

What we have learnt What we still need to learn from incidents

**TONY GOWER-JONES,
STICHTING TRIPOD FOUNDATION**

- 27 years with Shell (Chemicals and Exploration and Production)
- Network Rail Major Projects (West Coast Route Modification and Crossrail/Reading)
- Centrica Energy HSE Director and Capability Director
- Chemring Group
- Board Member of the Tripod Foundation

Aachen Process Safety Conference 17th Dec 2025



► The Stichting Tripod Foundation (STF)

- A charity, based in the Netherlands
- Setup by Shell in 1998
- Worked with the Energy Institute since 2012
- Managed by the Tripod Board

The Foundation helps organisations on their journey to become better and safer companies.

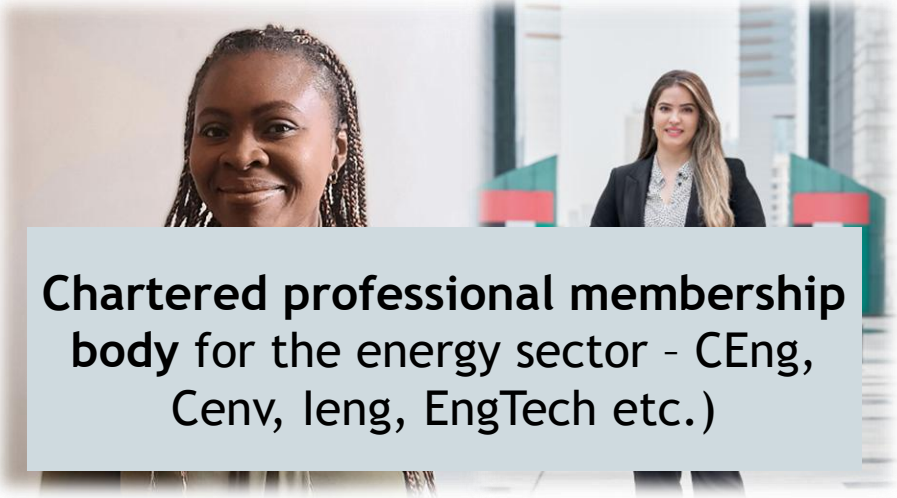
- This is best achieved by using **scientifically proven methods** that push organisations forward.
- The Foundation provides **thought leadership**.
- The Foundation develops, promotes, and ensures high quality delivery of **proven methods** to learn from events and sustainably embed learning into your organisation.




Emanuele Cimica | Chair, Stichting Tripod Foundation Board | *General Manager, Business Transformation, Shell*




► The Energy Institute

A photograph of two women standing in front of a modern building. The woman on the left is Black with braided hair, wearing a dark blazer. The woman on the right is white with long blonde hair, also wearing a dark blazer.


Chartered professional membership body for the energy sector - CEng, Cenv, Ieng, EngTech etc.)

A photograph of two industrial workers in a factory setting. A man in a yellow high-visibility jacket and white hard hat is looking at a tablet. A woman in a white hard hat is looking towards the camera.

Technical institute - \$2million annual research fund, publish 50+ industry guidance documents annually

A close-up photograph of a woman with dark hair, smiling and looking down at something out of frame.

Training provider - providing training on the energy sector itself, risk management, energy management, and more

A photograph of a large white wind turbine against a clear blue sky.

Registered charity - to disseminate accurate, scientific, knowledge about energy to wider society

A logo for 'tripod' featuring a yellow triangle with three dots at its vertices and the word 'tripod' in red lowercase letters to its left.

tripod

Industry has improved by at least an order of magnitude

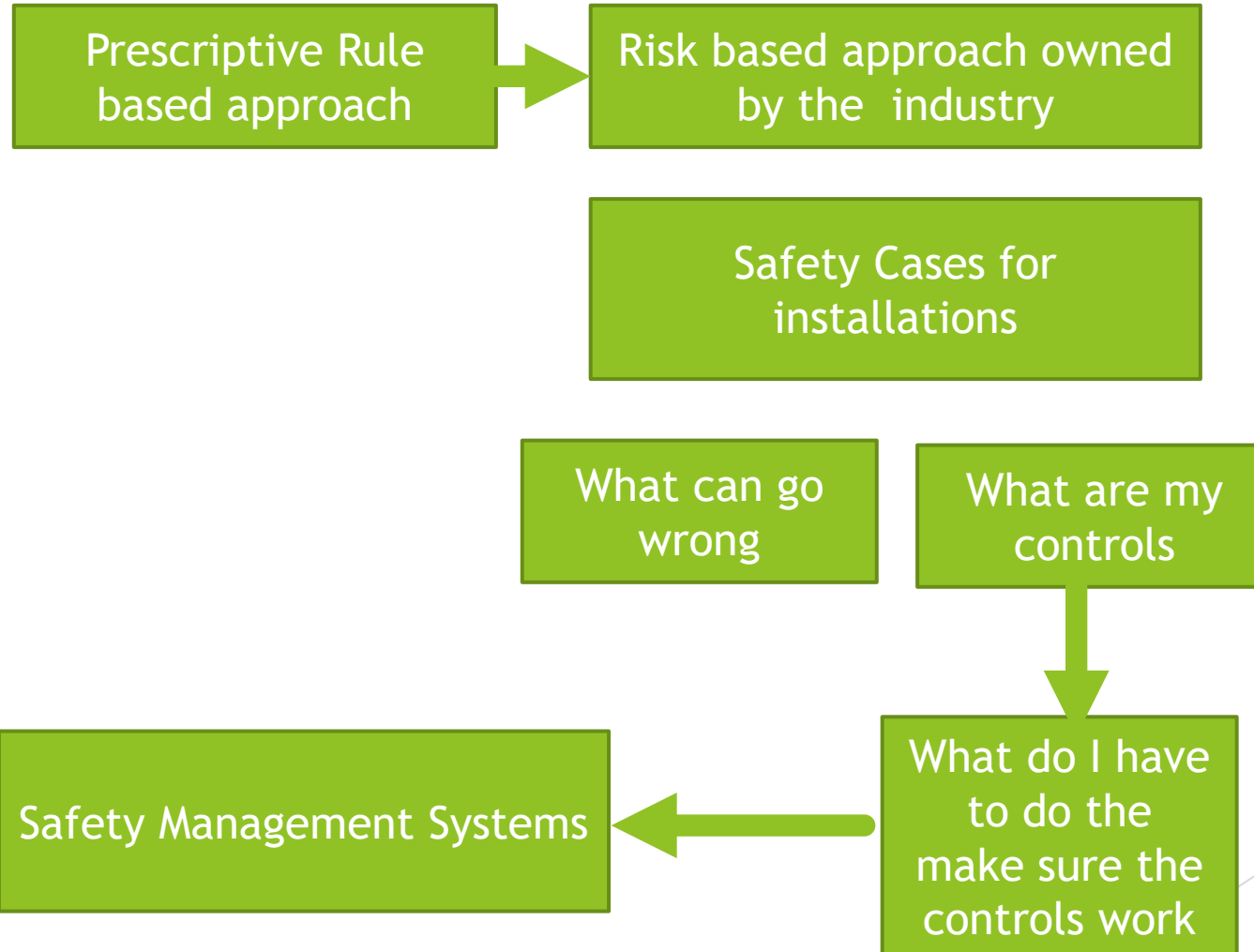


Year	
1974	Flixborough
1976	Seveso
1978	Carrington UK
1979	Three-mile Island
1980	Alexander Keiland
1984	Bhopal
1986	Challenger
1986	Chernobyl
1987	Herald of Free Enterprise
1988	Piper Alpha
1989	Exxon Valdez
15 years 10 Major incidents one every 1.5 years	



