

# Zero Harm

*Just a corporate mantra, or an aspiration that  
can be turned into reality?*

Presented by:  
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# Content

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- **Context**
- Zero harm vs zero risk
- Bird incident pyramid – true or false?
- Incident causation
- Conclusions

# Popular mantra...



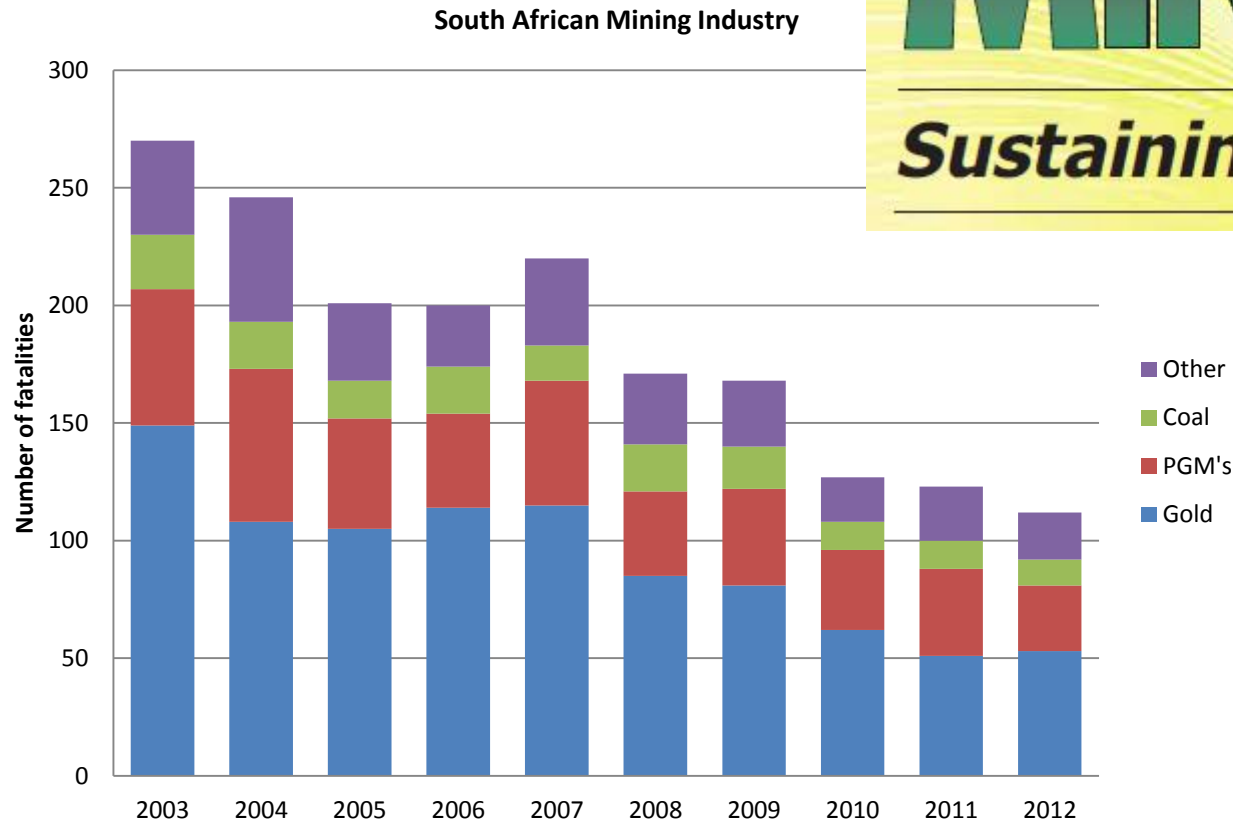
**ZEROMindset**

**NORepeats**

**SIMPLE** Non-negotiable standards



# When is zero, zero?



SUPPORTED BY:



# Zero Harm = Zero Credibility?

Zero Harm is an Occupational Disease  
and Health

Zero harm makes zero sense  
28/03/2011 — Leave a comment

NOVEMBER 27, 2012

Zero Harm persists in confusing  
companies on safety

COMMENT

Zero Harm=Zero Truth  
22 November, 2012

Zero harm: infallible or ineffectual?

Zero Harm: A Slogan Created for the  
CEO, Says Safety In Action  
Conference Speaker

APRIL 18, 2012

Zero Harm is a “fallacious deception” –

## Could Zero Harm be killing our people?

By Australian Exhibitions & Conferences

26 October 2009


# Common criticisms of zero harm

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- Our people do not believe it
  - at an impasse before you start
- The emphasis on lag indicators
  - clean-out of low hanging fruit, but the high-end risk is unaffected
- ‘All injuries are preventable’ = false proposition

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The logo for Arete Consultants, featuring the Greek word 'ἀρετή' (aretē) in a stylized font above the word 'ARETE' in bold red letters, with 'consultants' in a smaller, italicized font below it.

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# Concepts and Terminology

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- **Harm**

- *Noun* - physical injury, especially that which is deliberately inflicted
- *Verb* - physically injure...damage the health of...have an adverse effect on...

*Oxford English Dictionary*

- **Hazard**

- Source of potential harm

- **Unwanted Event / Incident**

- Situation or condition where the hazard is 'released'
- Physics 101 - Have to release energy to do work
- Uncontrolled/unwanted release of energy!
- The greater the magnitude of the energy, the greater the hazard



# Risk

- The chance of something happening that will have an impact on your objectives
  - Can be quantified as:

$$f \left( \text{LIKELIHOOD OF EVENT OCCURRING} \ \& \ \text{CONSEQUENCE OF EVENT} \right)$$

- Note: Risk is a measure of something – a person or object therefore cannot be a risk...

