



Mechanical Engineering Branch,
Systems Engineering Society and,
The Institution of Mechanical Engineers

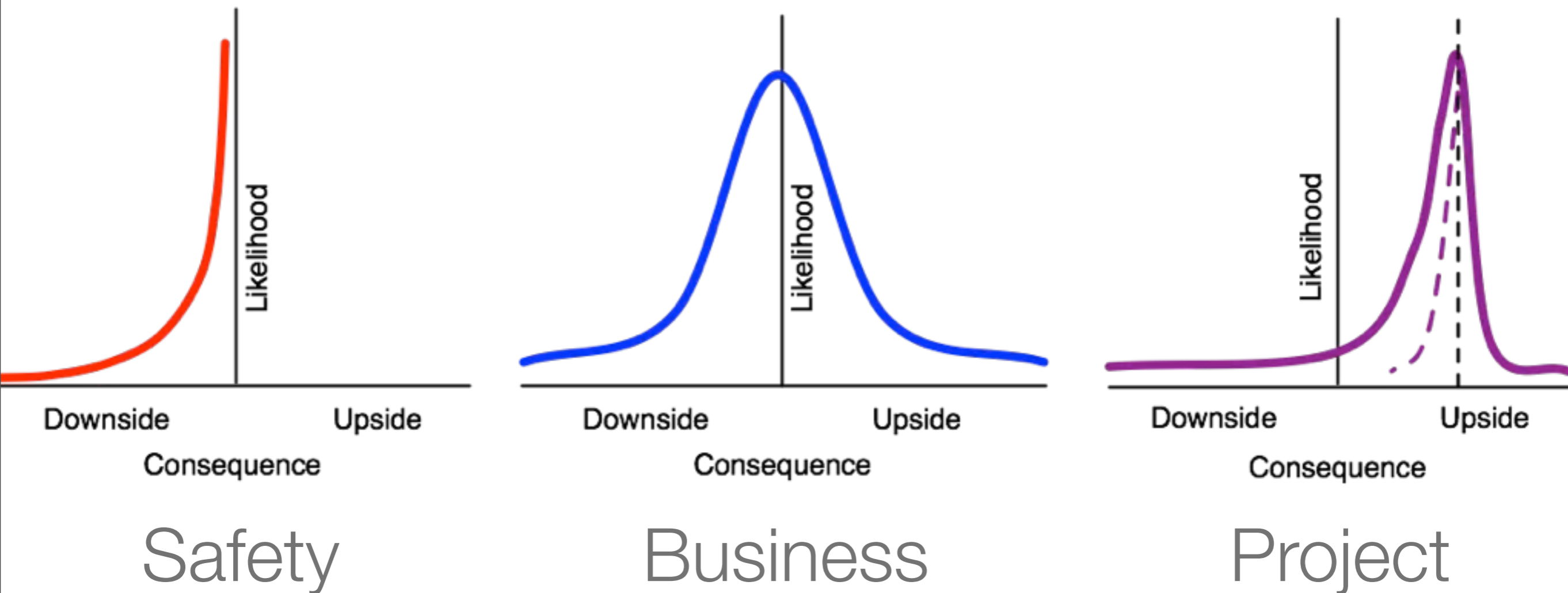
Achieving Defensible Risk Management

28 February 2011

Richard Robinson



This is about Safety Risk



Model Work Health and Safety Act 2010

This is the Model Work Health and Safety Act (fourth iteration, November 2010) prepared by the Parliamentary Counsel's Committee and approved by the Workplace Relations Ministers' Council.

Model Work Health and Safety Act 2010

27 Duty of officers

(1) If a person conducting a business or undertaking has a duty or obligation under this Act, an officer of the person conducting the business or undertaking must exercise **due diligence** to ensure that the person conducting the business or undertaking complies with that duty or obligation.



Officers includes the Crown

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- (1) A person who makes, or participates in making, decisions that affect the whole, or a substantial part, of the business or undertaking of the Crown is taken to be an officer of the Crown for the purposes of this Act.
- (2) A Minister of a State or the Commonwealth is not in that capacity an officer for the purposes of this Act.

Workplace

8 Meaning of *workplace*

- (1) A workplace is a place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work.
- (2) In this section, *place* includes:
 - (a) vehicle, vessel, aircraft or other mobile structure; and
 - (b) any waters and any installation on land, on the bed of any waters or floating on any waters.

Defines due diligence?

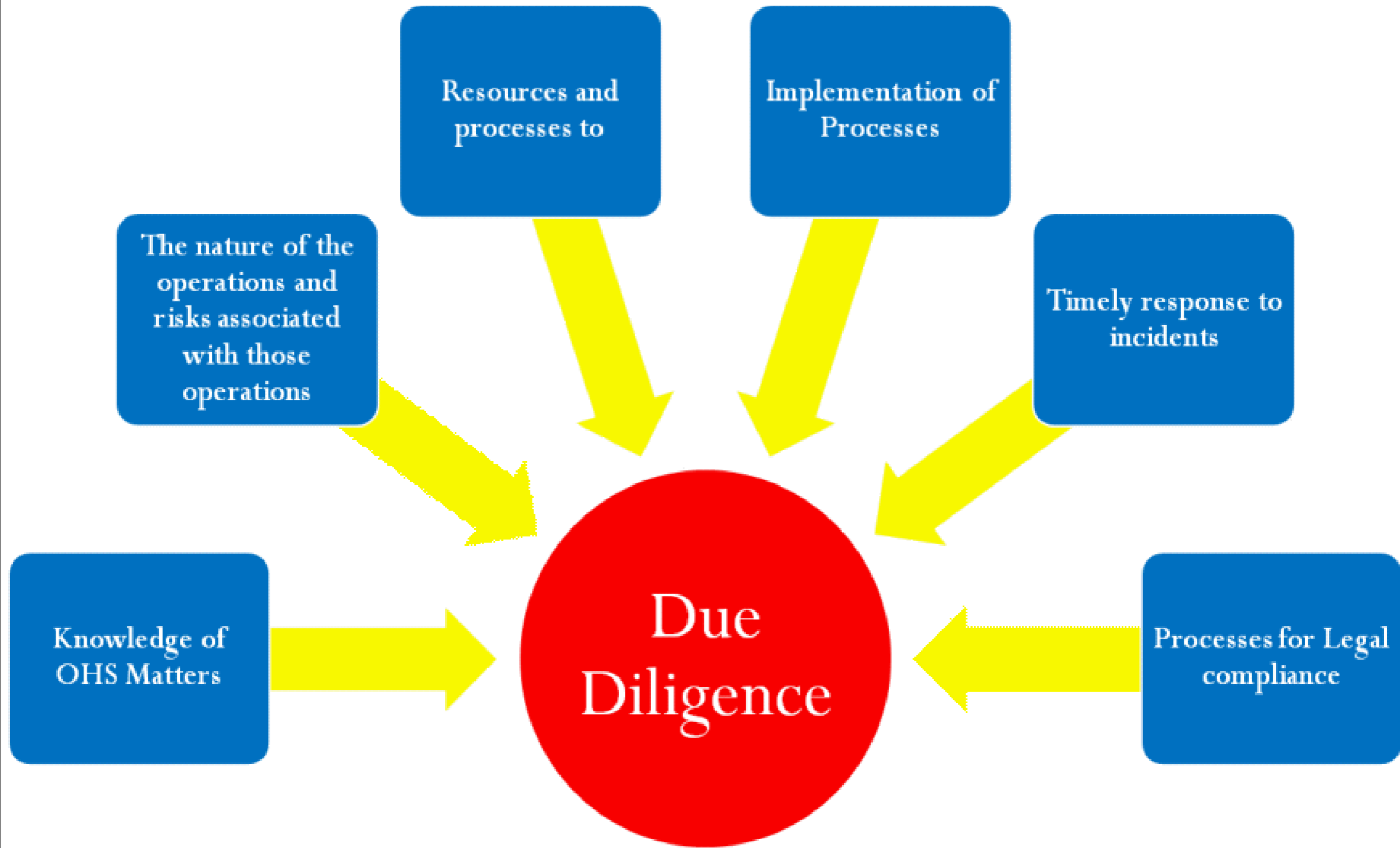
- (5) In this section, *due diligence* includes taking reasonable steps:
- (a) to acquire and keep up-to-date knowledge of work health and safety matters; and
 - (b) to gain an understanding of the nature of the operations of the business or undertaking of the person conducting the business or undertaking and generally of the hazards and risks associated with those operations; and
 - (c) to ensure that the person conducting the business or undertaking has available for use, and uses, appropriate resources and processes to eliminate or minimise risks to health and safety from work carried out as part of the conduct of the business or undertaking; and
 - (d) to ensure that the person conducting the business or undertaking has appropriate processes for receiving and considering information regarding incidents, hazards and risks and responding in a timely way to that information; and
 - (e) to ensure that the person conducting the business or undertaking has, and implements, processes for complying with any duty or obligation of the person conducting the business or undertaking under this Act; and

