Taking maritime transport into the digital age

SAFETY - ENVIRONMENT - EFFICIENCY
Monalisa 2.0
– Enhanced Maturity in Information and Communication Technology (ICT)

ICT is deployed extensively on ships today. By permitting existing systems to share information, the number of information sources on the bridge may be reduced, thereby simplifying the overview. Solutions from the air transport industry will be adapted to the maritime industry and thus shorten the time required to set a worldwide standard and reduce the necessary investments.

Safety based on new technology
By giving the captain insight into the movement of vessels in the vicinity, the anti-collision aid is enhanced. Indoor positioning optimizes the mass evacuation of a vessel. Traffic congestion can be reduced by suggesting safer routes. The procedures for interoperability between safety management on land and at sea will be ameliorated.

Competence and training
Training programmes covering various aspects of maritime safety will be elaborated and tested. Risk assessment standards for ships, ports, and coastal area will be enhanced. The goal is to secure the qualifications of personnel involved in SAR and evacuations, and to further improve the quality of port contingency plans.

Increased efficiency
– Streamlining of administrative procedures
By sharing information, all parties in the maritime transport chain can improve their operations. Ports will have up-to-date data on all ships and can plan accordingly. The captain will get information regarding port availability and can thus optimize his route.

Improved competitiveness
Voyage plans optimized by port conditions, shortest routes, hydrodynamic values and weather information will reduce costs for ship and cargo owners. Cargo will move more speedily through the maritime logistics chain.

Improved environmental performance
Ships will save fuel and costs by taking shorter routes and adapting speed to match the availability of port services. Providing day-to-day environmental data will assist ships bypassing sensitive areas. Further reduce accidents by developing enhanced anti-collision aid.
The maritime sector is a key link in the global transport chain. Approximately 90% of all world trade is conducted using sea freight. Some 51,000 merchant vessels of more than 500 gross tonnage (GT) are involved in carrying this cargo. In addition to these cargo carriers, there are some 27,000 other vessels of similar size, though they lack cargo carrying capacity. These include large fishing vessels, cruise and research vessels, as well as some 9,000 military vessels exceeding 500 GT.

Within the waters of the European Union – one of the world’s major consumer markets – there are approximately 17,000 vessels transiting per day. Also, on a yearly basis, there are some 29,000 calls to ports within the European Union. These calls alone generate some 580,000 individual vessel movements within the territorial waters of EU member states.

Accident reports have shown that approximately 500-600 maritime accidents occur within EU yearly. The results of these accidents include potential loss of life and the immediate environmental effects of maritime accidents, loss of cargo and loss of or damage to vessels. Moreover, the effects can present severe long-term problems for marine flora and fauna.

Moving a ship from A to B is not an exclusive navigational process, and has never been so. It also involves other processes, such as practical and economic cargo handling as well as cargo control, including customs, legal requirements and security. Yet these various processes are expensive and time-consuming for the shipping industry and the future will demand integration of these processes.

There are on-going developments of concepts on a national, regional, international, federative and cross-sector basis such as e-Navigation, e-Customs, and e-Security. These developments all contribute to improving the processes in their sectors. However, lacking a holistic approach they miss the overarching potential improvement required to make the shipping industry a safer, more environmentally friendly and more efficient cargo-carrying link.

New and sophisticated innovations and services in ports have proved effectfull, yet despite these innovations and services some port situations are still considered problematic such as mass evacuation, fire-fighting and accident management. In these situations, cooperation among actors involved is both crucial and essential. This requires prevention, preparedness and response plans to be managed from a risk assessment viewpoint, parallel with monitoring and surveillance aspects.

In the case of Search and Rescue, monitoring and management of actions, these operations must be evaluated in order to achieve higher efficiency. To maintain levels of efficiency, there is a need to make decisions concerning strategic locations
of SAR assets as well as human and technical resources. There is a need for solutions promoting interconnected and interoperable vessel traffic management and information services designed to establish a smart and efficient response in dealing with major passenger-ship accidents.

The future will see innovative designs, technologies and working practices for safer ship operations, enhance the evacuation and rescue of people. This will also reduce the environmental risks and potential loss of life, thus promoting more environmentally friendly operations.

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Scope of Monalisa 2.0

MONALISA 2.0 encompasses four activities, all of which contribute to improving the safety, environmental performance and efficiency of maritime transport.

