What Makes Risk Management Work?

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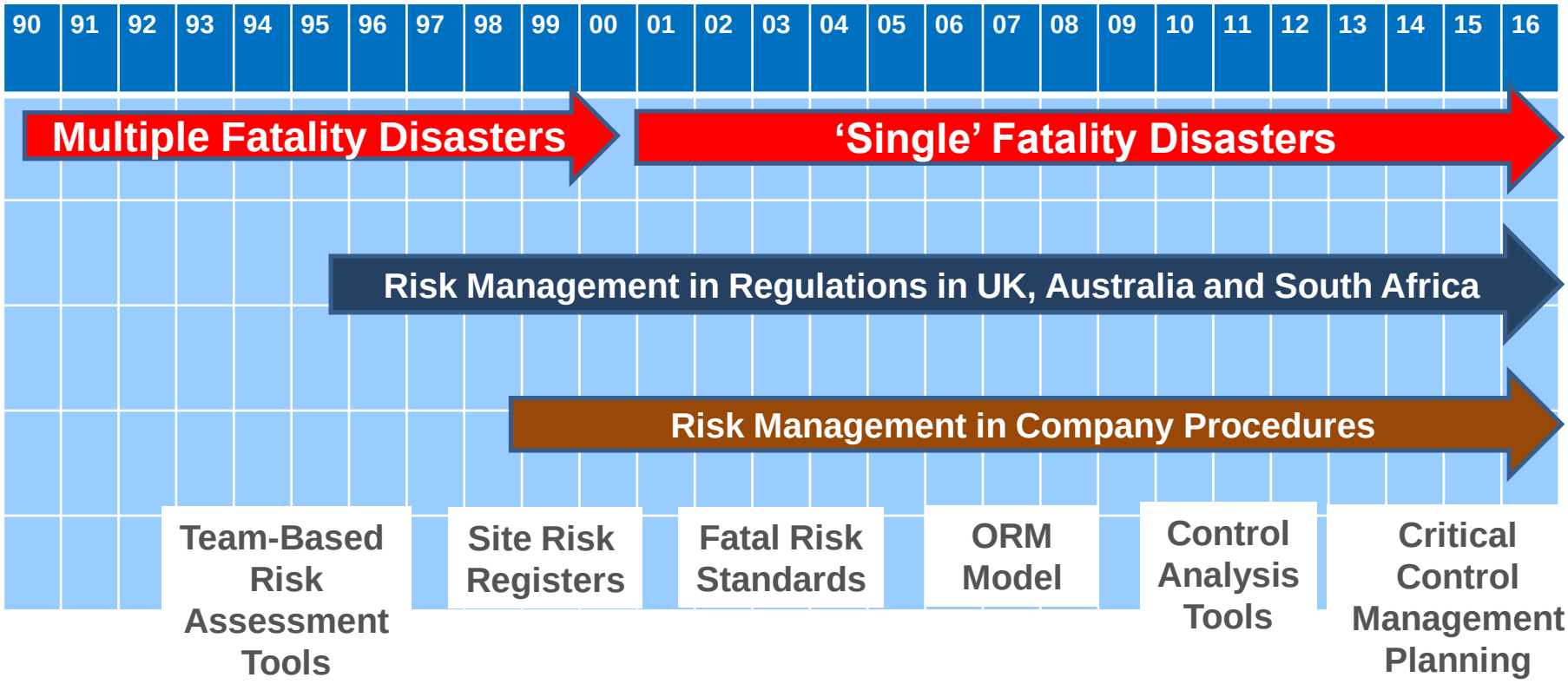
Agenda

- Introduction;
- Risk Assessment vs Risk Management;
- Issues with Risk Assessment;
- Issues with Risk Management;
- Risk Management Maturity

