FRONT PAGE

PROJECT FINAL REPORT

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Project acronym: **MESA**

Project title: **MESA – MARITIME EUROPE STRATEGY ACTION – FOSTER WATERBORNE**

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Periodic report: **1st ☐ 2nd X 3rd ☐ 4th ☐**

Period covered: **from 1st March 2014 to 31st August 2016**

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement.

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

Final publishable summary report

Executive Summary

The Maritime Europe Strategy Action (MESA – FOSTER WATERBORNE) project was conceived to support the activities of the WATERBORNE Technology Platform.

The MESA methodology was structured to foster new market needs, innovative ideas and research gaps through several implementation measures and groups such as:

1. Thematic Technology Groups of highly skilled and innovation-minded industry professionals and scientists, to identify the state-of-the-art and R&D gaps;
2. A Foresight Support Group, to identify long-term market, societal and regulatory needs; and
3. An Integration Group, to translate both the R&D gaps and the foresight needs into the WTB strategy.
4. A dissemination team, to ensure Europe-wide exploitation of the results and information gained throughout the project

The Thematic Technology Groups shared a common methodology and had the following objectives:

- Cluster major research projects relevant to the theme, and assess their relevant results;
- Organise appropriate conferences and workshops, bringing together industrial and research stakeholders;
- Identify gaps and RDI needs;
- Provide recommendations for future RDI;
- Monitor research project developments
- Propose research and innovation Implementation plans;
- Identify success stories in EU funded projects;
- Support the implementation of the research results for market uptake;

The responsibility of Foresight Support Group was to study trends in the Market, Societal, and Regulatory frameworks within the period to 2030. Along with the TTGs, the results of the Foresight Support Group fed into the work of the Integration Group. The Integration Group incorporated the leaders of the TTGs and the partners participating in the other WPs. This acted as an integration body, incorporating the results of the four TTGs and the Foresight Support Group, and supporting the preparation of the key Strategic documents, i.e.: Vision 2030; Updated Strategic Research and Innovation Agenda; Implementation Plan and Innovation Route Map;

Another input to the Integration Group was the Advisory Committee, chaired by CEREMA – chairman of the Mirror group inside the WATERBORNE TP. The Advisory committee was formed of National Administrations and representatives of the EC institutions. This ensured that the early documents received input from Member States and other European bodies formulating policy within the maritime sector.

The key areas for future opportunities have been identified as:

- Smart vessels, fleets and ports
- Automated and autonomous vessels
- Ultra low energy and emissions vessels and systems
- Safe, secure and adaptable passenger vessels for inland, inshore and offshore duties

- Green, efficient and flexible inland-waterway vessels

A summary description of project context and objectives

The Maritime Europe Strategy Action (MESA – FOSTER WATERBORNE) project was conceived to support the activities of the WATERBORNE Technology Platform, by contributing to the:

- Definition and optimization of the European maritime research and innovation strategies;
- Improvement of the stakeholders network, the dissemination, the use of research results, thereby
- increasing the visibility of the R&I findings of the waterborne sector;
- Fostering the definition of the maritime R&I transport policies.

Consequently, the project involved the participation of key industrial, research and members of European associations, active in the maritime sector, in order to ensure the widest possible participation within the platform stakeholders by:

(1) Activating the participating associations networks;

(2) Involving the WATERBORNE TP non-participating associations through the well-established "WATERBORNE Method" (based on open workshops/groups/brokerage events/panels/forum);

(3) Participation of key industrial actors in the maritime sector covering the full value chain;

(4) Establishing solid Networks of EU funded projects, via four Thematic Technology Groups, encouraging easier circulation of the deliverables through the Transport Research and Innovation Portal (TRIP).

Under the CA ACMARE project, the WATERBORNE TP [WTB] completed its initial phase and established itself as a key adviser to, and a strategic partner of, the European Commission, for the generation of consensus views relating to maritime research policy. The WTB Research Strategy was developed and published in three key documents: the VISION 2020, the WATERBORNE TP Strategic Research Agenda (WSRA) and the WATERBORNE TP Implementation Route Map (WIRM). As a result of the subsequent project, CA CASMARE, the VISIONS2025, WSRA and WIRM Issue 2011, were published with the aim to provide support to the maritime community in the implementation and delivery of the WATERBORNE TP Research Strategy for and beyond Horizon2020. However in a changing landscape, under the pressure of the economic downturn, MESA was conceived in order to adapt and review the sector's strategy.

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The Dissemination Team was responsible for a number of activities, focussed on ensuring European-wide exploitation of the results of the MESA project, and to ensure the project itself benefited from receiving input from European industry, academia, ship operators, policy makers, etc. These activities included:

- The 3rd and 4th European Maritime Research Policy Conferences
- Support of TRA 2014 and 2016
- Development of a new Waterborne TP Website, with a message board facility to receive feedback on the TTG , Foresight and Strategic reports
- The Maritime Brokerage Event [MIBE2015]
- Waterborne Newsletters
- Production of the RDI Success Stories brochure
- Production of the SRIA brochures

The MESA project was implemented in eight Work Packages, i.e.:

- WP1 - Thematic Technology Group 1: Energy Efficiency
- WP2 - Thematic Technology Group 2: Safety
- WP3 - Thematic Technology Group 3: Production
- WP4 - Thematic Technology Group 4: e-Maritime
- WP5 - Market, Societal, Regulatory Trends and Innovation Agenda Conceptual Frame
- WP6 - Integration Group and Strategic Documents Updates

- WP7 - Dissemination, Database, Showcases
- WP8 - Project Management

A description of the main S&T results/foregrounds

The major results of the MESA project is the information and knowledge produced as a result of the four Thematic Technology Groups, the Foresight Group and the Integration Groups, in developing the following:

1. Clustered Research Projects and global state-of-the-art [SotA] of each technology theme, i.e. Energy Efficiency; Safety; Production; and e-Maritime;
2. Proposals for R&D Road Maps, in each technology theme;
3. Reports of the Foresight Group, in relation to Market, Societal, and Regulatory Trends to 2030
4. The Strategic documents, i.e.:
    - Vision 2030;
    - Updated Strategic Research and Innovation Agenda;
    - Implementation Plan and Innovation Route Map;

The findings in these comprehensive reports can be summarised as follows:

Energy Efficiency

The State-of-the-Art analysis focussed on seven main areas, i.e.:

1. Ship resistance
2. Ship propulsion
3. Prime mover
4. Auxiliary energy (conversion) (solar, wind (not for propulsion), seaway energy)
5. Other on-board energy consumers
6. Energy Management Systems
7. Ship operations

The main conclusions were:

- During FP5, FP6 and FP7 a large number of energy efficiency related topics were supported. Based on the available information from these projects it is concluded that substantial progress has been achieved in a number of individual areas, e.g. in ship resistance and propulsion, and engine technology. Here, European manufacturers and suppliers are clearly among world market leaders and it can be reasonably concluded that at least part of this success is due to the work performed in European research projects. The developments and resulting products typically address individual solutions, as stand-alone solutions, promise substantial improvements. However, most projects fall short in reaching their full potential as often the integration of all advanced tools and concepts into a holistic energy saving approach is missing.

