

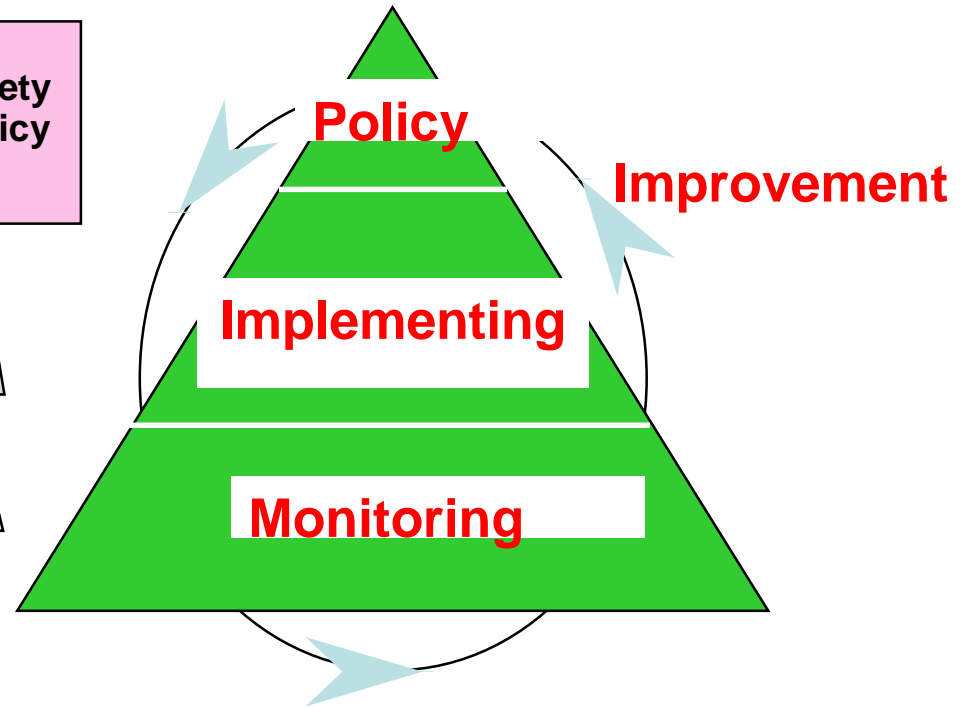
 **Nutech**
Global Safety



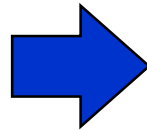


An Integrated Approach to
Reduce and Manage Risk

By
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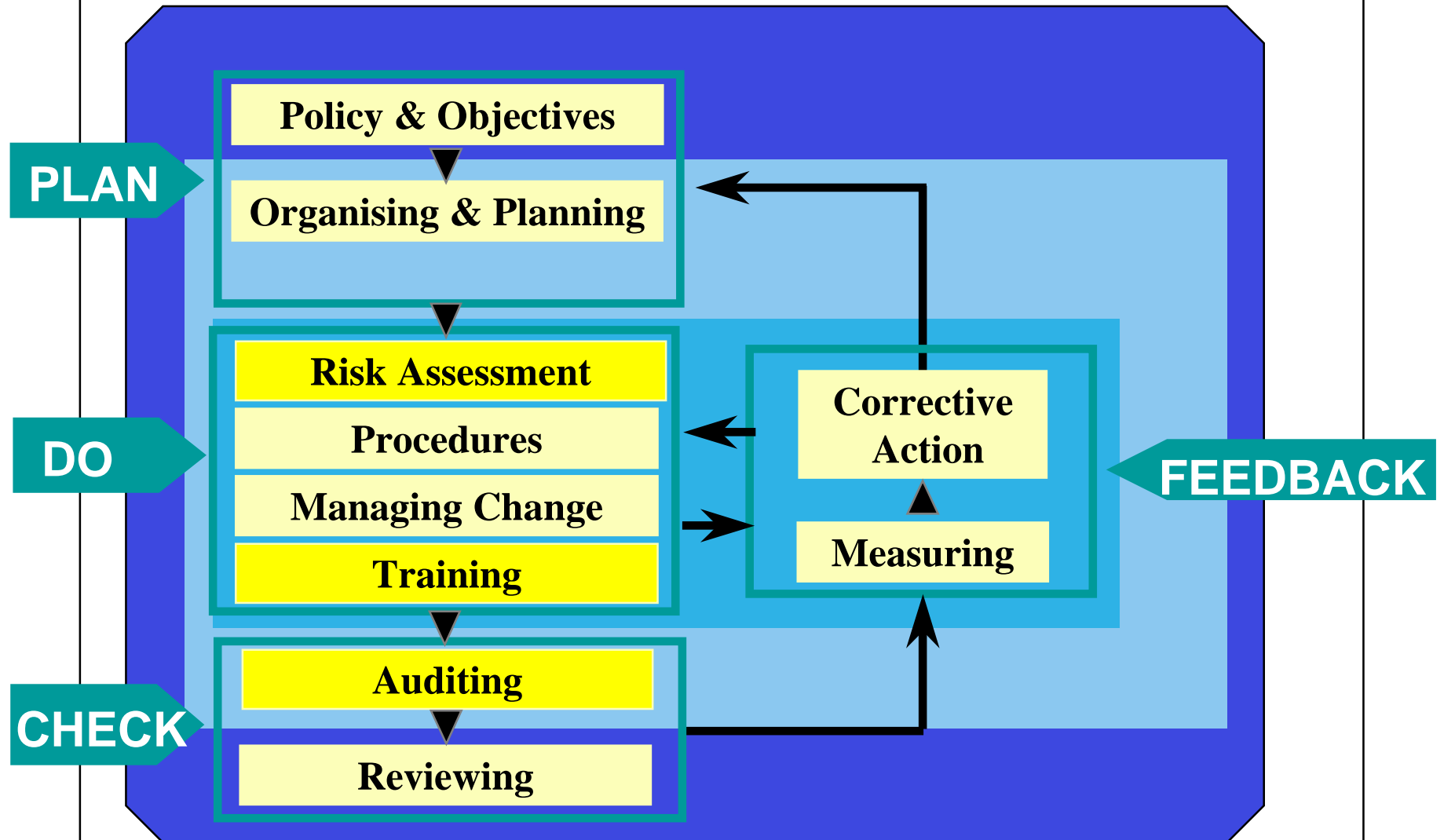
No Structure



