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DEVELOPMENT OF AN E-NAVIGATION STRATEGY IMPLEMENTATION PLAN

Results and recommendations from the MONALISA and MONALISA 2.0 projects

Submitted by Italy and Sweden

SUMMARY

Executive summary:	The MONALISA projects aim at making a concrete contribution to efficient, safe and environmentally friendly maritime transport. Through the introduction of Sea Traffic Management, it has been shown that the potentials for cost reduction, reduction of environmental effects and raised safety levels are enormous. The current project, MONALISA 2.0, will further enhance the use of ICT and ITS within various aspects of shipping, focusing on intermodality of logistics, SAR operations and port and coastal safety operations.
Strategic direction:	5.2
High-level action:	5.2.6
Planned output:	5.2.6.1
Action to be taken:	Paragraph 27
Related documents:	NAV 59/20, NAV 59/INF.8, NAV 59/6, NAV 59/6/6, NAV 59/WP.8; STW 44/19; COMSAR 17/17; MSC 92/26 and MEPC 65/22

Introduction

1 The MONALISA project, 2010-2013, showed how supplying vessels with the capability of seeing each other's planned routes, gives the navigator a more complete picture of how surrounding vessels are planning their onward voyage. Also, shore-side services are able to retrieve valuable information as well as supply vessels with advice on their routes. Such advice could be in the form of recommendations to avoid congestion in areas with high traffic, advice on environmentally sensitive areas and Maritime Safety Information (MSI). In all, the concepts introduced form the basis for Sea Traffic Management (STM).

2 Further, the MONALISA project showed that route optimization, according to the STM concept, on a full scale in sea transport would result in increased environmental sustainability as well as reduced costs and increased safety. A cost-benefit analysis carried out by the University of Linkoping, Sweden, indicates that an average reduction of 1% sailed distance per ship, saves approximately €100 million on a yearly basis for traffic sailing in the Baltic Sea Region, half of which was due to reduced fuel and other costs for the shipowners. Baltic Sea traffic makes up approximately 10% of the total European sea traffic, giving an indication of the potential savings in European waters alone. As a further indication of the potential savings, a voyage optimization tool developed within the project and evaluated on transit traffic in the Baltic Sea, has shown that bunker consumption can be reduced by up to 12% for the average vessel.

3 In the MONALISA 2.0 project, 2013-2015, the demonstrated results from the previous project will take a major step forward through further development of the STM concept. Joint actions and testing of concrete applications and services will allow swift commercial deployment. A joint private-public action has already developed a standard for route exchange through a common interface and data format, allowing equipment from all manufacturers to be used for the concept.

4 The project further aims at demonstrating concrete services using new technology to enhance maritime safety, making search and rescue as well as mass evacuation more efficient by addressing operational safety in ports and coastal areas. Innovations and services in ports have proved effective, yet some emergency response actions such as mass evacuation, firefighting and accident management are still considered problematic. Cooperation among actors involved is both crucial and essential, requiring prevention, preparedness and response plans to be managed from a risk assessment viewpoint, parallel with monitoring and surveillance aspects.

5 In the case of search and rescue, in order to improve efficiency, there is a need to make decisions concerning strategic locations of SAR assets as well as human and technical resources. By introduction of new innovations, monitoring, coordination and management of actions will be evaluated in real-time. Solutions promoting interconnected and interoperable vessel traffic management and information services, designed to establish smart and efficient responses dealing with major passenger-ship accidents, will be developed. Also, training will be developed in order to make full use of new innovations and methodologies.

6 MONALISA 2.0 aims at increased sustainability of sea transport by integration of Information and Communication Technologies (ICT) and Intelligent Transportation Systems (ITS), making a concrete contribution to efficient, safe and environmentally friendly maritime transport. The work in MONALISA 2.0 is well aligned with the work carried out within the frameworks of IMO and IALA, and several of the identified tasks of the proposed SIP for e-navigation are currently being worked on by the project.

Development of Sea Traffic Management

7 STM is a concept encompassing all actors, actions, and systems (infrastructure) assisting maritime transport from port to port. STM is a part of the multimodal logistics chain, encompassing sea as well as shore-based operations. STM is a network-based approach for optimal Intermodal Sea Transport. STM is performed on multiple actor levels, where each engaged actor co-produces traffic management. These actors contribute to the integrated performance of the realization of the performance targets of intermodal Sea Transport as the shared common object of interest of the ecosystem constituting Sea Transport. STM puts an emphasis on interoperable and harmonized systems allowing a ship to operate in a safe and

efficient manner from port to port with a minimal impact on the environment. STM secures sea traffic flow and capacity optimization.

8 During the span of the project, MONALISA 2.0 will investigate benefits of STM in more detail. An example of such an area of focus is fuel savings due to just-in-time-arrivals in port. The aim is that shipowners should be able to save fuel and costs by using optimized routes and a speed adapted to match the availability of port services.

