

*FLY BETTER*



# Crisis Management and Human Factors – How HF Can Support Crisis Management

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# Content

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

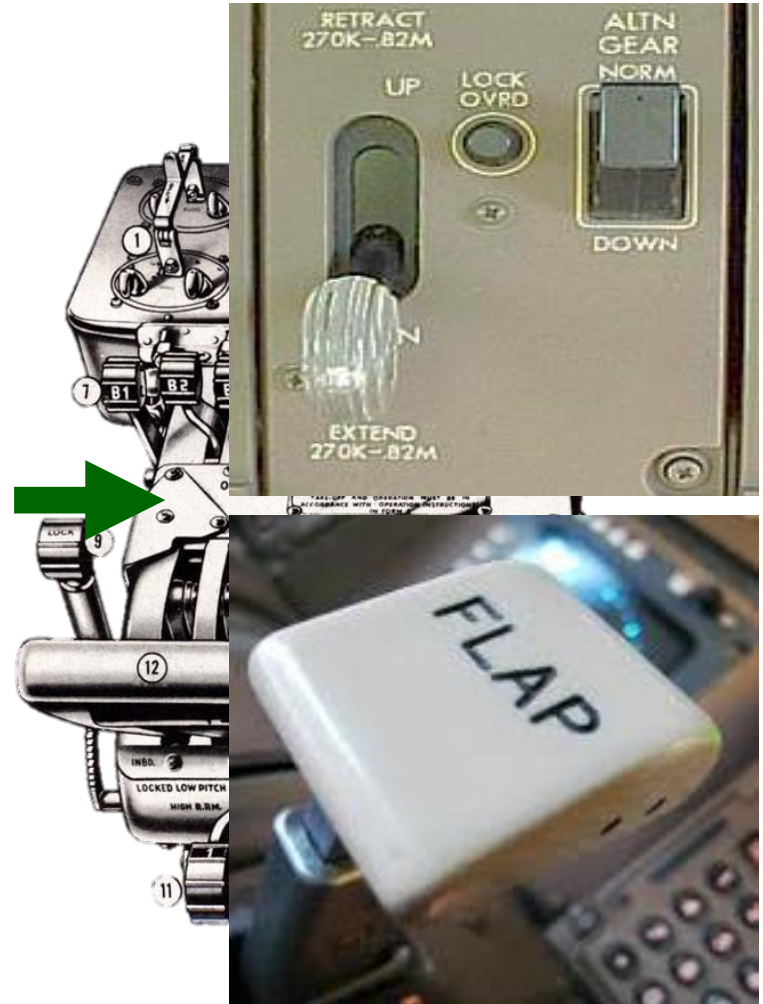
# Human Factors

## - What is it?

# Human Factors in Aviation



# Technology and Design



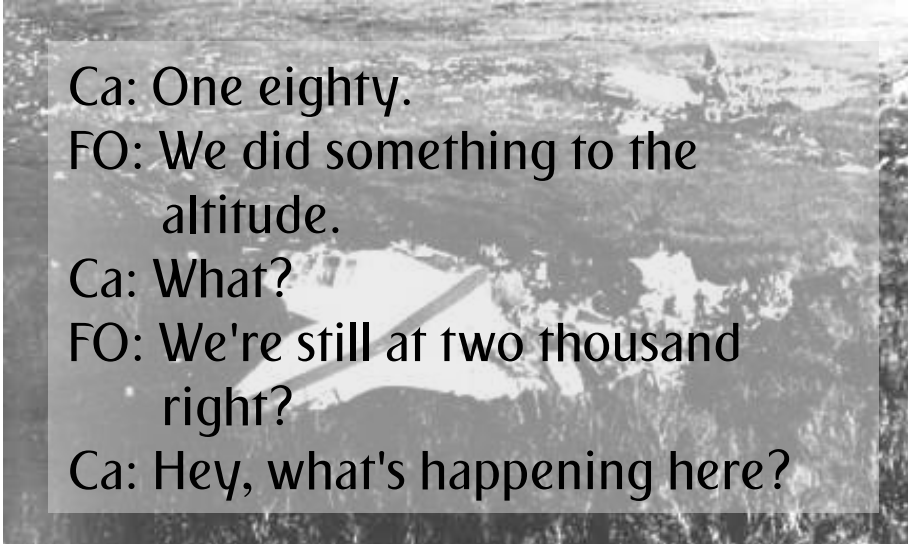
... but there were more problems!

URE WARNING

CO-PILOT CHECKLIST  
1. DON'T TOUCH ANYTHING  
2. KEEP YOUR MOUTH SHUT



# Technology, People and Organisation



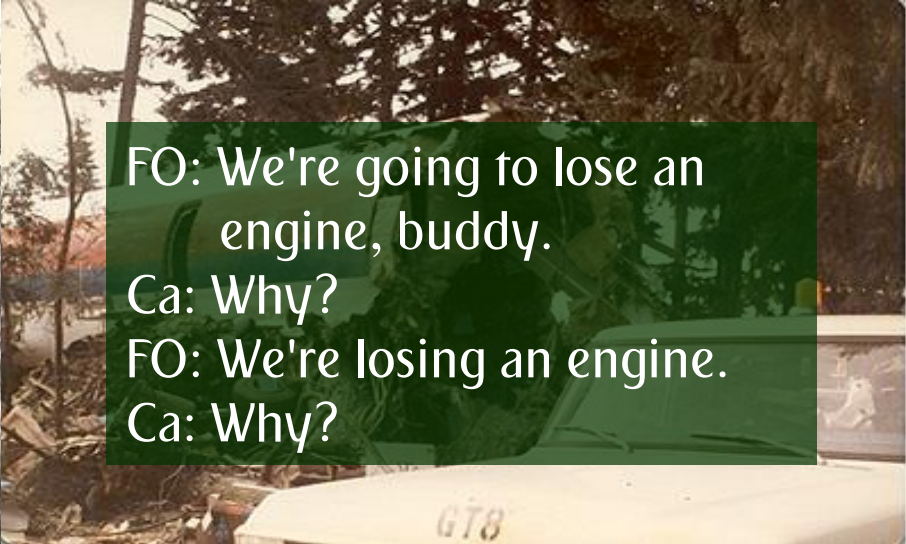
Ca: One eighty.

FO: We did something to the altitude.

Ca: What?

FO: We're still at two thousand right?

Ca: Hey, what's happening here?

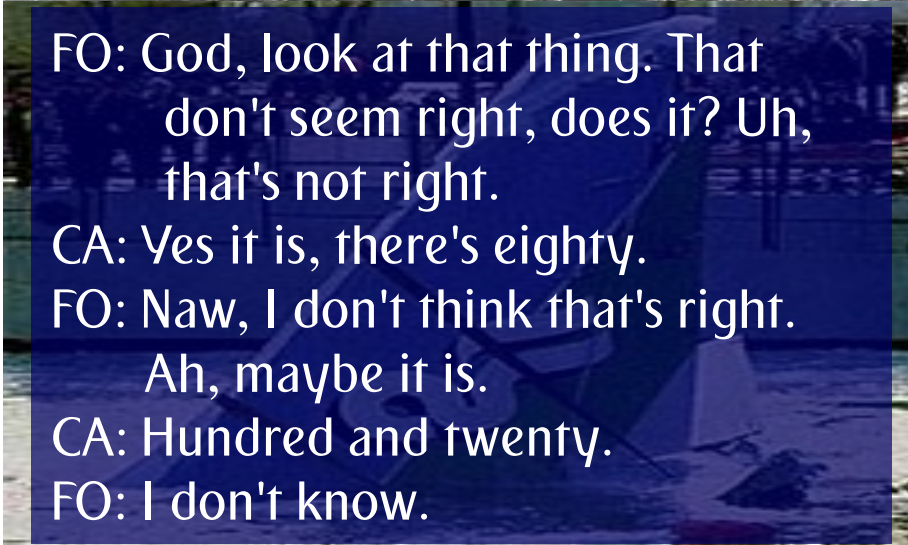


FO: We're going to lose an engine, buddy.

Ca: Why?

FO: We're losing an engine.

Ca: Why?



FO: God, look at that thing. That don't seem right, does it? Uh, that's not right.

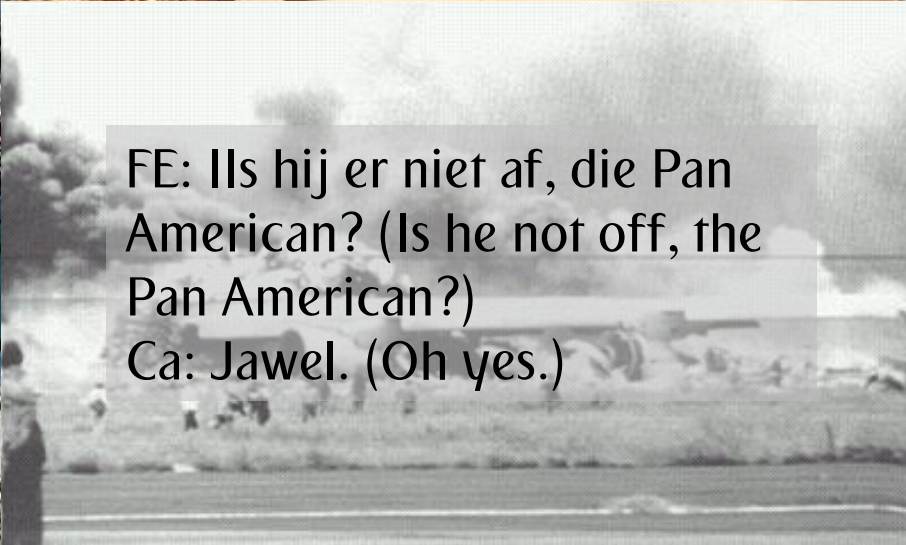
CA: Yes it is, there's eighty.

FO: Naw, I don't think that's right.

Ah, maybe it is.

CA: Hundred and twenty.