Structure

Developing and documenting the Management System aims to apply a structure to an often ad-hoc approach to risk management.

Leadership + Commitment = Control Environment

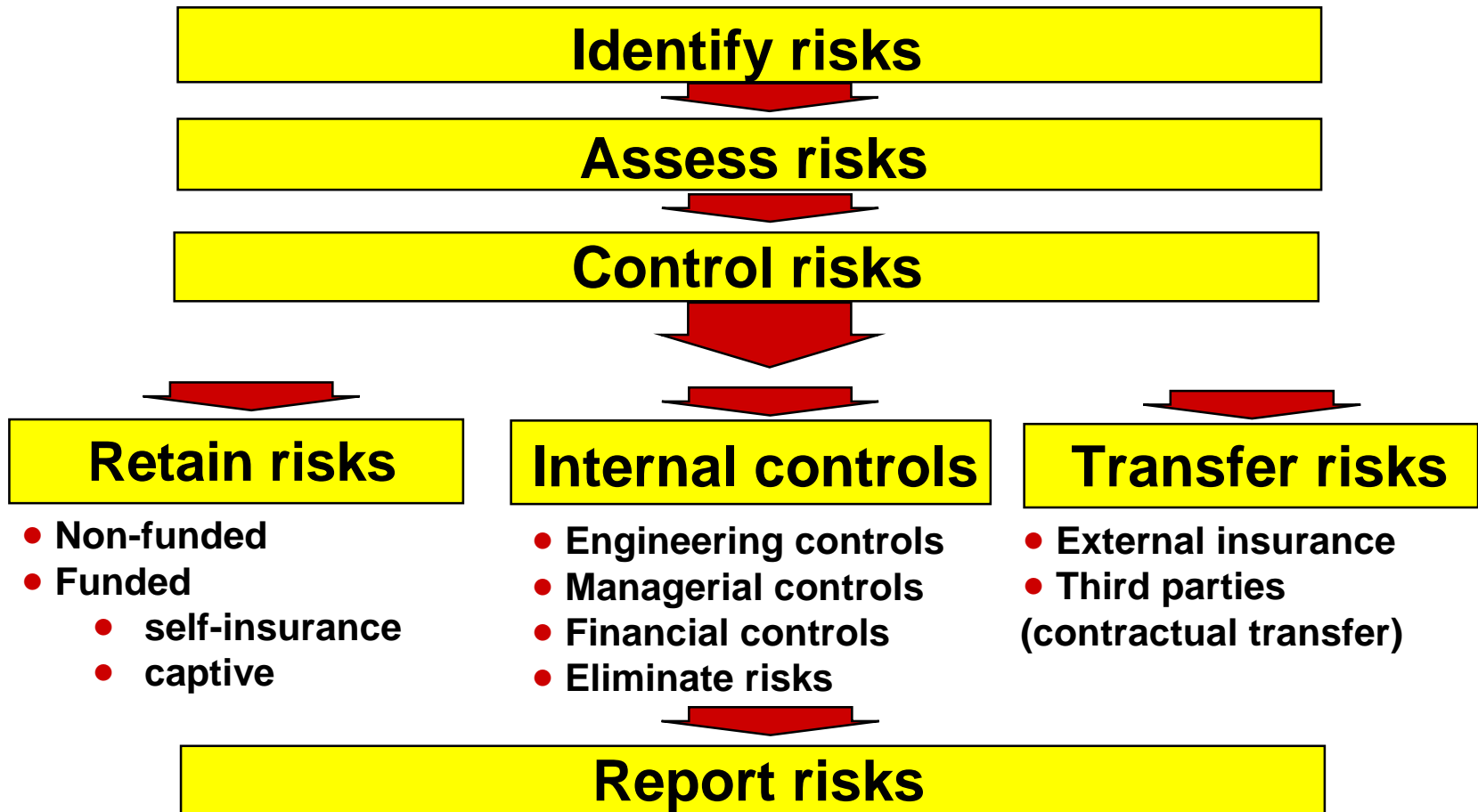


A structured Management System, based on the quality management principles of “plan-do-check-feedback”, ensures that the risks associated with all company or contracted activities are managed in a comparable way.



