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Fire Risk Assessment

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PRACTICAL APPLICATION

Identifying Fire Hazards and Managing Fire Precautions

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History of Fire

Fires that have changed our lives

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History of Fire

- Theatre Royal - Exeter - 1887
- Eastwood Mills - Yorkshire - 1956
- Hendersons - Liverpool - 1960
- Rose & Crown - Saffron Waldron – 1969
- Summerland – Douglas - 1973
- Woolworths - Manchester - 1979
- Bradford City Football Club - 1985
- Kings Cross - London - 1987

Theatre Royal Exeter

- No fire alarm
- No means of escape
- Doors locked

181
Dead

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Eastwood Mills 1956

- No fire alarm
- No means of escape

8 Dead

Hendersons - 1960

- Fire alarm did not work
- Delay in calling the fire brigade
- No evacuation procedures

11 Dead

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Rose& Crown 1969

- Fire alarm did not work
- Doors left open
- No fire procedures

11 Dead

Summerland – Douglas IOM

- Fire alarm not sounded
- Initial call had very little information
- Rapid fire spread
- Large numbers of people

53 Dead

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Woolworths - 1979

- Alarm not sounded
- Fire Brigade not called

11 Dead

Bradford City Football Club

- No means of escape
- Rapid Fire spread

56 Dead

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Kings Cross

- Delay in raising the alarm
- No proper procedures

31
dead

What Next !

We must be aware of

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FIRE

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Legal Requirements

- Management of Health & Safety at Work Regulations 2003
- Construction Design & Management Regulations 2003

Fire Risk Assessment - Identify

- Sources of ignition
- Combustible materials
  - Used during construction work
  - Finishes, Furniture and furnishings
  - Parts of structure and fittings
  - Flammable liquids and gases
  - Structural features
- People at significant risk
  - Staff
  - People with disabilities
  - Members of the public
- Actions required to reduce identified hazards
- Control measures present

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Hazards

- Maintenance of plant and equipment
- Storage and use of flammable materials
- Flammable liquids
- Work processes involving heat
- Hot work
- Electrical equipment
- Heating appliance
- Smoking
- Building maintenance work
- Waste

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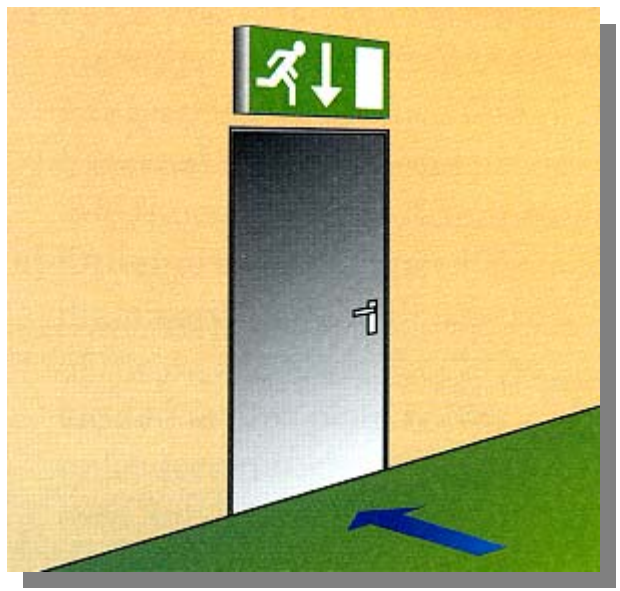
Means of Escape

- Travel distances
- Alternative routes
- Stairways
- Doors
- Inner rooms
- Checking and maintenance
- Lifts
- Surface finishes



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Compartmentation

- Fire doors
- Glazing
- Sandwich panels
- Sealing around services
- Voids
- Ductwork
- External escape stairs

