# MONALISA – Motorways & Electronic Navigation by Intelligence at Sea

## Summary

MONALISA is a Motorways of the Sea project which aims at giving a concrete contribution to the efficient, safe and environmentally friendly maritime transport. This is done through development, demonstration and dissemination of innovative e-navigational services to the shipping industry, which can lay the groundwork for a future international deployment. Quality assurance of hydrographic data for the major navigational areas in Swedish and Finnish waters in the Baltic Sea contributes to improving safety and optimization of ship routes.

MONALISA addresses a number of priority areas, strategic actions and flagship projects of the EU strategy for Baltic Sea region and thus contributes to the implementation of the Strategy. MONALISA is also in direct line with the EU concept "Green Transport Corridors", a concept which, inter alia, represents the environmental dimension in the development of the transport system.
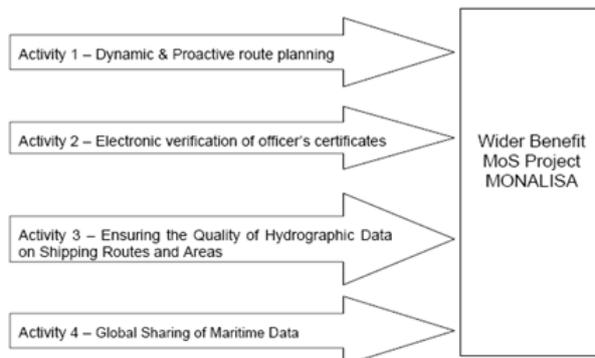
## Background

Maritime transport is crucial for the functioning of society. A large share of foreign trade goes by sea and the integration of maritime transport in the EU transport system has evolved over the years. There are still a number of challenges that maritime transport has to meet in order to further strengthen its competitiveness and thus contribute to more efficient transport solutions for transport buyers.

To increase competitiveness, reduce environmental impact, improve accessibility and enhance safety and preparedness in the Baltic region, the EU has adopted a regional strategy for the Baltic Sea region. Maritime transport has a central role in the strategy.

The Motorways of the Sea concept may be viewed as the maritime dimension of the trans-European transport network (TEN-T) and contributes in the form of co-financing as well as providing a platform for increased collaboration between governments, industry and academia.

In early 2010, Sweden and the Swedish Maritime Administration initiated a Motorways of the Sea project of wider benefit - MONALISA. MONALISA proceeds on the basis of the challenges facing the Baltic Sea region in the area of maritime transport, challenges that are outlined in the EU Strategy for the Baltic region. MONALISA has been selected for co-financing (50%) from the EU´s budget for TEN-T and the Motorways of the Sea program. The implementation period is September 2010 to December 2013.

## Project activities

### Activity 1 - Dynamic and proactive route planning – "Green Routes"
This activity aims to develop and demonstrate a new model in route planning, based on existing electronic nautical charts and the automatic identification system AIS. Each vessel's pre-planned route will be visible for other vessels and traffic centers ashore. The estimated optimal route and speed plan will be agreed on between captains and traffic centers. The route will be based on information on local sailing conditions – such as currents, wind and waves, water depth and sea ice – that affect sailing time and bunker consumption, as well as including traffic congestion, berth availability in the next port of call and cargo handling schedules.

Dynamic and pro-active maritime route planning will contribute to improving efficiency in maritime transport and optimising fuel consumption, thereby reducing emissions from shipping. Ideally, the system should also have an alarm function that provides alerts in the event of a vessel diverting from its agreed planned route, a function that increases maritime safety. This activity will be carried out by the Swedish Maritime Administration (Activity Leader), SAAB TransponderTech, Chalmers, SSPA and Danish Maritime Safety Administration.

### Activity 2 – Verification System for officer certification
A concept model for an automatic verification system, monitoring officers' certificates and time on watch, will be designed as part of the activity. A maritime IDcard with security codes will be designed and tested. Officers' certificates will automatically be checked against databases ashore (via AIS transmission) to ensure certificate validity. This activity will ensure the required competence, and prevent fatigue, which is a common factor in accidents at sea. Responsibility for this activity rests with the Swedish Maritime Administration (Activity Leader), SAAB TransponderTech and Chalmers.

