A Human Factors Approach to understanding Slip, Trip and Fall

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Change in Elevation
Hazardous Footwear

Human Factors Approach

Image from: http://mynds.bham.ac.uk/teamworkMatters/images/shutter_factors.jpg
Human Factors Approach

Human Factors Approach: A SYSTEM APPROACH

Image from: https://plus.google.com/communities/11686896797068132757
Human Factors Approach: Total Human Approach

Image from: http://erniemendes.com/yahoo_site_admin/assets/images/brain_diagram_cover_copy.326174442.jpg

Human Factors Approach: A SYSTEM APPROACH

SIM UNIVERSITY
Manage Your Future
What do you see?

http://www.weirdoptics.com/dalmation-camouflage-illusion/
Perception

- Unable to perceive ALL information we are bombarded with – brain is a filter
- We think we have all the information, but we don’t.
- We may not ‘get the picture’ because:
  - They are too much information (noise) presented
  - We are distracted and looking elsewhere
  - We are not looking where we are supposed to be looking at
  - Environment is working against us – too dark, lack contrast, etc.
  - Sometimes information presented are confusing
Is the cat going up or coming down?

Photo: Internet screen grab
Image from imgur.com
Perception

Why did he not see the missing panel?

SLT Hazards often missed

- Damaged steps
- Uneven surfaces
- Damaged mats / floorings / carpets

http://www.hse.gov.uk/slip/preventing.htm
SLT Hazards often missed

- Loose cables
- Wet floors

Images from:
- www.colinstattoos.com
- http://www.continuingcaresafety.ca/resources/photo-gallery-2/

SLT Hazards often missed

- Poorly lit places
- Congested, distracting places
- Obstructions

Images from:
- http://www.listen2unclejay.com/gallery/albums/userpics/10001/reason2.JPG
- http://www.canville.net/article.html?article=workplace-safety
Attention

Video at: https://www.youtube.com/watch?v=K4wftx5ZVu0

Distractions

Video at: https://www.youtube.com/watch?v=K4wftx5ZVu0
Do NOT text and drive

Video at: https://www.youtube.com/watch?v=TwSuWFF4VKU

Distractions

http://commons.wikimedia.org/wiki/File:Royal_Mail_postman2.jpg

Inattention in SLT

Image from: https://www.flickr.com/photos/66944824@N05/11329514543

Long-term Memory

Human Information Processing

Receive: Sensing

Comprehension: Sensemaking

Decide & RESPOND

Cues: visual, auditory, tactile

Environment

Short term Sensory Register

Perception

Attention Resources

Response Selection

Response Execution

Thought/Decision Making

Working Memory

Long-term Memory
That seeing they may see, and not perceive; and hearing they may hear, and not understand …

Mark 4:12

Comprehension

What are blue chip stocks?

Experience

Long Term Memory

Training
Comprehension

What is a Risk?
What are the consequences of risk taking?

Experience

Long Term Memory

Training

Risk Perception

Risk Perception

Image from http://curazy.com/archives/46707

Risk Perception

Image from: http://www.trekearth.com/gallery/Asia/Russia/Vorugo/Samara/Samara/photo411222.htm
Risk Perception

Comprehension

How do we help them build a library or a catalogue of hazards?
Situation Awareness

The **perception** of the elements in the environment within a volume of time and space, the **comprehension** of their meaning, and the **projection** of their status in the near future”

Endsley, 1988

What’s going to happen here?

Image from: http://gentresscaffolds.com/Better-Than-a-Ladder
Situation Awareness: A working definition

Continuous monitoring of environment, noticing what is going on and detecting changes in the environment.

Forming a good mental picture of the current task and the surrounding work environment.

Result → Quick reaction and adaptation to changing situations.

SA: What do you think will happen?

What should you do?
SA: What do you think will happen?


What should you do?

http://www.safetyrisk.net/safety-photos-funny-fails/
Why do people take risk?

Image from: http://www.laddersafetyhub.com/wp-content/uploads/2015/01/IMG_0609.jpg

Why do people take risk?

Image from: http://www.laddersafetyhub.com/wp-content/uploads/2015/01/IMG_0609.jpg
Why do people take risk?

- Too lazy?
- Too tired? Fatigue
- Inherently risk takers?
- Complacent attitude

**Individual Factors**

**Work and Organisation Factors**

- Rushing for time
- Penalty for delay / non-completion
- Tight Work/schedule
- Culture of speed
- Meeting deadlines
- Lack of training
- No risk awareness
- Laissez faire culture


http://www.safetyposter.com/simpsons-posters/
An information processing model for Slip, Trip and Fall Analysis

Adapted from:
Tim Bentley
The role latent and active failure in workplace STF: AN information processing approach.

Latent Failures

Active Failures

Exposure to hazards

Risk of STF Injury

Hazard Perception

Yes

No

Hazard Cognition

Yes

No

Decision to avoid

Yes

No

Ability to avoid

Yes

No

Avoid Injury

Unsafe Behaviour

Individual Factors

Age

Fitness, health, vision

Perceptual skills

Risk taking tendency

Fatigue

Tasks / Environmental Factors

Activity / Task

Footwear

Plant Environment

Equipment Design

Workspace Layout

Work and Organisation Factors

Production Pressure

Operational Decision

Equipment decision

Shift scheduling

Safety culture

Risk and safety management

Natural/ Uncontrollable factors

Weather condition

Outdoor underfoot env

Underfoot trip hazards

Tim Bentley. The role latent and active failure in workplace STF: AN information processing approach. Applied Ergonomics, 2009
Mitigate STF Hazards: Perception

• Scan for information – update mental model
• Pay attention
• Detect changes
• Manage distractions
• Manage attention resources

Images from:
http://www.slideshare.net/wyominginspector/slips-trips-falls-working-surfaces.ppt
http://okusoku.blog.jp/archives/20604466.html

For mobile phone addicts

Image from: http://www.china.org.cn/china/2014-06/13/content_35501513.htm
Maintaining SA: Comprehension

**Workers**
- Seek appropriate training
- Identify hazards at work
- Look at past events and learn from it
- Ask if not sure

**Employers**
- Provide appropriate training
- Establish a good housekeeping environment
- Establish a safe culture

Images from:

Maintaining SA: Projection

- Consider likely outcomes
- Visualizing future events
- Ask ‘what ifs’

http://www.ccohs.ca/oshanswers/safety_haz/sfts.html
Overcoming Organisation Barriers

Data Driven

- Non punitive reporting
- All accidents and incidents should be reported, analyzed and recorded in the company health and safety data base.
- Analysis should in depth and systematic
- Practice good record keeping
- Accident investigation followed by immediate rectification
Human factors analysis and classification (HFACS) system

Overcome Organisational Barriers

**Management commitment to safety**
- Prioritisation of safety (over production)
- Monitoring and supervision
  - Sufficient management care for vulnerable operators and conditions
- Proper communication
- Reward safe behaviours
- Joint participation in safety management
- Provide safety resources: Time, training, appropriate gears, equipment, etc.
BSc in Human Factors in Safety

http://www.unisim.edu.sg/programmes/programme-details/Pages/BSc-Human-Factors-Safety.aspx

Thank you