9 MONALISA 2.0 also encompasses the development of several decision support tools for route exchange and route optimization as well as tools aiming at further reducing accidents through an enhanced anti-collision aid. 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, providing up-to-date environmental data assisting navigators avoid environmentally sensitive areas.

10 As described above, sharing of information is a key feature for the success of the concept of STM. Sharing of information will be enabled through a service oriented architecture based on the Maritime Cloud concept facilitating System Wide Information Management (SWIM). Unique voyage numbers, similar to the concept of flight numbers in aviation, will be used as information carrier identification.

11 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. Using a controlled environment, these simulations will allow for the identification of needs for further development. An important tool in this testing and verification process is the Formal Safety Assessment (FSA) as well as the guidelines introduced as part of the proposed SIP.

Improving safety on board large passenger vessels by Information and communications technology

12 As a result of current and future availability of broadband 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, search patterns can be shared among all participants, including shore units, in the event of SAR operations.

13 Existing ICT and ITS solutions, used in other industrial fields and with some prototypal application in naval environments, can be tailored to human tracking for rescue purposes in an emergency. The concept of the networked vessel, an indoor positioning guidance system, will be developed, tested and demonstrated as a pilot application. The aim is to make crucial and real-time positioning information of crew and passengers available in an emergency situation, making rescue coordination safer, more accurate and more efficient.

14 Parallel to this, a safe evacuation system will be developed for evacuation operations (launch and recovery system for lifeboats) on board passenger ships. The system aims at being operational in extreme conditions (Sea state 8, heel up to 45º, trim up to 20º, and low temperature, around -20ºC). The final evaluation of the developed support systems will be appraised in a cost-benefit analysis.

15 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.

New technology supporting safety in ports and coastal areas

16 Operational safety is a key factor for integral safety management, which not only covers the port landside, but also the sea dimension of the port area and the coast. MONALISA 2.0 will contribute to improve management, coordination and interoperability between safety management on land and at sea.

17 Focusing on different aspects of operational safety in ports and in coastal waters, the purpose is to improve efficiency in SAR and crisis management, as well as updating the qualifications of personnel involved in SAR, evacuation and port contingency plans. With regard to this, the definition of specific and dedicated training exercises and the deployment of ITS to support SAR, evacuation, first aid and ship recovery is crucial. This training will be elaborated and tested with the aim of improving the level of performance.

18 MONALISA 2.0 will contribute to improving interoperability among SAR services, passenger ships, VTMIS and Mission Control Centres. Technological innovations include onboard life rafts recovery systems (OLRS), and the information exchange between land, SAR instruments, ships and other information sources.

19 A further objective is to provide an instrument for risk analysis to support tactical decisions by means of intelligent tools and decision-making systems. Focus for such an instrument is the analysis of reactions and the chain of responsibility during SAR operations. The introduction of a novel safety information system and the improvement of existing, making systems interoperable will encompass tests and demonstrations.

Benefits from the MONALISA 2.0 project

20 The cost-benefit analysis demonstrates considerable savings in sailed distance per ship and money on a yearly basis for traffic sailing in the Baltic Sea region. These results can be transferred to other regions and seas. This shows that there is a potential for enormous savings both for shipowners and society with the introduction of the STM concept.

21 The MONALISA 2.0 project has so far developed a new route exchange format, with the objective to create a unified format to be used on any brand of system on board a vessel, by different service providers and stakeholders ashore. The format contains data fields for vessels and voyage characteristics, route geometry and schedule. The work has been aligned with the ongoing revision of IEC 61174, ed. 4.0. Actual needs by the shipping industry have been identified and will be implemented in the final draft of the new IEC standard.

22 The establishment of a European Maritime Simulation Network, allowing large-scale testing with autonomous ships in a controlled environment, will create a foundation for further research and development as well as training cooperation between maritime academies. The network will in future be open for more participants.

23 From the results on the operational safety trials, SAR operation for massive evacuations as well as the interoperability between land and maritime safety will be optimized.

24 Through the introduction of ICT and ITS solutions, STM will be further advanced by the development of solutions enabling more efficient planning, booking, coordinating of sea traffic, cargoes and passengers.

25 The backbone of STM is the concept of system wide information management and based on a service-oriented architecture and the establishment of a maritime federation of information. An essential step in this direction is the introduction of unique voyage numbers, providing the ultimate keys for efficient intermodal logistics, in order to obtain real sharing of maritime related information.

26 It is crucial that these e-navigation solutions are developed and implemented in a common manner. Thus, testing of functions and concepts developed and demonstrated in the consecutive MONALISA projects will be performed in the environment of the global e-navigation testbed as established by the Republic of Korea, Denmark and Sweden and to which other partners are invited.

Action requested of the Sub-Committee

27 The Sub-Committee is invited to note the information in this document.