### Activity 3 – Quality Assurance of Hydrographic data
Quality-assured hydrographic surveys are an urgent matter due to the increasing number of large vessels navigating with deep draft. Verification that unknown shoals do not exist between old sounding lines is imperative, and thus the re-surveying of main maritime routes must be performed as soon as possible. The re-surveying of HELCOM fairways and Baltic Sea port areas is to be conducted using modern quality-assured methods to ensure the accuracy of hydrographic data

presented in existing nautical charts and other nautical publications. The outcome of this activity will provide the basis for route planning, as noted in activity 1 above, in terms of actual navigation decisions on recommended fairways, and dredging operations etc. Depth data models, vertical reference surfaces and depth presentations in nautical publications are currently set according to national standards, which represent obstacles to cooperation and exchange of depth information. Consequently, shared technical standards will be elaborated within the activity as a basis for decision-making. This activity will be undertaken by the Finnish Transport Agency (Activity Leader) and the Swedish Maritime Administration.

Activity 3, which is the main involvement for the Hydrographic Offices of Sweden and Finland, is described in more details below.

### Activity 4 – Global Sharing of Maritime Information

This activity aims at developing a functional demonstrator system with the final objective of extending regional sharing of maritime information to a global scale. The partners will endeavor to identify solutions supporting the sharing of an increased scope of maritime information between maritime authorities. Solutions developed will use cutting edge technology and take into consideration experiences gained from initiatives such as HELCOM AIS, and IALA-NET. The activity will be carried out by the Danish Maritime Safety Administration (Activity Leader), GateHouse, SAAB TransponderTech and the Swedish Maritime Administration.

## Quality Assurance of Hydrographic Data – Activity 3

Activity 3 will be implemented within 3 sub-activities:

### Sub-activity 1 – Speed up re-surveys

The re-survey will be conducted according to the HELCOM Copenhagen 2001 and Moscow 2010 Ministerial Declarations. The re-surveyed marine areas will cover about 32 000 km2 of HELCOM CAT I and II areas around Finland and Sweden. Areas vary on depth, bottom structure, water turbidity and weather vulnerability, which will in turn have a direct effect on the difficulty and time used on the field work and data post processing. This will further vary the cost widely. This geospatial data is necessary to obtain for sub-activities 3.2 and 3.3.

HELCOM areas in the Bothnian Sea in the Economic zone of Sweden and Finland will be surveyed during 2011 and early 2012 based on tendering in 2010 and contracts in April 2011. Additional HELCOM areas in the territorial waters will be surveyed with state-owned resources, in Finland by the state owned company Meritaito Oy and in Sweden by the Swedish Maritime Administration. The Bay of Bothnia and areas around Southern Sweden will be surveyed in 2012-2013. The areas surveyed by external contractors might be complemented by internal state surveys in territorial waters. Analysis on the data started in June 2011.