Risk Management in Mining



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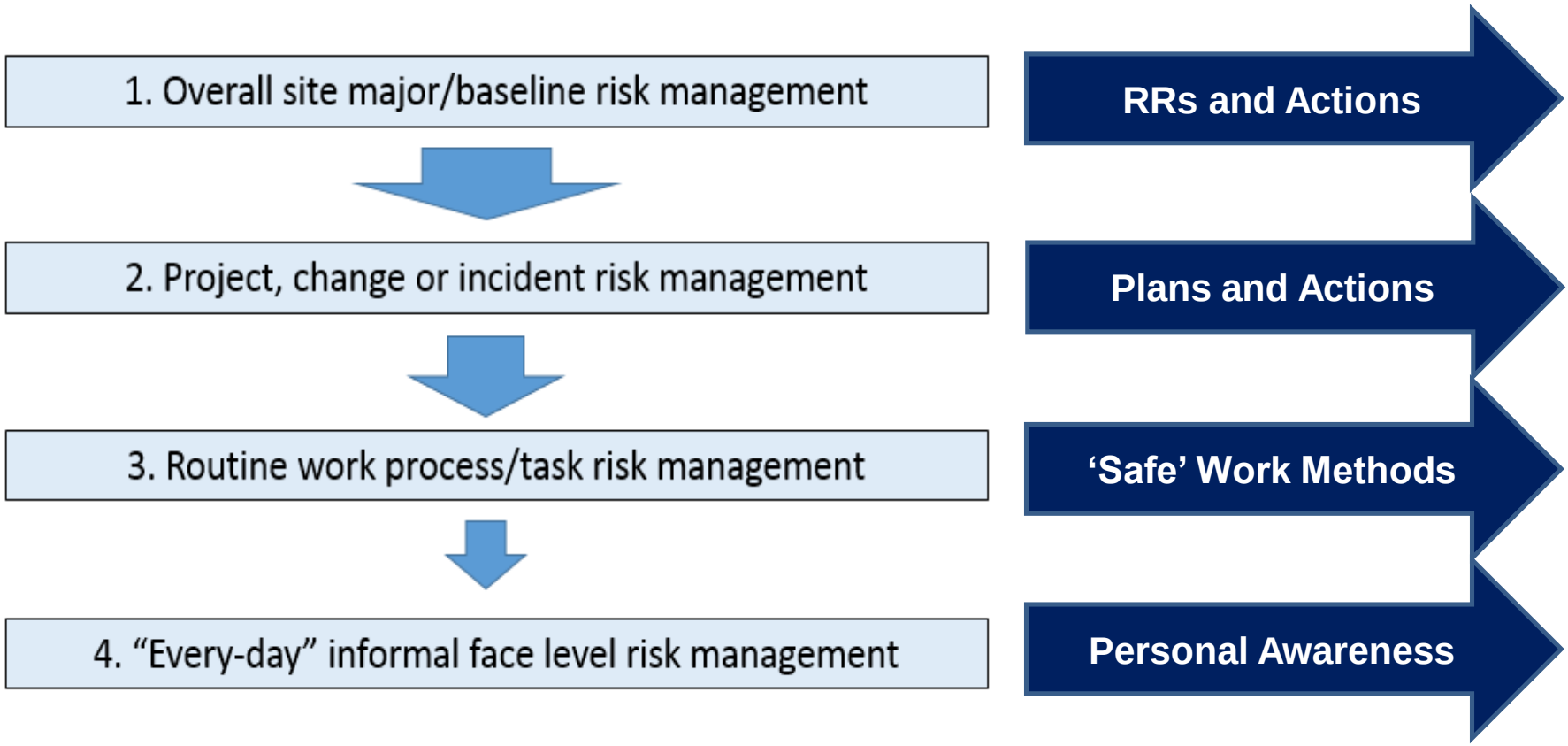
Why Do Risk Assessment?

- The Unwanted Event has happened before
- A Risk Assessment provides a systematic assessment of your current means of preventing
- Proactive
- Repeatable
- Team assessment supports objectivity

Global Best Practices

- Use of a layered RA approach
- Use of consistent definitions (vocabulary)
- Use of multiple Risk Assessment Tools
- Search for “Unwanted Events”

The ORM 4 Layer Model



Definitions

‘Hazard’

- A source of potential harm

‘Unwanted Event / Incident’

- A potential situation or condition where the hazard (energy) is released

‘Major Hazard’

- Hazards with high consequence-low likelihood Risk

Risk Assessment Tools

- WRAC - Workplace Risk Assessment & Control
- SLAM – Go or No Go Assessment
- Bow Tie Analysis – 2nd Level Assessment

