

Confusion Over Risk Criteria

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Hazards 30



RISK & HAZARD MANAGEMENT

Who are RAS Ltd?



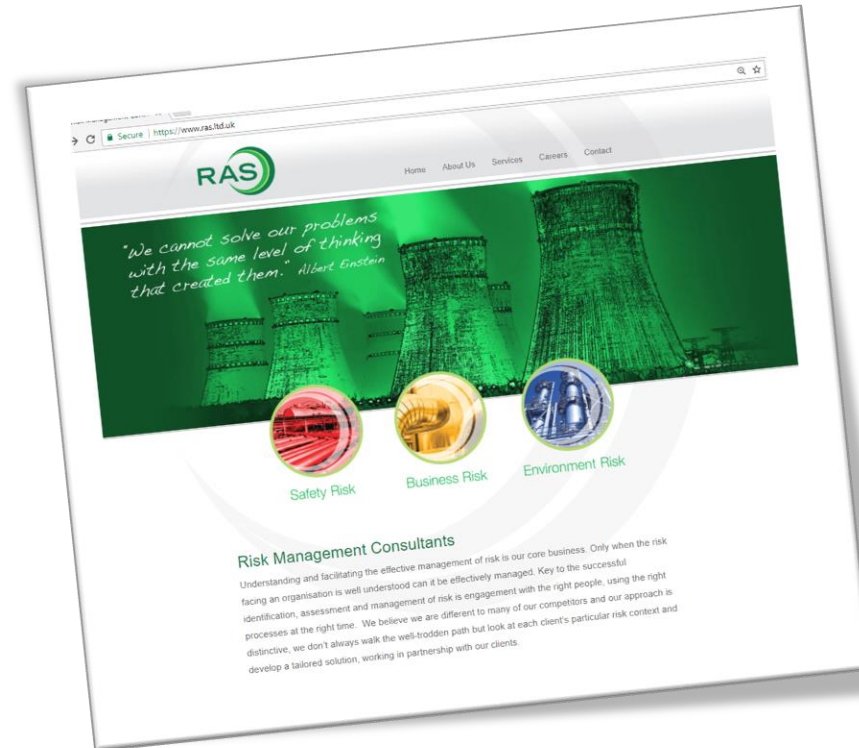
Safety Risk



Business Risk



Environment Risk

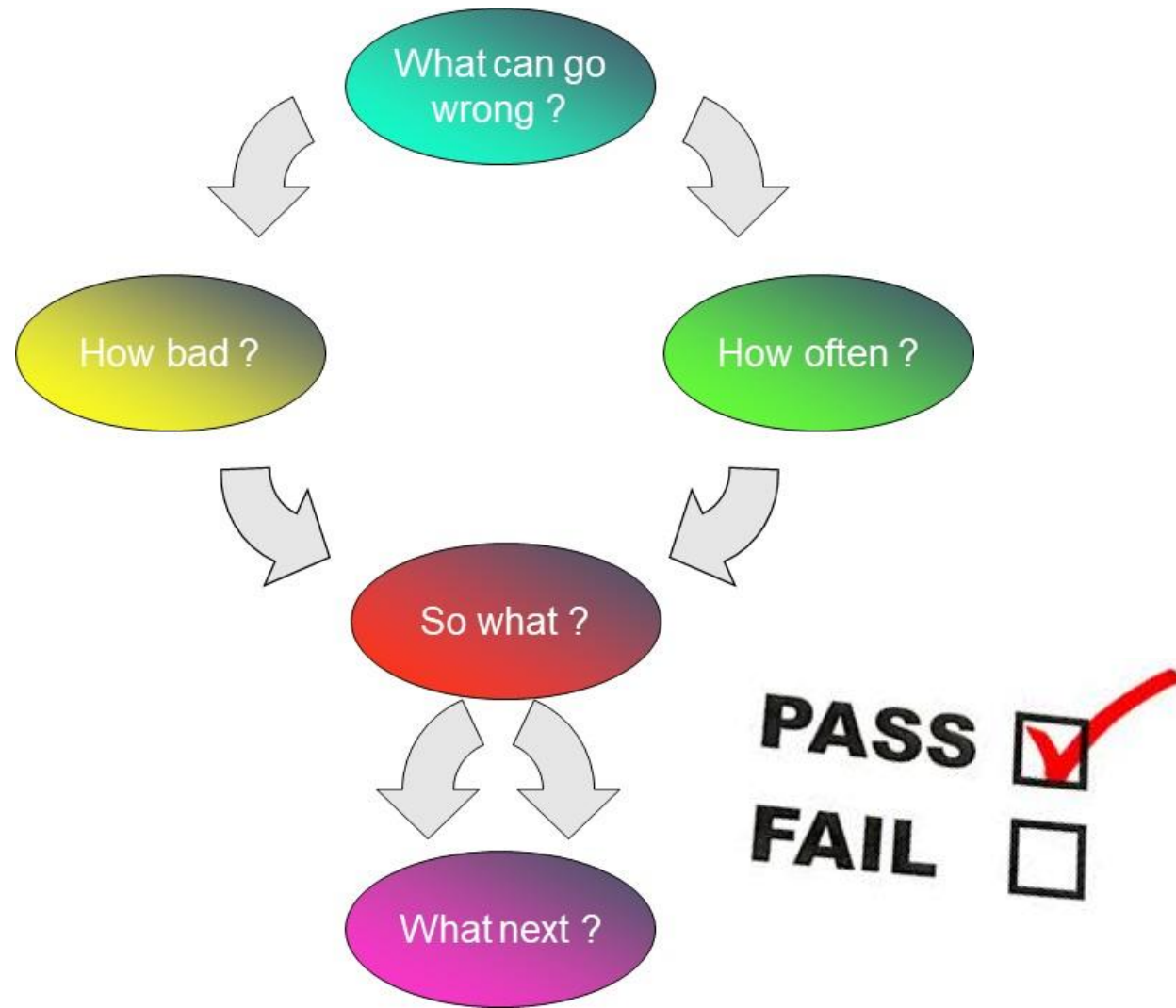


Why are we here?

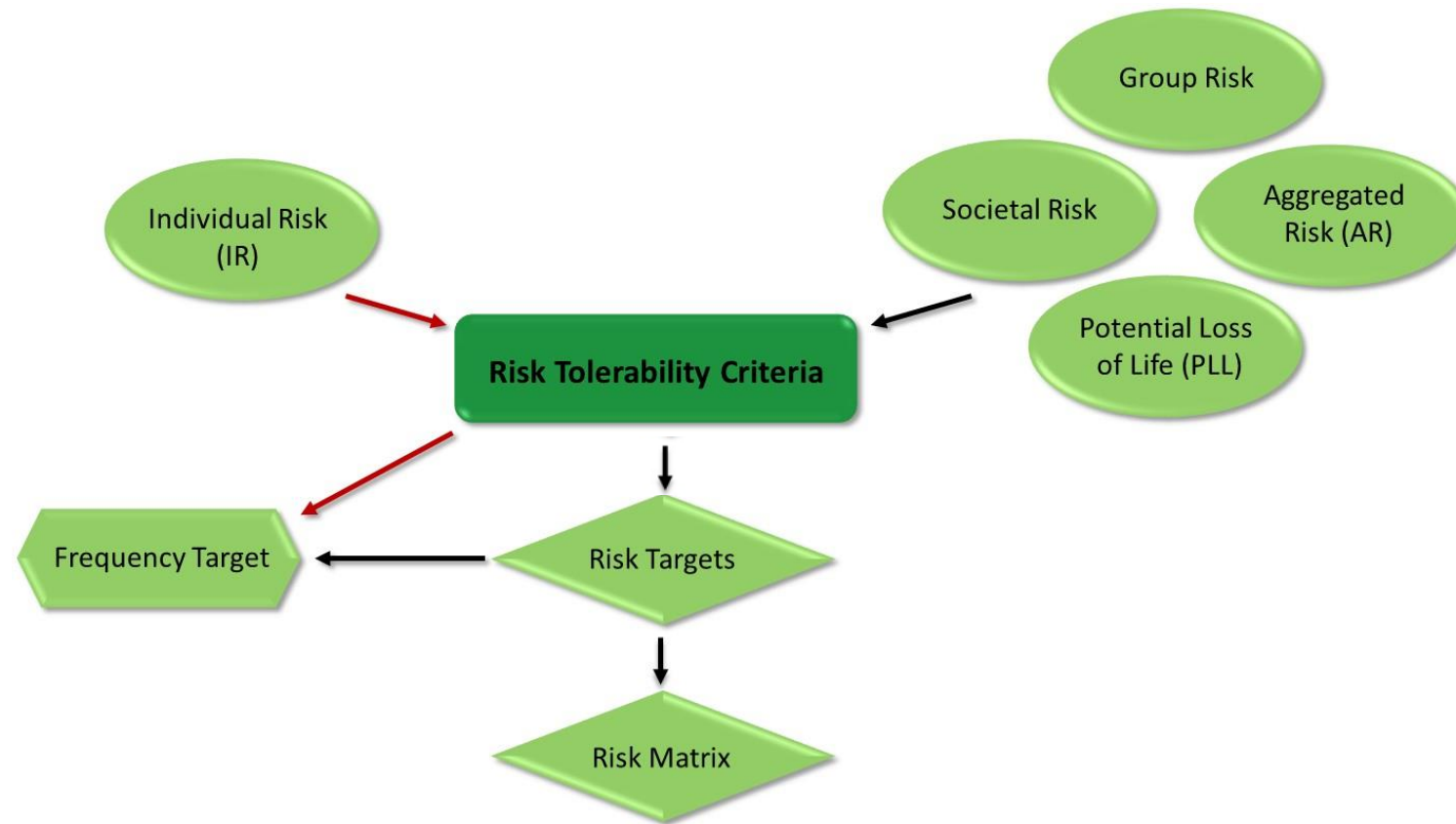


- There is a general lack of appreciation of the appropriate use of tolerability criteria in risk assessment.
- Presentation focus:
 - Types of risk and risk assessment tools
 - Risk tolerability criteria
 - Re-establishing links between risk assessment and ALARP
 - Pitfalls in risk assessment

Why assess risk?



