

What are Human Factors?

Human Factors: The Failings & The Fabulous
IOSH Yorkshire Branch
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Overview

- ▶ Definitions of human factors and ergonomics
- ▶ Brief history of the discipline
- ▶ Aims of human factors
- ▶ Domains of human factors
- ▶ Poor excuses for ignoring human factors
- ▶ Costs of no human factors
- ▶ Conclusions

So what do you do for a living?

“I’m a human factors specialist/ergonomist”

“Can you help me get a new chair for my office?”

“I’ve got pain in my hand - do you think it’s carpal tunnel?”

“Ooo, doesn’t that cost a lot of money?”

What are human factors?

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.

(HSE, 2018)

What is ergonomics?

Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimise human well-being and overall system performance.

(International Ergonomics Association)

History of human factors

▶ 1910-1930s

- Scientific management - Taylor (1911), Gilbreths (1911/1993)
- Hawthorne studies - Mayo (1933)

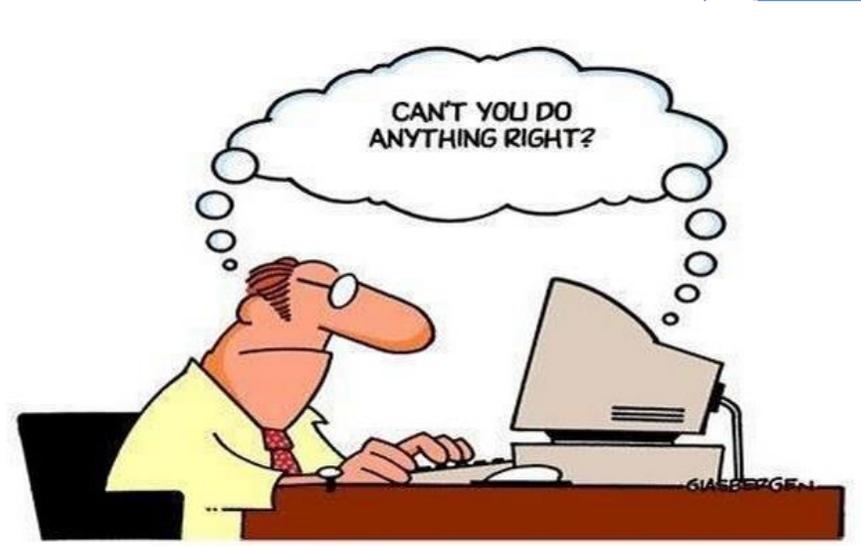
▶ World War II

- Modern discipline emerged
- Human-machine interaction and fit
- Controls and display designs
- Focused on aviation, military machines and weapons

