



The modern, fast and easy to use risk analysis tool

Advanced Features

Using HAZID in BowTie Pro™

Enterprise Business Centre
Admiral Court
Poyernook Road
Aberdeen, AB11 5QX, UK

Tel: +44 (0) 1224 51 50 94

enquiries@BowTiePro.com
www.BowTiePro.com

Introduction

HAZID (Hazard Identification) is a structured brainstorming technique typically involving a range of personnel in the organisation.

HAZID is one of the best known methodologies used to identify potential hazards as it provides a structured approach to identify hazards, possible undesirable consequences and evaluate the severity and likelihood of what is identified. The method is an enabling tool, acting to help organise the health, safety and environmental management.

HAZID studies are a systematic critical examination of facilities to identify any potential hazards and the consequential effects on the facility as a whole. A HAZID will often address both process and non-process hazards.

The major findings and hazard ratings help to deliver effective management of major hazards and form part of the project risk register required by legislation. These are the same hazards that can be more fully analysed in the bow-tie methodology. It is vital that all high risk hazards with the potential to cause a major accident are identified and BowTie Pro™ with its range of imports and analysis techniques can add consistency and improved management.

The HAZID Microsoft Excel template workbook allows you to do your HAZIDs in Microsoft Excel, and import the output into BowTie Pro™.

Hazards typically come from four areas:

People for example

- Improperly trained or poorly supervised
- Insufficient attention to surroundings
- Not wearing the assigned or appropriate safety equipment
- Safe work practices not followed

Equipment for example

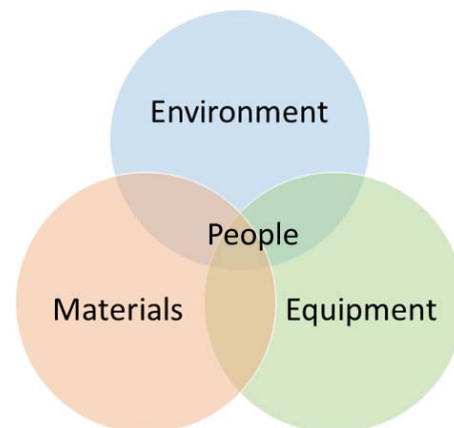
- Poorly maintained or uninspected equipment
- Unguarded equipment
- Using or wearing improper or worn out equipment for the task

Materials for example

- Working with materials that are flammable or require special storage and handling
- Working with chemicals that are volatile or dangerous when inhaled or in contact with skin

Environment for example

- Tripping hazards
- A wet floor
- Insufficient lighting
- Noise pollution
- Potential Dropped Objects
- Inclement weather



A safety system is a process to help identify seen and unseen hazards and risks in all four areas - risks from things that people are doing or NOT doing. It is also a way for them to report injuries and near misses and for you to track them.

Examples of Health and Safety Hazards			
Chemical	Includes any form of chemical, such as compressed gases, solvents, lead and others	Machine	Includes hazards from moving parts, like rotating shafts, belts and blades.
Physical	Includes noise, vibration, heat, cold and radiation.	Energy	Includes pneumatic or hydraulic pressure, steam, heat and electricity
Ergonomic	Includes design of the workplace and jobs that involve repetition, force and posture.	Material Handling	Includes moving, stacking and storing of all goods including dangerous goods.
Biological	Includes organisms or toxic substances produced by living things that can cause illnesses or diseases in humans, such as bacteria, viruses and fungi	Safe Work Responsibilities	Includes not following safe work procedures currently implemented, or working in an environment that does not have safe work practices in place or doesn't enforce them.

Benefits

Major hazards are revealed at an early stage in the project and before significant costs have been incurred

- Hazards are recorded and managed so that they can be avoided, mitigated or highlighted during design
- Action responses are auditable by management and legislative inspectorates
- Design or construction delays and budget over-runs are avoided

ISO 31000

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies. The main task of ISO is to prepare International Standards ISO 31000 principles and generic guidelines on risk management. This International Standard can be applied to any type of risk, whatever its nature, whether having positive or negative consequences.

