



# Designing Human Factors Training – Creating CRM Courses

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- Creating training with stakeholder interest (ownership)
- What are Human Factors?
- Identifying Threats
- Identifying Error
- The Typical CRM modules
- Searching for data to support the training
- Alternate Sources for Content
- Creating your three year plan

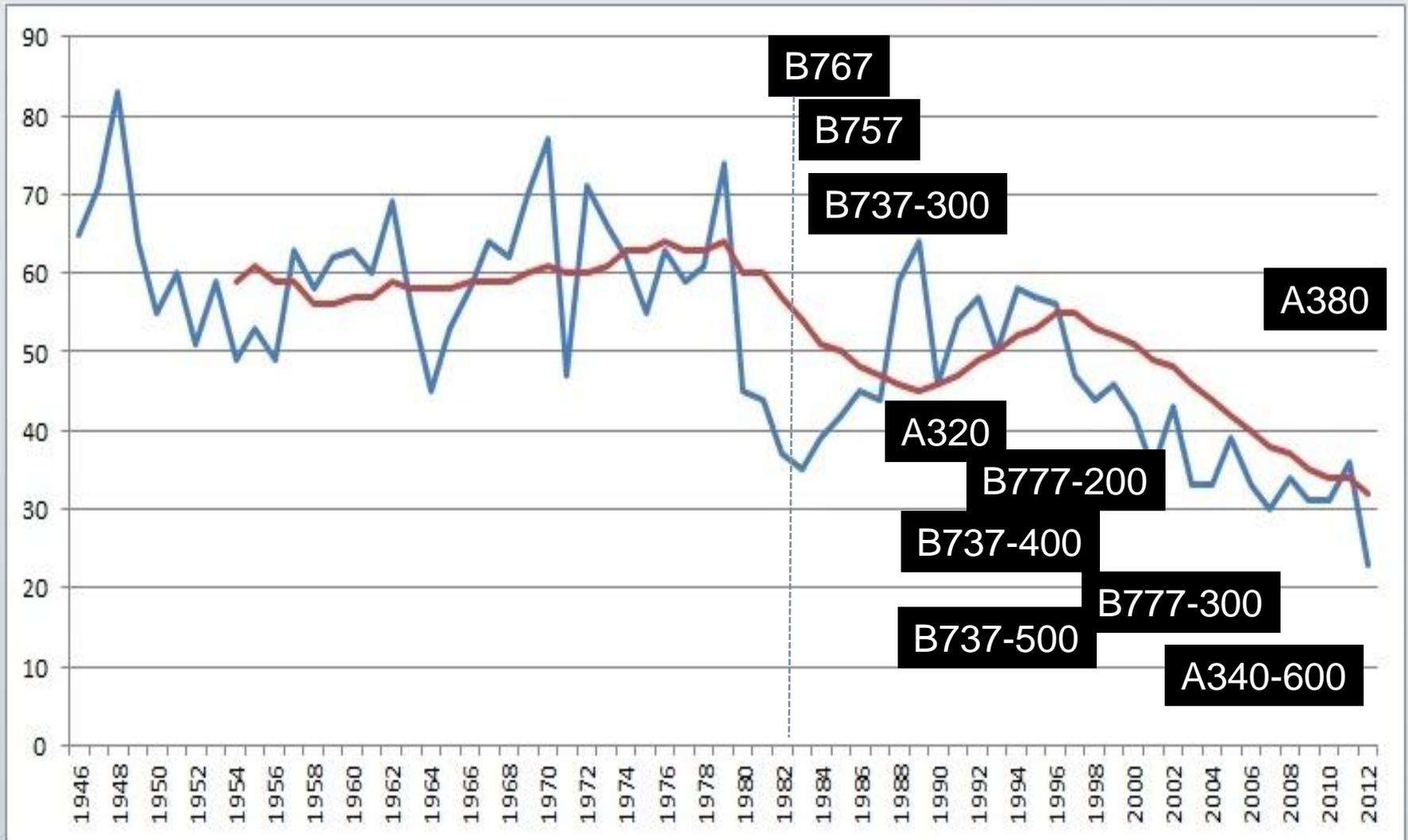


# Ownership of training

- Trainees take more ownership of their training when they can identify with the training
- An off-the-shelf program may not fit the type and scope of operations that you have
- One size does not fit all – you may have to adapt to each profession within the company
- Keep it simple – identifiable – and fit for purpose
- Do not force a concept or idea which has no relevance to your scope of operation
- Train like you work – and work like you train

# Airline Accidents and Trend

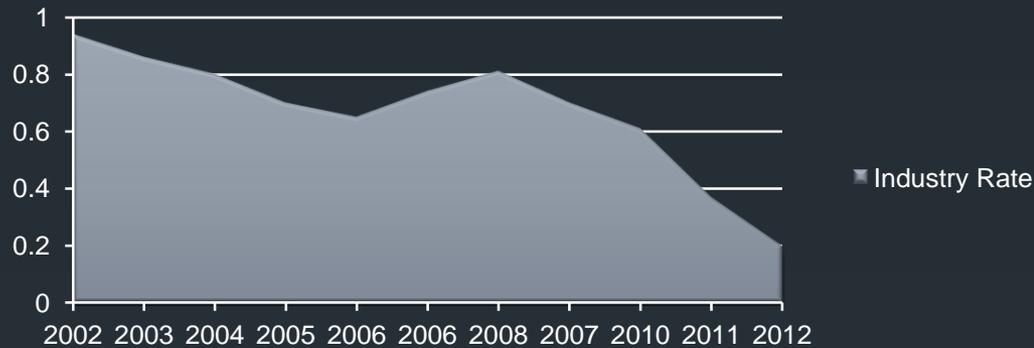
Fatal accidents per year (moving average in red)