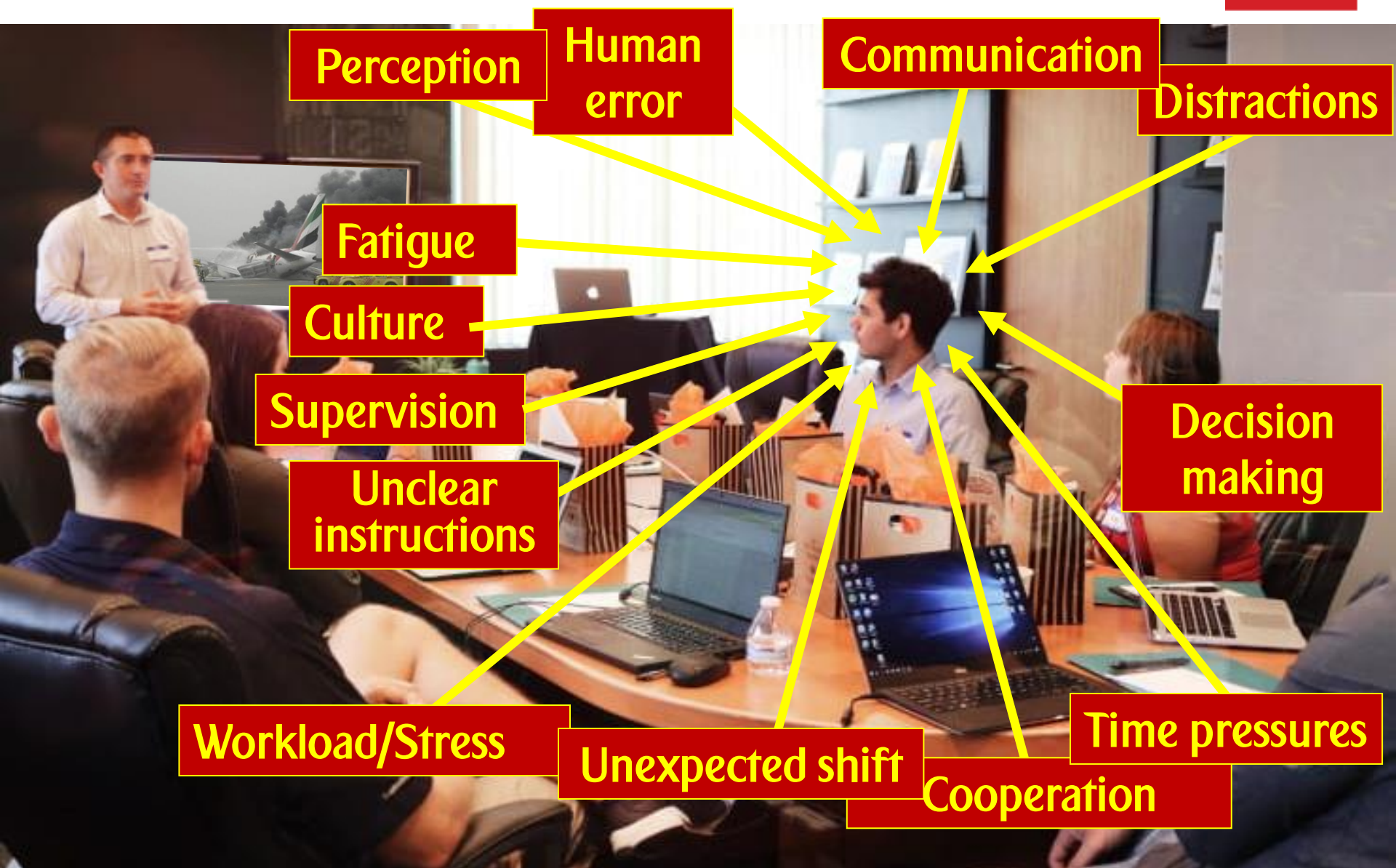
FO: I don't know.



FE: Is hij er niet af, die Pan American? (Is he not off, the Pan American?)

Ca: Jawel. (Oh yes.)