In MONALISA 2.0, the demonstrated results from the previous project will take a major step towards deployment through joint actions by:

• testing concrete applications and services that would allow swift commercial deployment,

• joint private-public action to elaborate better standards for route exchange through a common interface and common data format, thereby allowing equipment from all manufacturers to be used for the concept,

• demonstrating concrete services with the use of new technology to enhance maritime safety,

• making Search and Rescue and mass evacuation more efficient than is currently the case and by addressing port safety, and

• transferring the results of previous EU investments in air traffic management to the maritime domain.
Main objectives of Monalisa 2.0

Strengthen efficiency, capacity, flexibility, predictability, security, safety and environmental performance of maritime transport, while simultaneously reducing the administrative burden of the maritime sector

The more immediate objectives of Monalisa 2.0 are to:

- further demonstrate the navigational aspect of Sea Traffic Management, from a conceptual and technological point of view,
- support the navigational aspect of Sea Traffic Management using Standard Operating Procedures (SOPs) and a standard technical protocol,
- provide solid decision support tools for further development and deployment of Sea Traffic Management, including the completion of a Formal Safety Assessment,
- demonstrate concrete ICT solutions and how these can contribute to more efficient bridge resource management,
- develop Search and Rescue management and co-operation as well as the position of crew and passengers in the mass evacuation of a vessel, and
- secure the operational safety chain in coastal waters and ports.
Sea Traffic Management

- Definition phase study

Sea Traffic Management (STM) and information management are major challenges for the maritime industry. Within MONALISA 2.0, a definition phase study will be carried out, very much inspired by the SESAR program used in the aviation sector, and a Master Plan for further development and deployment of STM will be elaborated.

Sea Traffic Management is the dynamic, integrated management of sea traffic and maritime space (including sea traffic services, management of the maritime space and sea traffic flow management) through the provision of facilities and seamless services in collaboration with all parties and involving seaborne and shore-based functions. The aim of STM is safe, environmentally friendly and efficient shipping.

STM involves the aggregation of seaborne and shore-based functions (sea traffic services, maritime space management and sea traffic flow management) required for ensuring the safe and efficient movement of vessels during all operational phases.

The approach is to use experience from the Air Traffic Management (ATM) and the SESAR programme. Learning from ATM principles and experiences, structures, processes, methods and concepts will be adopted and scaled to the maritime sector.

The work will involve domain experts, such as partners, stakeholders and key players. A cost-benefit analysis will explore and motivate societal outcomes, operational performance and performance of technical enablers. Experiences from previous projects will be taken into account and cooperation with other relevant EU programmes like CISE and MIELE (Information technology related projects Co-financed by EU commission) will be initiated.

Use an architecting and modelling approach the expected outcomes will define and progress STM in a structured manner. This will be based on an analysis of the current situation, a target concept description and a performance framework. The end result will have the format of strategic road map and a work programme for the deployment of the STM concept.

The Swedish Maritime Administration coordinates the Definition Phase with technical assistance by Air Navigation Services of Sweden.
Further development and verification of operational and technical aspects supporting the STM concept, such as route exchange between ships and shore centres and time slot allocation in congested waters, are important steps towards future deployment.

The concept will take a considerable leap forward, as many of the major manufacturers of navigational equipment have joined forces in MONALISA 2.0 in order to develop a format and architecture allowing route/voyage plans to be seamlessly exchanged irrespective of the equipment brand. In this work, a major share of the key manufacturers of navigational equipment will participate in the technical advisory group.

Standard Operating Procedures, a work initiated in the previous project, will be further developed in order to foster safe and efficient deployment. There are several Decision Support Tools available for route exchange and route optimization. In an effort to enhance concept efficiency, a number of Decision Support Tools will be integrated into the system, such as a dynamic Maritime Spatial Planning tool.

Testing and verification will be achieved through engaging several European maritime simulator centres. Together these centres will form a European Maritime Simulator Network (EMSN), being interconnected in macro simulations using a large number of simulated ships. A Sea Traffic Coordination Centre (STCC) will be established and simulations of entire sea traffic environments in selected test areas will form the basis for studying the effects on safety, environment and efficiency.

Through the macro simulation in the EMSN needs for further development will be identified before the STM concept becomes operational. An important tool in this testing and verification process is the Formal Safety Assessment.