# State of Aviation Today



## Global Accident Rate Western-Built Jet Hull Losses per Million Flights



Source: IATA GSIC

78.72%  
safer  
than 2002

**If Emirates  
was subjected to  
the current rate:  
1 Hull loss in 34.25  
years**

### Accidents in 2012

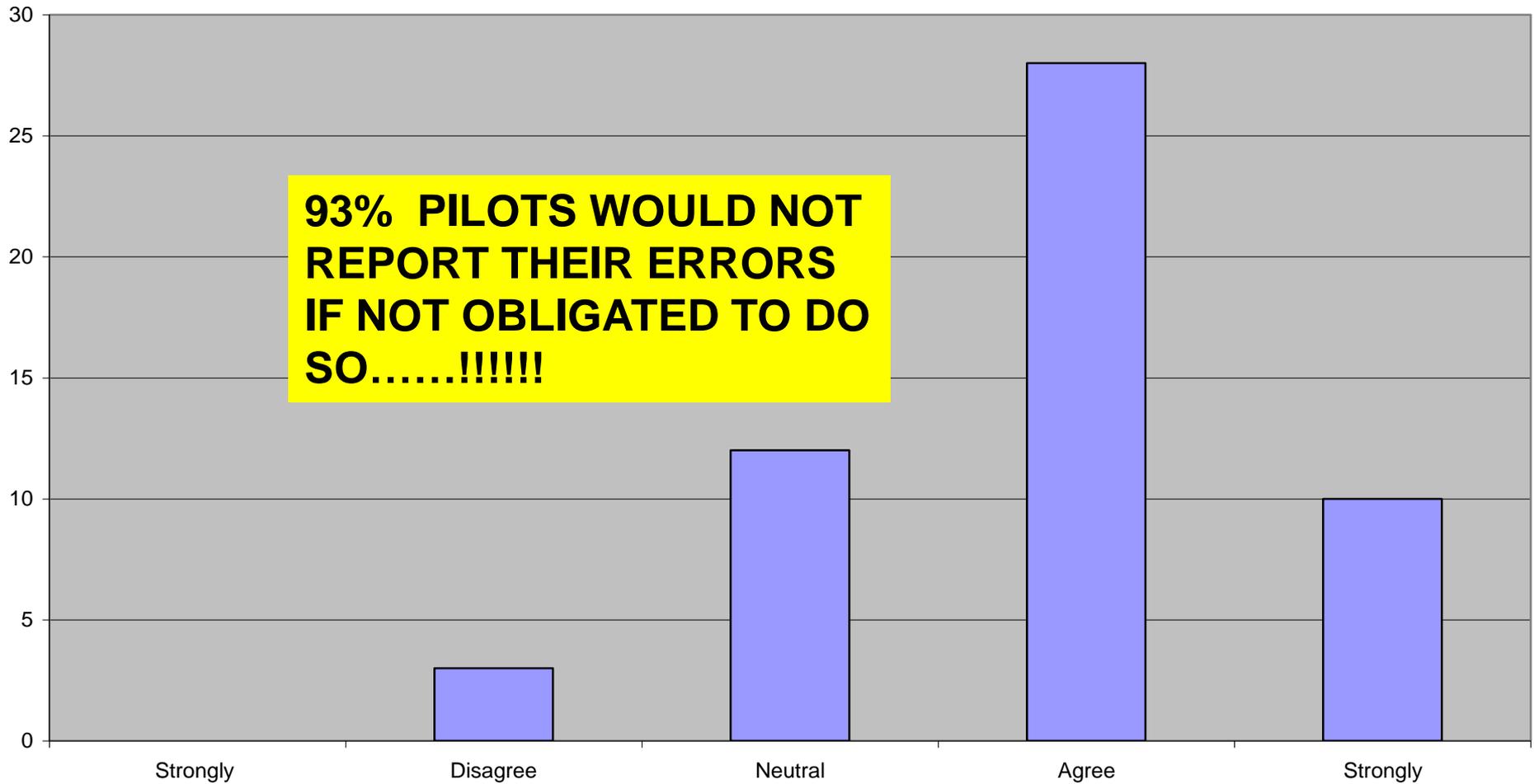
- No IATA members in 2012 (270 Airlines)
- Mostly non glass cockpit aircraft
- Difficult to assess monitoring as only major or causal factor

# Operators admitting their mistakes?

"If any of the crew has made an error and the other crew member, or SOPs has caught it and it has been corrected, I do not feel it necessary to report this event"

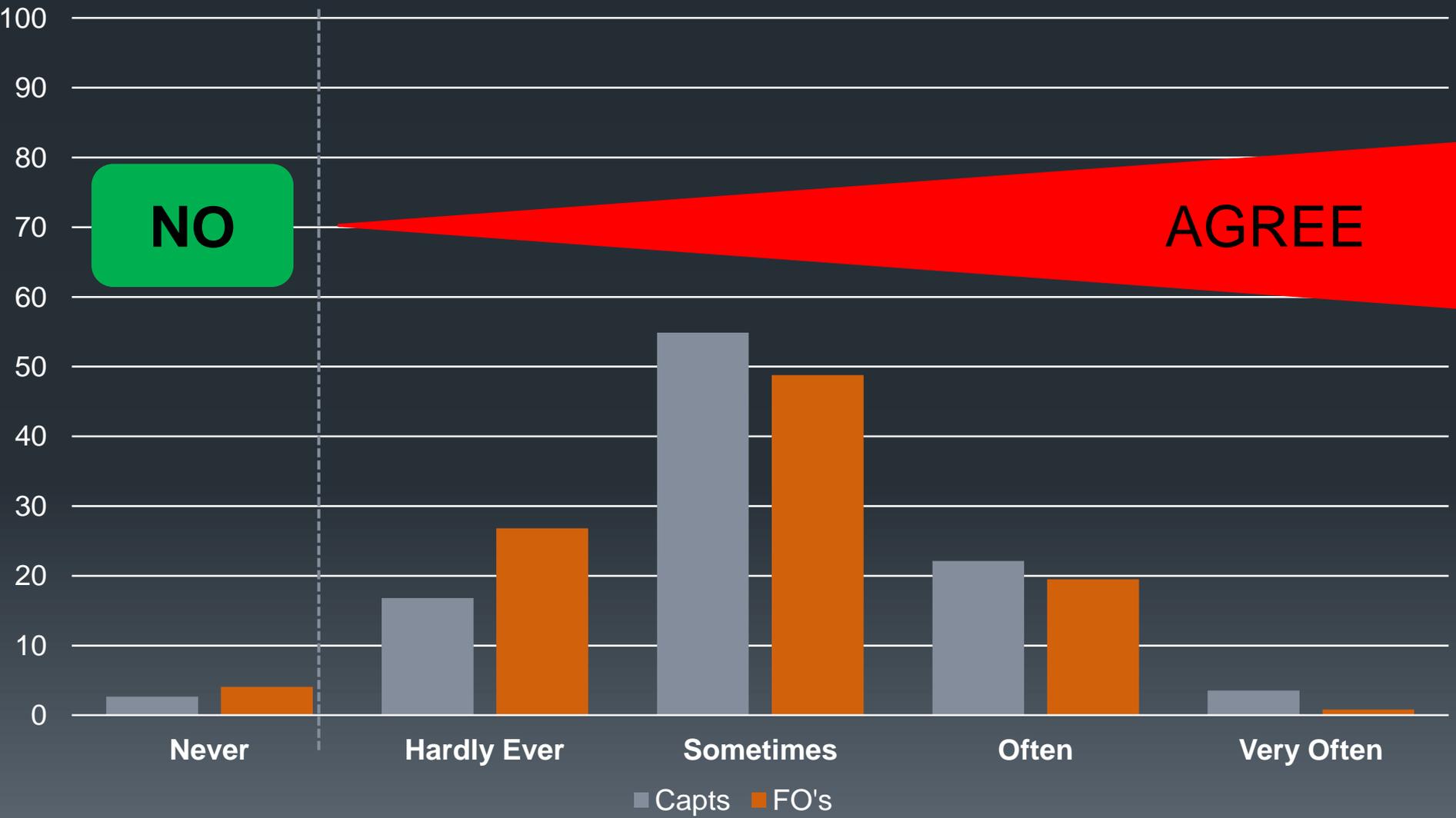
(N:81, Ave: 3.839, Mode: 4, Std Dev 0.872)