# Identifying Threats



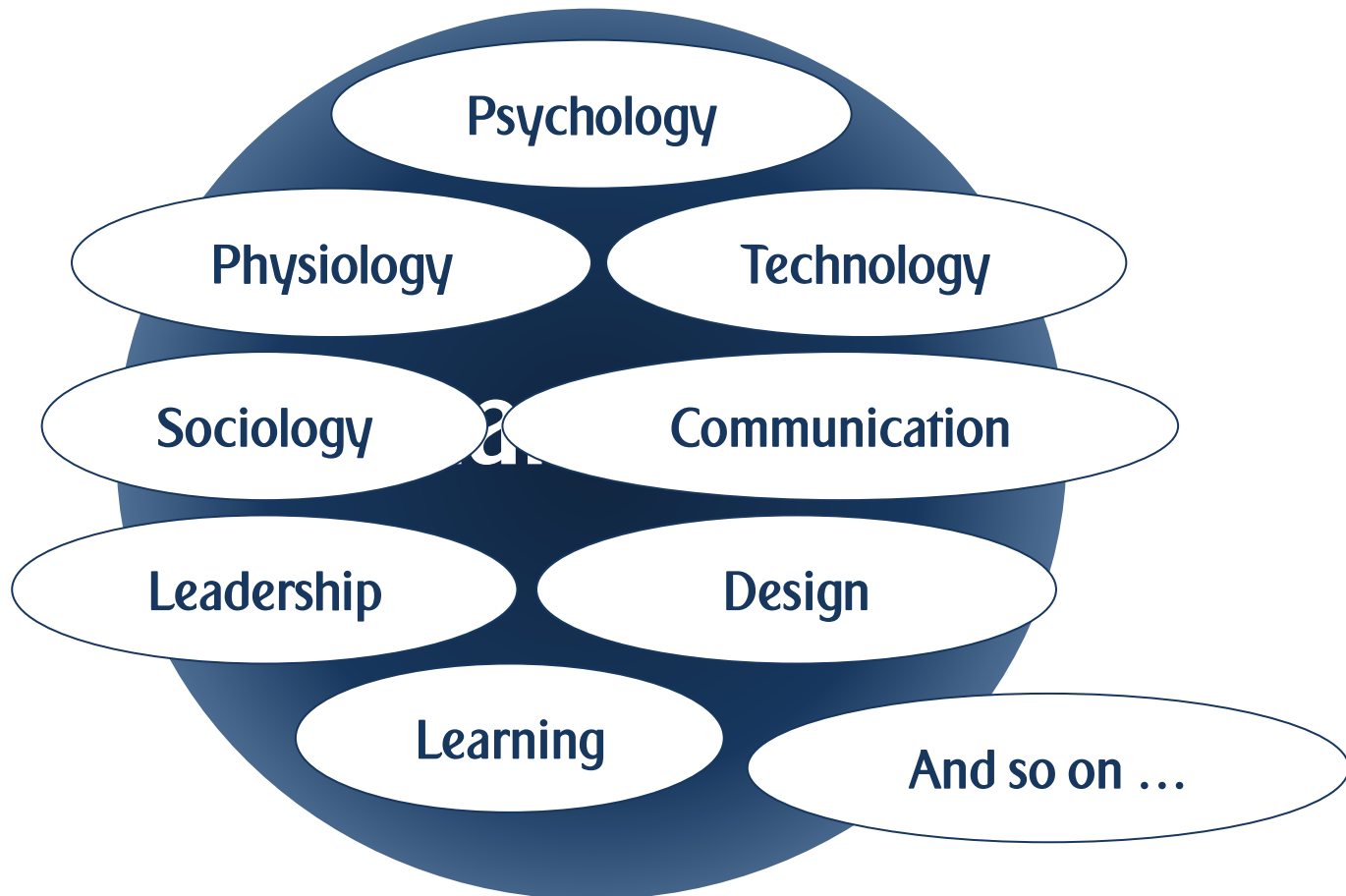


# Crew Resource Management

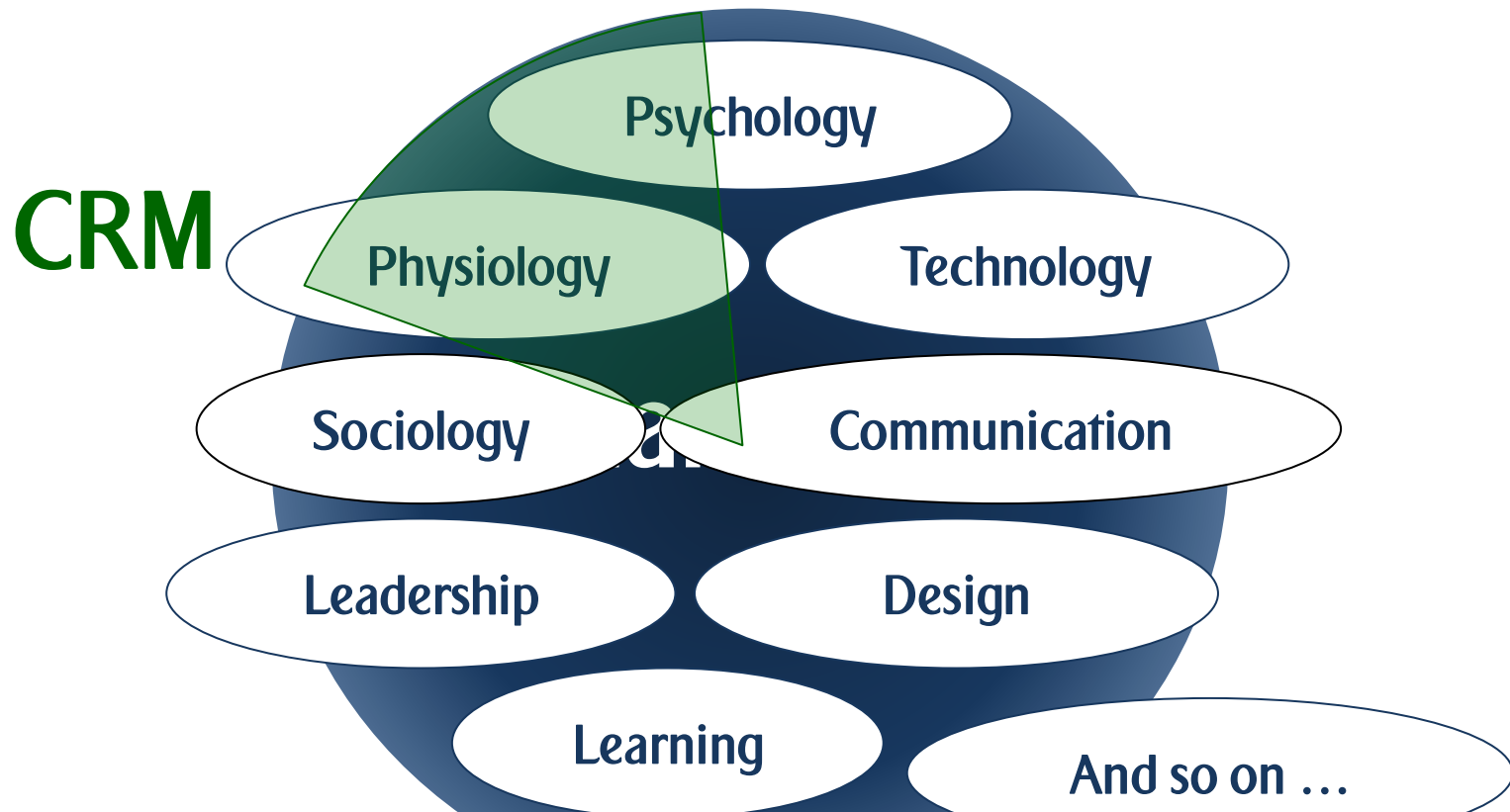


CRM is the effective utilisation of all available resources (e.g. crew members, aeroplane, systems and supporting facilities) to achieve *safe and efficient* operation.

# Human Factors



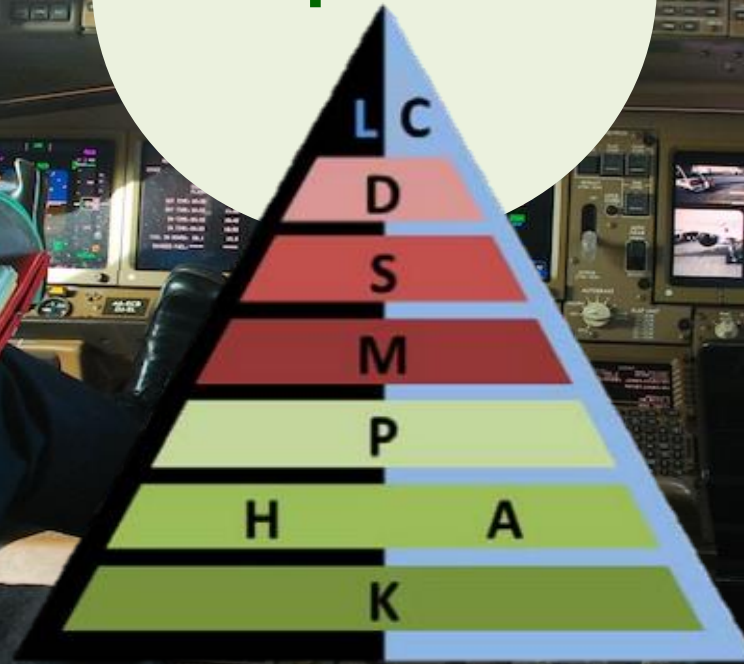
# Human Factors and CRM



**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?

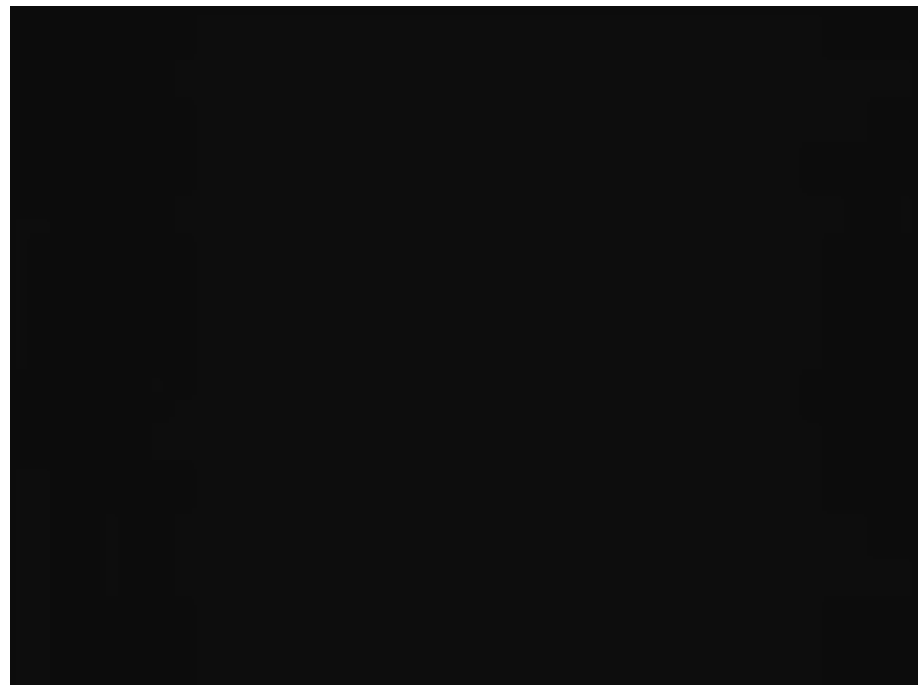
- Research at academic medical center in UK
- Mandatory HF/CRM training for 57 staff (surgeons, anaesthesiologists, nurses etc.), including use of briefings and checklists for coordination
- Pre-operative briefings up in the operating room from 6.7% to 99% within four months
- Wrong site surgeries and 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