Examples

For the purposes of paragraph (e), the duties or obligations under this Act of a person conducting a business or undertaking may include:

- reporting notifiable incidents;
- consulting with workers;
- ensuring compliance with notices issued under this Act;
- ensuring the provision of training and instruction to workers about work health and safety;
- ensuring that health and safety representatives receive their entitlements to training.

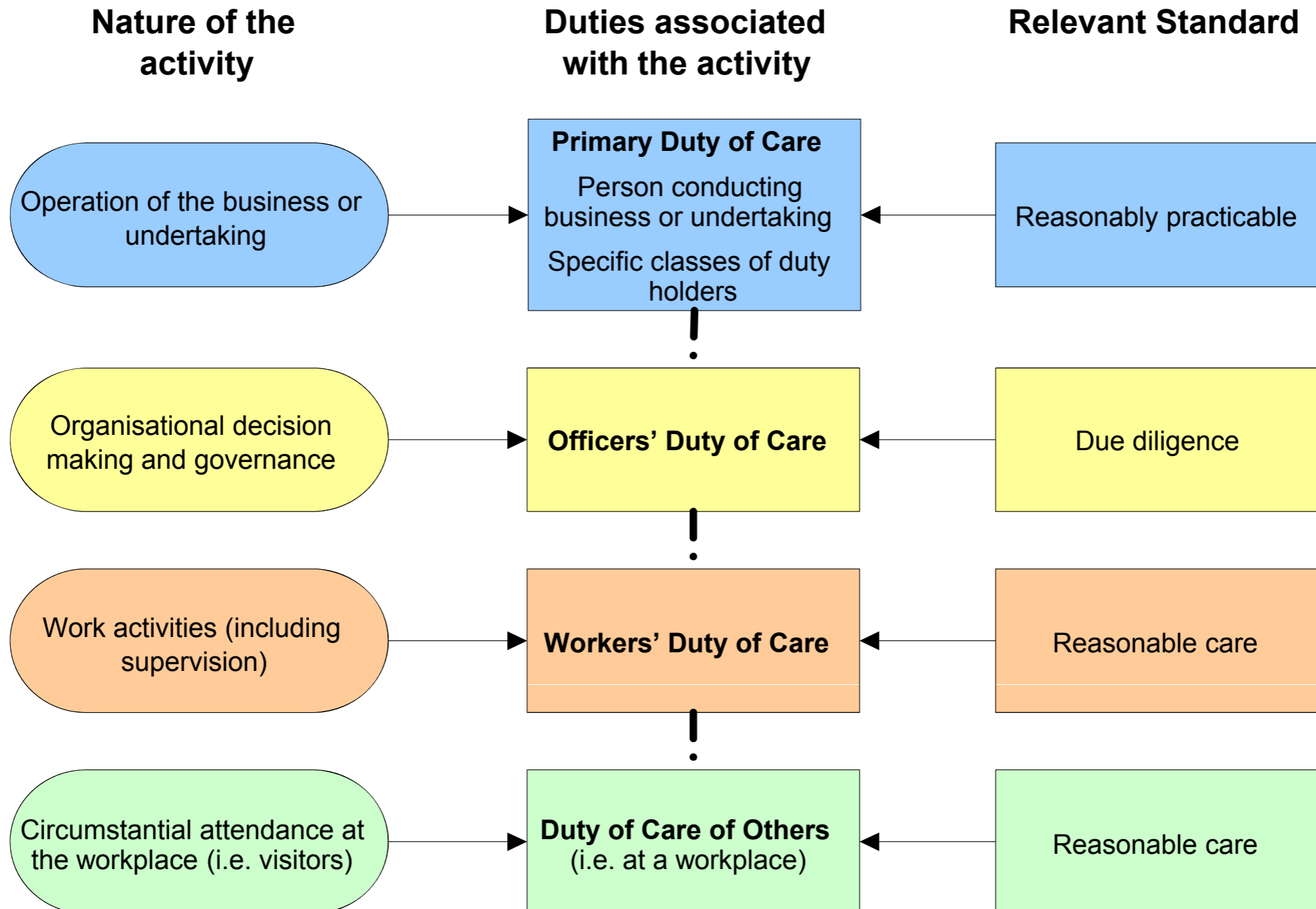
- (f) to verify the provision and use of the resources and processes referred to in paragraphs (c) to (e).



As presented by Barry Sherriff, Partner, Norton Rose. 2 February 2010

The duties of care – cause and effect

Relationship between recommended duties of care



As presented by Barry Sherriff, Partner, Norton Rose. 15 October 2010

Reasonably practicable defined

- Similar to the Victorian definition, but improved
- Clearer reference to
 - *that which is, or was.. reasonably able to be done...*
 - *taking into account and weighing up all relevant matters*
 - Likelihood of hazard or risk
 - Degree of harm
 - What you know or ought to know about hazard, risks, controls
 - Availability and suitability of ways of eliminating or minimising risk
 - Cost – *after assessing the extent of the risk and the available ways (of control), the cost of the available ways.. including whether the cost is grossly disproportionate to the risk...*
- ‘*...highest level of protection.. as is reasonably practicable..*’
 - Simply makes clear that you start with what can be done and only do less where it is reasonable to do so

As presented by Barry Sherriff, Partner, Norton Rose. 15 October 2010

Maximum Penalties

Categories based on degree of 'culpability' and risk/degree of harm

Category 1 – recklessness (knew and made or let it happen)

Category 1

Corporations: \$3m

Officers: \$600k / 5 years jail

Workers: \$300k / 5 years jail

Category 2

Corporations: \$1.5m

Officers: \$300k

Workers: \$150k

Category 3

Corporations: \$500k

Officers: \$100k

Workers: \$50k

As presented by Barry Sherriff, Partner, Norton Rose. 15 October 2010

Harmonisation timetable

2010

2011

2012



April 2010:
SWA Council approval of final version of model *Work Health and Safety Act*