- This holds in particular for Energy management systems, where considerable work has been undertaken during FP7, and in the early phase of H2020. Meanwhile, a number of commercial solutions have appeared during recent years, however, a number of these cannot be tracked down to earlier developments performed in EU research. Although there is constant improvement in these, a general assessment is however that they all lack generality. Each of them addresses parts of the energy management problem, but there is hardly any complete solution available today.

- The analysis concluded that many individual developments that benefitted from EU research funding have helped to move the state-of-the-art in energy efficiency technologies forward. The improvements achieved have helped to considerably reduce energy consumption for a given transport task or other maritime operation. This leads to the general conclusion that the overall European maritime transport research initiative has been successful.

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- Following present trends and up-to-date information in the maritime industry, it is becoming evident that the market for energy efficiency improvement technologies, in particular, is extremely dynamic with new products or solutions available almost every week. At the same time it is similarly evident that for many of these, even a proper proof of concept is missing and must be provided before major market-uptake can be diagnosed. This is particularly important the volatility of the global energy price situation, as with the present low oil, and other fuel prices, a large number of costly energy saving solutions lose their previous competitive edge.
- Today, the motivation for implementing such technologies needs to come mainly from i) a long term perspective, as latest OPEC news forecast rising oil prices again for the next years and ii) the inherent fact that each fuel saving technology implicitly goes along with emission reductions and hence helps to comply with the further increased requirements to control and limit ship borne emissions.
- These considerations lead to the final conclusion that the exercise performed in MESA should be taken up by the industry and continued on a regular basis to ensure that up-to-date information will be available also in the years to come.

The following technology trends were found most relevant for maintaining technological and commercial competitiveness and leadership for the European maritime industry. These are:

- Hydrodynamics, Resistance & Propulsion: Whilst a lot has been achieved particularly during the last decade to improve hull forms and propulsive efficiency, not least due to recent numerical (CFD) developments originating from earlier framework research, further improvements of frictional resistance (mainly on ship hulls) through the use of advanced coatings, air lubrication techniques and boundary layer control methods, all considered in a life-cycle context, are required. In the present operational context this appears to be the most important element to further reduce energy consumption of maritime transportation. In addition, full scale validation of prediction methods, further aspects of operational resistances – including wind and waves – and dedicated developments for advanced propulsors, will form the basis of anticipated future developments.
- Powering: Improved engine design for operation in "off-design" conditions with a special focus on advanced control strategies. Mechanically new and advanced cooling systems and the use of new engine components and materials for improved corrosion, fatigue, fouling and high load performance will be required plus novel concepts for engine room design to work for integrated retro-fit concepts.
- The use of alternative fuels in the context of multi-fuel engines opens a complete new field. While LNG has been widely adopted in Europe as well as international, the next big step will be the adoption of

even more alternative fuel concepts to be run in a single engine. This is associated with developments addressing technology as well as logistics with a special focus on life-cycle cost and impact assessment.

- Emissions: Emission reductions, though not strictly in the context of Energy Efficiency or savings, will play an important role in the future. Post treatment technologies, such as 2nd generation scrubbers, will receive more attention; modelling and more technical developments will be required. Here again, life-cycle considerations will play an important role.
- Energy Efficiency governance / EEDI: The presently (IMO) adopted approach to the formulation of the Energy Efficiency Design Index (EEDI) will need to be revisited in the future. A number of issues associated with the present formulation, including e.g. the minimum power requirement and conceptual rule driven designs need an adaptation of the design index, especially in view of the overall transport work / performance adding transportation time into the equation.
- Big Data / Ship Analytics: “Big Data” is one of the buzz-words in shipping terminology at the moment. Technological advances (IT) and advanced regulations (e.g. MRV guidelines) allow and require capturing a much larger amount of data relevant for the assessment of Energy Efficiency of a vessel. Whilst it will soon be possible to accumulate a large amount of information on fuel consumption, performance of individual components and the overall energy household of a ship, together with operational and environmental conditions, the processing of such data will remain a challenge. A proper analysis and decision-making support tools will remain the main task for future development.

The analysis revealed that there are a number of technology gaps which can be identified. These can be grouped into three main categories:

1. Individual technology gaps;

2. Lack of integration work;

3. No radically new powering technologies

The first group comprises mainly technologies which have been addressed as a whole and where research results indicated that still gaps exist to either explain phenomena in sufficient detail to exploit the positive effects to the max (an example is the air lubrication technology) or that technologies have been developed but a complete and comprehensive assessment is still missing to assure a shift to a higher technology readiness level and a sound transfer into industrial practice. Safety with respect to the introduction of new powering and fuel technology can serve as an example here.

The second group relates to the apparent lack of fully integrated energy efficiency solutions. While individual elements are already in place a full exploitation through integrated energy management solutions is still lagging behind and it is felt that a considerable additional potential can be unleashed when bringing the elements together in a consistent way. This relates largely to software techniques and the processing of large amounts of information in the context of “Big Data”. All relevant developments which have a wider impact on the global maritime sector so far, appear to be more or less incremental improvements of existing technology. A renunciation of existing “standard technology”, e.g. for the propulsion of ships, has not been addressed in past research in much detail. Such radical ideas constitute the third group of technology gaps found in the analysis.

The need for such type of long term strategic research has to be carefully balanced against more short term research needs, however the introduction of ECAs, the new European MRV rules and other emission related regulations aiming at limiting CO2 and other emissions, call for more stringent solutions. The most recent IMO Greenhouse Gas Study offers a number of different scenarios for the expected growth rates in international shipping. Even the most conservative assumptions indicate that the emission increases from shipping due to the increased traffic cannot be counterweighted by traditional means and the expected improvements which can be achieved by means of evolutionary developments and optimisations seen in the past years. Seen from this perspective it seems to be necessary to look into more radical, zero emission transport solutions for the future too and thus lay the foundations for a truly sustainable seaborne transport system in Europe and worldwide.

Safety

A large number of past research projects were analysed to produce a comprehensive definition of the state of the art of safety technologies in the maritime sector. Information has been grouped under a number of different interest areas, service and vessel types as follows:

1. Goal based regulations, accident reporting, and data reporting
2. System integration for safety and security
3. Survivability of smaller vessels in extreme conditions
4. Collision and grounding
5. Failure mechanisms
6. Safety of operations in sea and inland ports
7. Fire and evacuation

The analysis of past research projects has identified of a number of technological approaches, namely:

- Navigational tools
- Data network and communication systems
- Decision support systems
- Design software
- Knowledge exchange platforms
- Methodology / design concepts / requirements
- Monitoring instrumentation
- Remote vehicles and inspection robots
- Sensors
- Simulation tools
- Stabilising devices

To provide a common understanding of the current status of each of these technologies and the degree to which it has been implemented, the technology readiness level (TRL) of each was assessed. As a general principle, technologies with a TRL of more than 5 (“Component and/or breadboard validation in relevant environment”) were likely to require further funding for the development of demonstrators, whilst those below require further research funding.

Goal based regulations, accident reporting, and data reporting: the technologies available in this area are generally below TRL 5, indicating a need for further research funding. Technologies include:

- New data networks for security and ship monitoring data transmission
- Integrated Safety and Security Management Platform (ISSMP) software
- Decision Support system integrating different model
- Methods to forecast negative effects on the ship due to external forces (e.g. waves)
- Crisis Management systems

System Integration for Safety and Security: most technologies identified in this area are at TRL 6 or higher, suggesting that they are about to be implemented in real contexts.