What changed in the 1980's

Flixborough 74, Seveso 76, Alexander Keiland 80 and Piper Alpha in 88

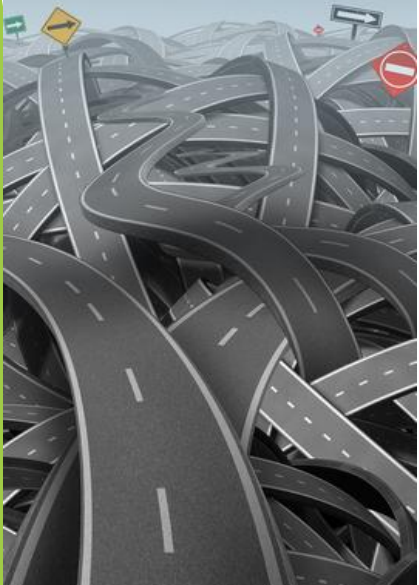


Our first safety cases in the 80's & 90's



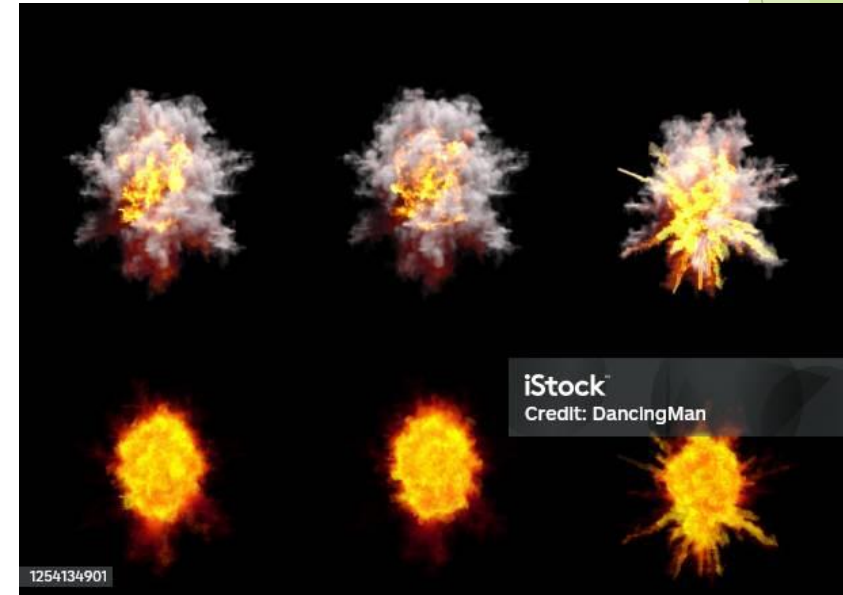
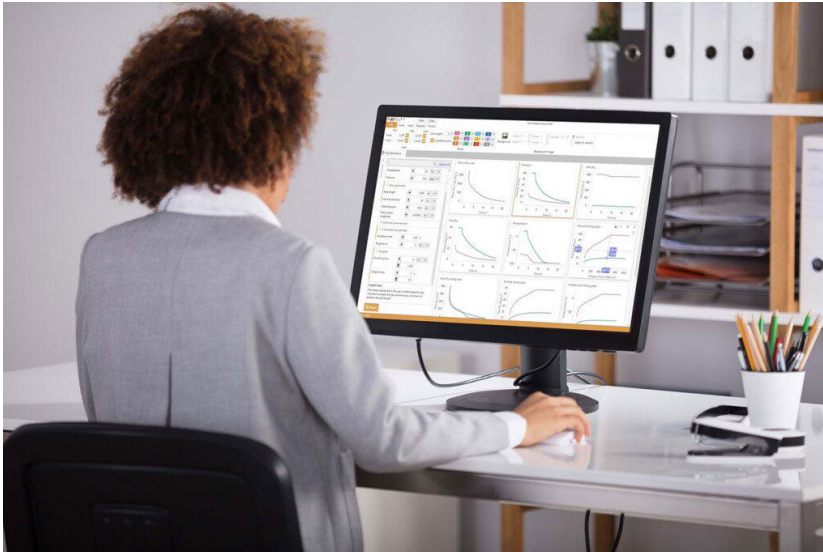
Detailed analysis
Complex terms
Written rather than pictorial
Only understood by NERDs
Great for propping open fire doors

Seems simple question
What can go wrong?
How do I control it ?
What do I need to do to make sure the controls work?

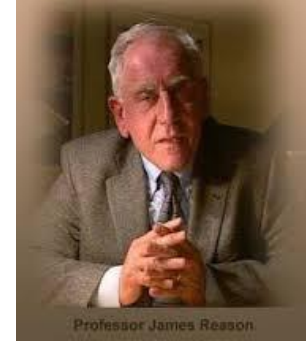
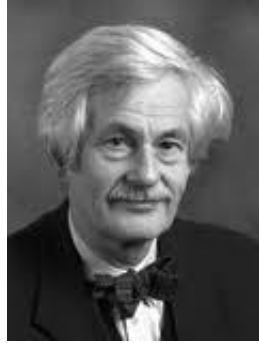


Research into Fire and Explosion into modelling 1985-?

- ▶ Shell's fire and explosion modelling tool is primarily **Shell FRED (Fire, Release, Explosion, and Dispersion)**, a powerful consequence modelling software developed by Shell and Gexcon to predict hazards from accidental releases in high-risk industries, offering advanced thermodynamic models, dispersion, fire, and explosion simulations for safety assessment, emergency planning, and risk management. It's used globally and provides detailed visual outputs for clear communication of risks.



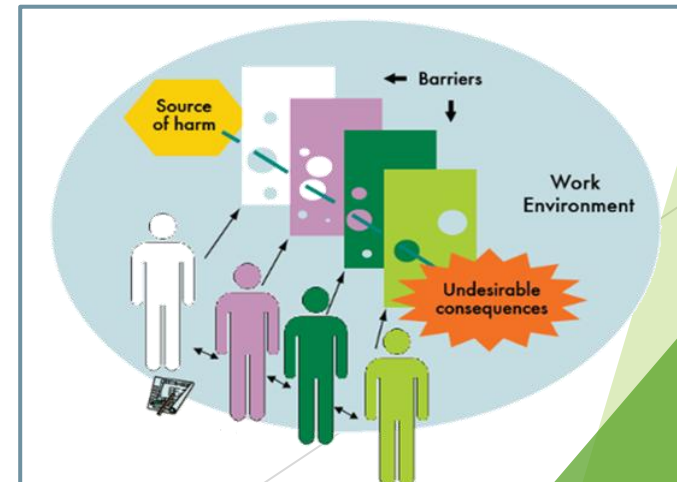
Shell research programme late 1980's and early 90's



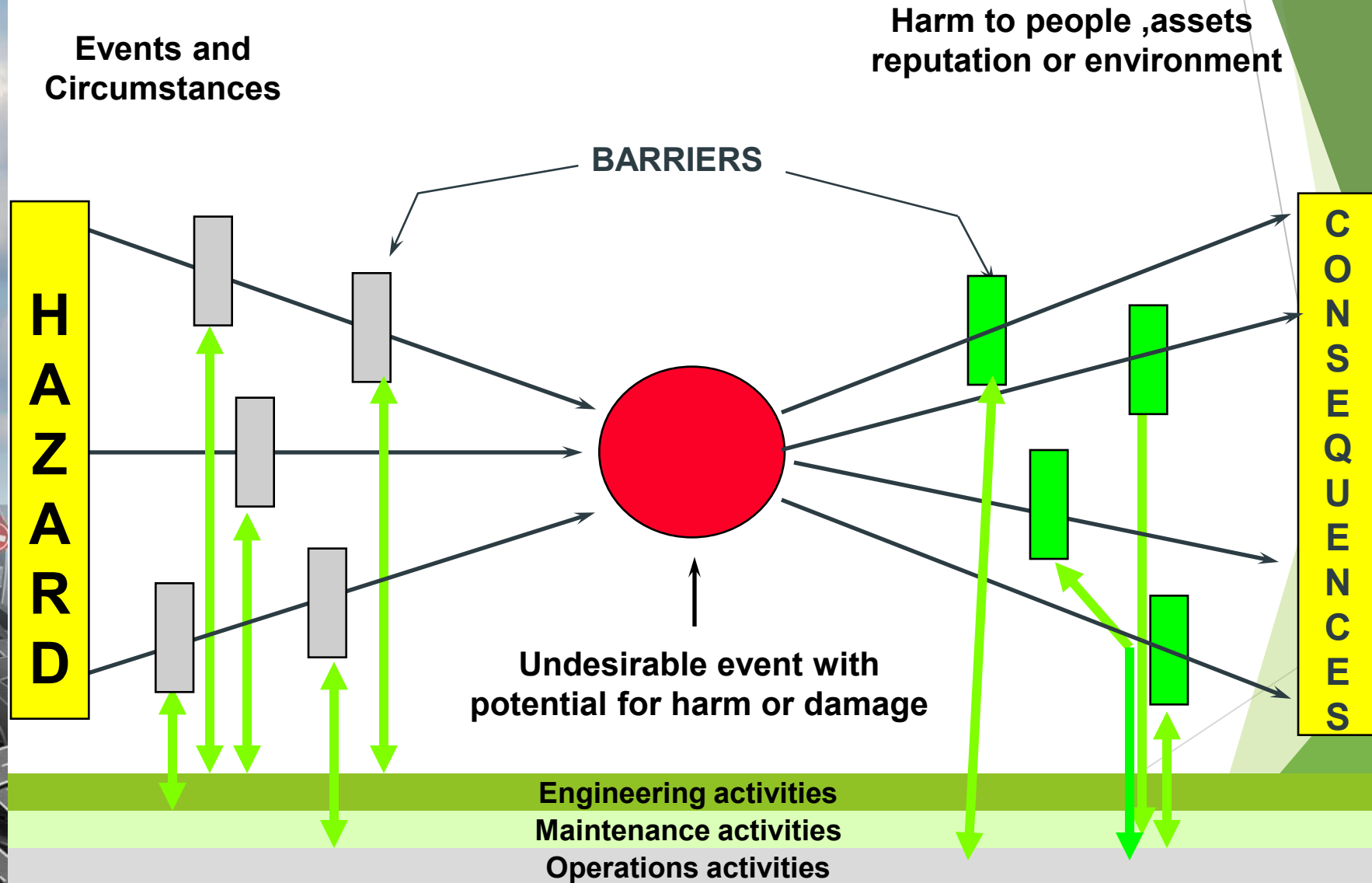
Universiteit Leiden



- People are good people
- If they fail it is due to the environment, we place them in
- The factors that create that environment are in place long before the barrier failure occurs



Bow-tie Concept



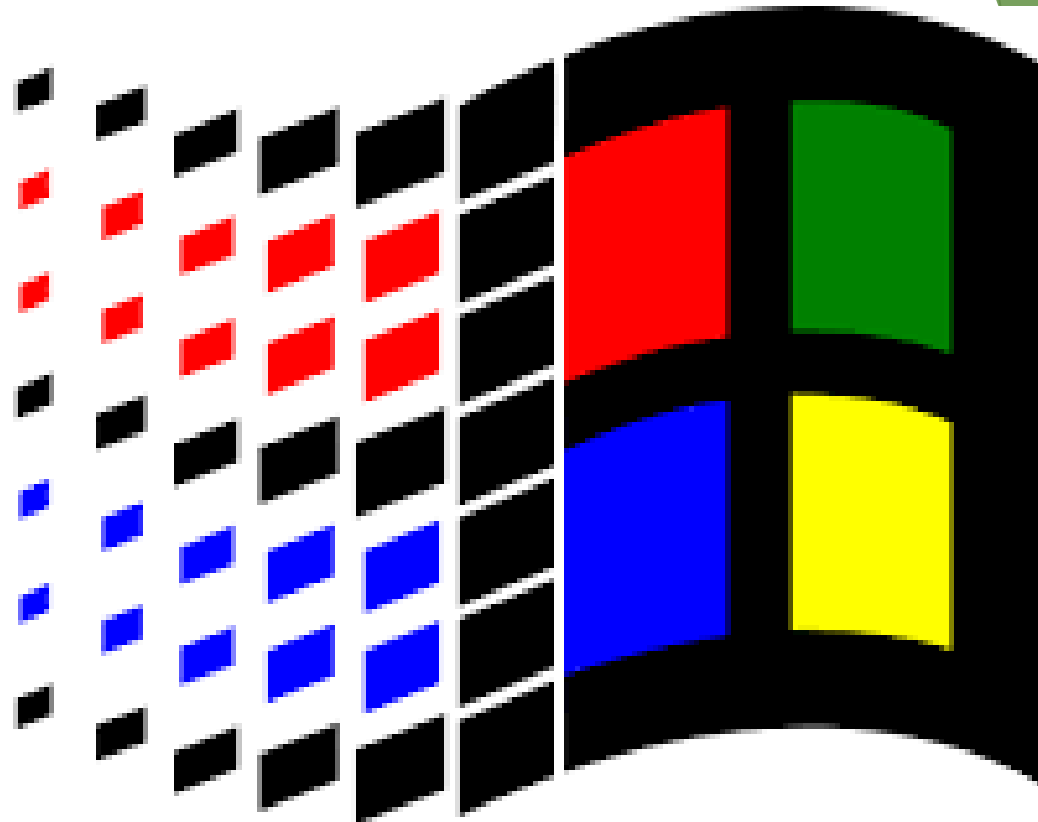
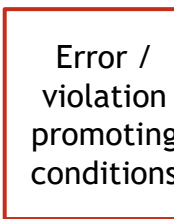


