Safety zones and other Land Use Planning tools to reduce acute environmental risks

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The EU Seveso II Directive

- Adopted in 1996 to prevent major-accident hazards involving dangerous substances and the limitation of their consequences
- Background: Several large incidents (Seveso 1976, Bhopal and Mexico City 1984 and others)
- Requires that Member States impose Land Use Planning Policies/procedures to include consideration of major accidents

Article 12 of the Directive

Article 12 of the Seveso II Directive requires that controls should be exercised on:

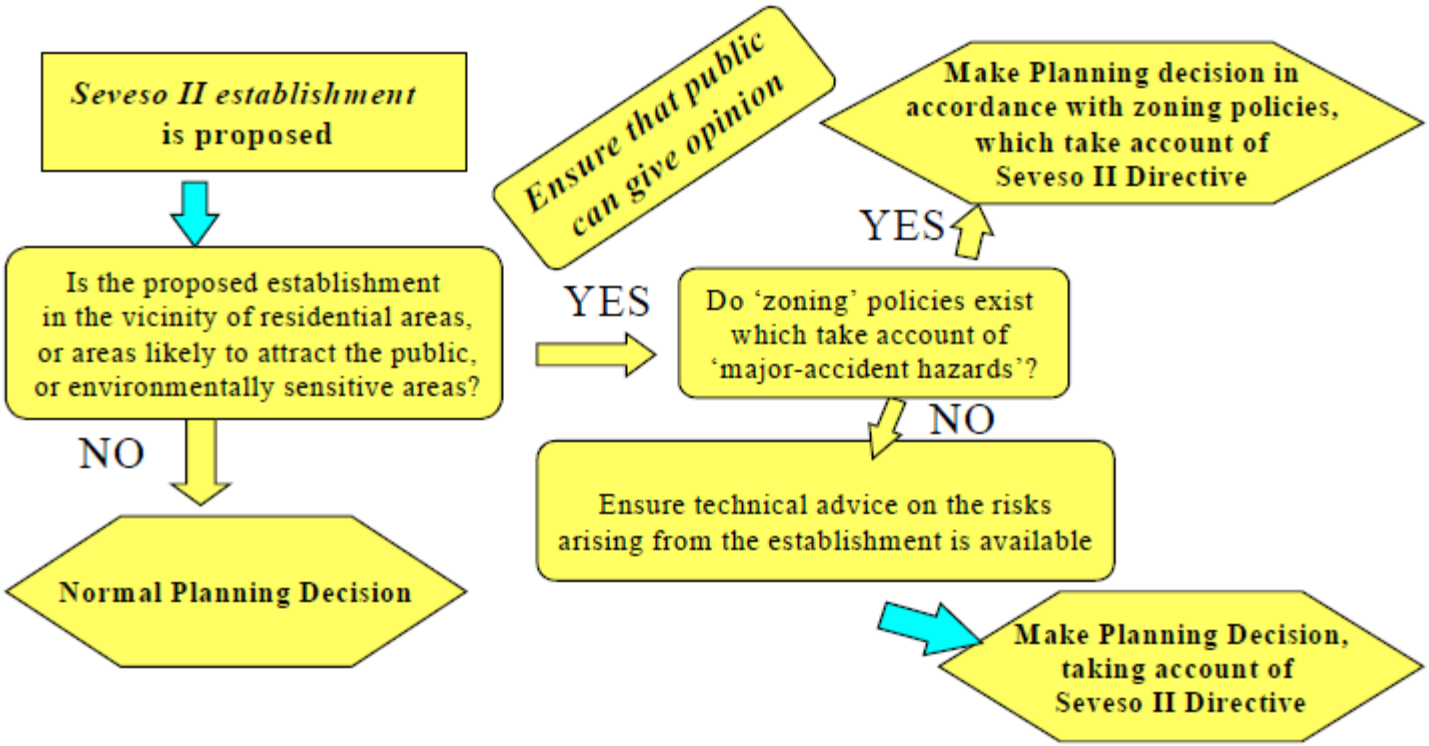
- The siting of new establishments
- Modifications to existing establishments
- New developments such as:
  - Transport links
  - Locations frequented by the public and residential areas in the vicinity of existing establishments, where the siting or developments are such as to increase the risk or consequences of a major accident

