

**RISK-BASED DECISION-MAKING GUIDELINES  
(SECOND EDITION) SERIES OF ARTICLES:  
HOW WERE THE TOOLS CHOSEN?**

*This article is the fourth in a series concerning the revised Risk-based Decision-making (RBDM) Guidelines. It contains information about tool selection and testing for the 2<sup>nd</sup> edition.*

**HOW WERE THE TOOLS CHOSEN FOR THE  
2ND EDITION OF THE GUIDELINES?**

Determining which methods would be included in the new risk toolbox involved an evaluation of risk tools in the context of Coast Guard marine safety decision-making. This required an appreciation of field unit decision activities, their processes, their existing applications of risk tools, and finally a mapping of risk-tool families to typical decision-making activities.

**FIRST EDITION**

***A few risk-management tools:***

- ✓ Total Quality Management Techniques
- ✓ Failure Modes, Effects and Criticality Analysis
- ✓ Port and Waterway Risk Assessment Guide

***Examples:***

A few examples of applications of risk-based decision-making methods

In creating the 1<sup>st</sup> edition (see inset) as a stopgap, the field was not consulted on their decision-making requirements. However, in creating the 2<sup>nd</sup> edition (see inset), a map of risk tools to typical marine safety decision-making activities was used to prioritize the tools that needed field validation. The tools were evaluated in one of three ways: 1) a critical review of past field unit risk-tool applications, 2) a critical review of marine industry RBDM best practices, and 3) an introduction of new tools in unit workshops.

***Past Field-Unit Applications.*** Many units have already been developing excellent applications of RBDM on their own. Some of

**SECOND EDITION**

***A more diverse risk-management toolbox for applications to marine systems:***

- ✓ Preliminary risk analysis (PrRA)
- ✓ Change analysis
- ✓ What-if analysis
- ✓ Checklist analysis
- ✓ Relative ranking/risk indexing
- ✓ Failure modes and effects analysis (FMEA)
- ✓ Hazard and operability (HAZOP) analysis
- ✓ Fault tree analysis (FTA)
- ✓ Event tree analysis (ETA)
- ✓ Event and causal factor charting
- ✓ Preliminary hazard analysis (PrHA)
- ✓ Pareto analysis

***Examples:***

Examples of applications to Coast Guard issues developed in MSO workshops

these applications were highlighted in the July-September 1999 Proceedings on Risk Management.

The project team performed a critical review of some of these applications to identify their implementation strengths and weaknesses and to use this knowledge to make improvements to the Guidelines. For example, based on the frequency of use of relative ranking/risk indexing tools by the field and weaknesses observed in their application, the new Guidelines placed more emphasis on how to custom develop and deploy this type of tool.

Field use of relative ranking/risk indexing, e.g., Port State Control targeting matrix, has been a hammer in a single-tool toolbox. In some cases, if units had a more diverse toolbox that they were trained in, the tool selected might have been very different and the overall application more effective.

***Marine Industry Practices.*** In contrast to the Coast Guard, the marine industry survey revealed no strong initiative in industry, as a whole, to use sophisticated risk-assessment tools. However, industry does support the

Coast Guard movement toward a risk-based decision-making focus.

All of the risk applications obtained during the marine industry survey fit well into the categories currently defined in the 2<sup>nd</sup> edition of the Guidelines. This validates the efficacy that the new guidelines can have if they are exported and/or used jointly with our MTS partners, e.g., harbor safety committees.

**Tool Testing by Field Units.** Workshops with field units were instrumental in shaping

the new Guidelines and final toolbox. The table below illustrates some of these applications. The field units demonstrated uses of these tools in conducting port and waterway operations, requirements for operating certain types of vessels, contingency planning priorities, mishap investigations, equivalency issues, and business planning. The results were used to determine the applicability of the various risk tools used and Guideline improvements.

<u>Risk Tool Used</u>	<u>Field Unit and Risk-based Decision-making Application</u>
PrRA/Guide Word/Change Analysis/Human Error Checklist	Activities Baltimore – Baseline risk profile of water-side and shore-side activities
Relative Ranking	MSO Buffalo/MSD Massena – Prioritizing Vessels for Coast Guard Inspection
FTA/FMEA	MSO Buffalo/MSD Massena – Establishing Specific Inspection Plans
5-Whys/FTA/Root Cause Map	MSO Buffalo/MSD Massena – Chronic Grounding Incidents in the St. Lawrence Seaway
Change Analysis/What-If/PrRA	MSO Charleston – Raising the Hunley
Event Tree	MSO Charleston – Operating Gaming Vessels from Myrtle Beach
FTA/Human Error Checklist/HRA	MSO San Francisco – Bridge Staffing for Ferries
PrHA/Checklist/Risk Indexing	MSO San Francisco – Marine Construction Activities
Event Tree/Checklist/Relative Ranking	MSO Mobile – Stability Letters on Small Passenger Vessels
Relative Ranking/PrRA	MSO Mobile – Establishing Planning Priorities
HAZOP	MSO Mobile – Oil Spills and Fires/Explosions During Fuel Barge Filling at Small Marine Terminals
Event Charting	MSO Mobile – Barge Grounding in Apalachicola Bay
Event Tree/ Risk Indexing	MSO Providence – Equivalent Lifesaving Requirements on Small Passenger Vessels Operating in Protected Waters
What-if Analysis	MSO Providence – Risk-based Approval of Operations Plans for Intentionally Grounding Small Passenger Vessels in Narragansett Bay

*Previous articles discussed differences between the 1<sup>st</sup> and 2<sup>nd</sup> editions and the status of RBDM in the Coast Guard. Future articles will provide additional information on RBDM, how to get started, the data compendium, and future*

*plans. The Marine Safety and Environmental Protection Directorate Risk Homepage at <http://www.uscg.mil/hq/g-m/risk/>, will post an electronic version of the 2<sup>nd</sup> edition, job aids, and best practices as they become available.*