

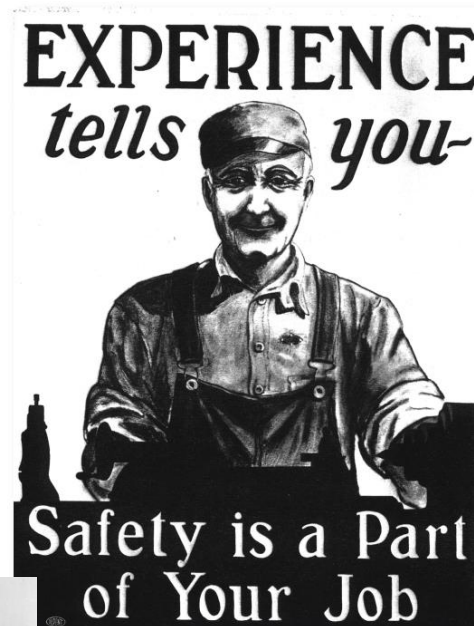


***Moving from Safety Philosophy to Safety Science
IPLOCA 2019 Convention, Bangkok***

The Industrial Revolution to WWI



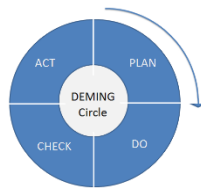
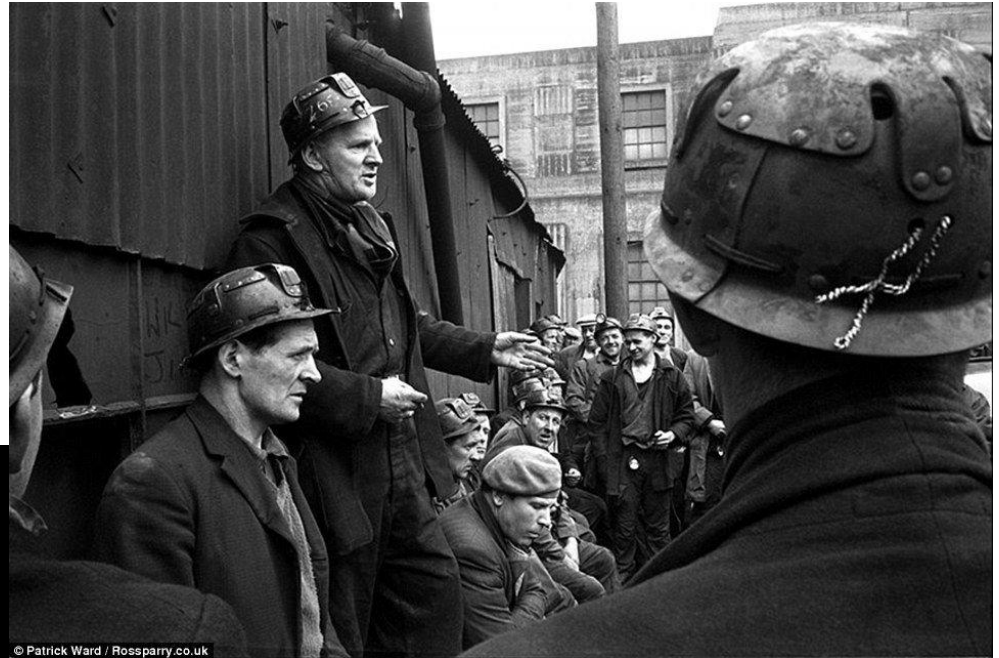
WWI to WWII