- Leaves it to the Member States on how to follow up this

Siting of new establishments

- Develop procedures for planning consultation for new Seveso II establishments
- Make suitable arrangements to coordinate Seveso II requirements & planning consultation prosedures
- If appropriate, define sones where Seveso II establishments may be permitted
- Define source(s) and type of technical advice
- Define to whom advice should be addressed

Planning Procedures



Enough *distance* important

Policies should in the long term ensure enough distance between hazardous-incident-prone plants («Seveso II plants») and:

- Residential areas
- Buildings and areas of public use
- Major transport routes
- Recreational areas
- Other sensitive areas

Uses of land which are not comptible should be separated by appropriate distances

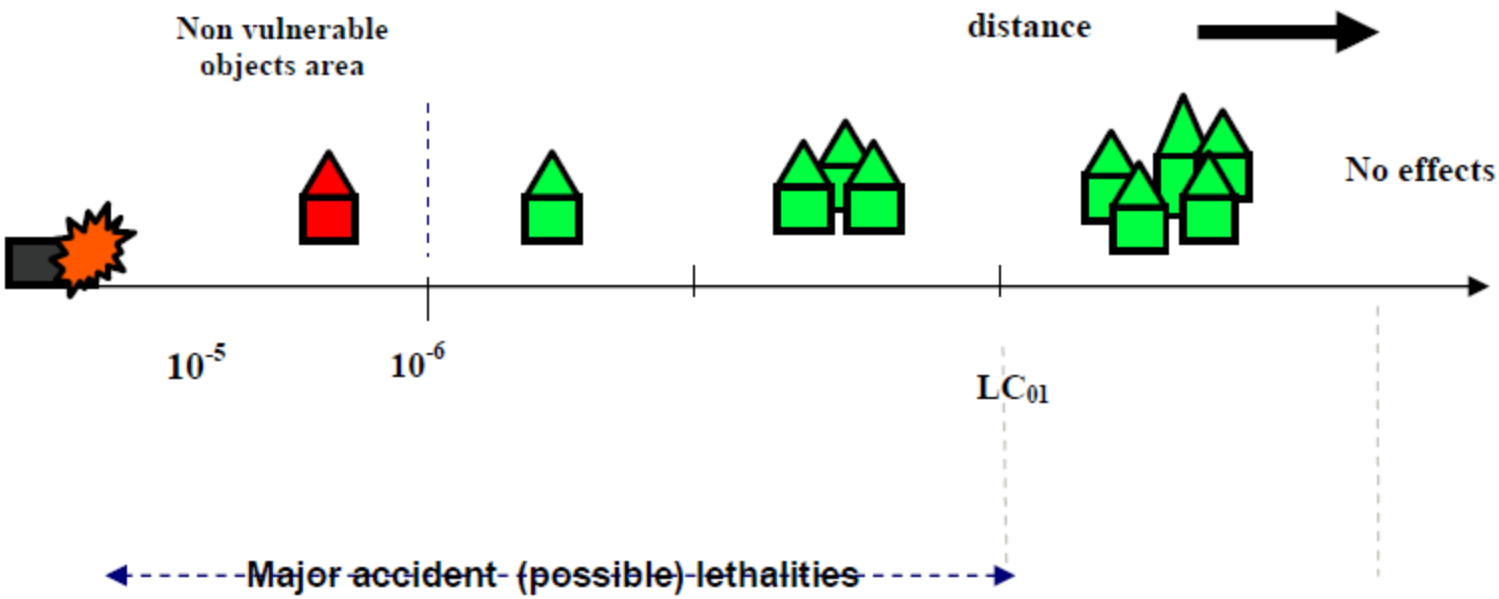
The concept of «zoning»

Countries should develop zones in the vicinity of Seveso II plants for:

- Emergency planning
- Land-use planning
- Information to the public on safety measures and how to behave in case of an accident

No requirements in the Directive that these zones should be the same for all of the above

Example of zoning



The follow-up varies

Variations in approaches between EU countries:

1. Developing distance tables based on historical experience, experts and depending on the type of the activity
2. Assessment of consequences of different event scenarios (consequence-based approach)
3. Assessment of both consequences and probabilities of occurrence of the different event scenarios (risk-based approach
4. Mixes of the above

Developing distance tables

- A simple approach
- Close to the traditional approach of the land-use planner
- Often highly based on expert judgement and historical data of accidents
- Take into account the type of industrial activity and/or the quantity and type of hazardous substances present
- Rely on expriences from operating similar plants
- Detailed design and safety measures are often not considered

Safety distances in Sweden

	Initial safety distances
Plastic industry	200 meters
Paper mill	500 meters
Non-organic chemical industry	1,000 meters
Oil refinery	1,500 meters

	Safety distances between industrial and housing areas
Industrial blocks	50 meters
Small industry area	200 meters
Industrial area	500 meters
Process industry	> 1,000 meters

Example from Germany

- A garden centre got a building permit some 250 meters from a chemical company
- The chemical company challenged this because chlorine is stored just 70 meters from the planned centre
- The European Cort of Justice decided that approval of a project should be decided on a case-by-case basis
  - Not only risk factors, but also socioeconomic issues should be considered
  - Safety distances should not be considered absolute
- Uncertain if the garden centre will be built

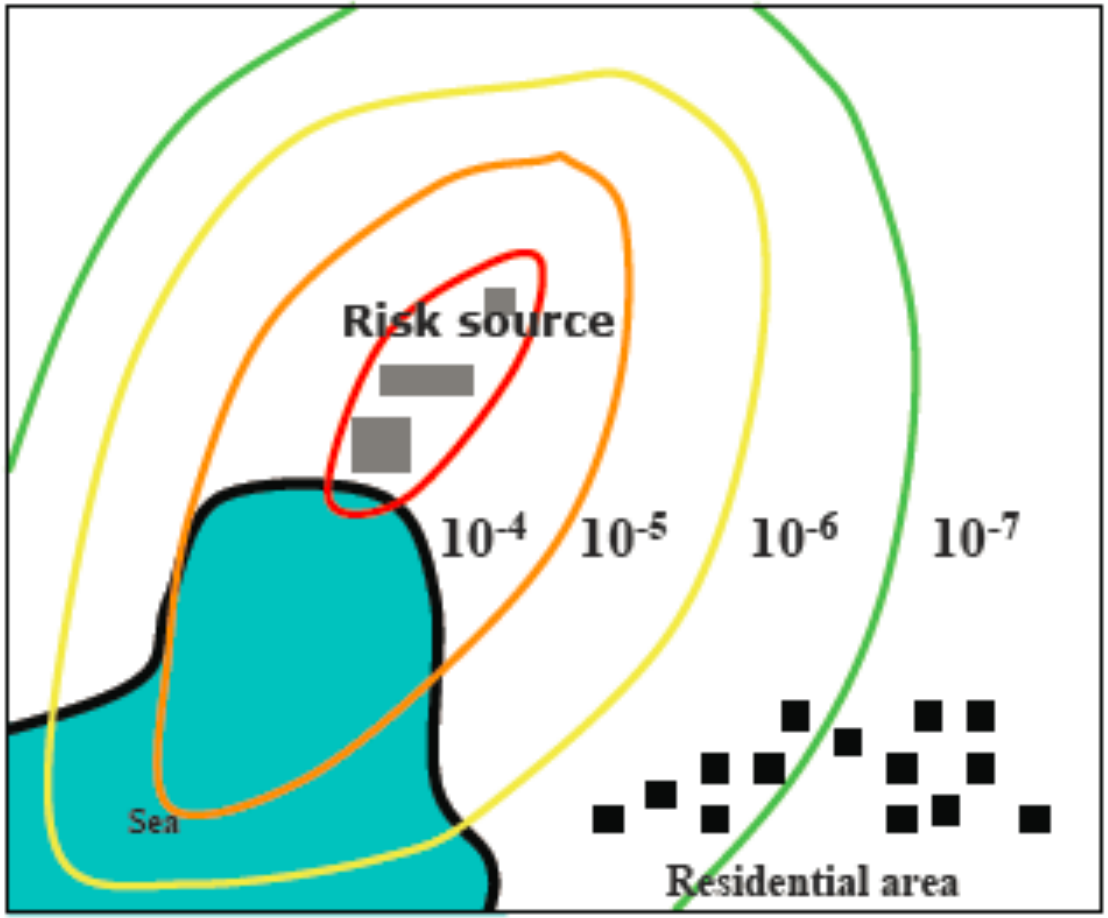
Consequence-based appr.