Late October 2010: Regulations and draft codes of practice released by WRMC for 4 months for public comment

May/June 2011: SWA and WRMC agree and approve model regulations

Mid 2011→: Model Act passed progressively in each jurisdiction

By late June 2010: Report on Draft regulations for WRMC

Early 2011: Comments considered and regulations and codes of practice finalised and approved

July 2011→: Education and transition in jurisdictions

Commencement of model Act and Regulations no later than December 2011

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As presented by Barry Sherriff, Partner, Norton Rose. 15 October 2010

Case law due diligence

Presently due diligence is a
defence against case
(common) law negligence
claims



HIGH COURT OF AUSTRALIA

SHIPPING CORPORATION OF INDIA LTD. v. GAMLEN CHEMICAL CO.
A/ASIA. PTY. LTD. [1980] HCA 51; (1980) 147 CLR 142

STEPHEN J. This appeal involves interpretation of the Hague Rules. During heavy weather in the Great Australian Bight, the severity of which was unusual but not unforeseeable, a number of drums of cleaning solvent stowed in a ship's hold broke adrift, were damaged and their contents lost. The means of securing them in place in the hold had been inadequate.

HIGH COURT OF AUSTRALIA

SHIPPING CORPORATION OF INDIA LTD. v. GAMLEN CHEMICAL CO.
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HAGUE RULES:

Article IV Rights and Immunities

1. Neither the carrier nor the ship shall be liable for loss or damage arising or resulting from unseaworthiness unless caused by want of **due diligence** on the part of the carrier to make the ship seaworthy, and to secure that the ship is properly manned, equipped and supplied...

Whenever loss or damage has resulted from unseaworthiness, the burden of proving the exercise of **due diligence** shall be on the carrier or other person claiming exemption under the section. (Bolding by R2A).

HIGH COURT OF AUSTRALIA

SHIPPING CORPORATION OF INDIA LTD. v. GAMLEN CHEMICAL CO.
A/ASIA. PTY. LTD. [1980] HCA 51; (1980) 147 CLR 142

Reynolds J.A. summed up the conclusion of the Court (of Appeal of the Supreme Court of NSW) in the following words:

"Loss or damage does not arise or result from perils of the sea where negligence is a concurrent cause. Where negligence allows or facilitates the perils of the sea to inflict damage on cargo, then in all relevant respects the loss or damage arises or results from the negligence. The perils of the sea must be guarded against by the use of due care."

The judges of the High Court (Gibbs, Stephen, Mason, Aickin, and Wilson) unanimously dismissed an appeal to the High Court and supported the view of the NSW Court of Appeal summarised by Reynolds above.

The model act will force the paradigm shift from hazard to precaution based risk assessment

AS/NZS ISO 31000
(hazard based)

Due Diligence
(precaution based)

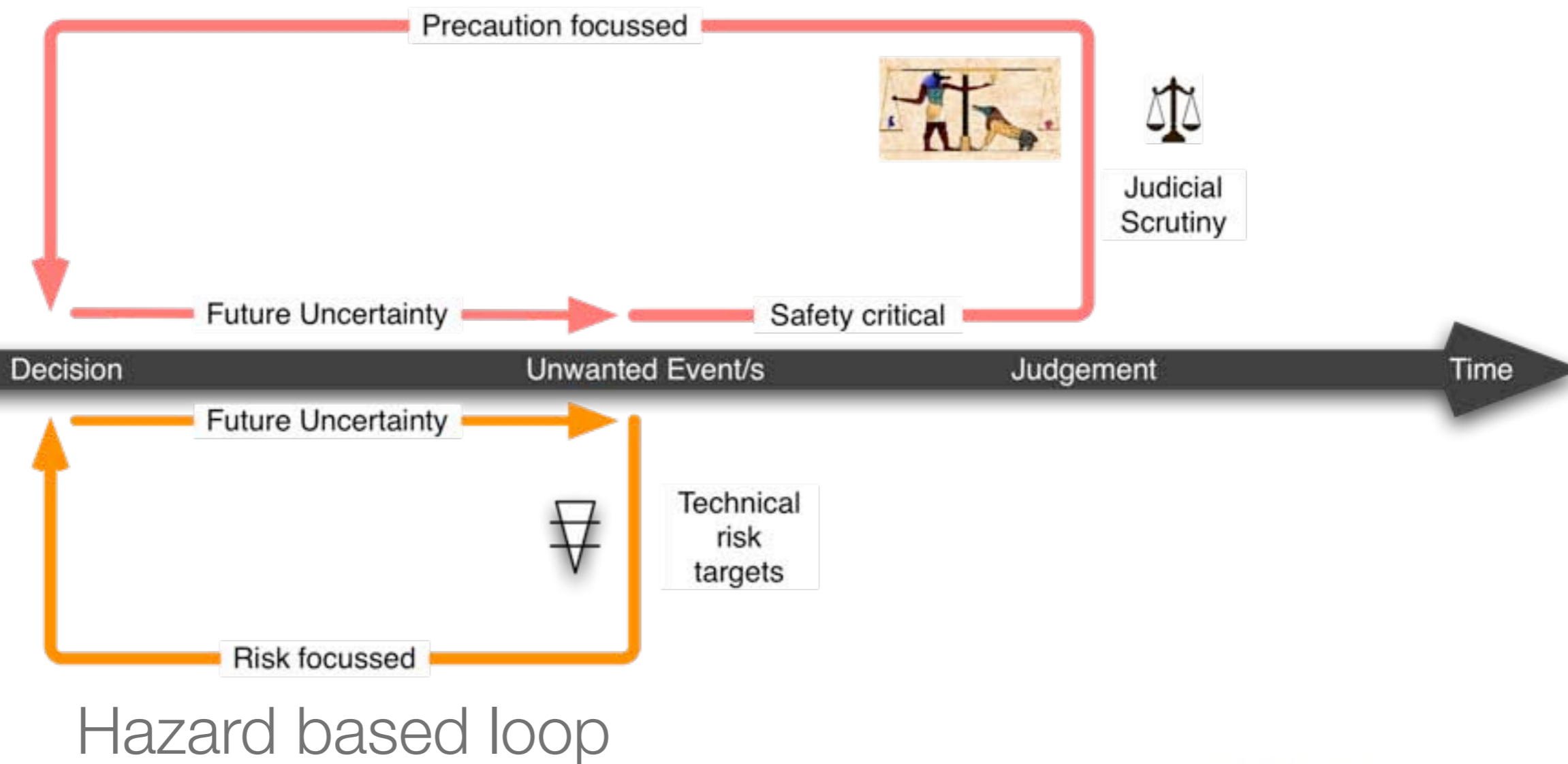
Establish the context
Risk assessment (hazard based):
 (Hazard) risk identification
 (Hazard) risk analysis
 (Hazard) risk evaluation
Risk treatment

Establish the context
Risk assessment (precaution based):
 Identify credible, critical issues
 Identify precautionary options
 Risk-effort balance evaluation
Risk action (treatment)

The point is to ensure that all reasonable practicable precautions are in place, not to achieve an indefensible target level of risk or safety.

Precautionary Focus

Precautionary due diligence loop



In the Hall of Maat



Anubis oversees the weighing of the heart.