THE TOOLS AVAILABLE

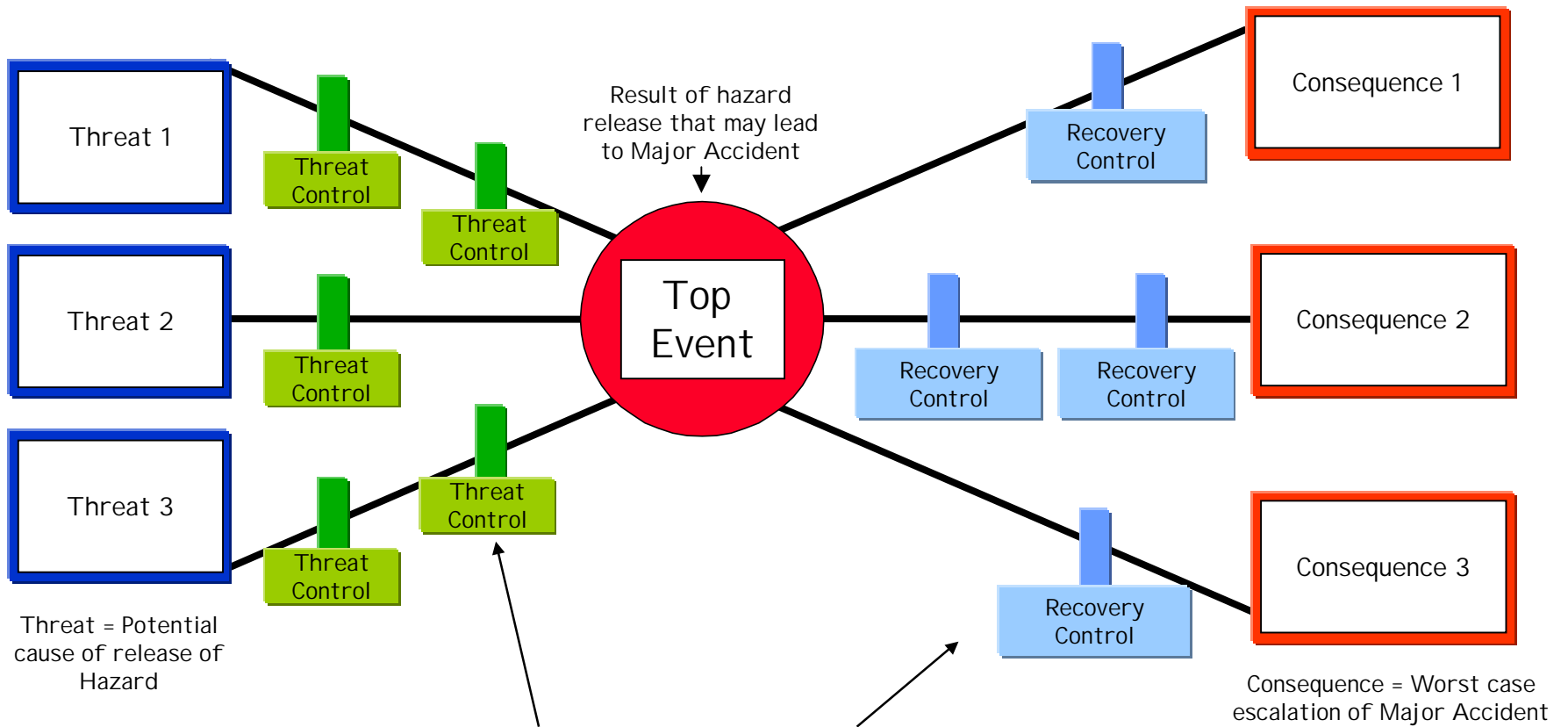
- 1 Risk Assessment
- 2 Risk Audit
- 3 Training



The Risk Assessment Process addresses the identification and evaluation of risks to all strategic aspects of the business, covering internal, external and natural hazards risks, and the development of cost-effective risk-reduction and control measures.

