Cargo Containment</td>
<td>2.2.4.6 Innovative material and systems</td>
<td>Intelligent Integrated Transport Network</td>
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<tr>
<td></td>
<td></td>
<td>Pillar 3 – research topics to research and Facilitate the Growth and Changing Trade Patterns</td>
<td>2.3.3 More Effective Ports &amp; Infrastructures</td>
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<td>The Low Risk Ship</td>
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Development of Pilot-Dock System (PNDs) for LNG tankers and marine ferries

Country: Poland  
Research Programme: Operative Programme Innovative Economy  
Start Date: 01-10-2009  
End Date: 30-09-2011  
Coordinator: Maritime University in Szczecin

Description:

The aim of the project is construction of a docking system for the purposes of the Innovative Sea Economy, which will correct the safety of navigation while mooring and will enable to raise the level of the research conducted so far on navigational systems, of which aim is raising the safety of navigation, the technique and technologies used in the water transport. According to assumptions of the Second Priority of the Development Strategy of the Country for years 2007 - 2015 in the field of the construction and modernization of water motorways and improving the competitiveness of ports, constant drawing up and implementing innovative solutions in the branch of the maritime industry are necessary. The tasks of the Maritime University include: Project objectives will be achieved through the development of scientific methods and assumptions for the construction of a docking system for deluge-PNDS (Pilot Navigation and Docking System) for ship maneuvering in Polish ports. This system will operate independently or can be made as a subsystem of an existing, built by the Maritime Academy in Szczecin PNS pilot navigation system (Pilot Navigation System) in 2004-2006 under the target project Fri "Pilot navigation system (PNS) for the safe maneuvering of ships in restricted areas." Verification of operation of the PNDS will be done through the construction of a functional pre-prototype. Results: The project will result in the creation of innovative in Poland and the world a docking system, through wireless communication systems support the pilot located on the side berth unit.

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<tr>
<td>Development of Pilot-Dock System (PNDs) for LNG tankers and marine ferries</td>
<td>N/A</td>
<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>2.2.5 Effective waterborne operations</td>
<td>2.2.5.1 Automated Ship Operations and Life Cycle Cost Reductions</td>
<td>Autonomous ship</td>
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</table>
Development of tank support solution and insulation for a ship hull integrated LNG fuel storage system

Country: Norway  
Research Programme: MAROFF  
Start Date: 02-01-2009  
End Date: 31-12-2010  
Coordinator: jahre Group AS

Description:

The aim for the project is to develop a new way of placing a pressurized tank for very low temperature LNG fuel into a ship. With basis on a patent pending tank support solution a method to lift a LNG tank into a ship compartment is to be developed. The tank supports and insulation is to be installed in the compartment prior to lifting in the tank. After installation on board the tank shall be safely kept in place by resting to the tank supports and shall have the freedom to shrink and expand. A key point is that the outside of the tank surface is in smooth sliding contact with the supports such that any later damage or fatigue failure to the tank that could be caused by the supports can be found and repaired from the inside of the tank. This is new for rigid gas tanks on ships. An obvious benefit will be the possibility to close off a LNG tank in a ship compartment and have a narrow space between the gas tank and the ship structure. Less space between the gas tank and the ship structure means more volume for LNG. LNG is very cold with temperature down to -163°C. The ship structure is not designed for such cold temperatures. One of the major challenges in the project is to design the insulation system on the ship structure with integrated support blocks that shall be a 100 % safe thermal barrier between the LNG tank on the inside and the ship structure on the outside. Design and real life testing of the insulation system solutions is the first part of the project and a necessary condition to be fulfilled before doing final tank design.

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<tr>
<td>Development of tank support solution</td>
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<td>Pillar 2- A competitive</td>
<td>2.1.4 Low</td>
<td>2.1.4.1 Marine Fuel Cell-Fuel Operation Test Facility</td>
<td>Low Risk Ship</td>
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<td>and insulation for a ship hull</td>
<td></td>
<td>European Waterborne</td>
<td>Emission Vessels and waterborne activities</td>
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<tr>
<td>integrated LNG fuel storage system</td>
<td></td>
<td>Industry</td>
<td></td>
<td>2.1.4.2 Fuel Supply and Fuel Systems</td>
<td></td>
</tr>
</tbody>
</table>
DNS deepwater - Pressure independent systems for deepwater applications

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-10-2009  
**End Date:** 31-12-2012  
**Coordinator:** ENITECH Energietechnik/Elektronik GmbH

**Description:**

Fundamentals will be developed for long-term underwater use of pressure tolerant systems. The plan is to develop, design, prototype and test typical components of submarine vessels like AUVs, ROVs as well as structures in deep sea. All facilities will be tested first in dock and in the Baltic Sea. New security concepts are needed for planned deepwater and long-term test in the Madeira basin. The advantage of pressure tolerant underwater systems for long-term or permanent use will be demonstrated.

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<td>DNS deepwater - Pressure independent systems for deepwater applications.</td>
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<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>2.2.5 Effective waterborne operations</td>
<td>2.2.4.6 Innovative material and systems</td>
<td>Future Ship Design</td>
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</tbody>
</table>
ELKOS - Improvement of crashworthiness in damage stability calculations of modern Ro-Ro passenger ships by integration of structural measures

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-08-2009  
**End Date:** 30-09-2012  
**Coordinator:** Flensburger Schiffbau-Gesellschaft

**Description:**
Structural measures and new construction options should increase collision safety measures for side collisions on ships. Results will be discussed to be part of regulations in damage stability calculation according SOLAS 2009.

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<tr>
<td>ELKOS Improvement of crashworthiness in damage stability calculations of modern Ro-Ro passenger ships by integration of structural measures</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.3 The Crashworthy vessel, Offshore Traffic Safety and Cargo Containment</td>
<td>2.1.3.1 Research with respect to Collision and Grounding</td>
<td>The Low Risk Ship</td>
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</table>
Evolutionary trajectories without jeopardizing collections ships in resolving situations of conflict at sea

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 01-10-2009  
**End Date:** 31-03-2011  
**Coordinator:** Gdansk University of Technology

**Description:**

Evolutionary trajectories without jeopardizing collections ships in resolving situations of conflict at sea is the main goal of this project.

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<tr>
<td>Evolutionary trajectories without jeopardizing collections ships in resolving situations of conflict at sea</td>
<td>N/A</td>
<td>Pillar 3 – research topics to Manage and Facilitate the Growth and Changing Trade Patterns</td>
<td>2.3.1</td>
<td>2.3.1.1 Planning Tools for Optimal Logistic Chains &amp; Hinterland Connections</td>
<td>Intelligent Integrated Transport Network</td>
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</table>
**Experimental and numerical studies of energy buoy to raise energy wave.**

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 09-10-2009  
**End Date:** 08-02-2012  
**Coordinator:** Gdansk University of Technology

**Description:**

Experimental and numerical studies of energy buoy to raise energy wave is the main goal of this project. No more data provided.