Understanding the terminology



Key definitions

- **Individual Risk** - total risk to a specified individual from all hazards to which that individual is exposed.
- **Societal Risk** – total risk to a population based the on the frequency of each hazard and total number of people affected.

Aggregated risk, group risk, PLL



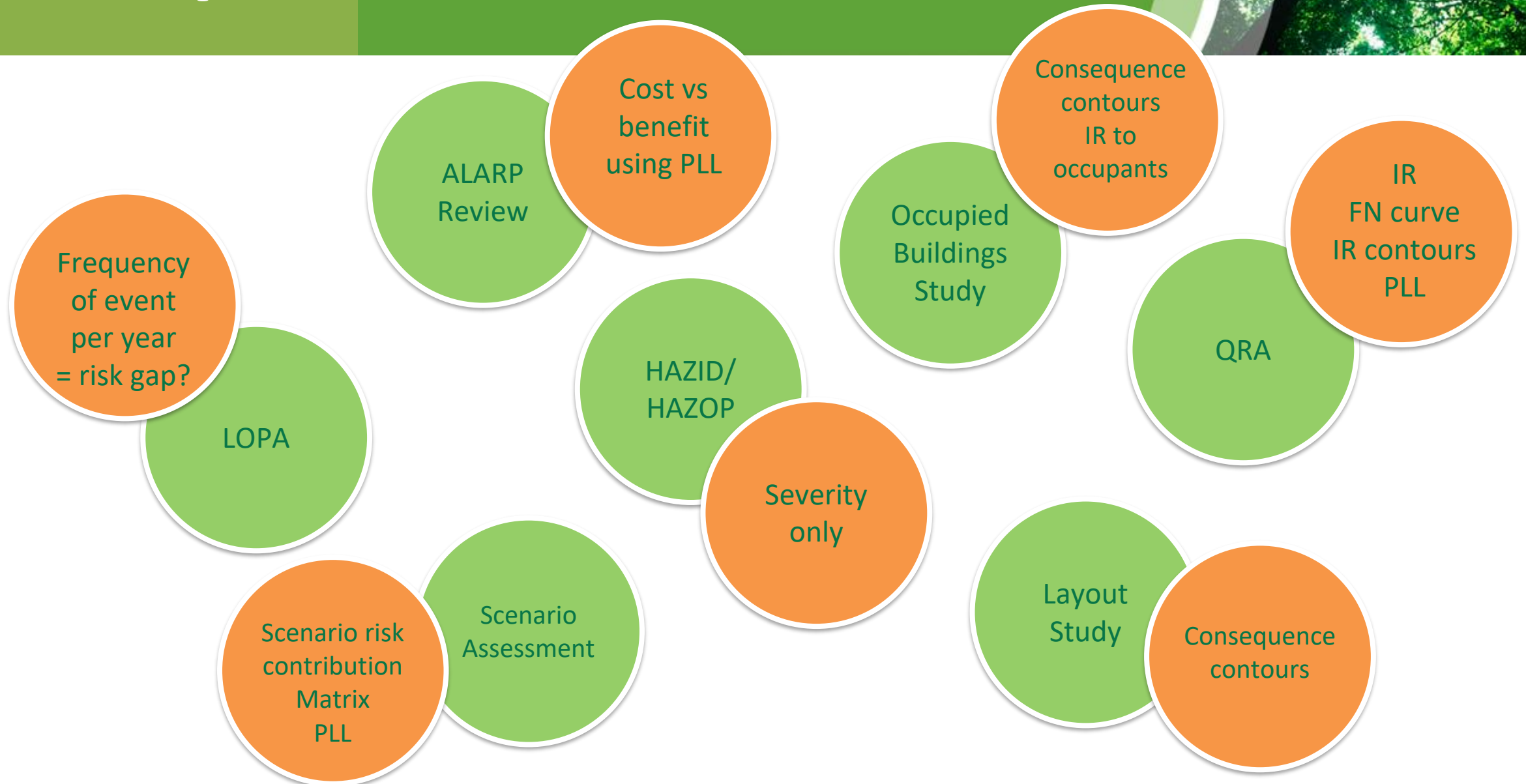
There are two main underlying issues:

- 1) Using the right risk assessment tool
- 2) Presenting the risk against the right criteria