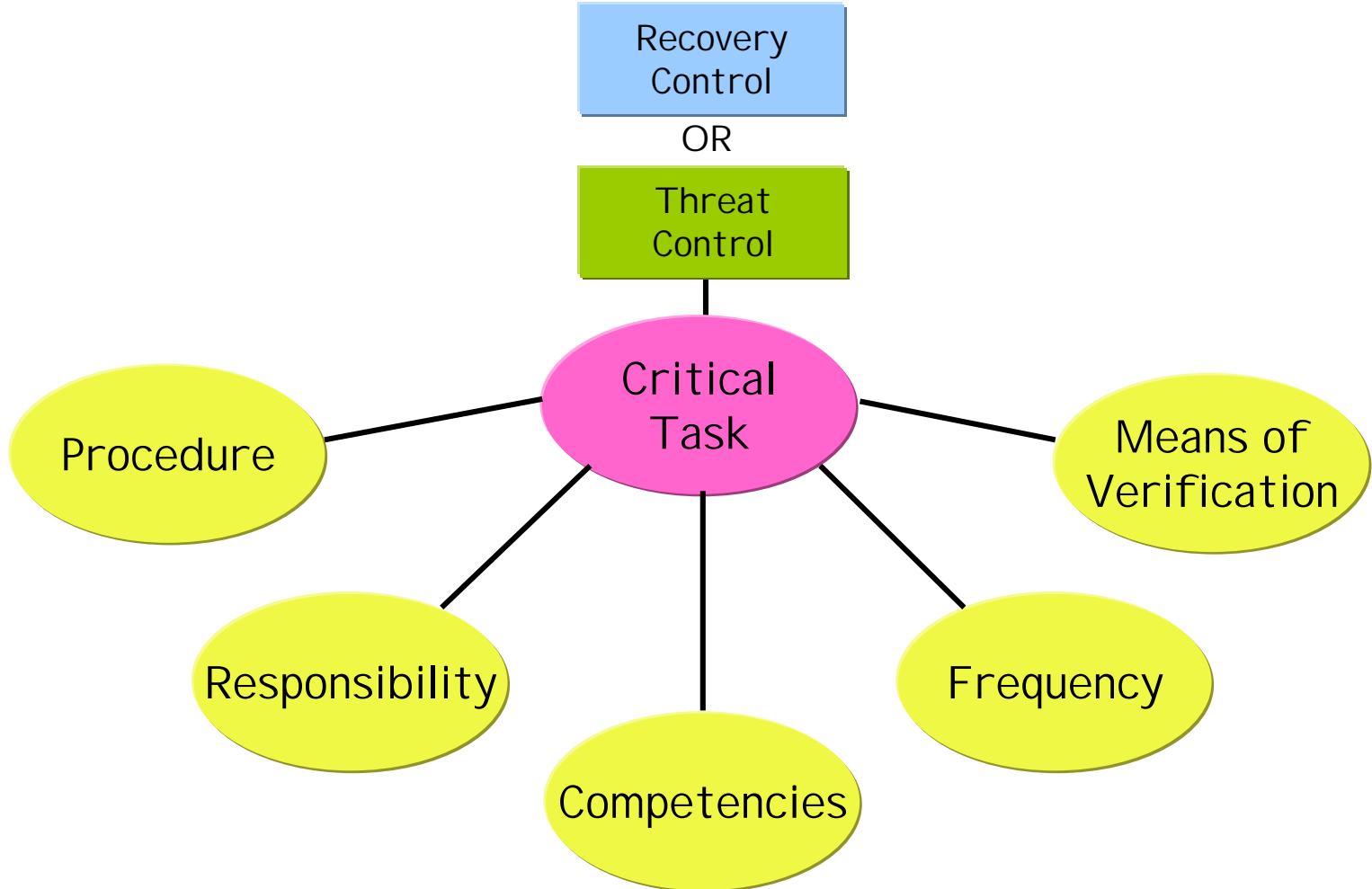
Severity	CONSEQUENCE				LIKELIHOOD				
	People	Asset Damage	Environmental Effect	Impact on Reputation	A	B	C	D	E
					Never heard of in our industry	Has occurred in our industry	Has occurred in our company	Happens several times/yr in our company	Happens several times/yr at one site
0	No injury	None	None	None	<p>Manage for continuous improvement</p> <p>Incorporate risk reduction measures</p> <p>Intolerable</p>				
1	Slight injury	Slight	Slight	Slight					
2	Minor injury	Minor	Minor	Limited					
3	Major injuries	Local	Localised	Significant					
4	Single fatality	Major	Major	National					
5	Multiple fatalities	Extensive	Massive	International					

