



# Engineering Safety Ltd.

International Provider of Functional Safety, Engineering Safety and Inspection Consultancy

## Technical Safety Services

Engineering Safety Ltd, (ES) is an international provider of Functional Safety Consultancy, Engineering Safety and Inspection Consultancy Services

ES are competent in providing practical solutions that emphasise the application of the appropriate level of rigour for various industries and applications. Our solutions and services are tried and tested, implemented by major operators in the process industry and accepted by regulating bodies.





## Technical Safety

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Alarm Management, Flow assurance, Plan optimisation, RAMS and RCM are just a few of the Engineering Safety Consultancy services we specialise in for the process sector. Globally we are approached at various stages of engineering design to support the various goals and requirements of projects.

Over the years we have grown quite a reputation in provision of high-quality engineering consultancy services which is supported by our extensive list of clients.

- Reliability, Availability & Maintainability
- Value Improvement Engineering
- Engineering Safety Studies
- Pre-Start Up Safety Reviews
- Building Risk Assessment
- Qualitative or Quantitative Risk Assessment
- Escape, Evacuation and Rescue Analysis
- Fire & Gas System Mapping and Modelling

# Process Hazard Analysis

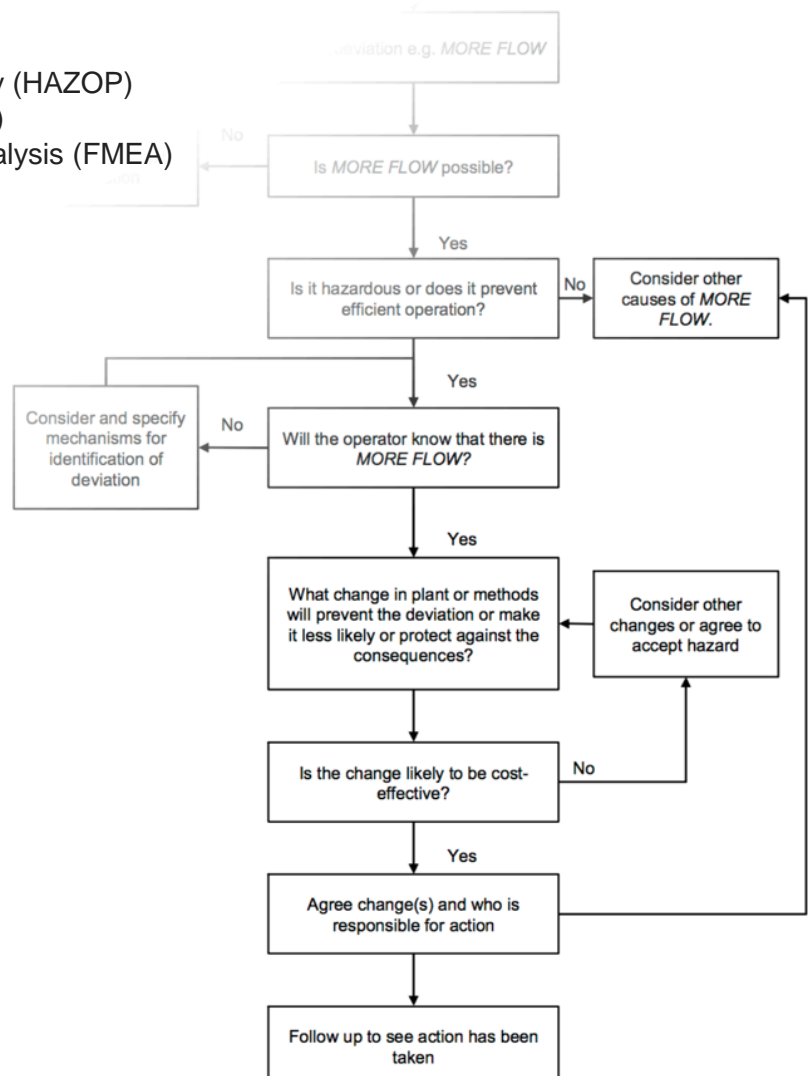
Process Hazard Assessment (PHA) is a set of organised and systematic assessments of the potential hazards associated with an industrial process. A PHA can provide information intended to assist in making decisions for improving safety and reducing the consequences of unwanted or unplanned releases of hazardous chemicals. A PHA is often directed towards analysing potential causes and consequences of undesirable events and focuses on equipment, instrumentation, utilities, human actions, and external factors that might impact the process.

PHA methods are qualitative in nature. The selection of a methodology to use depends on several factors, including the complexity of the process, the length of time a process has been in operation and if a PHA has been conducted on the process before, and if the process is unique, or industrially common.

