

A revolution

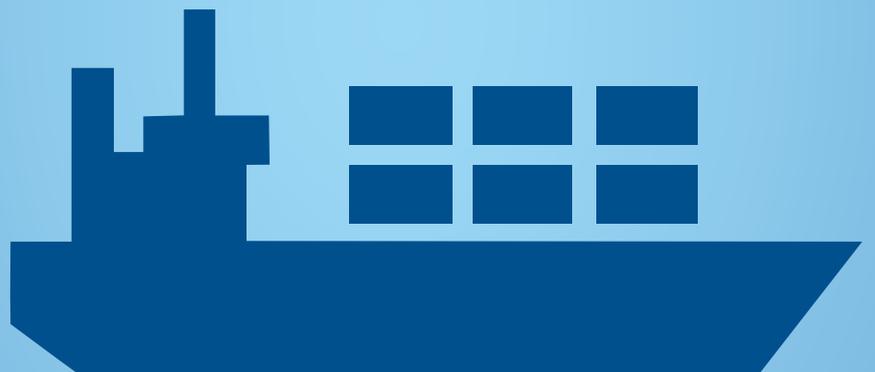
"We have seen the development of new services in many different industries, and the maritime sector can be revolutionised in ways that we cannot even imagine."

to come

The STM Validation Project involves 300 vessels. p.03

Port CDM will make port calls more efficient. p.04

STM will decrease collision risks at sea. p.08





INTRODUCTION STM

Sea Traffic Management on the agenda

The next step for a safer, more efficient and environmentally friendly maritime sector.

In the maritime world a distributed way of working is and will be the norm. All information is controlled by the information owner, however the lack of common standards and infrastructure makes information exchange a tedious task. The crew would understandably rather focus on safe navigation than on administrative reporting. The lack of coordinated information makes shipping and ports the black sheep of the logistic chain. In spite of this, maritime shipping is the preferred transport option for much goods due to the low cost.

Now more than ever, the maritime transport industry needs to revolutionise itself to over-

come the communication and information sharing challenges between industry stakeholders. This is the purpose of Sea Traffic Management (STM).

STM will provide the industry with standards and infrastructure enabling improved and new services. Ships will see the planned routes of nearby ships', giving navigators a more complete picture of how surrounding vessels may influence their onward voyage. Ships can easily use further value-added route advisory services to vessels, such as recommendations for avoiding congested areas or environmentally sensitive areas, as well as receiving maritime safety information.

Additionally, information exchange between vessel and port operators will improve planning and performance related to arrivals, departures and turnaround times. STM was conceived around 2009 and was chiseled out between 2013 and 2015, as part of the MONALISA 2.0 project, a consortium of 39 partners with a budget of Euro 24 million.

The consortium assessed the strengths and weaknesses of current maritime ship and transport systems, operations and interactions, and defined the STM concept and key performance indicators for four STM strategic enablers:

Port Collaborative Decision Making (Port CDM) services – increase the efficiency of port calls for all stakeholders through improved information sharing, situational awareness, optimised processes, and collaborative decision making during port calls.

Voyage Management services – support individual ships in both the planning process and during a voyage, including route planning, route exchange, and route optimisation services.

Flow Management services – support both onshore organisations and ships in optimising overall traffic flow through areas of dense traffic and areas with particular navigational challenges.

SeaSWIM (System Wide Information Management) – facilitate data sharing using a common information environment and structure (e.g. the Maritime Cloud). This ensures interoperability of STM and other services. ●

