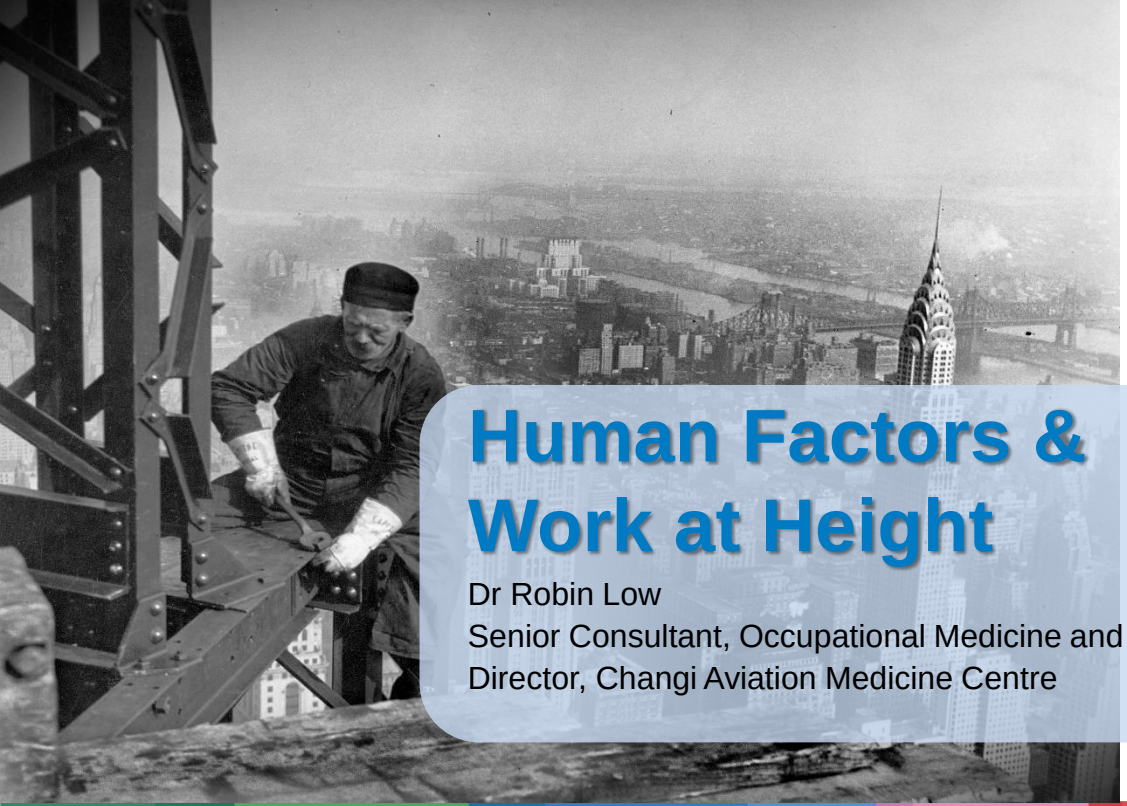

Human Factors & Work at Height

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What is Human Factors?

- The scientific discipline concerned with optimising the relationship between people and their activities by the systematic application of the human sciences, integrated within the framework of systems engineering – Edwards

- The study of man in his working environment – Murrell

- Study of people and their relationship with their environment - living and working conditions, machinery, procedures, other people.

What is Human Factors?

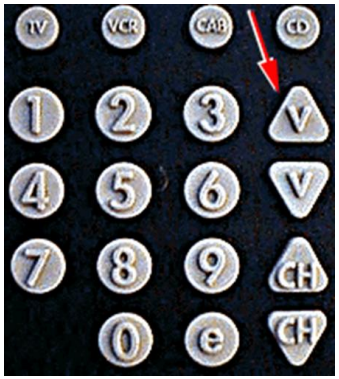
- Humans do not work in isolation.
- We work in a system or systems, where there are interactions.

- How these interactions occur can affect how the human works and his work output and work outcomes.
  - Efficiency/productivity
  - Accuracy/errors
  - Accidents

Why is this important?

- In 1930s and during WWII, many aircraft losses were due to accidents and not combat.
- Due to human mistakes or error
- **Why are people making these errors?**

- Incidents and accidents were the result of complex interactions between people, organisations, systems and machines.
- In an increasingly complex technological system, humans no longer seen as the cause of trouble, but the *recipient* of trouble.