Survivability of smaller vessels in extreme conditions: technologies identified include:

- Risk models
- Wave modelling
- Methodologies and design concepts aimed at increasing safety during extreme sea conditions or in an emergency.

Collision and Grounding: technologies identified include:

- Motion and acceleration monitoring systems
- Hull stress monitoring systems
- Active operator guidance systems
- Navigation planning aid tool to forecast compressive ICE dynamics and tool to assess the damage resistance related to ICE compression
- Docking aid (with laser meters and rope auto-tensioning) and mooring monitor on-board system

Except for few cases, most of the following are at TRL 5 or below.

- Failure mechanisms: there are a number of clustered projects in this subject area, whose target is that of preventing failures through the adoption of tools and software for assistance during navigation. TRL levels are typically above 5.

- Safety of operations in port: this covers port operating procedures and the associated support systems. TRL levels are typically greater than 5.

- Fire and evacuation: this is a significant area of interest, covering for example:
- Fire emission toxicity tests, methods and tools
- Fire safety engineering methodology
- Fire growth, toxic effects on people and effect on structural integrity simulation tools
- Evacuation of people simulation tools

<u>Production</u>

European industry is facing tough international competition, in particular in shipbuilding and maritime technologies. Despite market distortions by state aid and restrictive trade laws in some regions of the world, the European maritime sector has successfully established itself in high-value added niche markets for complex custom-made ships and has started to explore new opportunities in the emerging "Blue Growth" markets. This success has been achieved by advanced production methods, excellent networks and supply chains (production management) and secured employment and wealth in many maritime regions, as well as in the hinterland. Europe is leading the development of green technologies contributing to de-carbonization, energy efficiency and decreased life cycle cost. However, only competitive production will enable Europe to drive the development and implementation of those technologies in line with the policy goals. Shipyards play a key role in this process - their productivity, ability to integrate stake holders and technologies and quality largely defines the competitiveness of the entire production chain, as well as safety of ships, resource and energy efficiency of the products and the life cycle processes.

The SotA report covered the most important processes in the life cycle of modern ships, with emphasis on the production phase. A detailed bottom-up analysis was conducted in seven Technology Sub-Areas:

- Design tools and their integration;
- Production preparation and management tools;
- Metals and their processing;
- None-metallic structural materials and their processing;
- Materials and processes for corrosion and fouling protection;
- Assembly and outfitting techniques;
- Maintenance, repair, retrofitting and end-of-life.

The main conclusions were:

- A large gap can be observed between the state of production technologies in leading yards and smaller companies. While the description of the state-of-technology is primarily referring to leading yards, the situation in smaller yards is described where appropriate. Technology Readiness Levels achieved are usually given as ranges representing the different state of application across the industry. The analysis has underlined the need of technology transfer and technology adaptation to smaller companies to maximize the impact of research.
- Continuous research and development along strategic lines, rather than isolated projects, is important to achieve a sustainable improvement in competitiveness. RDI on production technologies on European, national and private level have contributed significantly to achieve and maintain the leading position of EU shipyards in high value-added niche markets.
- In an international comparison Europe the leading research and application of maritime production technologies relevant to its products. The efficient cooperation of research entities and industry in projects and implementation makes the European maritime research area (EMRA) unique. However, competing players in the global market tend to invest more in research infrastructure, "basic" maritime research to take up key enabling technologies and international rule development.

The following technology areas have been found of key importance for the competitiveness of the maritime industry and represent focus areas of research and development:

- Design for life cycle methodologies and tools have been developed and applied. This includes tools and processes for improved retrofitting as well as dedicated decision support and assessment tools. A more consistent use of operational data using the potentials of big data management and industry as well as more sophisticated and integrated life cycle simulation tools are technology gaps to be overcome in the next decade.

- Simulation tools and numerical modelling for investment and resource planning, robot programming and process modelling have been developed and are used by leading actors along the value chain. Those tools need to be further improved for new manufacturing processes and materials and to be integrated. Logistics and supply chain management are one of the major advantages of leading European yards versus their competitors.
- Automation of pre-assembly processes primarily of metallic structures has reached an impressive level in leading shipyards with a clear European lead in the use of low distortion welding processes. The level of mechanization and automation in block and final assembly, in outfitting, repair and retrofitting, in smaller shipyards and in the production of offshore structures bears a significant potential.
- The use of innovative materials and material combinations has made significant progress during the last years, but due to lacking long-term experience, lacking standardization and high cost and insufficient work sharing along the supply chain is not common practice yet. Nonetheless, the use of advanced material combinations, lightweight and adaptive structures, innovative coatings is a major contribution for greener shipping and competitiveness of shipyards and ship operators.

e-Maritime

In order to form a comprehensive overview of the current state-of-the-art for e-Maritime, projects were initially categorised against four main focus areas:

- Ship operations and e-Navigation
- Port operations
- Logistics Chain
- Regulations Management

For the purpose of this overview, e-Maritime was defined as the use of information exchange technologies to establish more secure and safer cooperation between ships and onshore stakeholders, in order to facilitate sustainable maritime transport.

A review of specific systems and applications of ICT technologies for exchanging information in the maritime domain, developed globally, indicated that European applications were considered to be state-of-the-art and more advanced in some areas, such as in the logistics domain and in Port Community Systems.

The rapid development in information and communication technologies will significantly increase digitalisation in all waterborne sectors. A higher degree of systems automation, the availability of smart sensors and global networks for data transfer between ship and shore will promote remote controlled, and semi or fully autonomous operation of assets. This will require secure systems and operations against cyber-attacks. Growing digitalisation in all waterborne sectors will result in the use of electronic data as a substitute for current legal paper documentation. It will also have a significant influence on how assets are designed and operated.

The main directions and topics for further technology developments that are beginning to emerge are as follows:

- Smart Ships: Vessels with reduced manning levels and automated information management and surveillance with shore-based assistance, protected from cyber-security risks. Improved integration with shore support centres for technical operation and remote maintenance.

- Smart Ports: Digital infrastructure and ICT innovation for ports, including: Robotics and automation; autonomous vehicles; the Internet of Things and Big Data Analytics, simulation and virtual reality, and cyber-security.
- European Marine Digital Highway: Shore-based marine information and communication infrastructure linked with the corresponding navigational and communication facilities aboard ships.
- Innovation in Hinterland Connectivity: Improved interconnectivity and integration between transport modes and established systems; safe and interconnected systems for data exchange and supply chain optimisation.

The key research priorities and the RDI needs for future development are as follows:

<u>Ship Operations:</u>

- Development of Decision Support and monitoring for on-board operations to capture information from machinery and bridge systems integrated in a reliable and maintainable network with high availability and connectivity, for a more efficient, safer and environmentally friendly operation.
- Development of e-inspection systems for monitoring for hull and machinery providing access to inspection tools database for a particular entity.
- Development of systemic model for a human oriented onboard Resilient Shipping Environment focused on improving the attractiveness of the seafarer profession, and the safety culture.
- Development of a decision support tool for Shipping Companies to optimise their crew repository information and long term assignment.
- Development of state of the art solutions for on board ship administration to provide integrated solutions for engine and bridge e-logs, crew allocation and resting hours monitoring, Master General Account, Crew licences and certificates etc.
- Development of a Decision support tool for e-Performance, incorporating AI and an energy efficient operation index (EEOI) adjusted for the actual vessel and voyage particulars.
- Development of information exchange protocol standards for e-Maritime Strategic Framework (EMSF) interoperability and standardisation of document formats, Ship Inspection Report Programme (SIRE) reports, and Charterers enquiries, etc.