Example user friendly risk assessment matrix

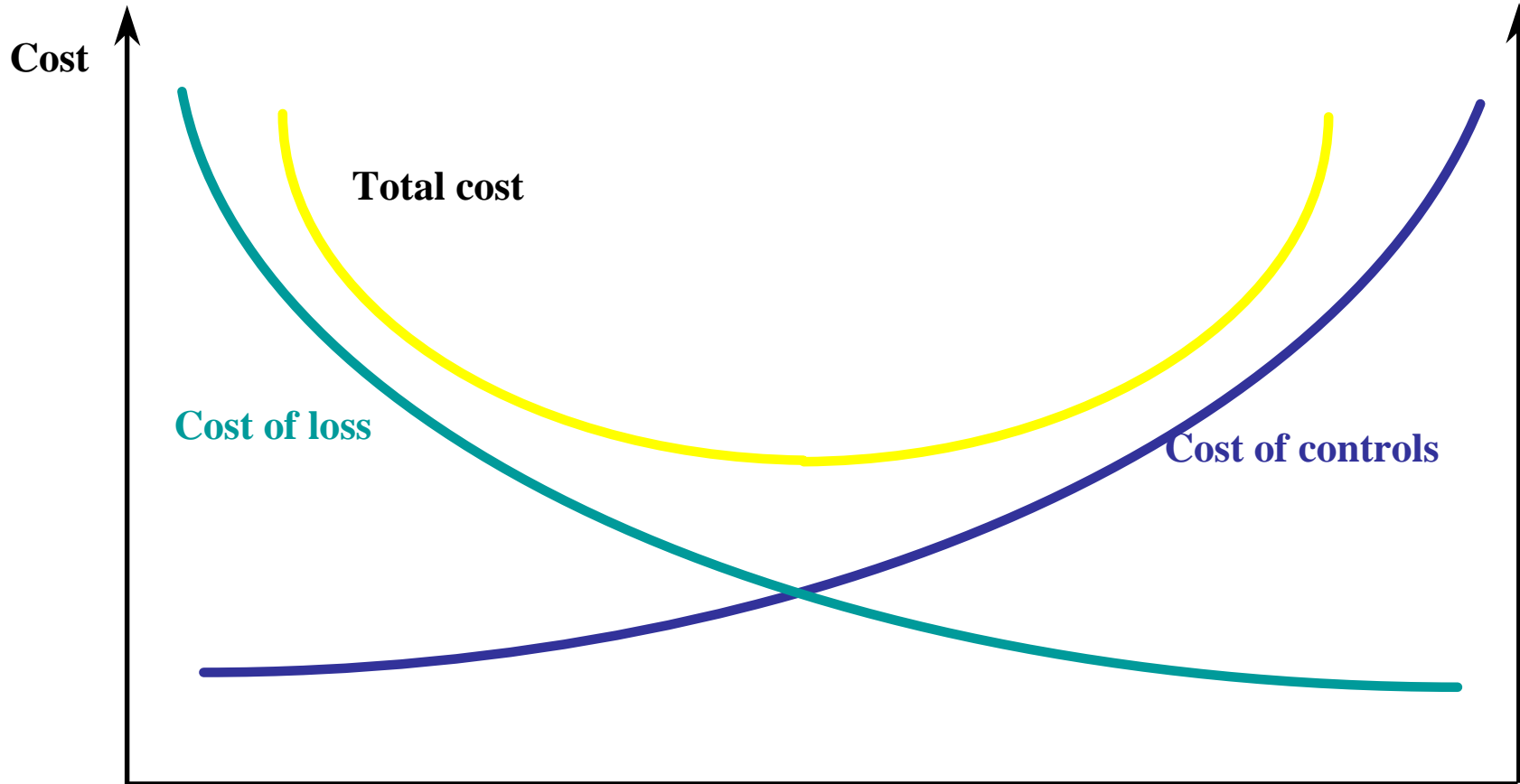


Threat and Recovery Controls are barriers to prevent the Major Accident and are provided by Critical Tasks

The hazard bow-tie diagram



Critical tasks



**Unstructured
Ill-defined
Superficial**

**Optimum balance
for risk control**

**Complex
Unworkable
Theoretical**

Economic control is achieved when any further cost of control outweighs the benefits arising from risk reduction.

Cost of Accidents

Major Accidents

1979 - THREE MILE ISLAND NUCLEAR PLANT	-	US \$ 1.3 billion
1986 - CHERNOBYL NUCLEAR PLANT	-	US \$ 5.5 billion
1988 - PIPER ALPHA OIL PLATFORM	-	US \$ 3.0 billion
1989 - EXXON VALDEZ	-	US \$ 20.0 billion

Cost of Accidents

Minor Accidents

CASE STUDIES

Construction Contract	-	8.5% of Contract Price
Transport Company	-	37% of Profits or 1.8% of Operating Costs
North Sea Oil Production Platform	-	£3.8 million/year (or shutting down the platform for one day a week)

Costs include:

- Financial Costs - additional costs actually incurred to achieve desired output.
- Opportunity Costs - costs of labour paid for no work or production

Cost of Accidents

Minor Accidents



£1

INSURED COSTS

- . Covering injury, ill health, damage.

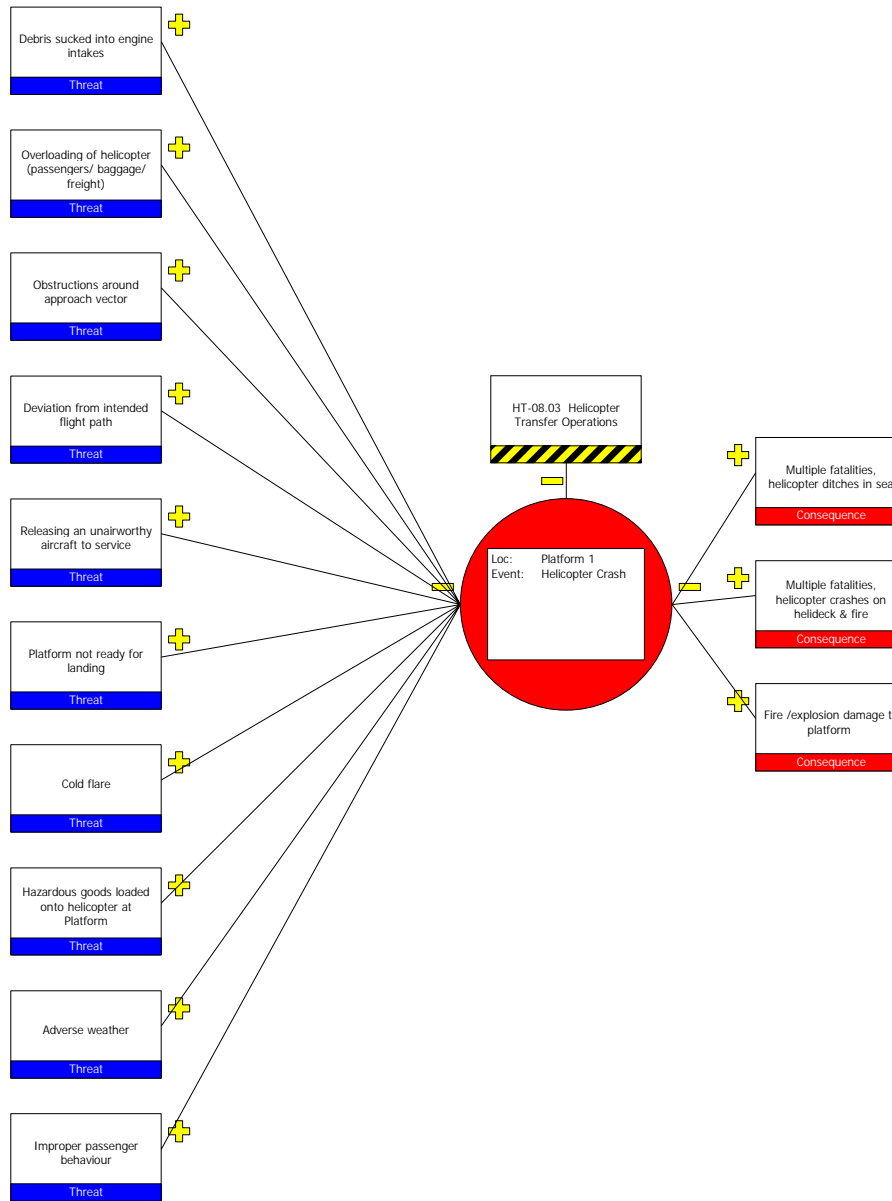
UNINSURED COSTS

- . Product and material damage
- . Plant and building damage
- . Tool and equipment damage
- . Legal costs
- . Expenditure on emergency supplies
- . Clearing site
- . Production delays
- . Overtime working and temporary labour
- . Investigation time
- . Supervisors time diverted
- . Clerical effort
- . Fines
- . Loss of expertise / experience

