

OpenRisk II Project Final Conference on Maritime Risk Management in the Baltic Sea Region

22 September 2026, Kristiansand, Norway

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Introduction of the project

The OpenRisk II project, *“Tools for shared & dynamic maritime traffic risk picture of the Baltic Sea region”*, was initiated in November 2023 and is co-funded by the EU Interreg Baltic Sea Region Programme 2021-2027. The project develops risk assessment and risk management tools designed to support competent maritime authorities in preventing maritime accidents and minimizing their potential consequences for people and the environment. A central objective of the project is to enhance the overall quality of maritime risk management by developing practical solutions responding to the needs of maritime authorities and other end users.

The project has focused on three main tools. The **AISyRISK Baltic**, including a new ice navigation module, supports strategic maritime risk assessment by presenting maritime traffic risks through interactive maps and graphs. The **EcoSensitivity tool** supports the assessment of potential environmental consequences of oil spills by combining information on accident scenarios, oil drift and ecological sensitivity. The **R-Mare matrix - Tool for enhanced overall risk management performance** provides a risk maturity model through which maritime organisations can assess their current risk management performance and identify opportunities for improvement.

The project consortium consists of seven partners: Finnish Transport and Communications Agency Traficom, Aalto University, Norwegian Coastal Administration, Gdańsk University of Technology, University of Tartu, University of Helsinki and Åbo Akademi university.

Aim of the Final Conference

The OpenRisk II Final Conference on Maritime Risk Management in the Baltic Sea Region was held on 22 September 2026 in Kristiansand, Norway, with participants joining both on-site and online. The conference brought together the results and experiences gained throughout the project, providing a forum to present the OpenRisk II tools, discuss their practical applications and reflect on opportunities for their continued use and development beyond the project. The list of participating organisations is provided in Annex I.

The programme combined presentations on the broader maritime risk-management context with dedicated workshop sessions on AISyRISK Baltic and the ice module, EcoSensitivity tool and the R-Mare matrix - Tool for enhanced overall risk management performance. The conference concluded with a future-oriented discussion on collaboration, expansion of the tools' user base and continuation of the work after the project. The full conference programme is included in Annex II.

Setting the scene

The conference was opened by **Hans-Petter Mortensholm from the Norwegian Coastal Administration**, who highlighted increasing maritime activity, climate-related pressures and the importance of continued cooperation between countries in managing maritime risks. As maritime incidents can have cross-border impacts and require resources beyond the capacity of a single country, shared knowledge and coordinated preparedness remain essential.

Following the opening remarks, the setting-the-scene session included presentations from the project and external experts on maritime risk management, ice services, digital tools for pollution response and emerging marine pollution risks.

The presentation **“OpenRisk II: the project process and maritime risk management”**, given by **Hermanni Backer Johnsen from Åbo Akademi University**, placed the OpenRisk II project within the wider context of maritime risk management at the Baltic Sea. While major oil spills have decreased considerably over recent decades, changing maritime traffic, technologies and environmental conditions create new challenges. At the same time, increased availability of maritime data and data-driven tools provides new opportunities for risk assessment and prevention.

Three thematic presentations complemented this perspective. In his presentation **“Norwegian Ice Services”**, **Geir Gjevang from the Norwegian Coastal Administration** presented the practical organisation of ice services in Norway, highlighting the close connection between reliable ice reporting and effective icebreaking. Changing ice conditions and climate-related developments were also discussed in relation to future icebreaking needs.

The **DIGIMARIS project**, presented by **Pentti Kujala from the Estonian Maritime Academy at Tallinn University of Technology (TalTech)**, demonstrated the potential use of sensors, unmanned vessels and digital management solutions in oil-spill response. Such technologies could provide more accurate information on the location and movement of spilled oil and thereby support the planning and coordination of response operations.

Victor Diaz Seco from the European Maritime Safety Agency (EMSA) presented its ongoing risk assessment work and the development of a future-proof, risk-based pollution response framework. Attention was given to evolving marine pollution risks, including alternative fuels and new pollutant profiles, which may require new approaches to preparedness and response.

Together, the presentations provided a broader context for the subsequent sessions on the three OpenRisk II tools: AISyRISK Baltic and its ice module, EcoSensitivity and the R-Mare Matrix.

OpenRisk II tools and results

AISyRISK and ice module

Session organisers: Aalto University, Norwegian Coastal Administration, Gdańsk University of Technology and Åbo Akademi University

The first dedicated tool session focused on AISyRISK Baltic and the ice module. AISyRISK Baltic provides an automated method for estimating maritime traffic risk and presenting the resulting risk picture dynamically and understandably. The tool is intended to support maritime authorities and other users in strategic risk-management activities. AISyRISK Baltic is primarily a strategic risk assessment and decision-support tool. It is not intended for operational voyage planning or for optimising the routes of individual vessels or fleets.