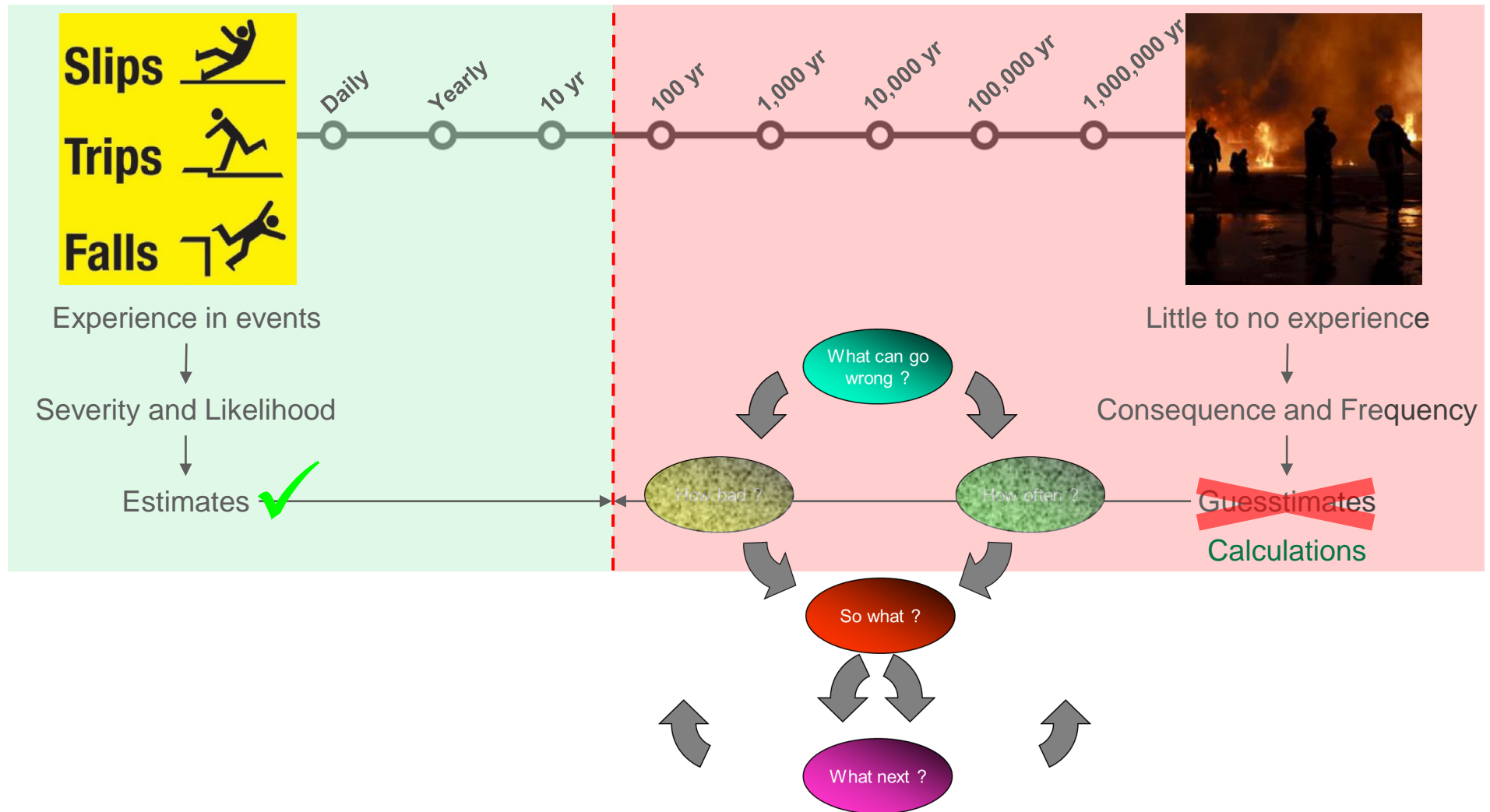
Risk assessment tools



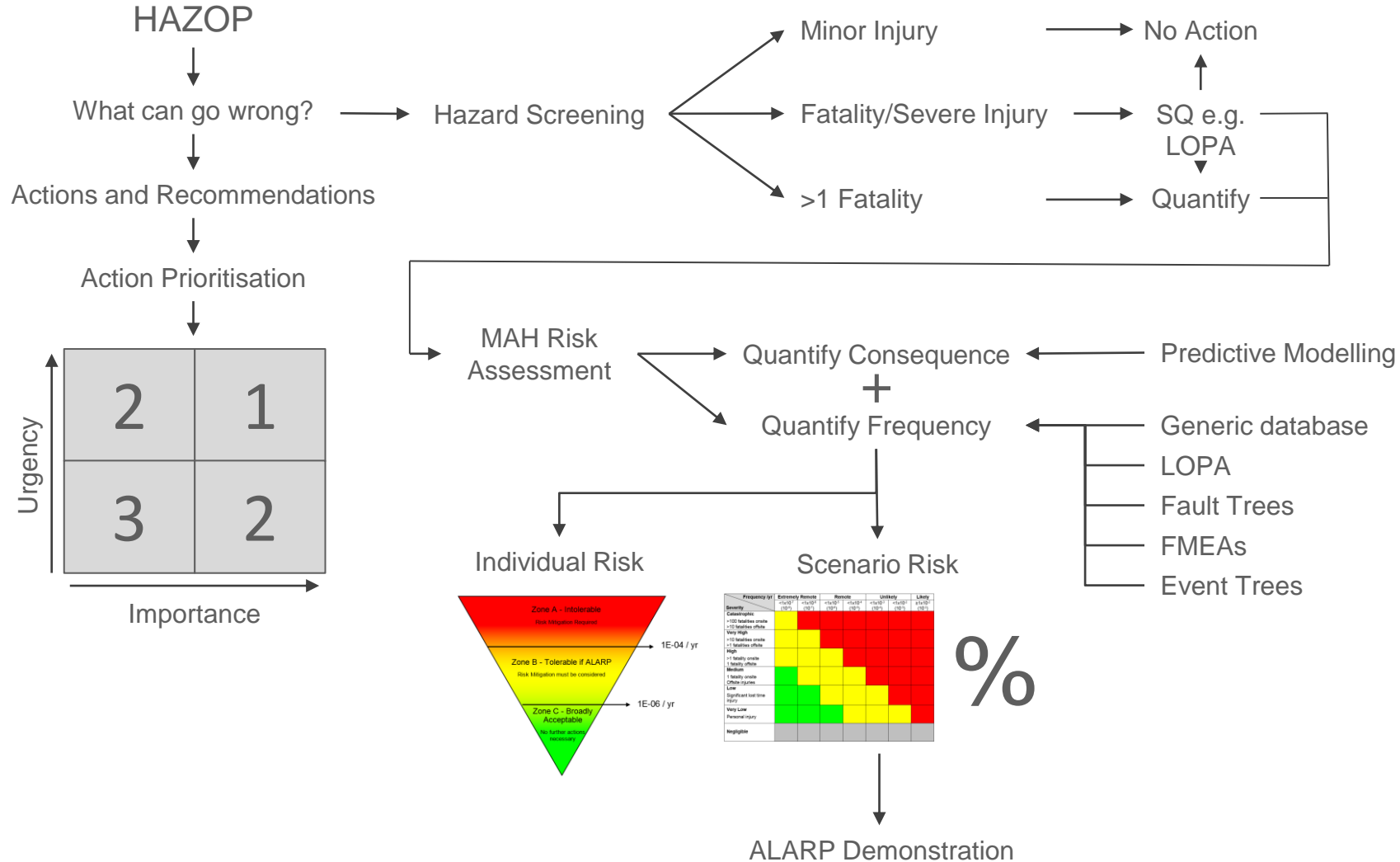
Risk presentation