- Often used to define the «worst case» scenario
- Considers measures to protect people and environment from this to happen
- Defines safety distances and other measures based on this
- Criticized for not considering the likelihood for the worst case to happen
- Should also plan for «high frequency – low impact» incidents

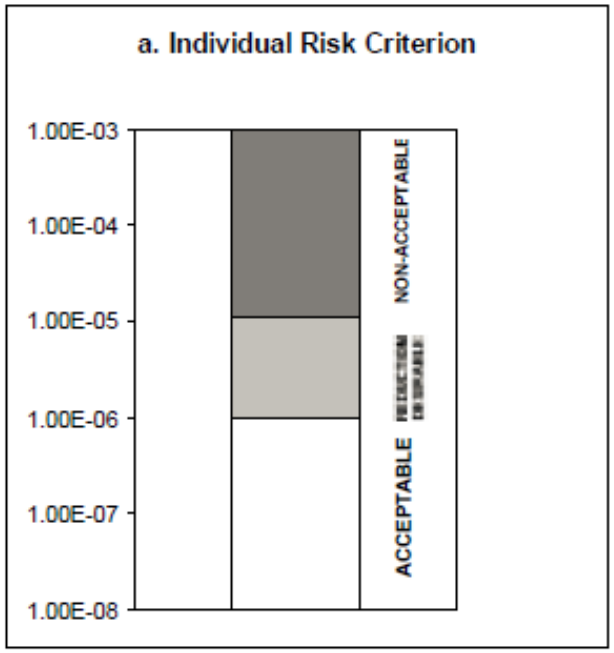
Risk-based approach

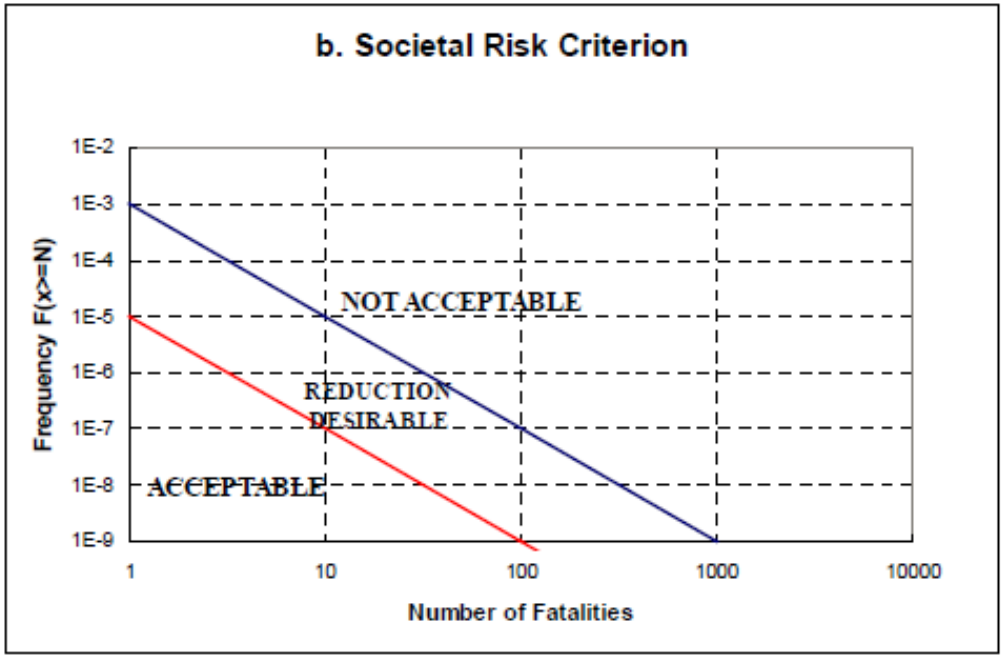
- Identification of hazards
- Estimating the probability of occurrence
- Estimating the consequences of the accidents
- Eventually integrate into overall risk indices
- Comparison of the calculated risk with acceptance criteria

