Process safety is about answering 4 simple questions:
Do we understand what can go wrong? Do we know what our systems are to prevent this happening? Do we understand the critical controls and how they may fail? Do we have critical information from specific control performance standards to assure us they are working effectively?

Risk analysis is about developing an understanding of the risk. It provides an input to risk assessment and to decisions about whether risks need to be treated and about the most appropriate treatment strategies and methods. Various methods for these analyses are in use, all with its own objective, input and outcome. The level of risk will depend on the adequacy and effectiveness of existing controls and how well critical controls provide decision-making criteria.

The Bow Tie Analysis Masterclass explains a simplistic methodology to follow during the risk analysis process. It will deal in particular with the strategic relevance of the Bow Tie Analysis, setting up a scene to compare results from audits, accidents, incidents, monitoring activities for comparison of passive and active controls related to specific scenarios determined during the risk identification process.

Principles of energy time lines, threats, consequence, escalating factors and the pathway they follow to produce major mishaps form the basis of the software used during the course.

A Bow Tie is a diagram that visualises the risk you are dealing with in just one, easy to understand picture. The diagram is shaped like a bow-tie, creating a clear differentiation between proactive and reactive risk management. The power of a BowTieXP diagram is that it gives you an overview of multiple plausible scenarios, in a single picture. In short, it provides a simple, visual explanation of a risk that would be much more difficult to explain otherwise.
Bow Tie Analysis Masterclass
Presented by the Department of Mining Engineering, University of Pretoria

Course content

The course consists of three modules and includes practical work with a software programme BowTieXP from CGE Risk Management Solutions in the Netherlands, to populate information and setting criteria for decision-making.

The strategic context of the Bow Tie Analysis within the framework of risk management supported by visualisation material in a theatre will be used to set the scene for the learning programme. This module would be conducted in a lecture format where a card game simulating the software and based on predeveloped BowTies will enhance principles. From here onwards the learning takes place interactively between visual material, the software and virtual reality. Thus the next 3 modules dealing with anatomy, definitions, risk appetite criteria, barriers effectiveness, critical control selection, performance standards and monitoring systems will be visual and interactive.

Based on actual events visual case studies will be used to prospect simulated release mechanisms and consequences leading up to control failures and escalating factor contributions. The attendees will have to meet specific criteria to advance in the programme to the next module and evaluated on effectiveness of total Bow Tie Analysis, echoing the chief objective of the process from a scorecard. To achieve these objectives attendees will be exposed to the virtual reality interactive system, allowing trainees to “select” answers from a list and “move” them to the correct gap in the visual programme, simulating a drag and drop process. Feedback on their attempts, as well as the correct answers will be visualised.

Learning outcomes

After successfully completing this course, you will be able to

• understanding of BowTieXP terminology and application
• ability to arrange data within the software programme
• ability to define rules and guidelines for decision-making criteria to set a company risk appetite
• comprehension through identification of critical controls, the classification of roles and responsibilities for critical control management regime, interpretation of the Bow Tie Analysis diagram and report on effectiveness and vulnerability against the set criteria
• ability to breaking down the information into critical related components and seeing the relationships between accident causes, behaviour traits and Bow Tie threats and consequences
• ability to define the escalating factors which render controls ineffective and classify same into cognitive domains, material and equipment categories
• ability to develop critical control performance standards, verification and trigger action response plans (TARP’s) based on acts, objects, systems with subsequent dependency and defence controls, and
• ability to use synthesis through deductive reasoning to assemble the diagram, design acceptance regimes, devise action plans, formulate results and propose more effective controls and barriers in a cost effective manner impacting on integrated objectives of risk management.

Who should enrol?

Many a manager has found himself or herself in a position where risk decisions are taken without a formal systematic process. The need may arise at any management or supervision level and is dependent on the risk maturity of the company. However, it is recommended that the following persons attend, in specific those with legal appointments where ALARP (as low as reasonably practicable) is a requirement:

• Production and project managers.
• Engineers and subordinate engineers.
• Rock engineers and geotechnical managers.
• Mineral resource managers.
• Survey managers.
• Training managers.
• Metallurgical managers.
• Process managers.
• Risk and safety managers.
• Environmental managers.
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- Occupational hygienists.
- Occupational medical practitioners.
- Community and social development managers.
- Any person in a managerial position involved with risk decisions.

**Course fees**
R10 600.00 per delegate (VAT incl.)
Course fees include all course material, refreshments and/or other materials.

**Course fees must be paid in full 14 days prior to course start dates. Proof of payment can be submitted to enrolments@enterprises.up.ac.za.**

**Assessment**
Delegates will have to meet specific predetermined criteria to progress to each module. Delegates will also be evaluated on the effectiveness of total Bow Tie Analysis, echoing the main objective of the process from a designed scorecard.

To further achieve these objectives, delegates will be exposed to the 3D Stereoscopic and 3D-360 Immersive environments so as to experience activities within this environment whereby delegates will also be required to “select” answers/responses from a predetermined list and “move” them to the correct gap in the visualised programme through a “drag and drop” process. Feedback on their attempts, as well as the correct answers, form part of this unique visualised process.

**Accreditation and certification**
Enterprises University of Pretoria (Pty) Ltd is wholly owned by the University of Pretoria. As a public higher education institution, the University of Pretoria functions in accordance to the Higher Education Act 101 of 1997. Enterprises University of Pretoria offers short courses on behalf of the University and these short courses are not credit-bearing, and do not lead to formal qualifications on the National Qualifications Framework (NQF) – unless stated otherwise. Delegates who successfully complete a short course and comply with the related assessment criteria (where applicable) are awarded certificates of successful completion and/or attendance by the University of Pretoria.

**Registration and enquiries**
**Course coordinator**
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