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<tr>
<td>Experimental and numerical studies of energy buoy to raise energy wave.</td>
<td>N/A</td>
<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>2.2.6 Technologies for New &amp; Extended Marine Operations</td>
<td>2.2.6.3 Environmental Design of Offshore Renewable Energy Systems</td>
<td>Energy Transport in Extreme Conditions</td>
</tr>
</tbody>
</table>
FormPro - Adjoint shape optimization of vessels with active propulsion

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-11-2009  
**End Date:** 31-10-2012  
**Coordinator:** Hamburgische Schiffbau-Versuchsanstalt

**Description:**

FormPro will create an integrated hull form optimization approach and environment for ships with active propulsion. Combining advanced methods for parametric form descriptions, mathematical optimization techniques and hydrodynamic analysis based on cutting edge RANS simulations and sensitivity analysis using adjoint equations, the project aims at a significant increase in ship powering performance. Accompanying fuel savings will allow FormPro to contribute to the overall objective of more energy efficient maritime transportation to meet future ambitious emission goals.

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</table>
| FormPro - Adjoint shape optimization of vessels with active propulsion | N/A | Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy  
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2.2.2. Innovative Marine Equipment and Systems | 2.1.4.3 Eco-Ship Systems  
2.2.2.3 Next Generation Power and Propulsion Concept | The Low Energy, Low Emission Ship |
GeneSim - Generic data and model management for the production simulation in shipbuilding

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-10-2009  
**End Date:** 30-09-2011  
**Coordinator:** Flensburger Schiffbau-Gesellschaft

**Description:**

Shipyards can increase productivity and planning reliability drastically by using simulation in production planning. But the lack of sufficient data from product, planning or resource management forms an essential obstacle. Individual solutions for simulation data management at some shipyards are neither satisfactory nor transferable to other companies. Therefore a generic concept for simulation data and model management will be developed in the GeneSim project. The concept will include amongst others data structures, importing and generating strategies, analyzing functions and scenario management. The results will be transferred in functional tools by the project partners.

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<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>Production simulation and generating strategies.</td>
<td>Collect generic data and model management.</td>
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MESCHLAS - Adding of large-format metal foam sandwiches in ship's structures by means of laser welding

Country: Germany  
Research Programme: Shipping & Maritime Technology for the 21st century  
Start Date: 01-12-2009  
End Date: 31-05-2012  
Coordinator: TKMS Blohm + Voss Nordseewerke

Description:

The aim of the project is the development of new fields of application in the shipbuilding industry for the use of large-scale steel-aluminum foam sandwiches. Important are the exceptional lightweight cushioning and reward characteristics as well as the fire resistance and insulation ability against noise and electromagnetic radiation. The suitability of sandwich structures with its specific conditions will be demonstrated. The focus of the planned investigations is on heavily loaded marine structures and components. In addition to the already established laser-welding technology innovative adding strategies will be developed and tested in order to finally realize first lightweight structures.

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<tr>
<td>MESCHLAS - Adding of large-format metal foam sandwiches in ship's structures by means of laser welding</td>
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<td>Pillar 2 - A competitive European Waterborne Industry</td>
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<td>Leading Ship Building Technologies</td>
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</table>
Modeling the properties of selected types of marine vessels in the preliminary design stage

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 15-04-2009  
**End Date:** 14-04-2011  
**Coordinator:** Maritime University in Szczecin

**Description:**

Modeling the properties of selected types of marine vessels in the preliminary design stage is the main goal of project. No more data provided.

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<tr>
<td>Modeling the properties of selected types of marine vessels in the preliminary design stage</td>
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<td>2.2.1.1 Future Ship Designs for Short Sea</td>
<td>Future Ship Designs for Short Sea Operations</td>
</tr>
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</table>
**Multivariate unmanned floating platform for securing the maritime activities of state departments**

**Country:** Poland  
**Research Programme:** Polish Funds for Science  
**Start Date:** 09-07-2009  
**End Date:** 08-07-2011  
**Coordinator:** Polish Naval Academy in Gdynia

**Description:**

The project aims to build an efficient and effective system to ensure protection of the state economic interests at sea and protection of its security against such threats such as drug trafficking, terrorism.

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<tr>
<td>Multivariate unmanned floating platform for securing the maritime activities of state departments</td>
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<td>2.1.5.1 Build an efficient System to Ensure Protection against political and economical threats.</td>
<td>Intelligent Integrated Transport Network</td>
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</table>
**PBCT - Plasma-based catalytic treatment of exhaust emissions of marine diesel engines**

**Country:** MARTEC  
**Research Programme:** Shipping & Maritime Technology for the 21st Century  
**Start Date:** 18-09-2009  
**End Date:** 28-02-2013  
**Coordinator:** neoplas GmbH (Germany)

**Description:**

The project addresses novel plasma-based catalytic (PBC) technologies for the reduction of pollutions from marine shipping diesel engines. Non-thermal plasmas in direct combination with unique catalyst adjusted to plasma processes shall be investigated in order to reveal new technology for future exhaust treatment. Systems with higher efficiency and versatility are needed to fulfill the future demands on environmental protection with regard to the predicted 30% increase of maritime traffic in the Baltic Sea Region by the year 2020. The foreseen solution integrates advanced power management technologies for plasma generation and considers the pollution from sulphurous fuels. The studies are completed by up-scaling 3D flow simulations and practical integration studies on engines, thus including transferability, applicability and proof of principle.

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<td>2.2.2.3 Next Generation Power and Propulsion Concept</td>
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POWER-VR - Competitive process oriented developments of a framework concept for virtual reality applications in shipbuilding

Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st century
Start Date: 01-08-2009
End Date: 31-07-2012
Coordinator: Technische Universität Hamburg-Harburg

Description:

The project targets a better integration of virtual reality based examinations into the shipbuilding product development processes. One core issue is therefore an easy data provision for the VR applications. Furthermore the naval requirements for sophisticated VR solutions and examinations are analyzed. According to the results additional methods and virtual tools are designed to support the reasonable stages of the development process of shipyards and suppliers.

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<tr>
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<td>2.2.4.1 Leading Edge Integrated Shipbuilding Production</td>
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PROPSEAS - Propulsion in seaways

**Country:** MARTEC  
**Research Programme:** MARTEC  
**Start Date:** 01-01-2009  
**End Date:** 31-12-2011  
**Coordinator:** MARINTEK “Norsk Marinteknisk Forskningsinstitutt” (Norway)

**Description:**

The primary objective of the project is to obtain knowledge about the forces acting on propellers and thrusters in operation in heavy seas, in order to ensure optimum reliability on new designs and to enable operational guidance on existing systems. Secondary objectives are to develop better prediction methods for forces and moments on propellers and thrusters operating in heavy seas, recommend model and full scale test procedures for propellers and thruster operating in heavy seas.