# The Problem with "Reliability"

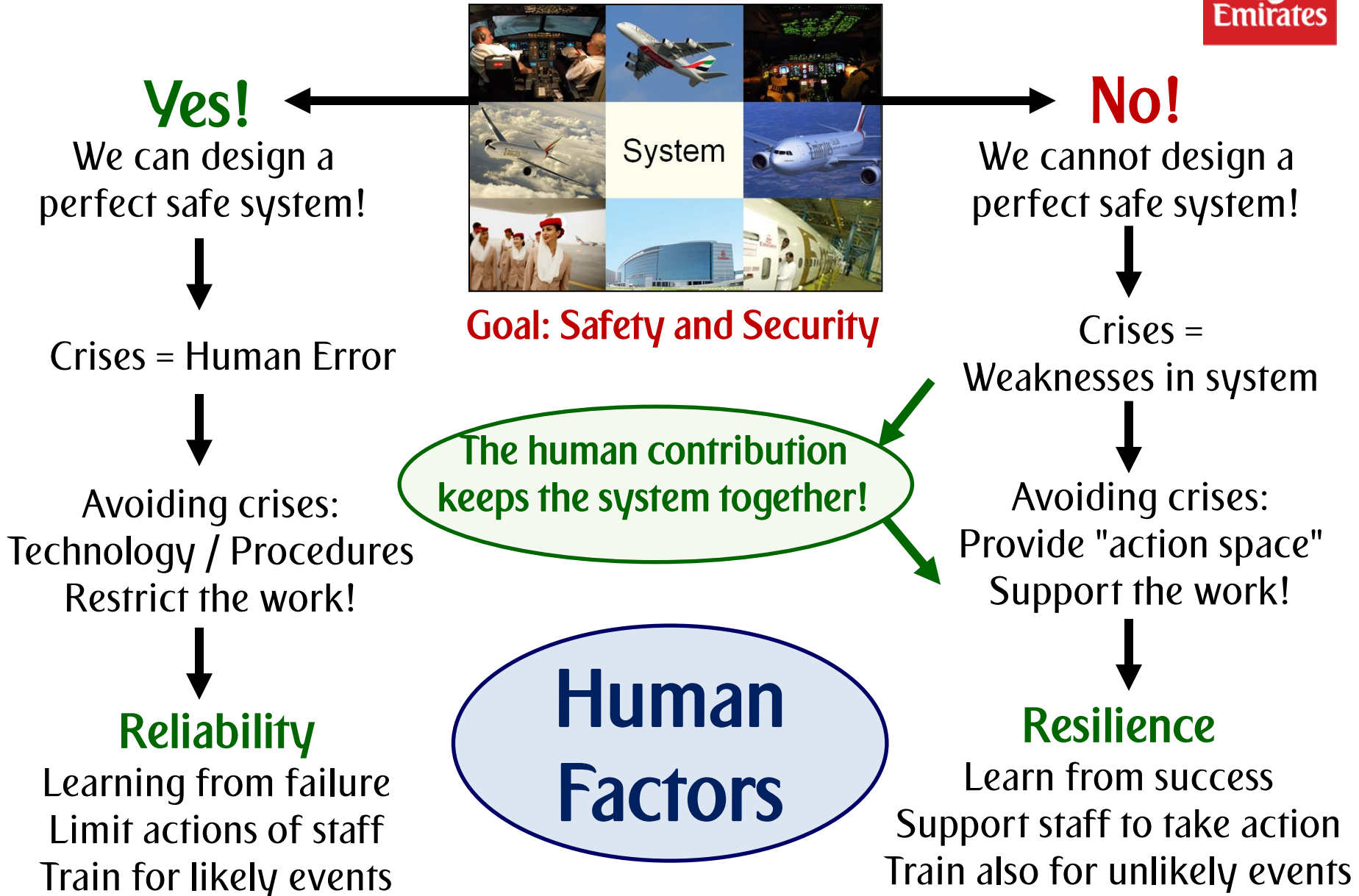


Reliability = Predicting what can happen



Reliable = Do what told/trained = Procedures

# Reliability and Resilience



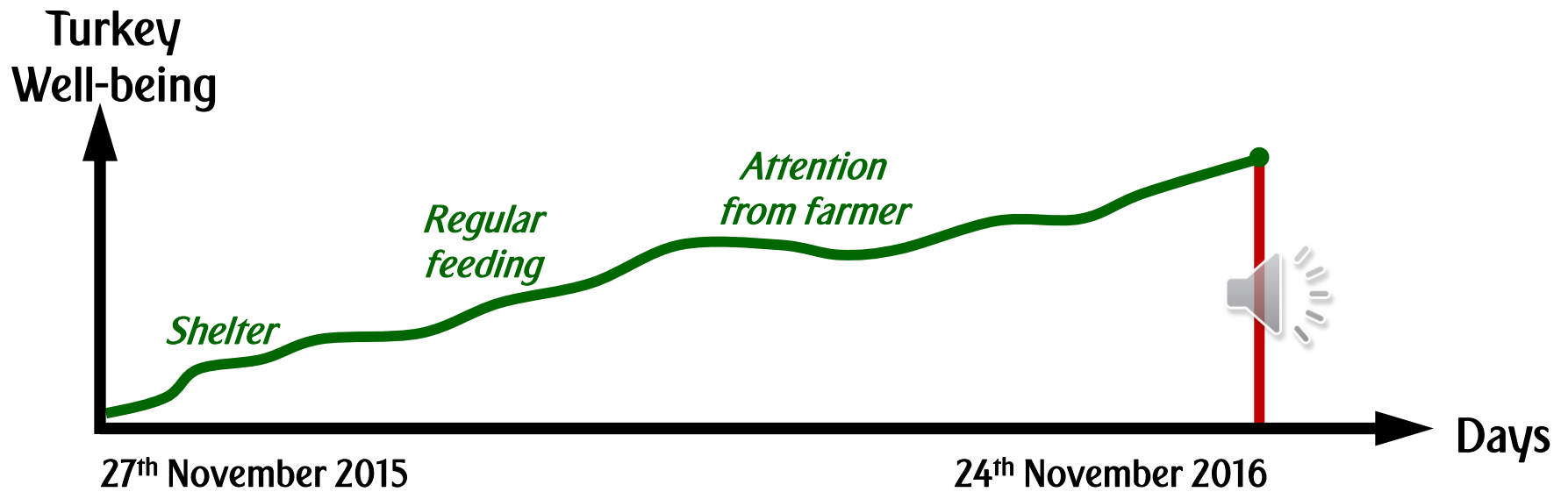
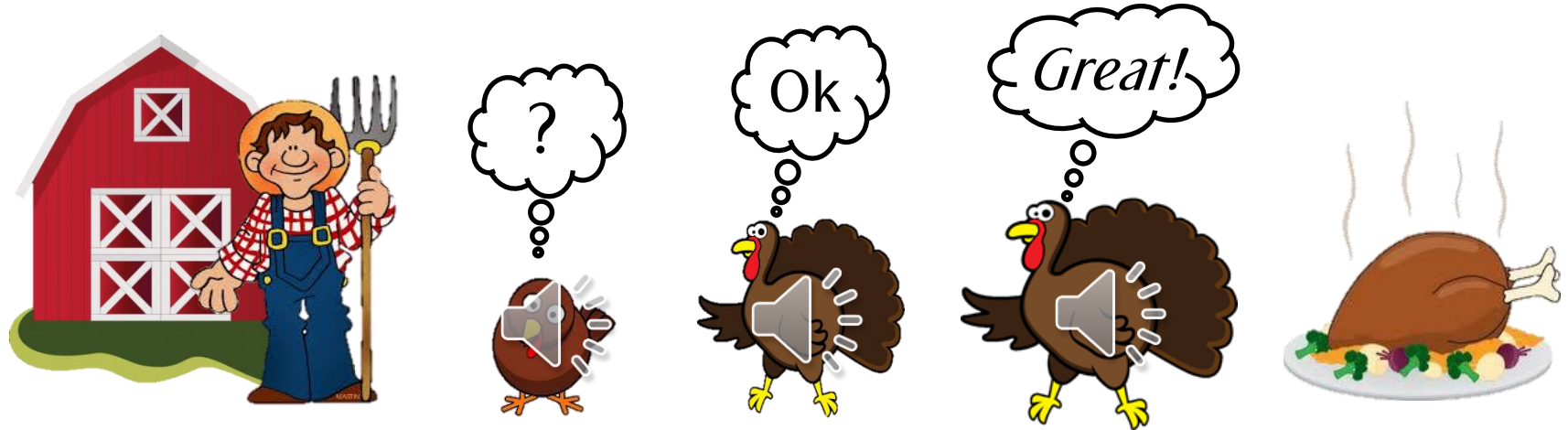
# Need for Resilience?

A photograph of two boxers in a ring. One boxer is in the foreground, wearing red gloves and black trunks, with a determined expression. The other boxer is in the background, also in red gloves and black trunks, with a more intense, focused expression. The background is dark with bright, out-of-focus lights.

**Everyone has a plan 'till they get punched in the mouth.**



# A Story about Safety



# Summary

## Human Factors- What is it?

- Advanced tech → Fatal Accidents

# NEED

- 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



# Crisis Management, Safety and HF - Shared Goals and Differences



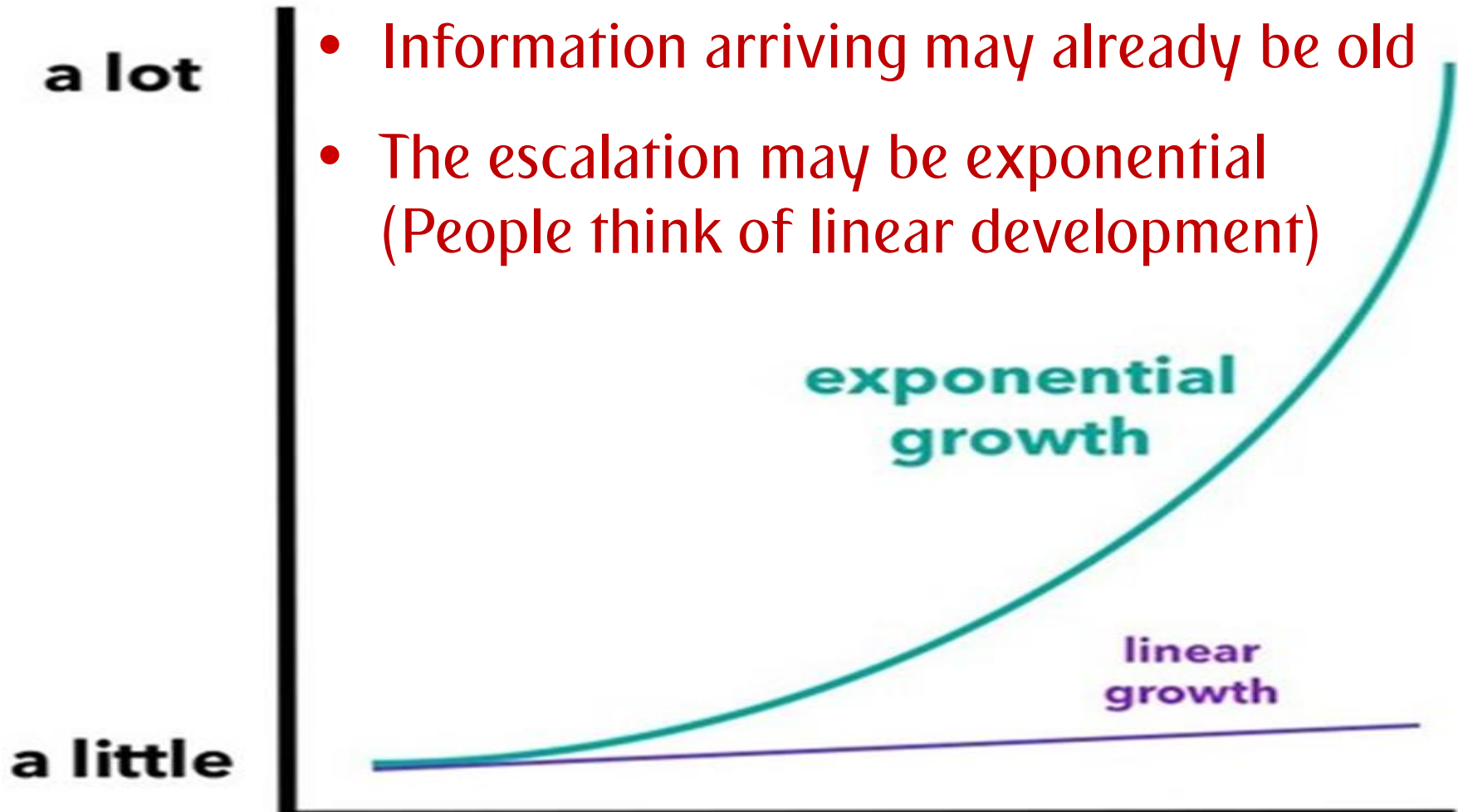
# Emergencies and Crises

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)