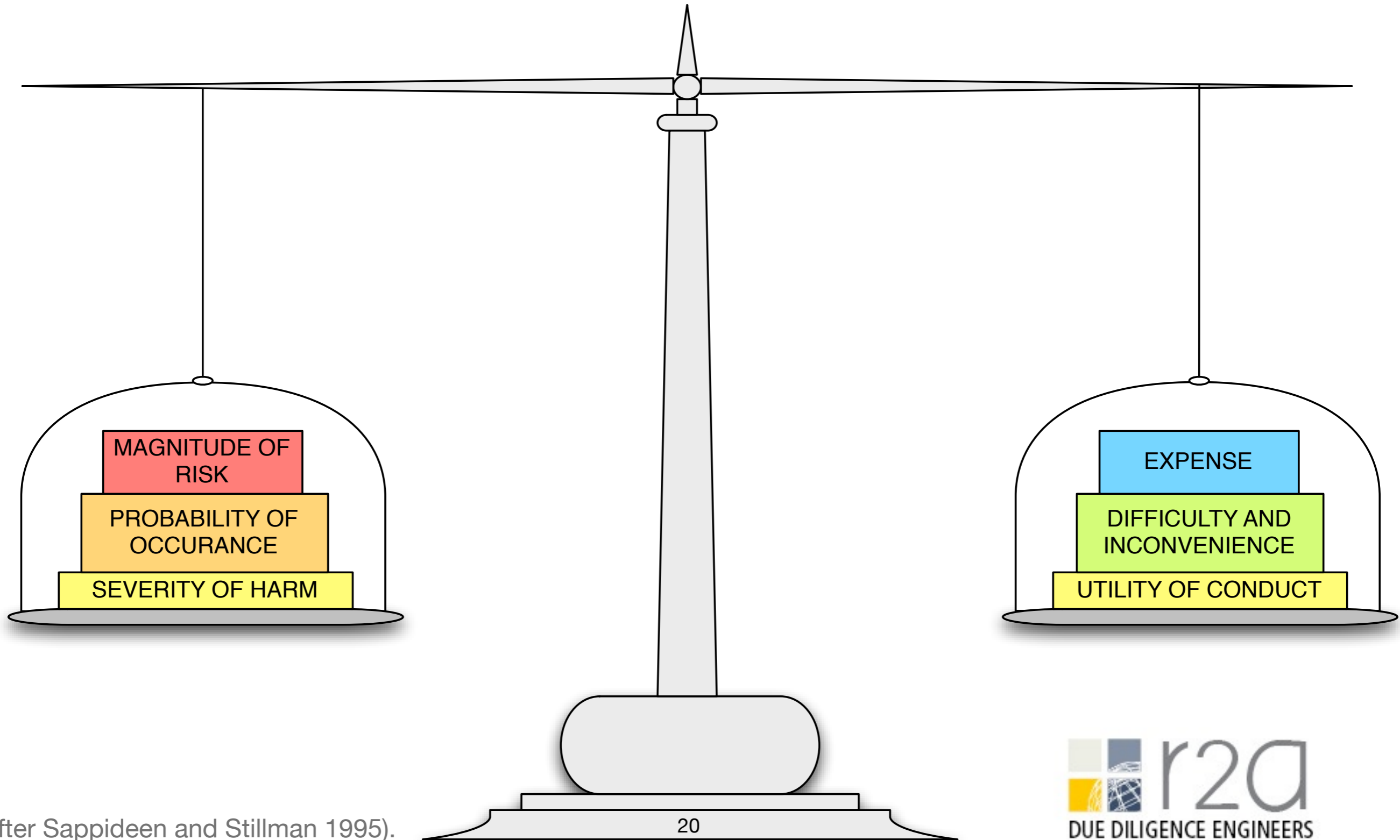
Fail and the demon Ammit eats the heart.

Succeed and Horus leads the soul to meet Osiris, King of the Dead.

Thoth inscribes the results.

(This is apparently how the term magistrate is ultimately derived)

Due Diligence



(after Sappideen and Stillman 1995).

R2A's Approach

Defensible risk management or engineering due diligence, that is, ensuring the laws of man and the laws of nature are congruent.



Safety Case (Due Diligence) Arguments

A safety case regime provides a comprehensive framework within which the duty holder's arrangements and procedures for the management of safety can be demonstrated and exercised in a consistent manner. In broad terms the safety case is a document – meant to be kept up to date – in which the operator sets out its approach to safety and the safety management system which it undertakes to apply. It is, on the one hand, a tool for internal use in the management of safety and, on the other hand, a point of reference in the scrutiny by an external body of the adequacy of that management system – a scrutiny which is considered to be necessary for maintaining confidence on the part of the public.

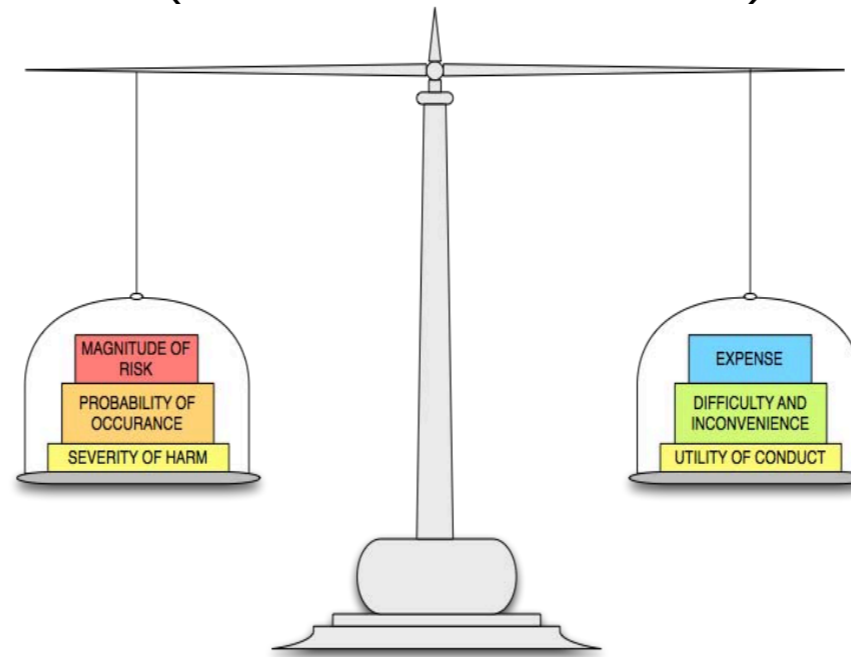
Technique>> RISK MANAGEMENT PARADIGM		<u>Expert reviews</u>	<u>Facilitated workshops</u>	<u>Selective interviews</u>
1.	The rule of law	Yes (Legal opinions)	Yes (Arbitration, moot courts)	Yes (Royal Commissions)
2.	Insurance approaches	Yes (Risk surveys, actuarial studies)	Yes (Risk profiling sessions)	Yes (<i>especially moral risk</i>)
3.	Asset based, 'bottom- up' approaches	Yes (QRA, availability & reliability audits)	Yes (HazOps, FMECAs etc)	Difficult
4.	Threat based 'top- down' approaches	Difficult in isolation	Yes (SWOT & vulnerability)	Yes (Interviews)
5.	Solution based 'good practice' approaches	Difficult to be comprehensive	Difficult to be comprehensive	Yes (Fact finding tours)
6.	Simulation	Yes (Computer simulations)	Yes (Crisis)	Difficult
7.	Risk culture concepts	Yes (Quality audits)	Difficult	Yes (Interviews)