Iso-risk lines



Societal risk

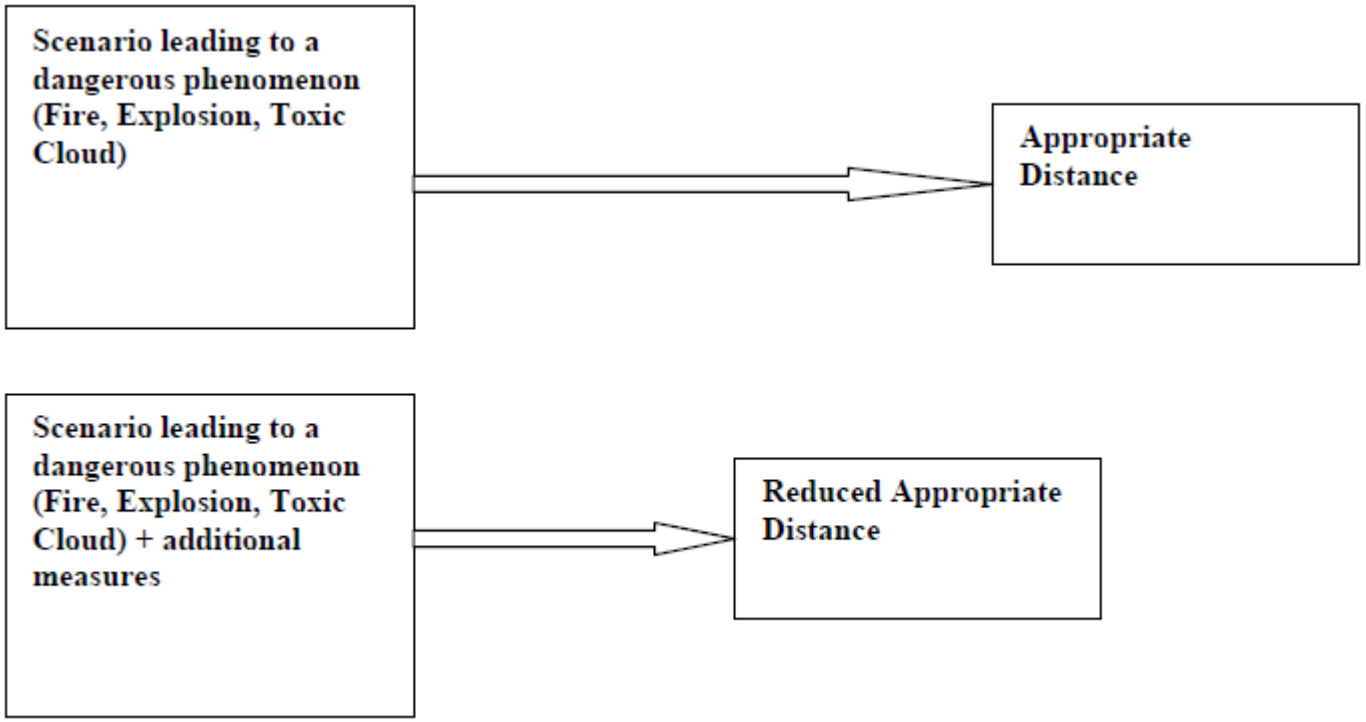




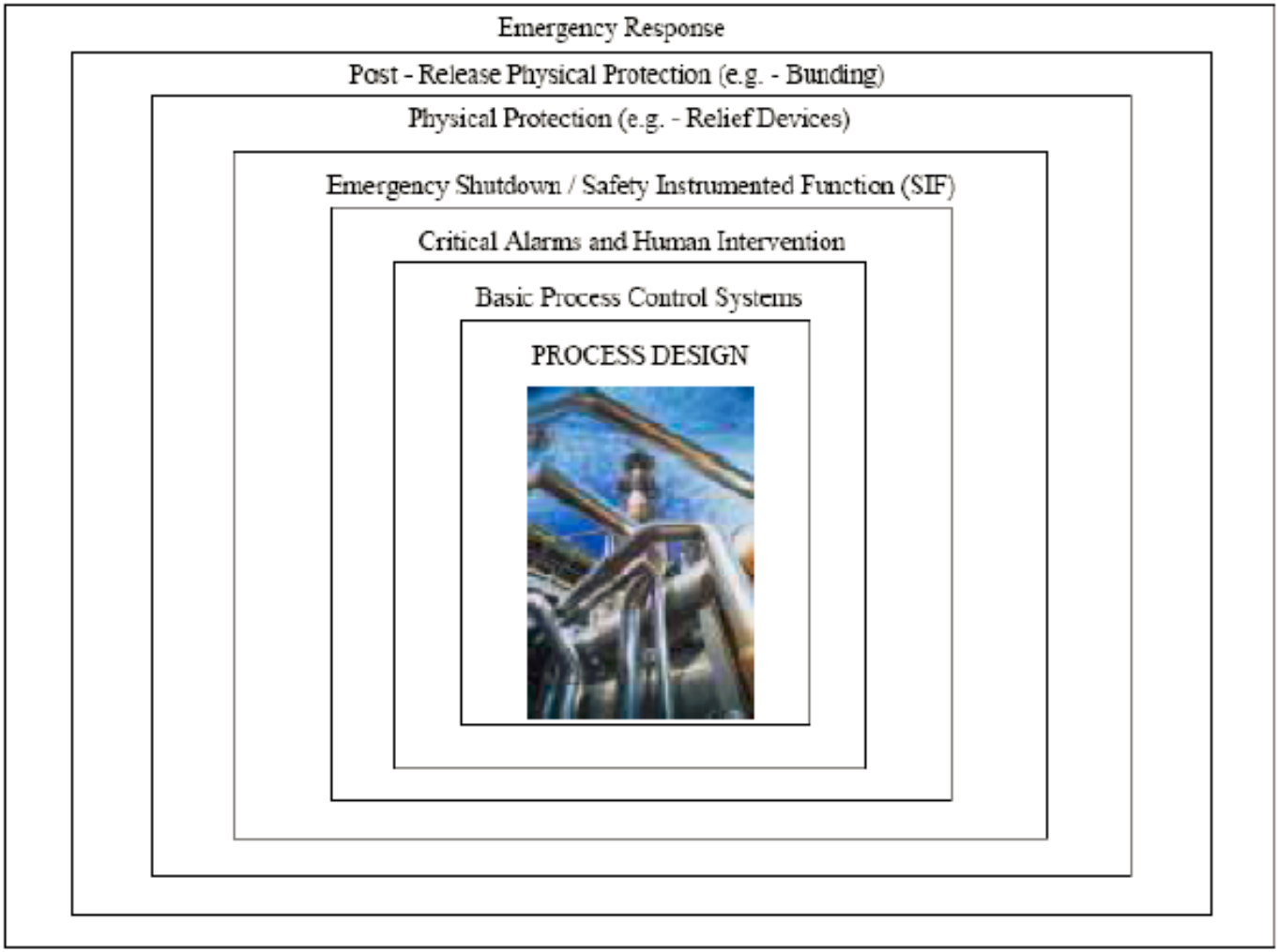
UK: a risk-based approach

Category of development	*Inner zone Individual risk exceeds 10^{-5}*	*Middle zone Individual risk exceeds 10^{-6}*	*Outer zone Individual risk exceeds $0.3x10^{-6}$*
A. Housing, hotel, holiday accommodation	Advice against development	Specific assessment necessary	Allow development
B. Workplaces, Parking areas	Allow development	Allow development	Allow development
C. Retail outlets, community and leisure facilities	Specific assessment necessary	Specific assessment necessary	Allow development
D. Institutional establishments and special accommodation	Advice against development	Specific assessment necessary	Specific assessment necessary