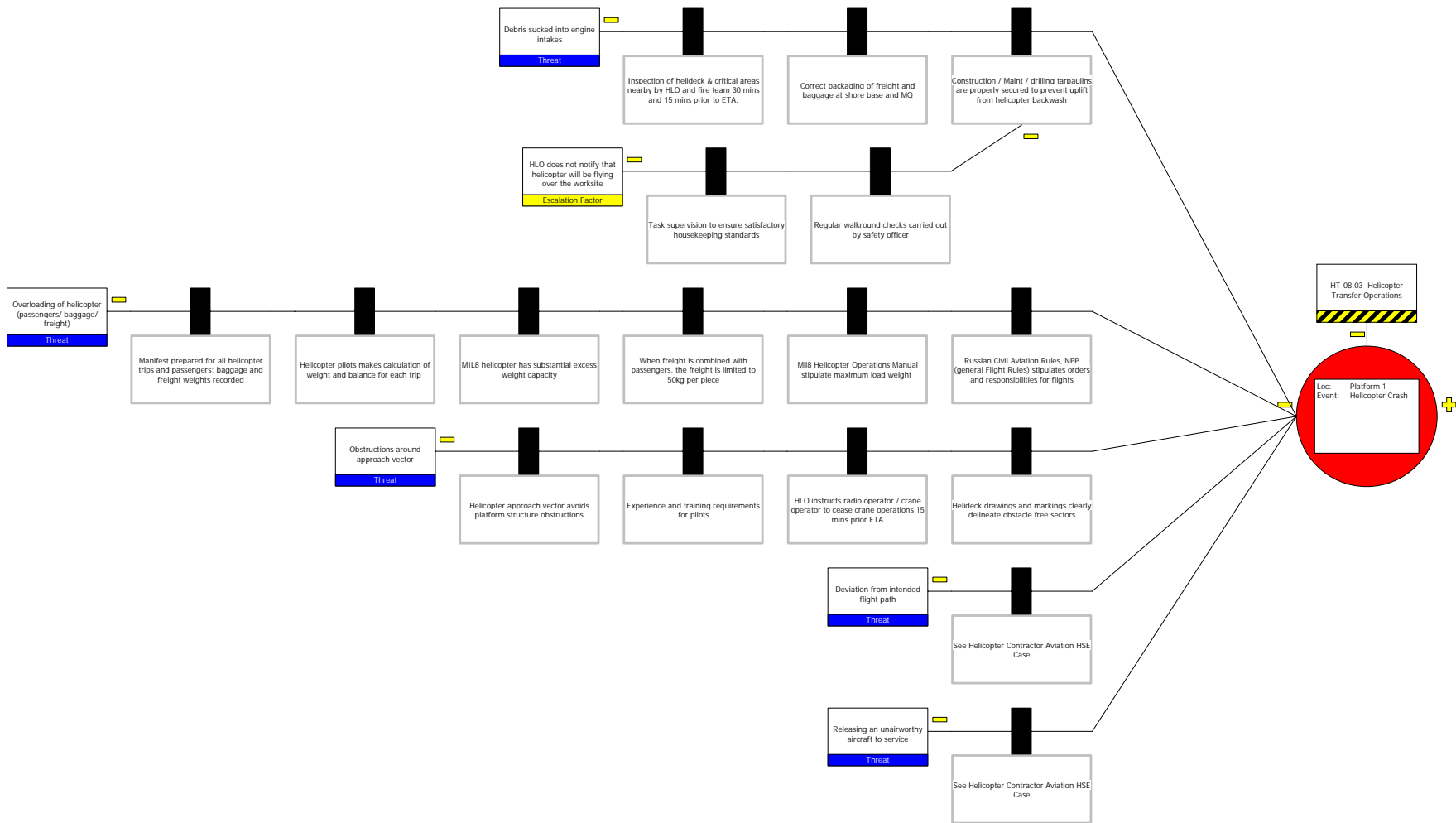
£8-£11

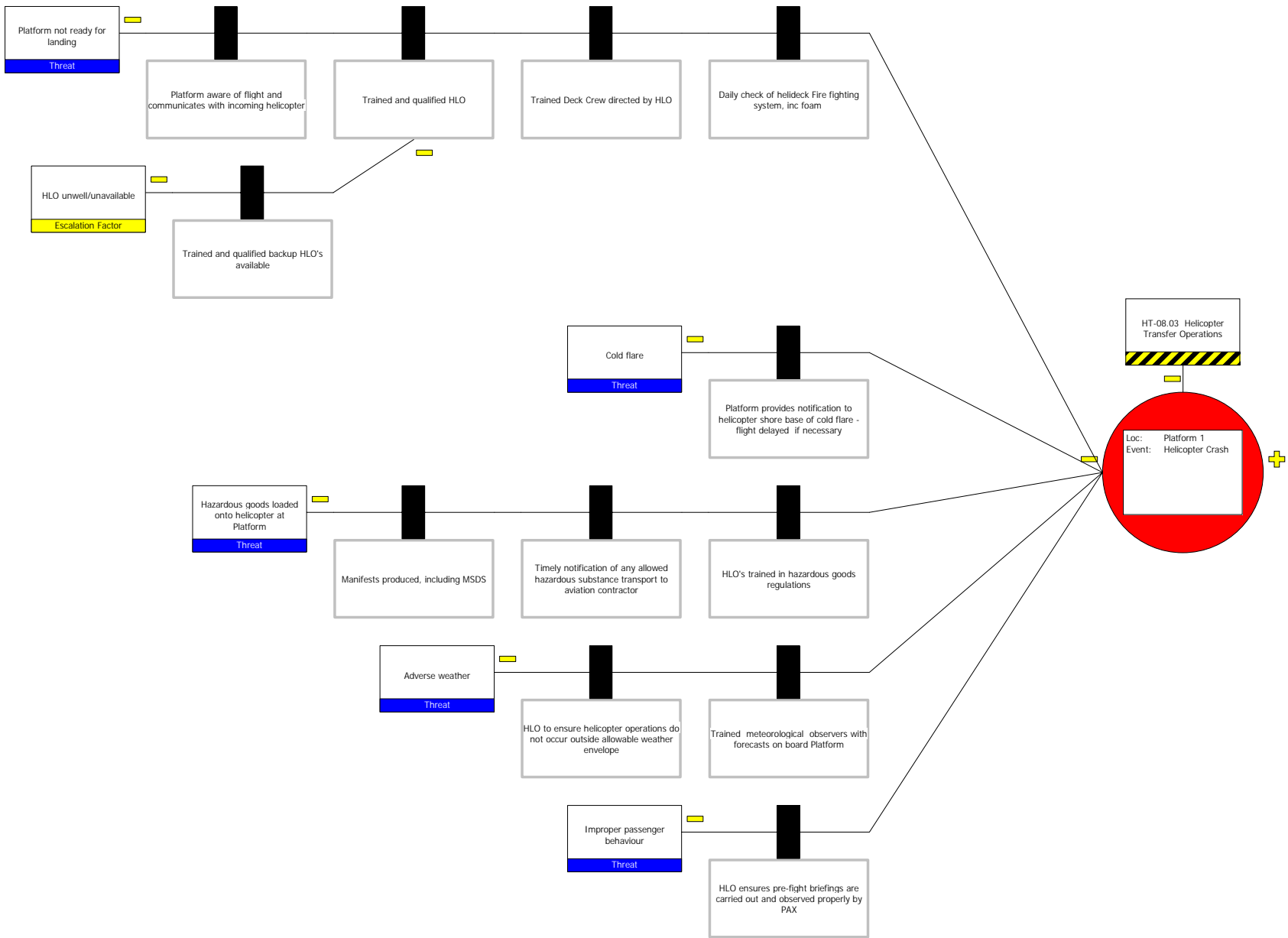
THE INTEGRATED WHEEL