ISO31000 can be used to describe the process of using HAZID outcomes as input for creating bowtie diagrams

Risk

Risk identification is the process of finding, recognizing and describing risks. The aim of this step is to generate a comprehensive list of risks.

A HAZID study is one of the best known methodologies for doing Risk Identification.

Risk Analysis

Risk analysis involves developing an understanding of the risk. Risk analysis involves consideration of the causes and sources of risk, their positive and negative consequences, and the likelihood that those consequences can occur. The analysis can be qualitative, semi-quantitative or quantitative, or a combination of these, depending on the circumstances.

The bowtie methodology fits seamlessly in the (qualitative) risk analysis stage of the ISO 31000 managing risk process.

Bowtie diagrams for high risk hazards

It is not practical to make bowtie diagrams for all existing hazards, instead it is more beneficial to create bowties for all the major hazards. Creating bowtie diagrams for simple or low impact hazards is should only be done when these hazards are not well understood and creating a bowtie will add clarity.

Using a Risk Matrix where there is a combination of PROBABILITY x CONSEQUENCE is an excellent way of estimating the risk. Using this approach a separation can easily be made between high priority hazards that require bowtie analysis and low priority hazards for which a HAZID analysis is sufficient.

An example of a Risk Matrix is shown below. The Risk matrix is fully configurable in BowTie Pro™ and the data entered will be output to the Microsoft Excel HAZID spreadsheet template from within the bowtie program.

SEVERITY	CONSEQUENCES				LIKELIHOOD				
	People	Asset	Environment	Reputation	1	2	3	4	5
					Very Unlikely	Unlikely	Possible	Likely	Very Likely
1	No/ Slight Injury	No/ Slight damage	No/ Slight effect	No/ Slight Impact	Low	Low	Low	Low	Low
2	Minor Injury	Minor damage	Minor effect	Limited Impact	Low	Low	Low	Medium	Medium
3	Major Injury	Local damage	Local effect	Major Impact	Low	Low	Medium	Medium	High
4	Fatality	Major damage	Major effect	Nat. Impact	Low	Medium	Medium	High	High
5	Multiple fatalities	Extensive damage	Massive effect	Internat. Impact	Medium	Medium	High	High	High

Risk matrixes come in a wide variety of both sizes and types.

- The matrix above is known as a 6 x 5 and is one of the most commonly used, though matrices may be encountered ranging from 2 x 2 to 10 x 10.
- The colours in the matrix can be altered but most are in line with the "traffic light" identification (as shown) but options such as the "black swan" options can also be implemented ie Red, Yellow(Amber) and Green
- The example matrix shown is a 'reactive' matrix which uses historical evidence to provide guidance on the frequency term. The other most frequently encountered type

is a predictive matrix, where the frequency terms could be e.g. '1 in 10,000 chance of occurring' to will occur ten times per year'.

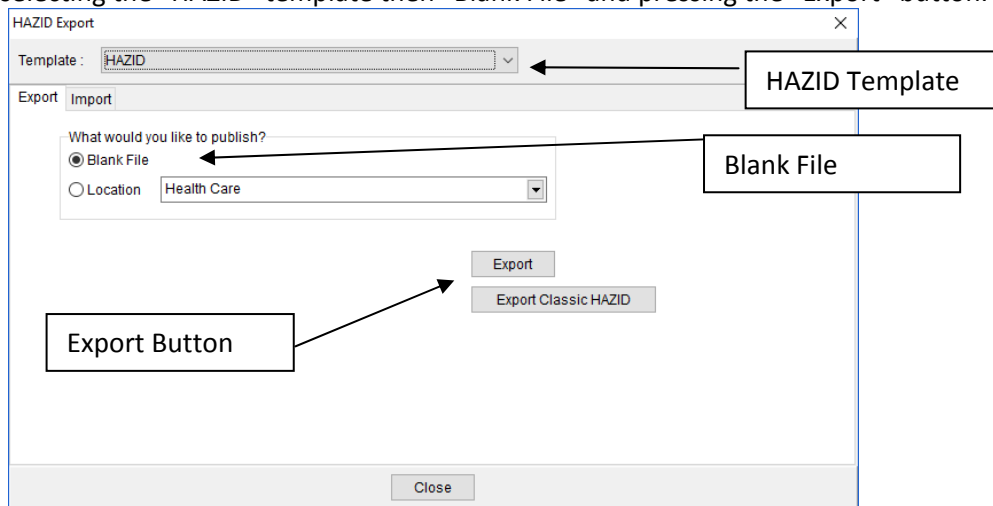
The basis of the risk matrix is always, however, the same - matching the frequency and consequence terms. As such it is important that the scoring mechanism used is decided in advance and applied consistently.