# Risk and Hazards

- Remember that Hazards...
  - (anything that can cause harm)
- ...is not the same as Risk
  - (likelihood harm will occur and it's severity)



## Low Risk



## High Risk



**The level of risk is determined by the control effectiveness**

# Risk Revisited

**Low Risk**



**High Risk**



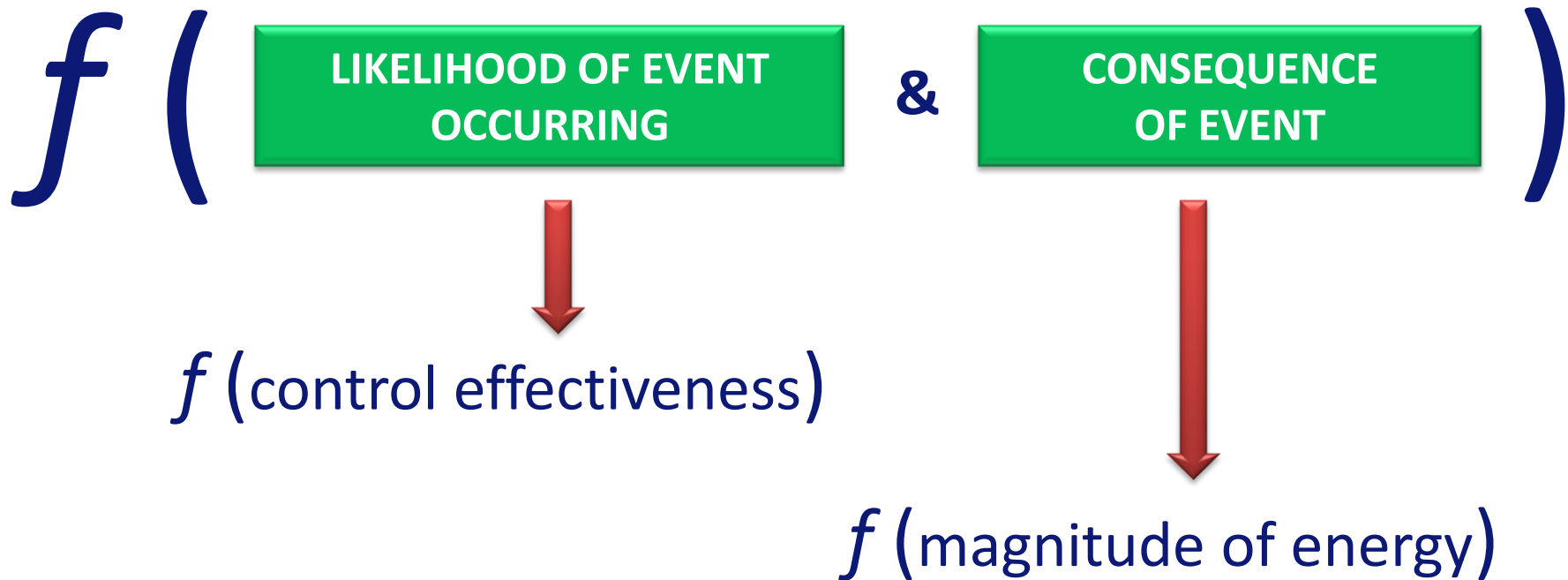
**The level of risk is determined by the control effectiveness  
and the magnitude of the energy**



**Lowest Risk**

# Risk Revisited

- The chance of something happening that will have an impact on your objectives
  - Can be quantified as:



# Do we understand the energies?

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# Zero Risk?

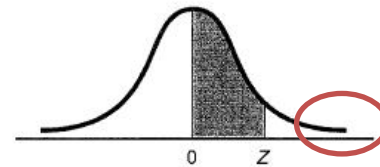
- Likelihood  $\approx$  Probability
- “Zero chance of something happening” cannot exist
- Zero Harm  $\neq$  Zero Risk
  - Manage the level of risk to achieve the outcome of zero harm



**Murphy's Law**  
Anything that can go wrong, will go wrong.

MOTIVATIONAL-GENERATOR.COM

The Standardized Normal Distribution



Entry represents area under the standardized normal distribution from the mean to Z


Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389

# Finagle's law...



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- Incident causation
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# History

- “Safety Triangle” or “Accident Pyramid”, was popularised by Frank Bird (USA).



- Seems to make intuitive sense, but no science to support
- Developed by Heinrich (1930's) to give figures to risk exposure in the insurance industry

# Echardt & Byard commentary

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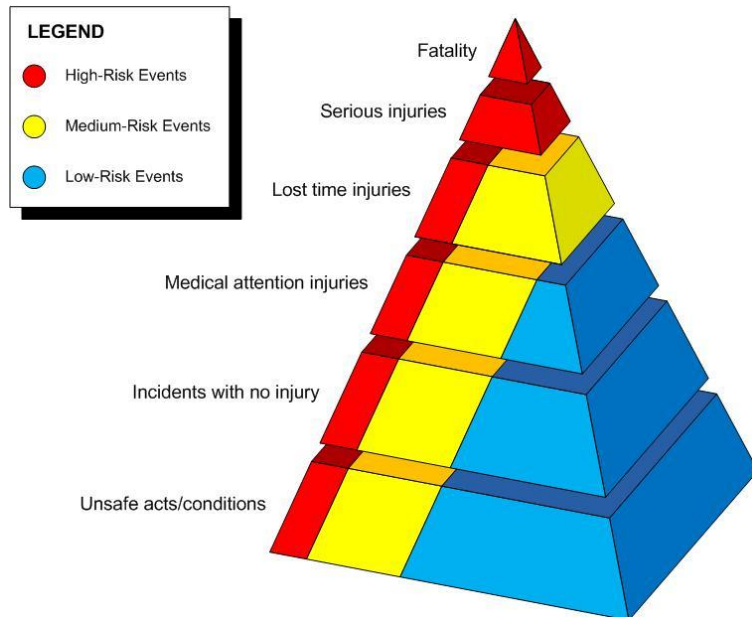
- Make-up & shape of pyramid is unique to each organisation
- Not predictive
- Went unchallenged for so long, that it developed a sense of “fact” and “reality” around it
- Class I Permanent Damage represented only 10% of the captured incidents but 90% of captured costs to employers, employees and the community