AISyRISK Baltic uses high-resolution Automatic Identification System (AIS) data to support calculations of maritime traffic risk. The methodology processes ship traffic data to identify potentially critical encounters and subsequently supports accident-frequency and risk calculations. One element of the methodology is the use of a safety domain around each vessel. Potentially critical situations can be identified when this safety domain around vessel interacts with another vessel, land or waters that are too shallow for safe navigation. The resulting information can help users identify areas and situations requiring closer attention.

A significant OpenRisk II development has been the integration of winter navigation considerations into AISyRISK Baltic. The ice module allows ice-related information to be incorporated into the assessment of maritime traffic risks. The approach includes an additional winter-navigation risk component reflecting how ice conditions can influence navigational risk. The conference discussion demonstrated that modelling winter navigation requires consideration of both environmental conditions and vessel behaviour and characteristics. Further development is also examining how the ice module could be applied to conditions along the Norwegian coast and around Svalbard, with potential for wider application in Arctic waters.

Several areas for further development were identified during the session. A key topic was the quality and reliability of AIS data. AIS spoofing and other erroneous data can create unrealistic vessel movements and apparent collision risks that do not exist. Possible improvements discussed included verifying vessel speeds between consecutive AIS positions, identifying physically impossible movements, comparing reported behaviour with vessels' physical capabilities and detecting cases where the same Maritime mobile service identity number appears simultaneously in different locations.

Participants also discussed whether the ship domains used in the calculations should be adapted to specific navigational environments, such as port approaches, where vessel behaviour and traffic patterns may differ from those in open waters. Further development in this area could improve the accuracy and relevance of local risk assessments.

Other development needs include improved consequence models for oil spills in ice-covered waters and further adaptation of the methodology for Arctic conditions. At the same time, work is ongoing to migrate AISyRISK Baltic to cloud-based infrastructure. Together, these developments aim to improve the reliability, accessibility and wider applicability of the tool.

EcoSensitivity tool session

Session organisers: University of Tartu and University of Helsinki

The EcoSensitivity session placed the tool within the broader challenge of managing increasing and increasingly diverse human pressures on the marine environment. The Baltic Sea is a shared marine ecosystem where environmental pressures and their impacts extend across national borders. Its large catchment area and numerous human activities make effective environmental management particularly challenging. Although progress has been made in addressing some environmental pressures, significant challenges remain. The complexity of marine ecosystems means that changes caused by human activities can be reflected in many interconnected environmental variables.

Decision-support tools can help bridge the gap between data collection, scientific knowledge and policy-making. During the session, the concept of an ecological digital twin was presented as an approach for supporting ecosystem-based management. By combining information on human pressures, environmental values and their interactions, such tools can support the assessment of cumulative impacts and contribute to data- and knowledge-driven environmental decision-making. This is a continuous process in which assessments inform management decisions, while new information and the effects of those decisions feed into future assessments.

The potential of AI-assisted data gathering was also discussed. Such methods can facilitate the use of information from a larger number of scientific publications and help integrate scientific knowledge into digital decision-support tools. This enables users to examine different human pressures and environmental values and assess their potential interactions based on available scientific evidence.

Within OpenRisk II, the EcoSensitivity tool focuses particularly on the environmental consequences of oil spills. The impacts of an oil spill are highly event-specific and depend on factors such as the location of the incident, the type and volume of oil released, prevailing environmental conditions and the sensitivity

of the affected ecosystem. The EcoSensitivity tool approach brings together different modelling and assessment tools to account for these factors. The process combines ADSAM for modelling oil release, Seatrack Web for estimating oil drift and PlanWise4Blue for assessing environmental impacts, with the results contributing to sensitivity mapping.

Future development needs include improving knowledge of new fuel types, such as ultra-low-sulphur fuel oil, and their behaviour and environmental impacts following a spill. The session also highlighted the potential to incorporate additional information relevant to practical response operations, further strengthening the connection between environmental impact assessment, preparedness and response.

Bayesian networks and decision support

The session also presented the use of Bayesian networks, which are probabilistic models that can support decision-making under uncertainty. The work focused on two areas: uncertainty concerning the effectiveness of policy measures and the integration of separately developed Bayesian networks into a common framework.

The results highlighted a connection between policy effectiveness and the value of additional information. When the effectiveness of a policy measure is uncertain or lower than expected, additional information about the system can become increasingly valuable for supporting decisions. This underlines the importance of considering uncertainty about policy effectiveness when evaluating management measures.