BowTie Pro™ HAZID template

The HAZID Microsoft Excel template workbook allows HAZIDs in Microsoft Excel to be imported into a BowTie Pro™ file.

HAZID Microsoft Excel Import/Export

The HAZID workbook is generated from BowTie Pro™ via the “HAZID-> Export import” menu option and selecting the “HAZID” template then “Blank File” and pressing the “Export” button.



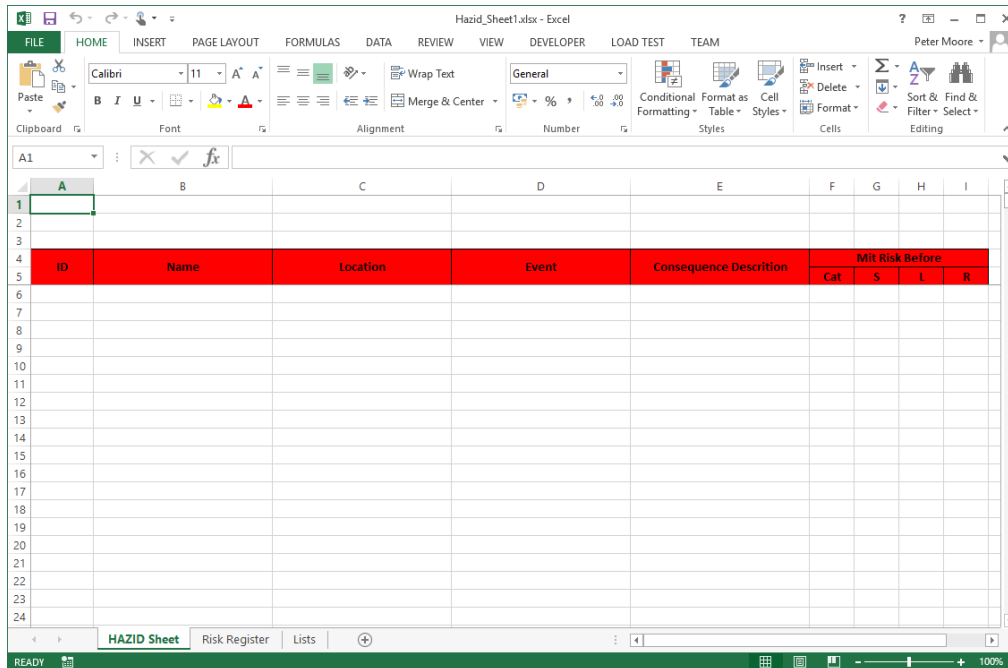
The output consists of three Microsoft Excel sheets:

- The HAZID sheet
- The risk matrices sheet
- A sheet that contains the lookup values.

The HAZID sheet is the place to put all your risk assessments. The other two sheets will make it easy to populate this first page.

HAZID analysis

The image below shows the hazard sheet:

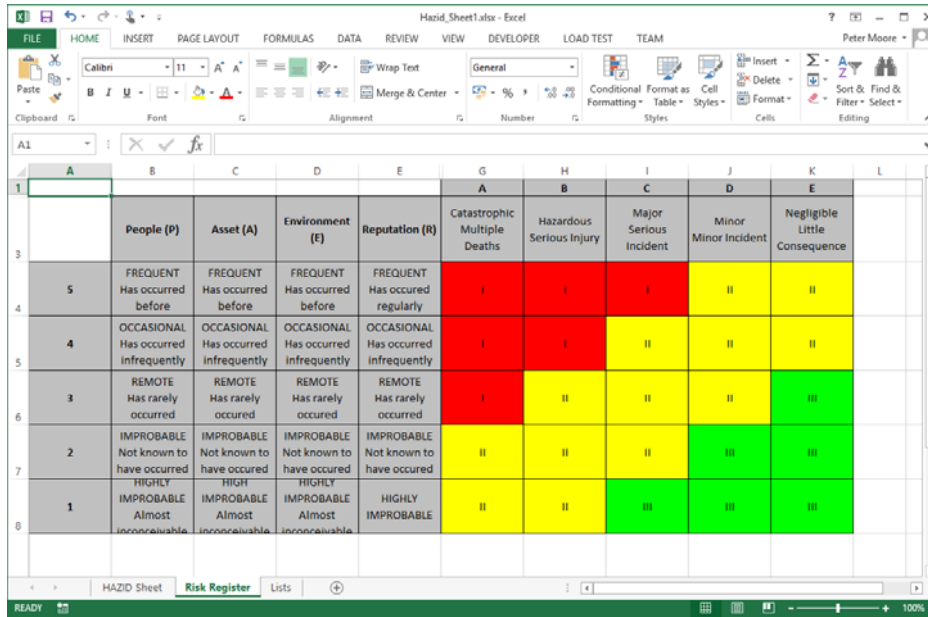


The table below shows the columns on the HAZID sheet:

Column	Description
ID	The hazard code
Name	The Hazard Name
Event	The Event
Location	The location where the hazard occurs
Top Events	The top events related to the hazard
Consequence Description	The consequences related to the hazard
Risk Matrix Category (Cat)	The Category will be items such as People, Asset, Environment, Reputation, Financial and will be setup by the Administrator
Risk Matrix Severity (S)	For each of the risk matrices, the severity is the worst that can happen when the top events occur, for each of the categories
Risk Matrix Likelihood (L)	For each of the risk matrices, the frequency indicates how often the top events lead to the consequences in this category
Risk Matrix Result (R)	Calculated by the Severity and Likelihood

Risk matrices

The Risk Matrix sheet takes is for information only and makes it easy to enter Risk Assessment values



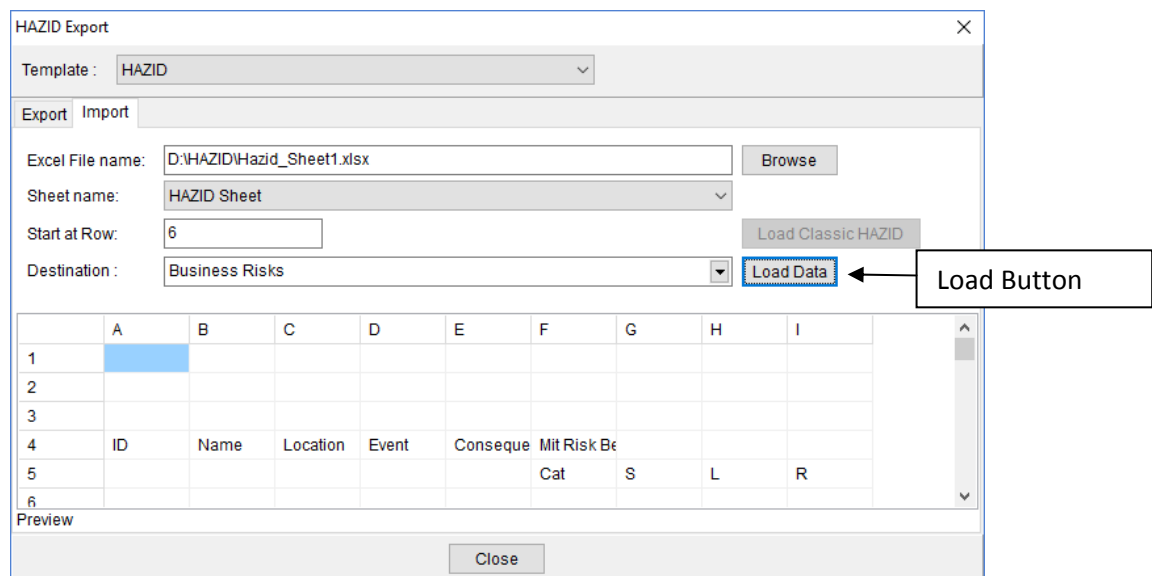
	People (P)	Asset (A)	Environment (E)	Reputation (R)	Catastrophic Multiple Deaths	Hazardous Serious Injury	Major Serious Incident	Minor Minor Incident	Negligible Little Consequence
5	FREQUENT Has occurred before	FREQUENT Has occurred before	FREQUENT Has occurred before	FREQUENT Has occurred regularly	I	I	I	II	II
4	OCCASIONAL Has occurred infrequently	OCCASIONAL Has occurred infrequently	OCCASIONAL Has occurred infrequently	OCCASIONAL Has occurred infrequently	I	I	II	II	II
3	REMOTE Has rarely occurred	REMOTE Has rarely occurred	REMOTE Has rarely occurred	REMOTE Has rarely occurred	I	II	II	II	III
2	IMPROBABLE Not known to have occurred	IMPROBABLE Not known to have occurred	IMPROBABLE Not known to have occurred	IMPROBABLE Not known to have occurred	II	II	II	III	III
1	HIGHLY IMPROBABLE Almost inconceivable	HIGHLY IMPROBABLE Almost inconceivable	HIGHLY IMPROBABLE Almost inconceivable	HIGHLY IMPROBABLE Almost inconceivable	II	II	III	III	III