Credible,
critical issues

Precautionary
options

Analyses &
decisions

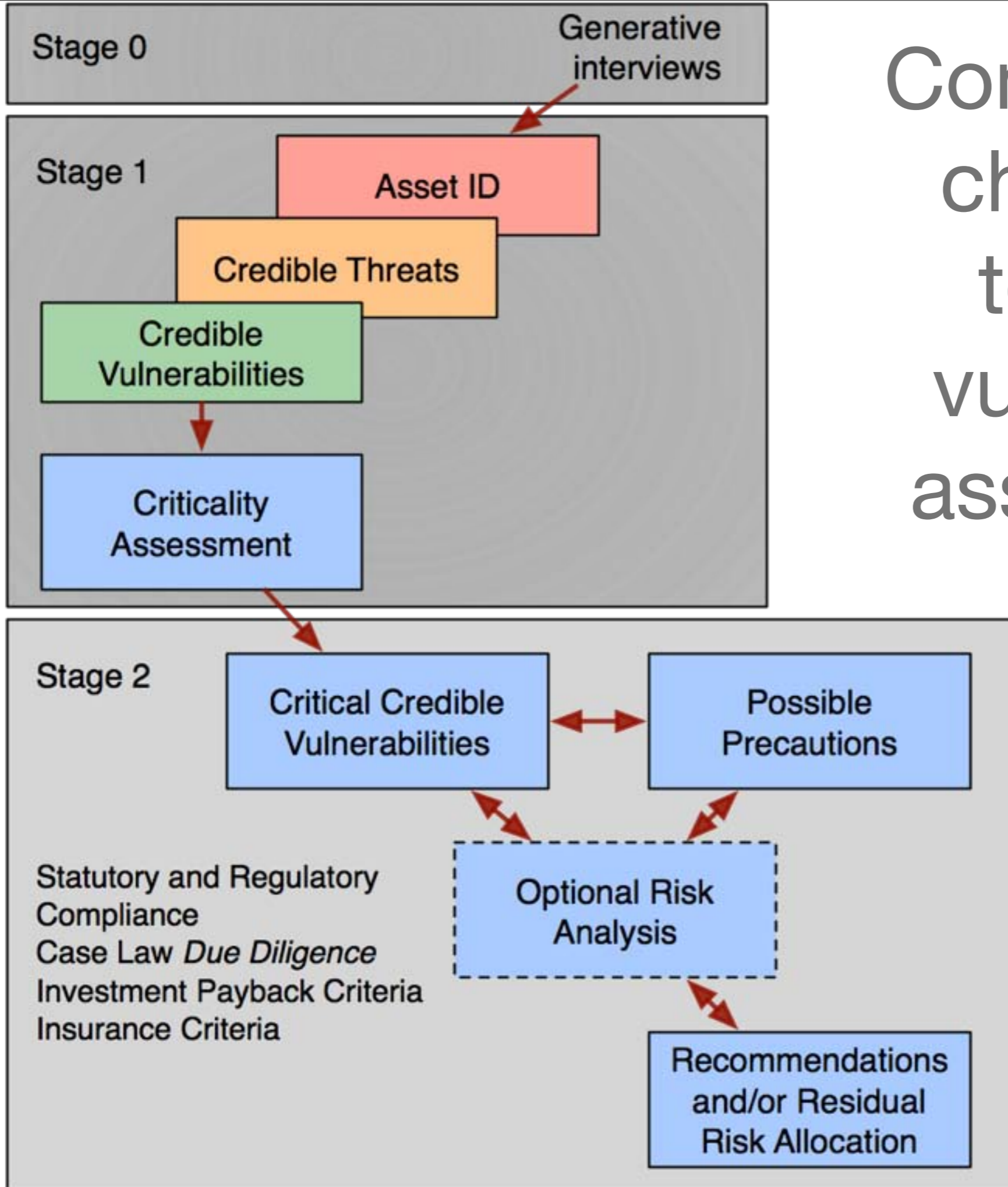
Disproportionality
engine



Barrier
implementation
QA system

R2A's Approach

Completeness checks. eg top down vulnerability assessments



THREATS	Patrons	Staff	Artists	Local Residents
Temperature Extremes				
Dehydration	X	X	X	
Sunstroke	X	X	X	
Sunburn	X	X	X	
Hypothermia	X	X	X	
Hyperthermia	X	X	X	
Wind	X	X	X	
Lightning	X	X	X	
Rain				
Floods	X	X	X	
Hail	X	X	X	
Storm	X	X	X	
Exposure	X	X		
People				
Crushing	X	X	X	
Attacks (patrons, security)	X	X	X	
Arson	X	X	X	X
Sabotage				
Riots	X	X	X	
Vandalism				X
Theft	X			
Potential & Kinetic Energy				
Landslide	X	X	X	X
Collapsing Structures	X	X	X	
Helicopters (police, news, etc)	X	X	X	X
Trains	X	X		
Cars	X	X	X	
Vans	X	X	X	
Buses	X	X		X
Carnival Equipment	X	X		