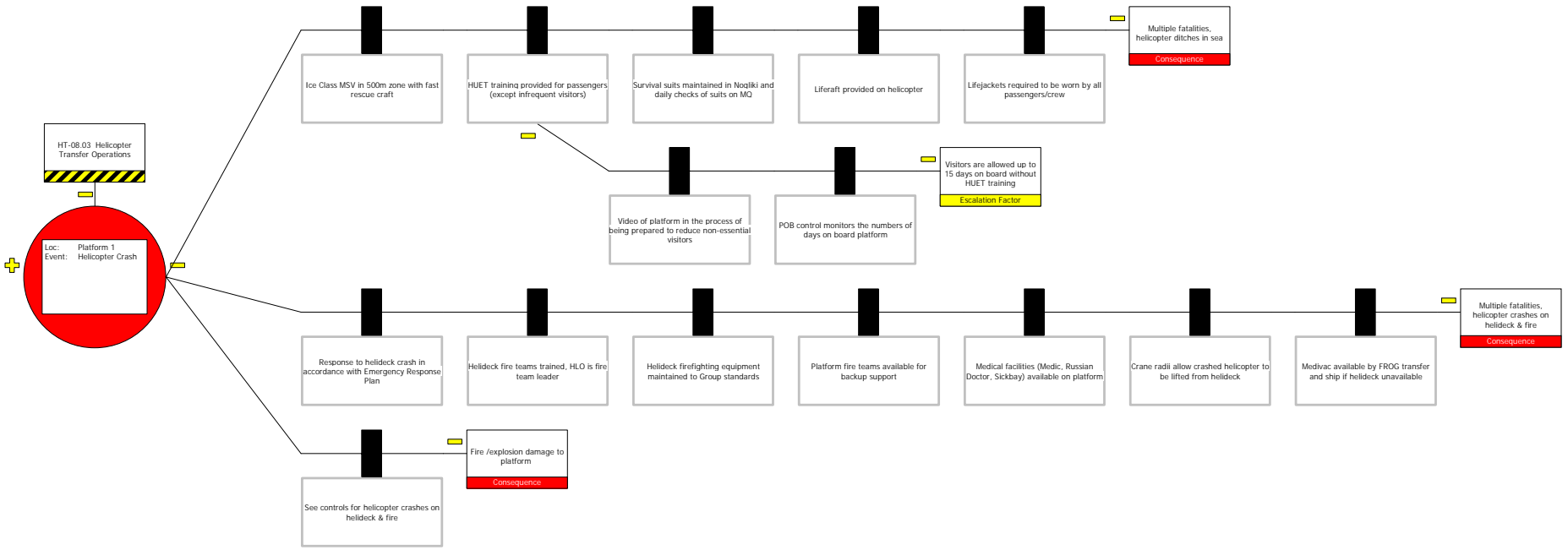




Russia Far East– Helicopter Impact Bow Tie







THE UNTHINKABLE !