Tripod Barrier

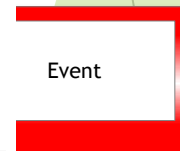
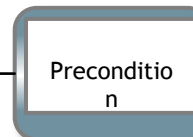
Underlying causes

Precondition

Causes



Accidents,
incidents and
business



MICROSOFT WINDOWS

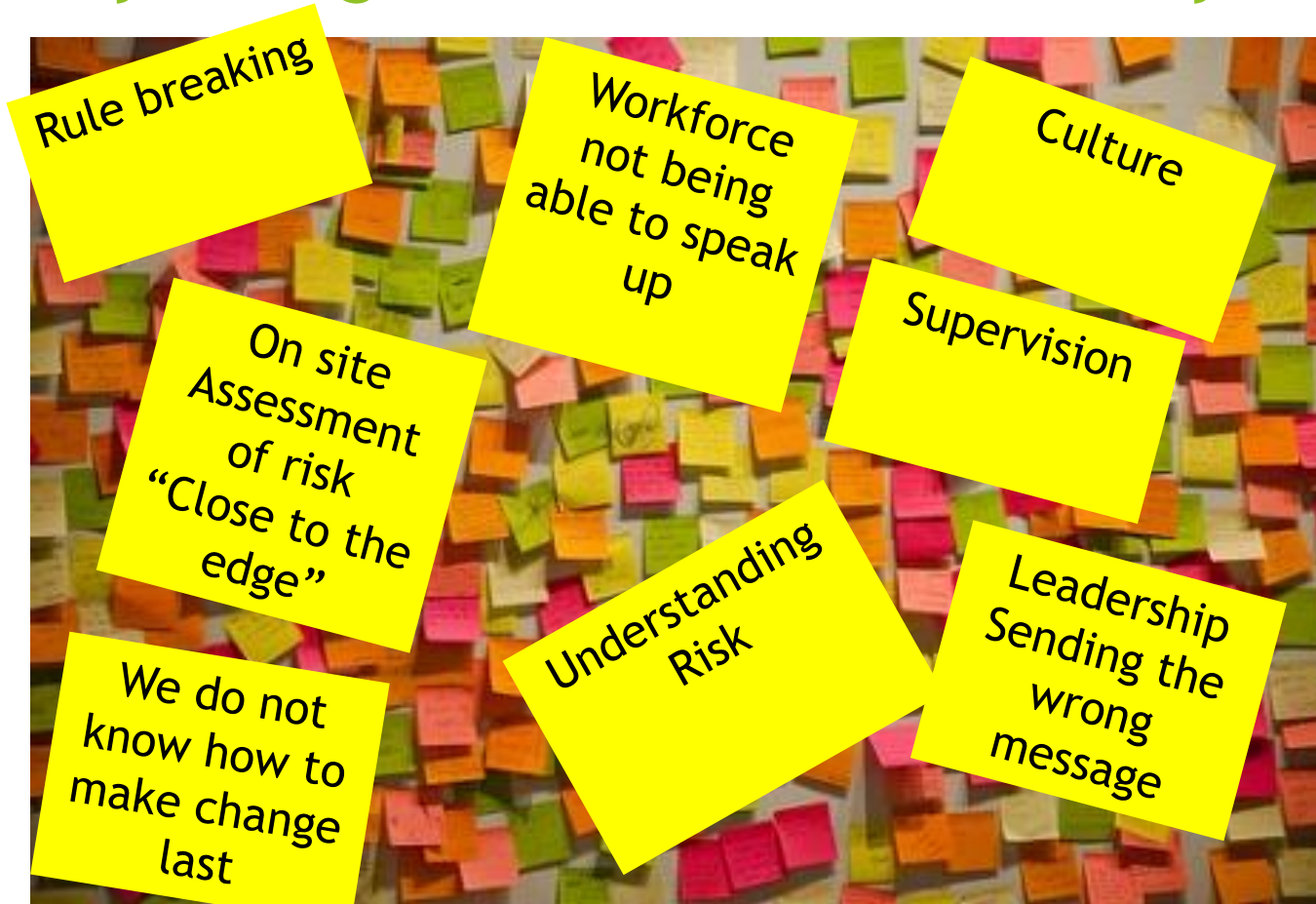
April 1992



By the mid 1990's the Oil & Gas Industry

- ▶ Understood the risks
- ▶ Knew how to control it
- ▶ Had documented this in Safety Case's
- ▶ Understood what it had to do to maintain safe operations.
- ▶ **Was still having serious & fatal accidents**

Maybe engineers do not know everything?



Creating an environment where people instinctively do the right thing



Universiteit Leiden

MANCHESTER
1824

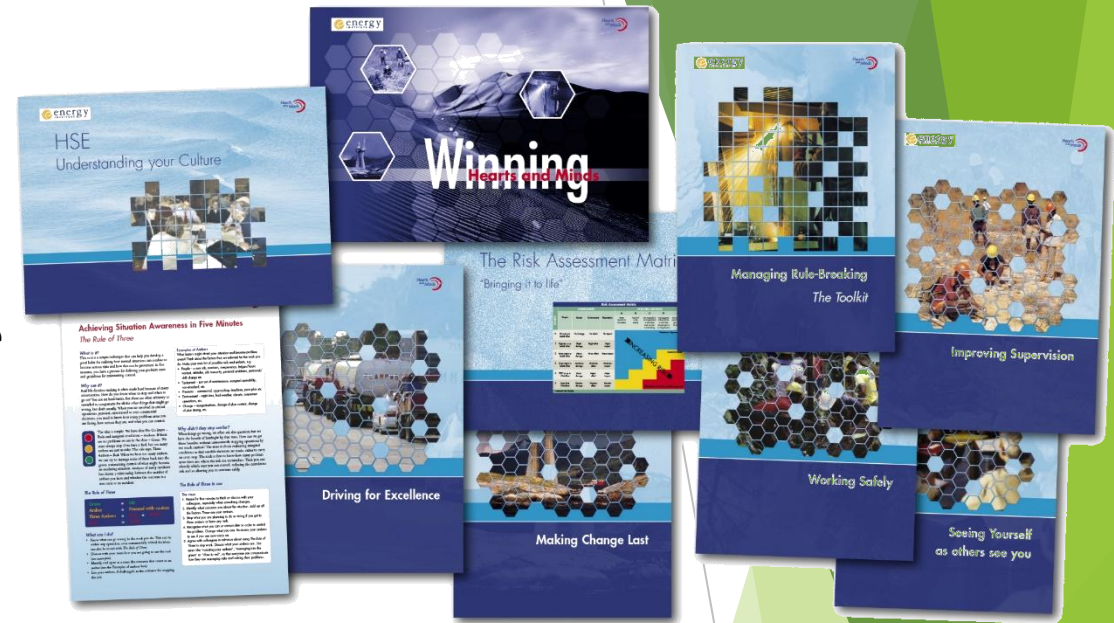
The University of Manchester

The Hearts and Minds Toolkit 1996-2004

- All of these issues have a part to play
- Different issues may play a part at different times
- There is no one silver bullet that will solve all of these issues
- Each one can be tackled if we understand why it is happening
- We need to develop interventions that tackle each issue

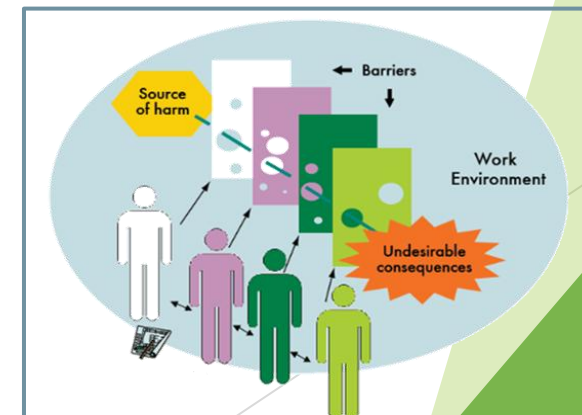
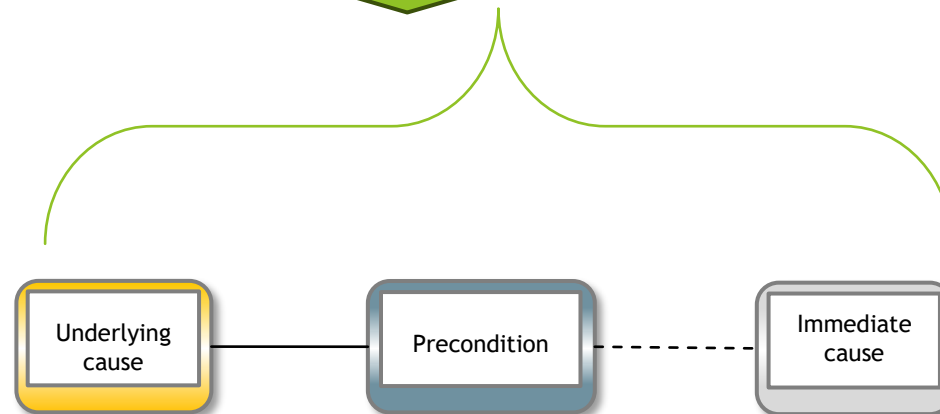
Each intervention needs to:

- Be based on solid academic research and sound theory
- Have a diagnostic that identifies issues
- Have a debate about the issues and potential solutions
- Develop actions that the group can control and implement
- Be able to be run by a non expert who can read the material and run the intervention
- Have an element of fun in it
- Work in different cultures



Focus of research since then

Tools, Techniques, applications to help us manage to and influence the environment that we operate in to maintain barriers and controls.