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<td></td>
<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>2.2.2. Innovative Marine Equipment and Systems</td>
<td>2.2.2.3 Next Generation Power and Propulsion Concept</td>
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</table>
QuInLas - Quality-3D laser welding process of innovative ship designs

Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st century
Start Date: 01-12-2009
End Date: 30-11-2012
Coordinator: Technische Universität Hamburg-Harburg - Institut für Laser- und Anlagensystemtechnik

Description:

The overall objective of the project QuInLas is to explore the use of high quality three-dimensional laser welding for the manufacture of innovative ship designs, as well as an integrated quality assurance. These should be developed for laser remote folding, laser-hybrid welding as well as for process, system and evaluation methods for new requirements on three-dimensional welding constructions in shipbuilding. The project will use design methods which offer the opportunity to significantly accelerate the production process and to reduce the use of resources particularly evident through innovative lightweight concepts.

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<td>2.2.4.6 Innovative Materials and Systems</td>
<td>Leading Shipbuilding Technologies</td>
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</table>
ROT - RObots in Tanks

**Country:** MARTEC  
**Research Programme:** MARTEC  
**Start Date:** 01-05-2009  
**End Date:** 30-04-2011  
**Coordinator:** Meyer Werft (Germany)

**Description:**

The proposed project will foster the development, application, and integration of new manufacturing and inspection processes for narrow, highly inaccessible, dirty and complex enclosed spaces on vessels, like ballast water tanks (BWTs). These processes will use a new generation of mobile robots that are able to operate autonomously under the specific conditions of such spaces. Based on an evaluation of typical designs for BWTs, the project will develop both concepts for "robot-friendly" tanks, as well as for robotic systems that are able to automate the maintenance (inspection, cleaning, coating and repair) of tanks. The requirements of shipbuilders, ship operators, and class societies, as well as the relevant international standards, rules and regulations will be considered to identify suitable robotic concepts and systems. To prove their usability under hash real-world conditions, key system components will be subject to intensive simulated as well as practical testing. In addition to state-of-the-art simulation tools, a special BWT test-bed will be developed for this purpose. The main outcome of the project will be tested technical concepts and specifications for a robotic tank-maintenance system in addition to a set of design-guidelines for "robot-friendly" ballast water tanks.
SOS3 - Analysis and Optimization of an Autonomous Carrier System for Offshore Oil Recovery

Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st century
Start Date: 01-10-2009
End Date: 30-09-2012
Coordinator: Technical University of Berlin, Department of Land- and Sea Transportation Systems

Description:

The aim of the project is the development and optimization of a sea state independent skimmer, which is already patented in Germany and the United States. The hydro-mechanical system can be used efficiently against oil spills. It will be very robust with no moving parts. The skimmer will be designed and optimized for an autonomous carrier system. Such a system is driven by a push boat or can act as oil barrier in rivers.

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<tr>
<td>SOS3 - Analysis and Optimization of an Autonomous Carrier System for Offshore Oil Recovery</td>
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<td>2.2.5 Effective Waterborne Operations</td>
<td>2.2.5.1 Automated Ship Operations and Life Cycle cost Reductions</td>
<td>Energy Transport</td>
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Ultra Light Cells - Development of ultra light shipbuilding structures in composite and hybrid construction

Country: Germany
Research Programme: Shipping & Maritime Technology for the 21st century
Start Date: 01-01-2009
End Date: 31-12-2011
Coordinator: WIS marine GmbH Wismar

Description:

A fundamental objective is the development of new technologies in designing and building of modular superstructures. Appropriate combinations of composite and hybrid materials will be used to demonstrate the manufacturing and mounting. Selected function modules for supply and disposal (heating, air conditioning and ventilation) and thermally insulated, sound- and vibration-absorbing elements will be developed in hybrid design. Functional tests and modifications of the integrated supply and disposal systems as well as of modular construction systems will be recorded. Core of the scientific work are methods of modular construction and the possible production of very large, lightweight composite modules for large vessels. Further applications of lightweight products are different areas of construction (holding tanks, general building, off-shore engineering).

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<td>2.2.4 Next Generation Production Processes</td>
<td>2.2.4.6 Innovative materials and Systems</td>
<td>Leading Shipbuilding Technologies</td>
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</table>
Arctic DP: Safe and Green Dynamic Positioning Operations of Offshore Vessels in an Arctic Environment

Country: Norway  
Research Programme: MAROFF  
Start Date: 01-01-2010  
End Date: 31-12-2013  
Coordinator: NTNU Norwegian University of Science and Technology

Description:

It is as expressed need of the industry to strengthen the competences of the Norwegian maritime industry in arctic operations with special focus on dynamic positioning (DP). The objectives of this Knowledge-building projects with User involvement (KMB) is to enable an accurate picture of the vessel’s and the environment’s situation, combining measurements with models in an observer, and it must act on this information safely using automatic feedback control. However, in designing such systems, it is vital to have a good understanding of the vessel and its hydrodynamics and the disturbances that influence the dynamic behavior of the vessel (ice; in addition to waves, wind, current). In overall there are two main research objectives of the research; (1) to understand and build competence on the effects if ice loads on DP vessels through modeling and simulation, and (2) to carry out mathematical control designs, that targets important aspects of sage commercial systems. These objectives are further translated into 4 proposed PhD themes of research: PhD1: Modeling, supervisory control, and simulation of DP vessels in varying arctic conditions. PhD2: Observer schemes for DP operation in arctic conditions. PhD3: Adaptive and optimal feedback control designs for DP operations in arctic conditions. PhD4: Development of fault-tolerant DP control designs and operational procedures for safe DP operations in arctic conditions. In order to achieve the goals, a multidisciplinary team is established by 4 key researchers (professors) from 3 departments at NTNU together with the industrial partners Kongsberg Maritime, DNV, and StatoilHydro. When these leading industrial partners combine forces with NTNU on the topics of this KMB, they clearly make a statement for the potential of this research. In addition, research synergy will be established with several research centres, CeSOS in particular.
Development of a technology based on advanced oxidation and UV-irradiation for management of ships’ ballast water

Country: Norway  
Research Programme: MAROFF  
Start Date: 01-01-2010  
End Date: 31-12-2011  
Coordinator: Redox AS