P.O.Kelly should have been asleep in his bunk. Instead, at 4am, he found himself rubbing tired eyes, staring at a relay lying in pieces on his bench.

The repair would take him another half hour, at least, he thought, cursing to himself. Oh well, at least he could look forward to an early breakfast.

A quiet hiss invaded his consciousness. Turning, his eyes focussed on a plume of mist issuing from a small bore pipe and drifting towards the turbo-generator switchboard.

In the next instant, the vapour cloud exploded, flinging him across the compartment.

Lying on the floor, struggling to breath, his thoughts danced to the prospect of the engulfing fire. The complete loss of electrical power would be bad enough for the submerged submarine.

Even now, he imagined, the well trained crew would be driving the crippled vessel to the surface and readying the fire fighting team. If they failed to rescue the compartment the situation was going to deteriorate.

Although the nuclear reactor is designed to shut down automatically on loss of power, its long term safety depends on restoring electrical systems.....

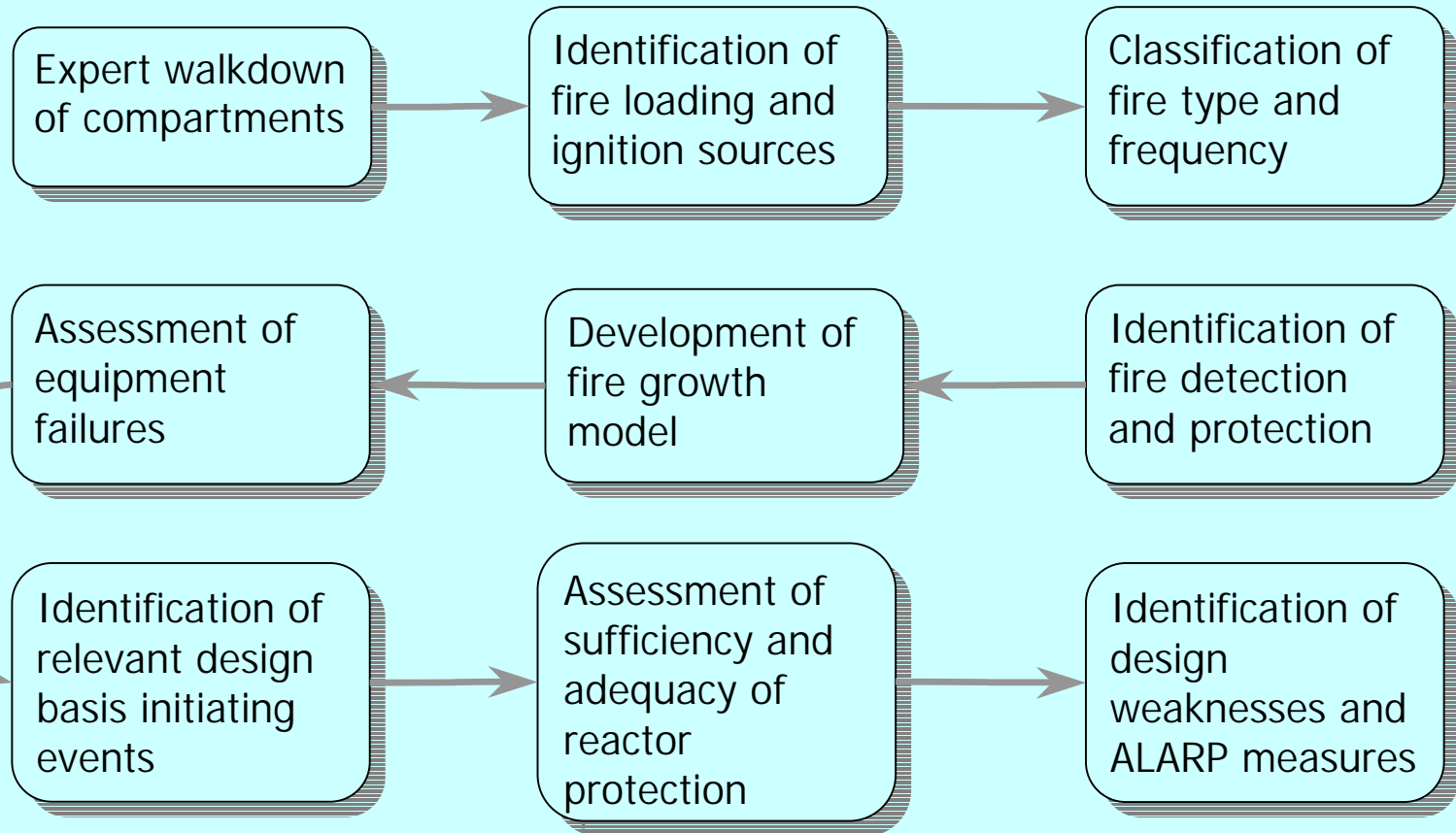


Figure 1

Fire hazard walkdown