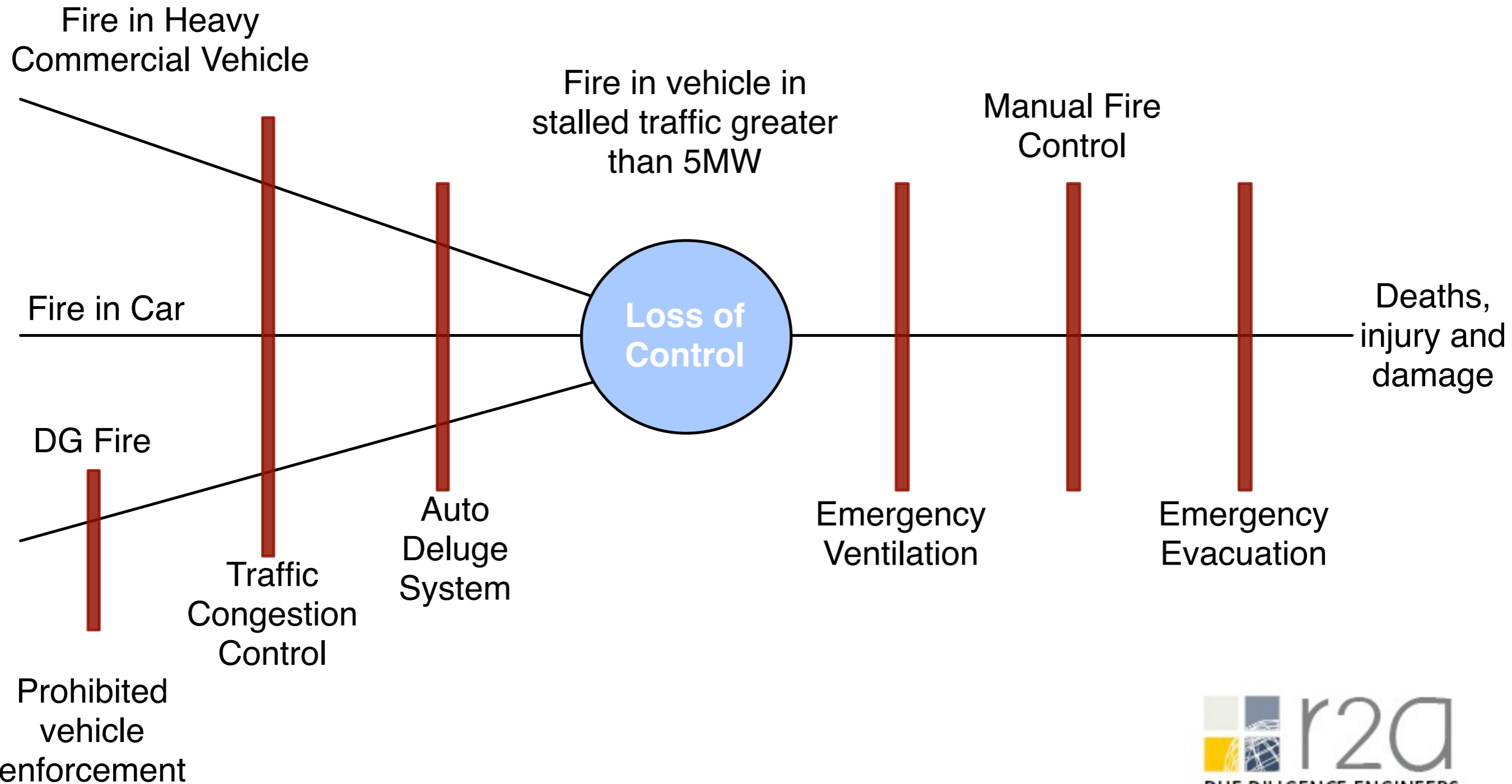
Rock Concert Vulnerability Assessment

Tunnel Vulnerability Assessment

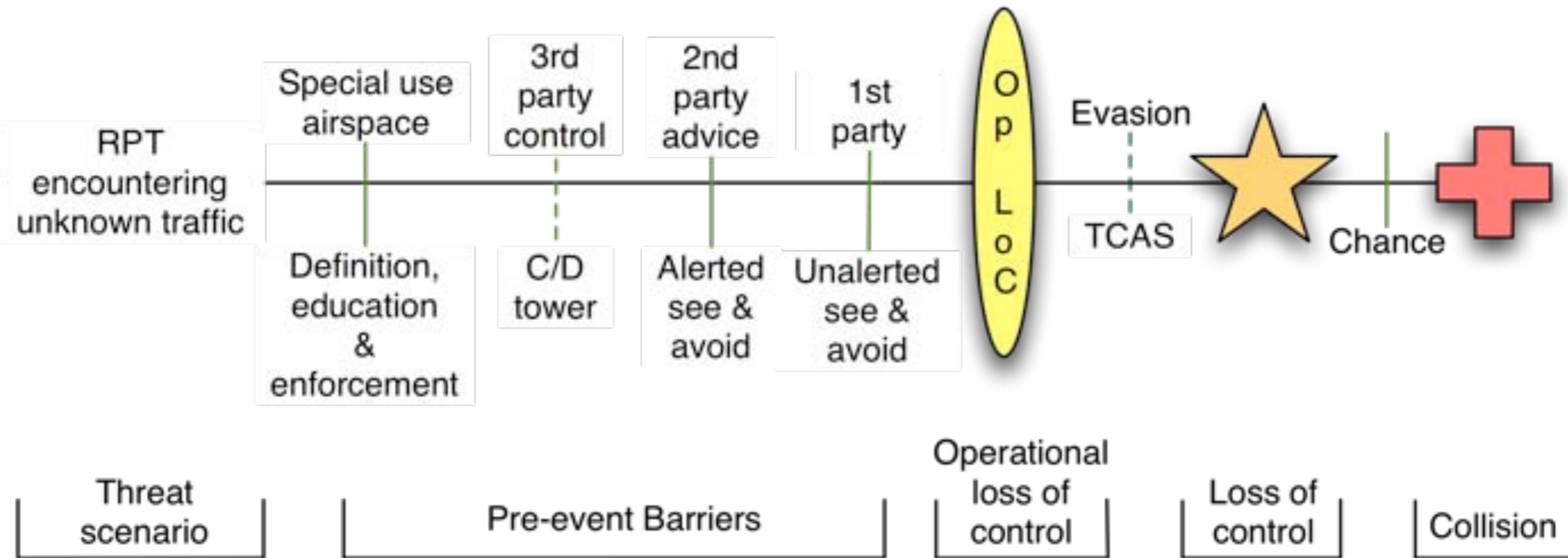
	Critically Exposed Groups			
	Travelling Public	Operations & Maintenance Staff	Incident Response Personnel	Local Residents
Credible Threat Scenario	incl. Disabled, Elderly, Non English speaking, small children, people who behave erratically		including Emergency Services personnel	
Collision	xxx	xx	xx	-
Fire / Explosion (including dangerous goods)	xxx	x	xxx	xxx
Toxic Release	xxx	-	xxx	xxx
Sabotage / vandalism / terrorism	xxx	xxx	xxx	xxx
Falling objects - infrastructure	xx	xx	-	-
Falling objects - thrown	xx	-	-	-

xxx Critical vulnerability (multiple fatalities)
 xx Major vulnerability (single fatality)
 x Minor vulnerability (injuries)
 - No vulnerability detected

