

# **The Nut Behind The Wheel**

**... the Future with Human Error**





**“Man is a creature made at the end of the week when God was tired”.**

**Mark Twain**

**“If you don't manage human error - human error will manage you !”**

**James Reason**

# Why an Issue ?

- **Human error DIRECT contributor to 80 – 90 percent of accidents**
- **If you consider full life cycle of equipment then:**
  - **Human error can probably be found in ALL accidents**
- **SO – IT MUST BE RECOGNISED AND ADDRESSED**

# **There is One Certainty !**

**Human Beings  
WILL  
Make Errors**



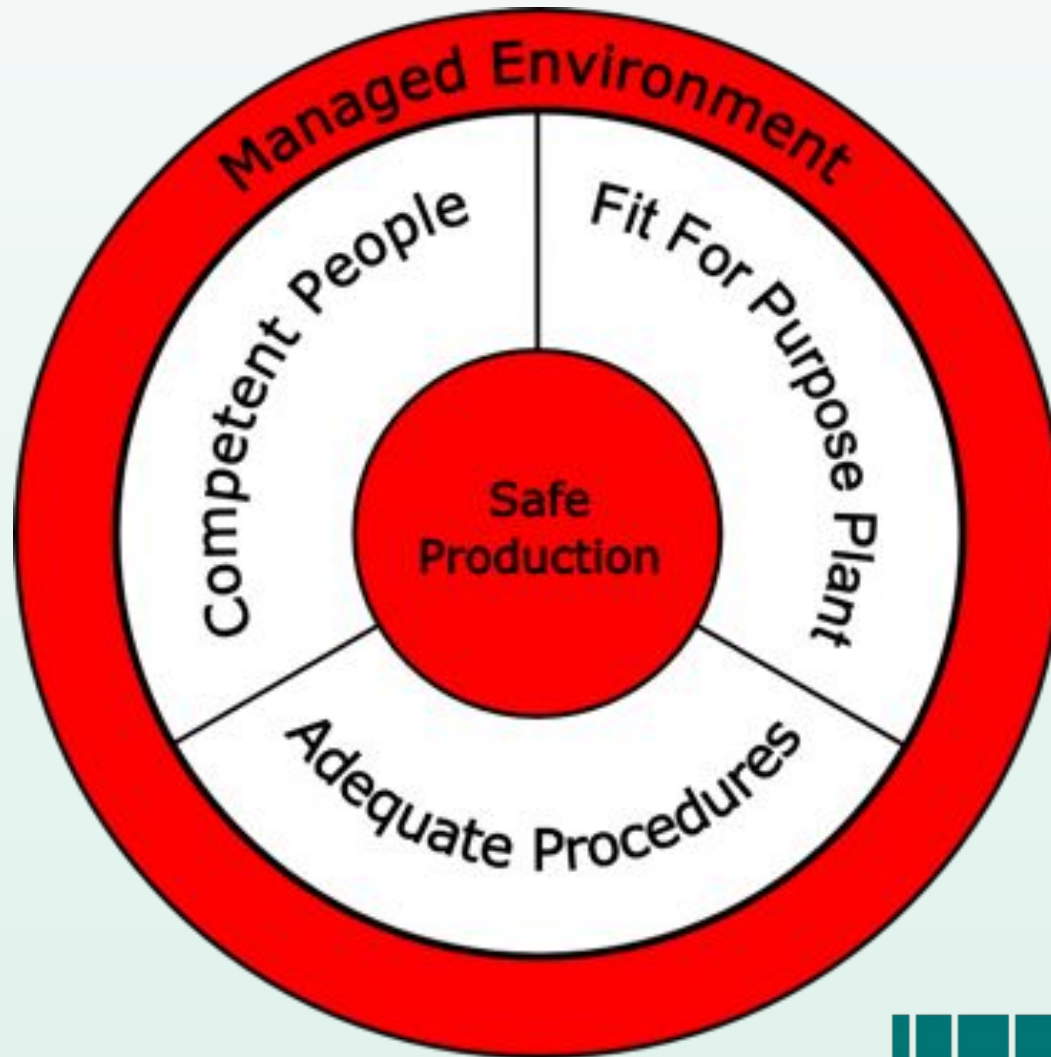
# What Can Be Done ?