**Industrial Accident
Prevention:
H. W. Heinrich**



WWII to the birth of OSHA



OSHA[®]
**Occupational Safety
and Health Administration**

The Ascension of Modern Safety

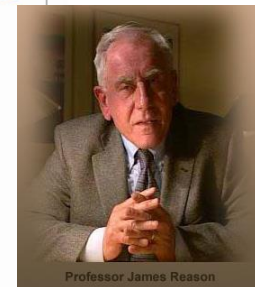
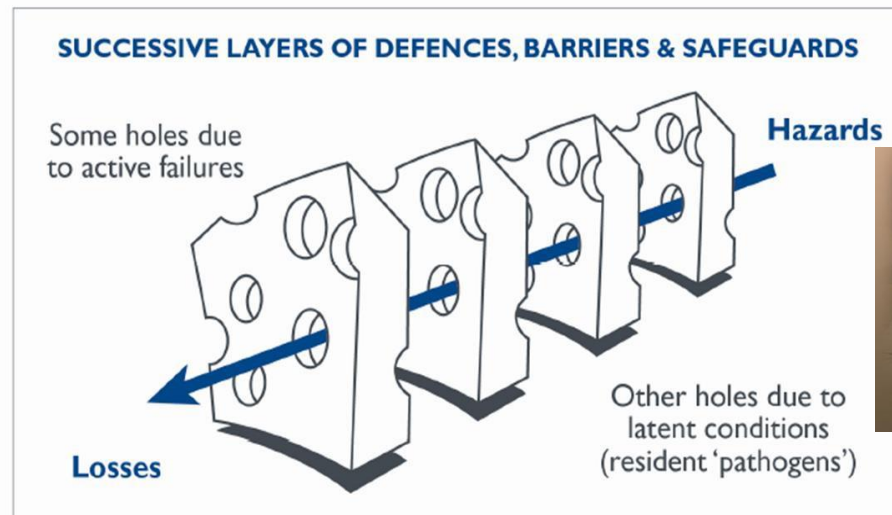
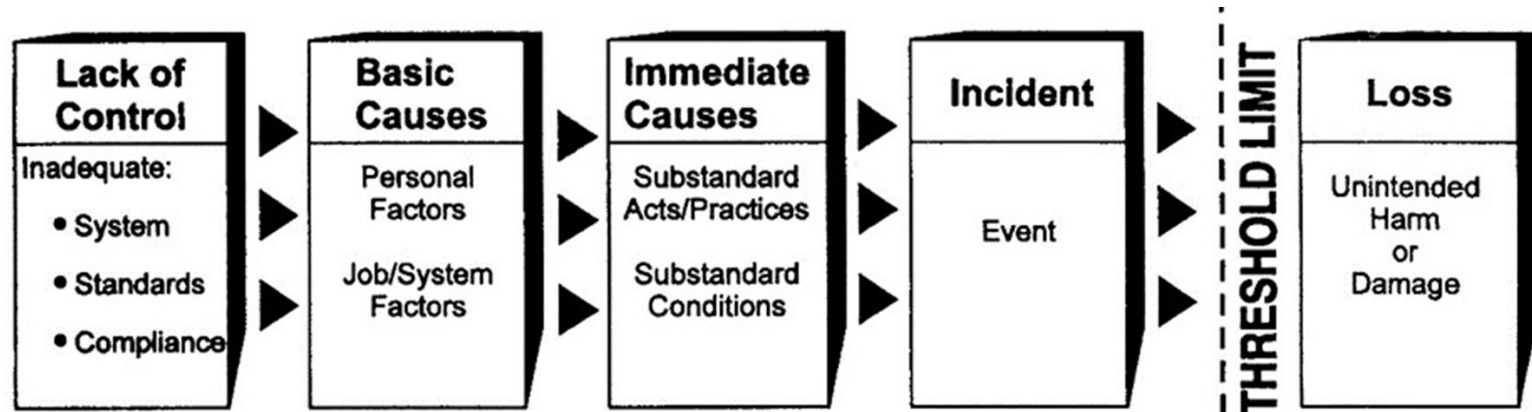