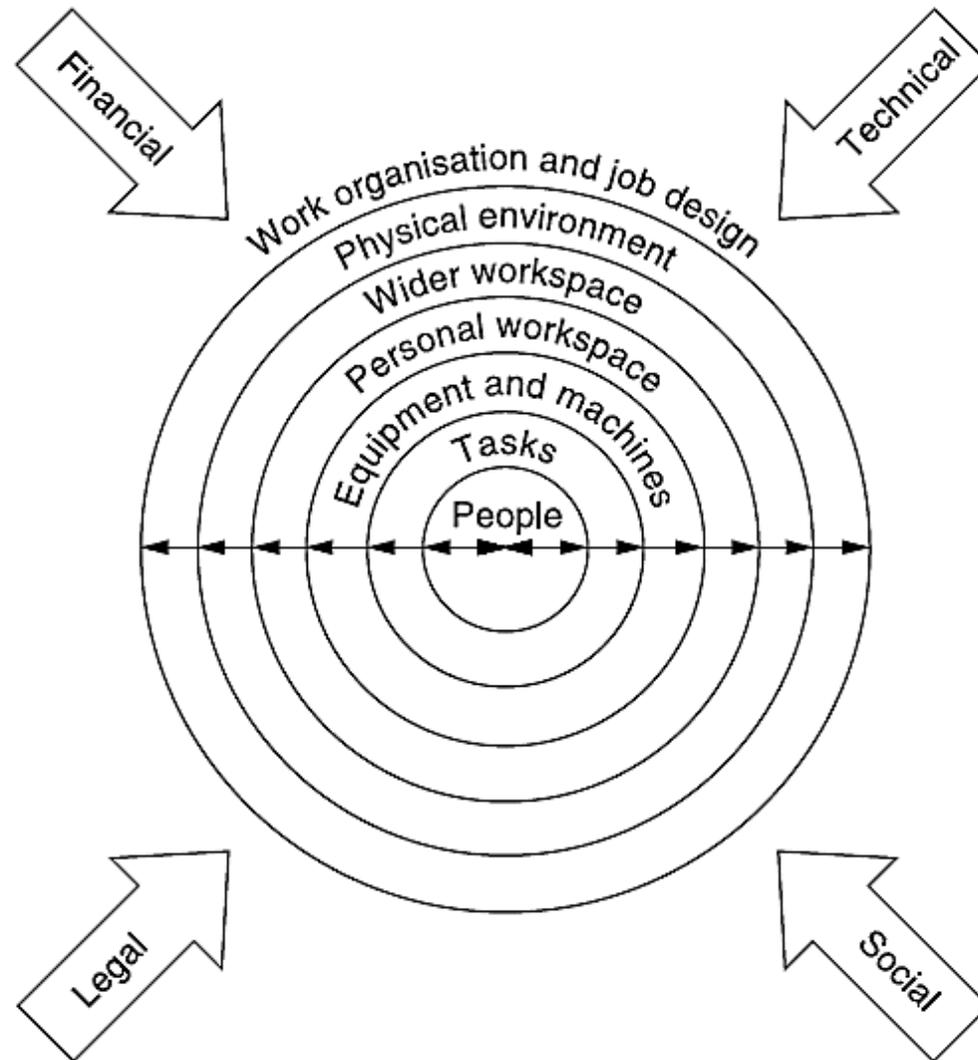


History of human factors

- ▶ Post World War II
 - Human-computer interaction
 - User centred design and usability
 - Allocation of function - Fitts (1951)
 - Worker safety
- ▶ Modern day
 - Mobile and tele-working
 - Virtual teams and environments
 - Web usability

