

Bowtie Analysis for Major Hazards Installations

Bowtie Analysis: See the Whole Picture, Manage Risks Effectively

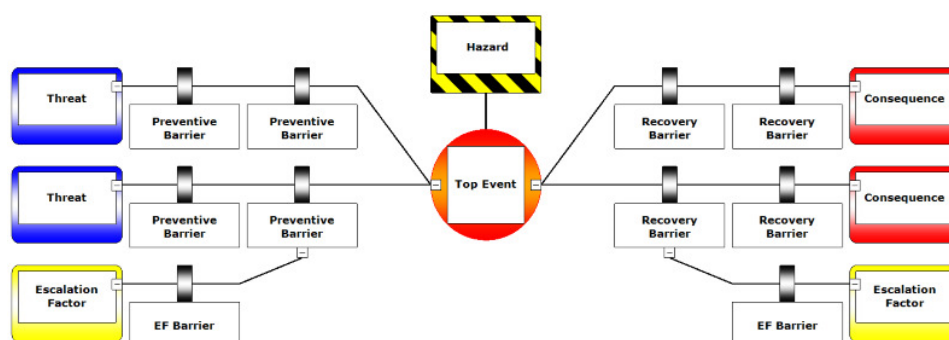
What is Bowtie Analysis?

Bowtie Analysis is a risk management tool that can be used to identify, assess, and manage the risks associated with major hazards installations. It takes the form of a visual representation, resembling a bowtie, illustrating the interconnections among hazards, threats, outcomes, and safeguards, creating a clear differentiation between preventive and mitigative risk management. The strength of the Bowtie lies in its ability to present an overview of multiple plausible scenarios. In essence, it offers a straightforward visual explanation of a risk that would otherwise be complex to elucidate.

How does Bowtie Analysis work?

Bowtie Analysis is typically conducted in a workshop setting with a team of experts from different disciplines. The process begins by identifying the top hazards that could lead to a major accident. For each hazard, the team then identifies the potential threats that could lead to the release of the hazard, the possible consequences of a major accident, and the barriers that are in place to prevent the incident or mitigate the consequences.

Subsequently, the Bowtie diagram is then created to illustrate these connections. The top hazard is placed in the center of the diagram, with the potential threats on the left and the possible consequences on the right. The barriers are placed along the line connecting the threats and consequences.



Example - Illustration of Bowtie to represent a hazardous scenario

How can Bowtie Analysis be used to manage risks in major hazards installations?

Bowtie Analysis can be used to manage risks in major hazards installations in several ways. For example, it can be used to:

- Effectively portray the overall risk in a qualitative manner
- Identify gaps in the existing risk management system
- Determine effective risk reduction measure and helps prioritize risk reduction activities
- Support decision-making about risk management investments
- Communicate risks to stakeholders and demonstrate risks are managed to ALARP
- Used as lesson learnt from incident to further enhance the safety aspects of the process.

Benefits of using Bowtie Analysis

Bowtie Analysis has a number of benefits, including:

- It is a visual and easy-to-understand tool that can help to communicate risks to a wide range of stakeholders.
- It is a comprehensive approach to risk management that considers all aspects of the risk, including the hazard, threats, consequences, and barriers.
- It is a flexible tool that can be used to assess and manage risks in a variety of industries and settings.

References:

1. <https://spha.com/glossary/what-is-a-bow-tie-analysis/>
2. <https://www.icheme.org/media/15543/poster-09.pdf>
3. <https://www.icheme.org/media/16937/hazards-28-paper-31.pdf>
4. Singapore Safety Case Assessment Guide Chapter 8 – Human Factors Aspects of Safety Case Assessment (Technical Criterion 8.2)

An initiative of the SCIC Major Hazard Installation (MHI) Committee

With the implementation of Safety Case regime progresses into its operational phase, this bulletin aims to promote effective sharing of information to support MHIs in a successful implementation that could deliver the expected safety performance improvement of our industry. For enquiries, please contact SCIC via secretariat@scic.sg