<u>e-navigation:</u>

- Integrated approach to ship navigation; including the bridge systems and the integration of bridge systems with human operators, other ships, and the VTS as well as SAR.
- New systems for cooperation between vessel traffic services and ships for efficient transport systems, including the development of remote control or autonomous ships.
- Development of open solutions for integrated ship control to enable increased involvement of smaller manufacturers, more innovation and lower cost systems.
- Development of new interfaces for integration between bridge systems and the operator, including alarm management, to improve the human factor.
- Development of navigation solutions for smaller craft similar to those emerging for international shipping; this includes all types of information from charts, and alarm and warning systems related to safety of shipping.
- Development of open information standards for data, data transmissions and data networks for

increasing the innovation rate in the e-Navigation area.

Port Operations and Ship-Shore Interfaces:

- Development of Intelligent holistic solutions for the efficient management of ships in ports for freight, passengers and workers, integrated with Urban Mobility Plans and solutions.
- Optimisation of interconnectivity between transport modes for efficient, safe, secure and environmental operation.
- Further harmonisation of customs procedures, vessel's calls and clearance at ports, and IT systems adapted to the new regulations.
- Best practices repository for supporting e-Port Operations and processes, including mechanisms to facilitate knowledge exchange of enabling technologies in port operations and new e-port services.
- Development of existing interoperable e-Maritime systems (PCS, SW, CCS, TOS, TMS, etc.) and electronic ecosystems to extend the scope, functionalities and performance of current existing systems.
- Developments to improve the interoperability and integration between transport modes, including advanced logistic chain management systems and operational tools, to facilitate very fast sea/land interchange.
- Developments to increase the data exchange between ports in order to improve the situational awareness, the whole port call efficiency and track-and-trace information.
- Upgrading and update of current port IT systems e.g. PCS and development of new services exploiting IoT and Big Data analytics capabilities

Logistics:

- Development of decision Support and Monitoring Systems enabled for cloud operations for all actors both at the office as well as mobile users and integration to the different systems (e.g. SafeSeaNet, AIS, LRIT, eCustoms, etc.) to improve data quality and operational efficiency.
- Development of Big Data and Analytics, offering quality data to all interested parties, in order to improve service provision.
- Development of improved Security Systems to increase check and control reliability and improve the security at a European level, and to improve interoperability and control quality among governmental agencies.
- Development of systems to improve compliance, reduce red tape and enforce clear, understandable and European wide regulations to reduce unnecessary administrative complexity and the time involved.
- Advanced interoperable and secure networks and mechanisms, for the facilitation of knowledge exchange along the logistics chain and for efficient and reliable transport services.
- Harmonising and simplifying National and international requirements for ports and ships operating in different Member States for a more coordinated reporting formalities through the European Maritime Single Window.
- Advanced co-operative multimodal transport networks to fully integrate short-sea shipping and inland waterways into the logistics chains, with greater interoperability between systems.
- Development of improved interfaces between sea and multimodal transportation to enhance the competitiveness of short sea shipping. Integration of e-Maritime tools to include logistics operators, rail

operators, short sea shipping providers and inland waterways operators

- The establishment of a Coordination and Support Action for transport users and researchers to identify areas where joint efforts will bring the greatest added value, enabling the transport sector to become more efficient, economical and environmentally sustainable.
- Further development of common definitions, rules, and common interoperable management framework architecture in order to improve the cooperation between the partners in the logistics chain. The applicability, scope, and commercial acceptance of standardization efforts also need to be addressed.

Regulations Management:

- Development of a data map from the internal system to the Maritime Single Window to enable automatic submission of reports.
- Further work is required on technical specifications and procedures for the National Single Windows (and the Maritime Single Window focusing on maritime transportation).

Market, Societal and Regulatory Trends to 2030

The MESA foresight activity provided market, societal and regulatory trends, with the aim of comparing these with present and expected technology developments and, thus, to be able to derive R&D needs to address identified gaps. This document provided the consolidated impacts on the waterborne industry foreseen until 2030 based on an analysis of the previously identified trends on population growth, food and water demand and supply, societal expectation related to health, safety, environmental and security, economic and waterborne trade growths, energy demand and supply, climate change and environmental damages and the effects of ICT. The following key trends and impacts were identified:

- Continued population growth and urbanization increases demand for focused waterborne services and upgrading of infrastructure
- Food and water demand is increasing with supply becoming challenged which calls for more water transport and aquatic food production.
- Society's increasing expectations to adequate health, safety, security and the impact of industries on the environment will lead to more strict regulations and require the waterborne industries to improve in these areas.
- Developing countries will continue increasing their share in global economic growth, which will in turn increase trade in particular among these countries.
- Global growth of population and GDP will increase energy consumption, despite higher energy efficiency of facilities and equipment.
- Waterborne trade growth will be driven by economic growth of developing countries and global growth in demand for food, water and technological products.
- Climate change will lead to more flooding, draughts, extreme weather events and polar melting and will impact all waterborne sectors.
- The fast development in information and communication technologies will increase digitalization in all waterborne sectors and will significantly influence design and operation of assets

Vision 2030

As a consequence of the above inputs, the Vision 2030 has been agreed as follows:

Powered by continuing research and innovation, the EU maritime industry will maintain its position as a global leader in high value maritime business. Our ships will be the smartest, greenest and safest on the World's seas; our autonomous vessels will be an increasingly common sight around the world and our passenger ships will be renowned globally for their safety and sophistication.

Smart ships, smart ports and smart infrastructure will be facilitated by the growing EU maritime data highway which will provide high capacity, low cost and secure data communications around our coasts. Close to zero environmental impact will be achieved by clean engines and clean fuels, low resistance hulls and rigorous management of all emissions. Adoption of green technologies on the operating fleet will be facilitated by plug-in refitting solutions.

Electric vessels in and around our maritime cities will be the norm. Port facilities will include clean, shore based power for larger vessels, and smaller vessels will routinely enter and leave ports and harbours under electric propulsion.

New sensors, data management and communications technologies will not only pave the way towards reduced manning and vessel autonomy but will also allow for smarter, cleaner and safer vessels. Fully integrated transport logistics will ensure the seamless transfer of materials and goods from source to final destination.

Safety and security of our shipping will be enhanced further by the development of improved materials for impact and fire resistance, by a better understanding of ship behaviour in abnormal conditions and by improved emergency planning and execution.

The EU will continue to lead the way with the design, build and operation of innovative, flexible, modular, and highly efficient working boats. With the inexorable increase in shipping and offshore activity, these vessels will take on an even more important role in the provision of the day to day services that keep our maritime industry on the move. The new challenges of Blue Growth will be met with specialised vesses, that are modular and reconfigurable throughout their entire operational life.

Increasing wealth around the world will lead to a growing middle class, with more disposable income to spend on goods, services and leisure. The EU will retain its lead in the design, build and operation of cruise vessels to satisfy this market and the recreational marine sector will lead the world with innovative craft responding to ever increasing customer expectations.

Advanced production technologies will underpin the high value products being built, using advanced modelling techniques, joining technologies and new materials to deliver flexible and cost effective solutions.

