FINALISING SURVEYS FOR THE BALTIC MOTORWAYS OF THE SEA

Status of Project FAMOS

Project goal

The FAMOS project aims at improving safety of navigation in the Baltic Sea by increasing hydrographic survey efficiency. This will enable the participating countries to map the remaining areas of interest for commercial shipping in the Baltic Sea according to the BSHC/HELCOM harmonized re-survey plan.

FAMOS provides a platform to coordinate the national efforts of the participating countries, which are needed to streamline the production chain from hydrographic field measurements to up-to-date, reliable nautical charts or ENCs being available for the end user on a vessel's bridge.

The FAMOS project is a space for cooperation between organisations and countries, leading to more efficiently meeting the needs of the shipping industry by realizing the BSHC/HELCOM plan. FAMOS also makes it possible to coordinate the use of the survey vessels for a side project working towards improving offshore navigation in the future.

The FAMOS project is planned to cover the time period 2014 to 2020, and is planned to be implemented in three phases: FAMOS *Freja* 2014-2016, FAMOS *Odin* 2017-2018, and FAMOS *Thor* 2019-2020.

Background

The Baltic Sea is a region of high and further increasing marine traffic. At any given time, more than 2000 vessels larger than 50 m navigate here. There is a trend of increasing vessel size and draft, as well as steadily increasing transports of crude oil and other hazardous substances.

At the same time, the Baltic Sea marine environment is fragile. Surrounded by nine countries and with 85 million people inhabiting the Baltic Sea drainage area, maritime safety matters are of uttermost importance in the Baltic Sea. To protect the marine environment, the Baltic Marine Environment Protection Commission – Helsinki Commission (HELCOM) has been coordinating intergovernmental cooperation between its contracting parties, all Baltic Sea states including Russia and the EU.

The geography of the Baltic Sea imposes special demands for navigation. The sea is very shallow with a median depth of only 43 m: 20% of the water area is not deeper than 15 m,

the draft of the deepest going vessels seen in the Baltic Sea today. 70% of the water area is shallower than 70 m, depths which are considered relevant for the fuel efficiency of ships, which due to hydrodynamic effects consume less fuel in deeper water. Significant savings of fuel and emissions are possible if the vessel speed is adjusted according to the water depth. To decrease the environmental footprint of shipping even further, a vessel could deviate slightly from the direct course in order to maximize the water depth under the keel.

Apart from this, the Baltic Sea is partly ice-covered during winter. This results in vessel tracks often not following the designated fairways, because they are routed depending on ice conditions. Long-time collections of AIS tracking data show that traffic patterns in the Baltic Sea are highly variable and that the major part of the water area is actively being used for commercial shipping.

The BSHC-HELCOM harmonised re-survey Scheme

As of today, almost two-thirds of the Baltic Sea area has not yet been charted to modern standards. Even close to major shipping routes, the depth information shown in some of the nautical charts and ENCs are still based on 19th century lead line soundings, sextant positioning and manual interpolation between sparse soundings. In the early 2000s, it was recognized that the status of hydrographic surveys of the Baltic Sea is not satisfactory. Re-surveys carried out since then have already proven to be useful. New shoals and areas shallower than previously known have been found, and the efficiency of surveying has been increased.

All Baltic Sea national Hydrographic Offices have for a long time worked together towards common goals within the Baltic Sea Hydrographic Commission (BSHC), a regional collaboration under the umbrella of the International Hydrographic Organization (IHO). Since 2002, one BSHC goal is to align the national surveying plans in order to cover the whole sea in a harmonized way, taking into account the actual shipping routes and new routing measures established or planned in the Baltic Sea.

This work has resulted in the *BSHC-HELCOM Revised Baltic Sea Harmonised Hydrographic Re-Survey Plan* (HELCOM plan). The HELCOM plan divides the Baltic Sea into three categories: Firstly, major shipping routes and other areas included since the first version of 2002 (CAT I). Secondly, additional areas needed for the safety of commercial navigation (CAT II). Thirdly, areas where surveying is needed for other reasons, such as environmental concerns (CAT III). The revised plan includes also time schedule estimations for each country and category. Depending on the country, the first two categories, i.e. all areas important for the needs of commercial shipping, are scheduled to be re-surveyed until 2015 to 2030.

In May 2013, the remaining CAT I and II area was more than 100 000 km^2 (corresponding to almost one-quarter of the entire Baltic Sea area or more than the land area of Portugal). Of the remaining CAT I and II area, Sweden is responsible for the largest part, followed by Estonia, Finland and Denmark.

From 2010 to 2013, Sweden and Finland have carried out large-scale surveying work in the Bothnian Sea and Gulf of Finland, under the MONALISA project. The project received co-financing from EU Trans European Network for Transport (TEN-T) structural funds, which made it possible for the two countries to survey the largest annual areas in modern history, covering a total of 34 000 km^2 in three field seasons at a total cost of 14 M€.

Political support from the HELCOM environmental ministers

The HELCOM plan has been adopted by the Baltic Sea environmental ministers in the 2013 HELCOM Copenhagen Ministerial Declaration. The meeting appreciated the substantial progress made in systematic re-surveying of major shipping routes and ports and agreed to take actions to ensure the completion of the re-surveys for CAT I and II areas within the estimated time limits and to also foster CAT III re-surveys.