**Purchased MonaLisa survey areas**

- Finnish EEZ 2012-13
- Finnish Territorial Sea 2012-13. Survey permission required
- Finnish EEZ areas 2011
- Swedish areas 2012-13
- Swedish EEZ areas 2011
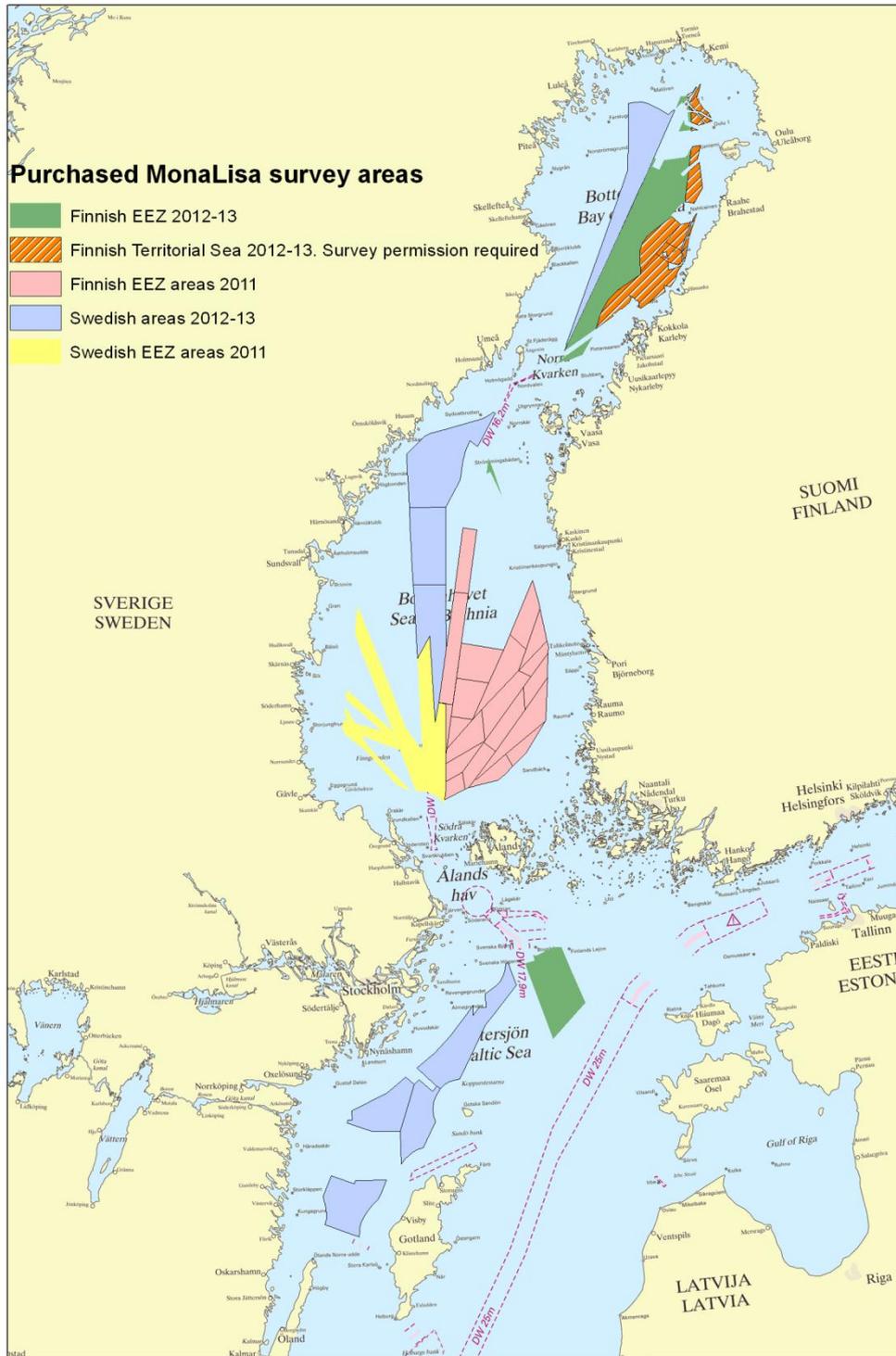
## Sub-activity 2 – Baltic Sea harmonised depth model (for Geospatial information)

Actions will be launched to establish a common database of bathymetric data for the Baltic Sea Area. They will include identification of existing regulations concerning depth data, development of proposals concerning storage, maintenance, exchange and distribution of the bathymetric data. A sample data model will be compiled from surveyed and processed data.