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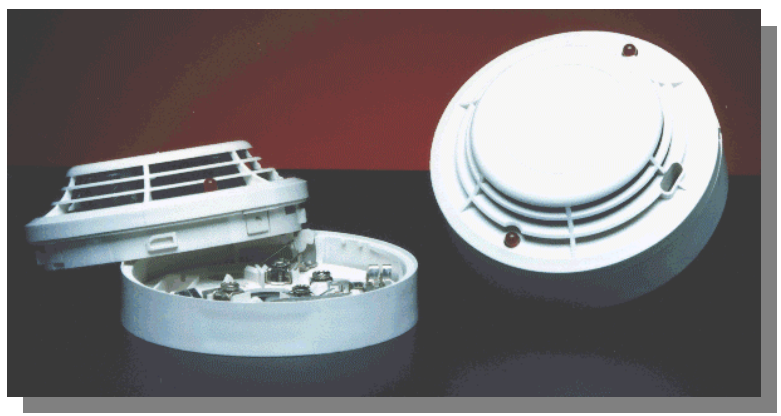
Fire Alarm and Detection Systems

- Types
  - Domestic (small workplaces only)
  - Conventional
  - Addressable
  - Analogue
- Detection
  - Smoke
  - Heat
  - Siting
- Call points
  - Siting
- Testing
- Maintenance
- BS 5839: Part 1
- Sleeping risks



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Fire Fighting Equipment

- Extinguishers
  - Types
  - Colours
  - Numbers
  - Siting
  - BS EN 3 (construction)
  - BS 5306 Part 8 (installation, siting and servicing)
- Hose reels
- Fire blankets
- Automatic suppression systems

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Emergency Escape Lighting

- Types
  - Single point
  - Central system
  - Maintained
  - Non-maintained
- Location
- Testing and Maintenance
- BS 5266: Part 1

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Fire Safety Signs and Notices

- Types
  - Plain
  - Photoluminescent
- Standards
  - BS 5499: Part 1
- Siting

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Evacuation Procedures

- Procedure on discovering a fire
- Procedure upon hearing the fire alarm
- Assembly points
- Management
  - Fire wardens / marshals

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Staff Training

- Induction
- All staff
  - Evacuation procedure
  - Escape routes
  - Extinguishers
  - Machinery
  - Disabled
  - Hazards
- Fire Wardens
- Those working in areas of high risk
- Fire drills

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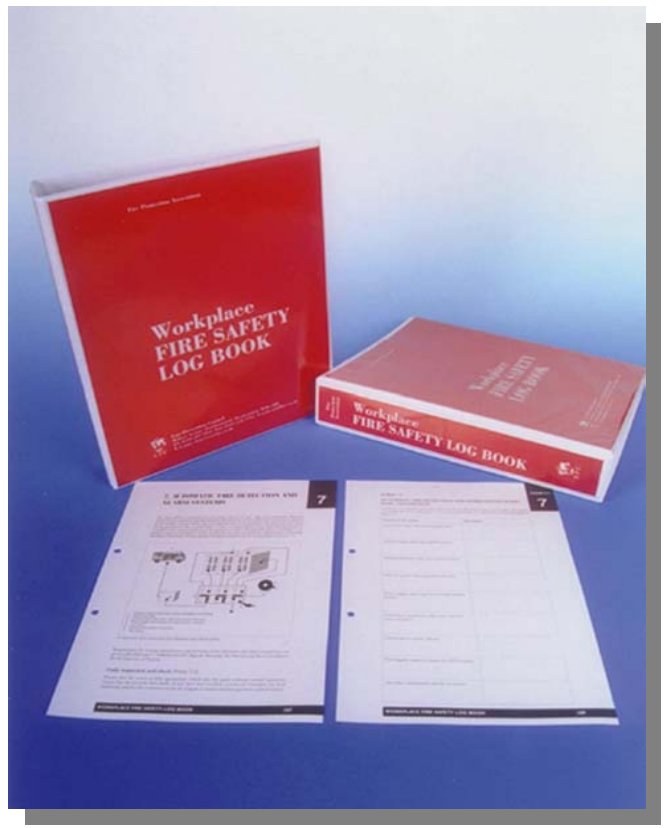
Record Keeping

- Staff training
- Fire drills
- Maintenance and testing
  - Fire alarm
  - Extinguisher
  - Emergency lighting
  - etc