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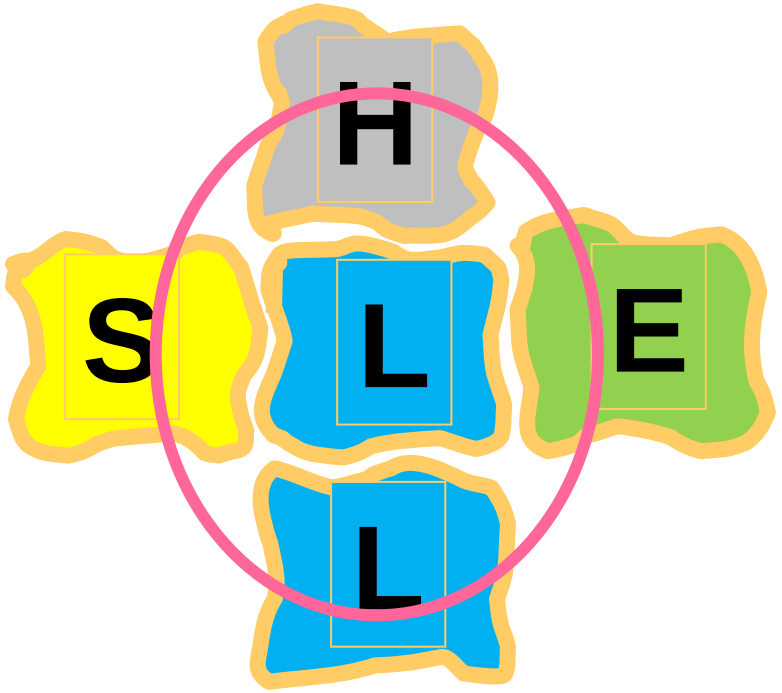
The SHEL model of HF

Software

Hardware

Environment

Liveware



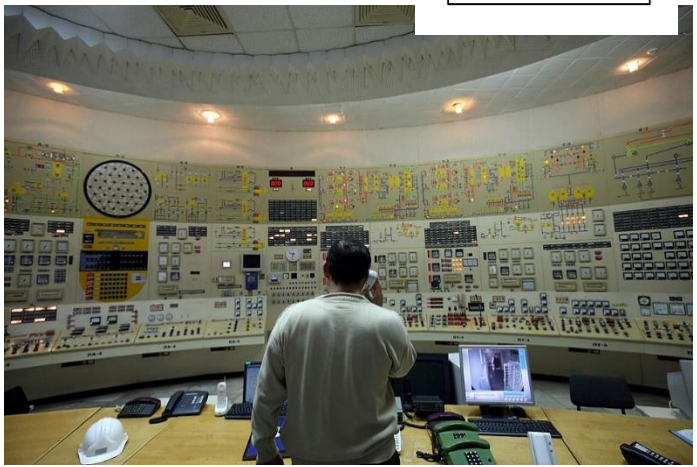
Hawkins 1975

Liveware (CENTRAL - SELF)

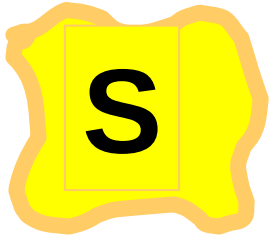
- Individual variability, intra-individual variability
- Physical size, age, fitness level etc
- Personality
- Emotions
- Physical, mental health and well-being
- Knowledge, skill level
- Ability to handle stress, decision-making abilities
- Personal and situational stressors

Hardware

- The equipment and tools
- Correct tools
- Used correctly
- Poor design = setting the human for failure



Software



- Processes, policies, regulations
- Checklists, SOPs, manuals

- Rules! Do they make sense? Are they practical to implement?

- Concept of :*Work as imagined* (or prescribed) vs *Work as done*

The offside rule in football

The solution?

Environment

- Physical: noise, temperature, humidity (comfort), lighting, space constraints, weather, day/night

- Social/Organisational: social support, company culture, management styles, time pressure, financial pressure (WY/FY),

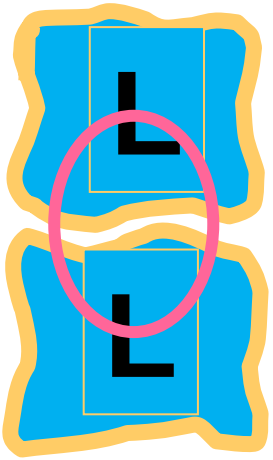
- Legal, regulatory, political environments, etc

Liveware (OTHERS)

- Human-human interaction
- Interaction can be downwards, upwards and sideways - Authority gradient

- Leadership
- Teamwork
- Communications (or lack of)

- Personalities, emotions, stress



In addition…

- Task (or mission)
- Secondary tasks/considerations

What has Human Factors got to do with WAH?