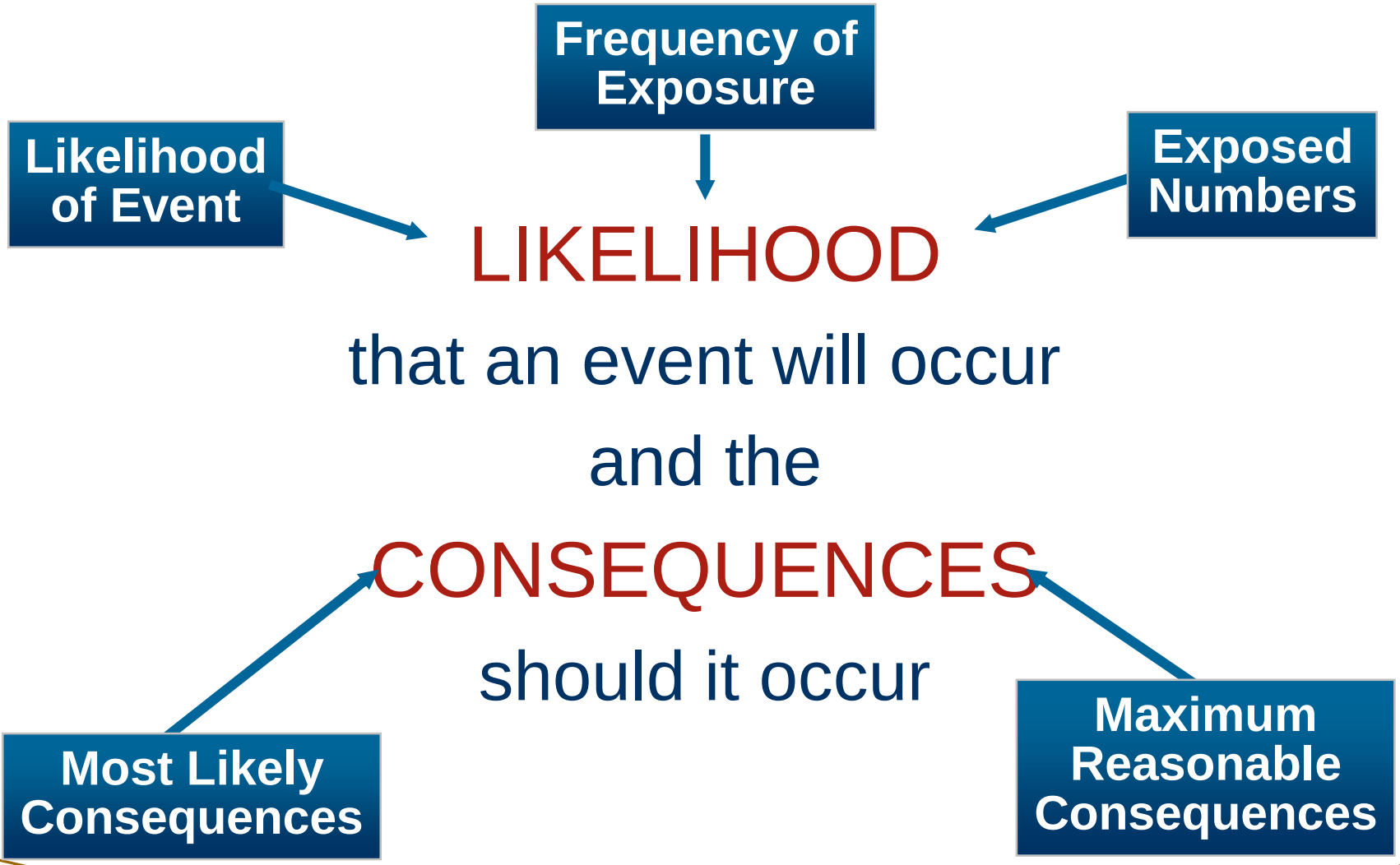
Stages of Undertaking a WRAC

1. Overview of the System/Process
2. Develop Process Map for the System
3. Pick a process step to evaluate
4. List Energy Sources
5. List the known controls
6. Risk Assessment with known controls

WRAC Form

A	B	C	D	E	F	G
Step in operation	Potential incident/accident	Current controls	Probability	Consequence	Risk rank	Recommended improvements or new controls

What is Risk?