Description:
The introduction of invasive marine species into new environments by ships’ ballast water has been identified as one of the greatest threats to the world’s oceans. The International Convention for the Control and Management of Ships Ballast Water & Sediments was adopted by the International Maritime Organization (IMO) in 2004, which implies that the world’s fleet must invest in approved technology for treatment of their ballast water before discharge. Redox AS is a Norwegian company providing water treatment and disinfection technologies for boats in the fisheries and aquaculture industry. The company wants to develop a reliable technology for ballast water treatment for smaller ships. To develop such a technology, a 2-year (2010-2011) research project was initiated with funding from the Norwegian Research Council. The responsible project owner is Redox AS (Norway), with Triogen Ltd (Scotland) and Norwegian Institute for Water Research (NIVA) as consortium partners. Project manager is Dr. Helge Liltved, NIVA. The main objective of the project is to develop and verify a technological solution base on filtration, advanced oxidation and UV-irradiation for ships’ ballast water management. The technology should be able to treat ballast water according to biological requirements stated in the Guidelines of IMO. The following sub-goals should be met in the project: • Find the best combination of ozone- and UV-dose to inactivate the test organisms used in ballast water. • Balance the treatment to produce a minimum of toxic by-products at deballasting. • Fulfill the IMO-requirements regarding test organisms and by-products • Provide the required documentation for application of “basic approval” to IMO, as a first step in the process of type approval. • Establish design criteria for a full scale ballast water management system.

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<td>2.2.1.3 Future Advanced Hull Structures</td>
<td>The Sustainable Recreational Craft</td>
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Feasibility study for testing of new technology for energy recovery in marine gas engines

Country: Norway
Research Programme: MAROFF
Start Date: 22-02-2010
End Date: 31-12-2010
Coordinator: Rolls-Royce Marine AS

Description:
Lean Burn gas engines are generally considered environmentally friendly compared to fuel based engines. Rolls-Royce Marine wants to further develop an even cleaner engine especially with regards to methane slip and reduced CO2 emissions. To be able to realize after-treatment and heat recovery of exhaust gasses the engine will have to be adapted. RR will have to carry out measurements to document CO2 equivalent gains of after-treatment of exhaust gasses. RCO2, Marintek and Rolls-Royce wish to carry out a realistic test of the possibilities of waste energy recovery based on exhaust heat, CO2 and adapted engine operation. The potential is both increased energy efficiency and specific reduction of CO2 in the exhaust. The project will evaluate and compare different technologies with regards to total energy efficiency improvement and climate gas emissions. Focus will be on comparing existing technologies for energy recovery and evaluate barriers and potential with regards to future technological and economical challenges. The particular technologies for energy recovery from marine gas engines are to be evaluated from a technical, economical and energy perspective with focus on ranking concepts based on cost efficiency and the technological potential. The following concepts will be evaluated: 1) Methanation and water splitting of CO2, (CCR concept) 2) The process of thermo-electrical materials (TEM) 3) ORC process with pressurized CO2 4) Condensing boiler with natural gas operation. By carrying out these studies the project target is to be able to offer profitable solutions that will together contribute to a substantial reduction of climate gas emission from ships.
Improved analysis of the risk presented graphically for effective environmental emergency response preparation.

Country: Norway
Research Programme: MAROFF
Start Date: 01-01-2010
End Date: 31-12-2012
Coordinator: Det Norske Veritas AS

Description:

The forecasted development in northern parts of Norway indicates a continued growth in shipping and oil / gas related activities, and suggests future activity possibly exceeding the current level in the North Sea. High level of ship traffic in Norwegian waters have already led to a number of accidents resulting in oil spill (including MV "Server" and MV "Full City") with significant damage to the environment. Authorities such as the Norwegian Coastal Administration should have risk based tools available that can take into account various factors such as current and future traffic, sailing conditions, vessel type and technical status, load and potential consequences of an accident. Such tools would enable the authorities to implement the appropriate cost-effective measures to reduce the risk of accidents. The main focus of the FARGE project will be to develop innovative tools to effectively and quickly evaluate different risk reducing measures primarily related to oil spills. Moreover, the project will through the application of these tools assess the potential effects of introducing risk reducing measures in shipping inspired by traffic management / control seen in aviation. The project will also seek to improve the models through the use of AIS data and accident data, combined with data mining and pattern recognition. The methods and models developed in this project will be demonstrated on real cases and is in demand in the industry.
**LeiSe - Lightweight components for shipbuilding elements**

**Country:** Germany  
**Research Programme:** Shipping & Maritime Technology for the 21st century  
**Start Date:** 01-01-2010  
**End Date:** 30-06-2012  
**Coordinator:** KAEFER Isoliertechnik

**Description:**

The research examines the substitution of non self-supporting steel and aluminium bulkheads by combinations of acoustically effective lightweight components with verified fire protection properties. It applies to meet the usual safety standards in shipbuilding and check the bulkheads for their suitability in shipyards. Background noises and weight savings of up to 20% to 25% are possible compared to steel structures for the entire ship by use of materials with restraining characteristics, high radiation losses as well as adhesive depressant joining technologies.

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<td>Lightweight components for shipbuilding elements</td>
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<td>2.2.3.2 Technology Base</td>
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LNG Fuel Tank for ships and other marine applications, developed on the NLI TS X system.

**Country:** Norway  
**Research Programme:** MAROFF  
**Start Date:** 10-03-2010  
**End Date:** 08-07-2011  
**Coordinator:** NLI Innovation AS

**Description:**

Goal The TS-X LNG Fuel Tank project has the overall objective of researching and thus verifying the TS-X concept for LNG Fuel Tank systems for marine applications. Main challenges Low/cryogenic temperatures: LNG is cryogenic at -162 degrees centigrade. This sets high demands on the choice of materials. Steep temperature gradients: From -162 degrees centigrade to ambient temperature is a span of up to 200 degrees centigrade. This means temperature related stress induced by thermal expansion-contraction in all components and systems used. Cost efficiency: An overall project goal, enabling more attractive pricing will require state of the art solutions not only in detail design, performance and materials selection, but also in rational production. This challenge will require extensive research efforts to formulate an insulation concept that both fulfill the technical and safety requirements and can be fabricated cost efficient. Market/user potential The NLI TS-X Fuel Tank (FT) is a new and novel concept for LNG Fuel Tank systems for marine applications. The main feature of the concept is that the FT is self-supporting, and is attached (to the ship) only in the bottom. This gives unlimited possibilities for placing the tank on deck, or in the hull. Also, the tank is prismatic, thus utilizing space in the best possible way. Together with building and insulation techniques we aim at developing a cost effective solution that will make LNG not only a possibility, but a standard, for propulsion on new ships. But at the same time, this prismatic design and the bottom only attachment-support system makes the solution perfect for retrofitting!