## Methods of Process Hazard Analysis (PHA)

There are a variety of methodologies that can be used to conduct a PHA, including but not limited to:

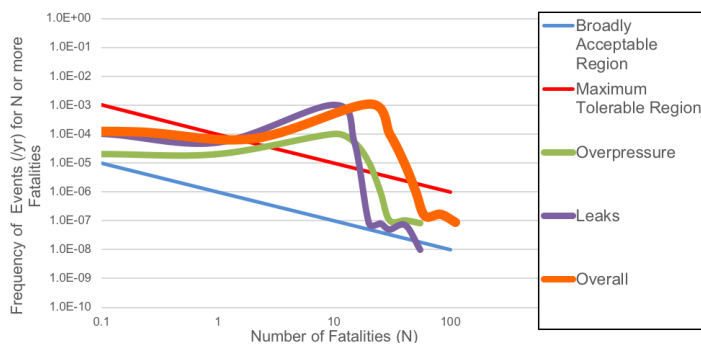
- Checklist
- What if?
- Hazard and Operability Study (HAZOP)
- Hazard Identification (HAZID)
- Failure Mode and Effects Analysis (FMEA)



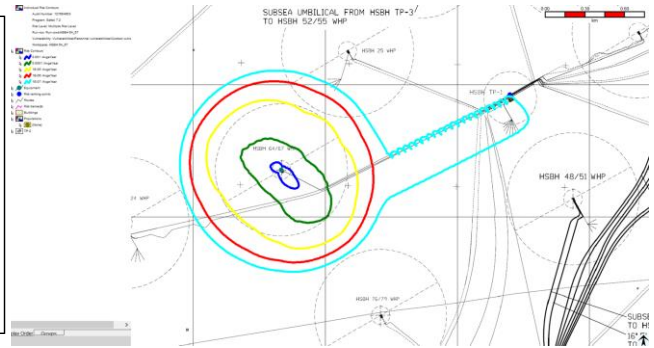
# Quantitative Risk Assessment (QRA)

Quantitative Risk Assessment (QRA) is a method which allows for a quantitative estimation of the risk, given the parameters defining them. The risk is calculated for the potential for safety, environmental or financial impact. The method can be defined as a formal and systematic approach in identifying hazardous events, estimating the likelihood of the hazardous event and the associated consequences.