The future for the EU maritime industry is bright, with global trends clearly indicating an increasing market for the sophisticated, high value technologies and products for which our industry is renowned.

The potential impact (including the socio-economic impact and the wider societal implications of the project so far) and the main dissemination activities and exploitation of results

The primary objective of the MESA project is to provide a vision for research and innovation within the European maritime sector, and to encourage the implementation of that vision within industry, academia, waterborne transport operators, and European and national policy makers. Consequently the wide dissemination of that vision, and supporting documents, across Europe is of primary importance. It is also important that European stakeholders have the opportunity to update that vision, on an ongoing basis, as technological, market, regulatory, societal and environmental factors change.

The primary dissemination routes will be through the following:

- Waterborne TP, including its proposed new working groups
- Vessels for the Future Association
- Members States, through the Waterborne TP Mirror Group
- Other Transport and non-transport ETPs, where there is the opportunity for collaborative projects or technology transfer, e.g. related to energy efficiency, automation, materials, manufacturing, and renewable energy; as well as advanced logistics and intelligent mobility.

The primary information source will be the new Waterborne TP website. All documentation will be visible, and with feedback/recommendations for revision actively encouraged. This is particularly the case for those background documents, e.g. State-of-the-Art analyses.

One of the key impacts of the updated Strategic Documents, i.e. Vision 2030; SRIA; and Implementation Plan, is as the Waterborne TP input to discussions on the formulation of work programmes for Horizon 2020 and its successor Framework Programmes, representing a common view of the maritime sector, as represented by the wider European maritime associations, including ship builders, marine equipment manufacturers, research institutes, classification societies, and academia.

However, these strategic documents, and the valuable technological and foresight information within, are of value to other public and private organisations. For example, a number of Member States and Associated Countries are studying the contents, with a view to taking on their conclusions within their own National RDI Programmes. In addition, it will provide valuable information to individual companies and research institutes, in relation to privately funded RDI and commercial exploitation.

During the project the Dissemination Team was responsible for a number of activities, focussed on ensuring European-wide exploitation of the results of the MESA project, and to ensure the project itself benefited from receiving input from European industry, academia, ship operators, policy makers, etc. These activities included:

- The 3rd and 4th European Maritime Research Policy Conferences
- Support of TRA 2014 and 2016
- Development of a new Waterborne TP Website, with a message board facility to receive feedback on

the TTG , Foresight and Strategic reports
- The Maritime Brokerage Event [MIBE2015]
- Waterborne Newsletters
- Production of the RDI Success Stories brochure
- Production of the SRIA brochures

A FOSTER Cross-modal Long Distance Freight Transport Workshop, was held on 30 January 2014 in Brussels. Both BMT and SEA Europe attended this workshop. The aim of the workshop was to discuss cross modal RTD topics for long distance freight transport, which involve at least two surface transport modes, and how to address them in future research programmes. Connecting transport modes was considered an important topic by the Commission and its linking with TEN-T and the Connecting Europe Facility an important goal, where Logistics and ICT play a key role. BMT and Sea Europe subsequently became partners in the SETRIS project, together with ERTRAC and ERRAC and other partners.

As a result of the important work of the MESA activities, the key areas for future opportunities have been identified as:

Smart vessels, fleets and ports

Waterborne transport will be an integral part of an efficient logistic chain. Connection with other transport modalities, or inland-waterway transport, will be seamless. Smart vessels will communicate with smart ports to limit congestion, waiting time and thus costs. Smart vessels will adapt their sailing speed to match harbour slots automatically.

An important facilitator for seamless integration of transport modalities will be the further harmonisation of administration between EU member states and regions. Smart vessels will automatically file the necessary paperwork, and provide port authorities with cargo information.

Constant real-time connected and monitored vessels worldwide will see ships become more closely integrated into logistics or supply chains. Global companies will focus on using a whole fleet to best effect, generating cost savings and improving revenue generation. This has the potential to create new shipping services, such as online cargo service marketplaces, more efficient pooling and leasing of assets, and new alliances.

Smart vessels will be able to adapt their operations not only to congestion in ports, but also to for instance weather conditions. Fuel consumption over the whole sailing route will be minimised by taking weather predictions and loading condition into account for selecting the optimal route and speed.

Ports will facilitate the energy transition of the fleet, by providing bunkering possibilities for different fuels, as well as recharging capabilities for electric or hybrid vessels. Safe solutions for bunkering of LNG will be provided, possible away from the quay.

Automated and autonomous vessels

With the increasing possibilities of ICT technologies, ships will become fully connected 24x7 throughout the world. This will create a wealth of opportunities in automated and autonomous vessels. Starting already now is remote monitoring of vessels, allowing for condition-based maintenance. Building on the increasing automation on-board, remote operations of vessels will become possible, eventually moving towards full autonomy of vessels. The wider use of Unmanned Autonomous Vessels (UAVs) – either aerial, underwater or on surface – will increase flexibility and energy efficiency of operations.

Remote operations require automation of all main systems on-board, and integration into a single communication channel to shore. A critical component will be the advanced navigation system, that will be able to maintain a vessel's course, detect and adapt to changing sea and weather conditions, avoid collisions and operate the ship efficiently within specified safety parameters. The system will be flexible to allow for different levels of autonomy, depending on location, congestion, or emergencies.

On-shore control centres will be responsible for operating vessels in congested sea lanes, or in proximity to ports and terminals, and in emergency situations. These control centres will be equipped with system simulators designed to swiftly simulate scenarios including all ships involved, and facilitate human intervention.

Reliability and security of communication will be key to the success of the connected vessel.

Ultra low energy and emissions vessels and systems

LNG will be the main fuel, with uptake first on short-sea ships operating in areas with developed gas bunkering infrastructure. Large ocean-going vessels will follow when bunkering infrastructure becomes available around the world. All new-builds will be equipped with multi-fuel engines, to allow for a smooth transition of main fuels.

Ultra low or zero emissions will be achieved by electric propulsion in special areas, such as ports or ECAs. Locally operating vessels will be fully electric; other vessels will have hybrid propulsion systems. Ships will become wind-assisted, and batteries for non-propulsion workload will be recharged by solar energy.

The power required to propel the ship will be minimal due to high efficiency propulsors, air lubrication or special coatings, and a hull design optimal for actual operational conditions. Latest virtual reality and simulation tools will be used to design the ship fit for operations.

Safe, secure and adaptable passenger vessels for inland, inshore and offshore duties

Increasing population in coastal will require safe and swift waterborne transport. Ferries will be built according to high safety standards and with low emissions. Many ferries will be all electric, recharging in ports and from solar energy.

Demand for cruising will be driven by the growing middle class worldwide. Next generation cruise vessels will not only be larger, but also more diversified to match local market requirements and environmental restrictions. Use will be made of the newest light-weight materials to save energy. Noise emissions under water will be low to comply with strict regulations. Customer experience will be enhanced by more open spaces and glass in the superstructure, and by an integrated interconnection between ship's IT infrastructure and passengers wearable devices.

The structural and safety aspects will be tackled by the latest insights in composites with regards to strength and fire resilience, hydrodynamic loads in the structure in intact and damaged situations, and in human behaviour for evacuation. Innovative rescue equipment will be applied.

Many technologies developed for cruise vessels and ferries will be applied to the newest recreational craft. On the other hand, recreational craft will be used as test bed for larger vessels, because of their relatively low power demand. Examples will be the electrification, and use of lightweight new materials. Super yachts will be used as launching customer for cutting edge technologies.