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<td>LNG Fuel Tank for ships and other marine applications, developed on the NLI TS X system</td>
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<td>2.1.4.2Fuel Supply and Fuel Systems</td>
<td>Low Risk and Low Emission Ship</td>
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Safer Ship Operations

Country: Norway
Research Programme: MAROFF
Start Date: 01-01-2010
End Date: 31-12-2012
Coordinator: Rolls-Royce marine AS

Description:

R & D Project Safety of anchor handling operations have got more and more focus, both academically and in media since this industry has experienced serious incidents and a larger part of this work is moving into geographical areas that are more susceptible to environmental impact. In particular, there is a need for increased research and development to ensure vessel operations for deep-water operations such as anchor handling. It's clear focus on these challenges from both the classification society and authorities, in particular the Norwegian Maritime Directorate's report on measures for anchor-handling vessels and mobile offshore units for "Bourbon Dolphin" accident, dated 05.10.2009. The goal of the research project is to develop instruments, including equipment and software that will enable secure offshore operations in order to increase the safety of vessels and crew so that basic decision-making information is available and that the technical systems and equipment enable the right operational decisions are taken and implemented during the operation. By developing information systems with internal and external partners, the project will ensure a comprehensive scientific approach so that there is a high transferability of the development to commercialization. Extensive use of new sensor technology in the industry could lead to substantially more and better quality information being available during anchor handling operations, and the correct software is being developed to provide high quality of information presented to the end user as basis for the decisions.

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<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.2 Toward the Zero Accident Target</td>
<td>2.1.2.2 Systems Integration for Safety and Security</td>
<td>Intelligent Integrated Transport System</td>
</tr>
</tbody>
</table>
Uncontrolled drifting of ships and large floating objects

Country: Norway
Research Programme: MAROFF
Start Date: 01-01-2010
End Date: 31-12-2011
Coordinator: Jeppesen Norway AS

Description:

Drifting vessels represent a significant environmental risk along the coast of Norway. Several accidents in recent years have made it clear that the vessel traffic along the coast can quickly drift to shore in cases of engine failure. Being able to alert that a vessel is drifting and to calculate where this vessel is drifting after it has lost power could potentially prevent such accidents. Acquiring data to determine the drift properties for various vessel types is almost impossible with traditional means of data collection. AIS, however, has made it possible to continuously monitor position, speed, course and heading for "all ships". This makes it possible to detect when vessels are drifting (e.g., when waiting for port entrance or performing maintenance) and record their drift. By combining the drift data with data for current, wind and waves, it is possible to estimate the drift properties for these vessels. The same concept can be used in an emergency situation to calculate the drift properties for any given floating object as long as we can track it (with AIS, radar etc) and have data for current, wind and waves. This enables us to determine drift properties for new kinds of floating objects (e.g. floating wind turbines), disabled vessels, vessel drifting with anchors etc. By comparing real-time calculated drift properties, drift properties for similar vessels (in database) and actual drift of vessel using both meteorological observations and meteorological models, one can by running multiple simulations calculate the probability for a drifting object to hit another object, whether that be land or objects such as oil platforms or wind turbines. Insufficient data on the drift properties of their own vessel, combined with, in many cases, poor tools for drift calculations will, in many cases, prevent the officers on board to take optimal decisions in relation to maintenance operations, involuntary breakdown, etc. An onboard system for drift calculations integrated into the navigation system will be of great help, and knowledge and results from the project can thus contribute to increased safety on board. The same data can also be used to calculate forces and moments acting on the various ship types and this may be used in ship maneuvering simulators.

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Acronym</th>
<th>Waterborne Vision Pillar</th>
<th>SRA Priority</th>
<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled drifting of ships and large floating objects</td>
<td>N/A</td>
<td>Pillar 1 – Safe, Sustainable, Efficient Waterborne Transport Policy</td>
<td>2.1.2 Toward the Zero Accident Target</td>
<td>2.1.2.2 Systems Integration for Safety and Security</td>
<td>Low Risk Ship</td>
</tr>
</tbody>
</table>
DNV Survey Toolbox - software for automated measurements of vessels based on 3D geometric model

**Country:** Poland  
**Research Programme:** Operative Programme Innovative Economy  
**Start Date:** n/a  
**End Date:** n/a  
**Coordinator:** DET NORSKE VERITAS POLAND Sp. z o.o.

**Description:**

Survey Toolbox - software for automated measurements of vessels based on 3D geometric model

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Acronym</th>
<th>Waterborne Vision Pillar</th>
<th>SRA Priority</th>
<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNV Survey Toolbox - software for automated measurements of vessels based on 3D geometric model</td>
<td>N/A</td>
<td>Pillar 2- A competitive European Waterborne Industry</td>
<td>2.2.3 Tools for Accelerated Innovation</td>
<td>2.2.3.2 Technology Base</td>
<td>Leading Shipbuilding</td>
</tr>
</tbody>
</table>
Implementation of innovative technology of installation of wind turbines and other specialized services for cranes

**Country:** Poland  
**Research Programme:** Operative Programme Innovative Economy  
**Start Date:** n/a  
**End Date:** n/a  
**Coordinator:** Viatron

**Description:**

Implementation of innovative technology of installation of wind turbines and other specialized services for cranes

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Acronym</th>
<th>Waterborne Vision Pillar</th>
<th>SRA Priority</th>
<th>WIRM Research Topic</th>
<th>WIRM Exploitation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of innovative technology of installation of wind turbines and other specialized services for cranes</td>
<td>N/A</td>
<td>Pillar 3 – research topics to Manage and Facilitate the Growth and Changing Trade Patterns</td>
<td>2.3.3 More Efficient Ports and Infrastructures</td>
<td>2.3.3.2 Vessel Shore Energy Systems</td>
<td>Accelerated Sustainable Port Development</td>
</tr>
</tbody>
</table>
5. Analysis from National Programs

5.1 Germany

Project Management Jülich (PtJ):

- Central Management, Planning and Controlling of Projects for Federal and Regional Ministries
- PtJ (staff around 500) is a largely independent unit within the Research Centre Jülich (staff around 4,400)
- Staff for Maritime Technologies about 10
- Offices in Berlin and Rostock-Warnemünde

Federal Ministry of Economics and Technology (BMWi) IVA6 "Maritime Economics"

- Strategic Planning, Final Decision and Programme Owner
- Mr. Ulf Zumkley, Dr. Thomas Rüggeberg, Frank Mittelstaedt
- Office in Berlin