**93% PILOTS WOULD NOT REPORT THEIR ERRORS IF NOT OBLIGATED TO DO SO.....!!!!!!**



# Do Operators report everything?

"I tend to ignore minor mistakes by the other pilot when I think they are inconsequential"

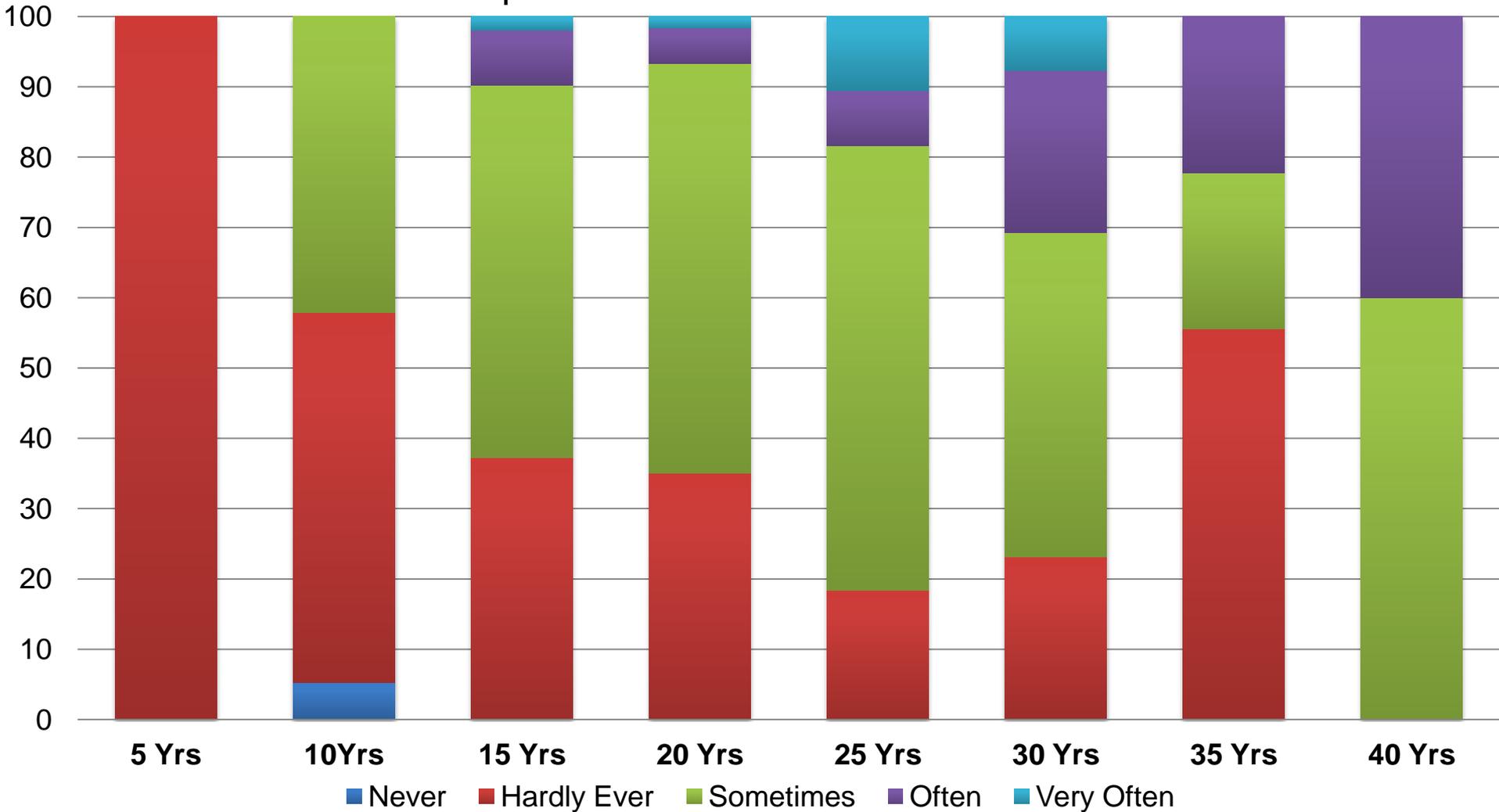


Source: EK Monitoring & Automation Questionnaire (326 Pilots : 145 Captains & 161 FO's)

# Knowledge & Experience

**"I have observed the other pilot make errors due to lack of knowledge /understanding of the automation"**

Responses based on Years in Aviation



# Human Factors

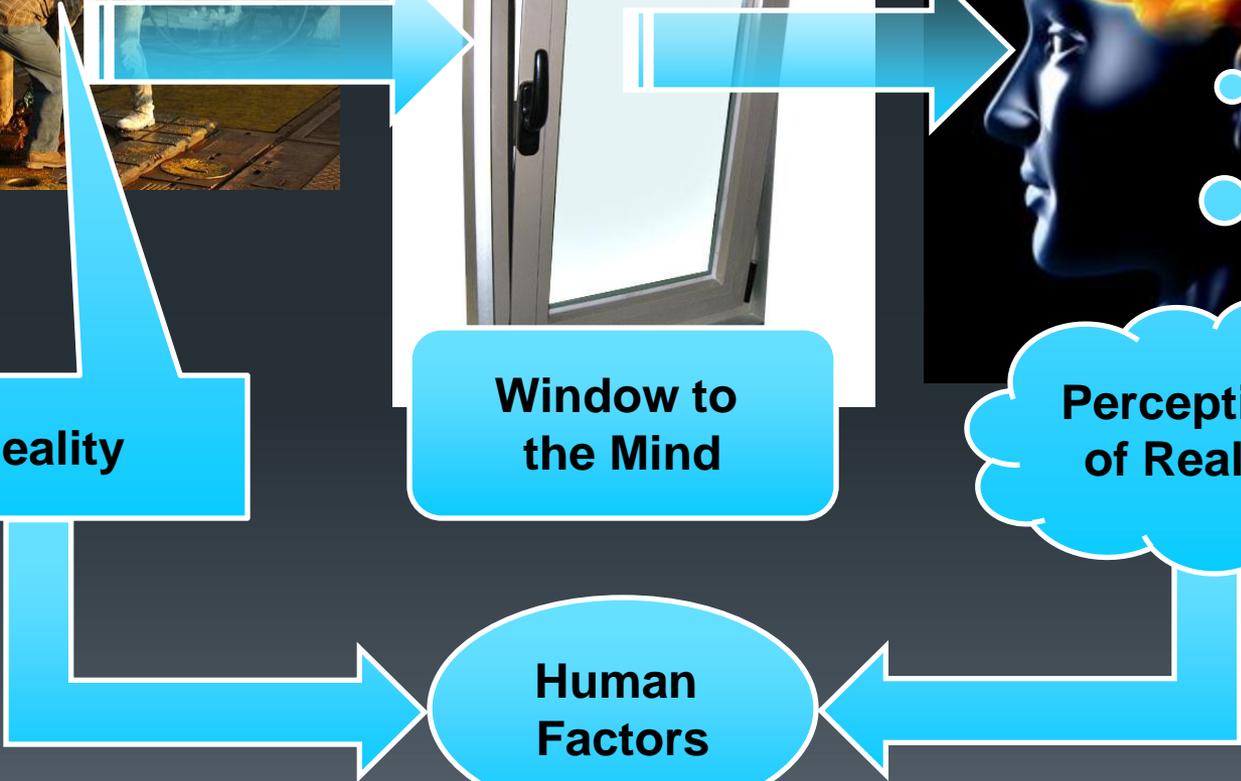


**Reality**

**Window to the Mind**

**Perception of Reality**

**Human Factors**





# Threats

- A threat is any situation that could create a deviation of the intended task or intention.
- The threat itself is normally outside the control of the operator.
- It is always a future event.
- Threats cannot normally be removed, but the effect of the threat can be managed.
- A threat is external to the individual.