**Design systems so that:**

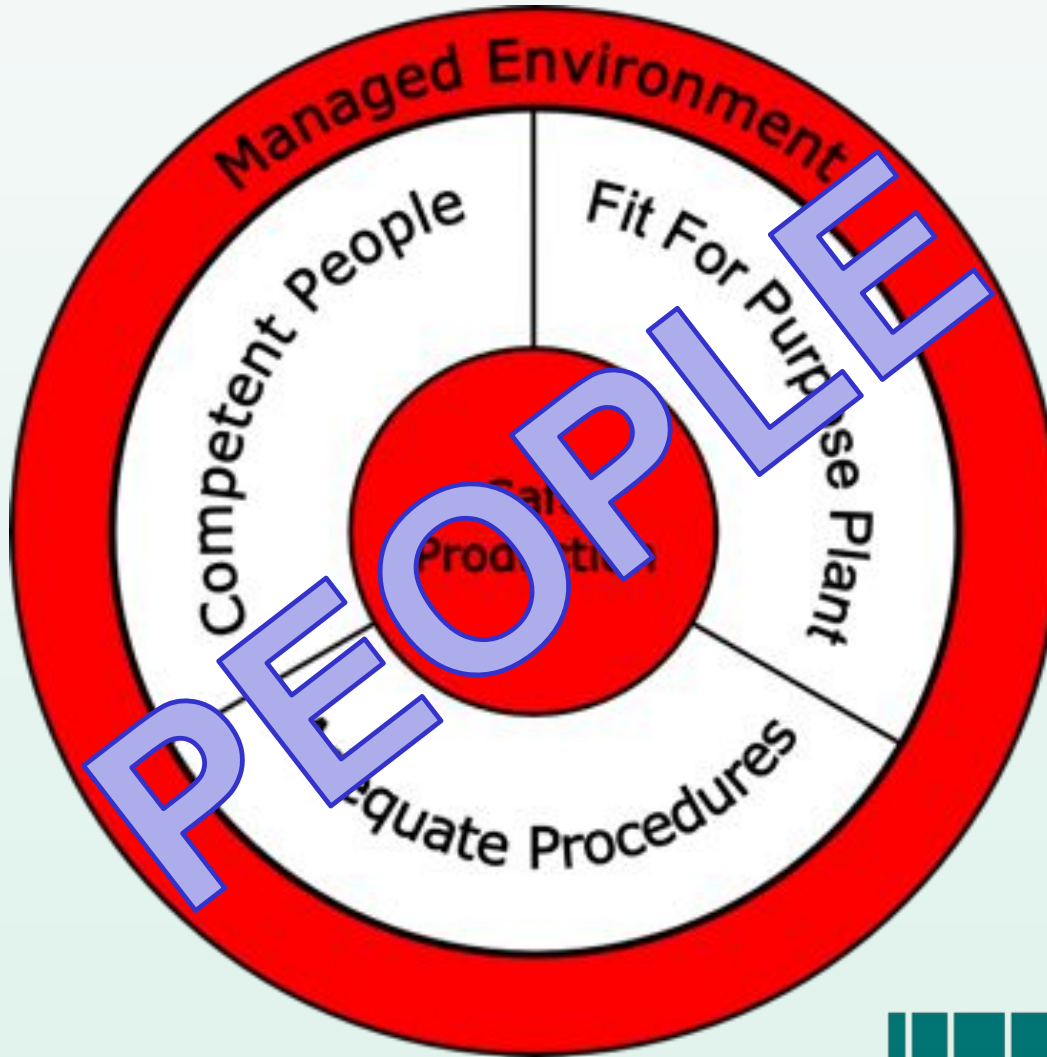
- the likelihood of human error is minimised, and**
- the consequence of human error is reduced**

