



# Step Change in Safety Human Factors

**Steve Murphy**

**TAQA HSE**

**Step Change Human Factors co-chair**

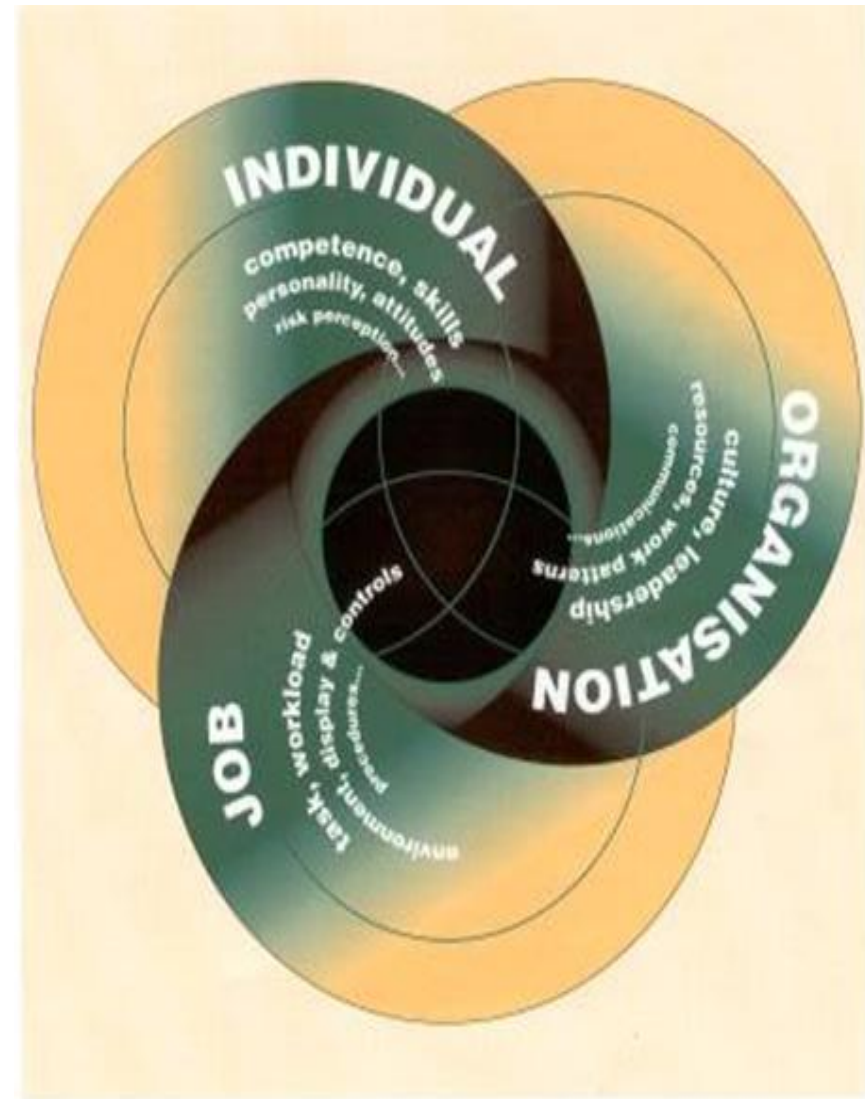


## Defining the 'issue'

# What are Human and Organisational Factors - HSE



‘Human Factors refer to environmental, organisational and job factors and human and individual characteristics, which influence behaviour at work in a way which can affect health and safety.’