# Threat exercise

- Re arrange yourselves in groups of similar company or type of operation. About 6 groups of 8.
- Now identify the typical threats your type of operation faces. Remember, it is the threats that force you to deviate from your intended plan of action.
- If you are going to design a CRM course for your operators, list the typical threats that they face in their daily tasks.
- List all the threats on the flip chart/paper provided.
- Feel free to ask for clarification at any time.



# Error Exercise

- Take each threat and now:
- List the typical errors the human operator makes when dealing with these threats.
- Try see yourself in the position of the operator if you are not an operator yourself.
- All errors must be listed, there is no such thing as an inconsequential error.
- Do not edit the list – write down everybody’s contribution.
- For the purpose of this exercise – 5 errors per threat will be sufficient (there may be more in reality)
- This exercise continues till and during lunch. Final lists after lunch please.



A quick introduction to the Crew Resource Management  
Modules

# CRM Modules



# CRM Modules

- Judgement
- Leadership
- Teamwork & Support
- Conflict Management
- Risk Management
- Decision Making
- Communication
- Assertiveness
- Culture - National, Organisational & Professional
- Situational Awareness
- Workload Management
- Cognition - Memory
- Distractions
- Automation
- SOP's

# Judgement

- The ability to assess a situation and predict the mostly likely outcome or result.



# Leadership

- The ability to identify if any real change is required in a situation and then implement it within the time available, using the resources available to you.
- Integrity, honesty, responsibility, motivation, empathy,
- Passion
- Self driven
- Role Model
- Professional
- Personal



# Teamwork & Support

Giving or accepting aid when it is required.

Goals, communication, resources, delegating, offering, accepting,



# Conflict Management

The ability to realise that one of you has to remain calm.

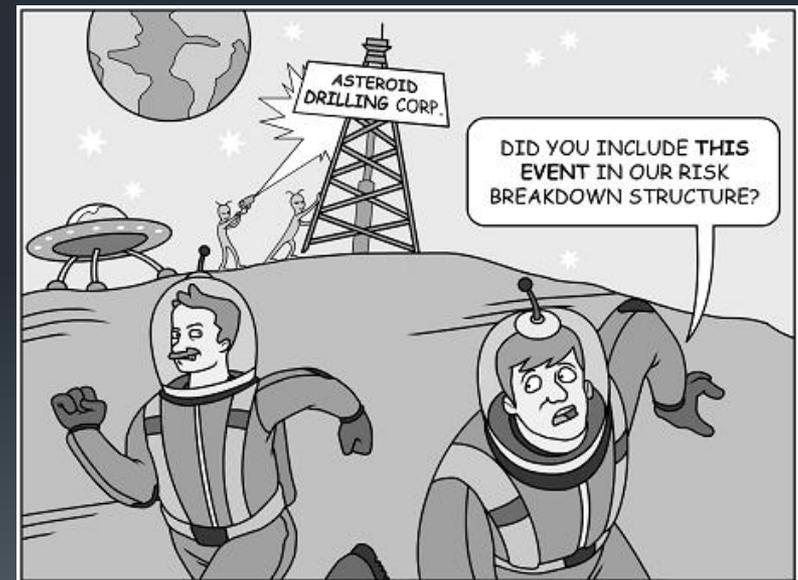
Values, beliefs, resources, pride, status, ego, emotions, goals, self stress, opinions, Misunderstandings,



# Risk Management

Evaluating the probability of something going wrong and determining the consequences, if it does go wrong.

Assessment, evaluation, prediction, estimating, severity, consequence, probability



# Decision Making

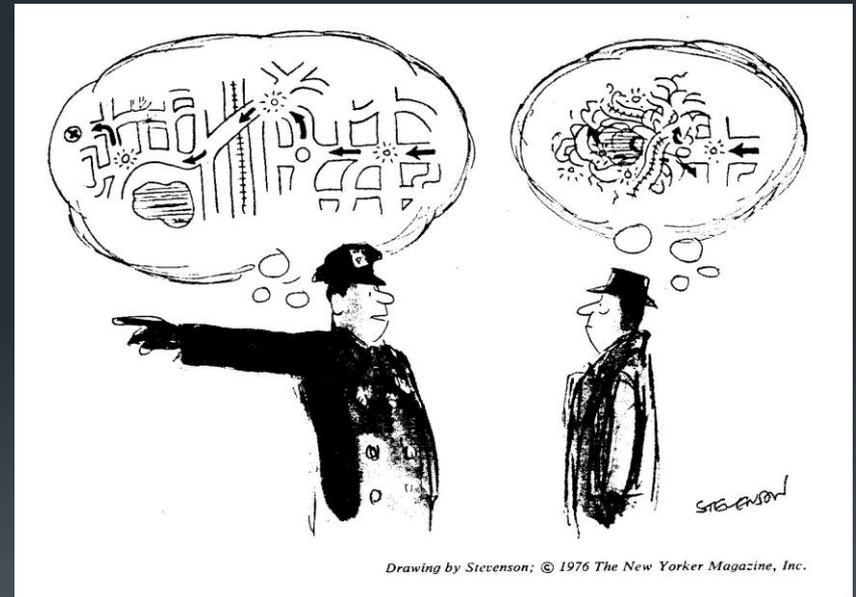
The ability to assess a set of options and choose the most suitable one in the time available.