National Programmes (programme owner – annual budget)
- Maritime R&D (BMWi – largest nat. programme, 30 Mio. €)
- Competitiveness programme (BMWi, 12 Mio. €)
- Maritime logistics (BMWi – port/mobility programme, 7 Mio. €)
- AiF (BMWi – SME programme, max. 200,000 € per project)
- AViF (Promotion programme, similar to AiF)
- ZIM (BMWi – SME programme, max. 350,000 € per project)
- BMBF (Basic research, open areas, no limitations)
- DFG (Basic research, open areas, no limitations)
- BMVBS (special maritime tasks < 1 Mio. €)

- Federal Programmes
  - Each state has its own funding budget

Challenges:

- World market position in shipbuilding markets
- Development of maritime technology

Objectives:

- Technology leadership in building highly complex ships
  - Reduction of costs
  - Systems competence in oil and gas offshore technology
- Highest level of quality, safety and environmental protection

Maritime transnational clusters of research
Germany is coordinating MARTEC initiative and the identified priorities in a 2014 perspective are:

<table>
<thead>
<tr>
<th>Priority Areas</th>
<th>DE</th>
<th>ES</th>
<th>FR</th>
<th>FI</th>
<th>DK</th>
<th>NO</th>
<th>SE</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>shipbuilding - new ship types, structures, ship design</td>
<td></td>
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<tr>
<td>shipbuilding - production process and technology</td>
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<tr>
<td>maritime equipment and services</td>
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<tr>
<td>ship and port operation services</td>
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<tr>
<td>inland water and intermodal transport</td>
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<tr>
<td>offshore industry / offshore technology</td>
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<tr>
<td>offshore structures for renewable energy</td>
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<tr>
<td>polar technology</td>
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<td>fishing/ aquaculture</td>
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<tr>
<td>safety</td>
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<td>security</td>
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<td>environmental and climate impact</td>
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<tr>
<td>human elements</td>
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</tbody>
</table>

### 5.2 France

**French institutional structure for maritime R&D**

CORICAN : national council presided by ministry for transport and sustainable development, elaboration of medium and long term strategy for maritime research and development topics. Strategic committee for shipbuilding industry : presided by ministry for industry, benchmarking of strengths and weaknesses of french companies, actions to increase competitiveness, relationship between big and small business, improve industrial process of production.

French waterborne mirror group: informal structure of exchange between french actors of maritime and inland waterways R&D (GICAN, defence procurement agency, ports, shipowners, public research centers, CETMEF).
French large loan

- 35 Mds€ dedicated to finance national programs for future investments
- Finance law 2010, which opens 35 Mds€ of additional credits on the state budget, to finance investments to increase the growth potential of french economy
- 3Mds€ for transport
- All modes of transport are concerned: car manufacturing, aeronautics, railways, inland waterways and shipbuilding industry

National program «future ship»

- May 2009: report of the think thank «grenelle de la mer» suggesting to focus public action about new generation of ships
- July 2009: creation of the ad-hoc group «future ship»
- April 2010: report of this ad-hoc group, defines a strategy to develop a new ship more economic, cleaner, safer and smarter
- Goals: 50% decrease in consumption of fossil energy, 50% reduction of environmental impact, improved safety and security
- 1 Md€ given to the Agency for the Environment and Energy Control (ADEME) to finance programs of R & D and industrialization, to greatly reduce the impact of transport equipment on the environment, including 100 million euros for the shipbuilding industry, dedicated to the program «future ship».
- This program adress different types of use: military ships, merchant ships, fishing vessels, research vessels and scientists, leasure boats.
- Call for projects to be launched by ADEME in september 2011: industrial research projects, research demonstrators, projects or technology platform test.

Potential demonstrators «future ship»

Eco cruise ship
- less 20% energy consumption
- less 20% CO2
- less SOX & NOX emissions (Marpol VI anticipation)
- Zero discharge into the sea
- 25 to 30% of recycled water used on board

FERRY LNG
- 15 à 20 % energy consumption
- emissions NOX(-90 %) and SOX (- 100 %)

Electric ship
- No fossil energy
- No emission
- No noise

Ship for laying and maintenance of wind turbines

Inland waterways ship

National program «future port»

Main objectives to achieve:
European Technology Platform of the Waterborne Industries

- deepening and strengthening docks more environmentally friendly
- promote mass transport until 18,000 TEU and develop associated feederings
- incentive pricing for terminals, modulated according to investment and environmental performance
- encourage production of alternative energy in ports
- set up equipment for connection to electrical grids to limit pollution and require ships to connect up
- reduce emissions from ships in and around the port
- design of future offshore platforms

- A new program including actions of R&D following recommendations of the commission «Grenelle de la mer»
- New generation of port infrastructure: floating, adjustable, reversible, innovative
  - anticipate new types of fret packing
  - anticipate changes in vessel size
  - seek innovative solutions taking into account rising sea level
- Call for projects to be launched by ministry of transport
  - 5M€ in first phase (concept, mathematical studies, reduced models)

**National program «renewable energies»**

- Creation of a new institute of excellence «France Energies marines» led by IFREMER, French institute for marine sciences: technological platform for national marine renewable energy, to be launched in 2011.
- Boost the competitiveness of the sector of marine energy sources
- Qualify the technology and pooling resources to test
- Promote the use and acceptability of marine renewable energy
- Contribute to compliance with the commitment of 6 MW installed ocean energy by 2020
- Budget: 124 M€ over next 10 years, 50% state money

**4 main R&D topics**

- Research on technological barriers: resource assessment, simulation tools, foundations and anchors, materials and structures, connection and network integration, energy storage
- Research on no technological barriers: environmental impact, economic models
- Evaluation and testing sites: tests at sea and estuary, floating wind turbine,
- Demonstrators and integrated projects: specific agreements for shared funding collaborative research

**Main conclusions**

France has a national strategy for maritime R&D, issued from Grenelle de la mer. French main topics of interest: new generation of ship, future port, renewable marine energies. Some calls of FP7 such as «ocean tomorrow» address this topics (offshore platform), we hope FP8 calls will do so

**5.3 The Netherlands**

Netherlands Maritime Innovation Programme
European Technology Platform of the Waterborne Industries

- Over 180 participants
- About 65% SME

**Economic Top Sector “Water”**

- Water technology
- Delta technology
- Maritime technology *Industry ambition to include:*
  - *Maritime Construction*
  - *Offshore*
  - *Maritime and Inland Waterborne Transport*
  - *Harbour Operations*
  - *Fisheries*

**Technology Themes**

**Inventory and ‘Gap Analysis’ in NL Maritime Sector 2010:**

- Sustainable technologies  
  “Clean Seas MTN” ➔  
  Fisheries – Shipping - Harbours
- Raw materials and Energy  
  “Pro-SeaFlore MTN” ➔  
  Offshore O&G – Sea Mining – Wind&Wave Energy
- Construction for extreme conditions  
  “HSS-MTN”  
  Maritime Construction – Offshore

**Process Themes**

**Inventory and ‘Gap Analysis’ in NL Maritime Sector 2010:**

- Production technologies  
  “Prog-IS”  
  Maritime Construction
- Operations design & Safety  
  Offshore – Sea Mining – Dredging & Infrastructure - Ships
- Logistics and Automation  
  Fisheries – Shipping – Harbours – Ship Systems

**Clean Seas Technologies**

- Emission Indexing  
  To optimise environmental impact  
  Shipping – Fisheries – Harbours
- Low emission & Protected zones  
  Arctic, Estuaries
- Offshore – Dredging – Fisheries – Sea mining
- Technologies for Noise  
  Prediction & Reduction
- Technologies for exhaust emissions??  
  LNG for Fuel??