- Not just for work at heights.
- HF is relevant in everything we do, for improving productivity, safety.
- Implement HF understanding and principles in company operations and safety system.

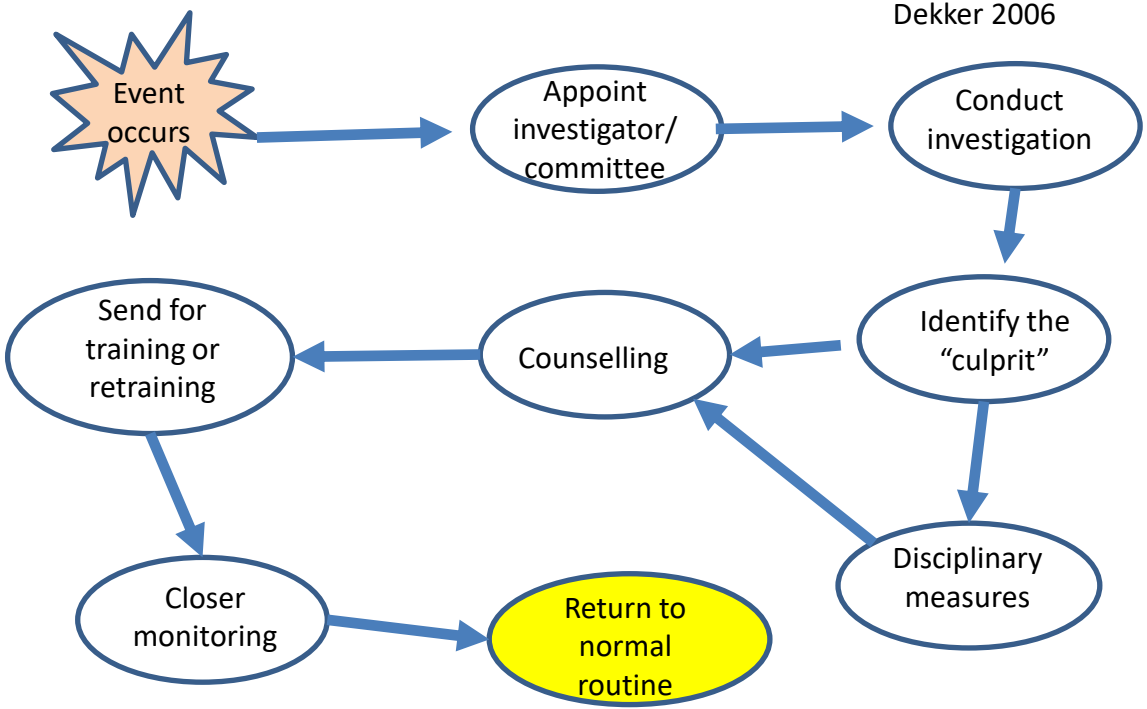
Applying Human Factors to occupational safety

- Accidents always occur because someone made an error (or they were caught) – the guy at the “sharp end”
- ASK:
  - Are they the only ones responsible?
  - What are the surrounding (human) factors that led to that fateful error?
- Conclusion: Human error as the cause of the accident?
  - Fact: This is a useless conclusion.
- ASK (and ask, and ask):
  - Why was the human error committed…!

Occupational Safety – when an accident occurs

Traditional sequence of events (adapted from the bad apple theory)

Dekker 2006



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Using the HF-type framework

- What was the task/mission?
  - Normal? / new? / unexpected?
- Lifeware (self)
  - Why did these people do such dangerous acts?
    - Were they idiots?
    - Bad attitude?
    - Lack of training?
  - What were they thinking?
- Hardware
  - Correct equipment?
  - Accessible/available?
- Software
  - Do the rules/SOPs facilitate the work?
- Environment

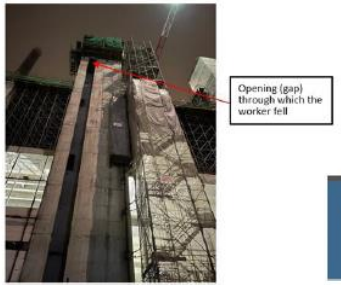
SUBSCRIBE RESOURCES EVENTS

WSHAlert

17 June 2021, Ref: 2122021

Worker fell through opening at construction site

On 10 June 2021, a worker fell 40 metres to his death through a gap in the floor of a warehouse building under construction. The structure used to cover the gap gave way when the worker was crossing the structure. The worker was wearing a full body harness without a lanyard attached.