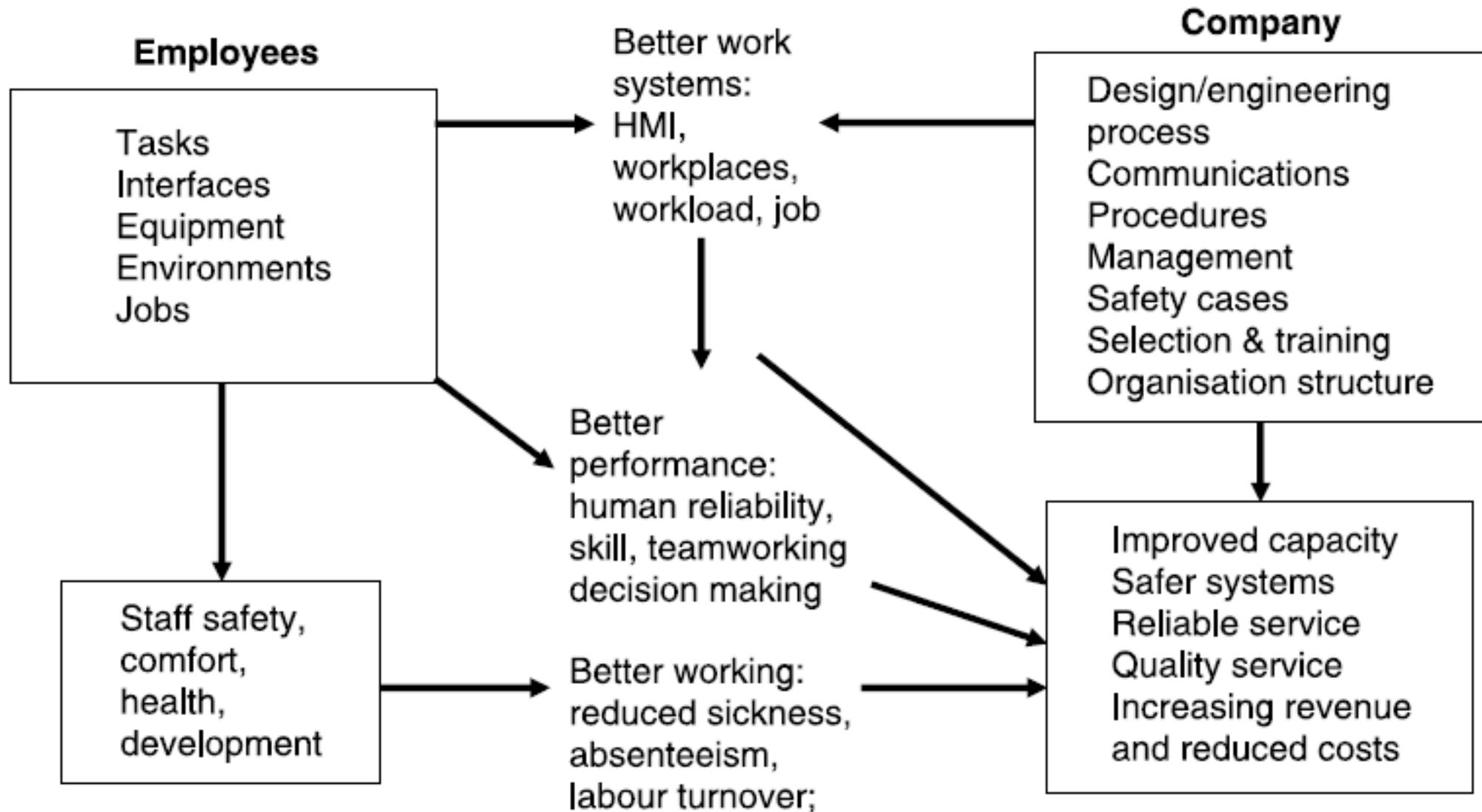


Putting people at the heart of design...



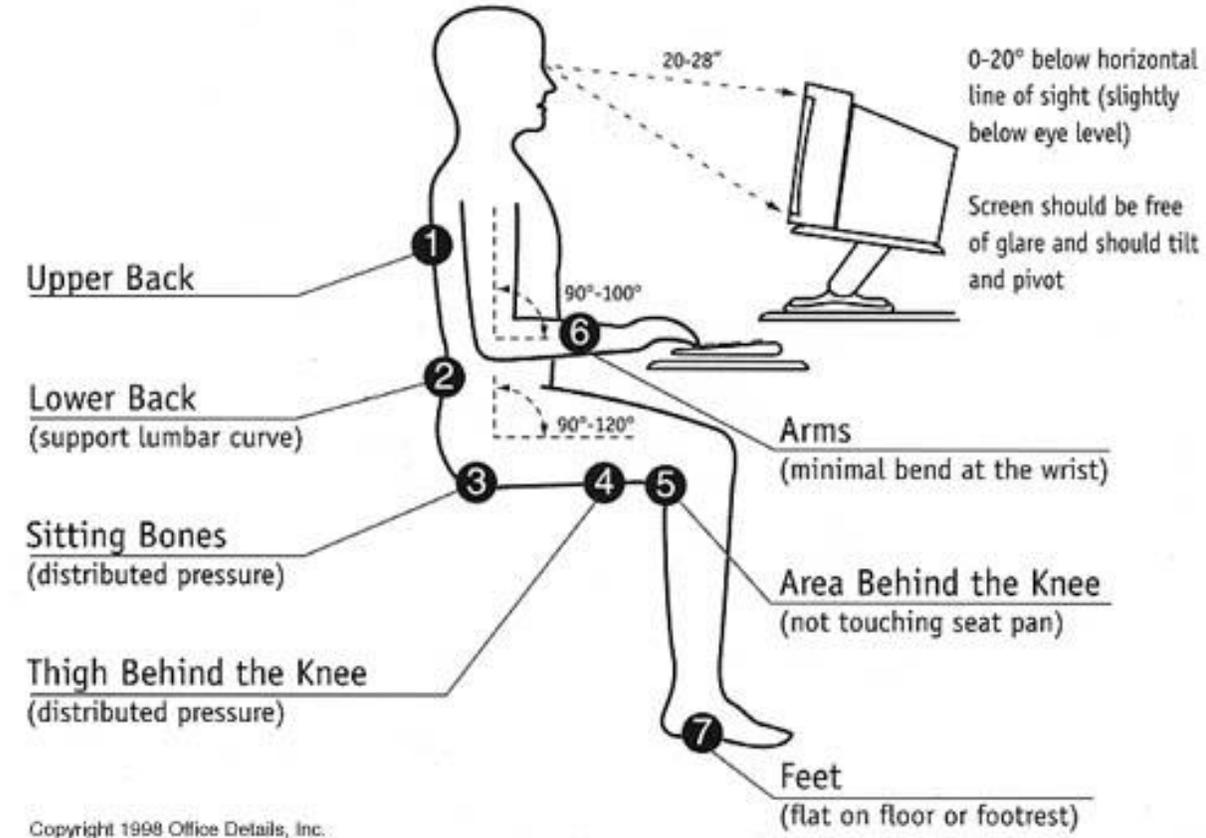
Taken from Wilson
(2005, p.7)