This is also a task given to the Swedish Maritime Administration from the Swedish Government where the Hydrographic Office should develop a proposal for availability and distribution of

bathymetry data for the Baltic Sea and to use the IHO regional network to achieve the result. A working group within the Baltic Sea Hydrographic Commission has been formed to work on this. Work will continue until the end of 2013 and all corner stones of a possible Baltic Sea Bathymetry SDI, governance, content and technology will be studied. The EU INSPIRE directive provides important requirements to include in the study.

### Sub-activity 3 – Pilot project on harmonised vertical reference on Baltic Sea
A study will be conducted to identify the difference between Baltic Sea States vertical reference surface and establish a common standard. Further on, a small scale pilot project will analyse the implications and effects to the products and services on implementing a new harmonized vertical references. The most obvious application of a common vertical reference is printed and electronic nautical chart and water level (tide) information.

# Next MONALISA project
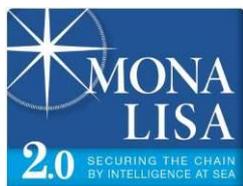


### Increased focus on safety of navigation
MONALISA 2.0 is a new project initiative on Sea Traffic Management and measures to enhance safety of navigation of large passenger vessels. The MONALISA 2.0 initiative is an outcome of the existing MONALISA project.

### Scope of MONALISA 2.0
MONALISA 2.0 encompasses a number of activities, which all of them contribute to improve efficiency, safety and environmental performance of maritime transport. MONALISA 2.0 will draw special focus to safety of navigation. The following activities are proposed to be conducted within the MONALISA 2.0 project:

**Activity 1 – Extended test-bed for Dynamic & Proactive Route planning**
Extended test-bed for MONALISA Dynamic and Proactive Route planning (Sea Traffic Management) in other sea areas than the Baltic Sea, which is included in the ongoing MONALISA project. Test-beds will be established for the Mediterranean Sea and for other sea areas. The activity encompasses both deployment of a Sea Traffic Control Centre (STCC) and operational tests of vessels in close cooperation with shipping companies.

**Activity 2 – Information management; a study on development of the SESAR concept for the Maritime Sector (LEONARDO)**
The SESAR concept is developed to address the demand of an efficient handling of all information connected with a flight (voyage) for the civil aviation sector.

The Leonardo concept implemented in the maritime sector is the paradigm shift of information management by introduction of "Voyage based operations" instead of "Surface based operations", as is the practice in the maritime world of today. With a combination of the SWIM

Process (System Wide Information Management) and Voyage based operations, the maritime sector is anticipated to solve the obstacles to obtain a complete chain of information, both from a Sea Traffic Management perspective as well as for the long-term strategic and mid-term tactical planning for any of the involved stakeholders. The planning stretches from years to come for shore-based stakeholders up until the critical executive minute operations of involved mariners onboard the sailing vessels.

Within the activity, a comprehensive feasibility study for applying Voyage based operations, woved into the "SWIM Process", also to the maritime chain of information, will be carried out.

**Activity 3 – Human Factors: Certificates, Route planning, Bridge procedures, responsibilities and education**

**Activity 4 - Safer Ships & SAR**
The activity aims at improving safety of navigation of large vessels. The maritime safety research programme SURSHIP has resulted in a number of concrete results that will contribute to improve maritime safety for large passenger vessels. The activity Safer Ships will contribute to increased maritime safety through implementation of some of the results of the SURSHIP program.

The EU-project MARSUNO contained a work-layer which relates to Maritime Search and Rescue services including the performance of distress monitoring, communication, co-ordination and search and rescue functions, including provision of medical advice, initial medical assistance, or medical evacuation. A number of actions were recommended to be followed-up, including recommendations from the EU-funded project MARNIS.

**Activity 5 – Large Passenger Ships in Ports**
The activity on issues related to port calls of large passanger and ropax vessels and their stay in ports. The activite aims at improving the ability of ports and authorities to handle risks and consequences connected with these large vessels.

## Time schedule and Partnership
MONALISA 2.0 is estimated to be implemented 2012-2014. The partnership for MONALISA 2.0 is under development. Maritime authorities, private sector partners as well as academic organizations are invited to join the project.