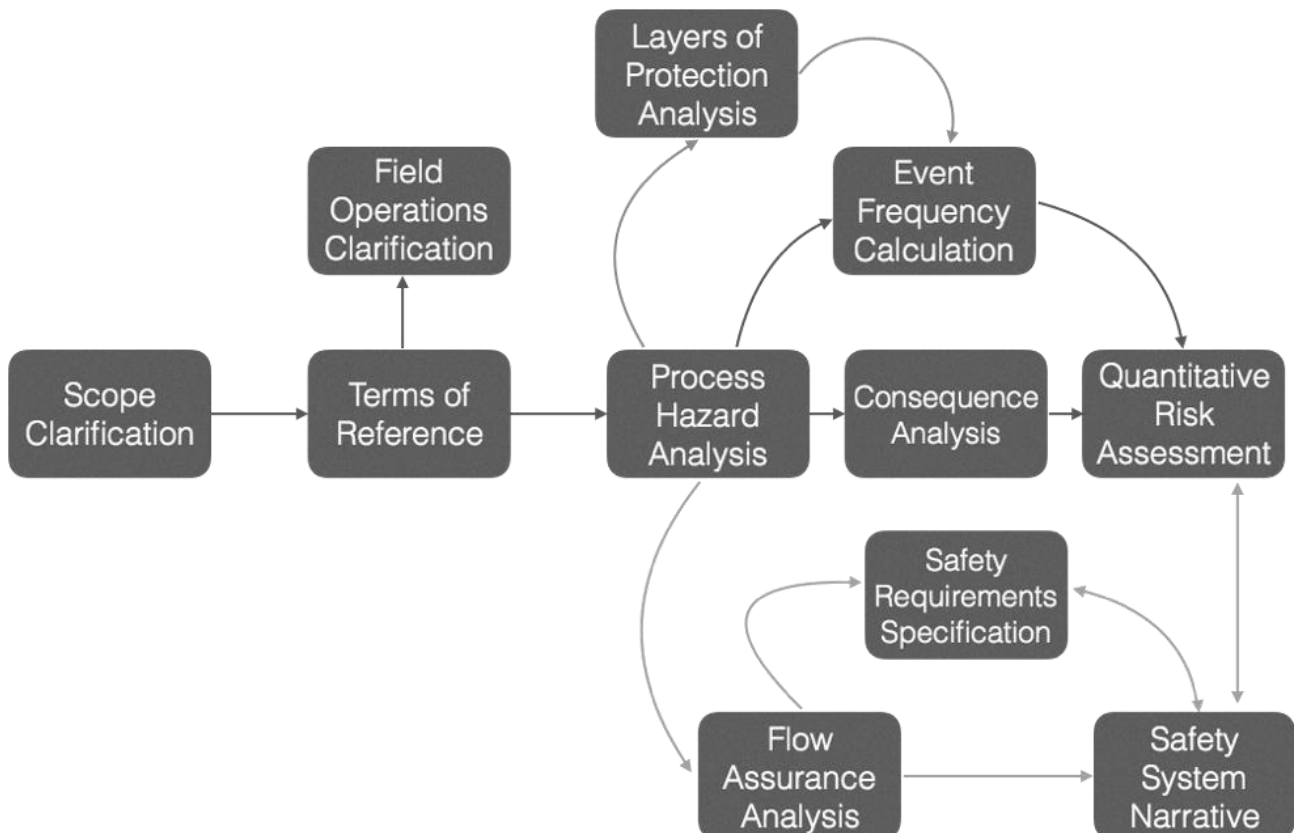
## Examples



Typical graphical representations of FN Plots and typical project schedule



Typical graphical representations of the risk contours







- Reliability is defined as the fraction or percentage of time that an item is available to respond to a demand placed upon it. Various techniques such as Reliability Block Diagrams (RBDs) and Fault Tree Analysis (FTA) can be used to determine the reliability.
- Availability is defined as a fraction or percentage of time that an item has not failed and thus is available for a demand. Based on this approach, unavailability can be defined as a fraction or percentage of time that an item has failed.
- Active and Reactive maintenance programs are required in order to ensure the reliability of the equipment and thus the reliability and availability of the Safety Instrumented Functions.
- Our expert team of consultants have been providing Reliability, Availability and Maintainability studies and analysis for various industries. The main objectives of a RAM analysis, is for it to be used as a decision-making tool to increase the availability of the system, and thus increase the overall profit as well as reducing the life cycle costs. RAM analysis can be carried out on systems and facilities of different types and sizes in various industries ranging from oil and gas, water and wastewater treatment, nuclear, process, manufacturing and many more.





## Human Factors

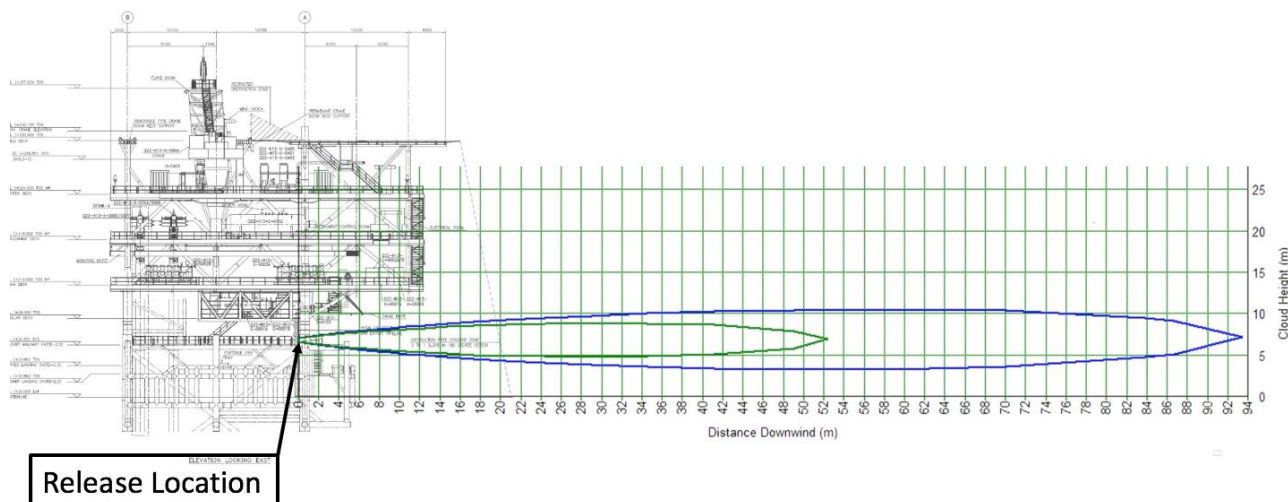
Human factors is a multidisciplinary field incorporating contributions from psychology, engineering, biomechanics, mechanobiology, industrial design, graphic design, statistics, operations research and anthropometry. Human factor assessment is a key area in identifying potential hazards which may be instigated by human errors. Our Human Factors experts can conduct relevant studies in identifying the potential hazards and probabilities of error and thus provide recommendations and guidance in reducing the probability of human errors.