Threat-barrier precaution analysis for fire in tunnels



Williamstown airport airspace threat-barrier analysis

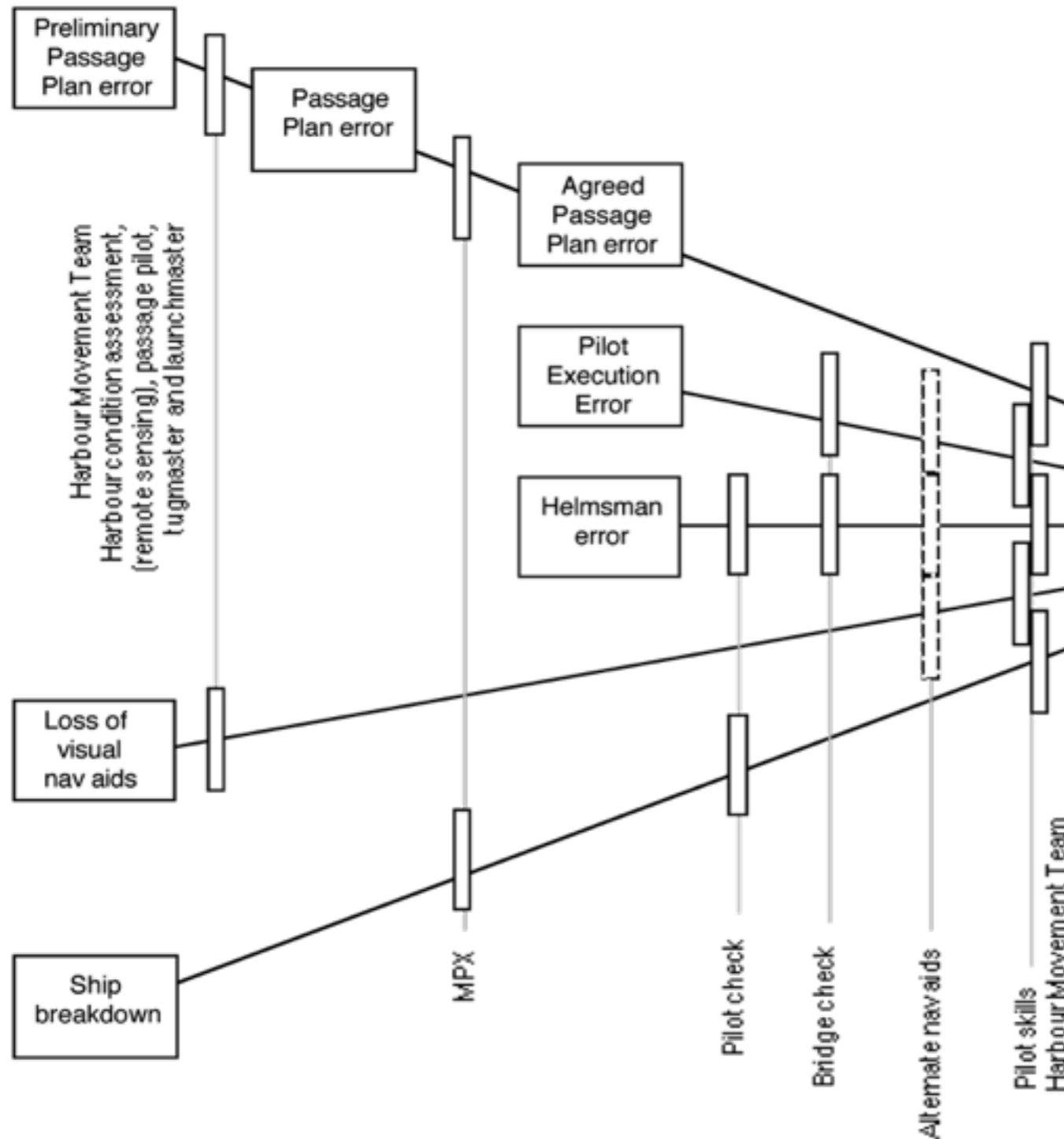


Unknown Aircraft vs RPT Collision Pair

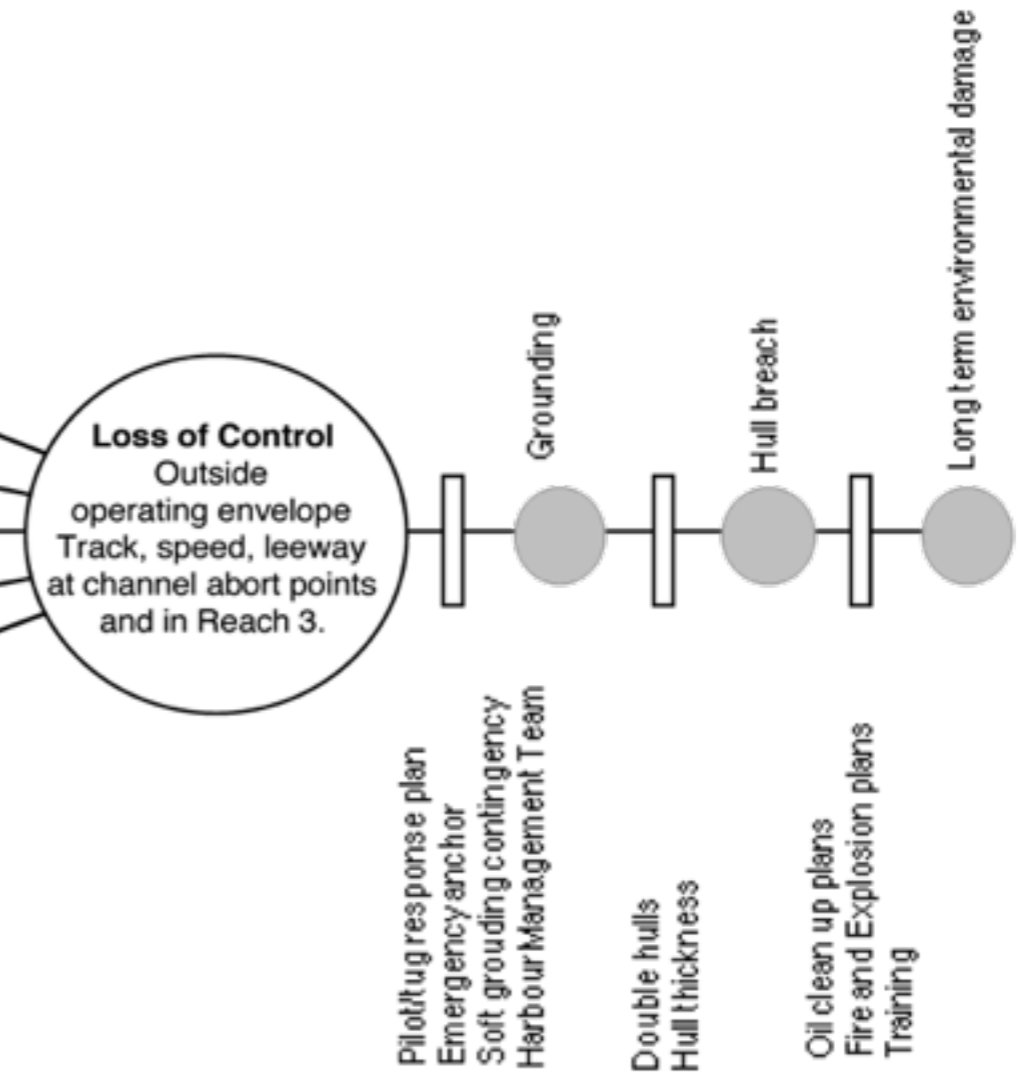
Threat-barrier precaution analysis for ship passage

(used for the grounding of the *Tai Ping* in New Zealand courts)

Threat Scenarios



Vulnerabilities and Escalation Scenarios



Water meter precaution analysis

(for Energy Safe Victoria)

Threat Scenarios

Neutral Fault in Customer Installation (≈ 25%)