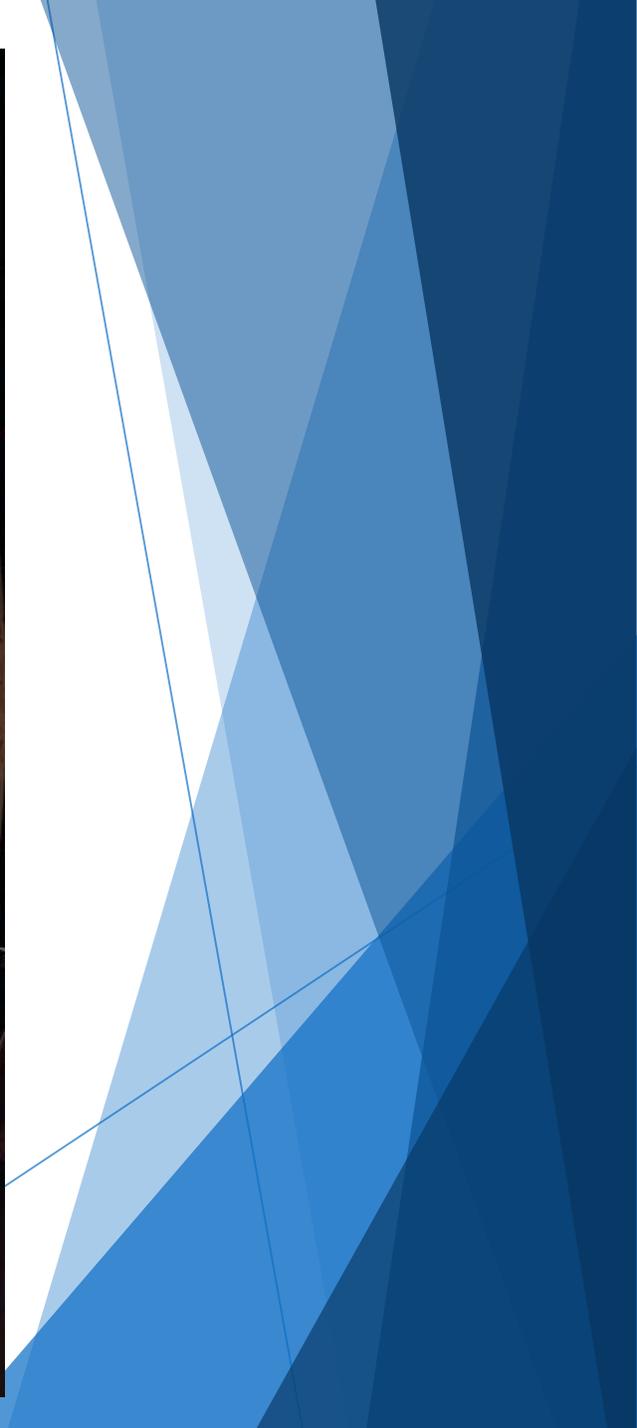
Aims of human factors



Physical ergonomics

- ▶ Concerned with human anatomical, anthropometric, physiological & biomechanical characteristics, as they relate to physical activity
 - e.g., fit, clearance, reach, access, tolerance, workload, manual handling, health & safety, workplace layout, displays & controls, product & equipment design, environment, tools





How do you exit?



Red vs green lights



Cognitive ergonomics

- ▶ Concerned with mental processes, such as perception, memory, reasoning & motor response, as they affect interactions among humans & other elements of a system
 - e.g., information processing, sensing, perception, decision making, problem solving, reaction, mental workload, fatigue, stress, communication, reliability, fault diagnosis



Organisational (social) ergonomics

- ▶ Concerned with the optimisation of socio-technical systems, including their organisational structures, policies & processes
 - e.g., attitudes, motivation, satisfaction, job & team design, hours & patterns of work, pacing, telework, implementation of change, organisational culture, virtual organisations, quality management



Technology-led change

What percentage of IT projects are considered successful?

What percentage of IT projects are considered complete failures?

e.g., Landauer (1995), Clegg et al. (1997), Gibbs (1997), Waterson et al. (1997), Brynjolfsson & Hitt (1998), Lippert & Davis (2006), Clegg & Shepherd (2007), Eason (2007), Kijasanayotin (2009), Baxter & Sommerville (2011), Bloch et al. (2012), McKinsey (2012), Innotas (2016), Project Management Institute (2017), Standish Report (2018)

Technology-led change

Failed government IT projects waste £100 million of taxpayers' money in just one year
The Mirror, 17th February 2015

Enterprise wastes £250bn a year on failed digital projects, finds report
Computing, 22nd September 2015