## Escape, Evacuation and Rescue Analysis (EERA)

In the event of a major incident, the design of a facility must be such that any ensuing risk to personnel can be assessed to a level considered to be As Low As Reasonably Practicable (ALARP). This can often be achieved through the provision of suitable means of Escape, Evacuation and Rescue (EER) in conjunction with the implementation of suitable emergency response procedures and training.

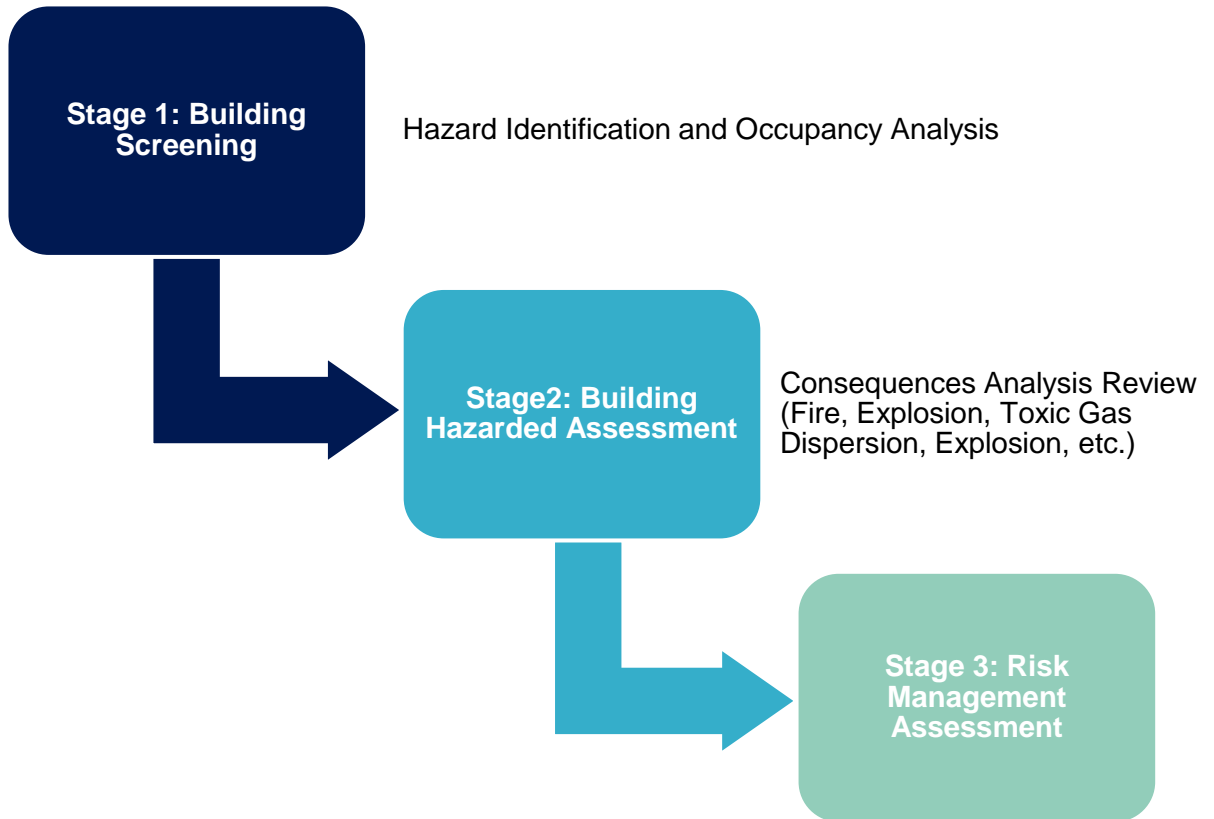
## Fire Explosion Risk Analysis / Consequences Analysis

FERA or Consequence Modelling refers to the estimation of the credible physical outcomes of loss of containment scenarios involving flammable, explosive and toxic materials with respect to their potential impact on people, assets, or safety functions.



## Building Risk Assessment (BRA)

Building Risk Assessment (BRA) is a tool used to assess the risks to people in occupied buildings in the facility. This is also sometimes identified as an Occupied Building Risk Assessment (OBRA).



## Methods of Conducting BRA

ES apply a software-based approach using DNV PHAST. The consequence models are analysed and the risk is calculated to the various occupied buildings, taking account of the average building occupancy.



