

Quantified Risk Assessment Techniques - Part 2 **Event Tree Analysis - ETA**

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Introduction

[Quantified Risk Assessment Techniques \(Part 1\)](#) discussed Failure Modes and Effects Analysis (FMEA).

This is the second briefing note to describe a specific risk assessment technique, Event Tree Analysis - ETA. It must be emphasised that this brief treatment is intended to be illustrative rather than definitive.

Event Tree Analysis (ETA)

Event tree analysis is based on binary logic, in which an event either has or has not happened or a component has or has not failed. It is valuable in analysing the consequences arising from a failure or undesired event.

An event tree begins with an initiating event, for example, a component failure, increase in temperature/pressure or a release of a hazardous substance. The consequences of the event are followed through a series of possible paths. Each path is assigned a probability of occurrence and the probability of the various possible outcomes can be calculated.

In the following example fire protection is provided by a sprinkler system. A detector will either detect the rise in temperature or it will not. If the detector succeeds the control box will either work correctly or it will not - and so on. There is only one branch in the tree that indicates that all the subsystems have succeeded:

Figure 1: Fire Protection System

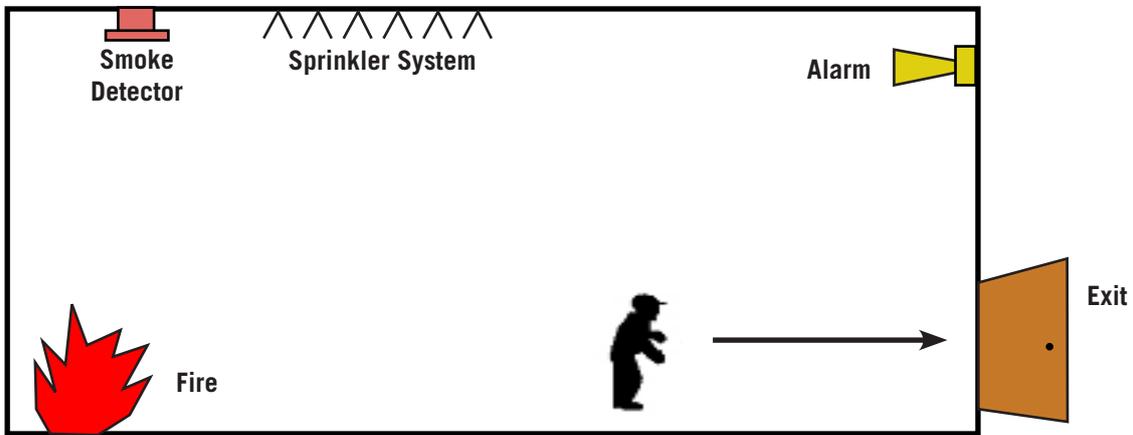
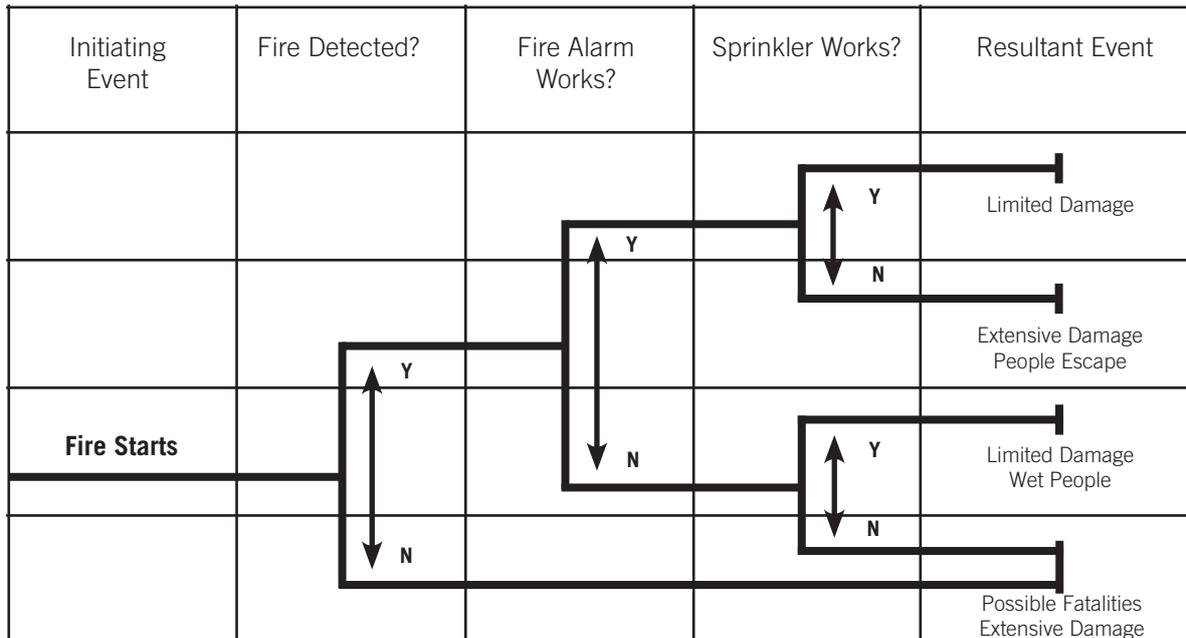
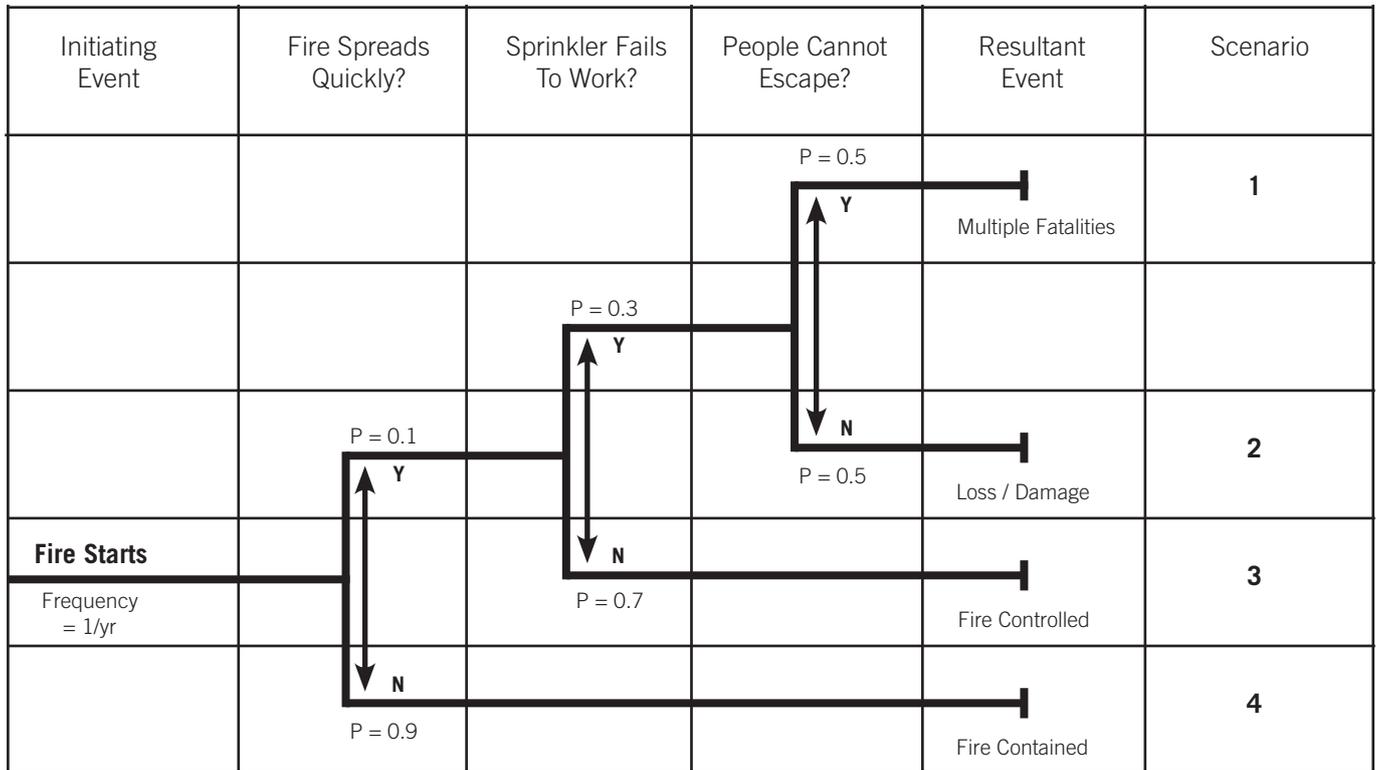


Figure 2: Simplified Event Tree



The analysis can be quantified as illustrated in the following example related to a building protected by a sprinkler system:

Figure 3: Quantification of Event Tree for Building Protected by Sprinkler System



Application

ETA has proved to be a useful tool for major accident hazard assessment and was used by the UK's Health and Safety Executive, for example, for the assessment of risks to the public from serious accidents at installations in the Canvey Island area of Essex. In major accidents, ETA is used for the evaluation of possible consequences following a release of toxic/flammable vapour cloud from a process and to analyse the effects on plant, personnel, general public and the environment.

References and Further Reading

- **Risk Assessment Methodologies** - H Raafat, University of Portsmouth, ISBN 1 069959434
- DIN 25419 **Event Tree analysis; graphical symbols and evaluation** (in German)
- BSR/AIAA S-102.2.17-200x **Performance-based Reliability and Maintainability Programs - Event Tree Analysis**

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