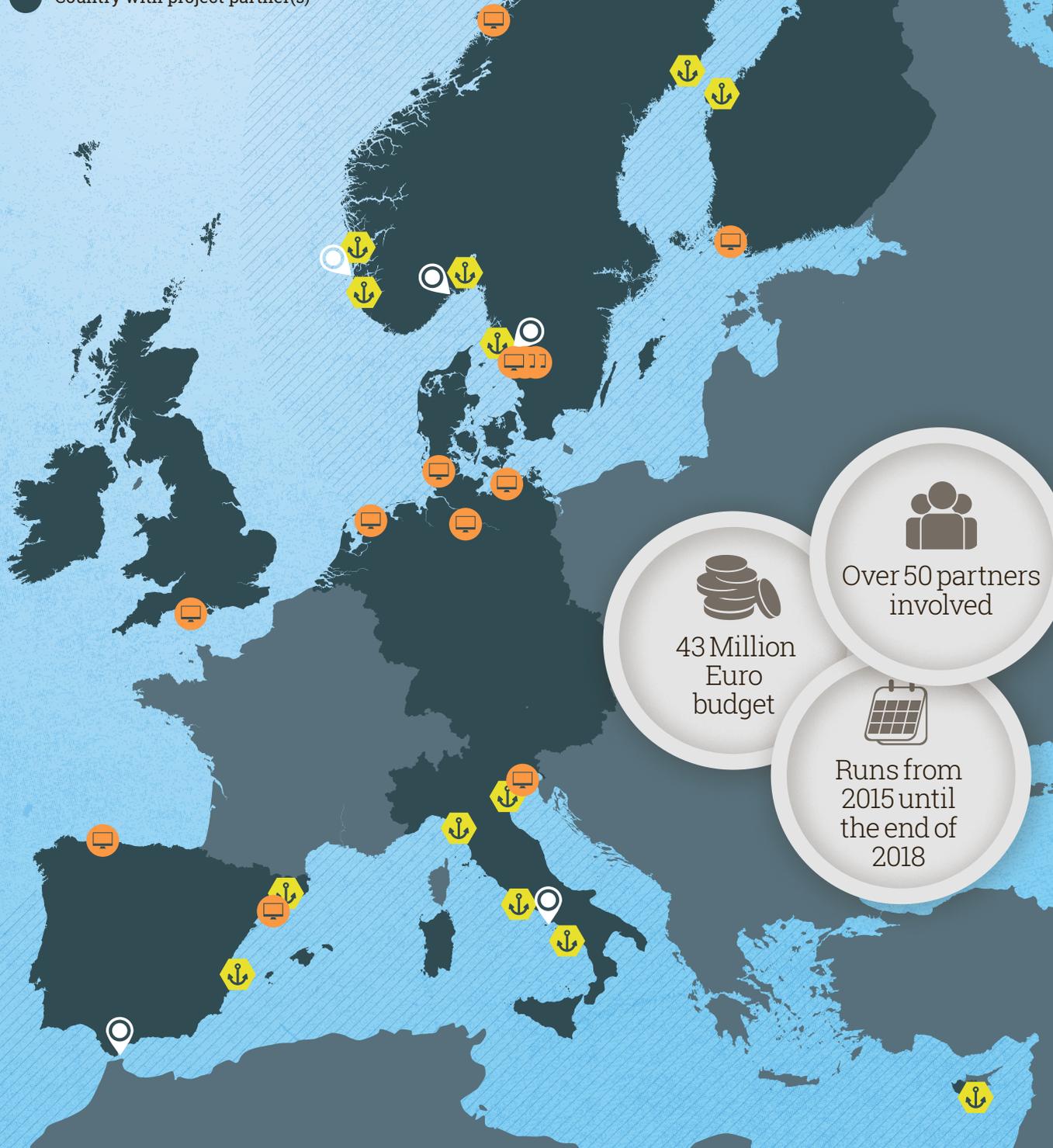
 Simulation centre

 Port CDM

 Shore centre

 Test bed for voyage and flow management

 Country with project partner(s)



Time to validate the STM concept

The STM Validation Project will demonstrate the STM concept in large-scale test beds in both the Nordic and Mediterranean regions. The test beds encompass some 300 vessels, 13 ports, five shore-based service centres, and the European Maritime Simulator Network. The key strategic enablers of STM will be tested and validated.



ACTIVITY 1:
Port Collaborative Decision Making

What is Port CDM?

 Mikael Lind and Sandra Haraldson from Victoria Swedish ICT are leading the PortCDM concept activities.



What is the activity scope?