**Accident  
Pyramid implies  
that by looking  
after the small  
hazards, you can  
avoid the major  
hazards**

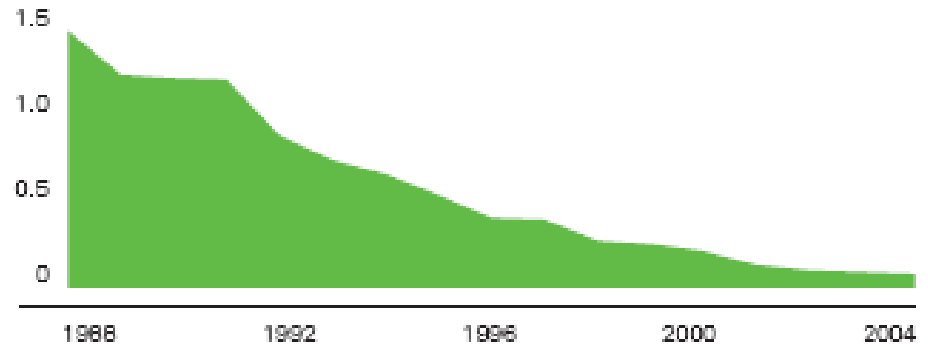
# BP Texas City

- 23 March 2005
- 15 deaths, 170 injuries
- >\$1 billion in compensation claims

## Accident Ratio Pyramid



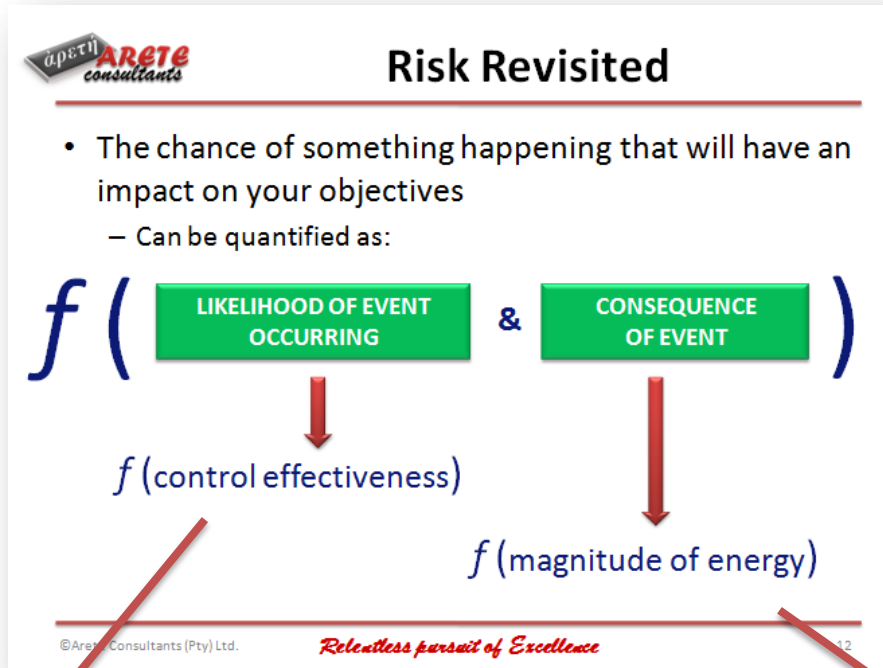
Long-term improvement in safety performance (DAFWCF)<sup>1</sup> 1988-2004



Since 1988, our DAFWCF rate has declined from around 1.5 DAFWC per 200,000 man-hours to 0.09 in 2003 and to 0.08 in 2004.

<sup>1</sup> Days away from work case frequency (DAFWCF) is the annual frequency (per 200,000 hours) of injuries that result in a person (employee or contractor) being unable to work for a day (shift) or more. For a full understanding of the underlying data on DAFWCF please refer to our website.

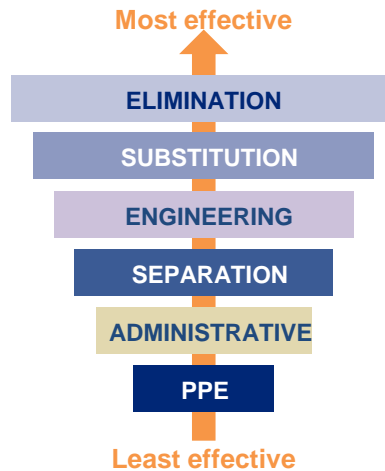
# Zero Harm and Risk management



Have systems in place to manage the critical controls

Prioritise unwanted events based on magnitude of energy

# Control effectiveness



Type?  
Is it reliable?  
Is it available?  
Is it survivable?



# Example: Control Effectiveness

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## Fire panic at Canal Walk

July 19 2014 at 11:22am  
By WEEKEND ARGUS REPORTER

Cape Town - A fire caused panic at Canal Walk Shopping Centre late on Friday afternoon. Parts of the mall were evacuated, leaving some customers bewildered and frightened.



Canal Walk spokeswoman Vanessa Herbst said a small fire broke out in the storeroom of one of the shops, triggering an alarm.