BBC was 'complacent' over failed £100m IT project
BBC News, 10th April 2014

Oh dear, is this another costly IT failure?
The Telegraph, 24th July 2014

Labour's computer blunders cost £26bn
The Independent, 19th January 2010

Bank customers hit by dozens of IT shutdowns
BBC News, 28th February 2019

The costly trail of British government IT and 'big bang' project disasters
The Guardian, 19th August 2014

UK wasting £37 billion a year on failed agile IT projects
Information Age, 5th May 2017

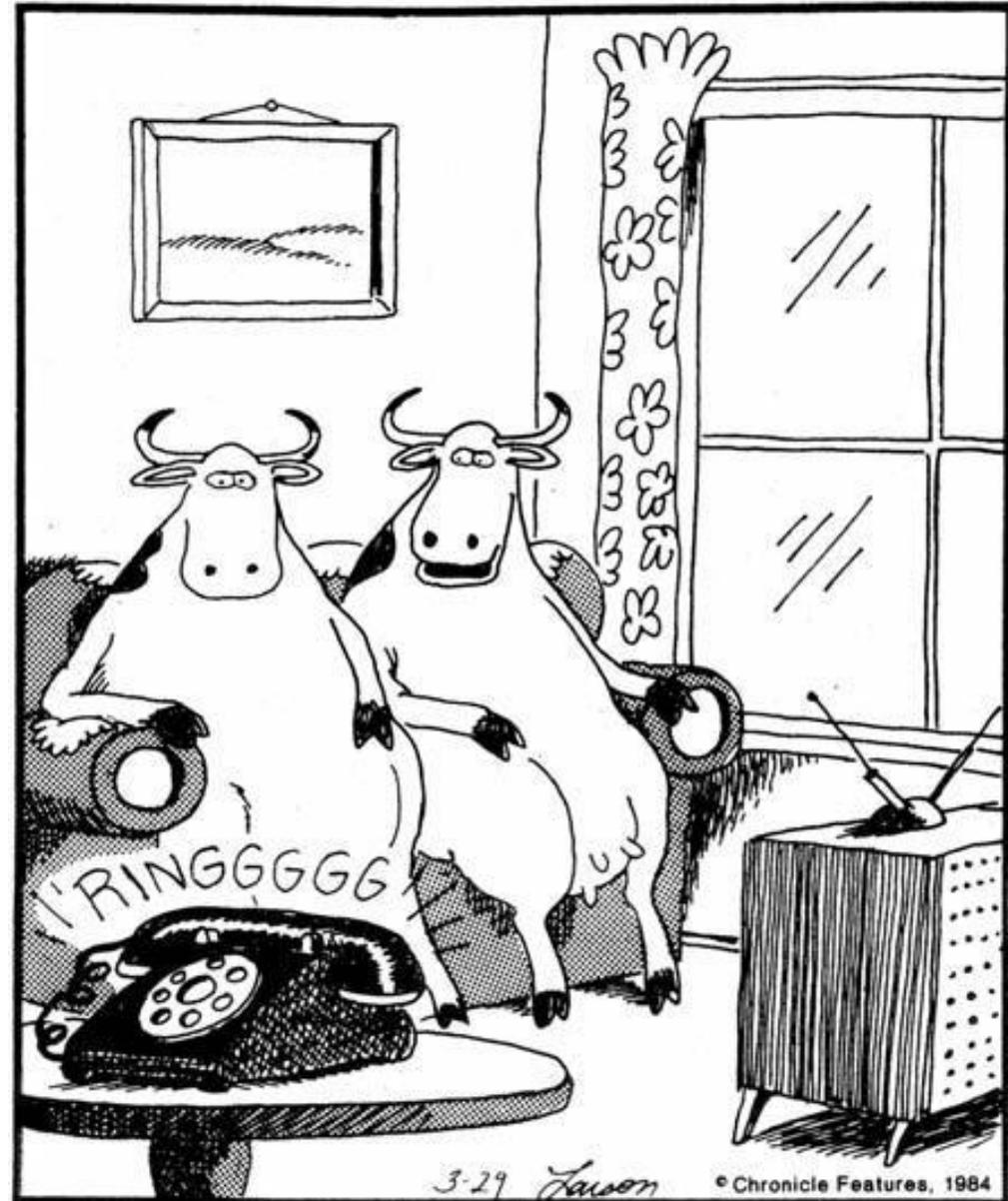
Arguments against human factors

We designed it for the average person so it will be fine!

Taken from Wilson (2005, p.7)

THE FAR SIDE

By GARY LARSON



"Well, there it goes again . . . And we just sit here without opposable thumbs."