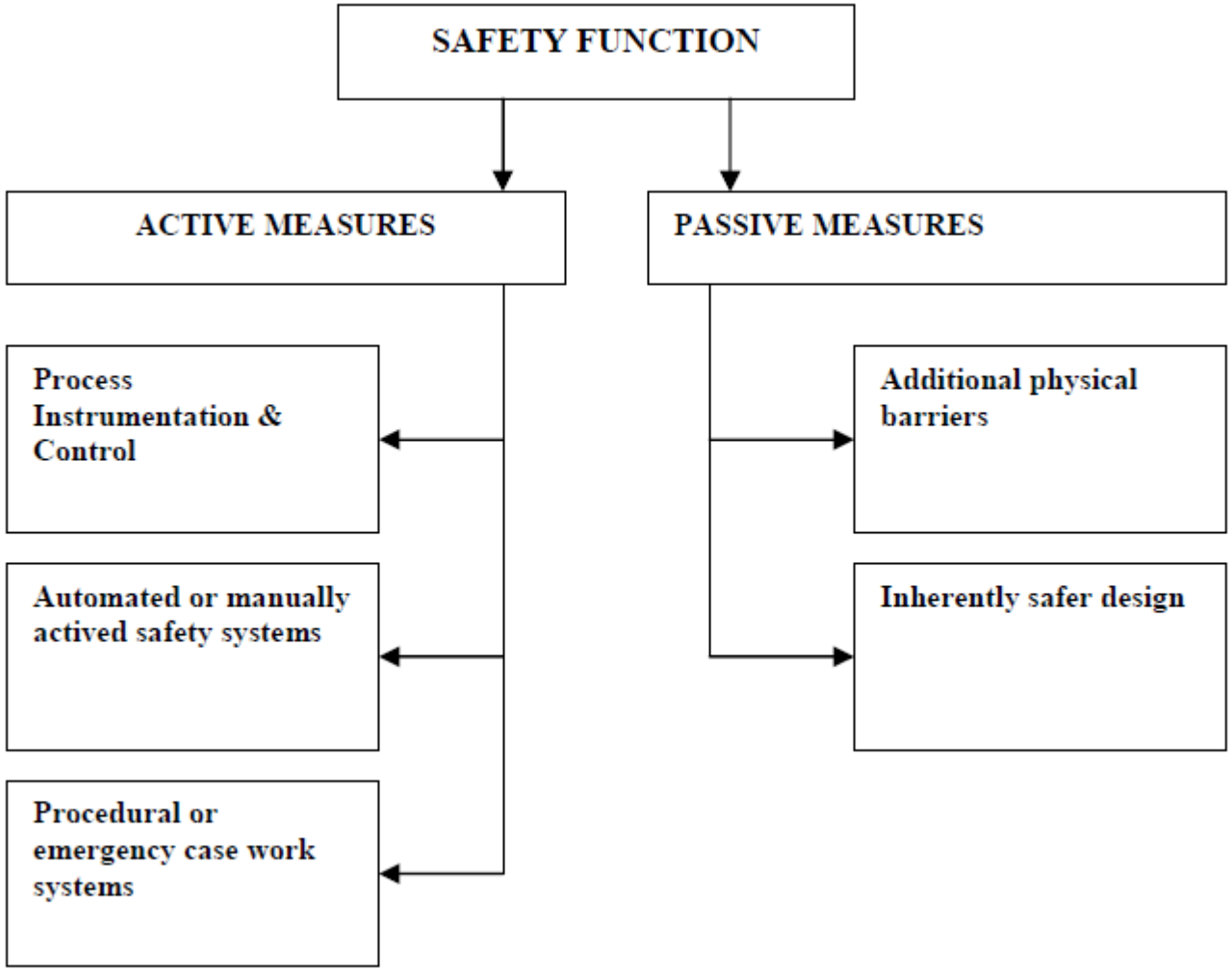
Actions to reduce distance



Internal and external safety



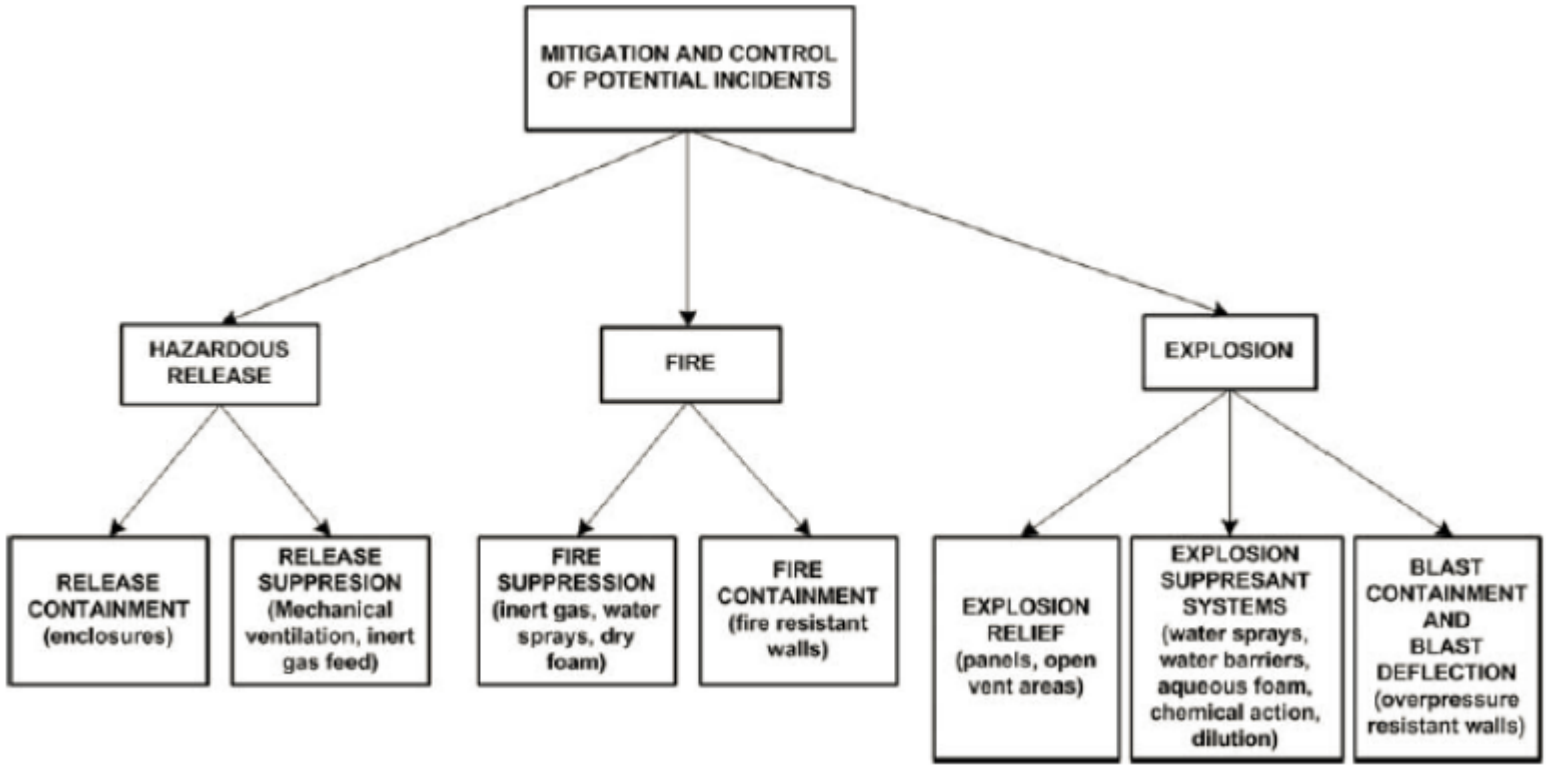
Safety measures



Types of measures

1. Passive hardware measures
   - Mostly to mitigate severity of accidents
2. Active hardware measures
   - E.g. automatic shutdowns, alarms
3. Passive behavioural measures
   - E.g. staying away from defined areas
4. Active behavioural measures
   - E.g. evacuation
5. Mixed measures
   - Combinations of the above

Mitigation and control



Suggestions for China

- Are there some safety distances in China today?
- If not, could it be helpful to establish some guiding distances for local authorities?
  - How could they be developed?
- Should only be *guidelines*
- Each case should be considered separately
- If some clearly defined safety measures are implemented, distances could eventually be shortened