The FAMOS project is the platform for these actions until 2020.

Support in the EU Strategy for the Baltic Sea Region

Speed up re-surveying of major shipping routes and ports is a flagship project in the Priority Area Maritime Safety and Security of the EU Strategy for the Baltic Sea Region (EUSBSR PA Safe). The work is supervised by both BSHC and HELCOM, but relies upon projects implementing concrete actions to achieve the goals. For example, the flagship project MONALISA's activity on quality assurance of hydrographic data included large-scale survey work in Swedish and Finnish areas.

The EUSBSR PA Safe steering group is being consulted during the planning of the FAMOS project, and the project has applied for flagship project status within the strategy.

Participating countries and organizations

The hydrographic offices of the following countries participate in FAMOS:

- Sweden: Swedish Maritime Administration (lead partner)
- Finland: Finnish Transport Agency
- Estonia: Estonian Maritime Administration
- Latvia: Maritime Administration of Latvia
- Germany: Federal Maritime and Hydrographic Agency (only activity 2)
- Denmark: Danish Geodata Agency (only the civilian chart production is included, not the actual surveys organized under the military)

Additional project partners for activity 2 include:

- Lantmäteriet (Swedish mapping, cadastral and land registration authority)
- German Federal Agency for Cartography and Geodesy
- GFZ German Research Centre for Geosciences
- Technical University of Denmark, National Space Institute

Associated partner:

- Lithuanian Maritime Safety Administration (Lithuanian hydrographic office)

Planned FAMOS project activities

1: Hydrographic surveying

This activity is the main focus of the FAMOS project. It includes the field work needed to fulfil the CAT I/II goals set in the HELCOM plan and measures to increase field work efficiency in order to speed up the work until the end of the project in 2020.

The aim is to provide as complete and accurate source data as possible for the improvement of nautical charts.

The measures taken depend on the participating countries' national plans, and include procurement of hydrographic surveys, vessel running costs and manning of survey vessels. An area of 96 000 km^2 will be mapped during the planned FAMOS surveys, corresponding to roughly the land area of Portugal.

Activity participants: Finnish Transport Agency (activity lead), Swedish Maritime Administration, Estonian Maritime Administration, Maritime Administration of Latvia and Danish Geodata Agency.

2: Harmonizing vertical datum

Within the BSHC there are ongoing efforts to harmonize the various vertical datums used in Baltic Sea nautical charts, and relate them to land elevation datums. This activity will provide data to support this work.

A harmonized chart datum will contribute to navigation safety especially in shallow areas, where deep-going ships navigate close to the seabed with tight vertical error margins. A geodetic vertical datum may in the future also allow for full 3D satellite based navigation, without the need of taking into account an error-prone hydrodynamic water surface. The activity will also increase the quality of future hydrographic surveys.

Measures will include marine gravity measurements by means of running a gravity meter on-board the survey vessels to collect additional gravity data on an opportunity basis during hydrographic surveys. This "piggy-back" concept of collecting gravity measurements has been successfully used by the Technical University of Denmark on hydrographic surveys.

Activity participants: Lantmäteriet (Swedish land survey authority, activity lead), German Federal Agency for Cartography and Geodesy, German Maritime and Hydrographic Agency, GFZ German Research Centre for Geosciences and possibly the Danish Technical University Space Institute. All participating hydrographic offices support the activity with their survey vessels.

3: Surveying infrastructure

This activity will include procurement of specific equipment to improve the efficiency of hydrographic survey work. Examples of such equipment are the latest generation Multibeam echo sounders, positioning equipment, or more capable survey boats.

Activity participants: Estonian Maritime Administration (activity lead) and Maritime Administration of Latvia.

4: Improving data workflow from sounding to chart

It requires complex workflows to transform the raw depth data from hydrographic surveys into the depth information relevant for navigators which is presented in nautical publications. Depending on the circumstances and the data workflow, the time it takes for a sounding from being measured to ending up on a nautical chart can span many months. Furthermore, the increasing amount of raw data from state-of-the-art echo sounders can lead to bottlenecks when it comes to processing the data.

This activity will focus on actions to improve data workflow efficiency. This can include for example software upgrades, software implementation, training or resources to solve problems with bottlenecks. The activity will also allow for better knowledge exchange between the participating hydrographic offices, and provide a platform for harmonization of products and workflows across country borders.

Activity participants: Swedish Maritime Administration (activity lead), Finnish Transport Agency, Danish Geodata Agency, Estonian Maritime Administration and Maritime Administration of Latvia.

Budget and financing

The indicative total cost for the FAMOS project covering the time period 2014-2020 is 79 M€. The hydrographic surveying activity alone has a planned budget of 57 M€, while the other project activities are much smaller in comparison.

Based on the previous experiences with EU Trans European Network for Transport (TEN-T) co-financing for several projects at the Swedish Maritime Administration and the Finnish Transport Agency, the project participants have submitted a project proposal for EU co-financing.

Specifically, the project applied for funds from the Connecting Europe Facility transport program, the successor of the TEN-T program, under the horizontal priority Motorways of the Sea. This first proposal covers the time 2014-2016 and comprises a budget of 33.9 M€, including 11.9 M€ of possible EU funds.

The project consortium plans to submit successive proposals for the time 2017-2020 when new calls for proposals will open in the coming years.