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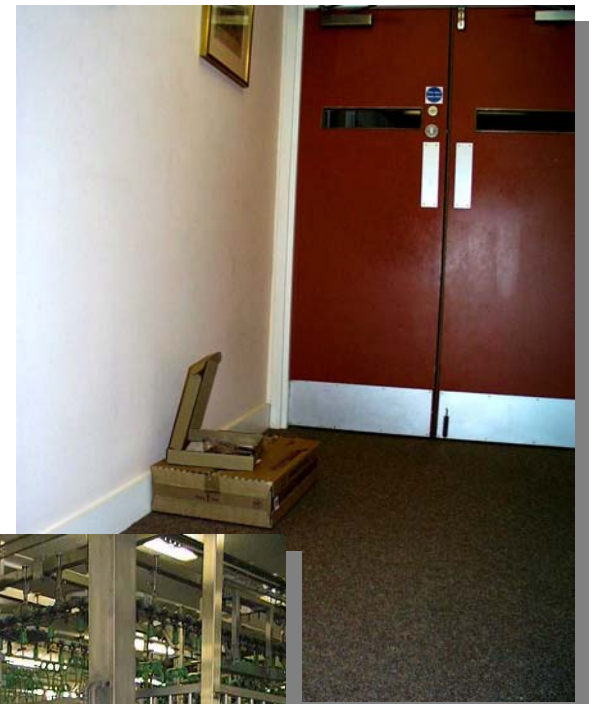
Housekeeping

- Stored materials
- Waste
  - Away from sources of ignition
- Escape routes



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Protection from the Threat of Arson

- Security
- CCTV
- Illumination
- Waste
- Storage

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Introduction to Fire Risk Assessment

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Definitions

- Risk Assessment
  - The quantitative evaluations of the likelihood of undesired events and the harm or damage being caused, together with value judgements concerning the significance of the results.
- Risk Management
  - The identification, measurement and control of risks that threaten the assets and earnings of a business or other enterprise
- Risk Control
  - The prioritisation of risks and the introduction of measures that might be put in place to reduce, if not prevent, the harm from occurring.

Definitions

- Hazard
  - Hazard is anything that can cause harm
  - Look for hazards
  - Don’t forget your own experience.
- Risk
  - Risk is the chance (large or small) of harm actually being done
  - look for the hazard then assess the risk.

What is Risk Assessment?

- Something we all do subconsciously
- May involve value judgements on the significance of the risks
- Risk assessment really only puts onto a formal structured basis something that we all do anyway.

Risk = f (frequency, consequences)

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Examples from US Statistics

- Murdered in any year
  - 1:11,000
- Seriously injured in a car accident
  - 1:40
- Death caused by passive smoking
  - 1:30,000

Risk Assessment Methods

- Elementary method *(Home Office method)*
- The risk value matrix method
- An industrial method
- An algorithmic method
- Hazard operability study (HAZOP)
- Hazard analysis (HAZAN)
- Fault tree analysis
- HTM 86 - Fire risk assessment in hospitals
- Risk Ranking and Hazard Indices

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Elementary Method

- Step 1: Identify fire hazards
  - Combustible materials, Sources of ignition, Work processes
- Step 2: Identify location of people at significant risk
- Step 3: Evaluate the risks
  - Are existing fire safety measures adequate?
  - Control of ignition sources/sources of fuel
  - Fire detection/warning, Means of escape, Means of fighting fire, Maintenance and testing of fire precautions
  - Fire safety training
  - **Carry out any improvements needed**
- Step 4: Record findings and actions taken
  - Prepare a fire management plan
- Step 5: Keep risk assessments under review
  - Revise as and when necessary

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Risk Value Matrix Method

- We define the probability that a fire event will occur as the ***fire risk***, and the harm that would result from that event as the ***fire hazard***.
  - Risk Value = Fire Hazard Value x Fire Risk Value

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Risk Value Matrix Method

Classification Tables

Fire Hazard		**Fire Risk**
Description	Value	Description
Negligible	1	Unlikely
Slight	2	Possible
Moderate	3	Quite Possible
Severe	4	Likely
Very Severe	5	Very Likely