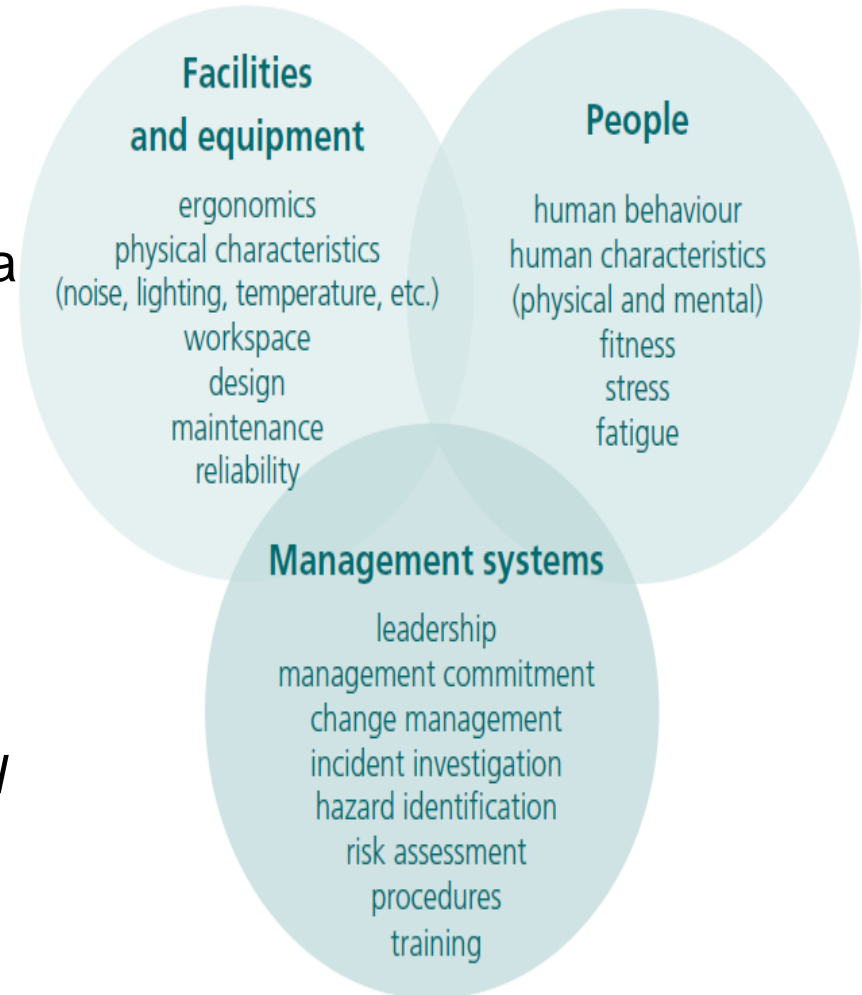


# What are Human and Organisational Factors – Energy Institute



HF refers to all of those things that could affect human performance in a task. The word ergonomics is used to describe broadly the same subject.

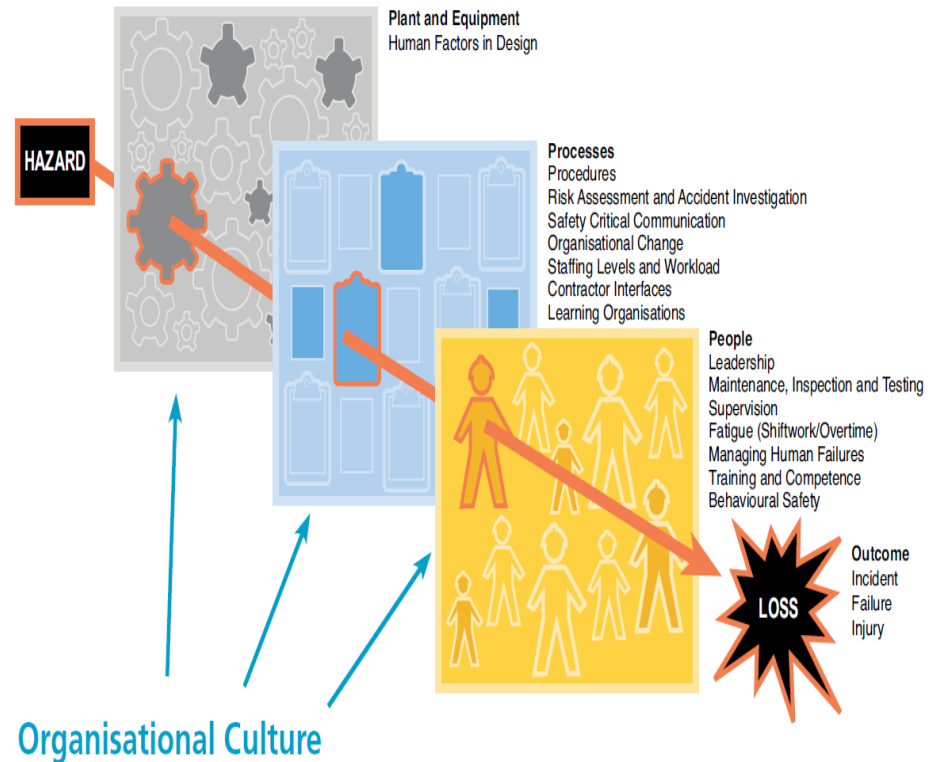
*“...environmental, organisational and job factors, and human and individual characteristics which influence behaviour at work. Careful consideration of human factors can improve health and safety by reducing the number of accidents and cases of ill-health at work.”*



# What are Human and Organisational Factors – Step Change



HF refers “...environmental, organisational and job factors, and human and individual characteristics which influence behaviour at work in a way which can affect health and safety.” Human factors covers a huge range of topics which can be grouped under three key headings:



# But What are Human and Organisational Factors really?



## The EI identifies 19 topics:

1. Alarm handling
2. Organisational change
3. Maintenance
4. Fatigue
5. Safety critical procedures
6. Training and competence
7. Ergonomics
8. Safety culture
9. Communications
10. Task analysis
11. Human error and non-compliance
12. Human reliability analysis
13. Behavioural safety
14. Incident and accident analysis
15. Human factors integration
16. Performance indicators
17. Leadership
18. Pressure and stress
19. Occupational safety vs. process safety

## The HSE identify 20 topics:

1. Human factors in risk assessment
2. Incident investigation
3. Procedures
4. Training and competence
5. Staffing levels
6. Workload
7. Supervision
8. Contractors
9. Organisational change
10. Shift handovers
11. PTW
12. Control rooms
13. Human computer interfaces
14. Alarm management
15. Lighting, comfort, noise and vibration
16. Fatigue and shiftwork
17. Behavioural safety
18. Learning organisations
19. Maintenance error
20. Intelligent customers

## Step Change identify 15 topics:

1. Human factors in design
2. Procedures
3. Risk assessment and incident investigation
4. Safety critical communications
5. Organisational change
6. Staffing levels and workload
7. Contractor interfaces
8. Learning organisations
9. Leadership
10. Maintenance inspection and testing
11. Supervision
12. Fatigue
13. Managing human failures
14. Training and competence
15. Behavioural safety

# Human and Organisational Factors in Real Life – Piper Alpha



## Piper Alpha Disaster

“It was caused by a massive fire, which was not the result of an unpredictable ‘act of God’ but of an accumulation of errors and questionable decisions. Most of them were rooted in the organisation, its structure, procedures, and culture.”

*Learning from the Piper Alpha Accident: A Postmortem Analysis of Technical and Organisational Factors, M Elisabeth Paté-Cornell, Risk Analysis Vol.13, Issue 2, April 1993.*

July 6<sup>th</sup> 1988

Hydrocarbon gas pumped into condensate pump which was under maintenance and blanked off with no safety valve, high pressure gas leak which then ignited

**167 dead**

**61 survivors**

Personnel who had the authority to order evacuation had been killed when the first explosion destroyed the control room. Nearby connected platforms continued to pump gas and oil until the pipelines ruptured in the heat in the second explosion. Their operations crews did not believe they had authority to shut off production.



# Human and Organisational Factors in Real Life – Longford Gas Plant



## Longford Gas Plant Explosion

“A combination of ineffective management procedures, staffing oversights, communication problems, inadequate hazard assessment and training shortfalls combined to result in a major plant upset with consequential tragic loss of life.”

*Have Australia's Major Hazard Industries Learnt from the Longford Disaster? , J Nicol, Institute of Engineers Australia, October 2001.*

September 25<sup>th</sup> 1998

Hydrocarbon vapour cloud exploded after a rupture in a heat exchanger caused by pumping hot fuel into a cold vessel.

**2 dead**

**8 injured**

Approximately **10 metric tonnes of hydrocarbon vapour** vented from the rupture. A vapour cloud formed and drifted downwind. When it reached a set of heaters 170 metres away, it ignited. This caused a deflagration (a burning vapour cloud). The flame front burnt its way through the vapour cloud, without causing an explosion.



# Human and Organisational Factors in Real Life – Texas City



## Texas City Refinery Explosion

“The Panel found instances of a lack of operating discipline, tolerance of serious deviations from safe operating practices, and apparent complacency toward serious process safety risks.”

*The Report of the BP U.S. Refineries Safety Review Panel, January 2007.*

March 23<sup>rd</sup> 2005

Hydrocarbon vapour cloud exploded after the overfilling and overheating of Raffinate Splitter Tower

**15 dead**

**170 injured**

A third party site inspection report in January 2005 found numerous safety issues, including "broken alarms, thinned pipe, chunks of concrete falling, bolts dropping 60 ft. and staff being overcome with fumes." The report's co-author stated, **“We have never seen a site where the notion 'I could die today' was so real.”**

