

The BowTie Risk Assessment Methodology

What is the BowTie Concept?

BowTie methodology is a fresh and coherent approach from the Risk Analysis selection. As everyday life shows, we encounter many unplanned events, which do not just happen, instead they stem from a multifaceted causation path, in relation to the complexity of “triggered” risks. Therefore, we desperately need a Scenario Based and a qualitative Hazard Analysis tool in proving our ability to mitigating risks effectively and that is what exactly Bow Tie is.

The Bowtie method has several Goals:

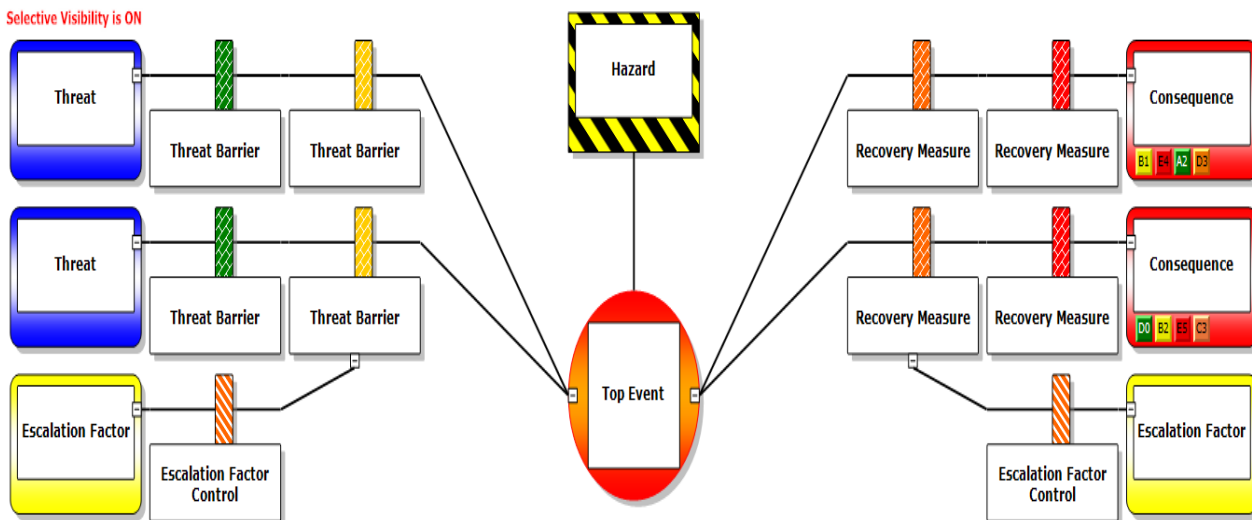
- Provide a structure and systematically analyse a hazard
- Help us make a decision whether the current level of control is sufficient (or, for those who are familiar with the concept, whether risks are As Low As reasonably Practicable or ALARP) and proving our ability to do so
- Help identify where and how investing resources would have the greatest impact
- Increase Risk Communication and Awareness within the organisation

The Bowtie does the Job because:

It is a perfect match for operational settings with human and organisational influences. In those occasions, quantification is impossible and instead we use Bowtie to proving the effectiveness of our processes and structures, the way our work force and management make decisions, suitable for the hazards we manage.

Bowtie simplifies the complexity to a manageable size without losing the context. Bowtie methodology conforms with ISO 31000 standards and when a relative software supports it, we maintain not only an overview of how organisation’s risks are managed but also we are enhancing risk communication and awareness on all levels of the operational phase.

How a Bow Tie Diagram looks like?



Bow Tie idea brings in an effective graphical representation of all potential interactions between (e.g. people, equipment, time, weather and mostly all organisational factors related to a hazardous sequence, etc.) which might lead into an business upset, in a measurable and understandable way, aiming at safety promotion within High Reliability Organisations. BowTies do that efficiently because they are constructed in a way to offer a better overview of each hazard and the specific scenarios that release it.

Threats are the scenarios, which release the hazard, and barriers are put in place to prevent them from happening or to mediate the potential outcomes of the released danger and their depiction on a single chart submits the ultimate tool for risk communication and training from top to bottom within the organisation.