The lifesaving rules 2005-2010

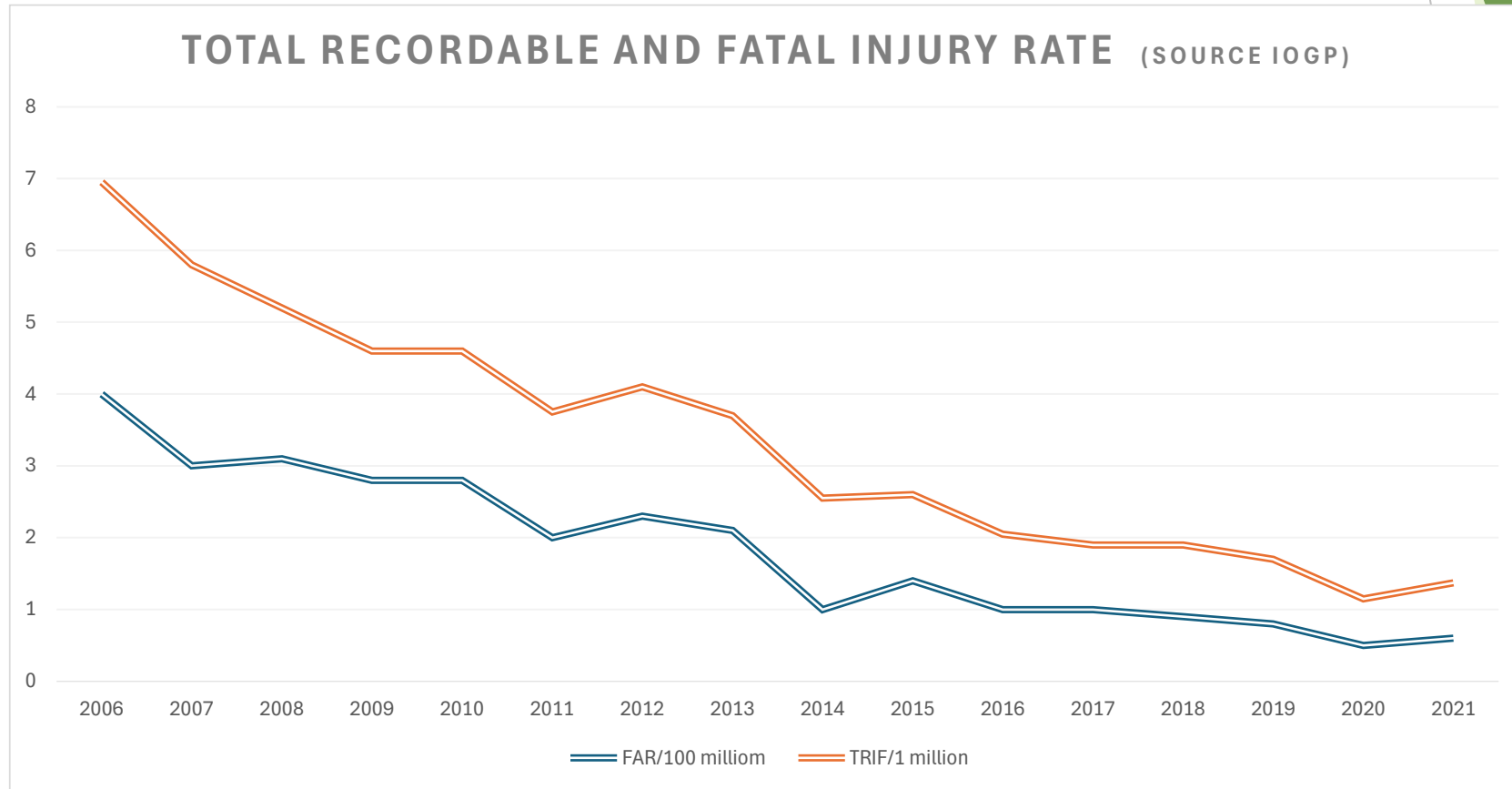
Live Saving rules

- Shell reviewed a large number of fatal accidents (1991-2010) using the Tripod Barrier based
- They found that 8 core barriers were involved in some 40% of fatal accidents
- A further 10 covered 75%
- They developed core and supplemental live saving rules that are well known
- They saw a 70% drop in fatal accidents
- In 2015 IOGP data shows that if the live saving rules were 100 effective 73% of global fatalities would be prevented

Life-Saving Rules



Global Oil & Gas Fatal accident rates (last 18 years)

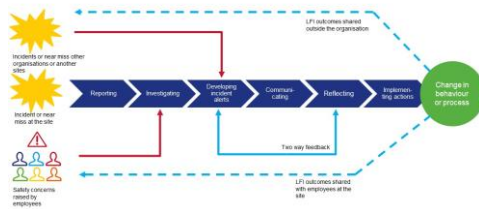


Source IOGP safety data report

A graphic titled "PROCESS SAFETY FUNDAMENTALS" in large, bold, black capital letters. Below the title is a horizontal row of ten yellow squares. To the right of the squares is a 2x5 grid of ten yellow squares, each containing a black icon representing a process safety concept. The background of the entire graphic is a faded image of a worker in a white protective suit and helmet.

- They are complementary to the organization's Life-Saving Rules, but focus specifically on process safety rather than personal safety incidents.
- The PSF concept originated within Shell and was developed from around 2014 before being adopted and published by the IOGP.

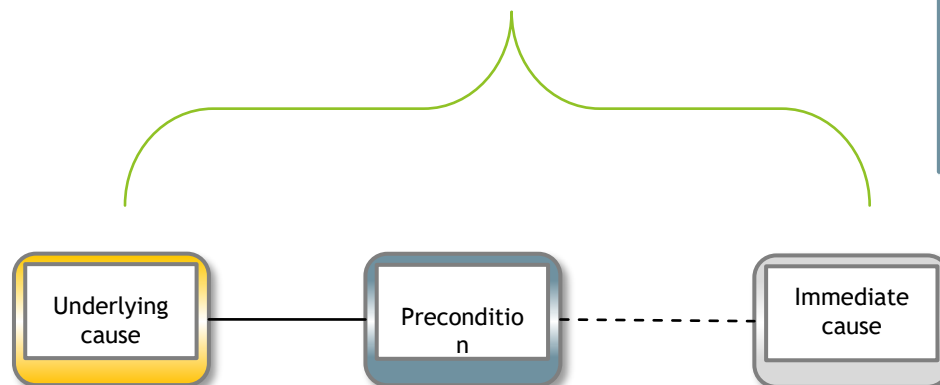
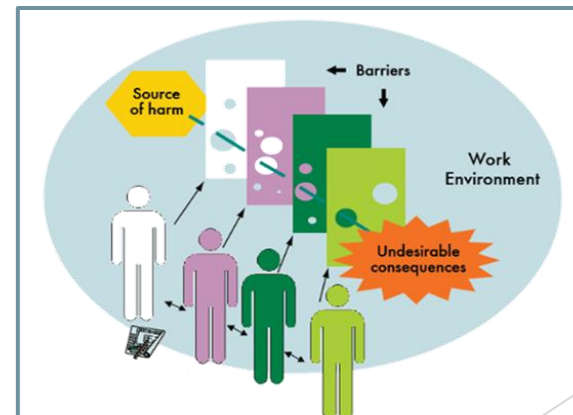
Learning from incidents 2014 to 2020



