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Agenda item 9.1

Technical Domain / Task Number 1.4.4

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Ports and Waterways Risk Assessment (PAWSA) Methodology in the United States

# Summary

The Ports and Waterways Risk Assessment (PAWSA) is a tool that uses a structured two-day process for evaluating risk in a port or waterway through local expert inputs. It was first developed in the United States in 1999, and the second iteration of the tool was adopted by IALA in 2005. This paper is presented to inform IALA on the ongoing U.S. Coast Guard PAWSA review.

## Purpose of the document

This is an information paper presented to the ARM Committee for discussion with Task 1.4.4: Review Risk Management related documentation. Update as per ongoing risk toolbox developments.

## Related documents

None.

# Background

The Ports and Waterways Risk Assessment (PAWSA) process was developed during the 1990s in the United States Coast Guard (USCG). The methodology uses a generic model of waterway risks that includes factors addressing the likelihood and the consequences of an incident. The focus of a PAWSA is on matters related to navigational and waterways safety. As such, security-related issues are not covered during the workshop.

The ultimate goal of a PAWSA is to provide the Captain of the Port and members of the waterway community an effective tool to evaluate risk and work towards long term solutions tailored to local circumstances. An effective PAWSA should help find solutions to excessive risk that are both cost effective and meet the needs of waterway users and stakeholders.

Over 70 ports and waterways in the U.S. have completed the PAWSA process, which generally has been well received by local maritime communities. During the course of almost thirty years of PAWSA workshops throughout the United States and in international venues, the model has twice been revised to reflect the nature of waterway risks being experienced and participant feedback. A third revision is currently underway.

In May 2024, the USCG hosted a team from the IALA Worldwide Academy to observe a PAWSA Mk III session in Tampa, FL with the goal to report back on their findings to ARM. Concurrently, the USCG used this PAWSA to assess the need for possible model changes. The results of both were discussed at ARM19. Since then, the USCG has developed and tested various updates to a new PAWSA model, Mk IV. The first use by a port is anticipated in May 2025.

# Discussion

The following Sections briefly outline the PAWSA Mk IV process. Before each step the participants are given background, instructions, and examples to help them understand what they will do at each step.

1. *Risk Factor Discussion*. A structured discussion of each of the 16 risk factors. This is the same as **Mk II and Mk III models. The facilitation team takes note of issues that are driven by each risk factor, geographic location, and consequences of potential incidents.**
2. *Risk Characterization*.
   1. The participant teams then evaluate each risk factor on three questions:
      1. What is the current risk level;
      2. What is the current risk trend; and
      3. How well are the current mitigations working?
      4. These questions are used to determine which of the risk factors should be quantitatively assessed the next day of the workshop. Due to the depth of the quantitative assessment, it’s not possible to review all risk factors, so this step filters to the most significant ones.
   2. The results of the questions are flagged as Red, Orange, Yellow, or Green for each team using this logic:
      1. Red. If the *Risk Level* is Unacceptable OR the *Mitigations* are Unacceptable.
      2. Orange. If the *Risk Trend* is Increasing AND the *Mitigations* are Tenuous.
      3. Yellow. If the *Risk Trend* is Steady AND the *Mitigations* are Tenuous.
      4. Green. All others.
   3. The team results are aggregated and coded as Red, Orange, Yellow, Green, or Grey. An example and the logic is in the graphic below. The intent is to find the largest agreement (>60%) on the current state and evaluate those risk factors. If there is no clear agreement, the participants are given a chance to discuss whether to include that risk factor in the quantitative assessment. The U.S. currently estimates that no more than 6 risk factors would be quantitatively assessed, with Red / Orange characterizations being prioritized. This is partially due to time limits and partially an attempt to reduce the cognitive load on the participants.

Graphical user interface, application

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1. *Issue Prioritization*. Once the risk factors are reduced to the most significant, the participant teams are shown a summarized list of issues associated with each risk factor. If the number of issues is more than three, then they do a multi-vote to reduce the issues to their top three within that risk factor. This is the end of Day 1. These risk factors and issues are populated in the forms they will use the next day for the quantitative evaluation.
2. *Quantitative Assessment*. Each team fills out one form per risk factor. Each form has space for three issues and up to four events associated with each issue. Each event is evaluated along three types of consequences: Safety, Environmental, and Economic. Each consequence type has five levels of severity. For each consequence severity category (*I thru V*), teams assess how likely each severity level is for each combination of Issue-Event-Consequence Type. Participants are given a handout to reference the likelihood and consequence descriptions as they fill the form in. The intent is to have a broader understanding of the risks in the port, to include lower consequence but more frequent events and get beyond looking at just a worst-case scenario. This can also be used to focus the subsequent mitigation discussion on specific risk hot spots that might otherwise be hidden. For example, if a main driver of collision risk is the environmental consequences, then the mitigations could focus more on ship design to protect cargo tanks or better response gear to limit the environmental damages. However, if the main driver of collision risk are the economic consequences from a port shutdown, then mitigations might look like tug escorts for the largest ships and policy changes like one-way traffic.

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1. *Mitigation* *Discussion*. This section is a brainstorming discussion for identifying and documenting potential mitigations to the issues, events, or consequences for each quantitatively evaluated risk factor. The facilitation team takes notes for the report.

## Actions Since ARM19

The USCG has done several rounds of internal review to build and refine the model. Included was feedback from ARM19, Worldwide Academy personnel, and contractors with IALA PAWSA experience. Within the past month a one-day workshop was done with personnel from outside the development organizations. This provided an opportunity for the facilitation team to use the Mk IV with participants who had a variety of experiences with PAWSA, but most had not been exposed to it before. The feedback from both the facilitators and participants is being reviewed and incorporated where possible.

## Next Steps

Once the last round of revisions from the training workshop is finished the Mk IV will be used for the port of Milwaukee, Wisconsin which is located on the Great Lakes. The feedback from that PAWSA will also be reviewed for potential changes. Unless major issues are revealed, we anticipate the Mk IV being used in subsequent assessments. Refinements and adjustments based on feedback trends is still possible, but these would likely be facilitation adjustments and not model adjustments.

Outstanding work:

* Descriptor checkpoint changes, to improve the alignment of risk scores to reality. Currently the Economic consequences dominate the results. This needs to be adjusted for better balance.
* Determine how to deal with blank quantitative cells. They either need to be disallowed or better explained to the participants.
* Determine how to clarify the central concept on Likelihood 🡪 Event 🡪 Consequence as it relates to the quantitative assessment. The current explanation opens questions of whether they are evaluating how often a collision happens vs. how often someone gets hurt at severity X because of a collision. The model includes some conditional probability concepts, but it’s not explained that way.
* Determine which quantitative risk values to show to the participants. A significant amount of detailed data is collected during the process but showing it all to the participants went poorly during the training.
* Improving the port-specific contextual information. The participants will benefit from seeing historical data on events and consequences from their port. This should anchor their discussions better and serve as a touchpoint in case wildly elevated risks are being discussed as if they were common.

Portions of the Mk IV are being incorporated into PAWSAs that were scheduled for a Mk III. This is mainly the risk characterization portion, which is a marked improvement over an equivalent Mk III process. The facilitation team is excited to use it since it’s easier to understand and faster to process.

As expected, and reflective of Mk II, the data-entry by participants is difficult. The repetition due to the depth of information being collected causes form-fatigue. While currently functioning, improving the user experience will be an ongoing project.

# References

None.

# Action requested of the Committee

The Committee is requested to:

1. Take note of the information provided and the ongoing review of PAWSA in the United States.
2. Forward to WG 3 for discussion and consideration for future PAWSA development.