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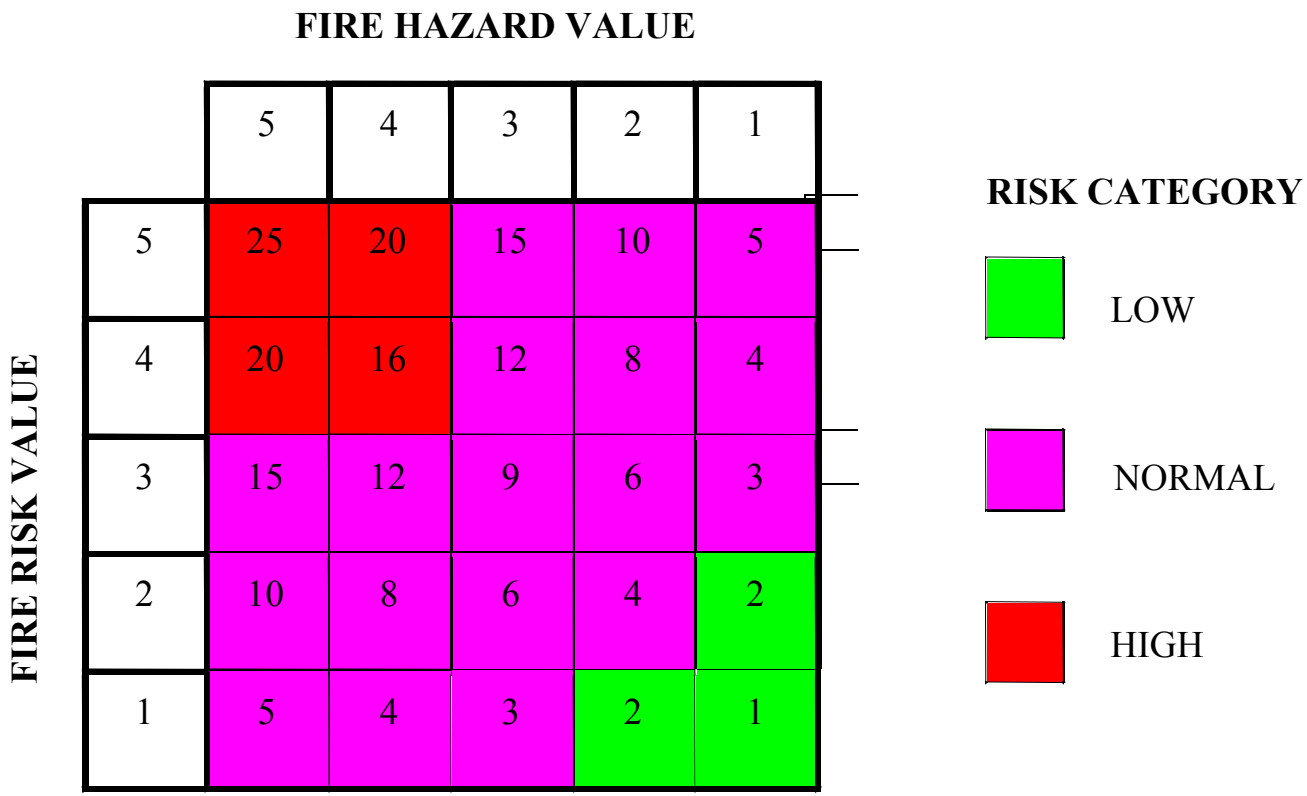
Risk Value Matrix