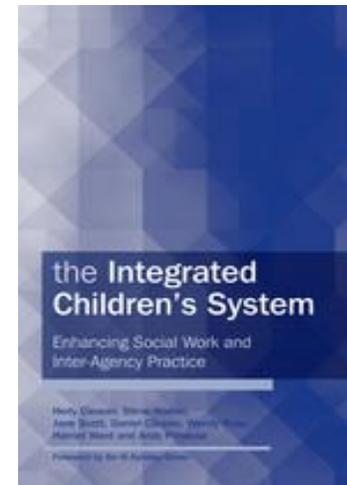
Arguments against human factors

People will just adapt to poor design so there's no need to worry about it!



Smartcard sharing in the NHS

The Integrated Children's System



Arguments against human factors

Tenerife airport disaster (1977)



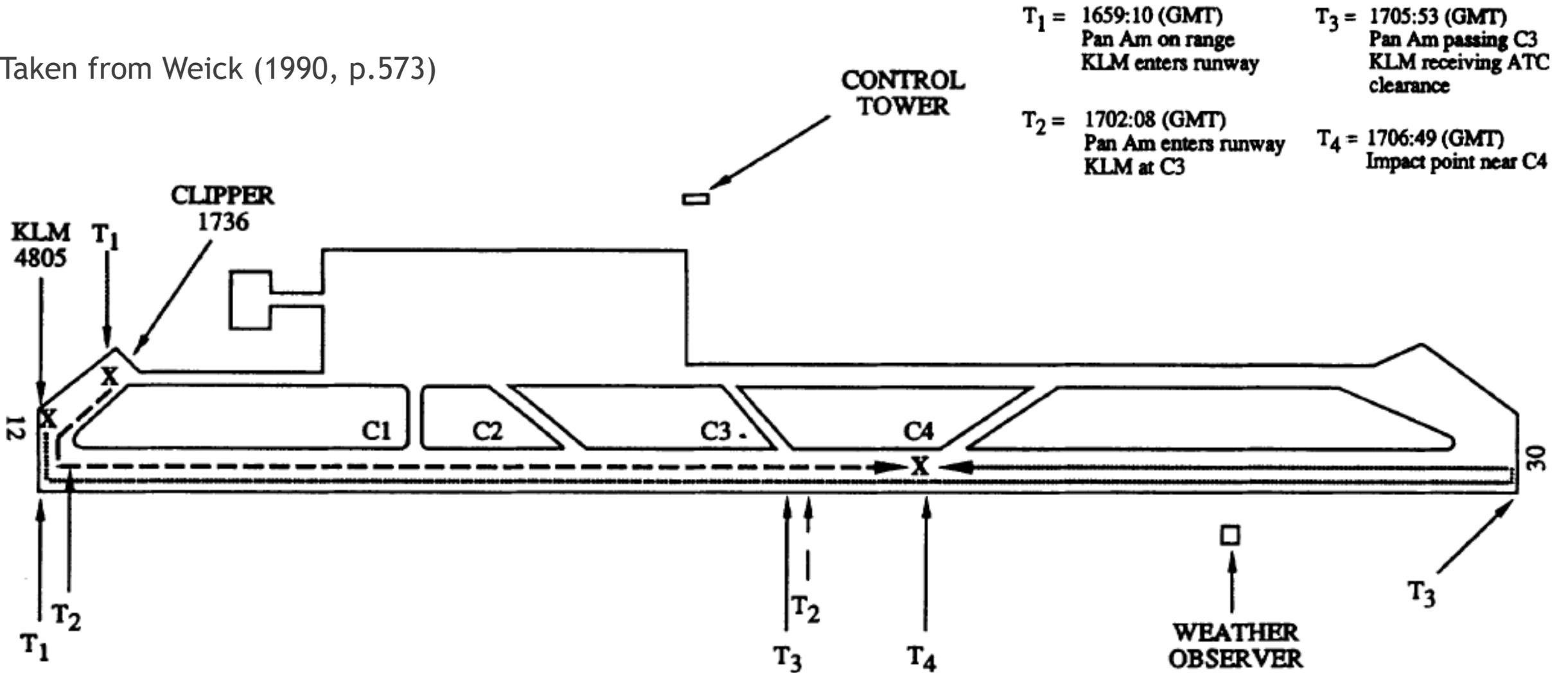
583 deaths

Worst aviation accident in history

If it goes wrong
or doesn't work
it's because
people always
make mistakes!

