Port safety and risk management

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In your port or waterway, is there more marine traffic, larger or different traffic, new infrastructure, significant dredging, or other changes that might affect risk or safety? Consider SIRA, the IALA (International Association of Lighthouse Authorities) Simplified Risk Assessment Model for Ports.

If we consider that safety in ports is an expensive undertaking, imagine the cost of accidents. This article will describe the IMO/IALA risk management assessment using the new IALA created **SIRA**, (**Si**mplified **R**isk **A**ssessment) tool and how it can analyze and quantify these risks and help make decisions to render risks as low as reasonably possible.

Background

All ports and waterways around the world have risks. Safety within ports is significantly defined by the effective management of these risks. Identifying, quantifying, and mitigating risks is an ongoing process whereby some ports rely on experience and local knowledge to manage risks while others rely on more formal procedures to safely manage vessel movement.

The International Maritime Organization (IMO) and the International Association of Lighthouse Authorities (IALA) previously put in place two risk assessment tools for ports and waterways: The first, IWRAP, is a quantitative program using AIS data which in the end identifies the risk of accidents; the second is PAWSA, a qualitative tool which requires a large stakeholder convention and identifies potential safety upgrades.

Both tools require significant amount of data input or stakeholder participation and as a result can be complicated and costly to complete. The International Maritime Organization endorsed these tools, thus identifying the importance of formal risk management, and encouraged port and waterway authorities to use them. Good quality historical AIS data, on which IWRAP depends, is not always available, even in advanced countries, nor are there always enough individuals with the necessary level of experience in the risk categories used by PAWSA.

A full IWRAP or PAWSA could cost more than $100,000 USD to carry out and thus there is a need for a simpler and less costly risk management tool for use by national and port authorities who cannot practically use IWRAP or PAWSA.

The Simplified Risk Assessment process (SIRA) was developed to enable port authorities to assess the volume of traffic and the degree of risk in their waters. SIRA is a basic tool that can be used to consider risk control options covering the potential, undesirable incidents that a port authority is required to address under *SOLAS Chapter V, Regulations 12 and 13.* It is intended to be used as an objective stakeholder consultancy.

Process

The *SIRA* process is based on the principles set out in IALA Guideline 1018 on risk management. Risk is defined as the product of two factors – the probability (or likelihood) of an undesirable incident occurring and if it does occur, the severity of its potential long and short-term impact (or consequence). Satisfactory understanding of the maritime environment and maritime traffic patterns is an essential first step to understanding the risk level within a port. SIRA is designed to assist that process by identifying hazards and undesirable incidents. This leads to a qualitative estimate of risk and the production of potential risk control options to reduce such risk to acceptable levels.

A "hazard" is something that may cause an undesirable incident. The basic thinking behind the SIRA method rests on the fundamental causal relationship between hazards and the consequences of undesirable incidents, which the hazards may cause.

Based on the identified hazards, a number of possible incidents or scenarios are identified by a group of stakeholders. SIRA addresses each undesired incident or scenario, such as the grounding of a vessel on a reef, or the collision between two vessels. The probability or likelihood of the occurrence of each undesired scenario is estimated, as well as its impact (or consequences), considering both short- and long-term consequences.

Analysis

Select the waterway or portion of the waterway to be analyzed:

- Define assessment zones and describe each area
- Identify hazards within each zone and develop associated scenarios
- Assess the probability and impact of each scenario
- Identify and prioritize possible risk control options
- Produce a comprehensive report of the risk assessment
- Communicate result to decision makers

Once zones have been selected, each zone must be described in terms of:

- Volume of traffic and mix
- Bathymetry (charts)
- Geometry of routes in the area, traffic choke points and sharp bends
- Oceanographic, meteorological and environmental conditions
- Existing fixed and floating Aids to Navigation and routing measures

- Availability of VTS and pilotage
- History of maritime incidents such as collisions and groundings
- Stakeholders of the zone

Hazard identification should be based on all available relevant information including:

- Volume and mix of traffic along all routes and areas within the zone
- Geometry of routes in the area, traffic choke points and sharp bends
- Waterway complexity
- Isolated dangers including wrecks and obstructions
- Quality of hydrographic data and charted information available
- Anchorages, fishing grounds, aquaculture, and offshore energy sites and the routes to and from them
- Safe minimum depth (chart Datum) required for vessel operation within the waterway
- Meteorological visibility in the zone
- Passages through a narrow channel, restricted waters or port entry
- Possible effects of low sun, background lighting or glare
- Spoil grounds, undersea cables, military exercise areas and particularly sensitive sea areas
- Information in IMO Ships' Routing publication and Sailing Directions
- History of maritime incidents such as collisions and groundings

When identifying hazards, largest scale charts covering the zone should be used.