Assessment, analysis, option generation, selection, implementation, revision, follow up



# Communication

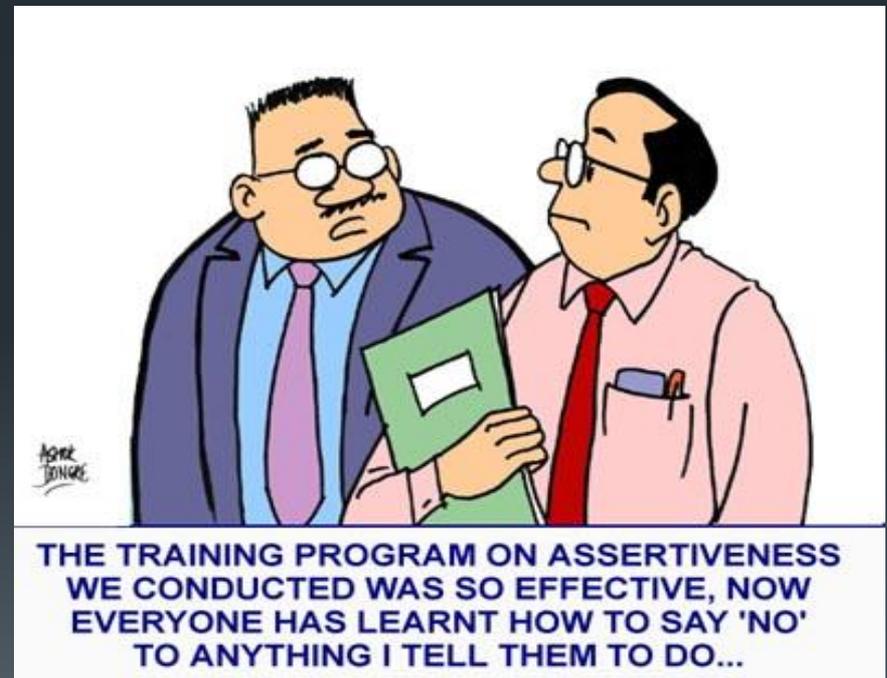
- The ability to get people to do what you intend them to do,
- and do so clearly and efficiently,
- and to make sure you hear, and understand, what people are saying to you.
- Changing what one knows, feels, does & thinks.



# Assertiveness

Being honest (truth & facts), about what is relevant and not negotiable.

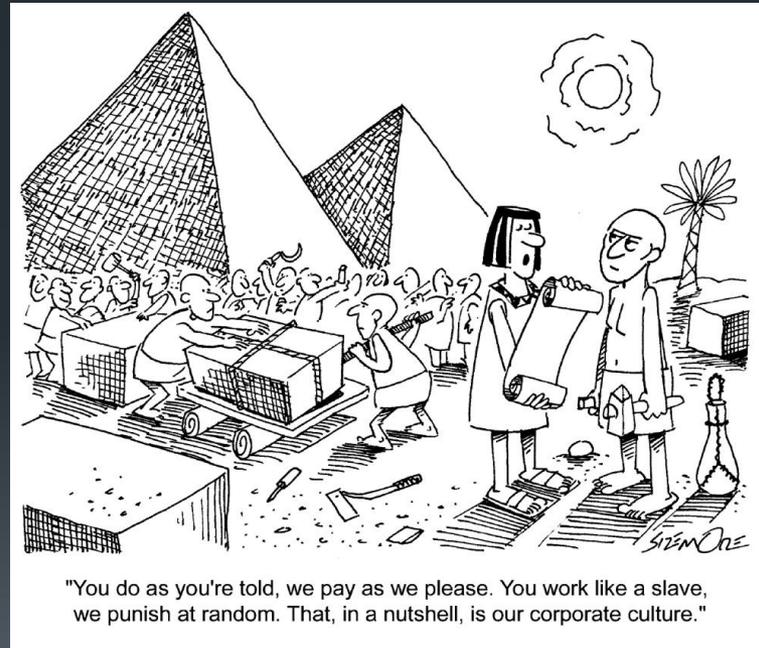
Assessing, asking, suggesting, insisting, intervening, convincing,



# Culture

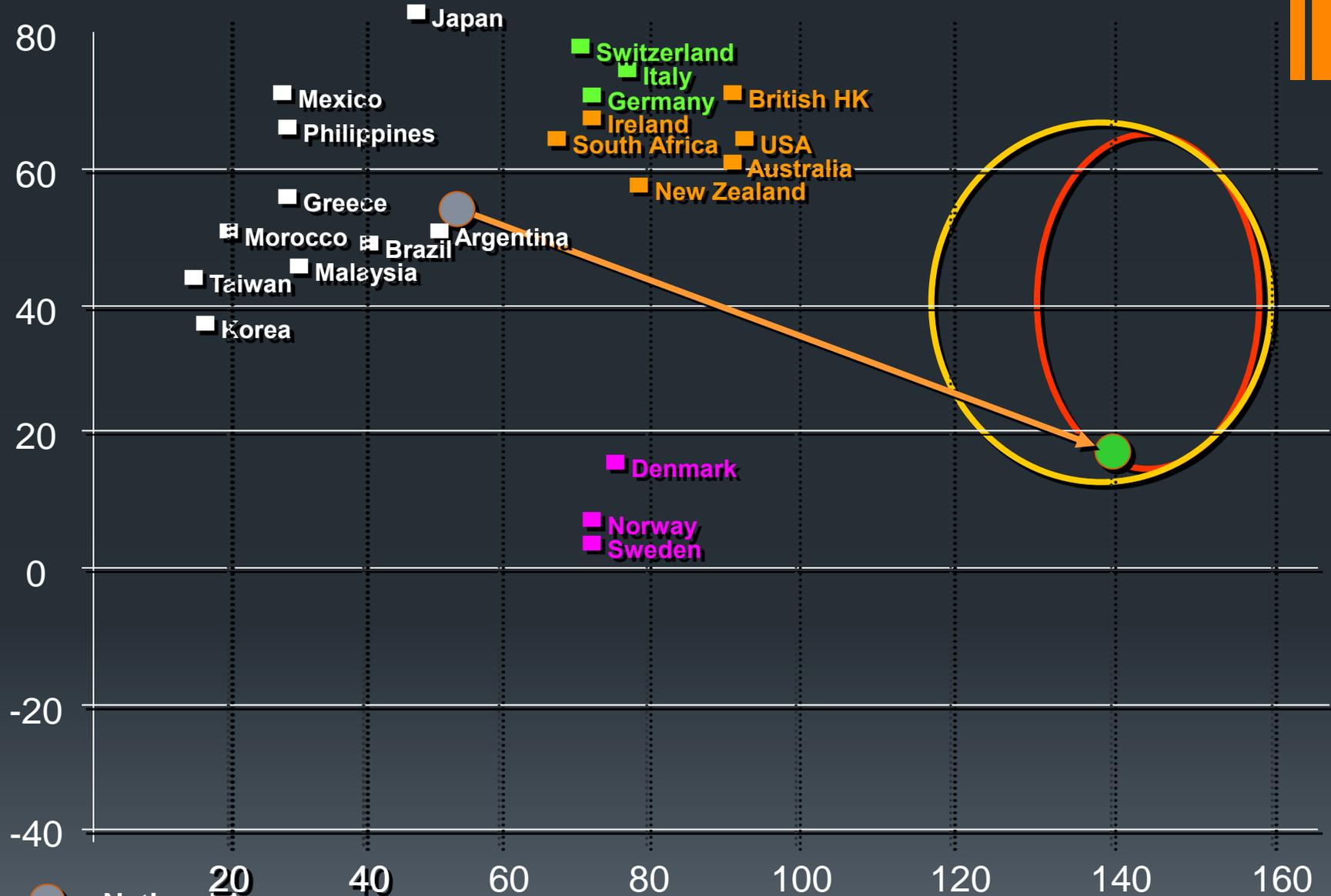
Addressing the values and beliefs of national, organisational and professional culture to ensure safe and efficient outcomes.