Do we need to quantify?



Where does risk come in?

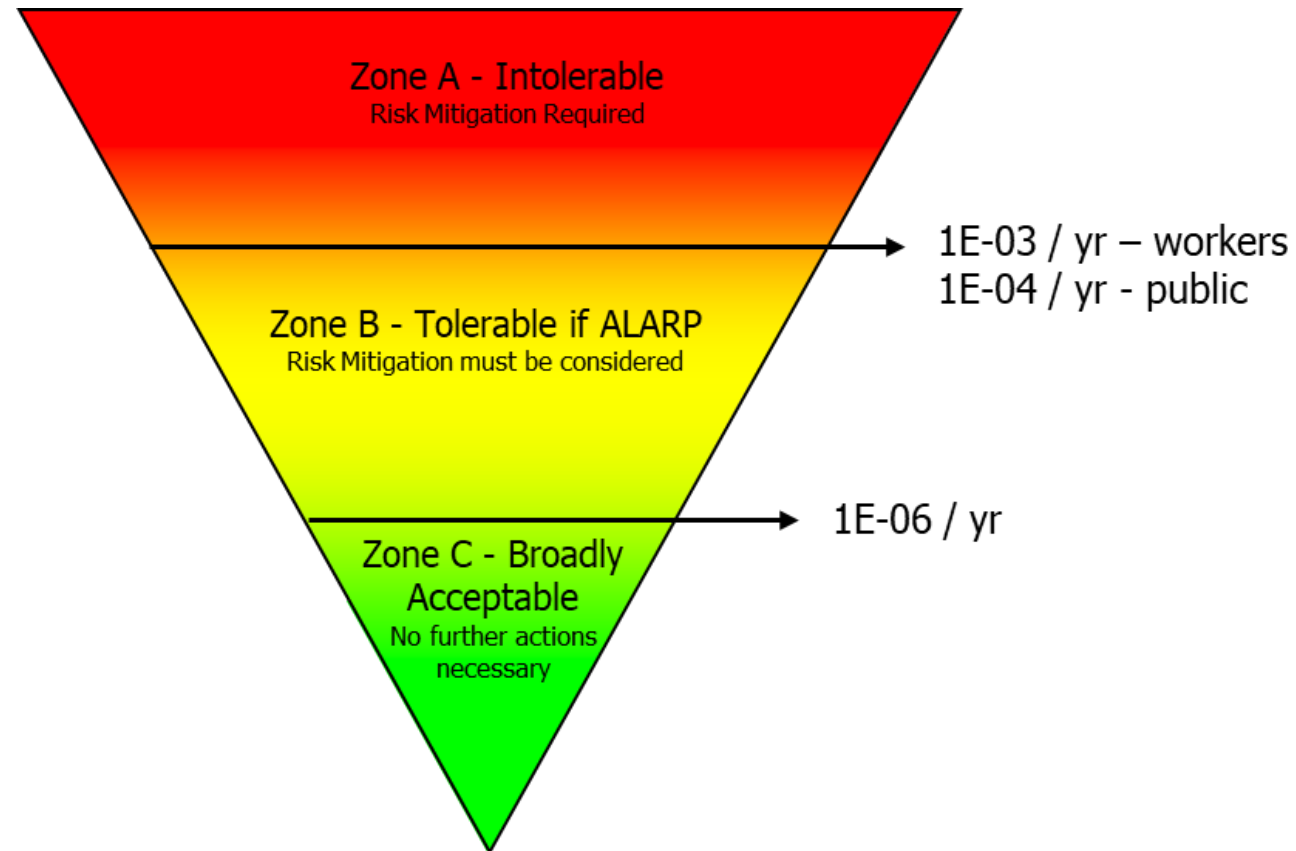


Which criteria?