**Or – manage the risk arising from humans !!!**

# Human Factors?



# Human Factors?



# Human Error Types

## SLIP/LAPSE

Not deliberate (didn't intend to do it)

Slip – usually physical – e.g. trip, wrong movement in sequence

Lapse – usually mental – e.g. distracted

## MISTAKE

Deliberate (intended to do it)

But 'wrong' in the circumstances

## VIOLATION

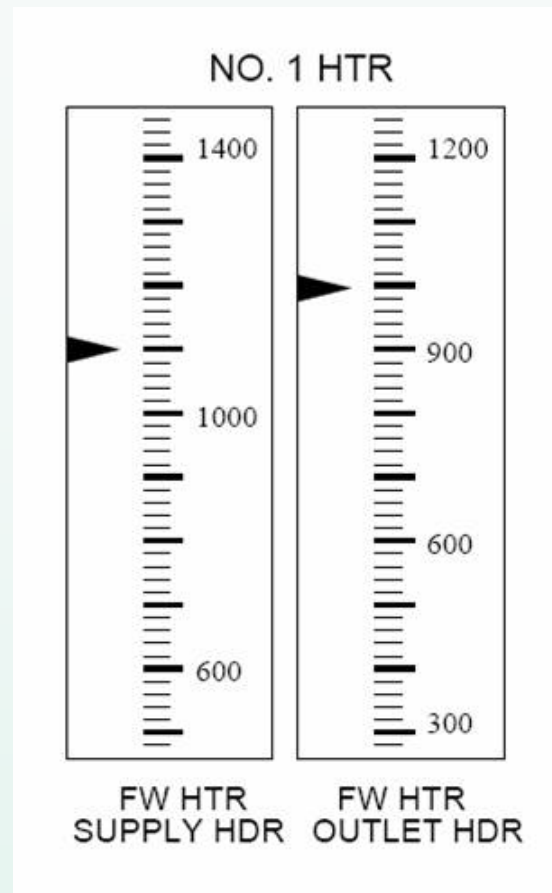
Deliberate

Bending or breaking the 'Rules'

# Slip / Lapse

## UNINTENTIONAL error:

- **SLIP** – physical error (slip / trip)
- **LAPSE** – mental error (miss sign, misread gauge)



**Which is the higher reading?  
Left or right?**

# Responses to Slip / Lapses

## WORK and WORKPLACE DESIGN:

- human factors
- 'error forgiving' controls
- e.g AS4024.1 "Safety of Machinery"

**NOTE: 'Training' is unlikely to be effective to prevent this type of error**

# Mistake

## **INTENTIONAL error:**

- **Incorrect in the circumstances**
- **May have been correct in other circumstances**

# Responses to Mistakes

- Adequate procedures (SWP's, JI's)
- Training
- Supervision
- Hazard awareness
- Situation awareness