The evacuation had caused some upset with shoppers. Shopper Faghrie Ghalpie posted on their Facebook post: **“How can you evacuate the mall then people must still pay parking its madness outside.”**

Chenica Jacobs added: “I agree with Faghrie... and **the evacuation procedure was up the pole. Security was not sure what was happening...**”



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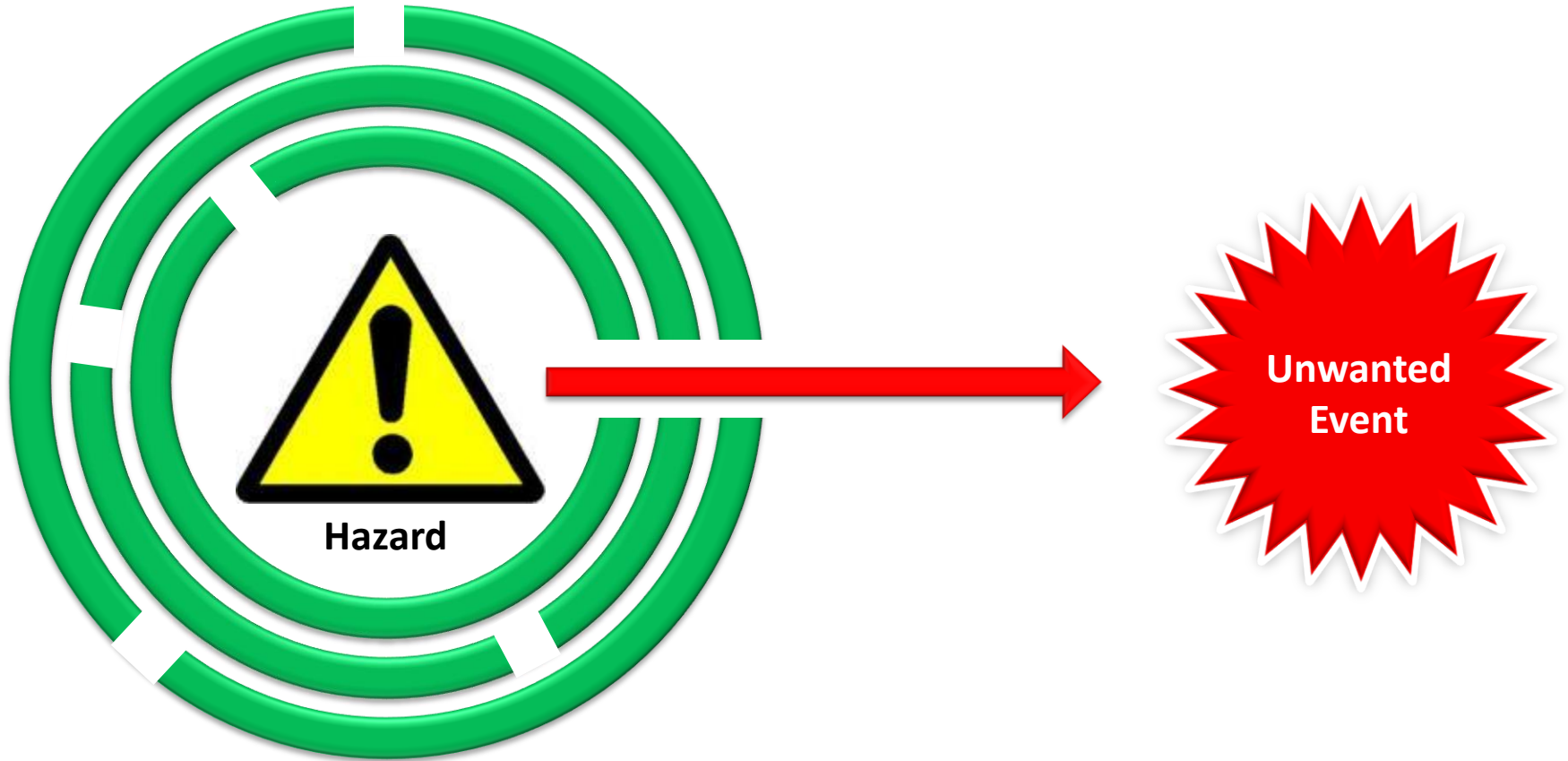
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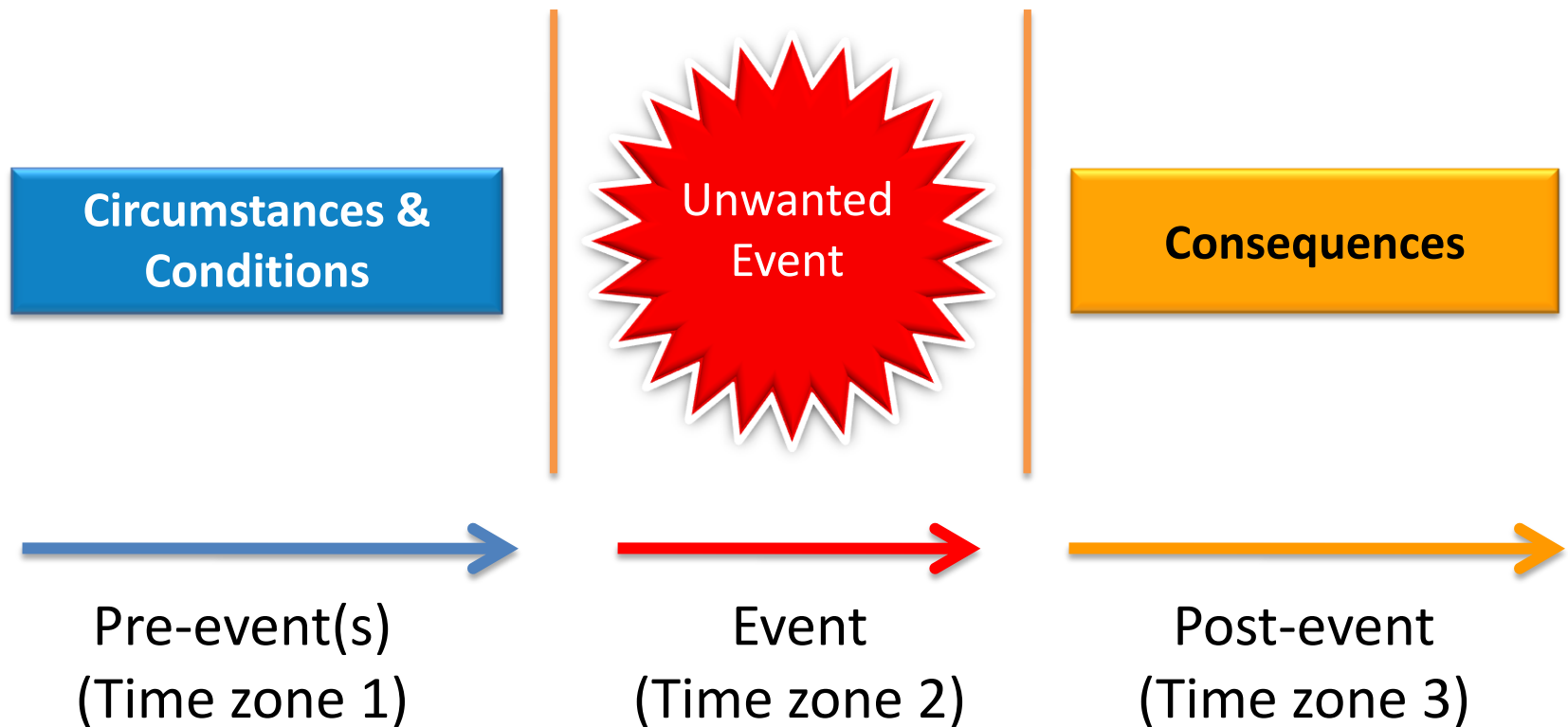
# Unwanted Events