In a polarising world, security of passenger vessels against outside attacks is a growing concern. The newest vessels will be able to withstand outside terrorist attacks, and be invulnerable for digital hijacking.

Flexible craft for coastal and offshore duties

With the onset of the Blue Economy, an increasing number of vessels for coastal and offshore duties will be in operation. Although many of these activities require dedicated vessels, all activities benefit from lowering of costs by employing a modular design of vessel and equipment. Within a relatively short period of time, ships can be refurbished to facilitate new offshore activities. Many of the vessels will be deployed as search-and-rescue vessels in case of calamities.

The offshore workboats will be characterised by a large operation window in adverse sea states. Cost of operation will be minimised by allowing crew to perform their tasks in a safe and healthy manner for most of the year. Although energy efficiency will not be the main economical driver for these vessels, dedicated ship design and propulsors will ensure a low power consumption in transit and operation. Noise emissions, both into the ship and under water, will be low to comply with strict regulations.

Green, efficient and flexible inland-waterway vessels

The new generation inland-waterway vessels will provide an integrated, energy-efficient, and flexible alternative to road transport.

Emissions from inland shipping will be very low through the use of low-carbon fuels, and hybrid propulsion. Dedicated shallow-water propulsors, and air lubrication will increase the efficiency of ship significantly.

All ships will be digitally connected to shore and each other to exchange information on local water depth, current profile, operations of locks, and congestion. Based on this information, the operation of the vessel is optimised with respect to fuel consumption and interaction with the logistic chain. Parts of the river navigation will be autonomous.

Flexibility of the inland fleet will be achieved by modular concepts, and the further application of barge trains.

The address of the project public website: http://waterborne-tp.org

4.1 Use and dissemination of foreground

A plan for use and dissemination of foreground (including socio-economic impact and target groups for the results of the research) shall be established at the end of the project. It should, where appropriate, be an update of the initial plan in Annex I for use and dissemination of foreground and be consistent with the report on societal implications on the use and dissemination of foreground (section 4.3 – H).

The plan should consist of:

- Section A

  This section should describe the dissemination measures, including any scientific publications relating to foreground. **Its content will be made available in the public domain** thus demonstrating the added-value and positive impact of the project on the European Union.

- Section B

  This section should specify the exploitable foreground and provide the plans for exploitation. All these data can be public or confidential; the report must clearly mark non-publishable (confidential) parts that will be treated as such by the Commission. Information under Section B that is not marked as confidential **will be made available in the public domain** thus demonstrating the added-value and positive impact of the project on the European Union.

Section A (public)

This section includes two templates

- Template A1: List of all scientific (peer reviewed) publications relating to the foreground of the project.
- Template A2: List of all dissemination activities (publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

These tables are cumulative, which means that they should always show all publications and activities from the beginning until after the end of the project. Updates are possible at any time.

TEMPLATE A1: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES										
NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers[3] (if available)	Is/Will open access[4] provided to this publication?

[3] A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

[4] Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

	e-Maritime for Automating Shipping Legacy Practices	Morrall. A BMT	Transportation Research Procedia	Volume 14, 2016	Elsevier B.V.	www.sciencedirect.com/science/journal/23521465/14	2016	pp. 143 - 152		Yes
	The future of maritime transport in Europe Multimodal Corridors - MESA Project	Humberto Moyano & al. Corporacion Maritima & Almazan Ingenieros	ROP – REVISTA DE OBRAS PÚBLICAS – Spanish Public Works Magazine	May-2016	Colegio de Ingenieros de Caminos, Canales y Puertos	http://ropdigital.ciccp.es/	2016	Madrid - Spain		Yes

TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[5]	Main leader	Title	Date/Period	Place	Type of audience[6]	Size of audience	Countries Addressed
	Article	CMT	Aufruf: Forschungsprojekt MESA sucht externe Experten zur Erarbeitung zukünftiger maritimer Forschungsschwerpunkte	11/2013	VSM Newsletter	Industry; Scientific community (higher education, Research); policy makers		Germany
	Meeting	WEGEMT	WEGEMT Annual meeting 2013	11/2013	Santiago de Compostela (ES)	Academic community - University representatives.	19	European
	Communication by post and email	WEGEMT	WEGEMT Annual communication 2013	11/2013	Several EU destinations	Academic community - University representatives.	40	European
	Oral presentation to a	CMT	VSM	13/03/2014	Hamburg	Industry; Scientific	11	Germany

[5] A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

[6] A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias, Other ('multiple choices' is possible).

	scientific event		Arbeitskreis Fertigung		(DE)	community (higher education, Research); policy makers		
	Workshops	CMT	Lightweight structures (Joint E-Lass – MESA Organisation of Workshops)	26/03/2014	Papenburg (DE)	Industry; Scientific community (higher education, Research); policy makers	50	Europe
	Workshops	CMT	Coatings (Joint MESA Organisation of Workshops)	26/03/2014	Papenburg (DE)	Industry; Scientific community (higher education, Research); policy makers	17	Europe
	Conference	CMT	E-LASS Meeting	27/03/2014	Papenburg (DE)	Industry; Scientific community (higher education, Research); policy makers	20	Europe
	Article	CMT	EU-Projekte ThroughLife und MESA laden zu einem gemeinsamen Workshop ein	03/2014	Schiff & Hafen	Industry; Scientific community (higher education, Research); policy makers		Germany
	Workshops	CMT	TTG 3 Organisation of Workshops IST	27/05/2014	Hamburg (DE)	Scientific community (higher education, Research)	n/d	Europe
	Article	CMT	Workshop der EU-Projekte ThroughLife und MESA	06/2014	Schiff & Hafen	Industry; Scientific community (higher education, Research); policy makers		Germany
	Workshops	CMT	Innovative	02/10/2014	Hamburg	Industry; Scientific	18	Europe

			applications of glass structures in the maritime industry (joint Workshop MESA-ADAM4EVE)		(DE)	community (higher education, Research)		
	Oral presentation to a scientific event	CMT	VSM Arbeitskreis Fertigung	30/10/2014	Hamburg (DE)	Industry	11	Germany
	Meeting	WEGEMT	WEGEMT Annual meeting 2014	10/2014	Las Palmas de Gran Canaria (ES)	Academic community - University representatives.	11	European
	Communication by post and email	WEGEMT	WEGEMT Annual communication 2014	11/2014	Several EU destination s	Academic community - University representatives.	40	European
	Workshops	CMT	German Welding Society (DVS) meeting 'Welding in ship building and marine technology' (joint Workshop)	06/11/2014	Hamburg (DE)	Industry; Scientific community (higher education, Research)	23	Europe
	Workshops	CMT	Friction Stir Welding Workshop (joint Workshop MESA-HILDA)	20/11/2014	Geesthacht (DE)	Industry; Scientific community (higher education, Research)	38	Europe
	Workshops	CMT	IFAM Bonding with Damen	12/12/2014	Bremen (DE)	Industry; Scientific community (higher education,	5	Europe