The hazards identified may lead to several different undesired incidents or scenarios. Each hazard should be considered carefully — and the possible scenarios it may cause — should be identified and recorded.

Unwanted incidents or scenarios can be categorized as follows:

- Grounding
- Collision
- Allision
- Foundering
- Structural failure
- Other

Probability and impact

Descriptions of probability

Classification	Score	Probability
Very rare	1	Very rare or unlikely, will occur only in exceptional circumstances and not more than once every 20 years
Rare	2	Rare, may occur every 2-20 years
Occasional	3	Occasional, may occur every 2 months to 2 years
Frequent	4	Frequent, may occur once weekly to every 2 months
Very frequent	5	Very frequent, may occur at least once every week

Descriptions of impact

Description	Score	Service disruption criteria	Human impact criteria	Financial criteria	Environment
Insignificant	1	No service disruption apart from some delays or nuisance	No injury to humans, perhaps significant nuisance	Loss, including third party losses, less than US$1,000	No damage
Minor	2	Some non-permanent loss of services such as closure of a for up to 4 hours	Minor injury to one or more individuals	Loss, including third party losses, US$1,000 – 50,000	Limited short-term damage to the environment
Severe	3t	Sustained disruption to services such as closure of a port or waterway for 4-24 hours	Injuries to several individuals requiring hospitalization	Loss, including third party losses of $50,000 - 5,000,000	Short-term damage to the environment in a small area
Major	4	Sustained disruption to services such as closure of a major port or waterway for 1-30 days	Severe injuries to many individuals or loss of life	Loss, including third party losses of $5,000,000 - 50,000,000	Long-term to irreversible damage to the environment in a limited area
Catastrophic	5	Sustained disruption to services such as closure of a major port or waterway for months or years	Severe injuries to numerous individuals and/or loss of several lives	Loss, including third party losses of over $50,000,000	Irreversible damage to the environment in a large area.

The acceptability of risk

Having determined probability and impact scores by consensus, the risk value can be calculated in accordance with the matrix in the table below:

Risk value matrix

		PROBABILITY / (LIKELIHOOD)				
		Very Rare (1)	Rare (2)	Occasional (3)	Frequent (4)	Very frequent (5)
CONSEQUENCE (IMPACT)	Catastrophic (5)	5	10	15	20	25
	Major (4)	4	8	12	16	20
	Severe (3)	3	6	9	12	15
	Minor (2)	2	4	6	8	10
	Insignificant (1)	1	2	3	4	5

Objective

The objective of the assessment is to identify risk mitigation options for each undesirable incident that would, if implemented, reduce the risk to an acceptable level. These may include:

- Improved co-ordination and planning
- Additional training and education
- New or enforcement of existing rules and procedures
- Improved charted hydrographical, meteorological and general navigation information
- Enhanced aids to navigation service provision
- Improved radio communications
- Active traffic management such as Vessel Traffic Services
- Changes to the waterway
- Improved decision support systems
- Pilotage requirements

A formal record of the risk assessment process and its outcomes is prepared that provides evidence of the decision process and risk mitigation measures considered and recommended. It also provides for a comprehensive record when future deliberations take place about the waterway.

The report includes:

- Description of the waterway and individual zones
- Stakeholders present at the remote workshop and their relevant experience
- Hazards and scenarios identified within each zone
- Mitigating measures identified and recommended
- The completed risk matrix
- Any other amplifying information regarding the assessment

Note: portions of this report have been extracted from IALA guideline "G1138 Use of SIRA"

For more information on SIRA, or to book a remote assessment, please contact: info@nauticalconsulting.com.

About Captain Brian Tuomi
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Captain Tuomi is a graduate of the Canadian Coast Guard College and following a career there including 12 years as a ship's captain, is now a consultant for Nautical Consulting International. He has worked in 18 countries on marine infrastructure and safety projects for agencies such as the World Bank and the Asian Development Bank**.**

He is certified by IALA, the International Association of Lighthouse Authorities to conduct their formal ports and waterways risk assessments IWRAP, an AIS based program, PAWSA, a consultative process and SIRA, a Simplified Risk Assessment now being delivered remotely. Details and quotations on a SIRA risk assessment for your port can be obtained at **info@nauticalconsulting.com**