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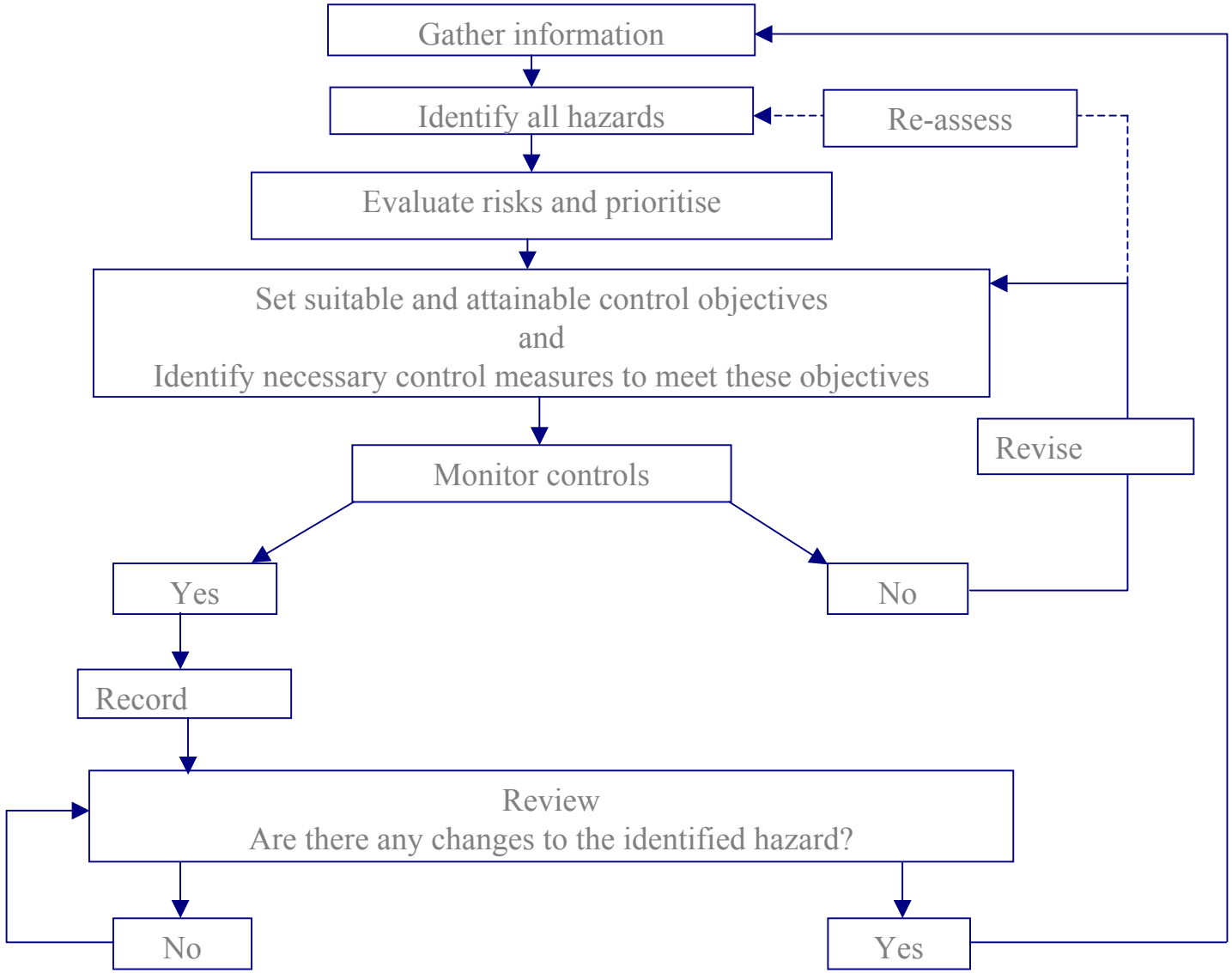
Industrial Method