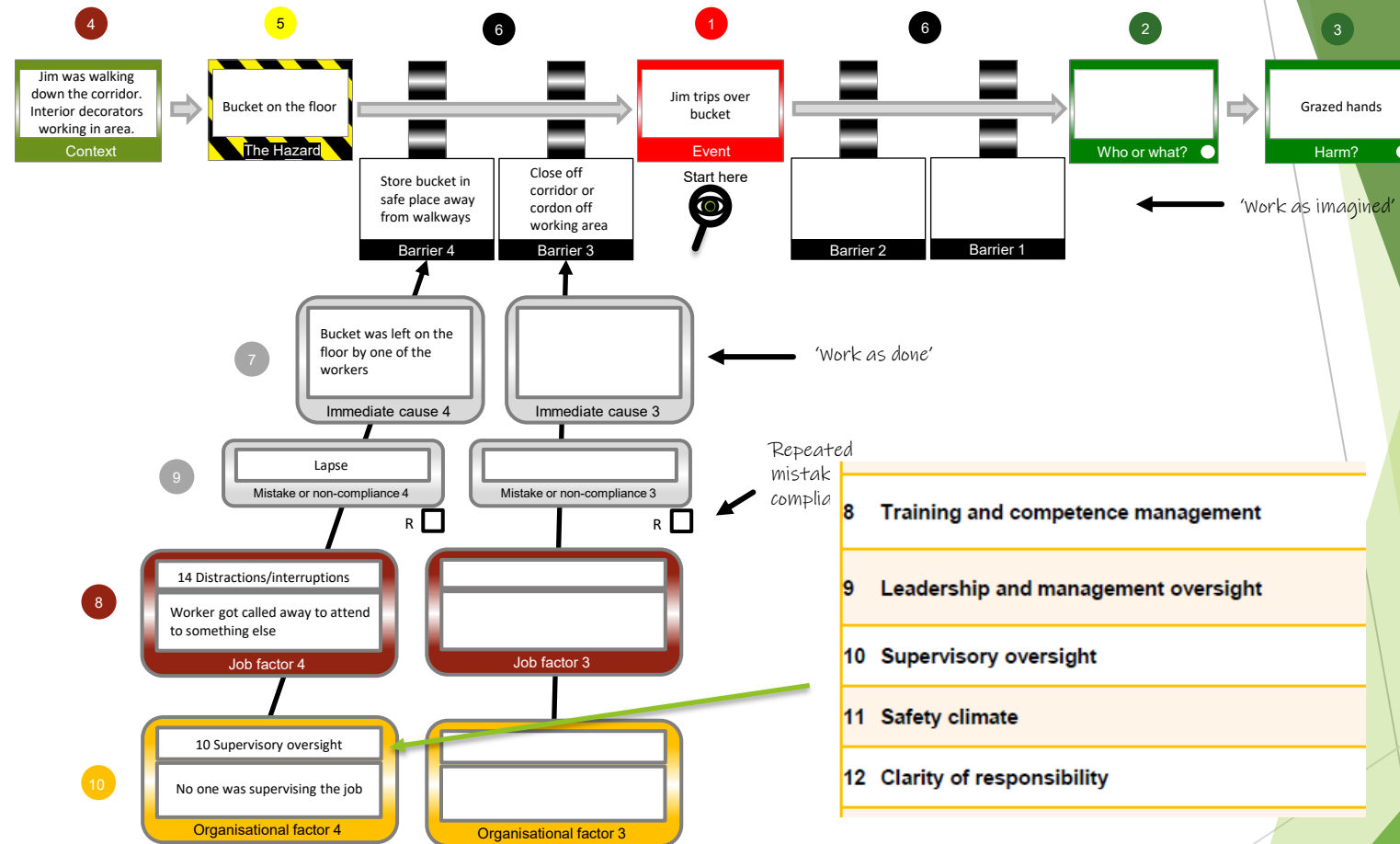
Tripod Lite 2023

Learning From Incident Guide EI & STF 2016

Investigation insights guide STF 2019/20



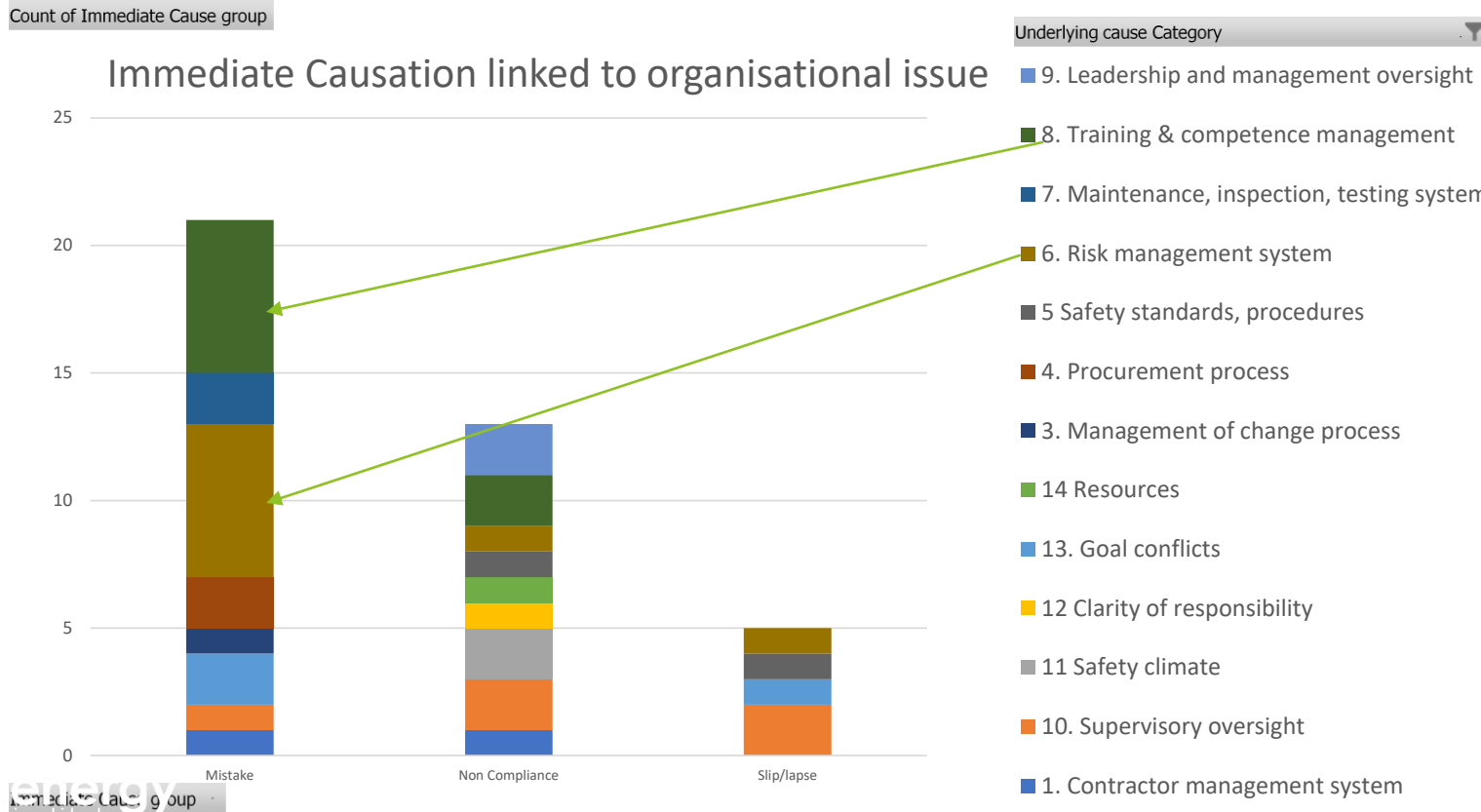
Tripod Lite



Why it happened

Tripod Lite

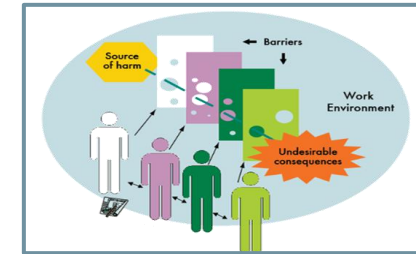
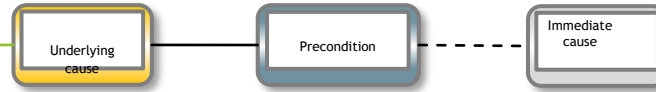
► Correlation of causation



My Challenge to this community

Tools, Techniques, applications to help us manage to and influence the environment that we operate in to maintain barriers and controls.

Fallible
Management
Decisions



Creating an environment where people instinctively do the right thing

Focus on Leadership how do we create an environment where leaders instinctively do the right thing



Challenge to this community

How can we change the C suite environment

What gets measured gets managed “ Peter Drucker, 1955”

“What gets measured gets managed — even when it’s pointless to measure and manage it, and even if it harms the purpose of the organisation to do so”. V. F. Ridgway 1956

"There's a risk that trusts will focus only on the measures that immediately boost their ranking, even if it's not necessarily best for patients,"

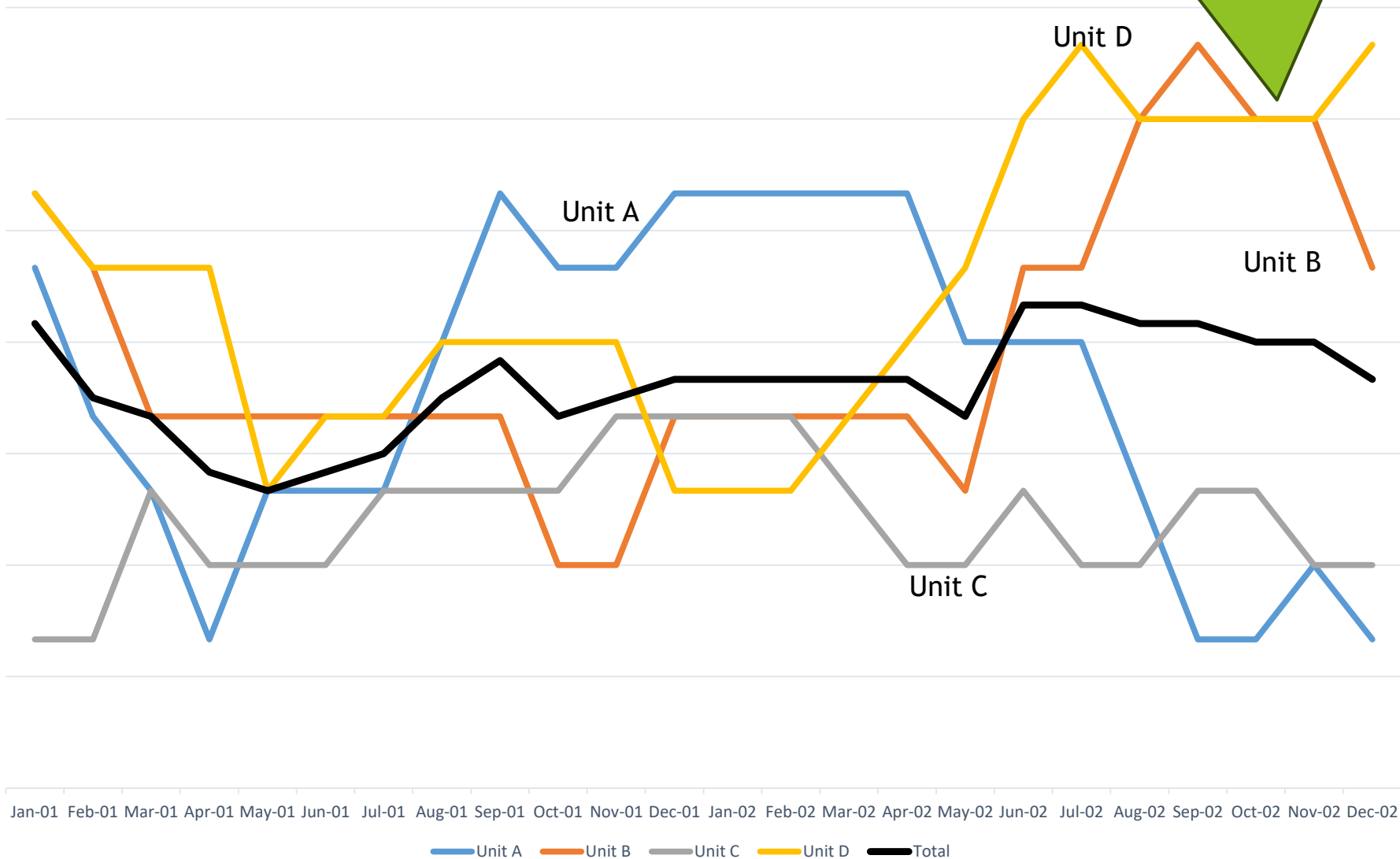
Nuffield Trust CEO on the 2025 publication of hospital league tables in the UK