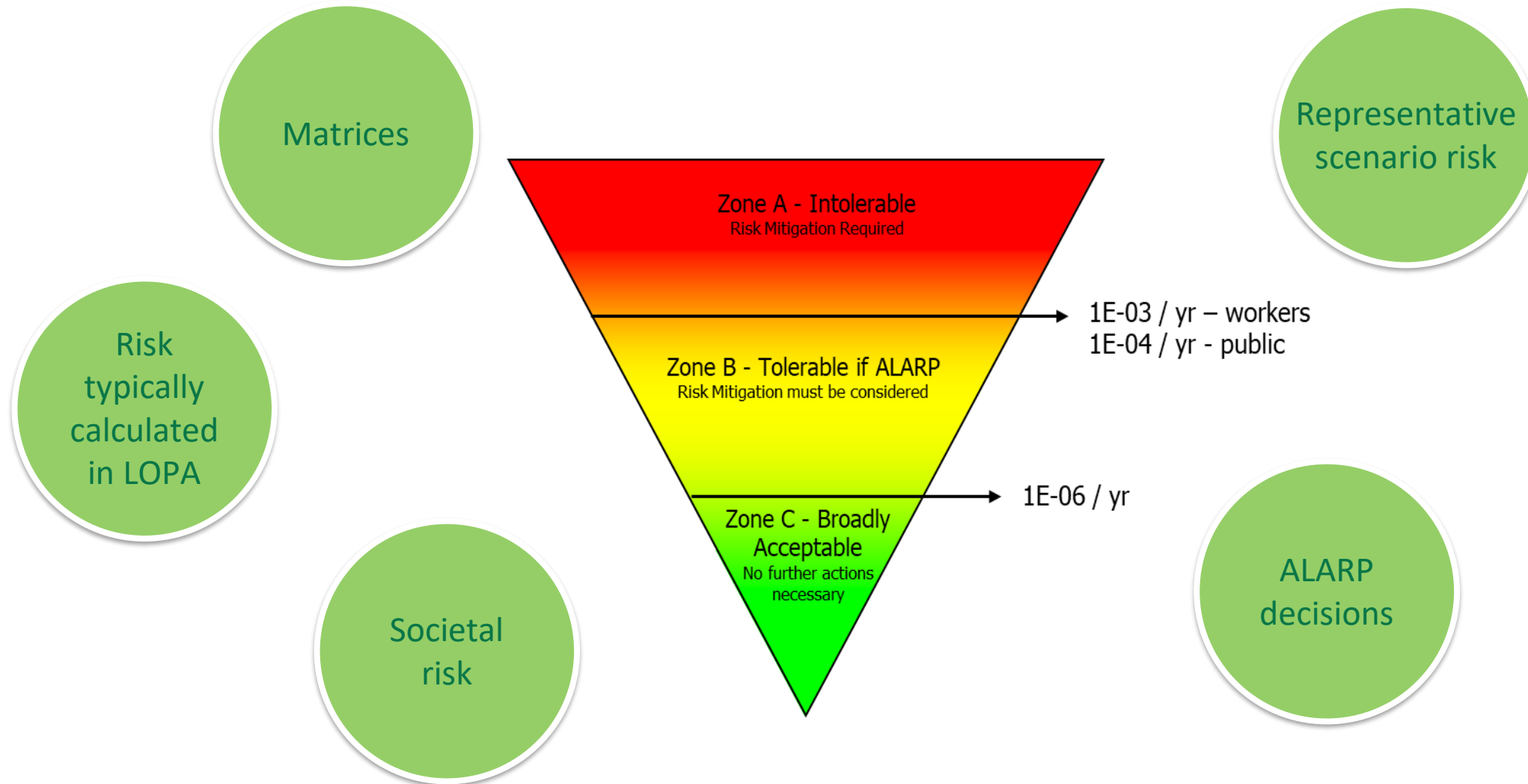
- If we are going to quantify – why?
 - Typically to answer the question – ‘is my risk tolerable?’
 - Maybe we want to know how to prioritise our efforts
- Which criteria?
 - What have we calculated?
 - Societal risk
 - Individual risk
 - Scenario risk...