Mikael: “We can summarise PortCDM as the

digitisation of time stamp information between port actors involved in the same port call. This needs global industry standard messages to work, and a version of these is currently being reviewed by the various industry partners involved.”

Sandra: “We are validating the expected impact of the information exchange on predictability, punctuality and resource utilisation. Thirteen ports will implement PortCDM for all types of port calls, initially starting with different types and then sharing the experiences, for example Stavanger - cruise ships, Gothenburg - bulk, Valencia - container. The solution will expand and cover integration with ships other ports and the hinterland”

What are the main benefits?

Mikael: “Information transparency leads to better informed decisions for all stakeholders. Ship owners can save fuel, port operators can use their capacity better, and goods owners will know when and where their goods are handled. We are introducing new possibilities in the ports and as with any change there is a threshold to overcome. Once they have started testing it though, they’ll all want to keep Port CDM.”

What is the progress to date?

Mikael: “We have demonstration plans for all thirteen ports and are running ‘living labs’* in the ports every fourth week. The technical infrastructure is progressing well and the standard is under review. The first tests will be held in Gothenburg in May.”

What do think is the most fun?

Sandra: “Meeting people and knowing that we bring them something truly new and helpful. Digitising the maritime industry and connecting all the parts in the maritime transport chain can make a huge difference.” ●

Port CDM in short:

Port Collaborative Decision Making (Port CDM) services will make port calls more efficient for all stakeholders through improved information sharing, situational awareness, optimised processes, and collaborative decision making during port calls. Port CDM will be validated by expanding the network of ports and Port CDM services in the Nordic and Mediterranean regions. The contextual differences between port approaches will be analysed, and will serve as a basis for refining the concept. The test beds will also be the first step towards involving commercial and public service developers/distributors in building Port CDM Services.

ACTIVITY 2:
Voyage Management

The biggest ever e-Navigation test-bed: 300 ships.

 The Swedish Maritime Administration and Björn Andreasson are leading the ship test bed work, encompassing five shore centres.



What new things will be tested?

“Messages between ship and shore using the new standardised Route Exchange

format will be used to test enhanced monitoring and detection of route deviations. This will also give shore side actors the possibility to check ships’ routes and improve route optimisation services. Currently, there is a bandwidth restriction for the direct exchange of routes between ships by AIS communication. This means we need to develop a message format that will be the base for a new international standard.”

What is the goal of this activity?

Björn explains. “We will validate and prove the concept defined in the MONA-LISA 2.0 project. And we’ll do this with real ships having real navigation systems doing real things, supported by multi-vendor STM functionalities. Some examples include communication with VTS centres, icebreakers, and SAR/MRCCs using STM in existing services. And we want to uncover any missing pieces in the concept. Reality is the best test bed for theories,” Björn adds smiling.

What are the benefits for the maritime industry & transport chain?

“We are helping the industry move from prototypes to off-the-shelf products by standardising information formats with involvement and support from the manufacturers. We believe that ship owners engaging in the test beds will gain greater understanding of STM and thereby be able to make informed decisions once the industry solutions come to market. This will give them a competitive advantage.” ●

Voyage Management in short:

Voyage Management services will support individual ships in both the planning process and during a voyage, including route planning, route exchange, and route optimisation services. Voyage Management will be validated in two test beds, one in the Mediterranean and one in the Nordic region. In the latter, STM services will focus on testing more efficient winter navigation and crisis management (ie. Search and Rescue).

*A recurring meeting where all involved parties get together and discuss how to implement and develop a PortCDM-solution for a specific port.

Ten Simulator Centres connected, three more to come

 Mikael Hägg and Reto Weber of Chalmers University of Technology is leading the work on validating STM in simulators.



What is the progress to date?

Mikael: “The European Maritime Simulator Network

(EMSN) created in 2014 has already been extended with five more simulator centres bringing the total number to 10. 25 bridges can now be manned simultaneously and used in the same test scenario.”

What is the main advantage of activity 3/the EMSN?