Frequency of Exposure
Likelihood of Event
Exposed Numbers
LIKELIHOOD
that an event will occur
and the
CONSEQUENCES
should it occur
Most Likely Consequences
Maximum Reasonable Consequences

Example SHE Risk Matrix

– to find the priorities, Risk Rank Numbers

Event Risk Rating					
Consequence / Likelihood	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Medium (5)	Significant (10)	Significant (15)	High (20)	High (25)
4 Likely	Medium (4)	Medium (8)	Significant (12)	High (16)	High (20)
3 Possible	Low (3)	Medium (6)	Significant (9)	Significant (12)	High (15)
2 Unlikely	Low (2)	Low (4)	Medium (6)	Significant (8)	Significant (10)
1 Rare	Low (1)	Low (2)	Medium (3)	Medium (4)	Significant (5)

Risk Assessment Ranking Matrix

Effect	Consequences					
	1 - Low	2 - Minor	3 - Moderate	4 - Major	5 - Significant	6 - Catastrophic
(P) - Harm to People	Report only Near miss No medical treatment (RO)	Slightly Injured First aid treatment Low Level short term inconvenience (FAI)	Medical Treatment Disabling reversible impairment (MTI) (RWI) (LTI)	Serious Bodily Injury or Disabling Irreversible impairment (LTI) (PPD)	Single or double fatality incident Significant irreversible health effects (TPD)	Greater than double fatality incident and/or significant injury/disease among multiple employees (TPD)
(E) - Environmental Impact	Environmental nuisance Limited damage to minimal area of low significance	Minor short to medium term material environmental harm to small area(s) of limited significance	Serious short to medium term environmental harm with widespread impacts	Major environmental harm Relatively wide spread medium to long term impacts	Extreme environmental harm Long term wide spread effects on environment	Catastrophic widespread, long term impacts to region. Significant fines/long term remediation costs and potential loss of license to operate at multiple sites
(F) - Finance (> of cost or NPV)	<$10K	<$10K $100K	<$100K - $1M	<$1M - $20M	>$20M – $100M	>$100M
(R) - Impact on reputation	Slight impact Public aware but no public concern	Limited impact Some local public concern	Considerable impact with potential for wider public concern	National impact with potential for wider public concern	International impact International public attention	Significant international public or media criticism
(L) - Legal	<$10K	<$10K $100K	<$100K - $1M	<$1M - $20M	>$20M – $100M	>$100M

Control Hierarchy

Control Type	Control Hierarchy
Elimination	5
Substitution	4
Passive Engineering	3
Warning Device/ Active Engineering	2
Procedure/Training	1

Control Type	Control Definition
Elimination	Engineering type controls that physically eliminate the hazard.
Substitution	Replacing something that produces a hazard with something that does not produce as significant a hazard.
Passive Engineering	Controls that are in place that do not require human intervention, this also includes separation controls
Warning Device/ Active Engineering	Alarms or monitoring that indicate a hazardous situation or Controls that are in place that require humans to activate them, this also includes design standards
Procedure/Training	Administrative controls that change the way people work, documented SOP's, training etc.