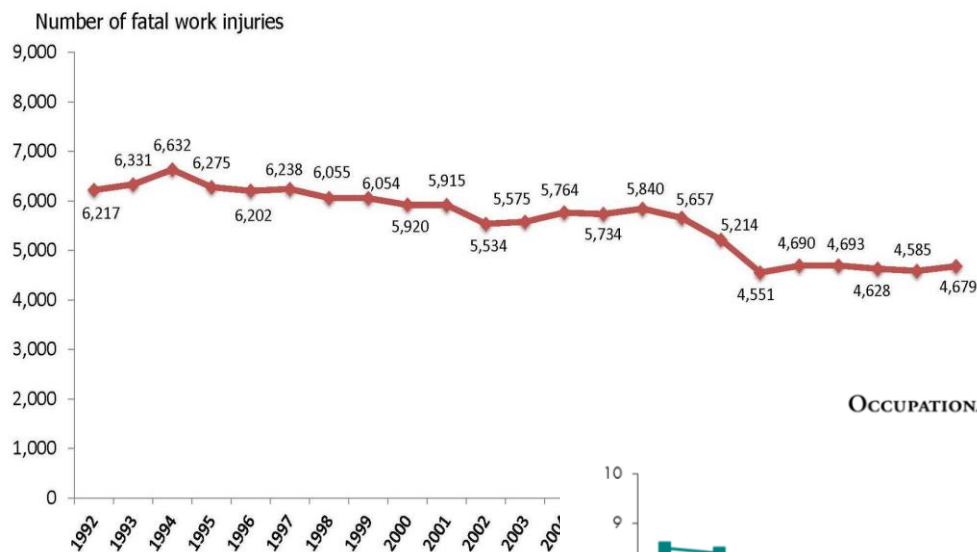
Figure 6: Reason's 'Swiss Cheese' Model (modified from Reason, 2008 p.102)