Individual risk criteria

- Clearly defined in R2P2



IR criteria limitations



LOPA and single event assessments

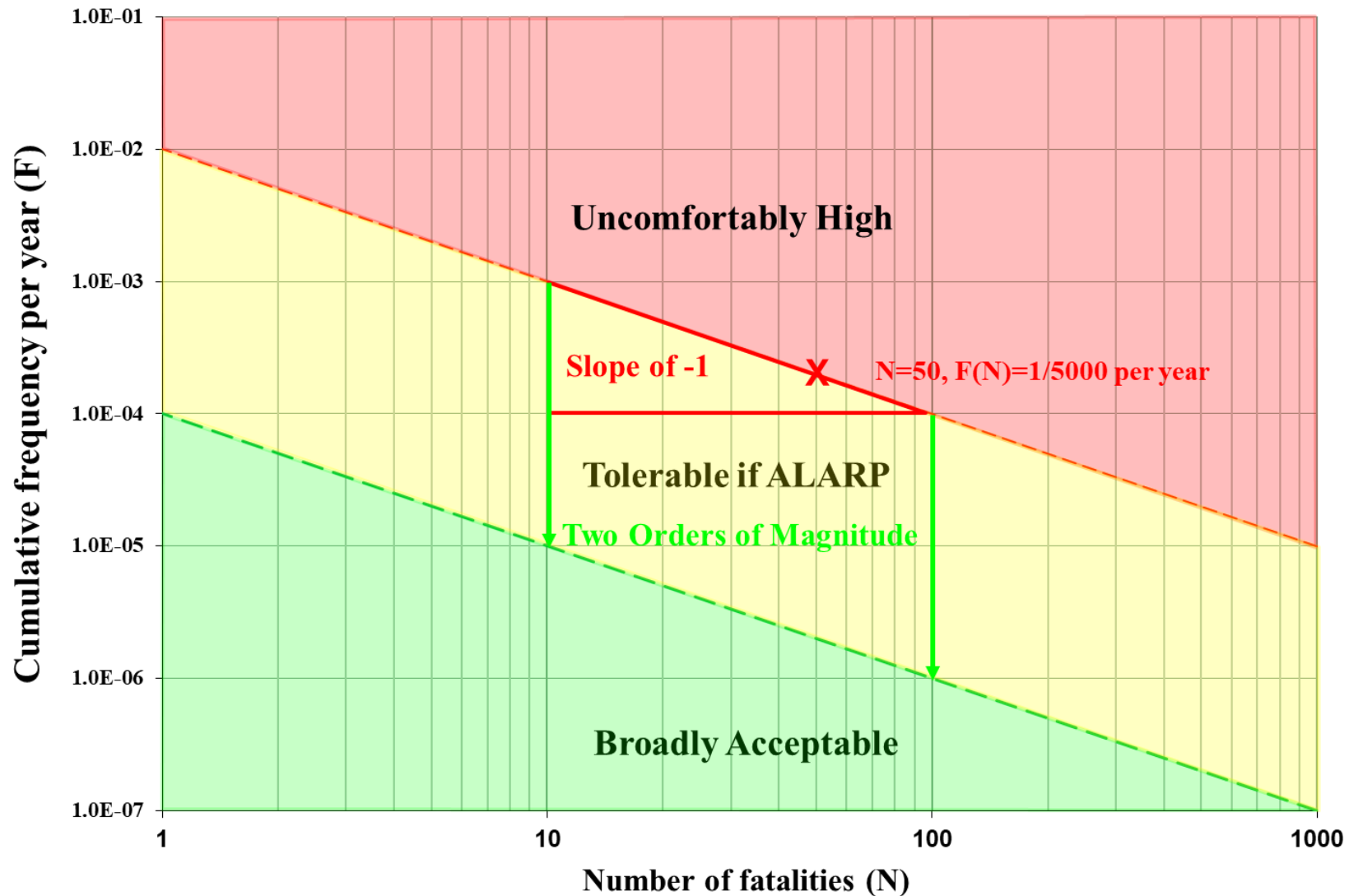
- The issue: Just part of an individual's or group's risk has been calculated, so it cannot be directly compared to IRF which is for total risk.
- Possible solutions:
 - Qualitative acceptance criteria
 - Scenario criteria
 - Enhancement and aggregation

