HUMAN FACTORS
- CHANGING PERSPECTIVES TO CHANGE OUTCOMES
Alastair Williamson
Associate Clinical Lead

Jane Higgs
Ergonomics (Human Factors) Advisor

West Midlands Patient Safety Collaborative
(part of WMAHSN)

Content

• What is human factors?

• How can it help me and my service?

• Using human factors to change your perspectives
  • SEIPS – how can I look at a situation from different viewpoints?
  • WAI vs WAD – which perspectives do I need to be aware of?
  • FMEA – how do I identify potential risks in my system?

• Summary and questions
What is Human Factors?

Definition(s)

Enhancing human performance through an understanding of the effects of tasks, equipment, workspace, teamwork, culture and organisation on human behaviour and abilities…

Ken Catchpole
Professor of Human Factors at Medical University of South Carolina
Definition(s)

Enhancing human performance through an understanding of the effects of tasks, equipment, workspace, teamwork, culture and organisation on human behaviour and abilities…
…and an application of that knowledge in clinical settings.

Ken Catchpole
Professor of Human Factors at Medical University of South Carolina

Fitting the system to the person

Ken Catchpole
Professor of Human Factors at Medical University of South Carolina
What HF is

• Understanding of interactions among humans and other elements of a system.
• How elements such as our environment, the equipment we use, and the systems within which we work and live interact with the way human brains and bodies work.
• The aim is to make our lives, both in and out of work, as easy, safe and well adapted to human behaviour and physiology as possible.
• When something is well designed you shouldn’t notice as it just works without you having to think about it!
What HF is

Cognitive

What HF is

Cognitive

Design
Cognitive

Design

Systems

What HF is

• Fiction: Human factors is about eliminating human error.

• Fact #1: Human factors is about designing systems that are resilient to unanticipated events.

• Fiction: Human factors addresses problems only by teaching people to modify their behaviour.

• Fact #2: Human factors addresses problems by modifying the design of the system to better aid people.

What HF isn’t

- Fiction: Human factors is focused only on individuals.
- Fact #3: Human factors work ranges from the individual to the organisational level.
- Fiction: Human factors consists of a limited set of principles that can be learnt during brief training.
- Fact #4: Human factors is a scientific discipline that requires accredited training; most human factors professionals hold relevant graduate degrees.


Where did it come from?

Names!
UK → Ergonomics
USA → Human Factors
Same discipline!

Early 20th century and before
Mainly fitting the person to the way the job is designed

Gilbreths (around 1911)
- Time and motion studies
- Surgery

WWII planes (Fitts and Jones around 1947)
- Instrument and control redesign
- Based on fitting design to human capabilities

Ergonomics /Human Factors
Fitting the way the job is designed to the human
Where is it used?

- Aviation, railways, vehicle design, power plants (especially nuclear), oil and gas industry, military
- Safety critical industries – High Risk Organisations

What about healthcare?

- Patients add extra complexity!
- Slowly being more widely used in healthcare settings across the board
  - All hospital settings
  - Ambulance design
  - Maternity units
  - Primary care
  - Care homes

How can human factors help me and my service?
HF in healthcare

- Healthcare is a very complex system!
  - Made up of smaller systems
  - Human factors perspective shows the multiplicity of systems factors that can affect actions and outcomes
- Just culture
  - Human factors allows analysis of situations, rather than simply looking at the last step/person in the chain
- Safety I and safety II
  - A safety II approach allows analysis of what goes right when outcomes are good, rather than always focusing on what goes wrong, thereby helping to spread good practice

SEIPS

How can I look at a situation from different viewpoints?
SEIPS – how can I look at a situation from different viewpoints?

- Systems Engineering Initiative for Patient Safety
  - the full system looks at contributions to healthcare transactions from professionals and patients
  - we will just look at the first part – breaking down a single situation
  - Link to the original paper: bit.ly/2KNvCFu

- A way of breaking a situation down into different viewpoints to see what contributes to the successful or unsuccessful completion of tasks

- Other similar models exist e.g. SHEEP (systems, human interaction, environment, equipment, personal)

---

SEIPS in practice

**Person/people**
e.g. role, experience, stress, fatigue, team support

**Tasks**
e.g. frequency, sequence, complexity

**Organisation**
e.g. staffing ratios, training, policies, culture

**Tools and technology**
e.g. usability, availability, familiarity

**Internal environment**
e.g. workspace, signs, noise levels, lighting

**External environment**
e.g. regulations, laws, national guidance
A few examples
Tools and Technology
A few examples
Tools and Technology