Where we are today....The Good

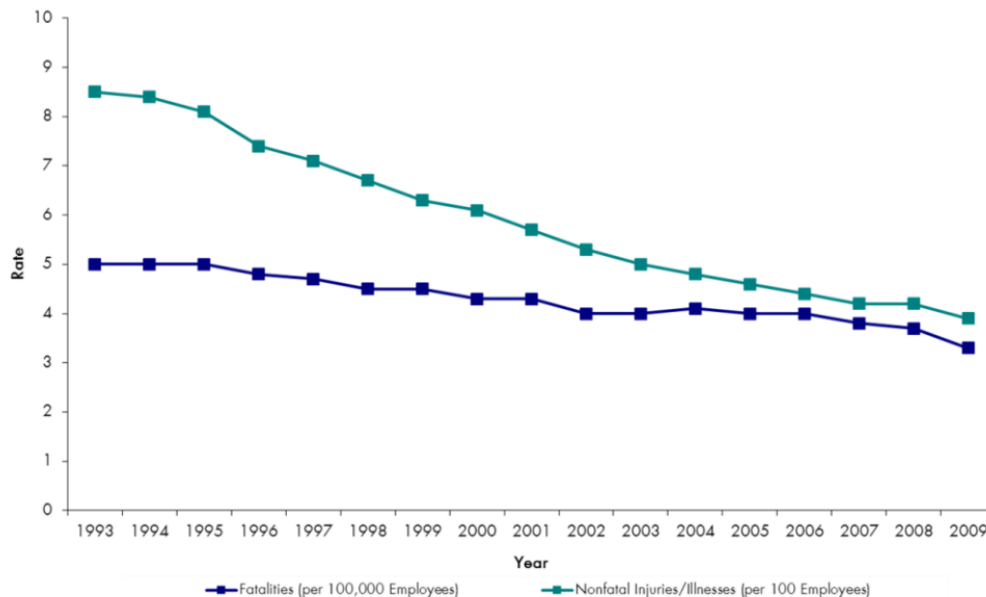


Where we are today....The Bad

Number of fatal work injuries, 1992–2014*



OCCUPATIONAL FATALITIES AND NONFATALITIES

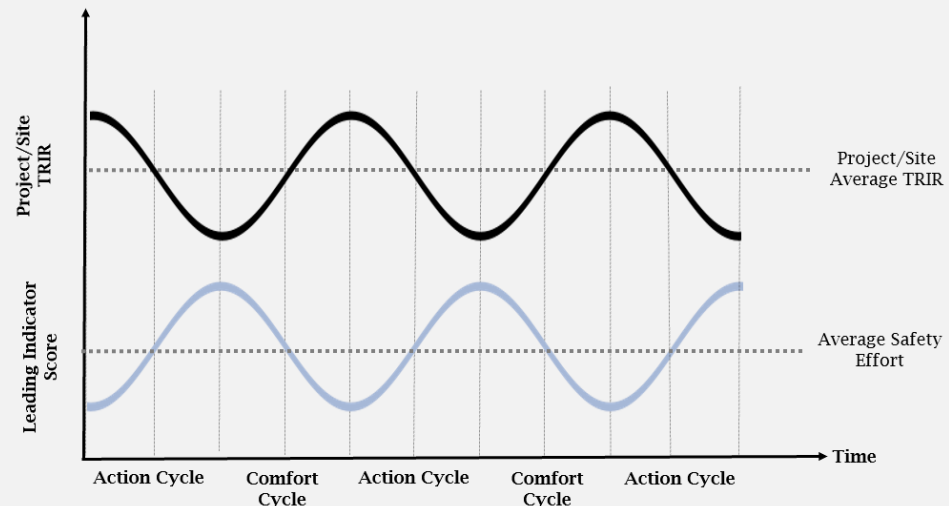


Lagging Indicators

TRIR Calculation

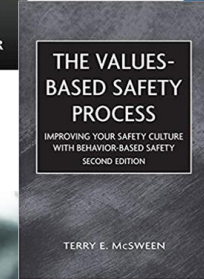
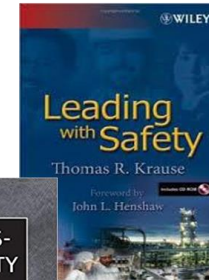
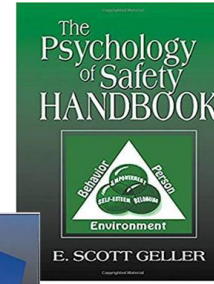
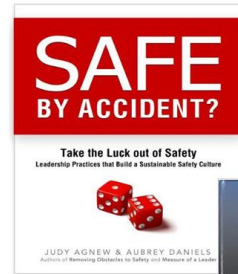
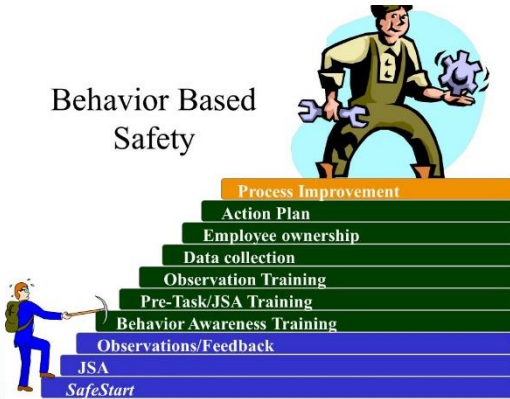
(Number of recordable injuries and illnesses x 200,000)