Overview of the accident scene.

Structure used to bridge the gap.

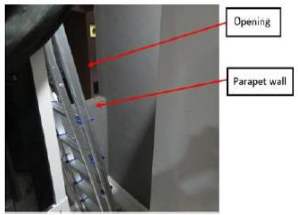
WSHAlert

19 April 2021, Ref: 2122004

Accident Advisory: Worker fell through wall opening

Ref: 2122001 WSH Alert Accident Notification dated 12 April 2021

On 5 April 2021, a group of workers was tasked to move and dispose of furniture and electrical appliances from a unit on the 10th floor of a residential building. One of the workers was working from a ladder when he fell backwards over a wall opening. The wall opening was above a 1m-high parapet wall and covered by a window blind located at the service yard. The worker landed on the 3rd floor below. He was pronounced dead by attending paramedics.



Overview of the accident scene.

WSHAlert

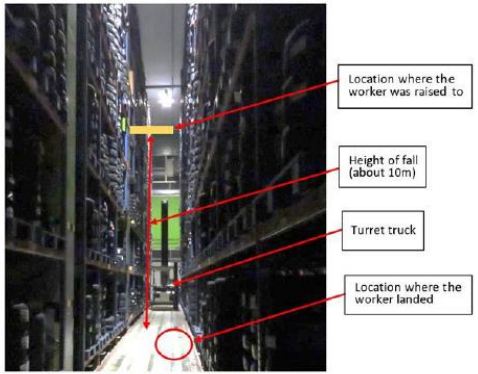
6 July 2021, Ref: 2122024

Worker fell from pallet lifted by turret truck

On 3 July 2021, a worker was tasked to install a beam on a storage rack about 10m from the ground in a warehouse. The worker was raised to that height as he stood on an empty pallet that sat on the forks of a turret truck (similar to a forklift) operated by a co-worker.

While being raised, the beam the worker was carrying accidentally struck a pallet placed on an upper storage tier, causing tyres from the upper tier to fall onto the worker and this resulted in him falling off the raised pallet.

The worker was sent to the hospital where he succumbed to his injuries.



Overview of the accident scene.

Most people do recognise dangerous situations.
But yet they still put themselves in it.
WHY?

Recommendations

Serial rule-breakers

Most people do recognise dangerous situations.
But yet they still put themselves in it.
WHY?

- "Routine" violations
- Ask **WHY**?
  - Is it because of bad attitude?
  - Dangerous people?
  - Will further training change things?
- Are you one?
- And deal with the real reasons

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Example

Fatal fall from height

Construction firm aware of hazard but didn't guard against it

Safety harness not worn when director fell through opening in floor: Coroner's inquiry

Wong Shiying

JMS Construction had identified falling from height as a potential safety hazard in the alteration works being done on a semi-detached house near Dunearn Road. But the company did not implement measures to guard against that risk, the court heard during a coroner's inquiry yesterday.

Its director Koh Kok Heng, 53, died on Feb 10

Straits Times 5 Oct 2021

- Is this the root cause?
- **WHY** didn't they guard against it? Why wasn't safety harness worn?
- S – What are the rules? Why wasn't it complied with?
- H – Harness available? Where was it? Barriers? Why not?
- E – Lighting? Rush?
- L – Director's state of mind, attitude to safety
- L-L – Why didn't anyone warn him?
- Mission – What was his task there?
- Company/Organisational culture/management attitudes – to safety? Communications?

Take away

- There are many reasons why people do things, including make errors/dangerous acts.

- Refrain from assuming that every worker is a bad apple
- Workers frequently do things that management ask them to do – even if unsafe
  - Address these factors
  - Discipline and training are options, but ask if they will really address the problem

- Applying Human Factors concepts
  - Build a system in your organisation that supports and facilitates the workers in doing their work (in every way)
  - Conduct safety investigations that seek the *real* root causes of accidents

- Build a company (safety) culture where everyone does the correct (and safe) thing, and reject unsafe behaviours

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Think safe and Be safe

Thank you