Societal risk tolerability

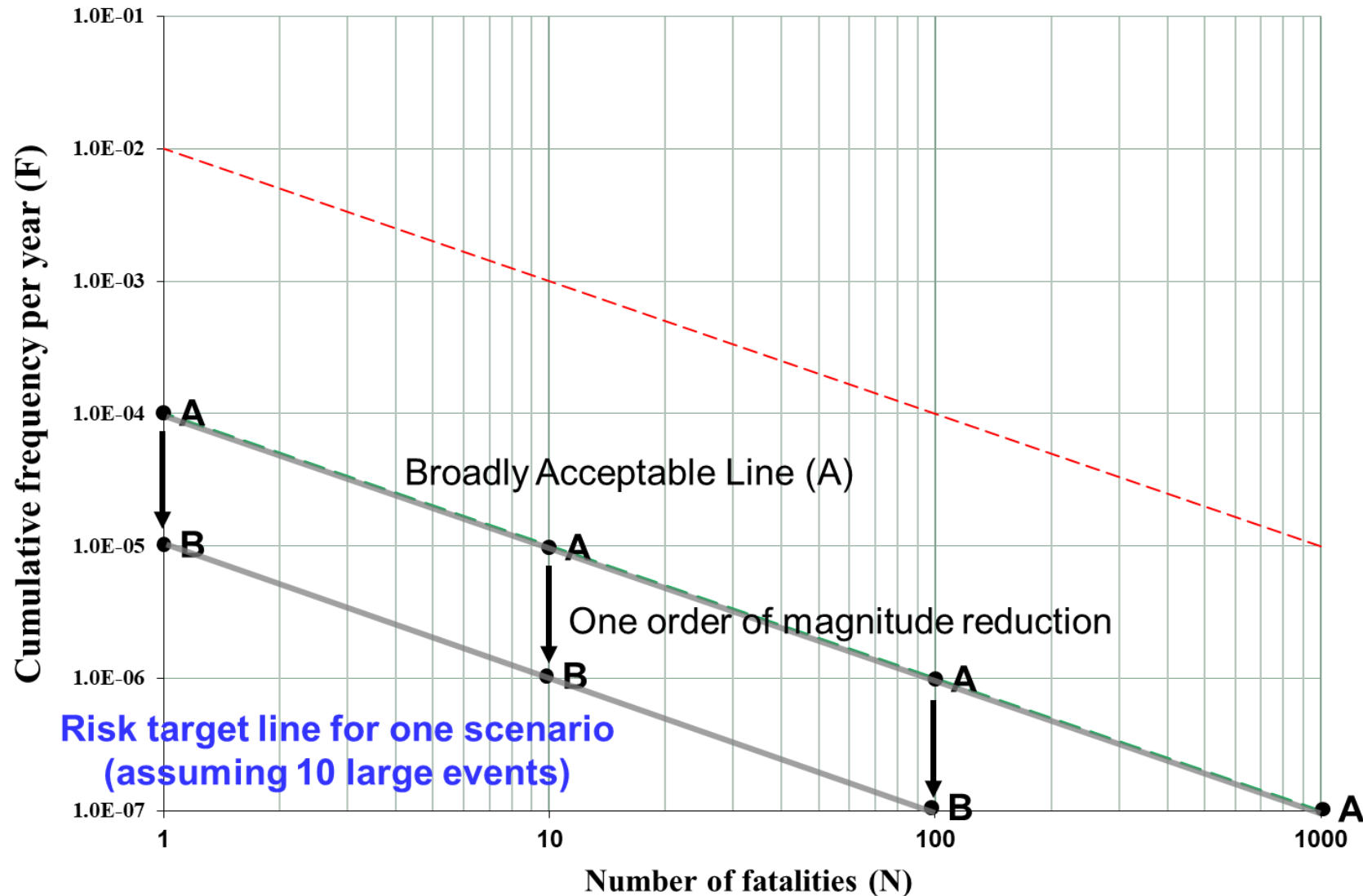


- Not so clearly defined in R2P2
 - 50 or more fatalities will be intolerable if it occurs more than once in five thousand years*
- HSE's 'Guidance on ALARP Decisions in COMAH' + Ball and Floyd (1998)
 - F-N curve with a slope of -1
 - Broadly acceptable region two orders of magnitude below the uncomfortably high boundary
 - Tolerable if ALARP region in between

Societal risk tolerability criteria



What if we haven't calculated the whole site risk?



Deriving scenario tolerability criteria

- LOPA targets can be derived

Severity / Harm	Target Frequency (per year)
Injury (0.1 Fatality)	1E-04
1 Fatality	1E-05
2 Fatalities	5E-06
10 Fatalities	1E-06

- If single figures preferred, it can be converted to PLL

Criteria	Whole Facility	Single Scenario
Intolerable / Uncomfortably high	1E-02 / yr	1E-03 / yr
Broadly Acceptable	1E-04 / yr	1E-05 / yr

Risk matrices

Key considerations:

- Resolution
- Type of risk assessed
- Risk tolerability criteria
- Scenario risk vs facility risk

		Frequency						
		Extremely Remote		Remote		Unlikely		Likely
		1	2	3	4	5	6	7
Severity	Catastrophic							
	Very High	A		G		C		
	High			B	F			
	Medium		H	D	E, I			
	Low					J		
	Very Low							
	Negligible							

The End – Or is it?



ALARP decisions



Common pitfalls

- Comparing LOPA results to Individual Risk criteria
- Comparing scenario risk to Individual Risk criteria without aggregation
- Not considering Societal Risk for high hazard events
- Looking for the Individual Risk criteria on a risk matrix
- Trying to use Individual Risk for demonstrating ALARP



- Assuming full quantification is needed
- Using experience based assessment in areas with low or no experience
- Wasting time estimating frequency of events in HAZOP or HAZID
- Investing in risk reduction measures designed to reduce group risk, after calculating individual risk

Summary



- Risk assessments come in all shapes and sizes.
- They range from the estimation of risk using a team's experience; through to semi and full quantification.
- Once the assessment is complete and there is a robust understanding of the risk, the next stage in the decision-making process is to decide if the risk is tolerable.
- If the risk is tolerable the next stage is to satisfy the challenge of demonstrating the risk is ALARP.
- Those key decisions require operators to be using appropriate risk criteria to support the decisions.
- There is not one size fits all.
- Individual risk of fatality is not always the appropriate risk criteria.

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