Values, beliefs, attitudes, habits, manners, expectations, recognition,



# Pilot Culture: The Helmreich/Merrit

Masculinity

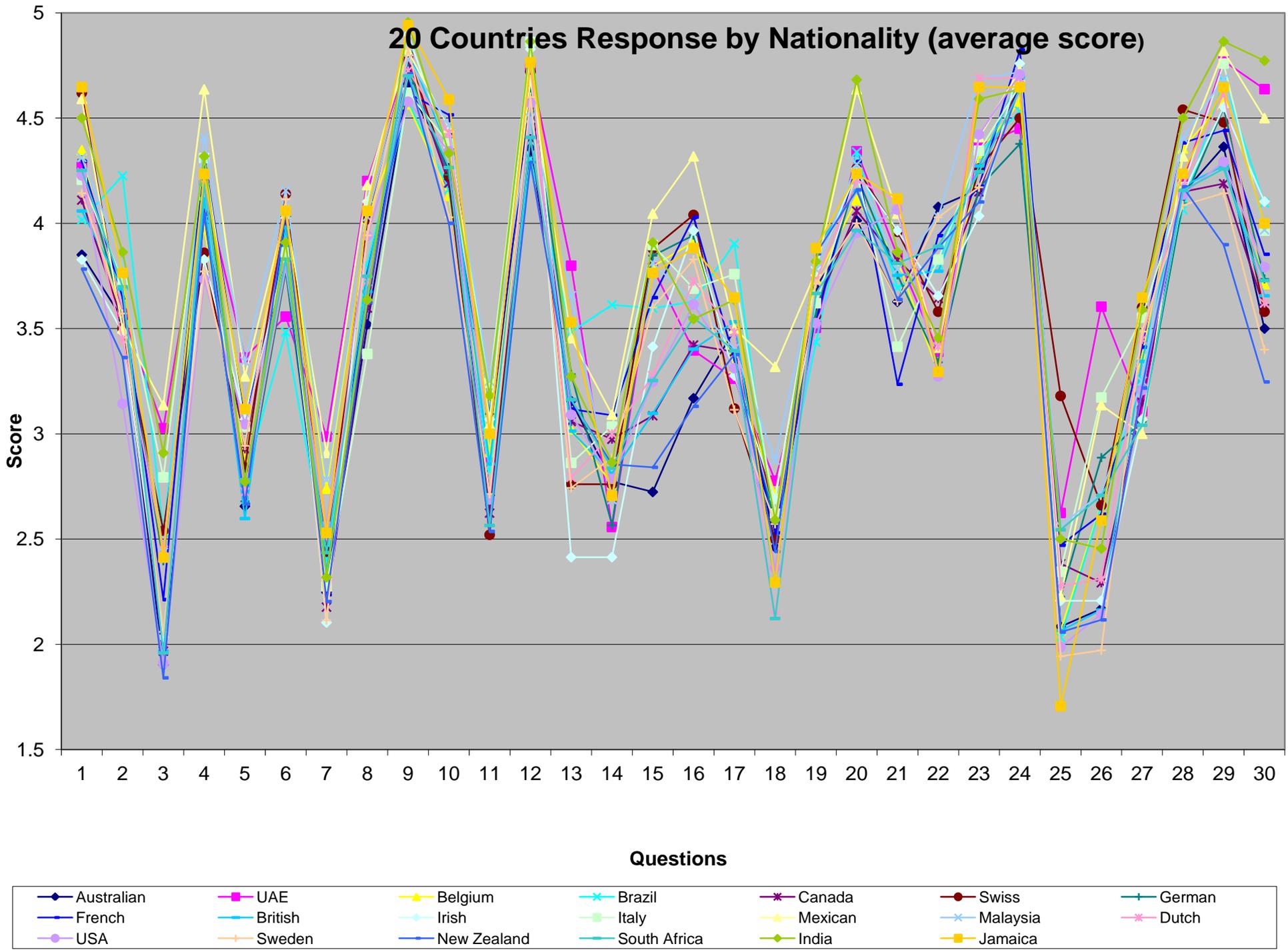


 National Average  
 Pilot Average  
 48% Pilots

 53% Pilots

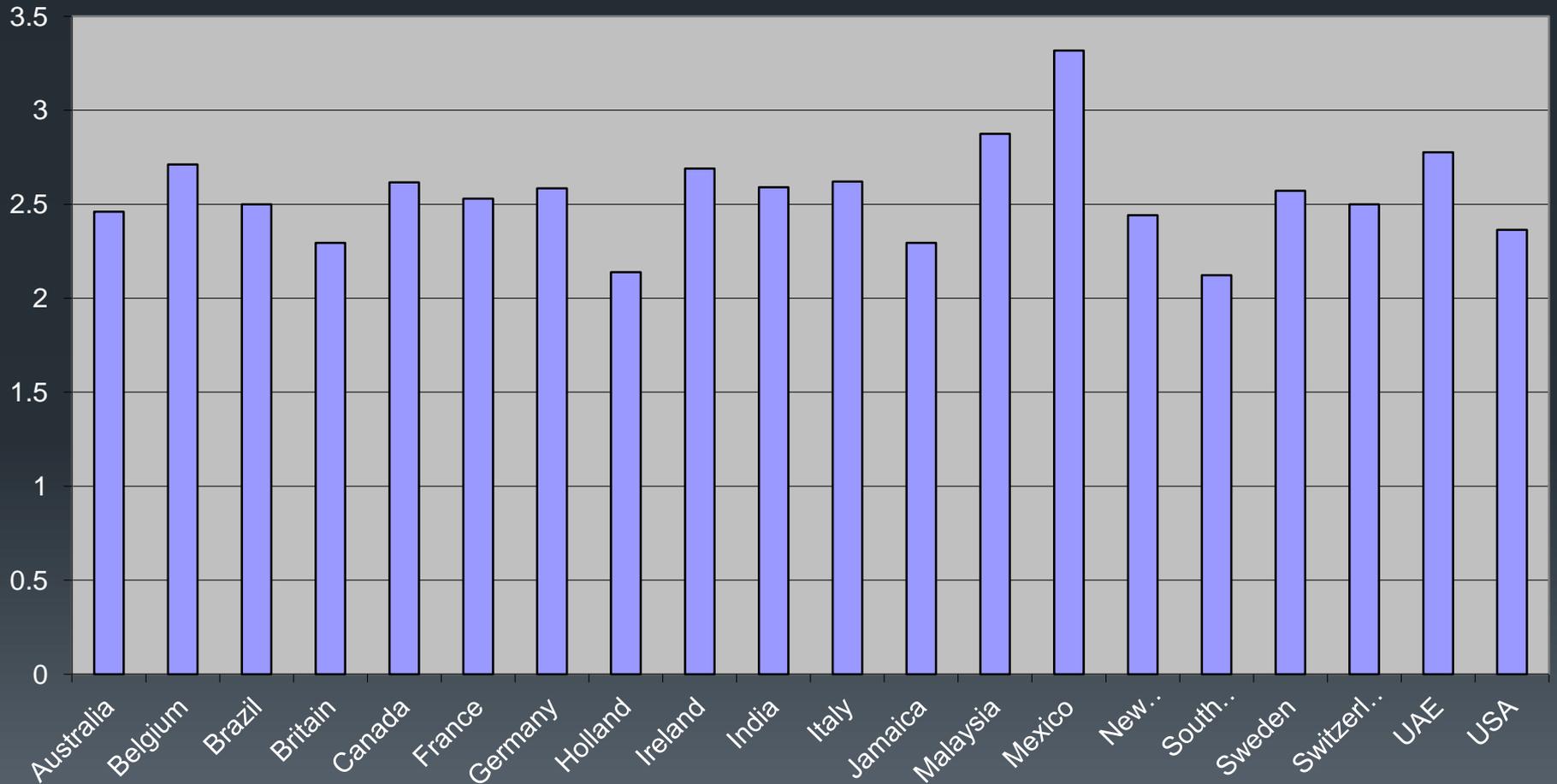
Individualism

# 20 Countries Response by Nationality (average score)





### Q18: "The Captain should take physical control and fly the aircraft in emergency and non normal situations"



# Situational Awareness

Knowing what is going on around you, the past, present and future, that can affect the outcome of your intention.

Assessment, consequences, relevance, negotiability, prioritising, briefings (initial and mini briefs), shared mental models