- ▶ Improvements to organisations come from
- ▶ Leaders looking at *Data*
- ▶ Having discussion
- ▶ Creating plans and actions from that *Data*

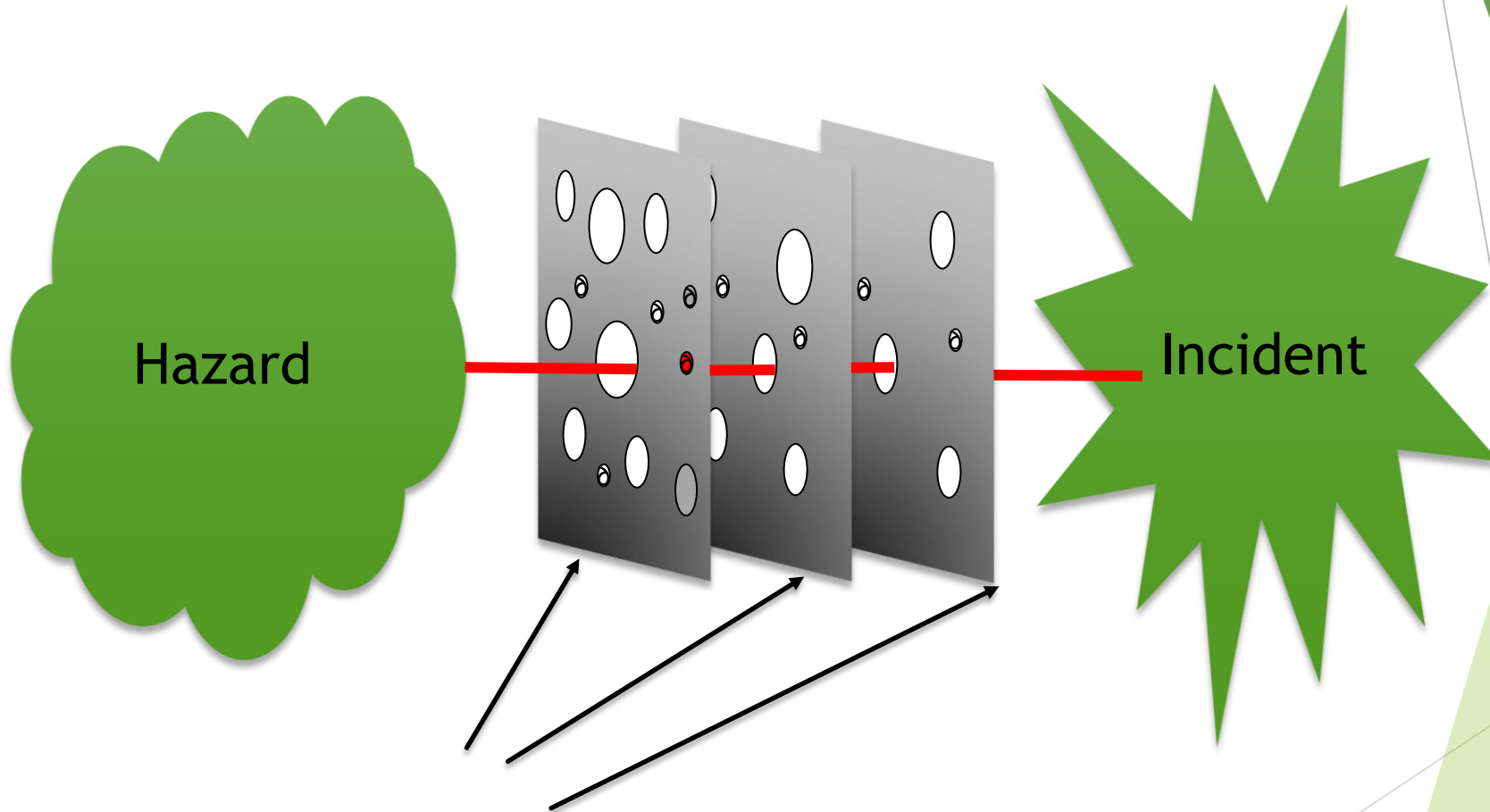
How should we measure safety?

Let's image the conversation?

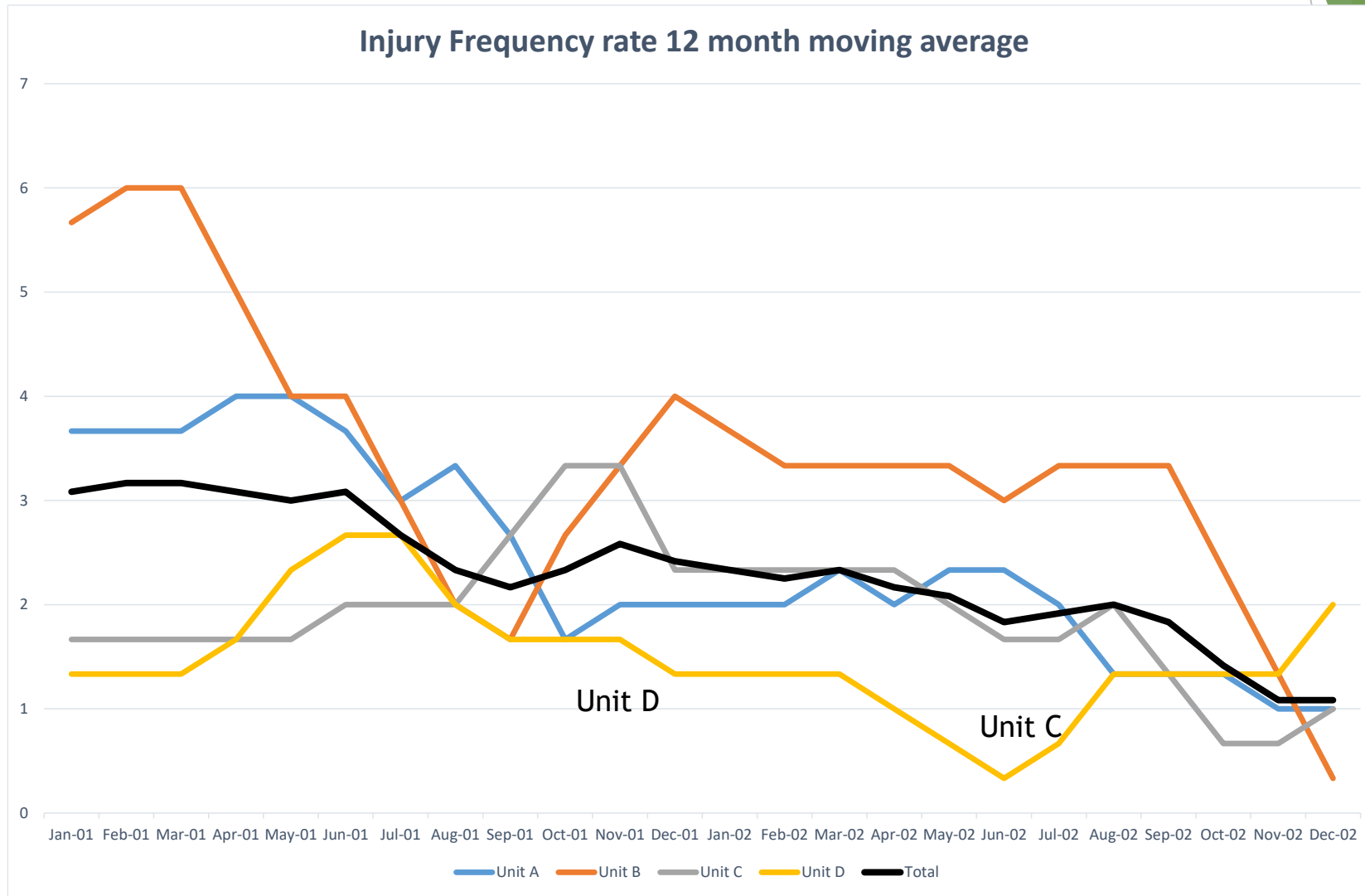
Injury Frequency rate 12 month moving average