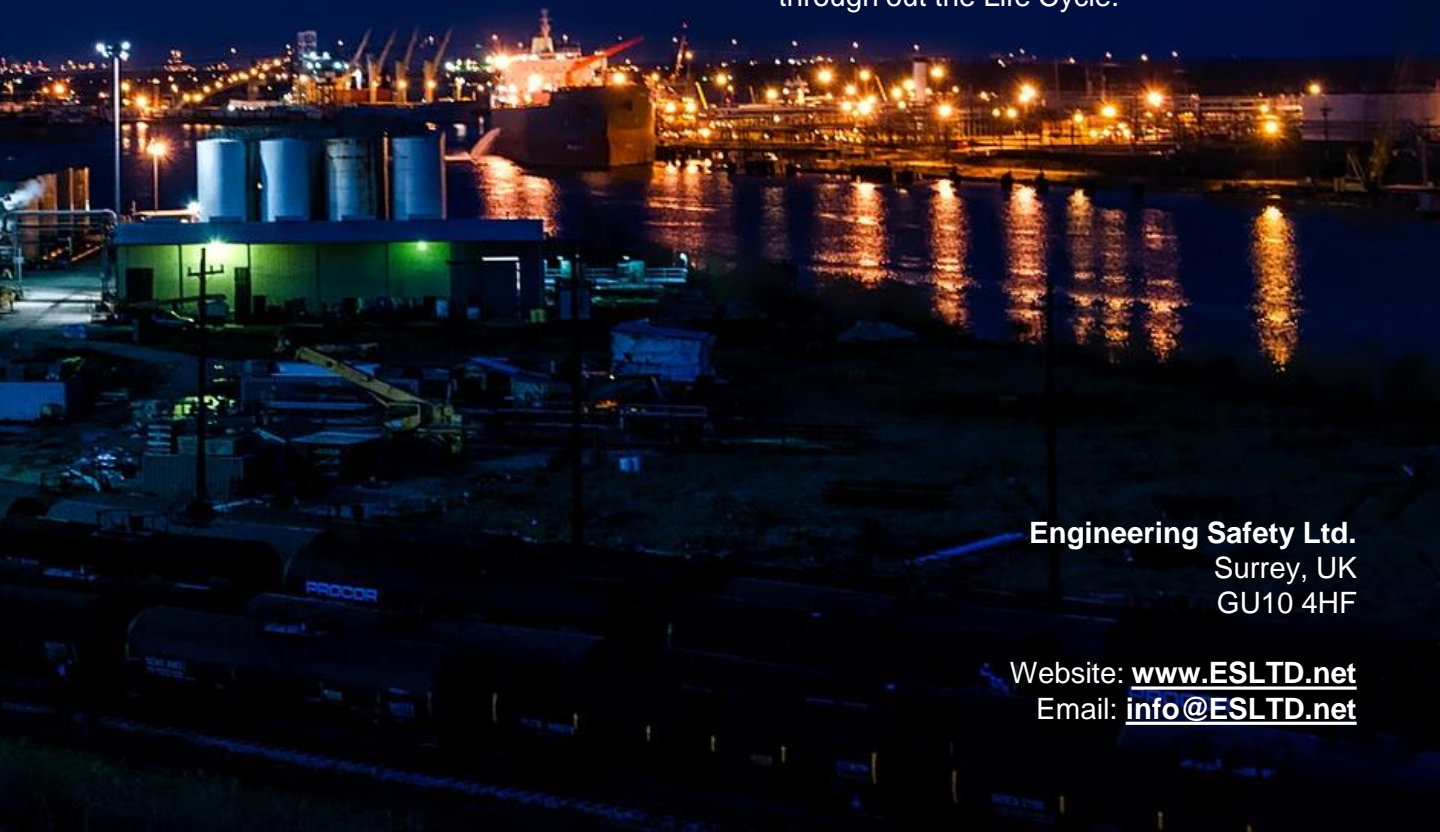


## Our Consultants

We work across the world with engineering organisations, equipment manufacturers and end-users providing services across all industries in every aspect of functional safety for systems, inspection and testing. Our consultants are TUV Functional Safety Engineers and NDT PCN level 3 certified, Quality focused through ISO 9001 Management Systems.

## Our Pledge

Feasibility study, conceptional or detailed design, installation, modification, operation, maintenance through to decommissioning, Engineering Safety have the experience, expertise and in depth knowledge of the international standards as well as the practical knowledge as to how they should be applied so you can be assured that your installations or projects are compliant and remain compliant with all required aspects through out the Life Cycle.



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