**SITUATIONAL  
AWARENESS**

It's paramount to your personal safety

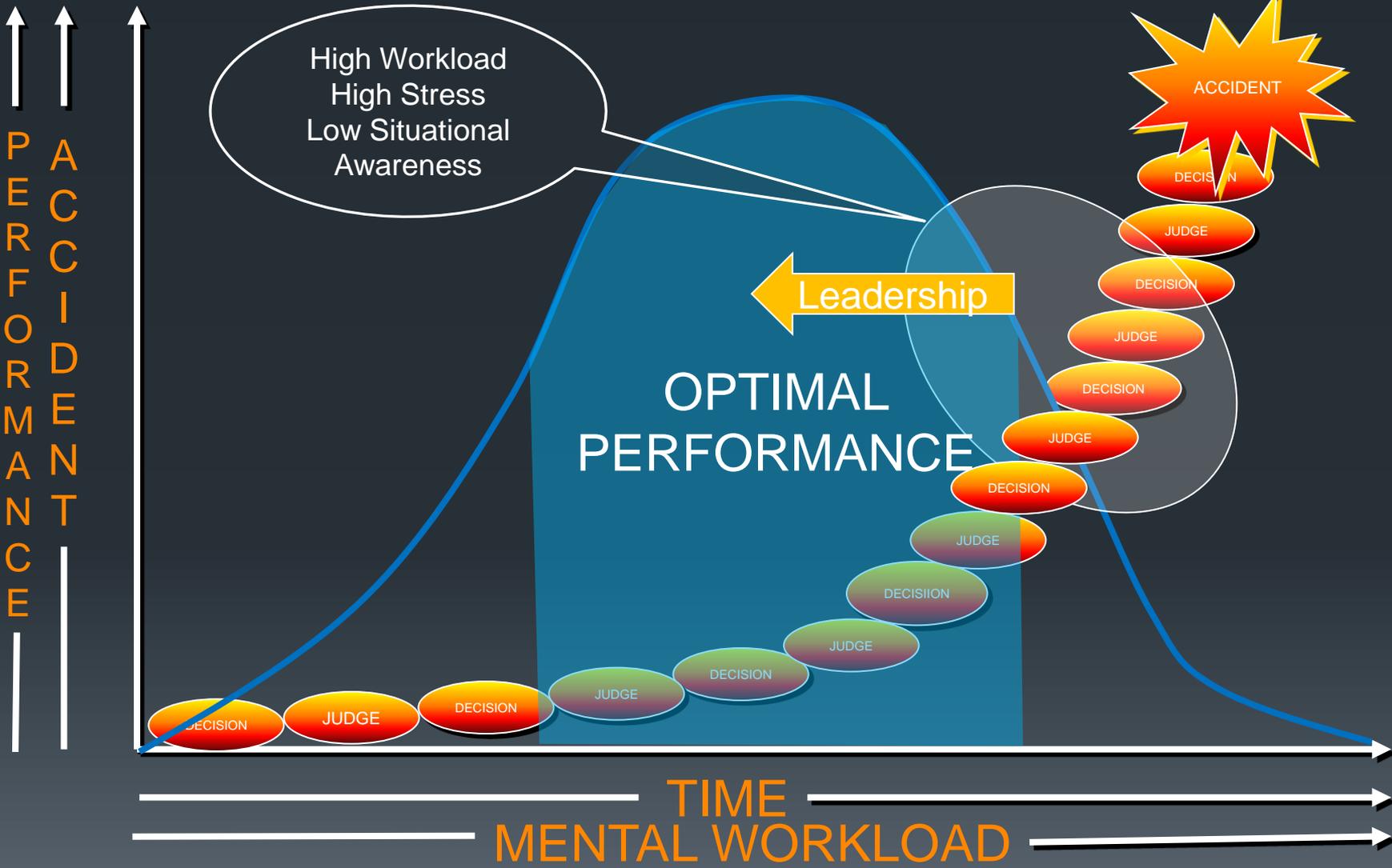
# Workload Management

The ability to balance your workload, using the resources available to you, so that you stay within your comfort zone.

Task Splitting, delegating, stress, comfort zone, resilience, fatigue,



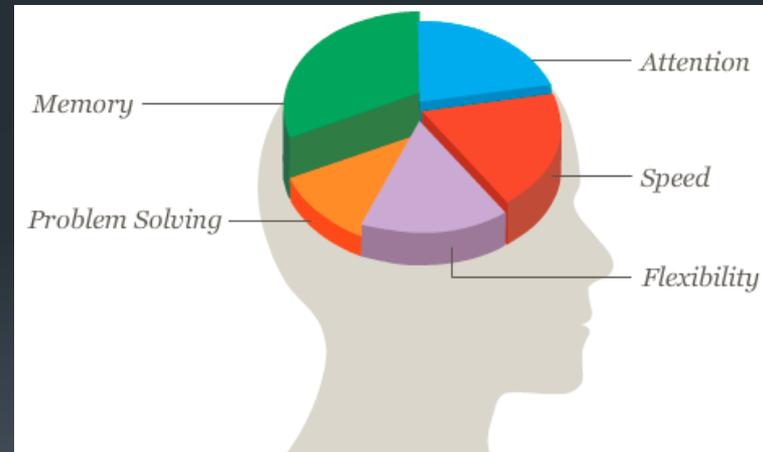
# Workload Management



# Cognition

Understanding the process of the brain and how this affects our perception of reality.

Short-, Long-, Working - & Procedural memory, filtering, conscious, subconscious, shared mental model, internal distractions.



# Distractions

The ability to pause, deal with the “distraction”, rewind and play again.