Risk and Hazards

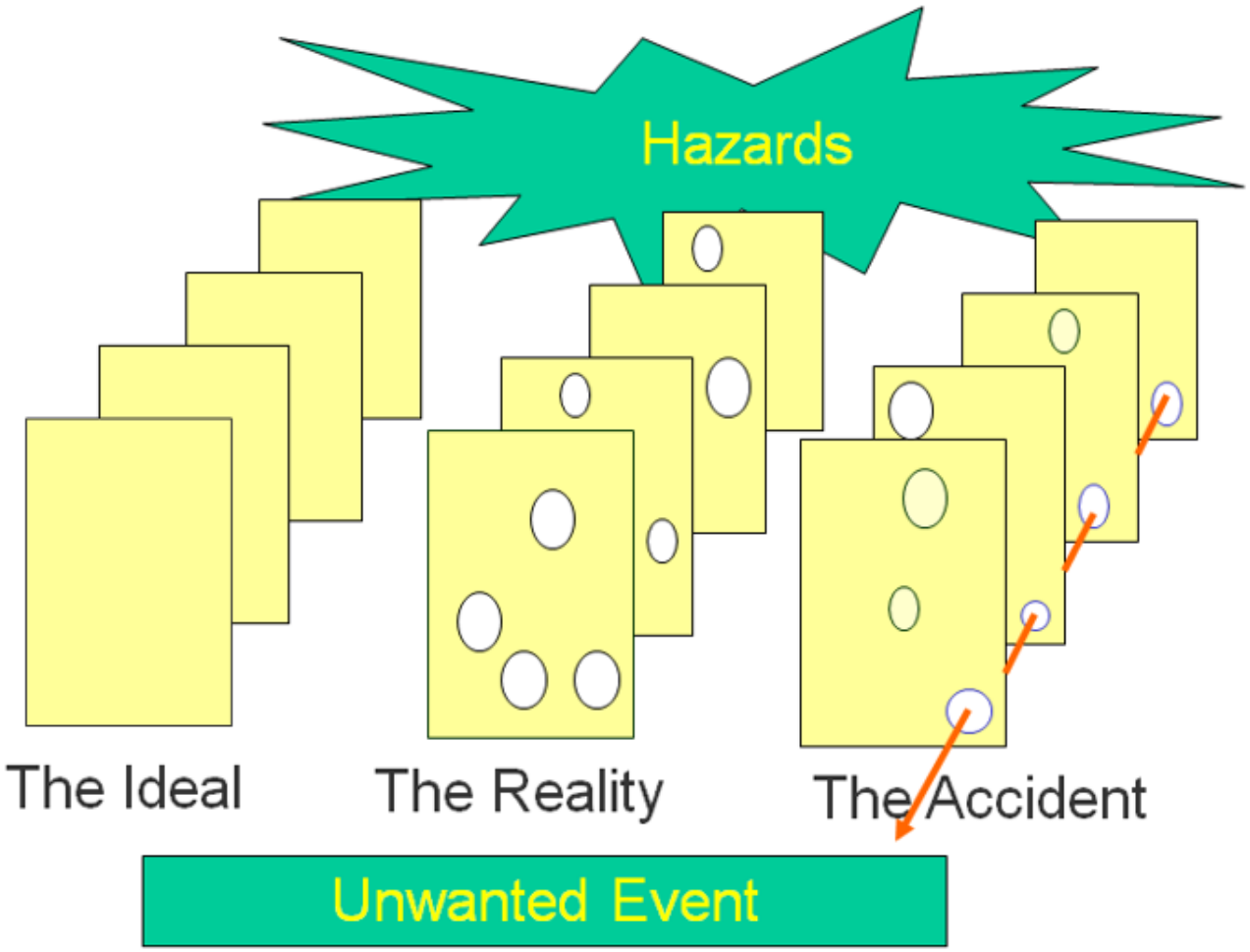
- **Remember that Hazards...**
  - (anything that can cause harm)
- **...is not the same as Risk**
- (likelihood that harm will occur and its consequence)

Low Risk

High Risk

The level of risk is determined by the control effectiveness

Controls & Control Effectiveness



Issues with Control Effectiveness

- Controls must be relevant to the Hazard and Unwanted Event
  - If data about is either unavailable or not studied then it is easy to make incorrect assumptions about control effectiveness, when
  - They do not exist, or
  - If they do exist they are not being utilized or maintained, or
  - They do not effectively control the hazard
- Documenting using one-word controls
  - Documenting using one-word controls will not lead to a sufficient and effective risk assessment
  - Examples are: Training, Procedure, Maintenance