# It takes time...

Unwanted events are the result of a process that takes time



# Tongaat Mall example

- 19 November 2013
- 2 deaths, 29 injured



## Steel bars missing at Tongaat mall, inquiry told

2014-04-02 14:31

Steel bars needed to reinforce a beam holding a concrete slab at the ill-fated Tongaat mall, outside Durban, were missing a commission of inquiry into the mall's collapse has heard.

## Tongaat mall scaffolding 'removed too soon'

2014-04-03 13:53

Scaffolding at the Tongaat Mall outside Durban, part of which caved in last year, was removed too soon, a commission of inquiry into the collapse has heard.

## Weak concrete used at Tongaat mall

2014-06-04 16:29

The strength of concrete used in the ill-fated Tongaat mall was in places less than a third of what it should have been, an inquiry has heard.

## Poor design on columns led to Tongaat mall collapse

2014-07-22 18:54

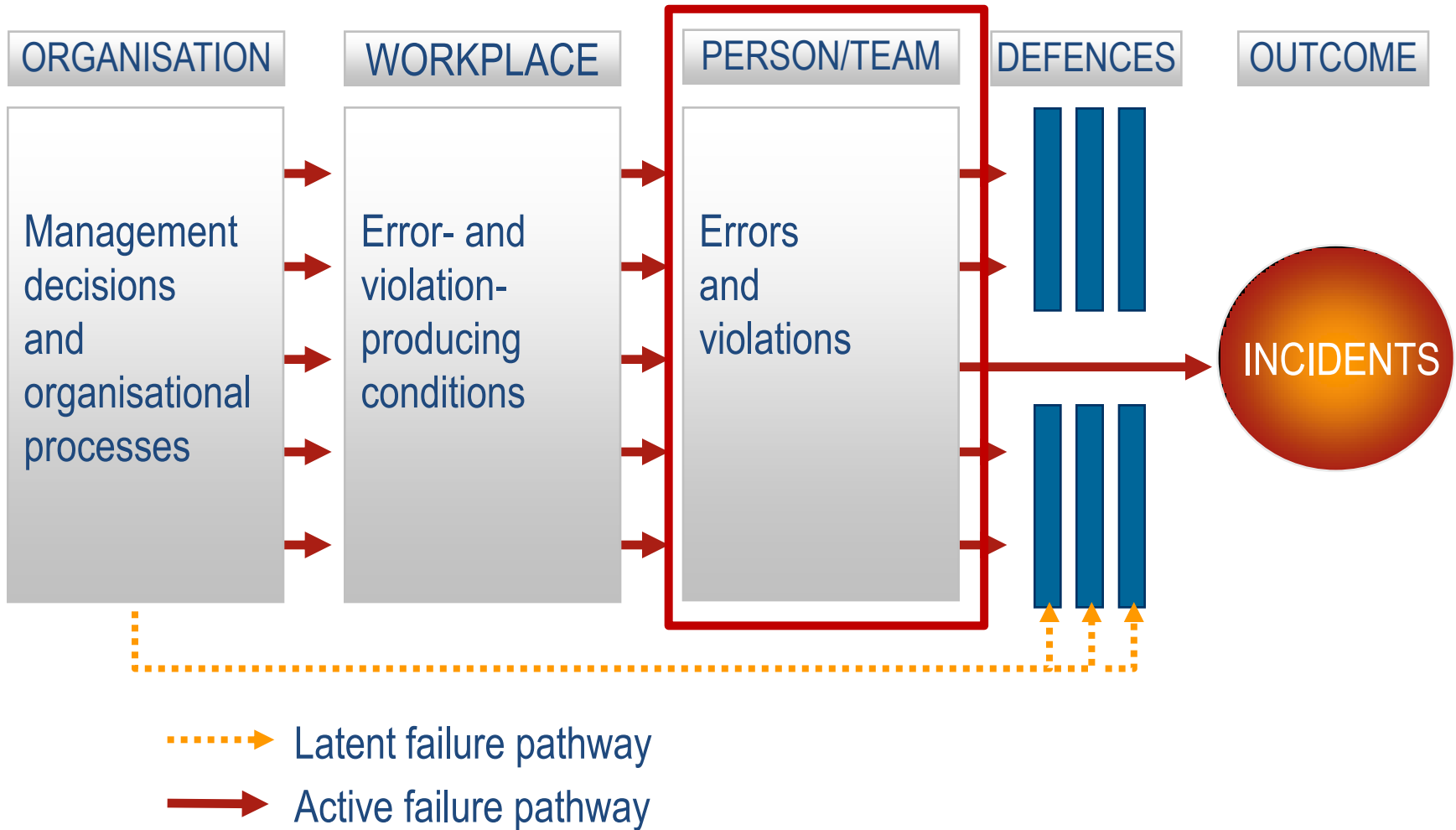
The poor design of two columns led to the collapse of the Tongaat mall, an expert engineer has told a commission of inquiry.