A few examples
Tasks

IMPORTANT NOTICE

PLEASE DO NOT ENTER ANY 'ORTHOPAEDIC EMERGENCIES' IN THIS BOOK WITHOUT HAVING 'BLEEPED 048'

MONDAY - FRIDAY
8am – 6pm ONLY

THANK YOU
## A few examples

### Organisation

<table>
<thead>
<tr>
<th>Admissions to accident and emergency</th>
<th>Specific clinical guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admissions to accident and emergency</td>
<td>1. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>2. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>3. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>4. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>5. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>6. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>7. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>8. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>9. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>10. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>11. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>12. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>13. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>14. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>15. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>16. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>17. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>18. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>19. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>20. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>21. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>22. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>23. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>24. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>25. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>26. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>27. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>28. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>29. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>30. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>31. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>32. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>33. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>34. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>35. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>36. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>37. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>38. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>39. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>40. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>41. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>42. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>43. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>44. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>45. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>46. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>47. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>48. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>49. Absent or uncooperative</td>
</tr>
<tr>
<td></td>
<td>50. Absent or uncooperative</td>
</tr>
</tbody>
</table>

### Internal Environment

[Image of an internal environment with medical equipment and a person working]
Example situation

This workshop!

SEIPS example

- **External environment**
  - Theme of the overall Meridian Live event
  - What the organisers want out of the day

- **Internal environment**
  - Light levels
  - Room temperature
  - Background noise; can you hear me?
  - Room layout

- **Tasks**
  - Me – conveying new information to you; getting the slides, etc to work
  - You – listening and taking part to learn new information; thinking of how you could apply new knowledge and asking me questions
SEIPS example

- **Tools and technology**
  - Me – laptop, screen, cables, training/competency? (Could fit here, under *People*, or (if their responsibility) *Organisation*.)
  - You – pens, paper, chairs, tables

- **People**
  - Me, you, organisers, venue staff, caterers, cleaners (don’t carers and families in patient situations)
  - HALT, illness, stress, etc

- **Organisation**
  - Teamwork, collaboration and communication, social relationships
  - Organisational culture, patient safety culture, supervisory/management style
  - Performance evaluation, rewards and incentives
  - Work schedules, rotas

---

Work As Imagined vs Work As Done

Which perspectives do I need to be aware of?
What we think we and others do in our jobs

Steven Shorrock
www.humanisticsystems.com
Work As Imagined vs Work As Done

What we think we and others do in our jobs

What we and others say we do in our jobs

What we and others are told to do in our jobs (e.g. policy/procedure)
Work As Imagined vs Work As Done

What we think we and others do in our jobs

What we and others say we do in our jobs

What we and others are told to do in our jobs (e.g. policy/procedure)

What we and others actually do in our jobs

Which one are you looking at? (Or which combination?)

Steven Shorrock
www.humanisticsystems.com
FMEA

How do I identify potential risks in my system?

Steven Shorrock
www.humanisticsystems.com

What is Failure Modes and Effects Analysis?
How do I do an FMEA?

1. Define the scope
2. Assemble a small multidisciplinary team
3. Conduct a process or task analysis
4. Consider what could fail at each step and why
5. Consider the effect of each of these failures on the outcome of the process
6. Scoring
7. Target mitigation efforts at high risk areas

Essential points to consider

• Clear goal – for example:
  • to identify failures that result in physical harm
  • to identify failures that impact successful completion of task

• Clear methodology – for example:
  • observation, interviews, experience, discussion

• Involve the stakeholders

• Understand any limitations

• Record assumptions
1. Define the scope
   • What will be your start and end point?
   • In this example:
     • start by asking the patients if they would like a drink
     • end by giving patients their drinks

2. Assemble a small multidisciplinary team
   • What expertise do you need in your team?
   • Always include the people who do the task!
   • Don’t forget associated people, e.g. maintenance staff, receptionists

3. Conduct a process or task analysis
   • Can be a flowchart of a simple task, or something more complex
   • Choose the method that suits the task