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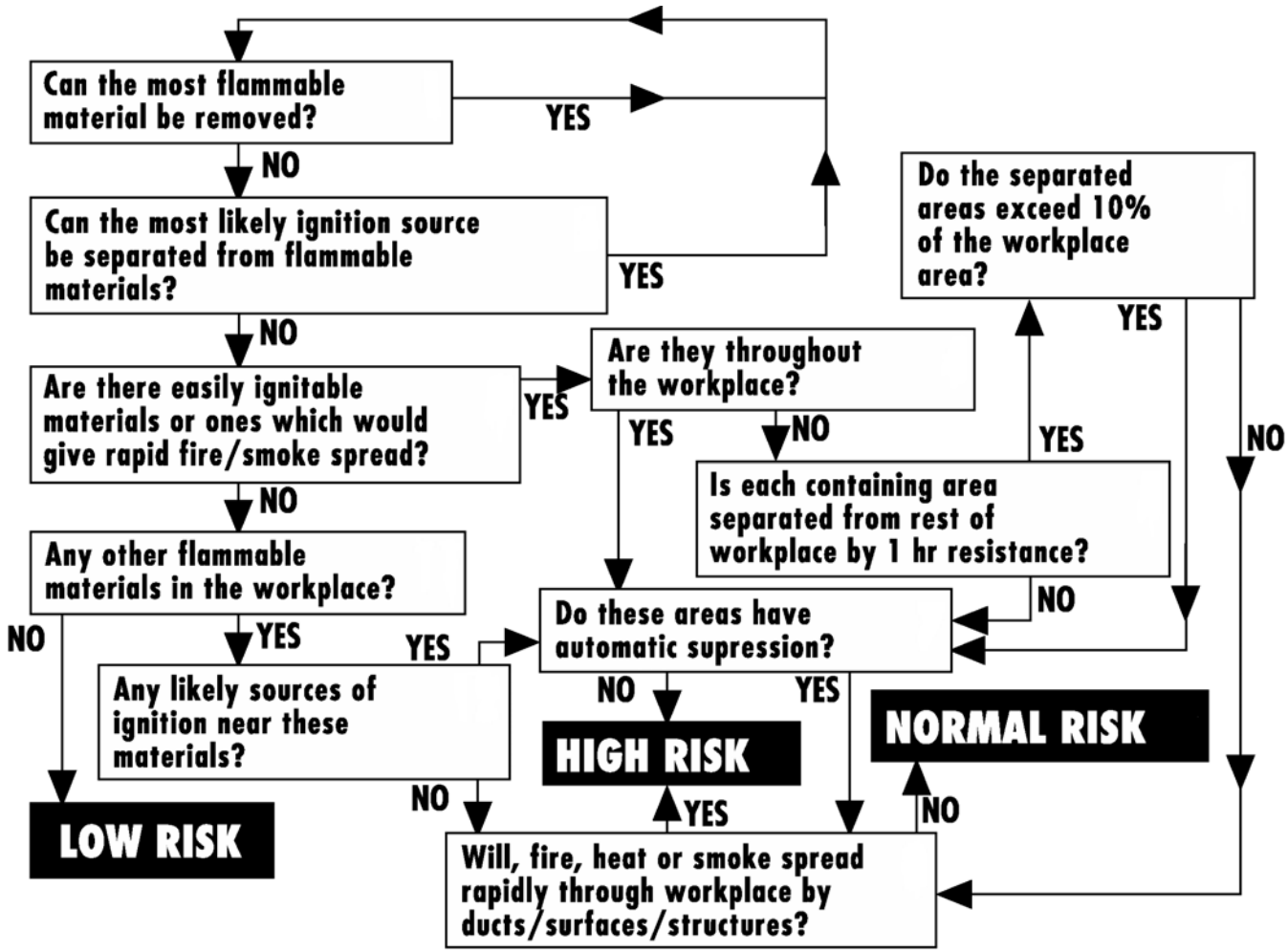
An Algorithmic Method



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Hazard Operability Study (HAZOP)

- Preferred for use in nuclear, chemical, and petrochemical industries
- Applied to a line diagram of the apparatus, line by line
- Guide words are used to decide if a hazard exists or could exist if certain events happened
- Typical guide words are: “None” – e.g. no flow: would that be hazardous? “More of” and “Less of”
- When hazards have been identified decisions are taken to eliminate them as far as possible

Hazard Analysis (HAZAN)

- Follows HAZOP study
- Hazards have to be assessed and decisions, taken about eliminating them
- In situations where little or no guidance is available HAZAN is applied.
- Accident risk is compared with a target or criterion in order to decide on a course of action.