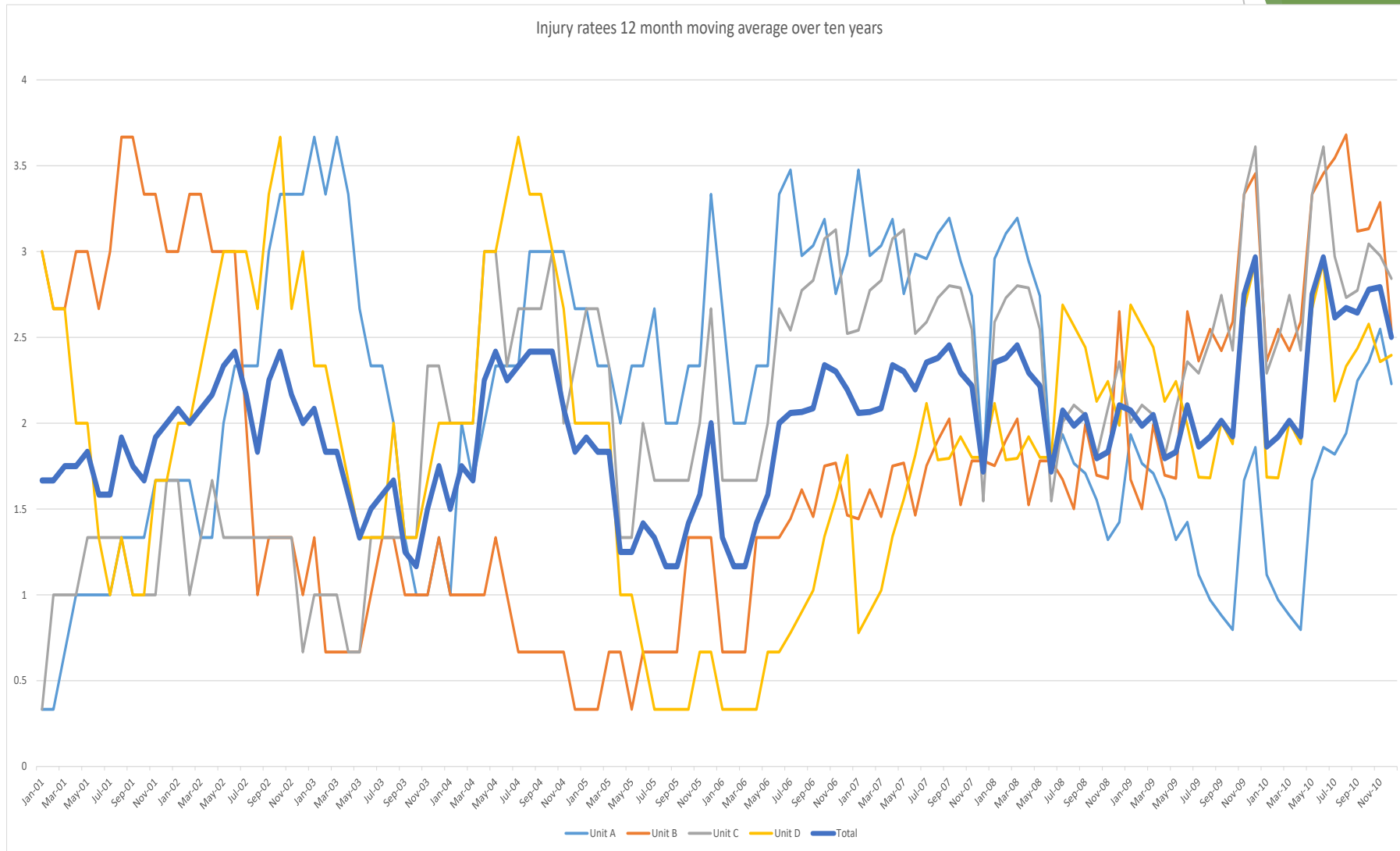
Jim Reason's Swiss Cheese Model



Reliability of barriers Reliability > Random
number barrier works

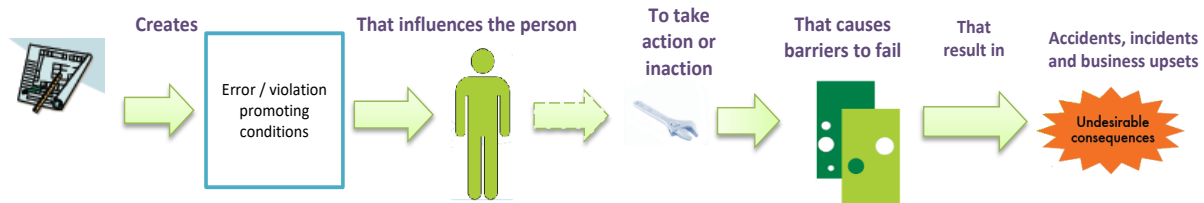
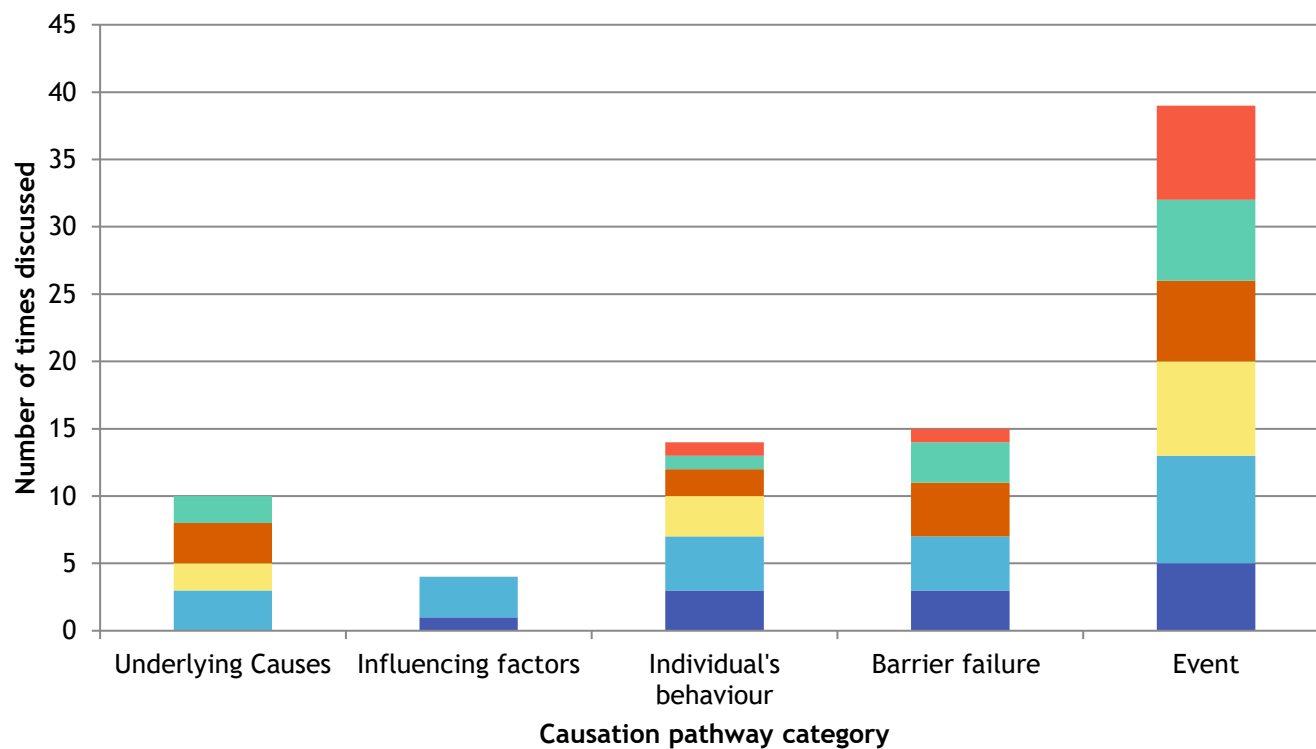


Press f9 and get a different result



20-30 Injuries per year and 12 million hours worked per year

Conversations about safety in leadership meetings

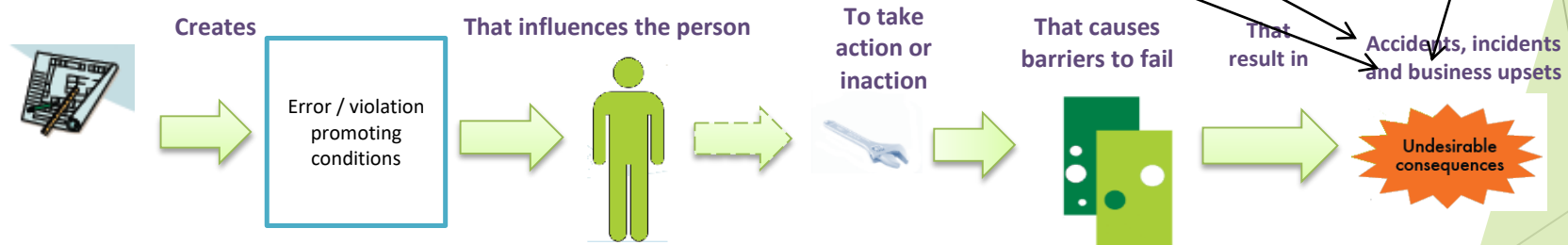


A man in a blue suit is hanging from a red hot air balloon basket. The balloon is large and red, with vertical stripes. The man is holding onto the basket with both hands. The background is a blue sky with white clouds.

May-15	GLENS	LID	LINCOS	Grimshy Base	Total
		O&M			
High Potential Events	0	0	0	0	0
Major	0	0	0	0	0
Significant	0	0	0	0	0
Important	0	0	1	0	1
Minor	0	0	3	3	6
Near Miss	1	1	5	1	8
LTIs	0	0	1	0	1
Reportable	0	0	1	0	1
Unsafe Items	4	35	115	16	180
Safe Items	4	24	14	15	88
Open Actions	1	32	36	37	106
Overdue Actions	0	1	3	7	6
Actions closed in month	6	22	37	32	97
Open Investigations	0	0	3	1	4
Overdue Investigations (Over 1 Month)	0	0	0	0	0

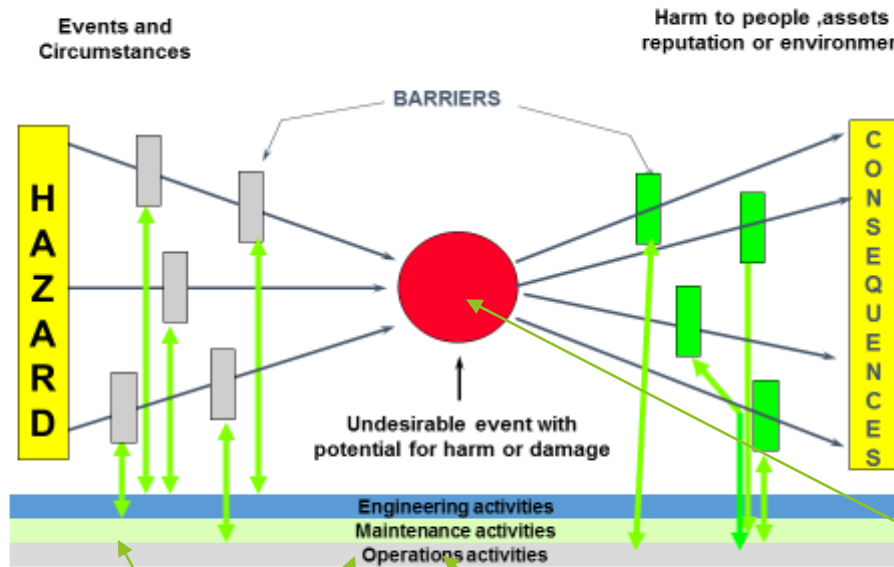
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	May 2001		FY0 2001		FY 2001	
People	Actual	Plan	Actual	Plan	Actual	Plan
Last time injuries (month) / LTIF (YTD)	0	0	0.09	0.07	0.09	0.07
Recordable Incidents (month) / TRIF	0	0	0.47	0.16	0.28	0.16
Tier 1 events	0	0	0			
Tier 2 events	1		2			
Near Misses	10		41			
HIPs	0	0	2	0	2	0
PSPI Redo	2	0				
Mindfulness Safety Contacts	30		169			
Environmental						
Reportable Hydrocarbon leaks	2	0	3	0	3	0
Breaches and Non Conformance	0	0	8	0	8	0

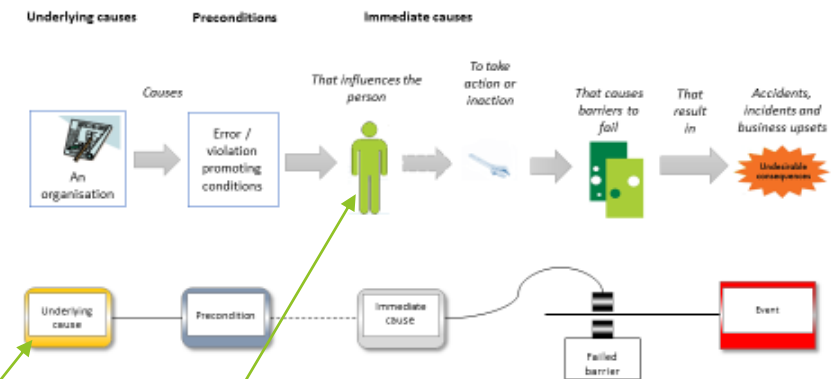


What could we measure?