Make a round of teas for ward-based patients
Making a round of teas

Planning
- Ask if a drink is wanted
- Ask about preferences

Preparation
- Find clean mugs
- Fill kettle
- Boil kettle
- Put teabags in mugs

Execution
- Pour water
- Remove teabag
- Add milk
- Add sugar

Completion
- Pass the mugs around

4. Consider what could fail at each step...

Making a round of teas

Planning
- Ask if a drink is wanted
- Ask about preferences

Preparation
- Find clean mugs
- Fill kettle
- Boil kettle
- Put teabags in mugs

Execution
- Pour water
- Remove teabag
- Add milk
- Add sugar

Completion
- Pass the mugs around

Incorrect details taken
- Overfill/underfill
- None clean
- Spill water
- Spill tea
- Incorrect drinks provided
4. Consider what could fail at each step and why

Making a round of teas

Planning
- Ask if a drink is wanted
  - Not everyone asked
- Ask about preferences
  - Incorrect details taken
  - Distraction

Preparation
- Find clean mugs
  - Cleaner off
- Fill kettle
  - Overfill/underfill
  - Markings worn off kettle
- Boil kettle
  - Indication light not working
  - Forget to switch on
- Put teabags in mugs
  - No teabags

Execution
- Pour water
  - Spill water
- Remove teabag
  - No cutlery
- Add milk
  - Milk off
- Add sugar

Completion
- Pass the mugs around
  - Nowhere to put mug
  - Spill tea
  - Incorrect drinks provided
  - Passed round by different person
  - Preferences not recorded

5. Consider the effect of each of these failures on the outcome of the process

Making a round of teas

Planning
- Ask if a drink is wanted
  - Not everyone asked
- Ask about preferences
  - Incorrect details taken

Preparation
- Find clean mugs
- Fill kettle
  - Overfill/underfill
- Boil kettle
  - Indication light not working
  - Forget to switch on
- Put teabags in mugs
  - No teabags

Execution
- Pour water
  - Spill water
- Remove teabag
  - Not removed
- Add milk
  - Milk off
- Add sugar
  - Wrong amount added

Completion
- Pass the mugs around
  - Spill tea
  - Incorrect drinks provided
  - Preferences not recorded
  - Wrong amount added
### 6. Scoring

#### Identifying risk levels

<table>
<thead>
<tr>
<th>Occurrence Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote (1)</td>
<td>No known occurrence</td>
</tr>
<tr>
<td>Low (2, 3, 4)</td>
<td>Possible, but no known data</td>
</tr>
<tr>
<td>Moderate (5, 6)</td>
<td>Infrequent</td>
</tr>
<tr>
<td>High (7, 8)</td>
<td>Frequent</td>
</tr>
<tr>
<td>Very High (9, 10)</td>
<td>Almost certain</td>
</tr>
</tbody>
</table>

#### Occurrence scale

<table>
<thead>
<tr>
<th>Severity Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight annoyance (1)</td>
<td>May affect the system</td>
</tr>
<tr>
<td>Moderate System Problem (2, 3)</td>
<td>May affect the patient</td>
</tr>
<tr>
<td>Major System Problem (4, 5)</td>
<td>May affect the patient</td>
</tr>
<tr>
<td>Minor Injury (6)</td>
<td></td>
</tr>
<tr>
<td>Major Injury (7)</td>
<td></td>
</tr>
<tr>
<td>Terminal Injury or Death (8, 9)</td>
<td></td>
</tr>
</tbody>
</table>

#### Severity scale

<table>
<thead>
<tr>
<th>Detection Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High (1)</td>
<td>Error always detected</td>
</tr>
<tr>
<td>High (2, 3)</td>
<td>Error likely to be detected</td>
</tr>
<tr>
<td>Moderate (4, 5, 6)</td>
<td>Moderate likelihood of detection</td>
</tr>
<tr>
<td>Low (7, 8)</td>
<td>Low likelihood of detection</td>
</tr>
<tr>
<td>Remote (9)</td>
<td>Detection not possible at any point</td>
</tr>
</tbody>
</table>

#### Detection scale

You can now complete a SEIPS analysis, consider different perspectives on work and complete an FMEA!
You can now complete a SEIPS analysis, consider different perspectives on work and complete an FMEA!

**Summary**

- Human factors is all about fitting the system to the person to make work (and life) easier and run more smoothly.
- A human factors perspective can unravel the influence of complex systems in healthcare situations and contribute to a just culture.
- SEIPS can be used to ensure different viewpoints and factors are considered when looking at a situation.
- Considering the effects of looking at work as imagined, work as disclosed, work as prescribed and work as done can help understanding of a system.
- FMEA can be used to identify potential risks in a system before they occur.
Any questions?

HUMAN FACTORS
- CHANGING PERSPECTIVES TO CHANGE OUTCOMES