Input paper: ARM20-9.1.3

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**X** ARM **□** ENG  PAP **X** Input

**□** DTEC **□** VTS **□** Information

Agenda item 9.1

Technical Domain / Task Number 1.4.7

Author(s) / Submitter(s) World-Wide Academy

Review and assess risk management tools currently used in the maritime and allied industries

# Summary

It is important for IALA to regularly review its publications to ensure they reflect current best practices and methodologies. This includes periodic evaluations of the IALA Risk Management Toolbox. As part of this effort, an output task from ARM 17 in October 2023 was to survey IALA committee members and the wider maritime community to identify the navigational risk assessment tools currently in use within the Marine Aids to Navigation (AtoN) sector. A brief questionnaire was developed to gather such insights.

Three surveys conducted between April 2024 and January 2025 gathered input from IALA ARM Committee members and the maritime community on risk assessment tools. The most cited methods were SIRA, PAWSA, and IWRAP, with some respondents indicating AISyRISK, NIST, SAMSON, and HAZID use. Additionally, Vincent Denis reported using the Voyage Planning Template in BASSnet, Axel Hahn reported using Maritime Traffic Simulation, Human Models, and a Risk Assessment Method from automotive and aviation, while Yvolkan Aydogdu mentioned the Environmental Stress Model. Further contact with Denis, Axel and Yvolkan is recommended.

## Purpose of the document

This document presents the findings of a questionnaire conducted following ARM 17 in October 2023 to identify the navigational and maritime risk assessment tools currently used within the AtoN sector. The results aim to inform the ARM Committee Working Group 3 (WG3) in reviewing the IALA Risk Management Toolbox, ensuring it reflects current practices and meets user needs.

## Related documents

* Risk Management Tools Global Survey Summary\_Email
* Risk Management Tools Global Survey\_LinkedIn

# Background

It is important for IALA to regularly review its publications to ensure they reflect current best practices and methodologies. This includes periodic evaluations of the IALA Risk Management Toolbox. The ARM committee tasked a working group with researching the use of risk management tools in the maritime industry as an ongoing work item.

# DETAIL

*Email survey 1 – April 2024.* The questionnaire, issued to IALA ARM Committee members on the 18th of April 2024 reflects a total of 36 responses. Among these, 9 respondents mentioned using the SIRA method, 4 referenced PAWSA, and 11 highlighted the use of IWRAP for navigational risk assessment. An initial review of the responses identified 8 particularly interesting answers that may warrant further discussion, particularly regarding the use of alternative tools and the need for clarity on specific tools applied rather than general risk assessment philosophies. Notably, while the Formal Safety Assessment (FSA) approach was mentioned, there was limited detail on how it is practically translated and applied.

*Email survey 2 - October 2024.* A second email was issued to ARM members. An additional 45 responses were received, bringing the total number of responses to 81. Of these, 19 mentioned using the SIRA method, 6 referenced PAWSA, and 10 highlighted the use of IWRAP for navigational risk assessment. Single responses indicating the use of non-IALA tools included AISyRISK by the Norwegian Coastal Administration, HAZID tools, NIST, and SAMSON.

*LinkedIn survey 3 – January 2025.* The LinkedIn survey conducted in January 2025 received 112 reactions, four comments, and 17 survey responses, with most respondents already using the IALA Risk Management Toolbox. Exceptions were the Voyage Planning Template in BASSnet (Vincent Denis), the Environmental Stress Model and Maritime Traffic Simulation (Yvolkan Aydogdu), Human Models and a Risk Assessment Method from automotive and aviation (Axel Hahn), and the MARNIS Port Assessment Toolkit (Monty Smedley). A discussion between Monty and the IALA WWA is summarized below. Further contact with Denis, Axel and Yvolkan is recommended.

**ABPmer organization**

ABPmer are a UK commercial organization and sister company of ABP (Associated British Ports) formed when the UK ports were privatised. It consists of maritime consultants, primarily providing maritime services to ports, both large and small in the UK. Whilst the services do include navigational risk assessment (including processing and visualisation of AIS data) both for harbour masters and private berth developers, many of the services revolve around the wider requirements of the UK’s Port Marine Safety code. This relates not only to vessel passage but also to port operations and environmental management.

**MARNIS software**

The ABPmer organisation together with port end users developed MARNISto understand what ports generally need to assist with risk management, including operational risk, accident reports and data analysis and portrayal. It is not primarily a navigational risk management tool, but the operational risk management module facilitates the appraisal of hazards for example, fire on, or grounding of, a vessel within a port, identification of frequency and consequence of the hazard and a means of qualitatively recording the perceived impact of risk control measures. It is therefore worth further examination by the IALA ARM Committee Working Group 3 to understand the method and underlying principles.

The MARNIS methodology used is analogous to SIRA. The hazard is identified and appraised for likelihood (frequency) and consequence, with the consequence being considered over a range of receptors e.g., environment, safety of personnel, reputation etc., and combined to establish a risk value. That risk value is then appraised in the light of a range of risk control options and a residual risk value obtained to give an indication of the efficacy of the selected options.

Here are some initial observations to compare the MARNIS method with SIRA. Each bullet point lists the MARNIS characteristic followed by the corresponding SIRA comparison:

* Like many other risk assessment methodologies, the method addresses “Worst Credible” and “Most Likely” hazard realization outcomes to try and achieve a better balance of caution with practicality and resources.

A SIRA does not consider these two outcomes. Without guidance there could be the potential to focus towards either of these ends of the consequence scale for a specific hazard, dependent on the opinion of the stakeholders (and guidance of the facilitator), with a potential for over exaggeration of the worst credible outcomes or maybe even underestimation of the most likely.

* The arithmetic combination of frequency (likelihood) and a *range* of consequences to obtain a risk value allows for weighting of the consequence categories depending on the hazard. For example, if you know that a collision between a fishing vessel and a commercial vessel that you consider is likely to have a greater safety implication than an environmental one, then you can weight the safety consequence category. The ultimate calculation is a weighted average across the consequence categories.

The SIRA method advises taking the highest consequence and using that in combination with the likelihood to obtain the risk value.

* There is the opportunity to provide a qualitative appraisal of the scale of influence of risk options. This is undertaken on an individual port basis, so does not refer to an absolute set of data held for the UK for example but facilitates individual qualitative discussion with stakeholders as to where the most benefit may be gained from a range of risk controls for a specific hazard.

The SIRA method does not specifically exclude separating out the impact of individual risk control options, but it does not specifically address it. In training we advise inserting rows A and B into the spreadsheet, for example, if there is more than one risk control measure for which you want specific risk reduction/cost information for a specific hazard.

* The software provides an ability to view risk levels over time and provides a historic view of risk values for a specific hazard. This aligns with the FSA and IALA principles of risk management that state risk management should include monitoring and review.

The structure of the SIRA facilitates auditable revisit but it does not translate and summarise a progression in numbers. We could advise this however more generally in training.

* MARNIS, like SIRA, does not provide cost-benefit/effectiveness appraisal (step 4 of the FSA) nor does it explicitly address iterative consideration of additional risks imposed by additional risk control measures.
* Please note MARNIS is a commercial product and not open source.

# ACTION REQUESTED OF THE COMMITTEE

1. The Committee is requested to review this paper and discuss whether any of the characteristics described in the bullet points above could complement the existing SIRA tools.
2. Agree to contact Denis, Axel and YVolakn to discuss their respective risk tools further.