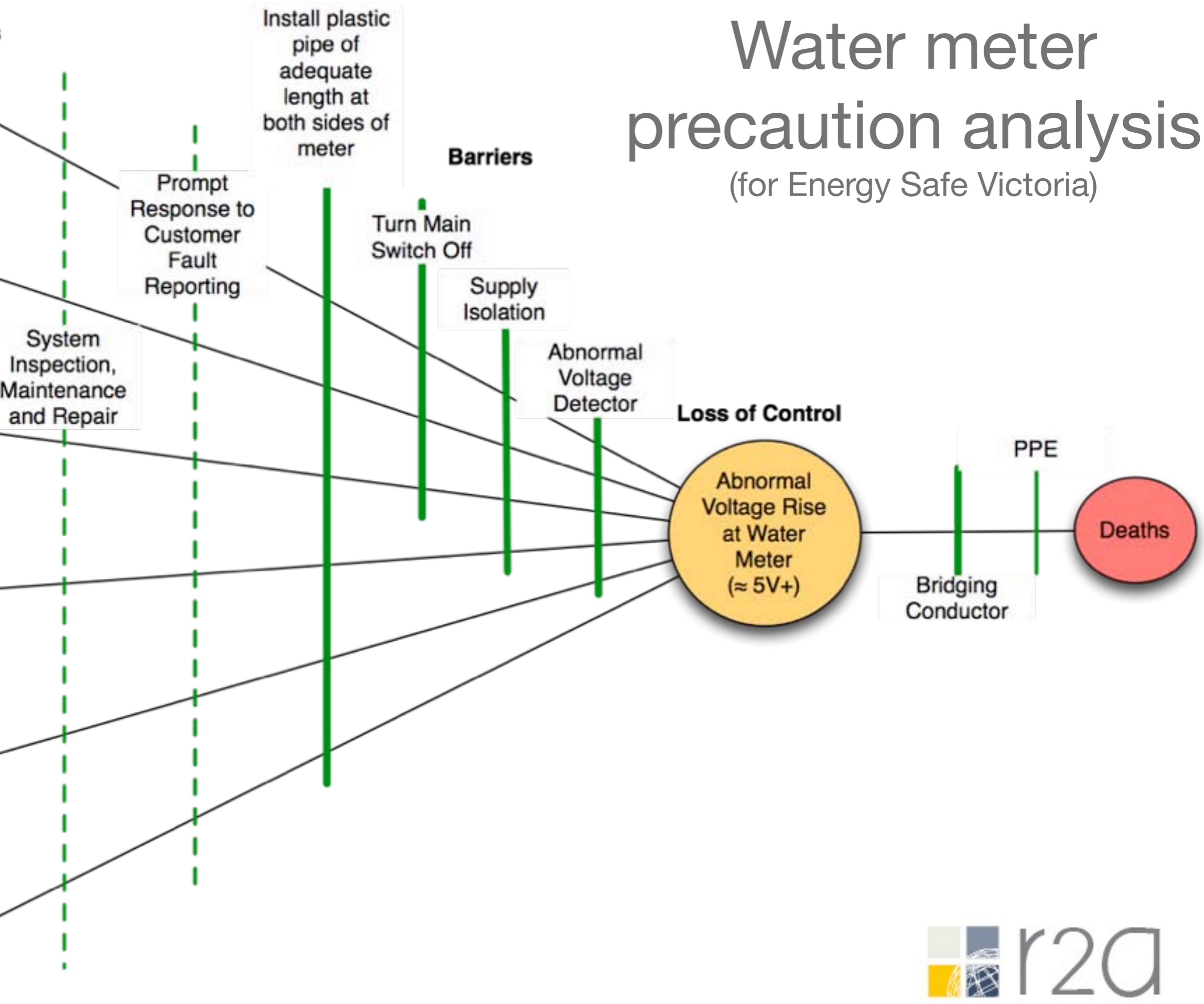
Customer Appliance Fault (≈ 4%)

Service Neutral Fault (≈ 70%)

Supply Neutral Fault (≈ 1%)

Polarity Reversal

External events incl lightning, HV injections

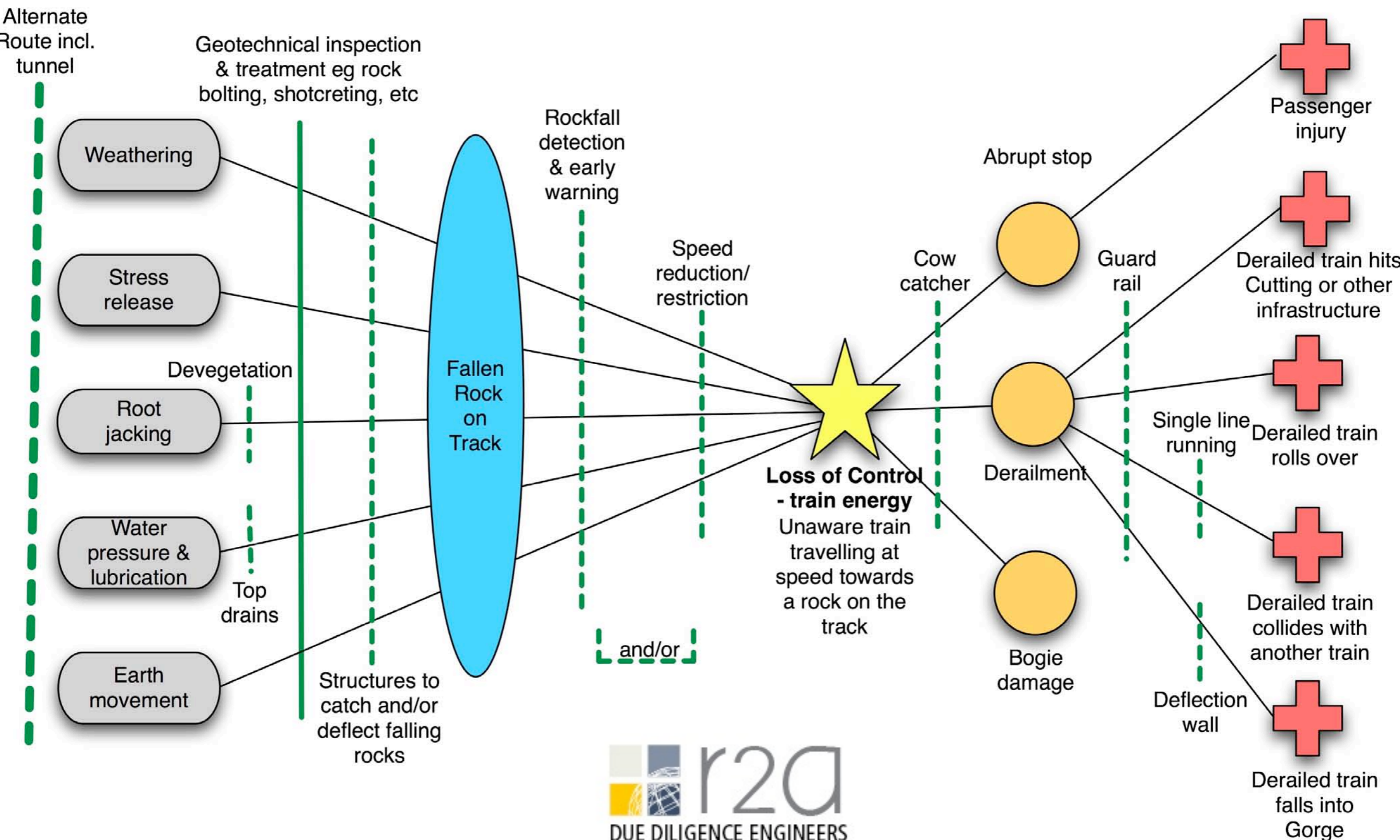


Rocks



Rockfall train collision precaution analysis

(for RailCorp, NSW)



Positively demonstrating due diligence

- a. **All credible critical issues.** This is a completeness check to ensure all credible critical safety issues have been identified. That is, the issues faced by the organisation that have the potential to cause serious harm.
- b. **All precautionary options.** This step identifies all of the precautionary options for the hazard and documents them in the form of a threat barrier diagrams. Solid vertical lines represent existing barriers and dotted lines represent possible barriers.
- c. **Precautionary analysis and decision.** This steps looks at all of the precautionary options available and in view of what is already in place decides on additional precautionary effort. The decision is based on the balance of the significance of the risk (consequence and likelihood) verses the effort required to reduce it. Effort includes cost (how much), difficulty and inconvenience (how hard it is to implement) and utility of conduct (what other things go missing if that course of action is adopted).
- d. **Barrier implementation & QA.** This task ensures that the barriers are in place and well maintained (quality assurance system). SOPs and Work Method Statements contain the barriers in place to carry out various activities. Inspections, spot checks, toolbox meetings, consultation and audits etc ensure barriers are being sustained.

Risk Review Types

Common (case) law

(Judicial interpretation of the general duty of care that all persons have in civil society, judgement made on the balance of the significance of the risk vs the effort required to reduce it)

Recognised good practice (especially published codes and standards)

Regulation called up by statute (including referenced standards)

Compliance audit

Expert investigation

Due diligence review

Statute law

(the will of parliament, beyond reasonable doubt test)



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