“Some of the STM concepts and scenarios can’t be tested with real ships. But in the EMSN we can put ships and crew in difficult and potentially dangerous situations, without causing any actual harm, for example testing extreme traffic volumes in congested waters.”

How does activity 3 contribute to the realisation of STM?

“Through simulations we can involve the users more in developing procedures for how work on the bridge will change once STM solutions are introduced. Simulators provide a

more controlled way of collecting data and input and the tests are an important complement to the test beds on-board and in ports,” says Mikael

What is most rewarding about the activity?

“We are developing something new that can revolutionise the industry. STM has the potential to be implemented worldwide and being part of that process, working with great teams at all centres, is very rewarding.”

Reto Weber of Chalmers, who is co-ordinating the test runs, adds, “What happens in the simulators during exercises is very interesting. Suddenly the simulations are so much more real with crews on every bridge. Nobody knows how the tests will evolve which makes them considerably more realistic. In some test runs nothing unanticipated happens, while others can have unexpected developments.

Both cases deliver valuable real-life knowledge. Interestingly, but not surprisingly, the simulator crews behave more politely, respecting other ships, crews and shore centres more, thus removing the partial computer game behaviour they normally show in simulations.”

How does this affect the simulator centres in the long term?

“There’s a lot of potential value in the increased cooperation between the different simulator centres. EMSN creates endless possibilities for SAR, education, research and large scale exercises to be conducted in ways we have not previously imagined,” says Reto.

What are the benefits for the maritime industry & transport chain?

“The simulations enable fine-tuning of the STM concept and solutions, saving much effort later in the implementation. “Compare it to developing a new car. A design error caught in the blueprint or in a CAD simulation costs almost nothing to fix compared to recalling millions of cars,” finishes Mikael. ●

Maritime Simulator Network in short:

MONALISA 2.0 developed and created a network of interconnected simulator centres in a number of EU countries – the European Maritime Simulator Network. This network enables testing of Sea Traffic Management in complex traffic situations, as well as other functions, like Search and Rescue, as a safer alternative to live testing.

This EMSN will be used both to simulate varying traffic conditions and further test and validate other parts of STM that are not possible to test and validate in real life at this stage, such as area management.

EMSN STATUS:



Connected and working

Chalmers (2)
FH Flensburg (3)
SMA (3)
Fraunhofer CML (3)
Aboa Mare (4)
Rörvik (5)

Soon available

Warsash Maritime Academy (Southampton Solent University) (1)
Connected Autumn 2016
Willem Barentsz (2)
Connected Autumn 2016
UPC Barcelona (4)
Pending upgrade

Connected and testing

Centro Jovellanos (4)
AIDA Cruise (1)
VeMarS (2)
SSPA (1)

Available Bridges (OS)

Simulator Centres



The bridge in a simulator looks just like a real bridge with screens instead of windows.

SAR simulation exercise

“It felt real as there were other real people involved”



In the first days of March 2016 the EMSN in STM activity 3 arranged a Search and Rescue (SAR) exercise with the network of simulators in Sweden, Norway and Finland. Anja Divkovic and Hanna Varvne from Chalmers were two of the participants on the on-scene coordinator ship Fure West. They are final year students of the Master Mariner programme at Chalmers University of Technology.

What roles did you have in the exercise?

“I was on the bridge of the on-scene coordinator ship acting as navigational officer and taking notes about all communication taking place,” Hanna explains. “I was on the same ship as co-navigator and managed external communication with the other ships. I was also

involved in planning the search,” Anja adds.

How did you feel during the exercise?

“I was nervous before the exercise started, and the first hour was very intense. There was so much to do on the bridge. The twelve minutes it took us to come up with a search plan felt like forever. We had to discuss, call the Joint Rescue Coordination Centre, document everything and communicate it to the vessels involved. Once we had the search groups sorted and could start to supervise them, the courses, the distances and so forth, things settled down a little,” Anja describes.

“Then we devised new plans and merged two of the search groups,” Hanna adds.

“Initially we were a bit nervous but during the exercise we grew more confident. We had been preparing for a few days when we re-

ceived the task, and the hours we had spent preparing really paid off.”

