
Dr. Nicklas Dahlstrom
Human Factors Manager

Webinar for IAEM
20 September 2023
Content

- Human Factors – What is it?
- HF and Crisis Management – The Link
- Delivery of Training – The Action
Human Factors – What is it?
Human Factors in Aviation
Technology and Design

(Chapanis, 1959)
... but there were more problems!

CO-PILOT CHECKLIST
1. DON'T TOUCH ANYTHING
2. KEEP YOUR MOUTH SHUT
Ca: One eighty.
FO: We did something to the altitude.
Ca: What?
FO: We're still at two thousand right?
Ca: Hey, what's happening here?

FO: God, look at that thing. That don't seem right, does it? Uh, that's not right.
CA: Yes it is, there's eighty.
FO: Naw, I don't think that's right. Ah, maybe it is.
CA: Hundred and twenty.
FO: I don't know.

FE: IIs hij er niet af, die Pan American? (Is he not off, the Pan American?)
Ca: Jawel. (Oh yes.)

FO: We're going to lose an engine, buddy.
Ca: Why?
FO: We're losing an engine.
Ca: Why?
Identifying Threats

- Perception
- Fatigue
- Culture
- Supervision
- Unclear instructions
- Workload/Stress
- Human error
- Communication
- Distractions
- Decision making
- Unexpected shift
- Time pressures
- Cooperation

Emirates
CRM is the effective utilisation of all available resources (e.g. crew members, aeroplane, systems and supporting facilities) to achieve safe and efficient operation.
Human Factors

Psychology

Physiology

Technology

Sociology

Communication

Leadership

Design

Learning

And so on …
CRM is the effective utilisation of all available resources to achieve safe and efficient operation.
Pilot Competencies

Competent pilot

K H A P M S D C L
Does it work?

• Research at academic medical center in UK

• Mandatory HF/CRM training for 517 staff (surgeons, anaesthesiologists, nurses etc.), including use of briefings and checklists for coordination

• Pre-operative briefings up in the operating room from 6.7% to 99% within four months

• Wrong site surgeries and retained foreign objects down from 7 in 2007 to none in 2008, after 14 months without training up to 5 in 2009

• Malpractice expenses down from $793,000 (2003-2007) to 0 (zero) in 2008

(Ricci & Brumsted, 2012)
The Problem with "Reliability"

Reliability = Predicting what can happen

Reliable = Do what told/trained = Procedures
Reliability and Resilience

**Goal: Safety and Security**

**Yes!**
- We can design a perfect safe system!
- Crises = Human Error
  - Avoiding crises: Technology / Procedures
    - Restrict the work!
  - Reliability
    - Learning from failure
    - Limit actions of staff
    - Train for likely events

**No!**
- We cannot design a perfect safe system!
- Crises = Weaknesses in system
  - Avoiding crises: Provide "action space"
    - Support the work!
  - Resilience
    - Learn from success
    - Support staff to take action
    - Train also for unlikely events

The human contribution keeps the system together!
Need for Resilience?

Everyone has a plan 'till they get punched in the mouth.
A Story about Safety

Turkey Well-being

Shelter

Regular feeding

Attention from farmer

Days

27th November 2015

24th November 2016

(Taleb, 2007)
Summary

Human Factors - What is it?

- Advanced tech → Fatal Accidents
- Accidents → Behaviour/Design
- More accidents → HF/CRM
- HF/CRM → Success of Safety

Makes work and people safer and better!
Crisis Management – The Link
Crisis Management, Safety and HF - Shared Goals and Differences
Emergencies and Crises

Characterised by:

• Goals are unclear or even contradictory
• Fast dynamic developments and changes
• Frequent "frictions", i.e. unexpected problems
• The situation has many layers of information, which makes it complex and difficult to grasp
• Large amounts of information of unclear relevance ("informational flooding")
• Effects of decisions often delayed, difficult to detect and therefore challenging to follow up on
The Problem of Escalation

- Information arriving may already be old
- The escalation may be exponential
  (People think of linear development)

Must get ahead of the development!
Crisis Management

Traditional approach: "Fight the crisis"

- Mastering the crisis by fighting its perceived causes
- Based on use of detailed plans for predicted events
- Relying on that it is possible forecast the origin, development and outcome of a crisis
Modern approach: "Managing the crisis"

- 100% safety is impossible to reach
- An exact forecast of the development of a crisis is impossible
- Plans that are designed for specific and well-defined situations may be useful but may become useless in contact with reality
- It may be impossible to drill "correct behaviour" – because nobody will know what this is in the actual situation

Focus on developing **general competencies** in managing unclear, dangerous, and dynamic situations
Understanding Human Behaviour – for Effective Crisis Management
## Decision Making

<table>
<thead>
<tr>
<th>Conditioned reaction</th>
<th>Natural decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify triggers</td>
<td>• Recognise cues</td>
<td>• Clarify priorities, analyse options</td>
</tr>
<tr>
<td>• Fast/directed actions</td>
<td>• Serial option evaluation</td>
<td>• Make use of time</td>
</tr>
<tr>
<td>• Focus on actions, avoid distractions</td>
<td>• Mental simulation</td>
<td>• Reflected choice</td>
</tr>
</tbody>
</table>

- Correct /fast reaction

- "Good enough" decision

- Optimal decision

- Split-second
- Seconds
- Minutes
- Hours
Understanding Human Error (and Human Strengths!)
Summary
HF and Crisis Management - The Link

- Shared Goals and Differences
- Understand Human Behaviour
- Human Error and Strengths
- Crisis Management + HF = Improved Crisis Management
Delivery of Training – The Action
Does culture affect behaviour?
Culture Module - Exercise

Where in the world do you think that Power Distance is likely to be very high?

Maybe in the Far East?

Yes, I think so.

Me too. I will fill this up to almost full … about 80%.
Culture Module - Exercise
Understanding Training
- Understanding Cognitive Artefacts

Cognitive Artefacts = Things to think with

(Krakauer, 2016)
Complementing and Competing Cognitive Artefacts

Complementing Leaves a supporting structure

Competing Leaves no supporting structure

(Krakauer, 2016)
Supporting Thinking and Decision Making

Involve and engage

Trigger mental models
"Simple Simulation" for Training
M/S Antwerpen
You have changed career, grown a hipster beard and now you are the manager of a supermarket…

Call from the supermarket:

"The automatic temperature control in the cold storage room has failed, you must come and sort out the temperature manually!"
Cold Store
Cold Store

"Phases of Learning"

"Reactive"

"Incremental"
Cold Store
- Data on Performance

1. Adaptor
2. Cautious
3. Changer
4. Oscillator
Emergency Descent
The First Scenario
The Second Scenario
Other examples

m/s Stockholm
Implementation & Integration
Summary

- Human Factors – What it is!

- Crisis Management and HF – there is a link and potential!

- Training delivery – finding new ways to train HF competencies
Thank you!
- Questions and Discussion

nicklas.dahlstrom@emirates.com