Phase 2 Understanding risk and control Bow-tie Concept



Tripod Incident Causation Model



Completion of
safety critical
activities

Management
activities and
behaviours

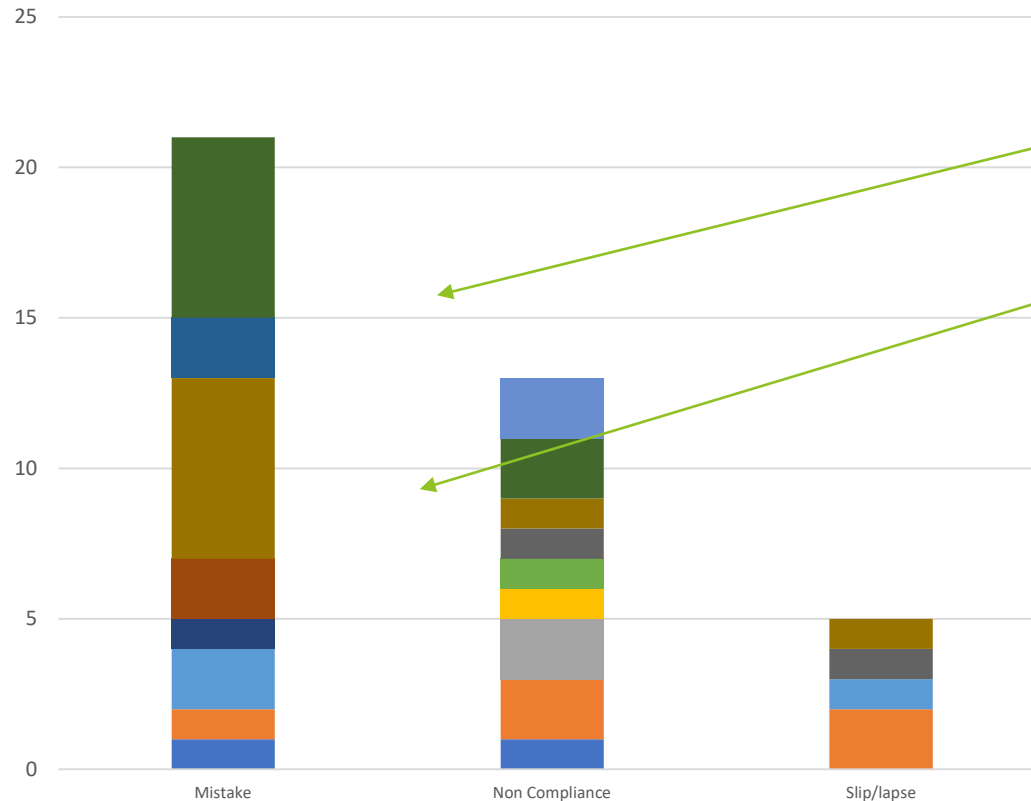
Classification
of Human
Error

Barrier
reliability

► Correlation of causation

Count of Immediate Cause group

Immediate Causation linked to organisational issue



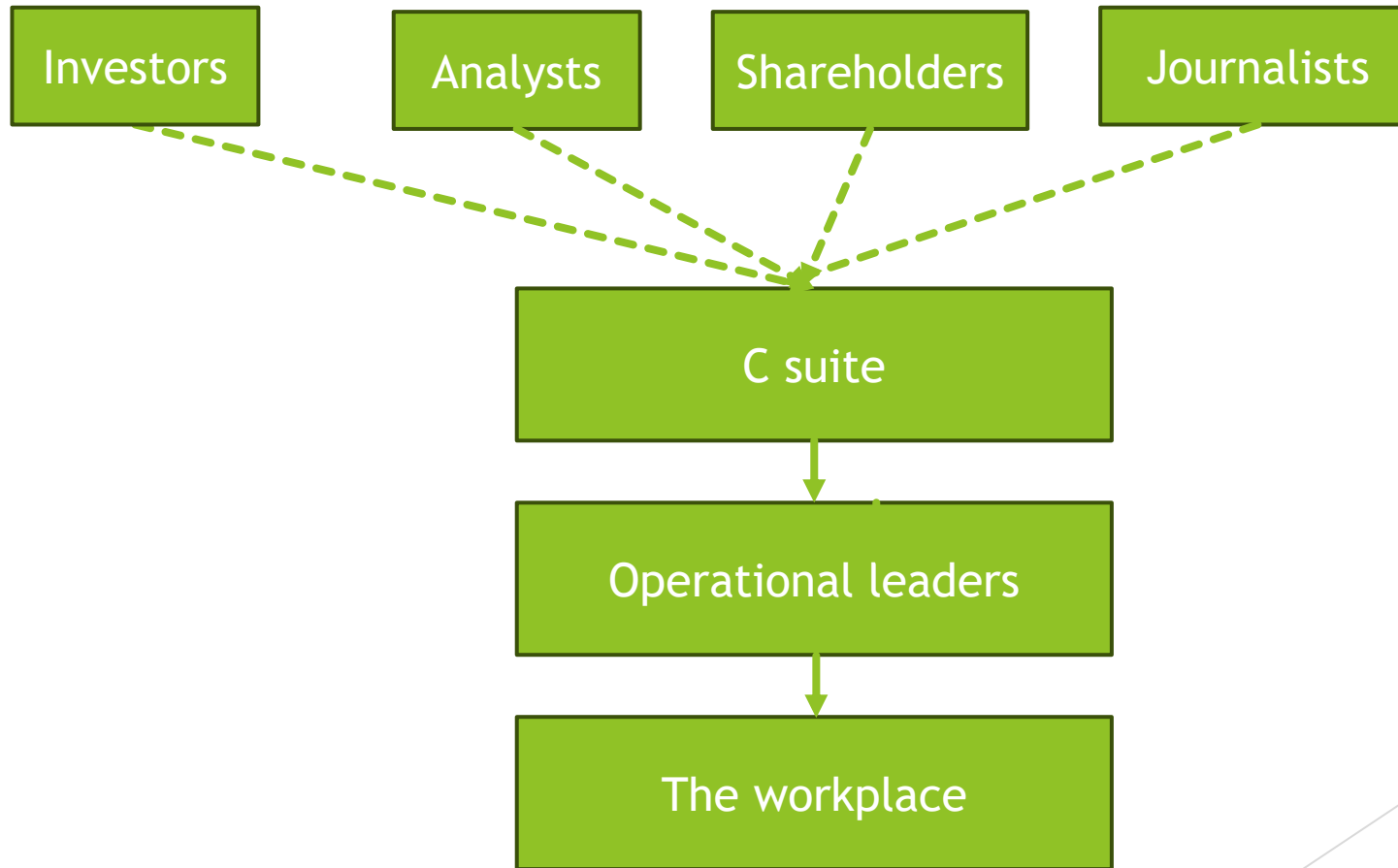
Immediate Cause group

Underlying cause Category

- 9. Leadership and management oversight
- 8. Training & competence management
- 7. Maintenance, inspection, testing system
- 6. Risk management system
- 5. Safety standards, procedures
- 4. Procurement process
- 3. Management of change process
- 14. Resources
- 13. Goal conflicts
- 12. Clarity of responsibility
- 11. Safety climate
- 10. Supervisory oversight
- 1. Contractor management system



Why we need to rethink how we measure safety

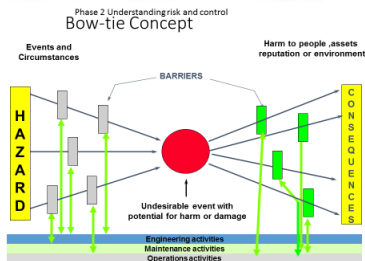
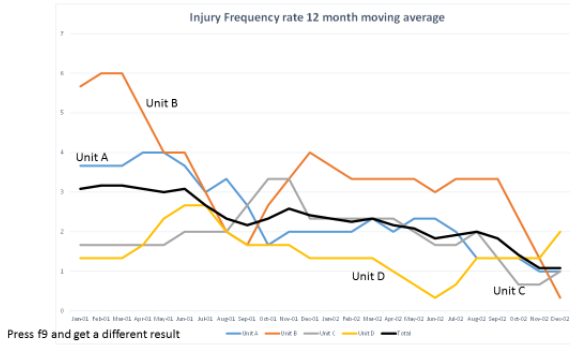


Challenges to change behaviour at the C suite level

- What would a good conversation look like
 - Board meetings
 - CEO/CFO to analysts/ key investors
 - At an AGM
- What information do we need to provide to support those conversations?

Conclusions

- Celebrate the amazing success we have achieved in both people and process safety
- Start researching what a good conversation would look like at different levels at different levels
- Use our understanding of accident causation to generate new measures to create encourage and support positive conversations



Tripod Incident Causation Model