# Violation

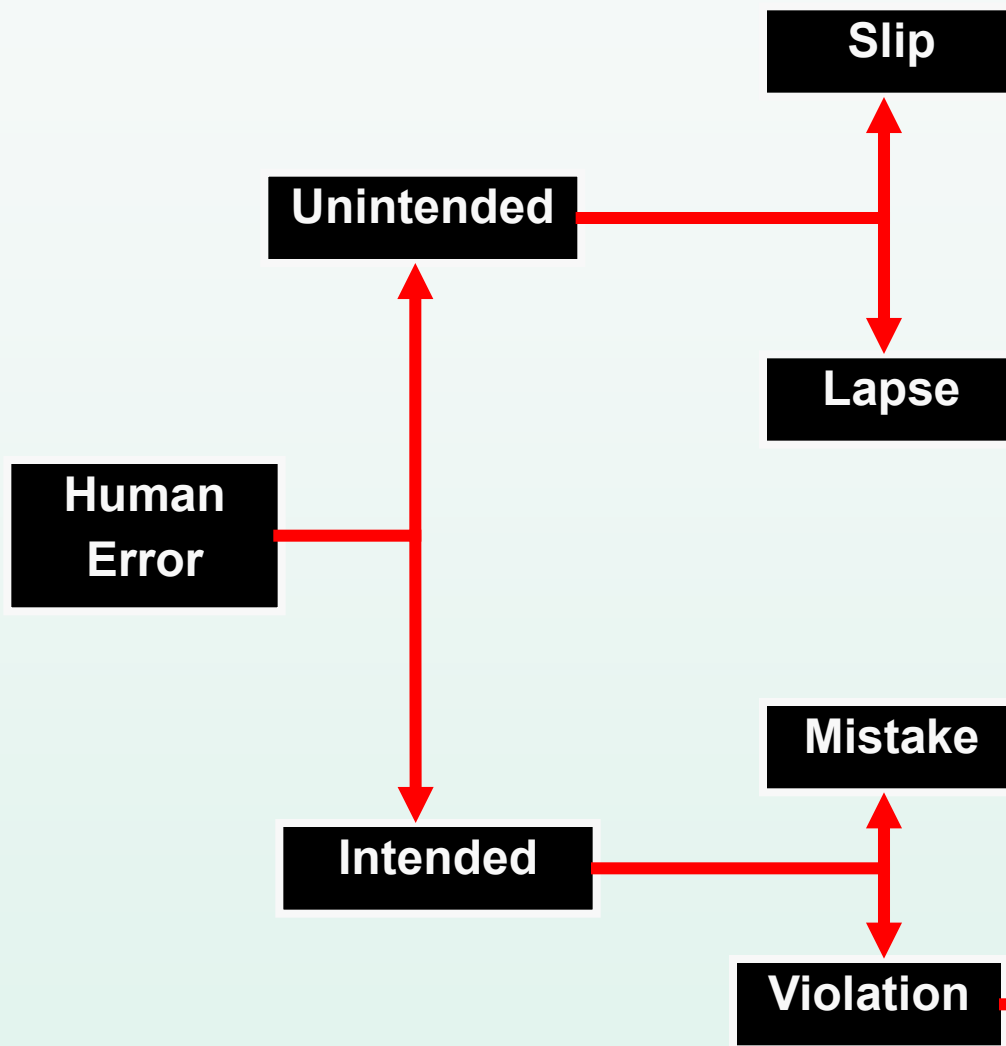
## INTENTIONAL error:

- bending or breaking 'rules'
- an important indicator of 'culture'

# Responses to Violations

These are **EVERYBODY'S** problem

- Aid people to understand the true risk
- Reduce inappropriate peer pressure
- Stop people cutting corners
- Promote involvement in 'rule' making
- Effective supervision of behaviour
- Have appropriate discipline
- Instil 'values' in the workforce



## Mainly physical

- Trips, fumbles, drops, slips
- Easily detected

## Mainly mental

- Forgetting, missing, not noticing
- Harder to detect

**Winging it**

**Familiar task**

**Following a procedure**

Cultural or  
deviant

# A 'Just Culture'

A culture where people are valued but held accountable.