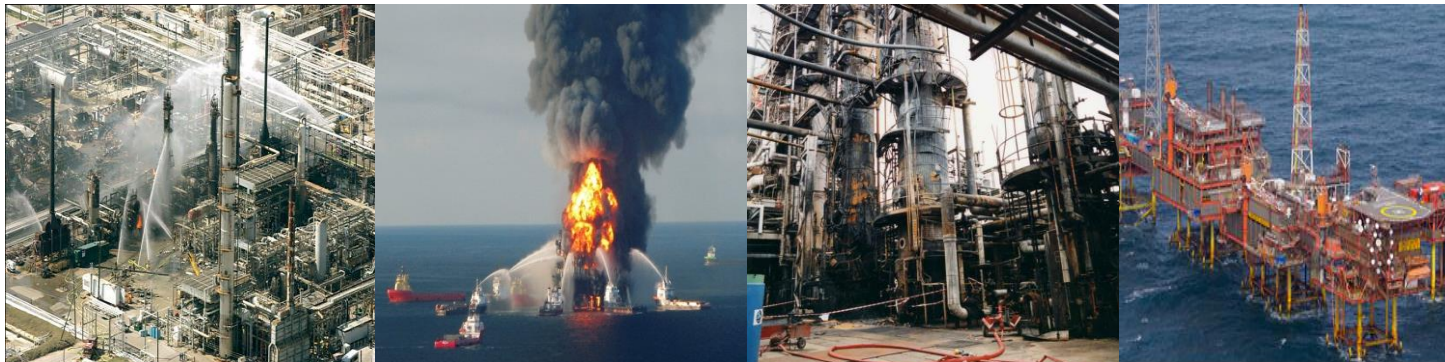
# The human contribution



*‘Rather than being the main instigators of an accident, operators tend to be the inheritors of system defects created by poor design, incorrect installation, faulty maintenance and **bad management decisions**.*

*Their part is usually that of adding the final garnish to a lethal brew whose ingredients have already been long in the cooking’*

Reason 1990







# Human Factors Toolkit

# Accessing the Human Factors questionnaire



 Human Factors Contact



## Welcome to the *Human Factors* online assessment tool

[Get Started »](#)



### Why

**We are all human.** Human factors is about how people interact with their working environment. Their working environment can involve people, process and plant. There are many factors which can influence their ability to perform well within this environment. To improve performance it is important to understand and manage these factors.



### What

This online assessment tool is designed to build on [The First Steps to Human Factors](#). This allows users to identify the opportunities for improvement within their own working environment for themselves and their organisation. This is done by the completion of assessment questions categorised as People, Process, Plant & Equipment and Incident Investigation. Each question set will take no longer than 10 minutes to complete. Upon completion of the assessment you will then get instant feedback on each of the categories assessed. This feedback will



### Who

This tool is designed to be relevant to everyone in the Oil & Gas industry, at all levels offshore and onshore. All data collected is anonymous. At the end of each self-assessment you will be asked to state your location and job level to allow the data collected to be analysed by your organisation to identify opportunities for improvement.




### Wherever

Access to this tool is available anywhere, anytime. It is easy to use on desktops, mobiles or tablets. You can contact your company Human Factors or healthy and safety focal point for more information or [Step Change In Safety](#).

# Questionnaire cover page



Human Factors Contact Help Logout



## Assessments



-  People 
-  Process 
-  Plant & Equipment 
-  Incident Investigation 








« Select an Area to begin



# Assessment type - People



 People 

- \*NEW\* Behavioural Safety 
- \*NEW\* Maintenance, Inspection and Testing 
- \*NEW\* Supervision 
- Fatigue 
- Leadership 
- Managing Human Failures 
- Training and Competence 



# What happens with the assessment results?



## Human Factors in Design

Dimension	Question	No	N/A	Yes
Fundamentals	Do you know what the major accident hazards scenarios are in your workplace?			4
Fundamentals	Do you know which pieces of plant and equipment are critical to the prevention of major accidents?			4
Access	Is there enough uncluttered space around equipment items to allow good access for operation, inspection and maintenance?	1		3
Access	Can all routinely used equipment items (control panels, switches, valves, instrument gauges, sample points, etc) be easily accessed from the floor or a permanent platform?	1		3
Access	Are you aware of any unguarded/unprotected equipment which could cause injury during normal operation?	4		
Access	Are there any permanent obstructions across your access/exit routes, walkways or main work areas (e.g. pipes or equipment)?	2	1	1
Access	Is the design of new equipment and/or workplace layout easy to use and as accessible as possible?		1	3
Operability	Are end users regularly engaged in the design process associated with the installation of new equipment?	3	1	

# Where to start?



“Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.”

Douglas Adams

Incident Investigations

# What next?



- All the assessment categories have extra guidance / reading
- Step Change are working on more targeted guidance once we have finished the analysis
- Websites:
  - <https://www.energyinst.org/technical/human-and-organisational-factors>
  - <http://www.hse.gov.uk/humanfactors/>
  - <https://www.stepchangeinsafety.net/safety-resources/human-factors>

---

# What next?



- Reading:
  - ‘The Field Guide to Understanding Human Error’ Sidney Dekker
  - ‘Human Factors and Behavioural Safety’ Jeremy Stranks
  - ‘Human Factors, how to take the first steps’ Step Change in Safety