**Conclusions - Options for national and EU supported maritime research**

- Cross cutting themes are present
- Industry ambition is present
- NL budget for EU Eureka and JPI’s on maritime topics is limited
- EU needs ‘fresh ideas’ for KP8-maritime
5.4 Spain

Spanish Maritime Technology Platform is connecting:

- Maritime transport.
- Fisheries and aquaculture.
- Shipbuilding and repair.
- Nautical Sport and leisure.
- Monitoring, prevention and maritime safety.
- Port infrastructures.
- Processing and canning industries.
- Technological centres and research organisations within the sector.

With the direct Involvement of:

- The Ministry of Industry and the Ministry of Education and Science, through Fundacion Innovamar promote and help in 2005 the creation of the SMTP.

**European connection:**

- EMTP collaborates with the European TP: Waterborne TP.
- Waterborne TP is composed of the asociations representing the maritime sector and also of universities and investigation centres, as well as Union Members and the European Commision and other relevant institutions of the society.

**Documents:**

- **Terms of reference:** strategic axes
- **Vision 2020:** Goals for the year 2020
- **Strategic Research Agenda:** Elaboration of RTDI lines and proposal for the Sector

**Main Challenges in a 2020 perspective:**

1. A competitive maritime industry
2. Safe, sustainable and efficient operations
3. Economic and population growth
4. Transversal areas (education and training, maritime policies, science & society)

To address the previous challenges a number of WGs have been installed:

<table>
<thead>
<tr>
<th>WG’S</th>
<th>AREA GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT1</td>
<td>Materials, joining technologies &amp; nanotechnology</td>
</tr>
<tr>
<td>PT2</td>
<td>Automatics &amp; robotics</td>
</tr>
<tr>
<td>PT3</td>
<td>TIC’s</td>
</tr>
<tr>
<td>PT4</td>
<td>Design, simulation &amp; Experimentation</td>
</tr>
</tbody>
</table>
Provisional finding of the work done in the WGs are reported in the following:

1. **Sustainability of marine transport**: improvement of the autonomous transport of goods by sea.
   - Development of e-guided vessels (autonomous ships)
   - New adapted port infrastructures
   - New navigation green corridors for exclusive use of autonomous vessels
In order to decrease truck traffic in EU roads, specially in EU groups of islands (i.e. Canary islands, etc.)

2. Development of new innovative (submerged) infrastructures between continental platforms and islands, or among groups of islands that allow to reduce costs, energy consumption and environmental impact.
   - Submerged floating tunnels for very long distance rail and short distance road transport

3. Improvement of marine energy technological fields over the entire life cycle of renewable marine energy installations. Improvement of technological solutions harmonized in an efficient (cost and time) and sustainable way with environmental aspects.
   - Infrastructures to achieve an overall efficiency and environmental impact, by means of integrated concepts to get electrical energy and fresh water at the same time, from marine renewable energy only or with a mix between marine and other renewable energy sources.

4. Improvement of an intensive use of information & communications technologies (ICT's) in intermodal processes at ports,
   - Focusing primarily the simplification of administrative procedures to a "paper free" objective (vessels, goods, passengers, road transportation to the hinterland) by means of a coordination between administrations at different levels (national, EU, worldwide)
   - And contributing to promote the ICT's in the transport and port business.

5. Development of a new generation of more efficient vessels:
   - With new propulsion systems based on new fuels
   - Designed for specific uses (i.e. Offshore activities, mini-cruises, sailing merchant ships, supply vessels for marine renewable energy installations)
   - Using new light, strong and self-repairing materials, and built by means of and ai-based manufacturing processes
5.5 Bulgaria

The Bulgarian Maritime sector is organized along the three main areas as in the picture below:

![Diagram showing the organization of the Bulgarian Maritime sector]

The main actors are in the process of setting up a maritime cluster. The main objectives of the cluster (www.marinecluster.com) are:

- Development of the maritime industry in Bulgaria;
- Improving the competitiveness of the sector;
- Popularise the marine sector on a national and international level;
- Facilitate international transport network integration;
- Support the members of the association in the activity they perform.

During the preparatory steps the Cluster has already identified some gaps in current national research programmers:

- Insufficient administrative and management power by the individual actors for coordination of large scale projects;
- Sector is organized only on the common interests in small unions and associations;
- Lack of support from the official authorities.

Main Challenges in front of the Maritime Bulgarian Cluster will be then:

- Developing of Bulgarian vision for sustainable maritime sector
- Implementation of a strategy for integration all parts of this field
- Unite all the interested forces toward the development of the sector
- Define the orientations, the primacies, the directions of development in the spirit of The Vision of The Technological European Platforms
The Bulgarian maritime sector is built on a solid and complete value chain that is facing the challenge of globalization and the lack of internal skills in playing as actor in European landscape.

5.6 Norway

Development of Norway’s maritime strategy
Maritim21 - the maritime research and innovation strategy

Measures for:
- Policies & regulations level playing field
- Environmental impact
- Recruitment, education and competence
- Research and innovation
- Short sea shipping in Norway

Target Industry:
• Ship owners
• Ship yards
• Equipment suppliers
• Service providers

Goals:
• A holistic maritime research and innovation strategy
• Develop new and more efficient forms of collaboration – within the industry and between industry and government
• Accelerate innovation – “INNOVATE OR DIE”

Maritim21 is the industry’s own proposal for a Norwegian maritime research and innovation strategy.

The strategy must focus on:
- High competence
- Smarter solutions
- The best frame conditions

7 Identified Priorities Areas
Holistic business development

Traditionally:

- Public funds allocated for internal R&D
  - Result: local effects, few large commercial projects
- National R&D programmes
  - Result: increased knowledge, but not linked to business development

The Maritim21 philosophy

- R&D, prototyping and market development – interconnected
- Utilise the array of public funds more appropriately
  - Result: larger commercial projects & industrial development
5.7 Italy

**RITMARE Ricerca ITaliana per il MARE**
*(Italian Research for the Sea)*

**Priorities Areas:**

**A) OCEAN 2015: Maritime Technology Demonstrators (high tech oceanographic ships)**

1.1 **Industrial need**
A full demonstration of innovative solutions in passenger ships is too slow. Demand for high tech oceanographic ships. Opportunity: conceive and develop 2 prototypes of high tech oceanographic ships that can be used by the scientific community and that can work as a “platform of opportunity” to test innovative shipbuilding technologies.