## Concrete used for Tongaat mall not tested - foreman

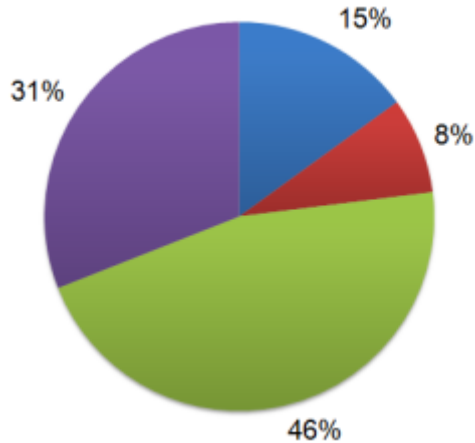
2014-07-23 14:18

Strength tests have never been carried out on the concrete used in the columns supporting the ill-fated Tongaat Mall.

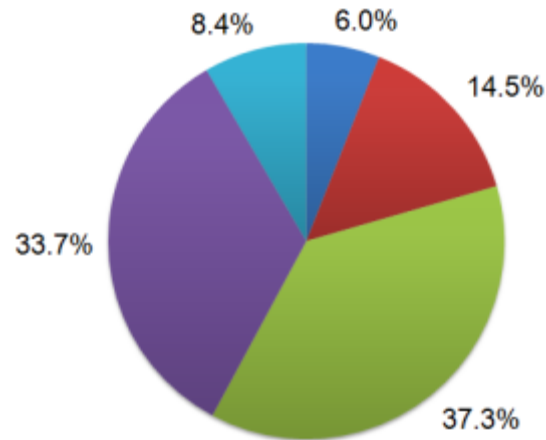
# Organisational Error (James Reason)



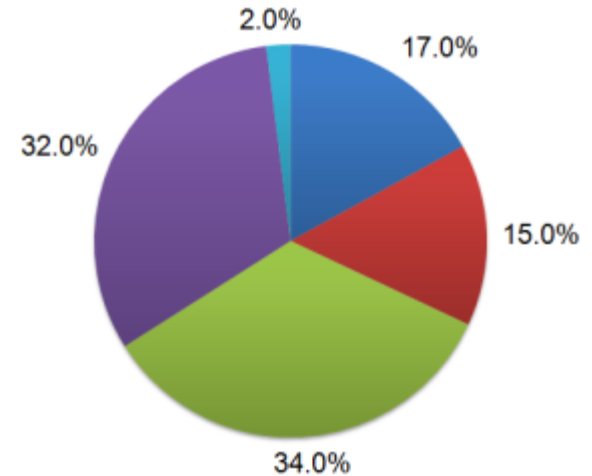
# Human error during incidents



25 Serious Mining Incidents



28 Fatalities – Narrow Reef Mining



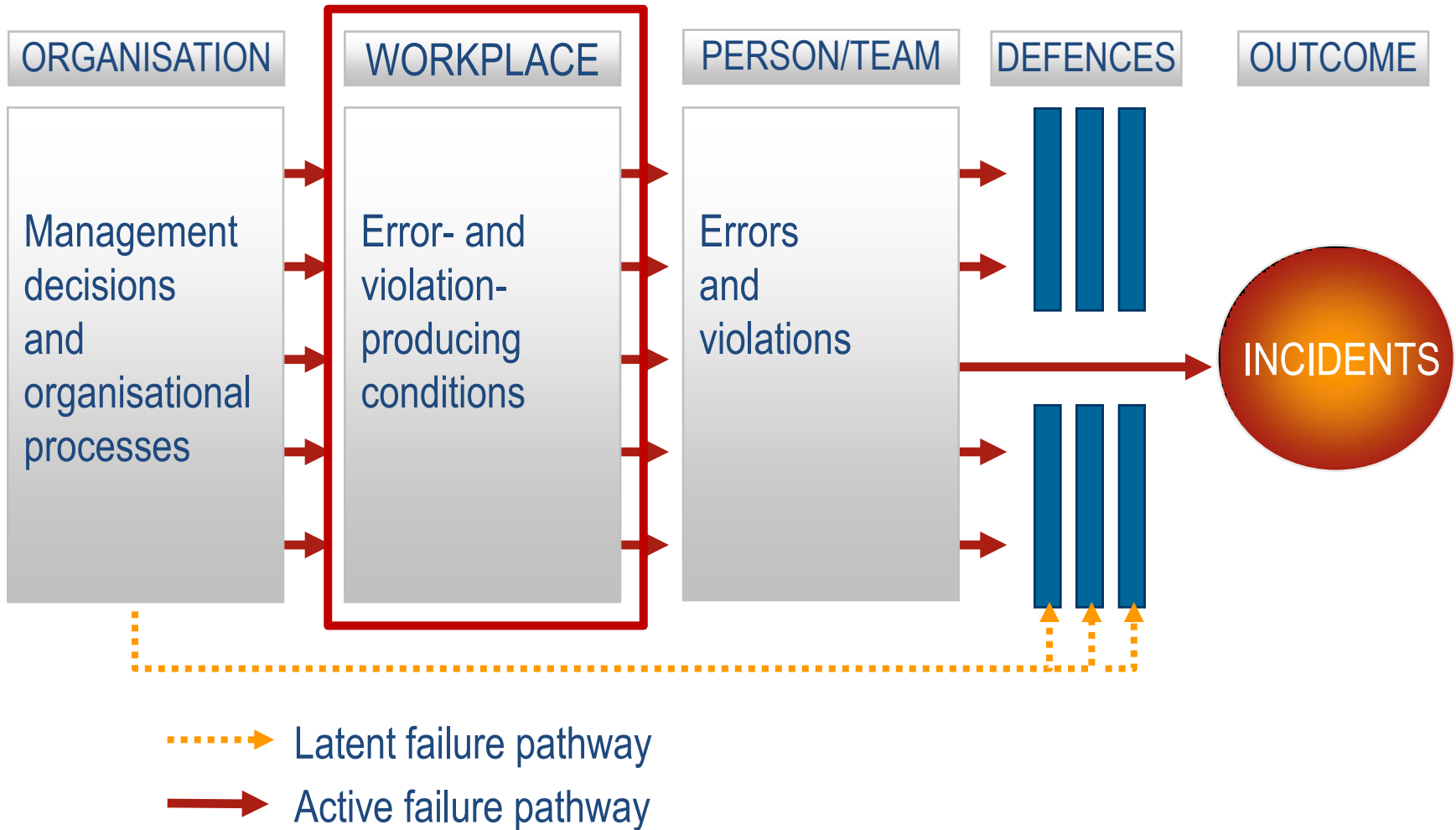
21 Incidents – Opencast Mining

More than one  
person breaking the  
'rules'