To pursue this, we need to distinguish between different types of behaviour

## Acceptable

## Unacceptable

**Desired  
Behaviour**

**Behaviour in line  
with company  
policies and  
procedures**

**Human  
Error**

**Slips, lapses and  
'honest' mistakes  
– need to be  
identified**

**Doing It 'Wrong'**

**Needs to be  
admitted so that  
systems can be  
improved**

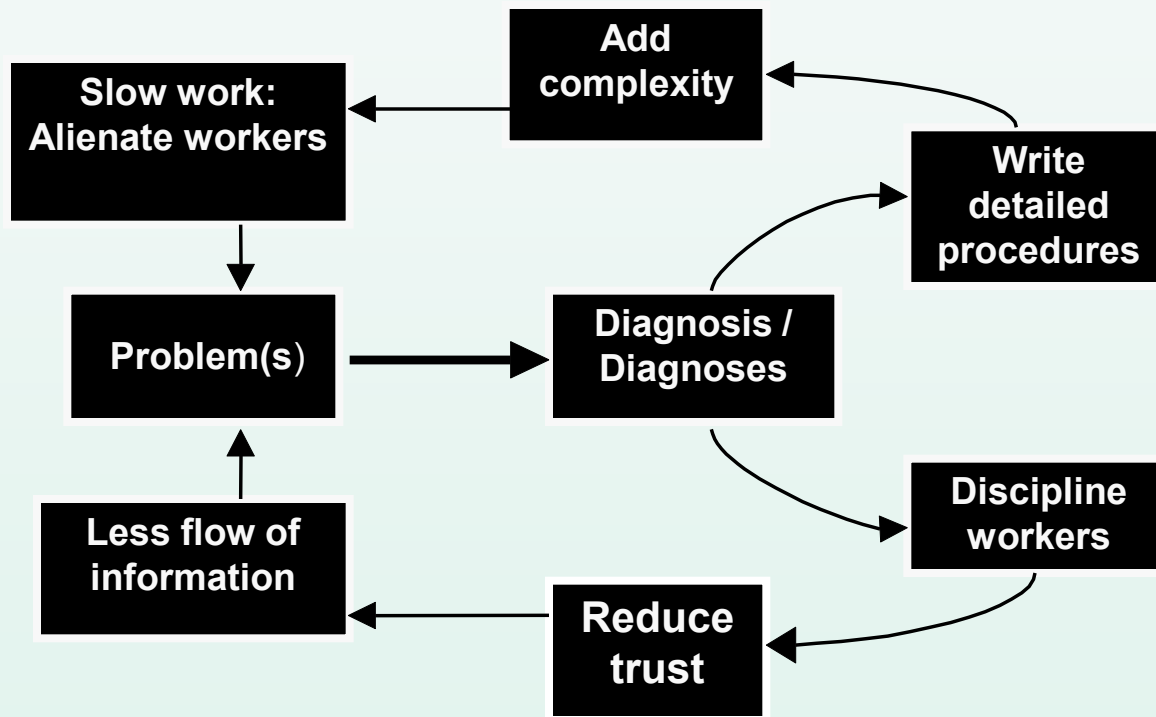
**Reckless  
Behaviour**

**Conscious or  
known disregard  
of accepted /  
agreed standards /  
rules**

# Just Culture

An atmosphere of trust in which people are encouraged (even rewarded) for providing essential safety-related information, but in which they are also clear about where the line must be drawn between acceptable and unacceptable behaviour.

# “Fixes” That Fail



# Where to Use (for example)

- **PROACTIVE** – consider humans in safety analysis (e.g. FMEA)
- **REACTIVE** – consider human error in accident investigations

# FMEA

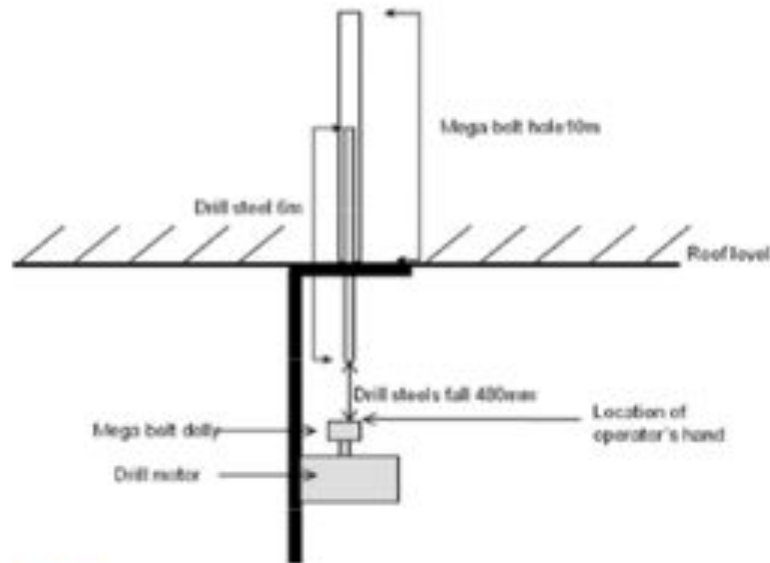
**Consider human as component in system**

**Human Failure Modes:**

- slip / lapse**
- mistake**
- violation**

# A Recent Example

**Problem:** An operator can inadvertently release the roof bolt gripper jaws causing a hand injury



# Transferability and Innovation

- Widespread transferability to roof bolting equipment
- Can be applied to other control functions
- The design is simple, robust and reliable.