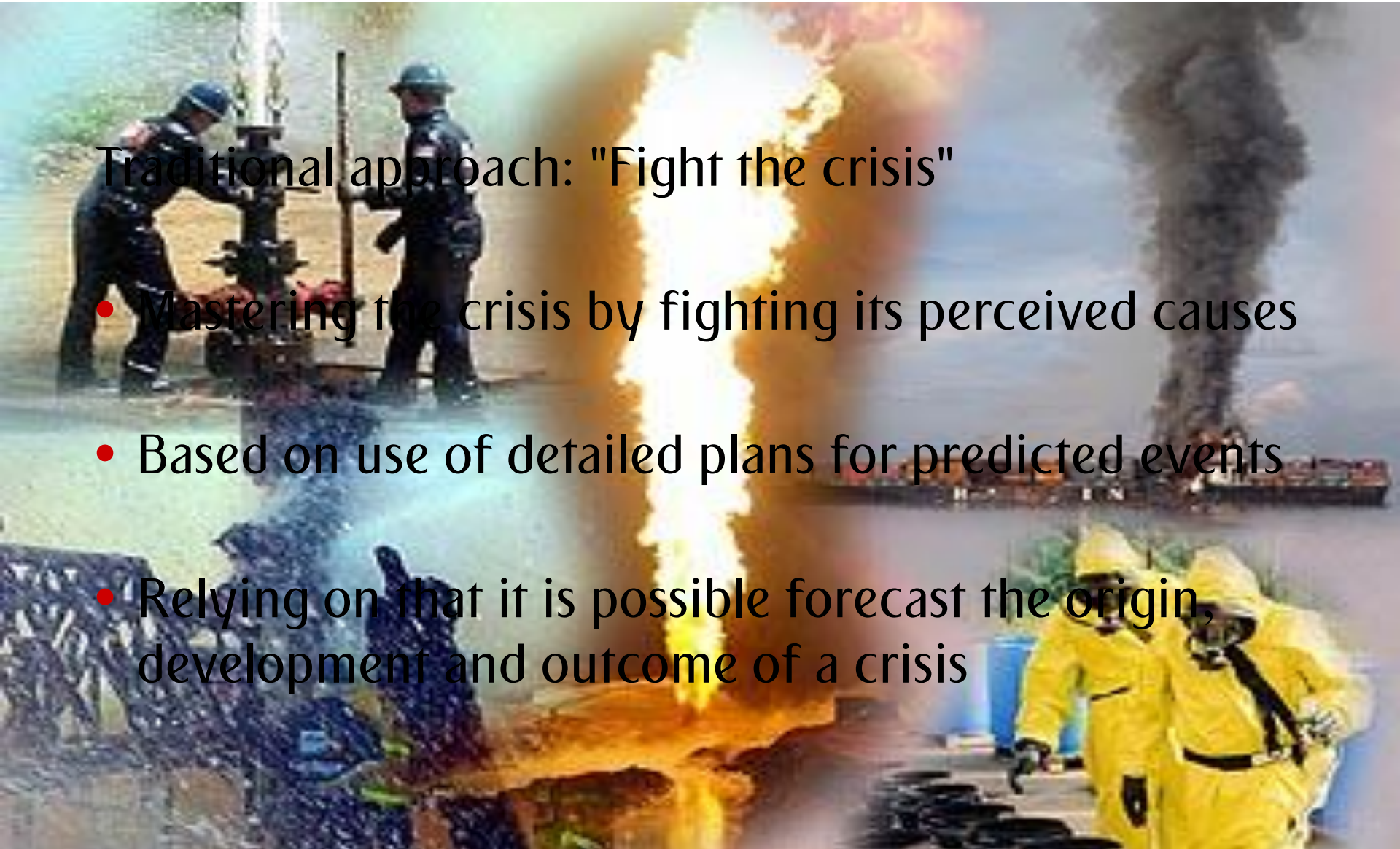


***Must get ahead of the development!***

# Crisis Management

Traditional approach: "Fight the crisis"

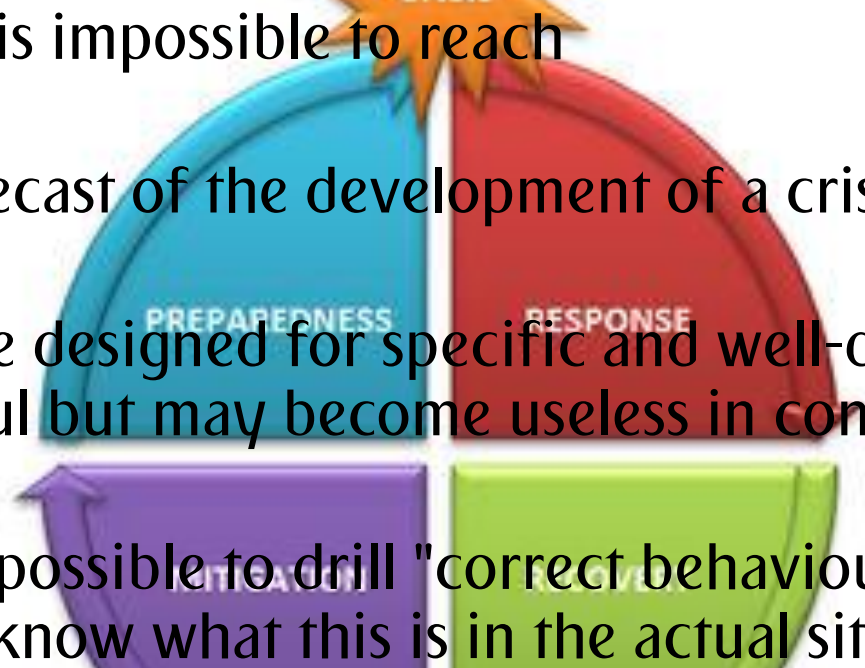
- Mastering the crisis by fighting its perceived causes
- Based on use of detailed plans for predicted events
- Relying on that it is possible forecast the origin, development and outcome of a crisis





# Crisis Management

## 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

| Conditioned reaction   | Natural decision making   | Rational decision making  |
|--|---|---|
| <ul style="list-style-type: none"><li>• Identify triggers</li><li>• Fast/directed actions</li><li>• Focus on actions, avoid distractions</li></ul> | <ul style="list-style-type: none"><li>• Recognise cues</li><li>• Serial option evaluation</li><li>• Mental simulation</li></ul> | <ul style="list-style-type: none"><li>• Clarify priorities, analyse options</li><li>• Make use of time</li><li>• Reflected choice</li></ul> |
| ⇒ Correct /fast reaction   | ⇒ "Good enough" decision  | ⇒ Optimal decision  |



# 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?



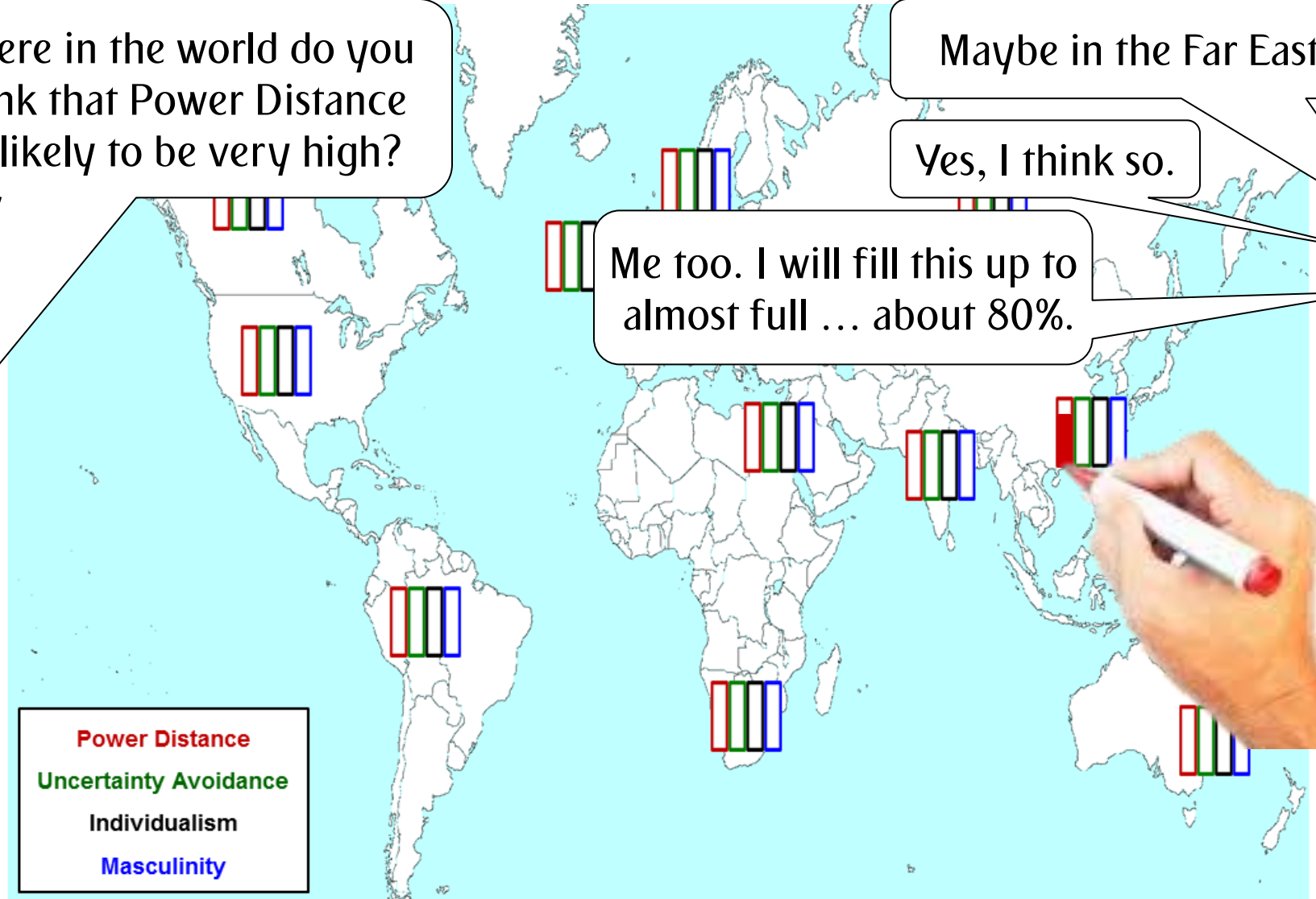
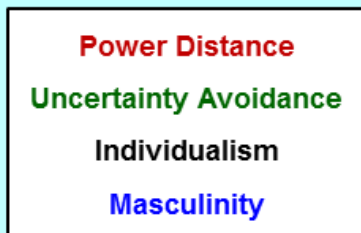
# Culture Module - Exercise

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

Maybe in the Far East?