- No active human error
- Slip/Lapse
- Mistakes
- Cultural Violations
- Deviant Violations

Lack of knowledge on  
controls and energies

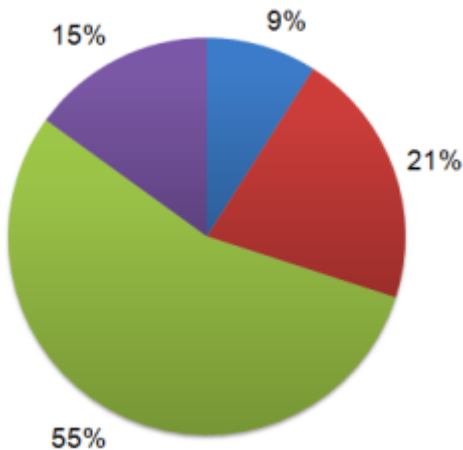
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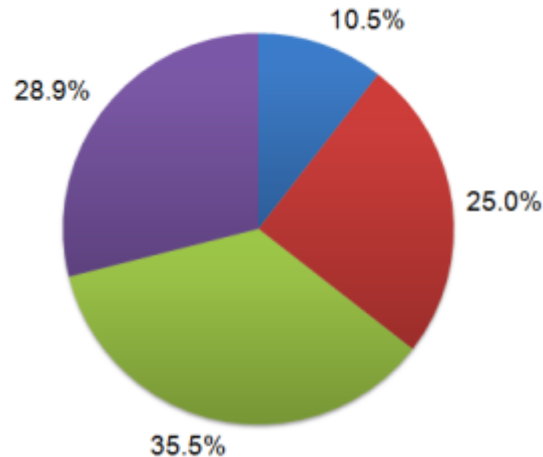
# The work-process model (Bullock 1979)



