

Bow-tie diagrams: Increasing benefits in the risk management process

Bow-tie diagrams are a pictorial display of the relationship between the various components that result from what is commonly termed the Hazard and Effects Management Process. The diagrams depict the relationship between hazards, threats, barriers, escalation factors, consequences and controls in the form of a qualitative risk assessment. With their roots well established within the traditional high hazard oil, gas and petrochemical industries, the concept is increasingly being adopted by other business sectors, including transportation, finance, commercial and medicine. In fact, any industry — or process that is exposed to risk — can benefit from this simplistic yet very powerful representation of a business management system.

A management system is a structured and documented process for managing risks within a company, to assure the protection of people, the company's assets and the business reputation, and for the protection of the environment the company operates within. A company management system will often follow a common structure, starting with the business principles, followed by the progressive and continuous

development of risk identification and subsequent mitigation. The manner and means by which a risk is controlled are delivered through people and procedures, which are also identified.

Developing the bow-tie

In its simplest sense, the bow-tie can just be a pictorial relationship of the hazards that can threaten the business through to the identification of how these hazards can be realized and what consequences may result. The controlling measures are also shown.

Subject to the nature of the bow-tie tool used and processes by which information is distilled or collected, the management system representation can be much more thorough and include:

- Assigning actual levels of risk via a corporate risk matrix.
- Developing critical tasks that serve to illustrate how a control will be managed.
- The document management system and linking of the relevant documents to the controls.
- Identification and assignment of personnel to the critical tasks.
- Monitoring the performance of the

controls via effective ratings.

- Capturing shortfalls and assigning and tracking actions.

Critical tasks

It is through the linking of critical tasks to controlling measures that the bow-tie demonstrates the implementation of a management system in managing the risk associated with hazards. Each controlling measure should have at least one supporting task, to ensure that the integrity of each control can be maintained. The critical tasks are required to be performed, undertaken or executed by responsible and competent persons.

The purpose of the bow-tie is to be a dynamic reflection of the management system which, through its clarity, can be readily contributed to and understood at all levels in an organization. For those industries that are regulated, the bow-tie is a clear statement that a business is serious about understanding and managing its risk profile.

The bow-tie process is an extremely attractive presentation tool and there can be numerous predefined reports that can be automatically generated. The ability to

query the database in this way adds increased flexibility.

The bow-tie process can be used for a number of applications:

- Supports management of major hazards.
- Unlocks relationships between hazards, controls and tasks (often hidden in paper-based systems).
- Bow-tie diagram summarizes hazard and effects analysis.
- Used for hazard awareness training.
- Preparation of emergency exercises.
- Hazard gap analysis.
- Incident investigation.
- Audit checklists/planning, e.g., critical tasks can be used as the basis for audit checklists.
- Input into operating procedures, job descriptions, annual tasks and targets, defining individual roles and responsibilities, etc.
- Possible linkage to other forms of analysis, e.g., layer of protection analysis.
- Capture shortfalls and track remedial actions.

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THESIS BowTie™ is the market-leading software for undertaking simplified, yet integrated risk management for your whole business portfolio. THESIS assists companies/operators in the analysis and management of the hazards and risks to which their business is exposed, graphically displaying the relationship of hazards, controls, risk reduction measures and business activities.

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