# Another ...



# And Another ...







# **The Future ...**

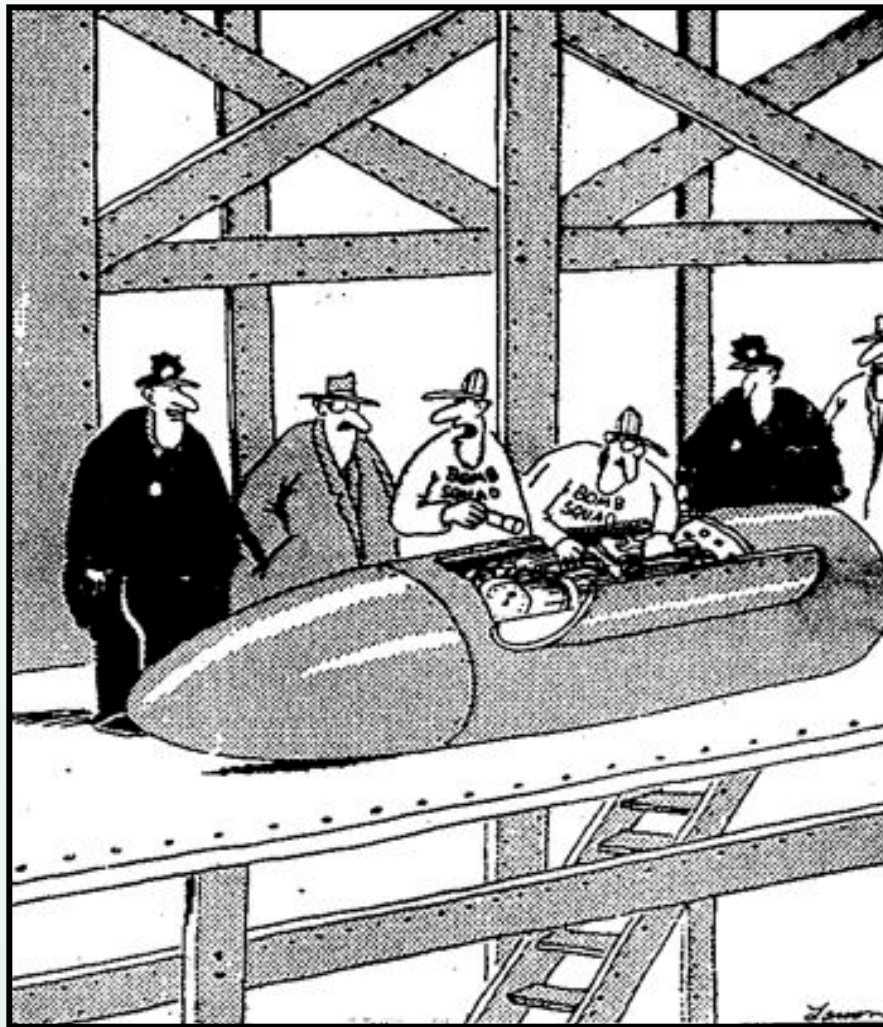
**The importance of human error will be recognised**

**It shouldn't be in the TOO HARD BASKET**

**The potential for human error will be considered at the design phase**

**It shouldn't be the subject of 'retrofits'**

**Human error will be adequately considered as part of incident investigations**



"Well it's a delicate situation, sir... Sophisticated firing system, hair-trigger mechanisms, and Bob's wife just left him last night, so you *know* his mind's not into this."

# Thank You