What did you learn during the exercise?

Hanna explains, “We practiced a critical scenario in a calm and secure environment, where we could test how we would have done things in a real-life situation.” “It was a great way to gain experience,” Anja adds.

“The exercise felt real as there were other real people involved in the other countries who we did not know and whose reactions and behaviour we couldn’t predict,” Hanna says. “We had to trust them and that they had the knowledge and will to act according to our instructions. Just like in real life,” Anja concludes.

Did you act differently knowing there were actual people on the other vessels?

“Yes, it makes a huge difference, for example we updated the other crews with a situation report every 20 minutes throughout the exercise,” says Anja. “I was very content with my team’s effort. The group did an awesome job and things worked out very well.”

What was best thing during the exercise?

“I was very happy with the day - it was incredibly valuable,” Hanna starts. Anja continues. “Everyone should have the opportunity to be the on-scene coordinator. The exercise really challenges you as a person, the situation is stressful and you have to embrace a whole way of thinking in a SAR situation. This is one of the very best exercises we have done during the whole programme.” ●



STM is all about connecting the maritime sector and enabling instant information exchange between selected parties.

How will your part of the project contribute?

“We will develop a Maritime Service Infrastructure as one of the enablers of the digital transformation. That means a federated, interoperable, decentralised data sharing and service-provisioning ecosystem for the maritime market. First we’ll demonstrate and validate interoperable maritime services with a prototype implementation of selected components of the maritime service infrastructure. We’ll do this on 300 ships, in thirteen ports and in five service centres, in the Nordic region and the Mediterranean sea. Then we will do the technical specifications of the full Maritime Service Infrastructure that will provide important input for standardisation and commercialization”, summarises Michael.

Could you compare a maritime service infrastructure to something that has been developed in another sector?

“E.g. the SWIFT network that enables financial institutions worldwide to send and receive information about financial transactions using a secure, standardized and reliable infrastructure.”

What is the key to success?

“Making use of existing, proven best-practice industry solutions and standards where available”

What is the most fun in the project?

“In many markets even the biggest players have failed to set interoperability standards on their own. Alliances and joint efforts are necessary. That is why I love to see the commitment of more than seventy maritime participants in STM Validation and in the sister project, EfficienSea2, all working to make STM come true in the world of shipping.” ●

ACTIVITY 4: Maritime Service Infrastructure

The key to success – making use of existing solutions

Michael Siegel, Director of OFFIS, is leading the work on the service infrastructure.



Why is STM happening now?

“The digital transformation of the maritime sector is already on its way,” says Michael. “The maritime communication market is predicted to double in the next 10 years, communication bandwidth will significantly increase and communication costs will decrease. Experts also believe that international seaborne trade will increase with a compound annual growth rate (CAGR) of 4%, and cruise shipping with a CAGR of 6.55%.” Innovative ICT systems and services that share maritime

information across all stakeholders along the maritime logistics chain are key enablers of this growth,” Michael continues. “Interoperability of these ICT systems and services is essential to reduce operational costs substantially and increase shipping safety.

Interoperability of maritime ICT systems does not only mean the ability to communicate but also to speak the same language concerning maritime information. This is as relevant for existing standards like AIS, route exchange and IVEF for information exchange between VTS centres, as it is for other data like trade data, hydrological data, and bathymetric data. The digital transformation will federate all this information into a global maritime service market.”

Maritime Service Infrastructure in short: Standardised information exchange is at the heart of STM. Validation of a common Maritime Service Infrastructure using System Wide Information Management (SeaSWIM) will facilitate data sharing in the validation test beds using a common information environment and structure (e.g. the Maritime Cloud). This ensures interoperability of STM and other services.

ILLUSTRATION: ISTOCKPHOTO

Benefits across the entire maritime logistics chain

Interview with **José Andrés Giménez Maldonado** of the Valenciaport Foundation



José Andrés Giménez Maldonado manages the analysis and evaluation of STM at Valenciaport Foundation from where activity 5 is being lead. Valenciaport Foundation is the innovation and training centre of Port of Valencia. It is a non-profit organisation that conducts most of its work through projects within the port logistics domain. The main focus is to improve port logistics in areas such as safety and energy, both port to ship and hinterland.