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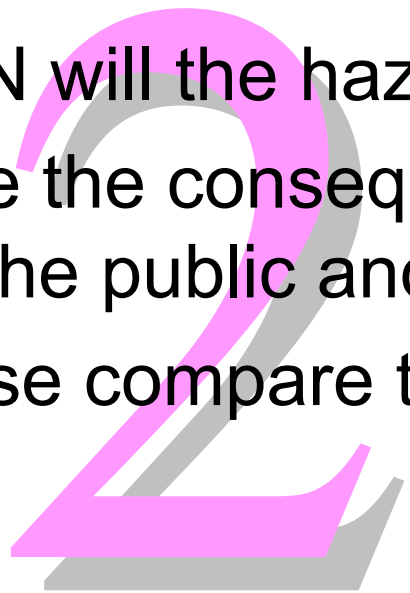
Hazard Analysis (HAZAN)

- HAZAN has to answer three questions:
  - HOW OFTEN will the hazard occur?
  - WHAT will be the consequences to employees, the public and to the plant?
  - HOW do these compare to the target or criterion?



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HTM 86 - Fire risk assessment in hospitals

- Specific method for hospitals
- Based on requirements of HTM 85
- Premises split into discrete units i.e.
  - Outpatients
  - Pharmacy
  - Physiotherapy
  - ITU

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HTM 86 - Fire risk assessment in hospitals

- The assessment is carried out in 5 stages by considering the following:
  - Stage 1 Dependency of patients
  - Stage 2 Existing fire hazards
  - Stage 3 Existing fire precautions
  - Stage 4 Recording the assessment
  - Stage 5 What, if any compensations are required

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HTM 86 - Fire risk assessment in hospitals - Compensatory Factors

- The ‘compensatory factor’ matrix is complicated and allows for the compensation of a poor feature only by the identification of a “high standard” of certain other precautions.
- i.e. a high hazard identified in “Fires started by patients” can only be compensated for by a “high standard” of either “observation” or “alarm and detection systems”.

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HTM 86 Compensatory Factors

Inadequate Feature	Possible Compensatory Factors	Degree Of Compensation
High hazard rooms (i.e. Boilerhouse)	AFD system Sprinklers	Total Total
Alarm and detection system	Observation Staff Sprinklers	Total Total Total
Single direction means of escape	Observation AFD system Travel distance Escape lighting Staffing levels Smoke control	Partial Total Partial Partial Total Total
Travel distance	Observation AFD system Refuge provision Staffing levels Smoke control	Partial Total Partial Total Total
Stairways	Height above ground	Total
Elements of structure	Sprinklers	Total
External envelope protection	Compartmentation Sprinklers	Total Total
Height above ground	Stairways Refuge Compartmentation Access for Fire Brigade	Partial Partial Partial Partial

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Heat Release Rates from Fires

- 1kW = 1 bar electric fire
- 50 kW = Waste bin fire
- 1 MW = Armchair fire
- 10 MW = Room fire
- 100MW = Large industrial fire

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Design Fire Growth Rates

- Dwelling = Medium
- Office = Medium
- Shop = Fast
- Hotel reception = Medium
- Hotel bedroom = Medium
- Picture gallery = Slow
- Industrial storage = Ultra fast
- Industrial plant room = Ultra fast

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Risk Ranking and Hazard Indices

Defined as the process of modelling and scoring hazard and exposure parameters to produce a rapid and simple assessment of relative risk.

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Risk Ranking and Hazard Indices

- Values are assigned to selected variables based on statistical evidence, professional judgement and past experience
- Variables are representative of both positive and negative fire safety features
- Values are operated on by some combination of arithmetic functions to arrive at a single value
- The resulting figure is then compared to other similar assessments or to a standard to rank the fire risk

Summary

- Fire Risk Assessment is a requirement of the Fire Precautions (Workplace) Regulations 1997 (amended 1999).
- Risk assessment = evaluation of the likelihood of undesired events and the harm or damage being caused, together with value judgements concerning the significance of the results.
- Simple process in general – varied tools available to assist.
- Not ruled by economics, the safety of people must always come first

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