Employee total hours worked



Safety-as-Philosophy

Behavior Based Safety

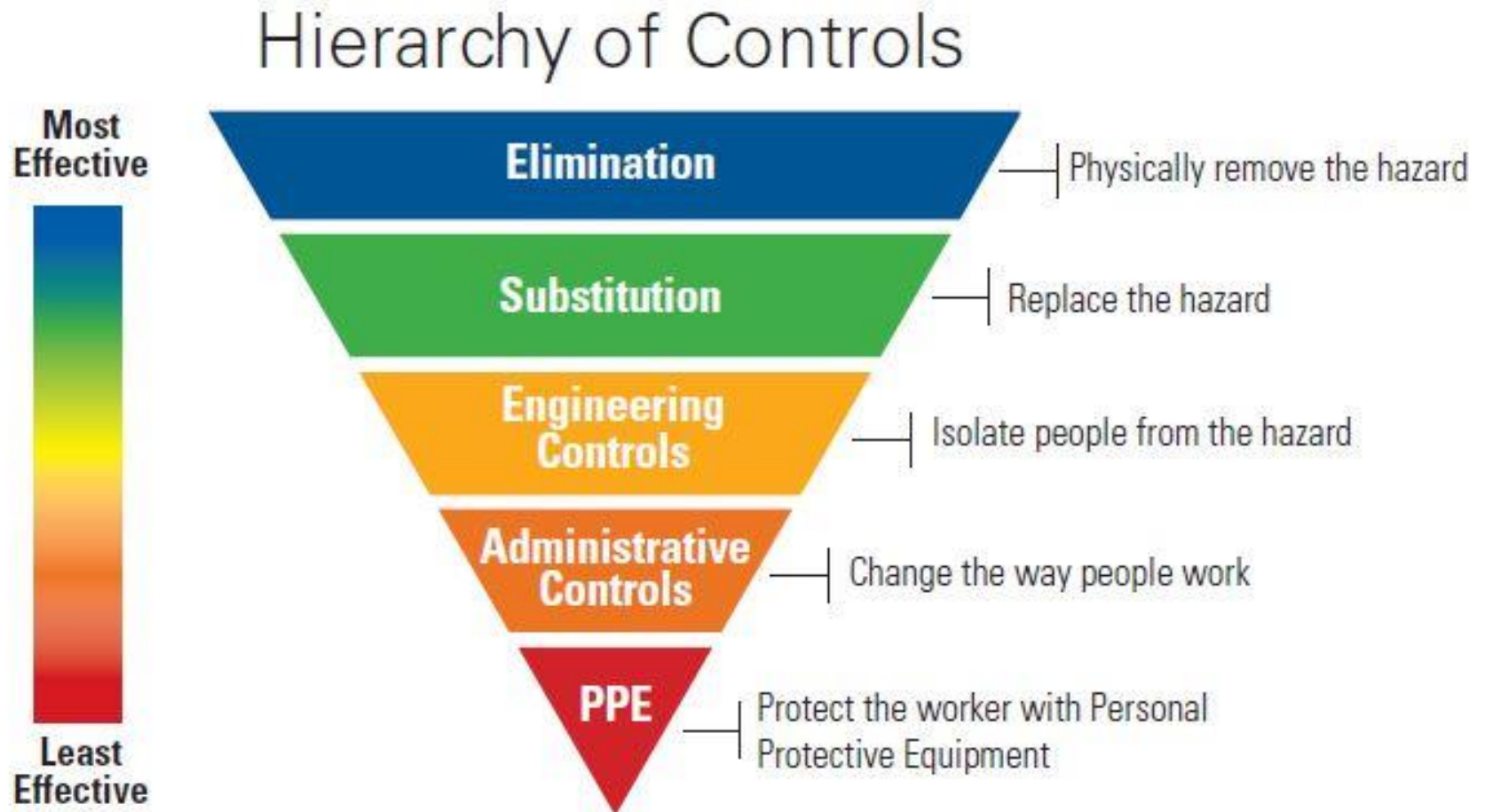


“Culture eats strategy for breakfast”

– Peter Drucker

Then the
Psychologists
arrived –
We’re Saved!

Injury Prevention Hierarchy



Source: NIOSH

Near Misses

REPORT ALL
NEAR MISSES



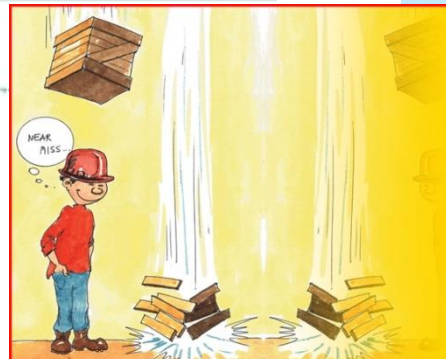
**A Near Miss
Today
Could Be
An Accident
Tomorrow**



REPORT ALL NEAR MISSES
AS SOON AS THEY HAPPEN!



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**Report
All Near
Misses**

#MONDAYMOTIVATION

Safety Science – What does it look like... Today?