1.2 **Goals**
To merge the technological skills and innovations of the shipbuilding sector with the know how and needs of the marine science sector. Use such a common knowledge to conceive, design and realize two new types of oceanographic ships to be used as floating research centers as well as technology demonstrators.
B) Requalification of the waterborne transport and of the pleasure boat systems from the environmental and energy conservation points of view

1.1 Industrial need
Green technologies available from EU shipyards. Not significantly used for retrofitting purposes. Technologies could be transferred to the ports & marinas.

1.2 Goals
To identify key environmental performances for existing ships/yachts & for ports and marinas. To adapt existing & proven environmental Technologies for these sectors by means of prototype applications in view of demonstration.

C) The 3rd Millennium Sustainable Fishing System

1.1 Industrial need
The Mediterranean fleet of fishing vessels & the fishing system is outdated. Inefficiencies & environmental impact are increasing. Significant technological developments for sustainable fishing.

1.2 Goals
To build a stable co-operative network of scientific & technological competences on the fishing system. To integrate scientific, technological & production skills To re-engineer the fishing sector. To study, design & develop 3 new generation fishing vessels & related sustainable fishing/fishing processing equipment. To verify the efficiency of the re-engineered system based on prototype fishing vessels and equipment to be tested on the field in view of demonstration.

D) Strategies and tools for dismantling and re-cycling of leisure boats at the end of their commercial life.

1.1 Industrial need
Environmental impact of pleasure boats (fiberglass) at the end of their commercial life. Leisure boat dismantling and re-cycling industry (not existing today) has great economical development potentials.

1.2 Goals
in the short term – develop and test (demonstrators) technologies, plants and a logistic system to re-cycle and re-use in an environmentally controlled way, leisure boats; in the long term – re-design leisure boats to make their dismantling and re-cycling (“design for re-cycling”) easier.

E) ICT for the Seas

1.1 Industrial need
In the maritime sector the use of ICT is relatively limited. ICT is strategic for the sector (e.g. COM(2009) 8 “Strategic goals and recommendations for the EU’s maritime transport policy until 2018”)

1.2 Goals
Interoperability of ICT systems along the logistic chain use of Intelligent Transport Systems (“info-mobility”) also in deep seas; ICT for other sectors (fishing, leisure boats, maritime tourism, etc.); services based on satellite infrastructures, exploiting on-going efforts (such as COSMOS-SKYMED)

H) Materials and components for ships and yachts

1.1 Industrial needs
The passenger ships and mega-yacht industry is related to the “luxury” market niche in which technical functionality shall integrate with aesthetics. Materials and components shall fulfill architectural & style requirements. In turn, such a need boosts innovation.
1.2 Goals
To join technological innovation & aesthetics using the skills & abilities of different industrial sectors (textile, furniture, furnishing, materials) & the potentials of cross-cutting technologies such as nanotechnologies, nano-materials and biotechnologies.

6. Conclusions
Based on previous results, the following analysis can be made:

<table>
<thead>
<tr>
<th>Projects mapped onto the Research Priorities of the Waterborne Vision Pillars</th>
<th>Total Occurrences for all the analyzed projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementing Goal/Risk Based Frameworks</td>
<td>2</td>
</tr>
<tr>
<td>The Zero Accidents Target</td>
<td>5</td>
</tr>
<tr>
<td>The Crashworthy Vessel</td>
<td>8</td>
</tr>
<tr>
<td>Low Emissions vessels and Waterborne Activities</td>
<td>6</td>
</tr>
<tr>
<td>Enhanced waterborne Security</td>
<td>1</td>
</tr>
<tr>
<td>Innovative Vessels and Floating Structures</td>
<td>5</td>
</tr>
<tr>
<td>Innovative Marine Equipment and Systems</td>
<td>11</td>
</tr>
<tr>
<td>Tools for accelerated Innovation</td>
<td>10</td>
</tr>
<tr>
<td>Next generation Production Processes</td>
<td>7</td>
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<tr>
<td>Effective Waterborne Operations</td>
<td>8</td>
</tr>
<tr>
<td>New and Extended Marine Operations</td>
<td>8</td>
</tr>
<tr>
<td>Development of New Port and Infrastructure</td>
<td>1</td>
</tr>
<tr>
<td>Interoperability Between Modes</td>
<td>0</td>
</tr>
<tr>
<td>More Effective Ports and Infrastructure</td>
<td>2</td>
</tr>
<tr>
<td>Intelligent transportation technologies</td>
<td>2</td>
</tr>
<tr>
<td>Infrastructure Building and Dredging</td>
<td>0</td>
</tr>
<tr>
<td>Traffic Management Studies</td>
<td>2</td>
</tr>
<tr>
<td>Education</td>
<td>0</td>
</tr>
<tr>
<td>ICT</td>
<td>2</td>
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</tbody>
</table>
The bulk of the projects are funded in the area of Low Risk, Low Emissions and Leading Shipbuilding Technologies.
In particular the focus on technologies is particularly accentuated, demonstrating how National Programs have a more “close to the market” approach and scope.

This circumstance can be regarded as very positive because is possibly bridging the gap between the EU Funded Research under FP7 – Cooperation which is delivering basic and technological research but that in many circumstances cannot achieve the market uptake level.
<table>
<thead>
<tr>
<th>WATERBORNE PILLAR</th>
<th>TOTAL OCCURENCES</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe, Sustainable and efficient Waterborne operations</td>
<td>35</td>
<td>49</td>
</tr>
<tr>
<td>A competitive European maritime industry</td>
<td>30</td>
<td>42</td>
</tr>
<tr>
<td>Manage &amp; Facilitate growth and changing trade patterns</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Enablers</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

It’s clear from the figures in the table that the main focus is shifted on the manufacturing leaving behind the infrastructure element.

During the analysis some difficulties arose due to the difficulties in collocating some of the projects under the WATERBORNE priorities. Those projects are mainly related to the offshore activities and to the harvesting of the resources from the seas in terms of energy and raw materials.

This circumstance points out the need to re-focus some of the WATERBORNE priorities and to include new priority areas.

7. Bibliography

[5] CORDIS WebSite search tool under FP7
[6] TKRC WebSite search tool
[7] MARTEC WebSite search tool