Risk in BowTie methodology is elaborated by the relationship between Hazards, Top Events, Threats and Consequences. Barriers or Controls are used to display the exact mechanism, an organisation has arranged for risk mitigation.

Barriers are analysed further down and are combined with the management system behind to support them. That means that we further examine persons in charge of every barrier, training that is required and activities that keep the barrier active and ready to defend. The parts in the diagram are laid out in a sequential order and time factor is accounted as well. Their definition follows:



A hazard is defined as "The condition, object or activity with the potential of causing injuries to personnel, damage to equipment or structures, loss of material or reduction of ability to perform a prescribed function".

Hazards are commonly part of the accepted operating environment as in fact their existence offers a Key business advantage that is highly esteemed. Rather than being something that an organization seeks to take off its function it is more convenient to focus on effective management instead.



During the time that a hazard is under control, nothing really happens and everybody is happy. Trouble really starts when something causes the beginning of a LOC (Loss of Control) situation. Then a sequence of events is ready to start rolling and that specific moment is called as the Top Event.

In Bow Tie methodology, such an event is not catastrophe yet because still we maintain a control, based on the preparations we have done before.

The fact is that although a major disaster requires far more to arrive, the open air is full of dangerous characteristics, which in case they will not be satisfactory mitigated; a set of unwanted events shall be expected.

In occasions, several Top Events might get involved with a solo hazard.



Often the Top Events can be released by a series of factors that in Bow Tie methodology we call Threats.

There is a cause and effect relationship between the two and the prerequisite for Threats to be named like that is their strength to incur that release individually, without any additional contribution by elements of an external factor being simultaneously present.

Threats according to the previous thoughts require the customisation of a set of Barriers, which in occasions will sufficiently hinder Top Events from bursting.



When a Top Event has occurred, it can lead to certain consequences.

A consequence is every potential event stemming from the release of the hazard, which results directly in loss or damage.

Consequences in Bow Tie methodology are unwanted events that an organisation "by all means" wants to avoid. In case that cannot be happened the organisation itself will start suffering up to a point that it might cease operations.



A Threat Barrier is anything that can holistically remove the Threat or might prevent the Top Event from happening.

A Barrier or Control can be any measure taken that acts against some undesirable force or intention, in order to maintain a desired state.



That type of Barriers play their role after the time line crosses Top Event eruption. Again, there are two different kinds of measures that could be taken. The first kind takes effect between the Top Event and the Consequence.

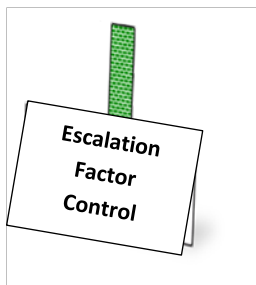
On the contrary, the last one takes effect after initial release of Top Event to minimize further consequences.

There is no need saying that we can put several Barriers in place many times of different type that could do the job with a different efficiency level, which shall be taken into account on the system construction for preventing unpleasant events.



Life unfortunately does not follow identical pathways, instead it is full of surprises and Barriers as well sometimes fail. There are certain conditions that can make a Control fail. In Bow Tie methodology, these are called Escalation Factors.

An Escalation Factor is a condition that leads to increased risk by defeating or reducing the effectiveness of a Control. By examining the Escalation Factors (and the Escalation Controls that are used to manage them), the methodology reveals important factors that many other types of risk analysis fail considering.



Escalation Factor Controls are solutions, controls, ideas that make barriers that previously had failed functional again. Escalation Factor Controls/Barriers never control threats or consequences. In our selection for Escalation Factor controls/barriers we shall avoid repetition and duplication.

Overall, BowTie methodology and BowTie diagrams depict in colour the system of decisions, measures, trainings, functions we have put in place to prove our ability to deal with hazards. Simultaneous application of the methodology on a software platform like BowtieXP provides us with the opportunity to keep a track and record on how we are succeeding and also plays the role of our ambassador in marketing submitting a competitive advantage in turbulent moments.

Endorsement of the methodology enhances and promotes organisational learning for risks, improves learning curves and creates the positive environment for fast and efficient learning.