						Research)		
	Article	CMT	Innovative Glasstrukturen in der maritimen Industrie	12/2014	Schiff & Hafen	Industry; Scientific community (higher education, Research); policy makers		Germany
	Workshops	CMT	Adhesive bonding Workshop (Workshop jointly organized by MESA and the maritime section of the German National Funding AiF	21/01/2015	Hamburg (DE)	Industry; Scientific community (higher education, Research)	11	Europe
	Workshops	CMT	Additive Manufacturing Seminar IWS	25/02/2015	Dresden (DE)	Industry; Scientific community (higher education, Research)	160	International
	Conference	CMT	Vessels for the Future - Topic Group Day	29/04/2015	Brussels (BE)	Industry; Scientific community (higher education, Research)	n/d	European
	Meeting	CESA	Waterborne Support & Mirror Group	19/05/2015	Brussels	Associations, industry, Member States	20	European
	Conference:	Corporacion Maritima	SEA Encounters: Spain and the Sea - SPANISH MARITIME CLUSTER	11/05/2016	Naval Engineering School, Madrid Polytechnic University	Maritime Industry, Port Authorities Bank and Insurance	50 people	Spanish

	Conference	CMT	EFFRA General Assembly	22/05/2015	Brussels (BE)	Industry; Scientific community (higher education, Research)	157	European
	Workshops	CMT	Innovative Design Solutions (Joint Workshops ADAM4EVE – MESA)	04/06/2015	Espoo (FI)	Industry; Scientific community (higher education, Research)	22	European
	Conference:	Corporacion Maritima	EUROMODAL-2015 Corridors and European Transport Networks The maritime dimension – MESA Project	16-18 June 2015	Universidad de Alcalá – Madrid - Spain	Professional Transport & Logistic operators Public sector	300 people/day average	International
	Conference	CESA	3rd Maritime Research Policy Conference	16/06/2015	Brussels	Industry, policy makers, EC, Member States	80	European
	Workshop	BMT	Potential for greater interoperability in e-Maritime and e-Navigation	17/06/2015	Brussels	Scientific community, industry, policy makers	28	European
	Newsletter	CESA	Waterborne TP Newsletter	06/2015		Scientific community, industry, policy makers		European
	Conference	CMT	PROSPER Final Meeting	15/07/2015	Hamburg (DE)	Scientific community (higher education, Research)	8	European

	Oral presentation to a scientific event	CMT	VSM Arbeitskreis Fertigung	17/09/2015	Hamburg (DE)	Industry	11	European
	Conference	CMT	16th Additive Manufacturing Stakeholders Meeting	23/09/2015	Brussels (BE)	Industry	n/d	European
	Article	CMT	Workshop zu adaptiven Schiffsstrukture n	09/2015	Schiff & Hafen	Industry; Scientific community (higher education, Research); policy makers		Germany
	Presentation	CEREMA	ETNA+	19/10/2015	London	NCPs	20	European
	Newsletter	CESA	Waterborne TP Newsletter	10/2015		Scientific community, industry, policy makers		European
	Meeting	WEGEMT	WEGEMT Annual meeting 2015	11/2015	Rotterdam (NL)	Academic community - University representatives.	10	European
	Communication by post and email	WEGEMT	WEGEMT Annual communication 2015	11/2015	Several EU destination s	Academic community - University representatives.	40	European
	Oral presentation to a scientific event	CMT	VSM Arbeitskreis Fertigung	10/12/2015	Hamburg (DE)	Industry	11	Germany
	Workshop	BMT	The Connected Port	27/01/2015	Valencia	Scientific community, industry, policy makers	30	European
	Conference	CMT	Intern. Laser Symposium and Symposium	23/02/2016	Dresden (DE)	Industry; Scientific community (higher education,	400	European

			"Tailored Joining"			Research)		
	Oral presentation to a scientific event	CMT	VSM Arbeitskreis Fertigung	31/03/2016	Bremen (DE)	Industry	11	Germany
	Oral presentation to a wider public	CMT	Transport Research Arena 2016	18/04/2016	Narodowy, Warsaw (PL)	Industry; Scientific community (higher education, Research); Civil Society; policy makers	3,000	International
	Brochure	CESA	Maritime RDI Success Cases	04/2016		Scientific community, industry, policy makers		European
	Conference Poster at TRA2016	BMT	e-Maritime for Automating Shipping Legacy Practices	18/04/2016	Warsaw	Scientific community, industry, policy makers	1500-2000	European
	Article	CESA	MESA	05/2016	Parliament Magazine	EU Institutions, etc	?	European
	Meeting	WEGEMT	WEGEMT Executive Committee meeting 2016	05/2016	London (UK)	Academic community - University representatives.	10	European
	Workshops	CMT	Shipbuilding of the Future (Joint MESA - EFFRA Workshop)	20/06/2016	Papenburg (DE)	Scientific community (higher education, Research); policy makers	79	International
	Conference	CESA	4th Maritime Research Policy Conference	28/06/2016	Brussels	EC members	120	European
	Workshop	BMT	The Connected Ship and	29/06/2016	Brussels	Scientific community,	35	European

			Shipping			industry, policy makers		
	Newsletter	CESA	Waterborne Newsletter	06/2016		Scientific community, industry, policy makers		European
	Meeting	Mario Dogliani (D'Appolonia Expert)	Strategic research Agenda for Maritime safety	19-1/07/2016	Brussels	EC and Technology Platform representatives	11	Transport Technologies Platforms (ALICE, ERTRAC, ERRAC, WATERBORNE) and EC Transport Commissioner
	Newsletter	CESA	Waterborne Newsletter	08/2016		Scientific community, industry, policy makers		European
	Brochure	CESA	Global Trends Driving Maritime Innovation	08/2016		Scientific community, industry, policy makers		European
	Brochure	CESA	Waterborne Vision 2030 & Innovation Opportunities	08/2016		Scientific community, industry, policy makers		European

Section B (Confidential[7] or public: confidential information to be marked clearly)
Part B1

The applications for patents, trademarks, registered designs, etc. shall be listed according to the template B1 provided hereafter.

The list should, specify at least one unique identifier e.g. European Patent application reference. For patent applications, only if applicable, contributions to standards should be specified. This table is cumulative, which means that it should always show all applications from the beginning until after the end of the project.

TEMPLATE B1: LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS, ETC.					
Type of IP Rights[8]:	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant (s) (as on the application)

[7] Note to be confused with the "EU CONFIDENTIAL" classification for some security research projects.

[8] A drop down list allows choosing the type of IP rights: Patents, Trademarks, Registered designs, Utility models, Others.

Part B2

Please complete the table hereafter:

Type of Exploitable Foreground[9]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[10]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
	Ex: New supercond uctive Nb-Ti alloy			*MRI equipment*	*1. Medical* *2. Industrial inspection*	*2008* *2010*	*A materials patent is planned for 2006*	*Beneficiary X (owner)* *Beneficiary Y, Beneficiary Z, Poss. licensing to equipment manuf. ABC*

In addition to the table, please provide a text to explain the exploitable foreground, in particular:

- Its purpose
- How the foreground might be exploited, when and by whom
- IPR exploitable measures taken or intended
- Further research necessary, if any
- Potential/expected impact (quantify where possible)

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[19] A drop down list allows choosing the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.

[10] A drop down list allows choosing the type sector (NACE nomenclature) : http://ec.europa.eu/competition/mergers/cases/index/nace_all.html

4.2 Report on societal implications

Replies to the following questions will assist the Commission to obtain statistics and indicators on societal and socio-economic issues addressed by projects. The questions are arranged in a number of key themes. As well as producing certain statistics, the replies will also help identify those projects that have shown a real engagement with wider societal issues, and thereby identify interesting approaches to these issues and best practices. The replies for individual projects will not be made public.