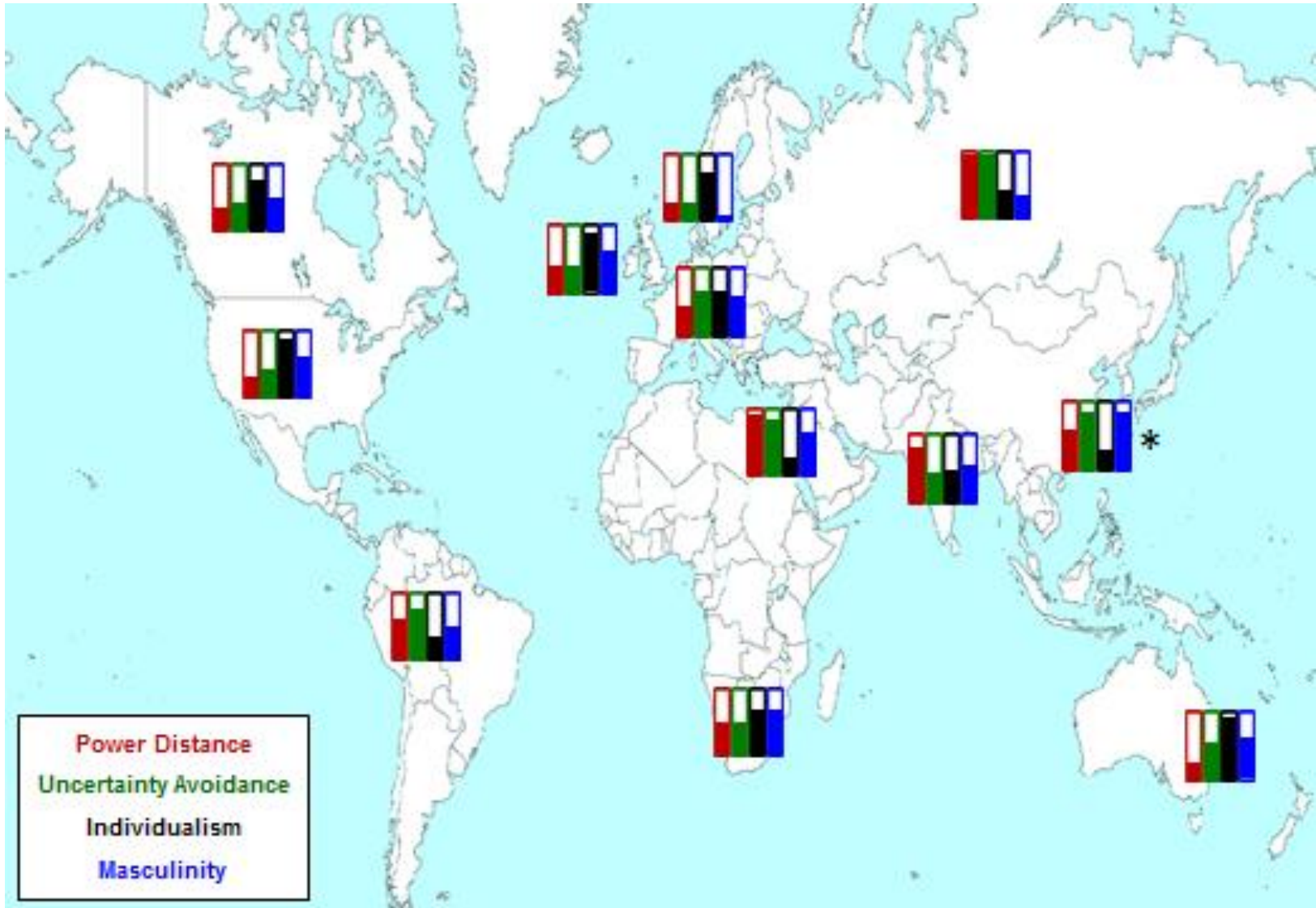
Yes, I think so.

Me too. I will fill this up to almost full ... about 80%.