The Swedish Maritime Administration coordinates Sea Traffic Management, Operation and Tools.
Safer ships

- Improving safety on board large passenger vessels

Availability of information in Search and Rescue operations is crucial. MONALISA 2.0 will develop tools for the sharing of information among all participants in the event of SAR operations and will test a system for indoor positioning of crew and passengers, allowing for more efficient rescue operations.

As a result of current and future availability of broadband satellite communication, ICT is a mature technological enabler for enhanced operational safety when data sharing is essential. Developing a pilot application using a new system of chart engines and displays integrated with MONALISA 2.0 information and search patterns can be shared among all participants, including shore units, in the event of SAR operations.

Methods and tools used in other industrial sectors to promote safe behaviour among the workforce at all levels provide best practice examples that are ready to be transferred and adapted to the maritime environment. In particular the adaption of the concept of Behaviour Based Safety is an approach which will be further developed for the maritime industry.

Existing ITS (Intelligent Transport System) solutions, currently used for container tracking, can be tailored to human tracking in an emergency or for rescue purposes. This would make crucial and up-to-date positioning information of crew and passengers available in an emergency situation. With this information at hand, rescue coordination would will be safer, more accurate and more efficient.

The NETWORKED VESSEL, an indoor positioning and guidance system will be developed, tested and demonstrated as a pilot application. Parallel to this a Safe Evacuation System will be developed. This will be evaluated and demonstrated focusing on the effectiveness of a system to perform evacuation operations on board passenger ships and should be operational in extreme conditions.

The final evaluation of the developed support systems will be appraised in a Cost Benefit Analysis.

The Italian Ministry of Transport coordinates Safer Ships, with the technical assistance of RINA.
Safety in ports is a key factor for integral safety management, which does not only cover the landside but also the sea dimension of the port area. MONALISA 2.0 will contribute to improved management, coordination and interoperability between safety management on land and at sea.

Focusing on different aspects of operational safety in ports and in coastal waters, the purpose is to contribute to updating the qualifications of personnel involved in SAR, evacuation and port contingency plans. In this, the definition of specific and dedicated training exercises and information systems employed to support SAR, evacuation, first aid and ship recovery is crucial.

MONALISA 2.0 will contribute to improving interoperability among SAR services, passenger ships, VTMIS and Mission Control Centres.

Technological innovations include the remote recovery of life boats, information exchange between land, SAR instruments, ships and other information sources.

The objective is to provide an instrument for risk analysis to support tactical decisions by means of intelligent tools and decision-making systems at the field level. Focus for such an instrument is the analysis of reactions and the chain of responsibility during SAR operations. The development of such a Safety Information System will encompass tests and demonstrations and MONALISA 2.0 will also develop training programmes for different aspects of maritime safety which will be elaborated and tested.


Operational safety
- New technology supporting safety in port and coastal areas

By using modern technology and tailored training programmes, MONALISA 2.0 can provide tools for identifying and reducing risks, prevent risk situations and optimize actions when accidents occur.

Sea Traffic Management Vision 2020

The MONALISA tool "Sea Traffic Management" and the impact of the holistic view, will finally integrate the maritime sector into the digital age of tomorrow.

With STM we will build the future framework, digitalizing the flow of information and securing the seagoing link in the transportchain.

The benefits will be;
Enhanced safety, a better environment and improved efficiency.
39 partners from 10 countries

PUBLIC SECTOR
- Air Navigation Services of Sweden
- Danish Maritime Authority
- Danish Meteorological Institute
- D’Appolonia
- Italian Ministry of Transport
- Norwegian Coastal Administration
- Port of Livorno
- RINA
- SASEMAR
- Swedish Maritime Administration
- Swedish Meteorological and Hydrological Institute
- Valencia Port Authority
- Valencia Port Foundation

ACADEMIA
- Chalmers University of Technology
- National Technical University of Athens
- Novia University of Applied Sciences
- Technical University of Madrid
- University of Catalonia
- University of Genua
- VEMARS
- World Maritime University

INDUSTRIAL PARTNERS
- Carmenta
- Carnival Corporation
- CIMNE
- Corporacion Maritima
- DLR
- ERGOPROJECT
- Ferri
- Fraunhofer
- GateHouse
- IB
- Jeppesen
- MARSEC–XL
- MARTEC
- Navicon
- Rheinmetall
- SSPA
- TRANSAS
- Viktoria Swedish ICT

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