Tenerife airport disaster (1977)

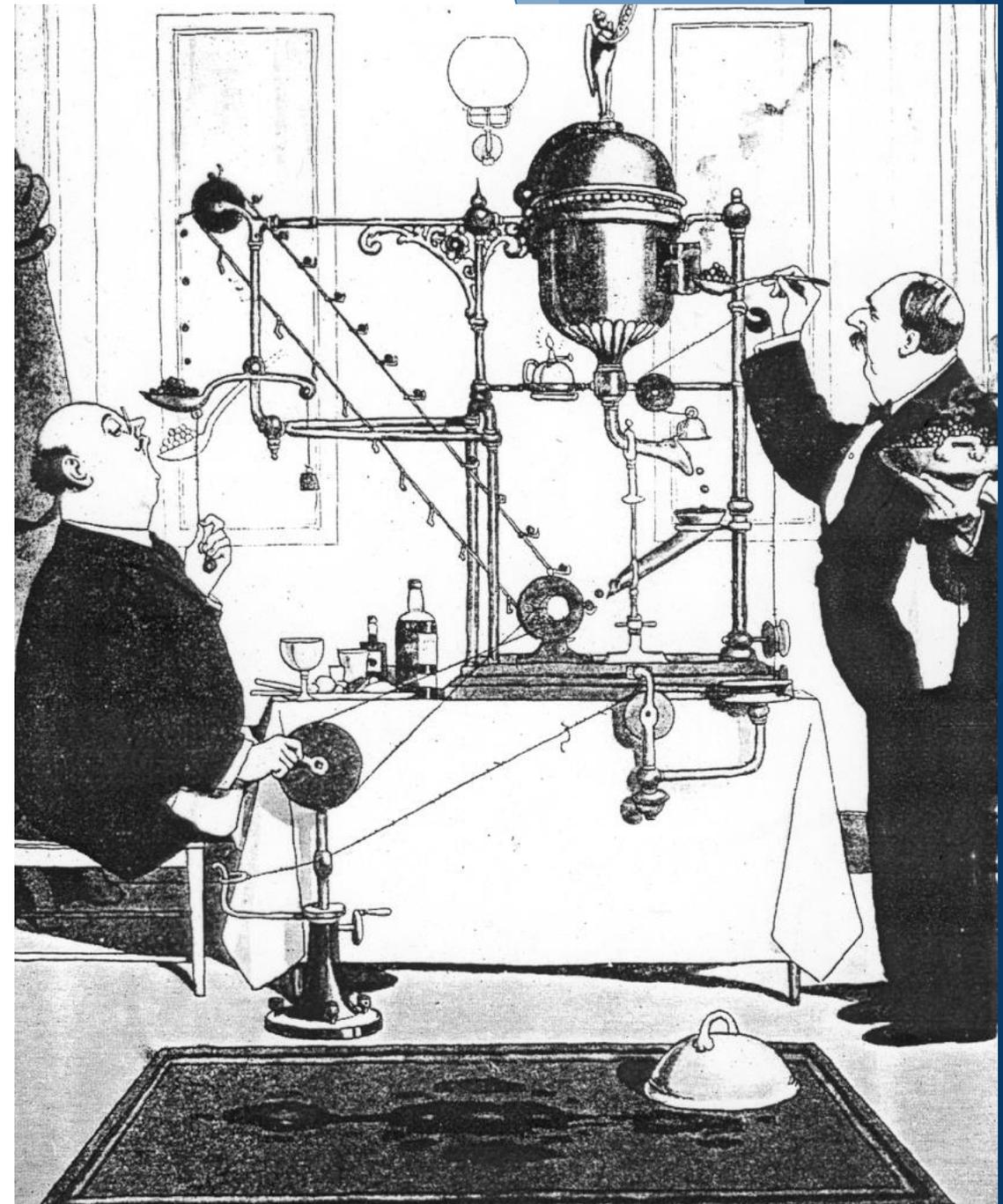
Taken from Weick (1990, p.573)



Arguments against human factors

We really need this new technology to improve our organisational performance!

Taken from Clegg et al., (2000, p.237)



Arguments against human factors

- ▶ Personnel & administrative resources
- ▶ Technical & equipment resources
- ▶ Cost of analysis & evaluation process
- ▶ Capital costs of redesign features
- ▶ Increased system development time
- ▶ Disruption to normal activities



**It costs too
much money
and takes
too long!**

Can we really afford to ignore human factors?