# Culture Module - Exercise



# Understanding Training

## - Understanding Cognitive Artefacts

**Cognitive**



**Thinking**

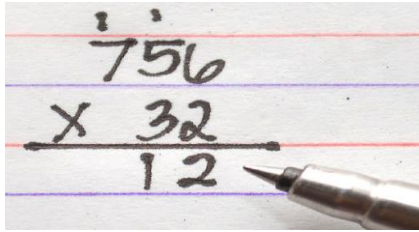
**Artefacts**



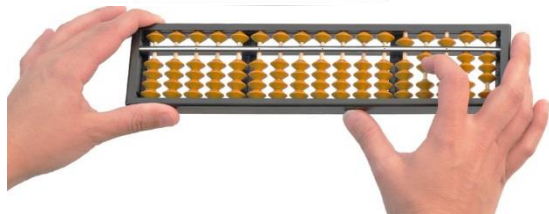
**Things**

**Cognitive Artefacts = Things to think with**

# Complementing and Competing Cognitive Artefacts



# XLVI



**Complementing**  
Leaves a supporting structure

**Competing**  
Leaves no supporting structure

# Supporting Thinking and Decision Making



**Involve and engage**

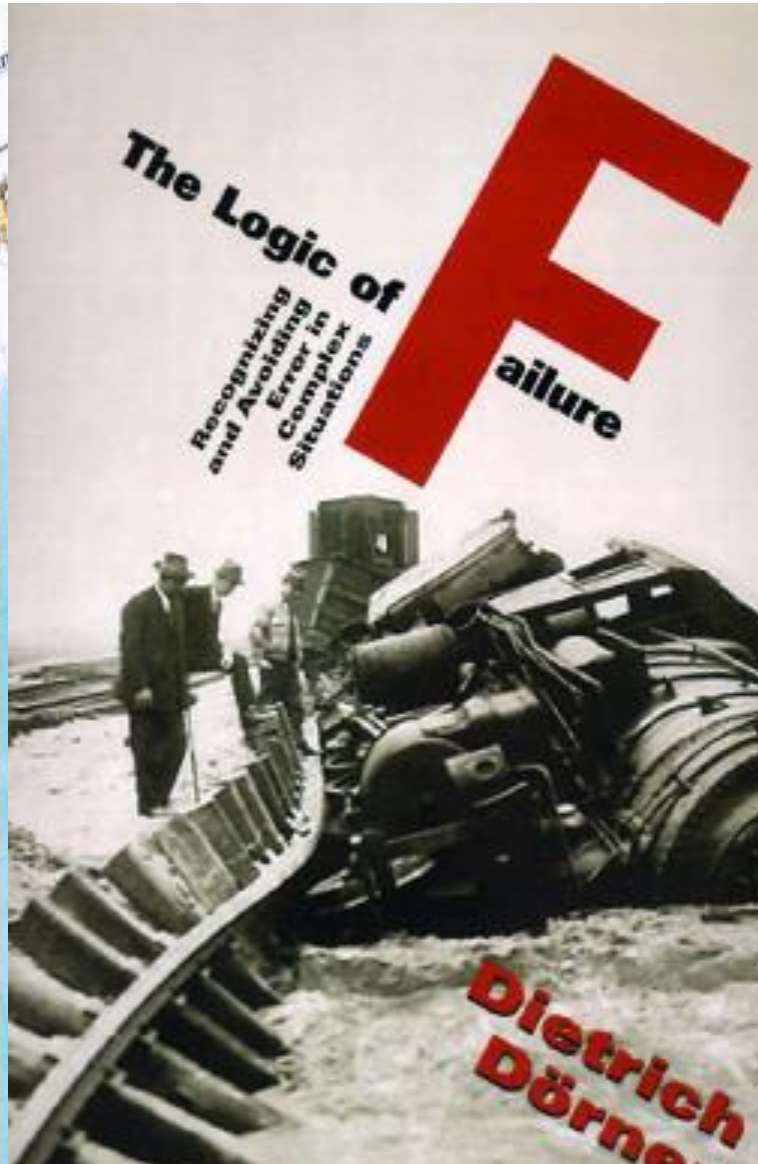
**Trigger mental models**



# "Simple Simulation" for Training



# M/S Antwerpen



**You have changed career, grown a hipster beard and now you are the manager of a supermarket...**



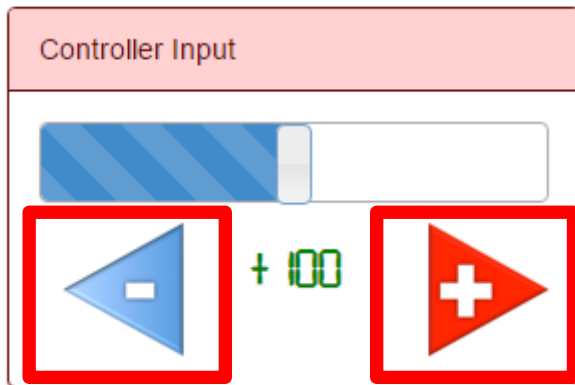
**Call from the supermarket:**

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

# Cold Store

Thermo Sim

Controller Input



+ 100

Target Value

+04

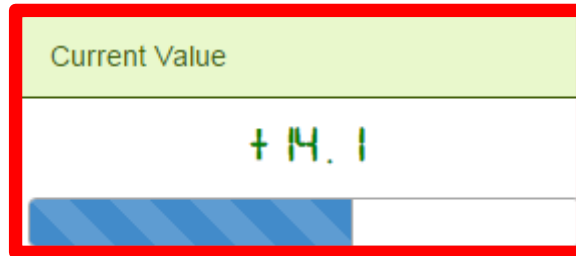


Start

100  
8

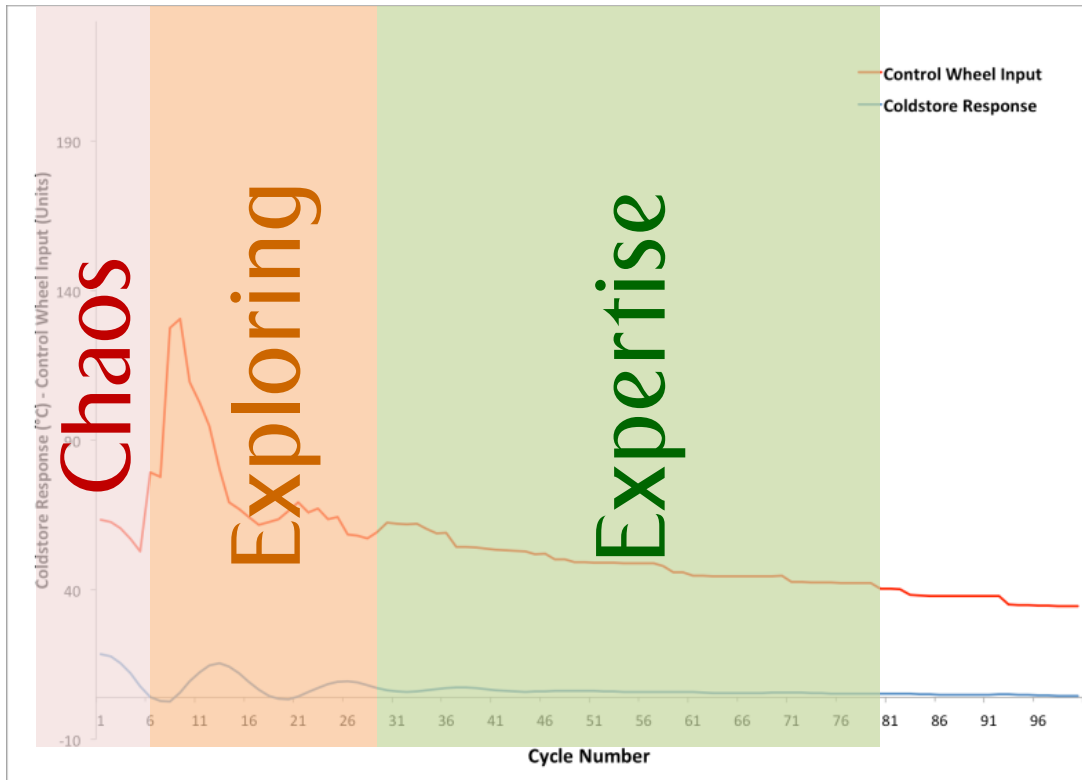
Current Value

+14.1

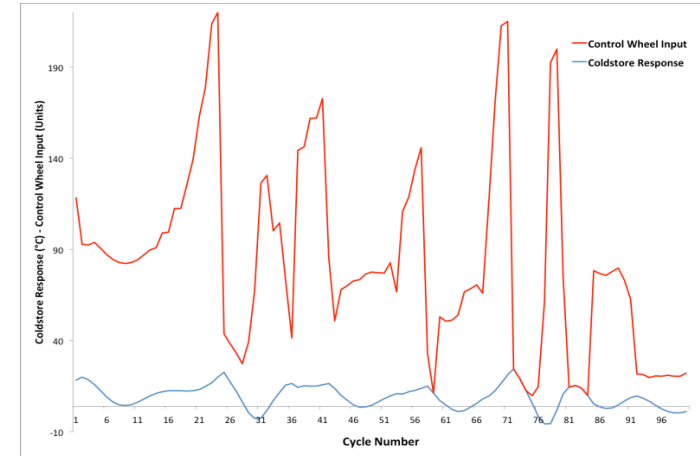




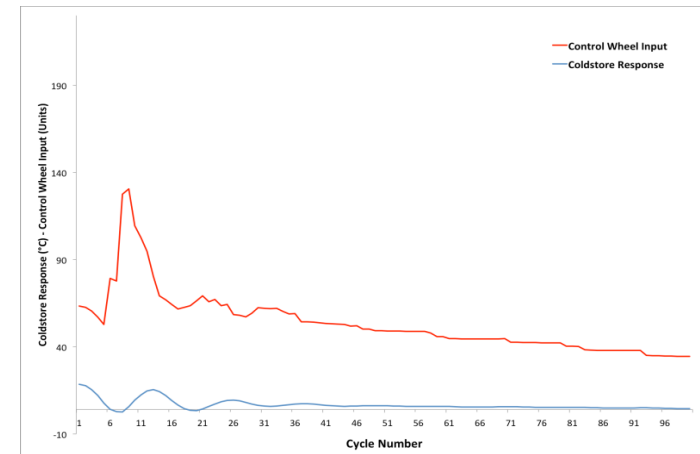
# Cold Store



"Phases of Learning"

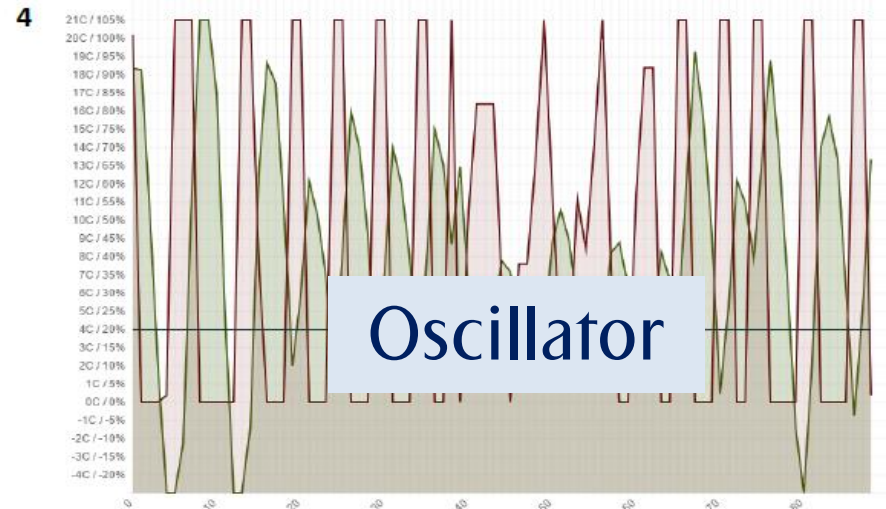
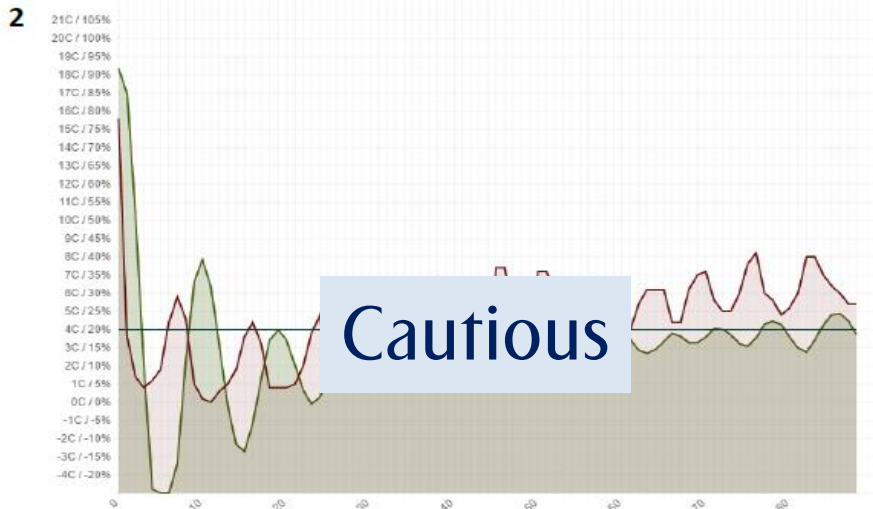
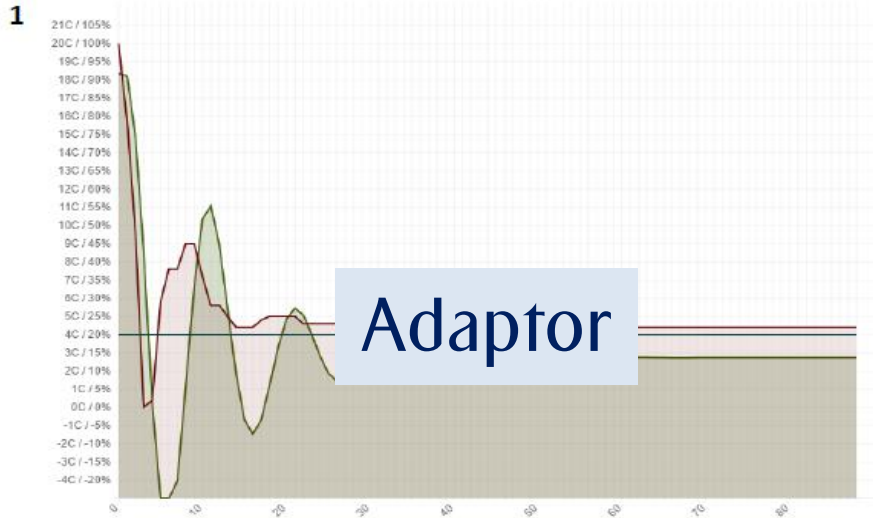


"Reactive"

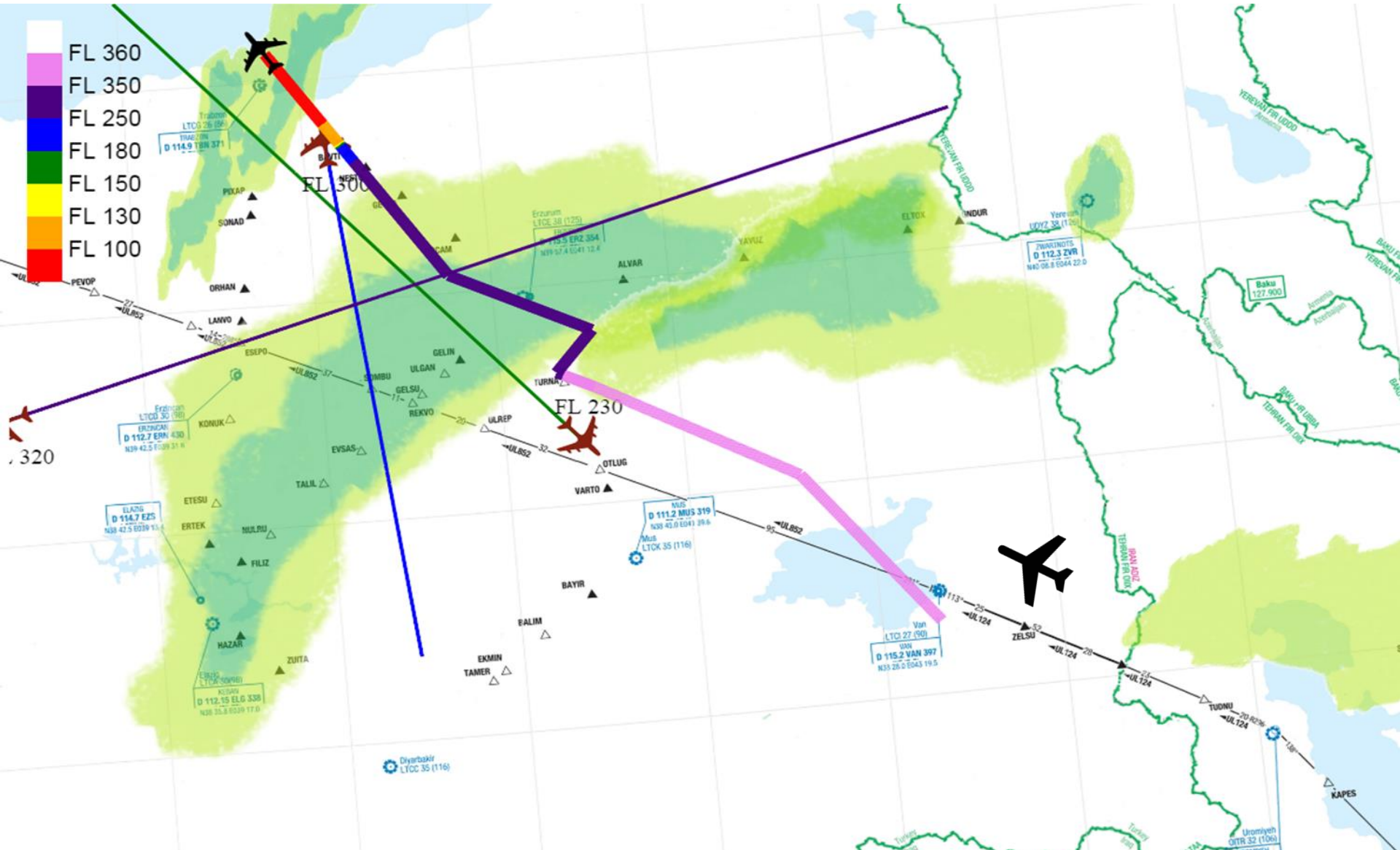


"Incremental"