A General Information *(completed automatically when **Grant Agreement number** is entered.*

Grant Agreement Number:	604857
Title of Project:	MESA – Maritime Europe Strategy Action
Name and Title of Coordinator:	Mr Cliff Funnell

B Ethics

1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'*	No
2. Please indicate whether your project involved any of the following issues (tick box) :	No
RESEARCH ON HUMANS	
• Did the project involve children?	
• Did the project involve patients?	
• Did the project involve persons not able to give consent?	
• Did the project involve adult healthy volunteers?	
• Did the project involve Human genetic material?	
• Did the project involve Human biological samples?	
• Did the project involve Human data collection?	
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	
• Did the project involve Human Foetal Tissue / Cells?	
• Did the project involve Human Embryonic Stem Cells (hESCs)?	
• Did the project on human Embryonic Stem Cells involve cells in culture?	
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	
PRIVACY	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	
• Did the project involve tracking the location or observation of people?	
RESEARCH ON ANIMALS	
• Did the project involve research on animals?	
• Were those animals transgenic small laboratory animals?	
• Were those animals transgenic farm animals?	
• Were those animals cloned farm animals?	

• Were those animals non-human primates?	
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	
• Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	
DUAL USE	
• Research having direct military use	0 Yes 0 No
• Research having the potential for terrorist abuse	

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator		**4**
Work package leaders		**6**
Experienced researchers (i.e. PhD holders)	**7**	**41**
PhD Students	**1**	**1**
Other	**16**	**20**

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	**0**
Of which, indicate the number of men:	

D Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project?	○ X	No

6. Which of the following actions did you carry out and how effective were they?

		Not at all effective				**Very effective**
❑	Design and implement an equal opportunity policy	○	○	○	○	○
❑	Set targets to achieve a gender balance in the workforce	○	○	○	○	○
❑	Organise conferences and workshops on gender	○	○	○	○	○
❑	Actions to improve work-life balance	○	○	○	○	○
○	Other:					

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○X No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

○ No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

○ No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

○ Main discipline[11]:

○	Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)	○	Associated discipline[11]:

G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? *(if 'No', go to Question 14)*	○	Yes

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

[11] Insert number from list below (Frascati Manual).

○ No

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	○	No

12. Did you engage with government / public bodies or policy makers (including international organisations)

- ○ Yes- in framing the research agenda
- ○ Yes - in implementing the research agenda
- ○ Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

- ○ Research & Innovation
- ○ Energy; Environment; Fisheries & Maritime Affairs; Information Society;
- ○

13b If Yes, in which fields?

Agriculture Audiovisual and Media Budget Competition Consumers Culture Customs Development Economic and Monetary Affairs Education, Training, Youth Employment and Social Affairs		Energy Enlargement Enterprise Environment External Relations External Trade Fisheries and Maritime Affairs Food Safety Foreign and Security Policy Fraud Humanitarian aid		Human rights Information Society Institutional affairs Internal Market Justice, freedom and security Public Health Regional Policy Research and Innovation Space Taxation Transport	

13c If Yes, at which level? Yes Local / regional levels Yes National level Yes European level Yes International level	
H Use and dissemination	
14. How many Articles were published/accepted for publication in peer-reviewed journals?	**2**
To how many of these is open access[12] provided?	**2**
How many of these are published in open access journals?	
How many of these are published in open repositories?	
To how many of these is open access not provided?	**0**
Please check all applicable reasons for not providing open access:	
❑ publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑ other[13]: ……………	
15. How many new patent applications ('priority filings') have been made? *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).*	**0**

16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	**0**
	Registered design	**0**
	Other	
17. How many spin-off companies were created / are planned as a direct result of the project?		**0**
Indicate the approximate number of additional jobs in these companies:		

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

Y ❑	Increase in employment, or	Yes	In small & medium-sized enterprises
Y ❑	Safeguard employment, or	Yes	In large companies
❑	Decrease in employment,	❑	None of the above / not relevant to the project
❑	Difficult to estimate / not possible to quantify		

[12] Open Access is defined as free of charge access for anyone via Internet.
[13] For instance: classification for security project.

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:	*Indicate figure:*
Difficult to estimate / not possible to quantify	YES

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

○ ○ No

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ Y ○ No

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

Y	❑	Press Release	Y	Coverage in specialist press
	❑	Media briefing	❑	Coverage in general (non-specialist) press
	❑	TV coverage / report	❑	Coverage in national press
	❑	Radio coverage / report	Y	Coverage in international press
Y	❑	Brochures /posters / flyers	Y	Website for the general public / internet
	❑	DVD /Film /Multimedia	Y	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	Y	English
❑	Other language(s)		

Question F-10: Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

FIELDS OF SCIENCE AND TECHNOLOGY

1. NATURAL SCIENCES

1.1 Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 ENGINEERING AND TECHNOLOGY

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary, methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]

2. FINAL REPORT ON THE DISTRIBUTION OF THE EUROPEAN UNION FINANCIAL CONTRIBUTION

This report shall be submitted to the Commission within 30 days after receipt of the final payment of the European Union financial contribution.

Report on the distribution of the European Union financial contribution between beneficiaries

Name of beneficiary	Final amount of EU contribution per beneficiary in Euros
1. Community of European Shipyards' Associations	394,863.33 €
2. European Community Shipowners Association	3,768.39 €
3. DNV GL SE	75,493.85 €
4. Wegemt	58,972.50 €
5. European Council for Maritime Applied R&D Association	17,183.06 €
6. International Council of Marine Industry Associations	68,202.03 €
7. Hamburgische Schiffbau-Versuchsanstalt GmbH	155,293.90 €
8. Rolls-Royce Power Engineering PLC	23,743.75 €
9. Bureau Veritas	31,728.72 €
10. Brookes Bell LLP	22,906.14 €
11. D'Appolonia Spa	139,039.77 €
12. Fincantieri Spa	24,308.30 €
13. DCNS SA	17,538.99 €
14. Center of Maritime Technologies EV	194,618.79 €

15. Meyer Werft Papenburg GmbH & Co KG	13,873.79 €
16. Scheepswerf Damen Gorinchem BV	0.00 €
17. Flensburger Schiffbau-Gesellschaft mbH & Co KG	54,005.72 €
18. Rheinisch-Westfaelische Technische Hochschule Aachen	0.00 €
19. Safinah Limited	34,494.41 €
20. Stichting Netherlands Maritime Technology Foundation	28,669.51 €
21. BMT Group Ltd	203,915.68 €
22. Norsk Marinteknisk Forskningsinstitutt	35,443.15 €
23. Inlecom Systems Ltd	30,418.25 €
24. Danaos Shipping Company Ltd	30,709.00 €
25. Fundación de la Comunidad Valenciana para la Investigación, Promoción y Estudios Comerciales de Valenciaport	40,154.23 €
26. Centre d'Etudes et d'Expertise sur les Risques, l'Environnement, la Mobilité et l'Aménagement	41,001.37 €
27. Corporación Marítima Lobeto SL	25,658.92 €
28. University of Strathclyde	13,011.48 €
29. Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	30,710.54 €
30. Stichting Maritiem Research Instituut Nederland	43,837.19 €
Total	**1,853,564.76 €**