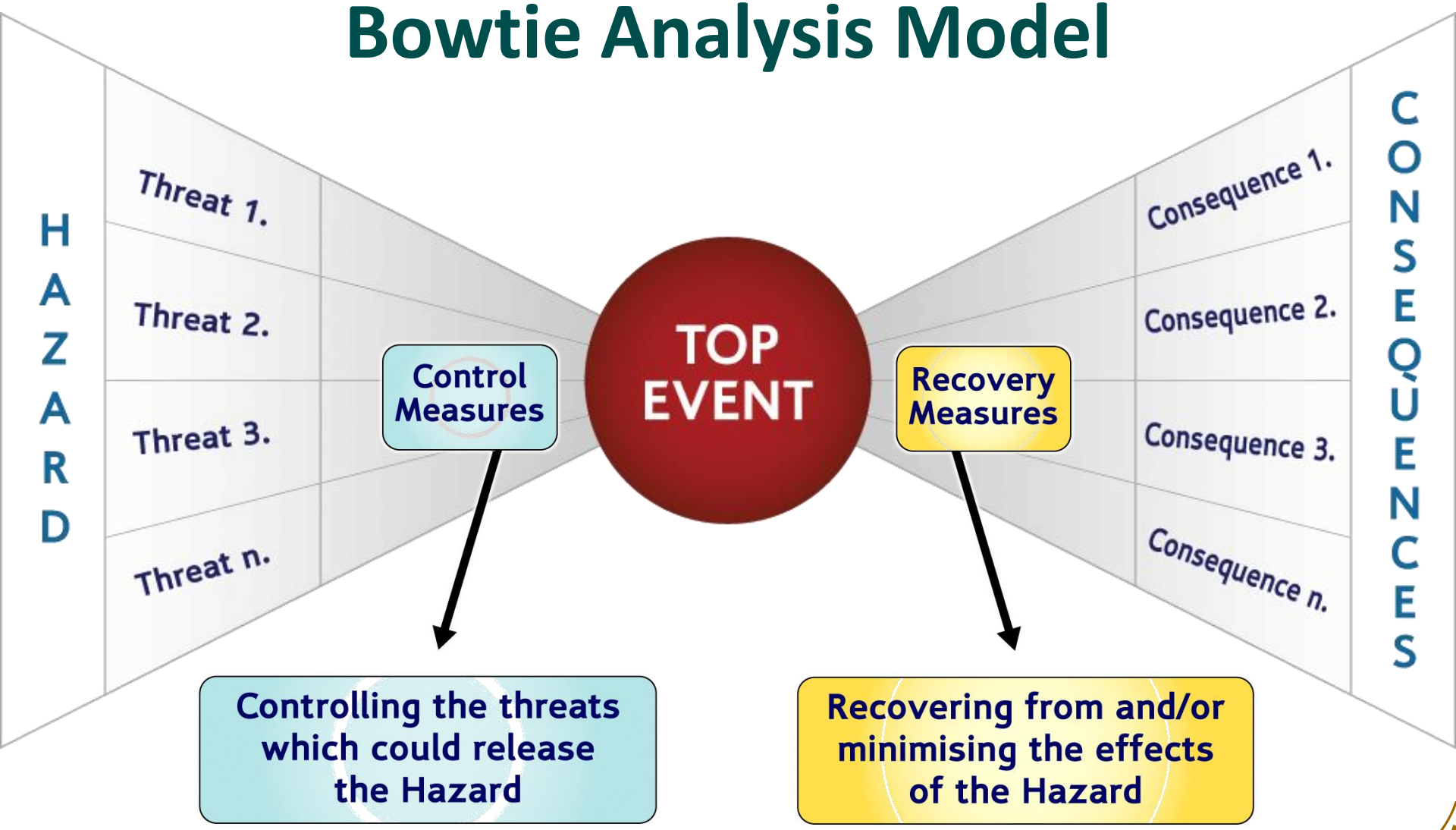
Bow Tie Analysis Overview

- What is a Bow Tie Analysis (BTA) ?
- How the BTA tool fits in a hazard management program ?

Identification of Unwanted Events for BTA

- Identification of Major unwanted events from
  - Site Baseline Risk Assessment
  - Project
  - Identified through Management teams

Bowtie Analysis Model



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Issues in Risk Assessment

- Not properly planning/scoping the assessment
- Not being systematic in approach
- Rushing through assessment
- Not adequate representation or not correct individuals
- No follow-up through development of auditing systems for controls

Issues in Risk Management

- Not clearly identifying the person responsible for managing the risk
- Not providing adequate training to all levels of the staff
- Lack of participation and involvement by all levels of the organization
- Lack of implementation of controls
- No follow-up through development of auditing systems for controls

Risk Management Maturity

BASIC

- "one size fits all" risk assessment process applied to all types of health & safety risk;
- Use of "one word" hazards and controls in assessments;
- No consideration of control effectiveness;
- Risk matrix used to determine acceptability;
- Control improvements fix what is wrong
- Limited application of action plans and ongoing monitoring

IMPROVING

- Team based approach;
- Some consideration of the 4 layer model in establishing structure;
- Different RA techniques used for assessing different types of risk;
- Control measures identified, discussed, but still generally assumed effective;
- Risk matrix used to prioritise issues,
- Hierarchy of control followed;
- Formal monitoring of some controls

FOCUSED

- 4 layer model used to structure overall implementation;
- Control effectiveness formally considered when analysing controls and discussing acceptability;
- Critical controls identified
- Verification and monitoring criteria for critical controls defined

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Making Risk Management Work

- Leadership
- Systems

- Questions?

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