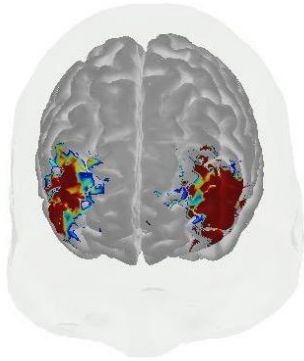
Precursors Analysis

$$Probability = \frac{e^{(-1+0.20*X_1+0.56*X_2+0.46*X_3+0.24*X_4)}}{e^{(-1+0.20*X_1+0.56*X_2+0.46*X_3+0.24*X_4)} + 1}$$

Poor Work Planning	Factor Presence	Weight	Weighted Score
Crew Members are Unaware of Work Procedure		x1	
No/Poor Plan to Address Work Changes		x1	
No/Poor Pre-Task Plan or Discussion Specific to Work		x1	
Productivity Dominated Culture	Factor Presence	Weight	Weighted Score
Crew Members are NOT Active in Safety		x2	
Fatigue		x2	
Schedule/Productivity Pressure		x2	
Significant Overtime		x2	
Prior Safety Performance is Poor		x2	
Vulnerability to High Energy	Factor Presence	Weight	Weighted Score
Lack of Control Barrier and/or Visual Warning		x2	
Line of Fire is Uncontrolled		x2	
Improvisation		x2	
Outside Safety Influences	Factor Presence	Weight	Weighted Score
Congested Workspace/Crowding		x1	
Distracted Workers		x1	
Limited Safety Supervision		x1	
Poor Quality or Inexperienced Foreman		x1	
Working Alone		x1	
Total Score (if score equal to or greater than 4, HILF is Predicted)			



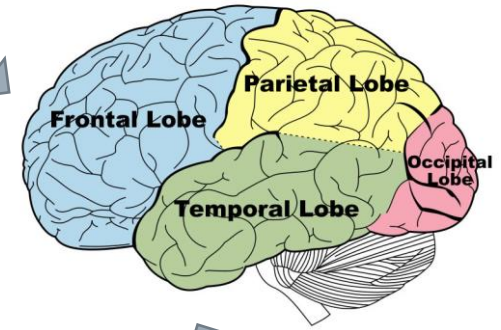
Safety Science – What does it look like... Today?



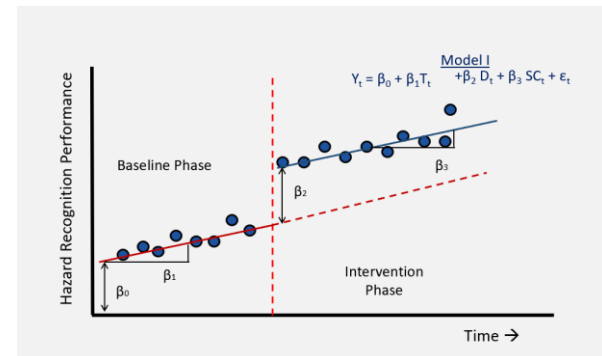
Energy-Based Hazard Recognition



Gravity
Motion

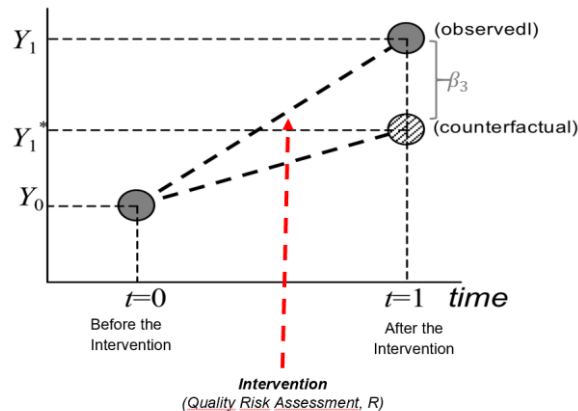


Mechanical
Pressure
Others



Safety Science – What does it look like... Tomorrow?

Safety Economics



Predictive Analytics

Quality Leading Indicators



Safety Science – What does it look like... Tomorrow?

TRIR
Stability

SAFETY STATISTICS		
YEAR	EMR	TRIR
2018	0.78	0.00
2017	0.67	0.46
2016	0.69	0.20
2015	0.69	0.58

Artificial Intelligence



Virtual
Reality

What can you as a leader do?

- Support the research.
- Ask the right questions.
 - Is this intervention supported by peer-reviewed research?
- Operationalize the research.
- Don't wait for the clients to drive the conversation.



Questions and Comments



The Natural Resource for Strong Business