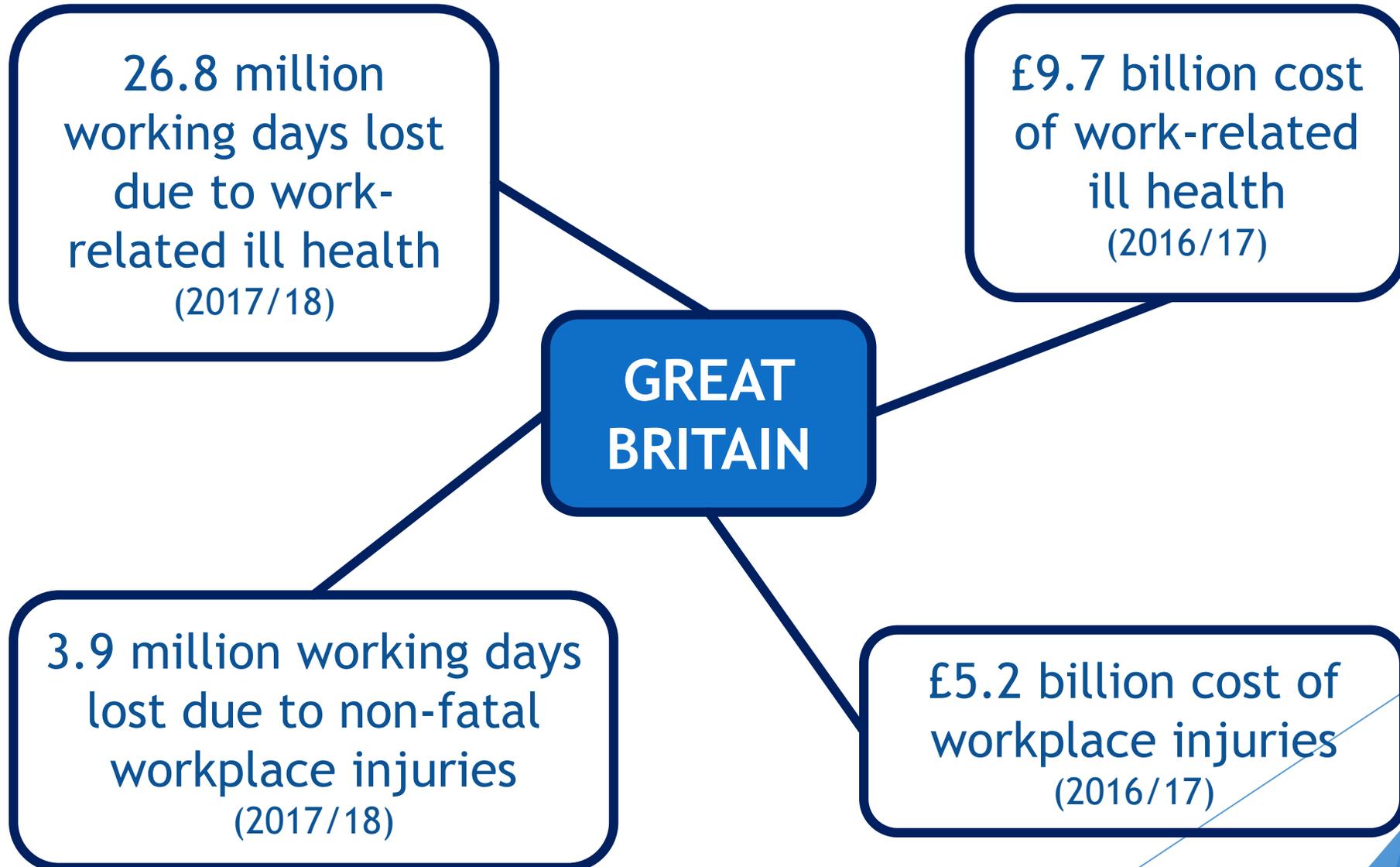
- ▶ Accidents & injuries
- ▶ Ill health
- ▶ Poor worker well-being
- ▶ Absenteeism
- ▶ Increased labour turnover
- ▶ Recruitment & retraining
- ▶ Organisational disasters
- ▶ Criminal prosecutions
- ▶ Compensation claims
- ▶ Increased insurance premiums
- ▶ Failed projects
- ▶ Lower product sales
- ▶ Reduced profits
- ▶ Poor company reputation

Costs to workplace safety

Every 15 seconds, 150 workers have a work-related accident, and 1 worker dies from a work-related accident or disease

Every year, more than 2.78 million workers die as a result of work-related accidents or diseases

Workplace safety in GB



Human factors are crucial

▶ We need to design for people

▶ We need systemic thinking

- Who is doing the job?
- Who are they interacting with?
- What are they being asked to do?
- What demands (physical and mental) does this create?
- What equipment/technology is needed?
- Where are they working? Workspace? Organisation?
- What about the wider environment? Societal concerns?
Legal requirements? Financial constraints?

Thank you for listening