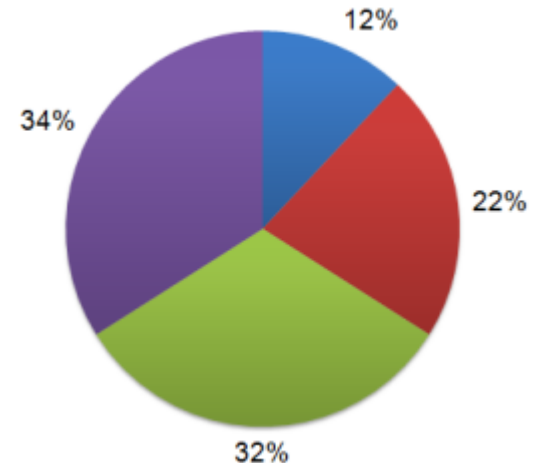
# Work-process factors during incidents



25 Serious Mining Incidents



28 Fatalities – Narrow Reef Mining



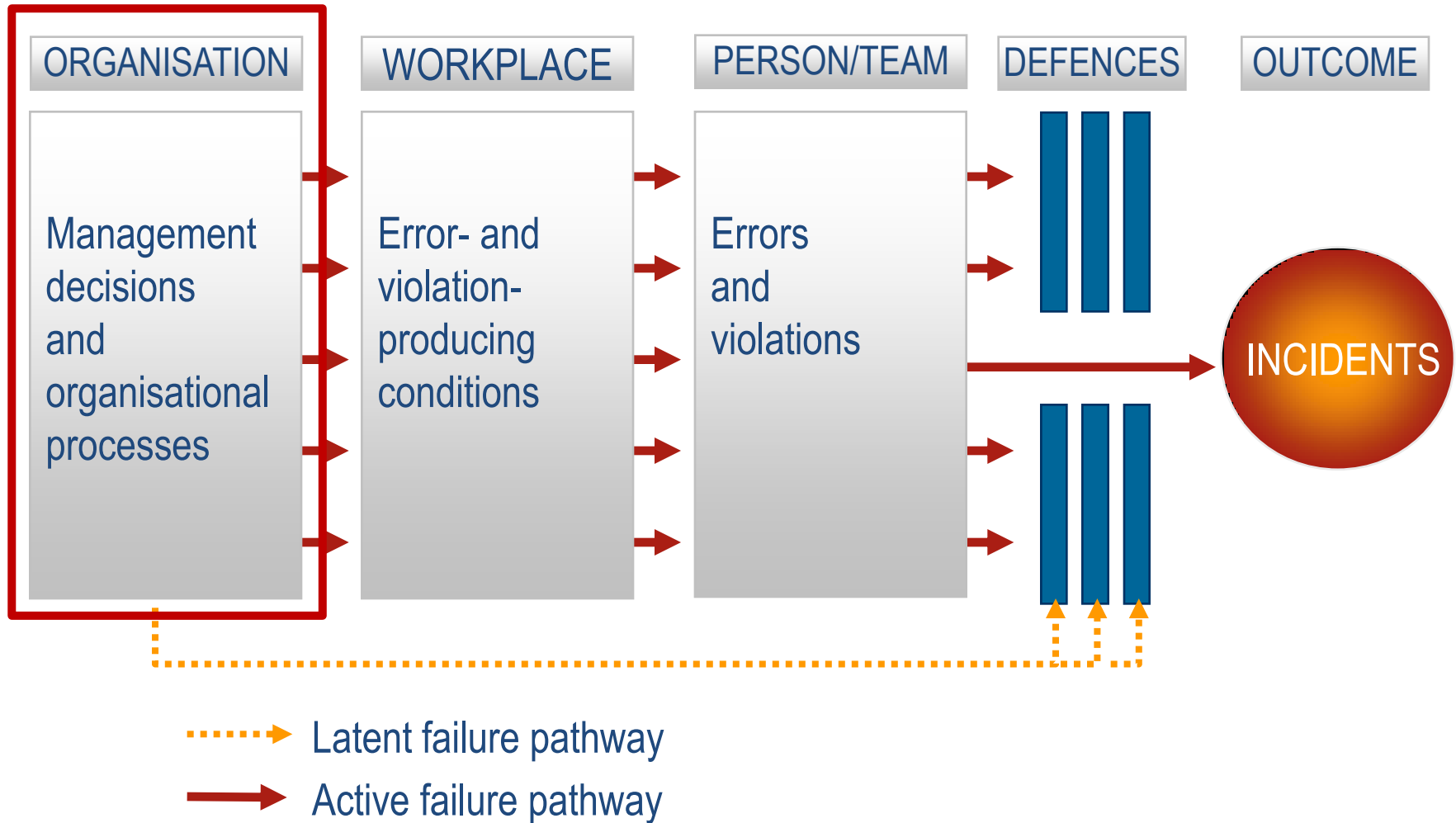
21 Incidents – Opencast Mining

Majority linked to cultural violations (lack of supervision)

- Competency of Person
- Safe work practises
- Fit for purpose equipment
- Controlled work environment

Majority linked to 'mistakes'

# Organisational Error (James Reason)





# Management Systems

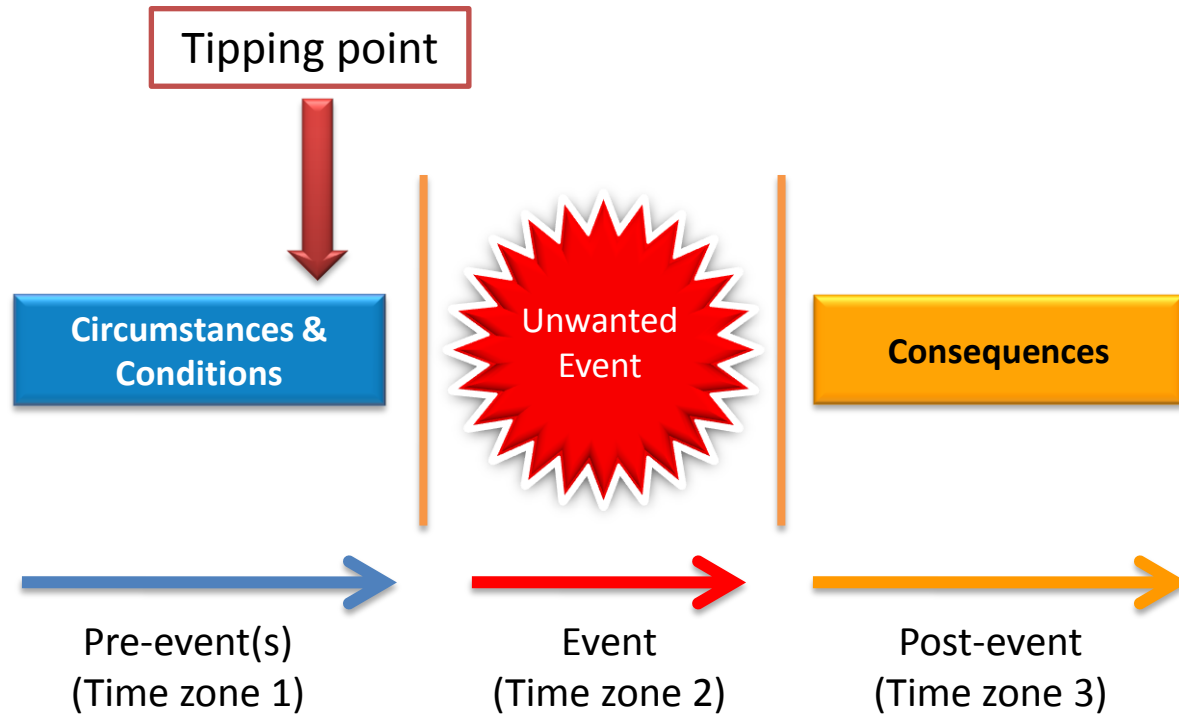
## Organisational & Management Environment

- Risk Management
  - Planned Maintenance
  - Project Management
  - Procurement
  - Training & competency
- 
- Strategic Planning
  - Leadership
  - Role design – supervisors
  - Planned task observations



# It takes time...

- An unwanted event is not a sudden event in time
- They are preventable up to a point in time, where after it will happen



# Chess Analogy to Risk Management

- What makes a Grand Master?
  - Think 7+ moves ahead
  - See patterns developing, not just snapshot
  - React decisively

**Risk Management system must enable leaders to look ahead, pick up patterns developing and act decisively, before tipping point is reached**



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# Some thoughts

- In Physics, there is no 'Absolute Void'
  - Any effort to try and measure zero is affected by the efforts to measure it.
  - Can't get to absolute zero (Zero Kelvin -273.15 degrees).
- Yet many organisations (and CEOs) set 'zero' goals for their organisations in the management of risk.
  - Harm does not always occur, so there must be periods of 'Zero Harm'
- Just another corporate mantra...



# Turning the aspiration into reality

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- Zero Harm  $\neq$  Zero Risk
  - Manage the level of risk to sustain periods of zero harm
- Zero Harm is only useful where Zero Harm is defined by the reduction and elimination of high risks
  - Prioritise unwanted events based on magnitude of energy
  - Have systems in place to manage critical controls
- All incidents are preventable up to a point in time, where after it will happen
  - Think ahead
  - See patterns developing
  - React before the tipping point

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