Where sufficient information on policy effectiveness is not available, expert knowledge can also be used to support the assessment. Understanding how future changes may affect the effectiveness of existing or planned measures can help decision-makers adapt their approaches and contribute to more resilient environmental management.

R-Mare matrix: Tool for enhanced overall risk management performance

Session organisers: Finnish Transport and Communications Agency Traficom and Åbo Akademi university.

The R-Mare Matrix is a qualitative risk maturity tool designed to support self-evaluation by maritime authorities. It enables organisations to assess their current risk management performance, better understand their existing capabilities and identify specific areas for future improvement. Based on the assessment, the tool provides a structured framework for planning actions to improve risk management practices and increase organisational understanding of risk management.

The model distinguishes between five levels of risk management maturity: inadequate, reactive, compliant, proactive and optimal. The levels describe a progression from limited or mainly reactive risk management towards increasingly systematic, proactive and continuously improving practices. The compliant, proactive and optimal levels represent progressively more developed risk management practices.

In practice, the R-Mare assessment starts with appointing a qualified risk analysis expert and selecting the risk management attributes to be assessed. Suitable internal evaluators then conduct the assessment and provide justification for their evaluations. The results are summarised to identify strengths and areas requiring further development, after which the organisation can plan and implement improvement measures.

An important feature of the approach is periodic reassessment. R-Mare is intended to support a continuous improvement cycle rather than provide a one-time evaluation. Assessment results inform improvement actions, while subsequent assessments allow organisations to review progress and identify new development needs as their operating environment and risks evolve.

Future-oriented session: collaboration in maritime risk management and what happens next

The final session of the conference looked beyond OpenRisk II and discussed the future of maritime risk management in the Baltic Sea Region and beyond. The discussion focused on strengthening regional cooperation, increasing the uptake of risk management tools, expanding their use beyond the Baltic Sea, moving from research to practical application, and identifying priorities for future work.

Continued **regional cooperation and dissemination** were identified as important for ensuring that the results of OpenRisk II are taken forward. The EU Strategy for the Baltic Sea Region Policy Area Maritime Safety (EUSBSR PA SAFE) will continue to focus on maritime risk, providing an opportunity to build on and disseminate the results of OpenRisk II. Norway's participation also brings additional expertise and opportunities for cooperation within the region. Further uses of the tools could also be explored, including the development of the EcoSensitivity tool to support oil-spill response exercises and further work related to ice navigation.

Increasing the **uptake and long-term use of the tools** was another central topic. The international nature of AISyRISK Baltic and the other OpenRisk II tools was highlighted as one of their key strengths, and their continued use could support cooperation between countries in the region. Norway aims to provide AISyRISK Baltic as a regular service, although engagement and financial contributions from Baltic Sea coastal countries would be needed to support this ambition. The possibility of wider EU-level application

was also discussed. In addition, some of the models and algorithms developed for strategic purposes could potentially have more operational applications, such as surveillance. Cooperation with security organisations and the private sector was therefore identified as another area for further exploration.

The discussion also considered the potential application of project results **beyond the Baltic Sea, particularly in the Arctic**. Dissemination of the project results at the Arctic Circle Assembly in Reykjavik was identified as one opportunity to support this process. Potential interest from Asian countries was also noted. At the European level, access to high-resolution AIS data would be an important step towards wider application of AISyRISK. While such expansion is considered technically feasible, strong support from national authorities would be required.

A further theme concerned moving **from research to practice**. The discussion highlighted the importance of public administrations not only participating in research and development projects but also taking an active role in implementing the resulting solutions. Rather than developing one comprehensive “mega model”, linking complementary tools and models through common platforms was identified as a more useful approach. Creating bridges between existing models could also enable their wider application. One example discussed was the development of a drift model covering the European area, potentially building on available **Copernicus** tools, which could support wider application of the EcoSensitivity approach.

Developing **user skills, learning materials and training** was also identified as important for the long-term uptake of the tools. Such capacity-building activities can be organised nationally even when the tools themselves are intended for international use.

Overall, the discussion demonstrated that continued technical development alone will not ensure the long-term impact of OpenRisk II. **Effective dissemination, cooperation between countries, commitment from maritime authorities, sustainable service arrangements, interoperability between tools and sufficient user competence will all be important for taking the project results forward.**

Summary

The OpenRisk II Final Conference brought together project partners, maritime authorities, researchers and other stakeholders to present and discuss the results of the project and the future of maritime risk management in the Baltic Sea Region. The conference highlighted the importance of continued international cooperation in responding to changing maritime traffic, environmental pressures and emerging risks. It also demonstrated the growing role of data-driven tools in supporting maritime risk assessment, environmental protection and organisational preparedness.