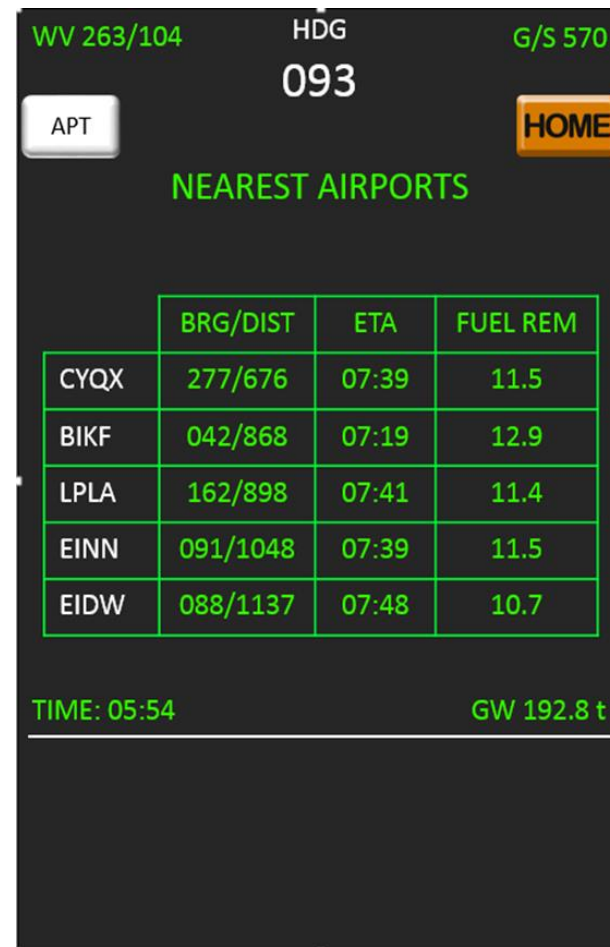
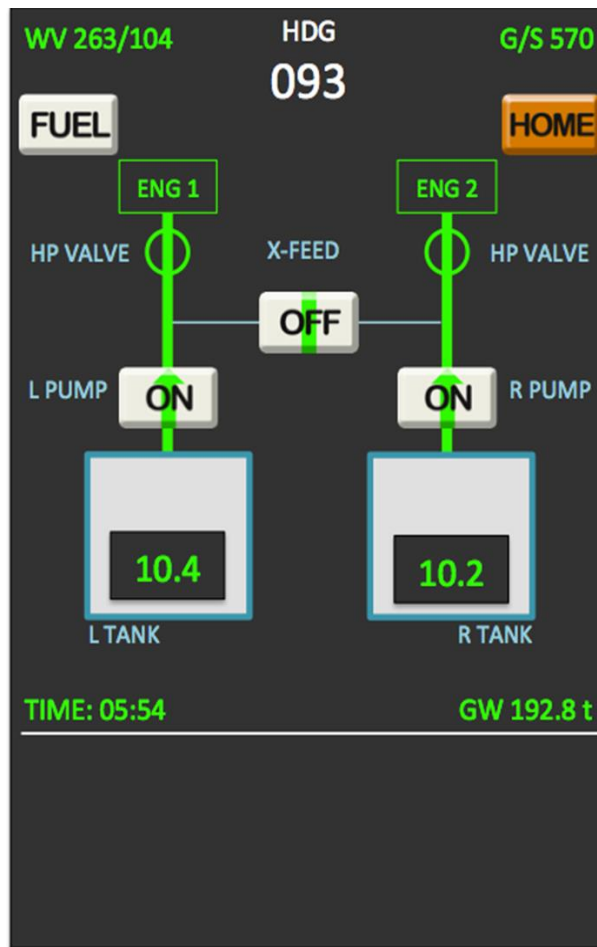
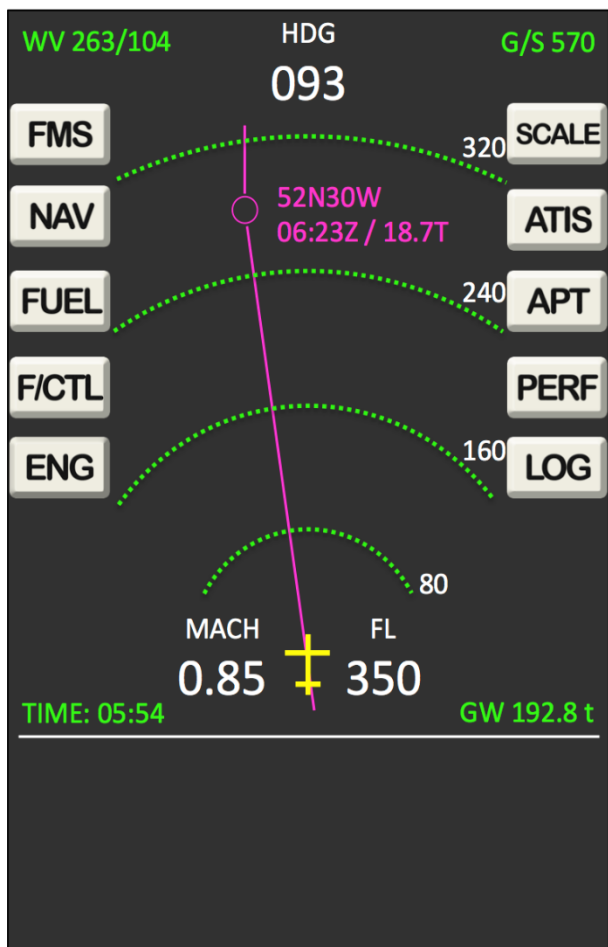
# Cold Store - Data on Performance



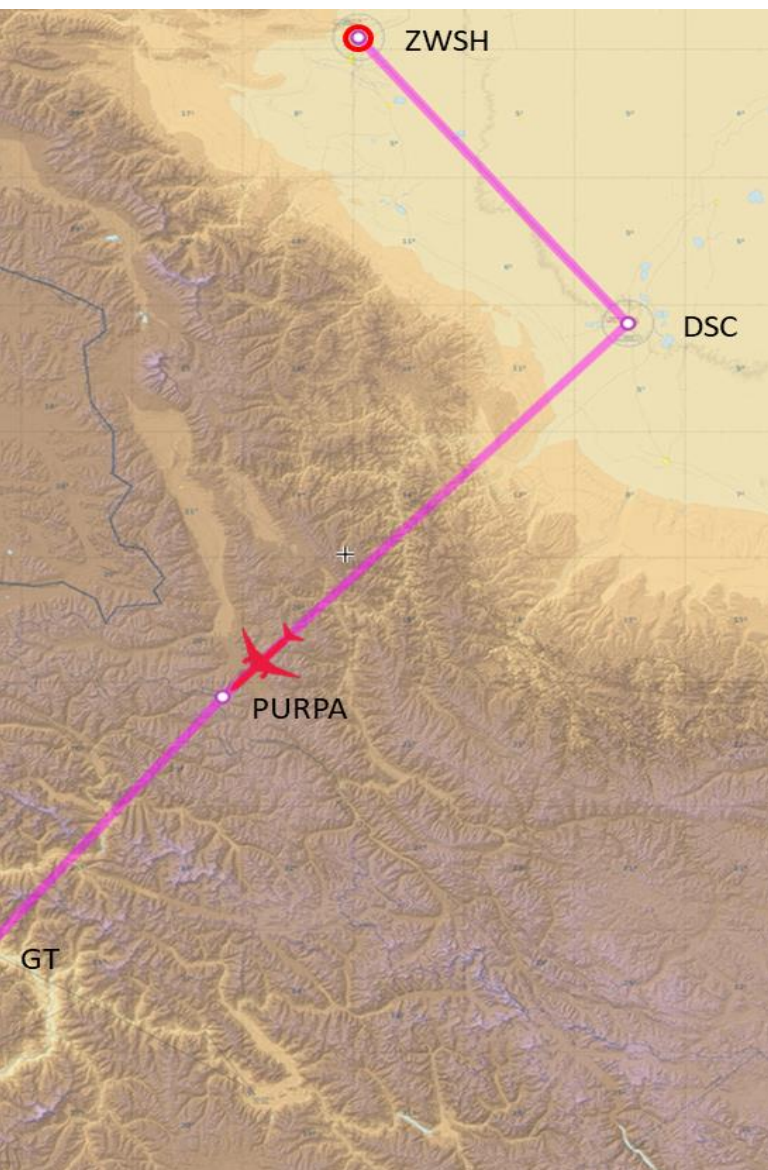
# Emergency Descent



# The First Scenario



# The Second Scenario



# Other examples

Instructor

Manage

Trainee

Observer



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



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