What does your activity do?

“Our part of STM is to analyse and evaluate the STM services that are being developed in the other activities. We demonstrate benefits in a quantitative way by providing tools to measure impact. Our team is very much connected to activities 1, 2 and 3, involved in the test beds and collecting data. We need to understand their needs and develop appropriate tools.”

What is the main objective of your activity and STM as a whole?

“Our main objective is to show the benefits and the different impacts STM may have across the entire maritime and port logistics chain. The impacts of STM are potentially wide reaching. There’s the economic impact from improved efficiency and improved maritime voyages. There’s the environmental impact from vessels travelling **optimal routes** thereby consuming less fuel and creating less pollution and green house emissions. Decreased emissions and shorter ship time in the port reduces pollution in the city in question, having a positive effect on the inhabitants.

Another important area of impact is **safety**. STM can enable increased situational awareness for the involved parties. When vessels know the surrounding vessels’ routes and in-

tentions, it reduces the risk of collisions considerably.”

What is the progress to date?

“Things are going good. We are working intensively with activities 1, 2 and 3 to understand their needs and expectations and define useful KPIs. It’s a very sensitive task as we need information that will be useful for the future of the project.

We’re underway with activities 1 and 2. We’ve also commenced with other sub activities for example training matters. We have started planning the legal, operational and formal safety that will start this summer. These activities cross all test-beds, giving us a holistic view of STM.”

What is your main challenge?

“Communicating effectively with all involved and understanding the different stakeholder needs is a challenge. Regulatory

bodies have different needs than other agents and bodies for example, and we need to be able to communicate the benefits of STM in the best way for each stakeholder group and their business.”

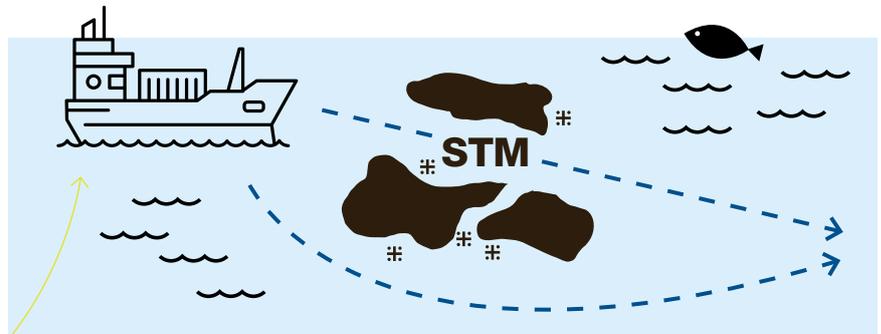
What do you see as STM’s main challenge?

“STM should be viewed by the maritime world as the main facilitator of the evolution of this strategic sector to a new era, based on information sharing and digital exchange.”

What is most fun?

“Working in such a complex project as STM can be challenging, but at the same time it is really fun being in contact with people in so many different geographical areas and in different parts of the maritime world, with different ways of thinking. This diversity provides us with new ways of looking at problems. After three years I’m getting to know people from the consortium and I enjoy the work camps and meetings. It moves you out of your comfort zone and you get new perspectives that can change your approach.” ●

Analysis & Evaluation in short: Analysis and Evaluation covers many of the future changes: business, socio-economic, risk, technological, legal and institutional. It will also consider competencies and training requirements for STM implementation. Reporting will be in line with the IMO and IALA test bed guidelines.



IMPROVED SAFETY WITH STM

Risk reduction rate	Flow management – flow optimisation	Flow management – enhanced monitoring	Dynamic Voyage Management – route exchange
Collisions	58%	5%	52%
Groundings	6%	64%	8%

ICONS: NOUNPROJECT

SOURCE: ML2 D2 FSA – FORMAL SAFETY ASSESSMENT

FOR MORE INFORMATION, PLEASE CONTACT:

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