The number of risk categories, the size of the matrix and the colours are all configured within BowTie Pro™ and the Excel mirrors these settings. Each of the categories has two axis usually called severity and a frequency (A). The severity indicates the possible extent of damage; the frequency indicates how often this happens. In the matrix, a hazard potential rating is assigned to each of the combinations of frequency and severity. Different hazard potentials have different colours.

Importing the Microsoft Excel worksheet into BowTie Pro™

To import the HAZID information into BowTie Pro™, follow these steps:

- Save the Microsoft Excel file
- In BowTie Pro™ select HAZID-> Export import” menu option and selecting the “HAZID” template then the Import tab
- Press the “Browse” button and locate the Microsoft Excel Sheet.
- The File Should automatically read the data.
- Select the Destination Location
- Press the “Load Data” button



HAZID Export

Template: HAZID

Export Import

Excel File name: D:\HAZID\Hazard_Sheet1.xlsx

Sheet name: HAZID Sheet

Start at Row: 6

Destination: Business Risks **Load Button**

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4	ID	Name	Location	Event	Consequence	Mit Risk Be			
5					Cat	S	L	R	
6									

Preview

After import into BowTie Pro™

Hazard control

Once tasks and their hazards have been identified they can be set into this matrix. High-risk issues with high likelihood/high impact need immediate attention.

The next step is to develop and implement hazard controls. How you control a hazard depends on the circumstances. Consider the seriousness of the risk and then identify what controls are reasonable and practical in the circumstances.

Ways to deal with hazards

1. Elimination

Eliminate the workplace conditions, equipment, process or procedure that is causing the hazard. Elimination is the best method of control, but it's difficult to re-engineer some hazards, for example:

- Replace a toxic substance with a non-toxic substance.
- Replace broken tools.
- Insist workers wear personal protective equipment such as fall protection.

2. Substitution

Substitution is the process of replacing a hazard with a less hazardous method, equipment, chemical or condition, for example:

- Replace a toxic substance with a less toxic substance.
- Purchase a stepladder for someone who stands on a chair to retrieve items from a shelf.

3. Engineering

Engineer ways to eliminate or contain hazards, for example:

- Add ventilation to remove toxic fumes.
- Install adjustable-height ergonomic surfaces to eliminate strain from repetitive movements.

4. Administration

Create administrative policies and procedures that reduce exposure to hazards, for example:

- Create specific job procedures for operating equipment.

5. Personal protective equipment (P.P.E.)

This is your final approach to reducing hazards. Personal protective equipment is your last line of defence, for example:

- Personal protective equipment includes items such as safety glasses, steel-toed boots, work gloves and hard hats.