The conference presented the three main OpenRisk II tools: AISyRISK Baltic and its ice module, the EcoSensitivity tool and the R-Mare Matrix. AISyRISK Baltic supports strategic assessment of maritime traffic risks using high-resolution AIS data, while the ice module extends the approach to winter navigation conditions. The EcoSensitivity tool brings together information on oil releases, oil drift and environmental sensitivity to support assessment of the potential environmental consequences of oil spills. The R-Mare Matrix enables maritime authorities to assess their risk management maturity, identify areas for improvement and support continuous development of organisational risk management practices.

The discussions also identified areas where further work could strengthen the use and applicability of the tools. These include improving AIS data quality and addressing spoofing, further developing risk assessment for ice-covered and Arctic waters, increasing knowledge of the environmental behaviour of new fuel types, and strengthening connections between different models and decision-support tools. Moving from research to practical implementation was a recurring theme, with the active involvement of maritime administrations, development of user skills and training, and long-term arrangements for maintaining and operating the tools identified as important factors.

As OpenRisk II comes to an end, the conference underlined that the project's results provide a basis for continued cooperation and practical application. Opportunities were identified for wider use of the tools within the Baltic Sea Region, elsewhere in Europe and potentially in the Arctic. Rather than developing isolated or all-encompassing systems, future efforts could focus on connecting complementary tools and existing platforms. Continued cooperation between authorities, researchers and other stakeholders can help ensure that the knowledge, methods and tools developed through OpenRisk II continue to contribute to maritime risk management beyond the lifetime of the project.

Annex I: Participating organisations

ORGANIZATION / COMPANY
Aalto University
County Administrative Board of Västra Götaland
DMA
DNV
Estonian Fund for Nature (ELF)
Estonian Marine Institute
Estonian Transport Administration
European Maritime Safety Agency
EUSBSR PA Safe
Federal Maritime and Hydrographic Agency
Finnish Shipowners Association
Finnish Transport and Communications Agency Traficom
Fintraffic VTS
Gdańsk University of Technology
German Central Command for Maritime Emergencies
Germany's Federal Waterways and Shipping Administration
HELCOM Secretariat
IALA
International Islamic University Malaysia
Interreg BSR MA/JS
Kotka Maritime Research Centre
Maritime Office in Gdynia
Ministry of Climate of Estonia
Nord University Business School of Nord University
Norwegian Coastal Administration
Research Institutes of Sweden
South-Eastern Finland University of Applied Sciences Xamk
Swedish Coast Guard
Swedish Maritime Administration
Swedish Meteorological and Hydrological Institute
Swedish Transport Agency
Tallinna Sadam AS
Taltech, Estonian Maritime Academy
University of Helsinki
University of Tartu
World Maritime University
Åbo Akademi

ANNEX II: Full agenda of the Conference

Programme of the OpenRisk II Project Final Conference on Maritime Risk Management in the Baltic Sea Region

22nd September 2026, Kristiansand, Norway

Time: 8:30 – 16:00 (Central European Time, (UTC+1))

On-site Venue: Kunstsilo, Sjølystveien 8, 4610 Kristiansand, Norway

8:30 – 9:00 Registration open on-site

9:00 – 9:10 Welcome to the event

- Welcoming words from Norway, Hans-Petter Mortensholm, Norwegian Coastal Administration

9:10 – 10:10 Setting the scene

- Openrisk II: the project process and maritime risk management, Hermann Backer Johnsen, Åbo Akademi university
- Thematic speakers
 - Ice service in Norway – a practical perspective, Geir Gjevang, Norwegian Coastal Administration
 - Digital tools for Response – DIGIMARIS project, Pentti Kujala, TalTech Estonian Maritime Academy
 - EMSA's new Regulation and the Risk Assessment work initiated under its implementation, Victor Diaz Seco, European Maritime Safety Agency (EMSA)

10:10 – 10:40 Coffee Break

10:40 – 10:45 Introduction to workshop sessions

10:45 – 11:45 AISyRisk and ice module session

11:45 – 12:45 Lunch on-site covered by organizers

12:45 – 13:45 EcoSensitivity tool session

13:45 – 14:30 R-Mare matrix: Tool for enhanced overall risk management performance session

14:30 – 14:45 Coffee Break

14:45 – 15:45 Future oriented session: collaboration in maritime risk management, expansion of the tool userbase and what happens next

15:45 – 16:00 Wrap-up of the day and the project

OpenRisk II project (2023-2026) is co-funded by the EU Interreg BSR programme 2021-27.