Distraction vs Attraction, attention, task switching, re-assessing, acceptance, balancing, situational awareness,



# Automation

Delegating monitoring tasks to the “machine” which humans are not very good at monitoring themselves.

Awareness, delegating, understanding, knowledge, prediction, expectation, intervention, anticipating,

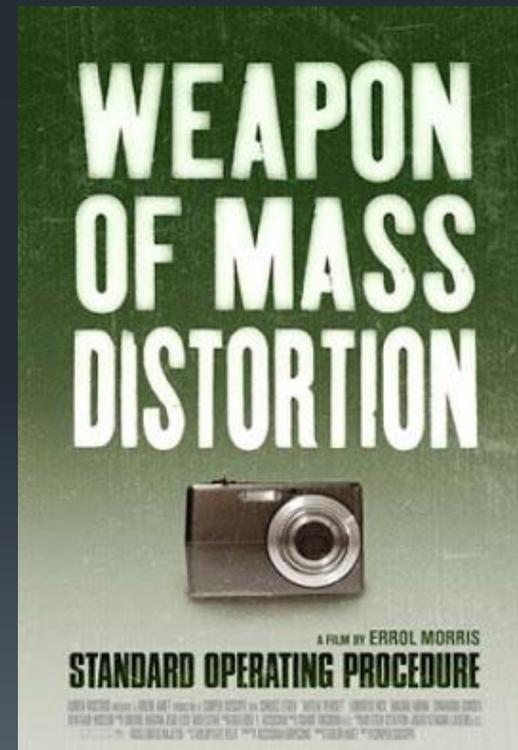


# Standard Operating Procedures

It is the glue that holds a team together.

However, also understanding that following SOP's will be right 99,9% of the time, but when it does not, then think outside the box.

RESILIENCE





# Error Exercise Continued

- Now assess each error and categorise whether it is a HF error
- And if so, what category (use the CRM modules)
- Review the list once complete and count how often each of the CRM modules appears
- The top three or four should be the basis of your training, the rest of the CRM modules can be used as fill ins.



# CRM Modules

Link each error to one or more of the CRM modules below

- Judgement
- Leadership
- Teamwork & Support
- Conflict Management
- Risk Management
- Decision Making
- Communication
- Assertiveness
- Culture - National, Organisational & Professional
- Situational Awareness
- Workload Management
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- Automation
- SOP's



# CRM at Emirates

- 2 Day Initial CRM
  - 1 Day Type Specific CRM
  - Annual full day refresher – Flight Deck only
  - Next day, 2 hour Joint CRM – Cabin & Cockpit Crew
  - Full day – Command Development CRM
  - Command Course – 2 Full days (with Personality Profiling)
  - Core Instructor Course – Full day
- 
- Flight deck – approximately 10 courses per week
  - Cabin Crew – approximately 40 courses per week



# Integrated Human Factors – Using Pilot Assessment Markers

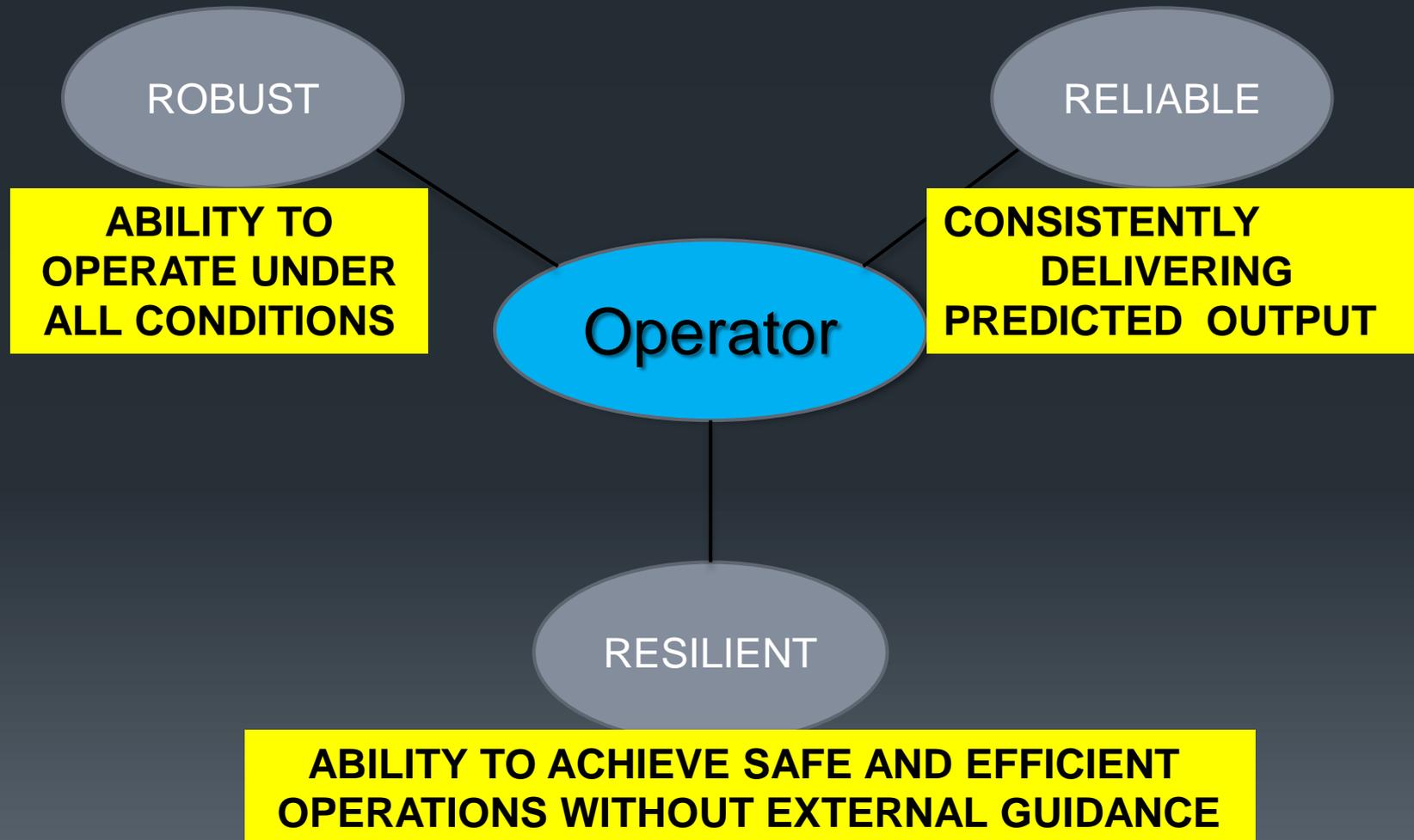
- Knowledge
- Application of Procedures
- Workload Management
- Handling
- Leadership/Teamwork/Support
- Communication
- Situational Awareness
- Judgement & Decision Making
- Automation
- All training assessed
- Assessed on Grade from 1 – 5
- 2 or below a fail
- First Checked – next day trained
- 6 Monthly – 2 days ground school, 2 days simulator
- Manual handling – twice a year



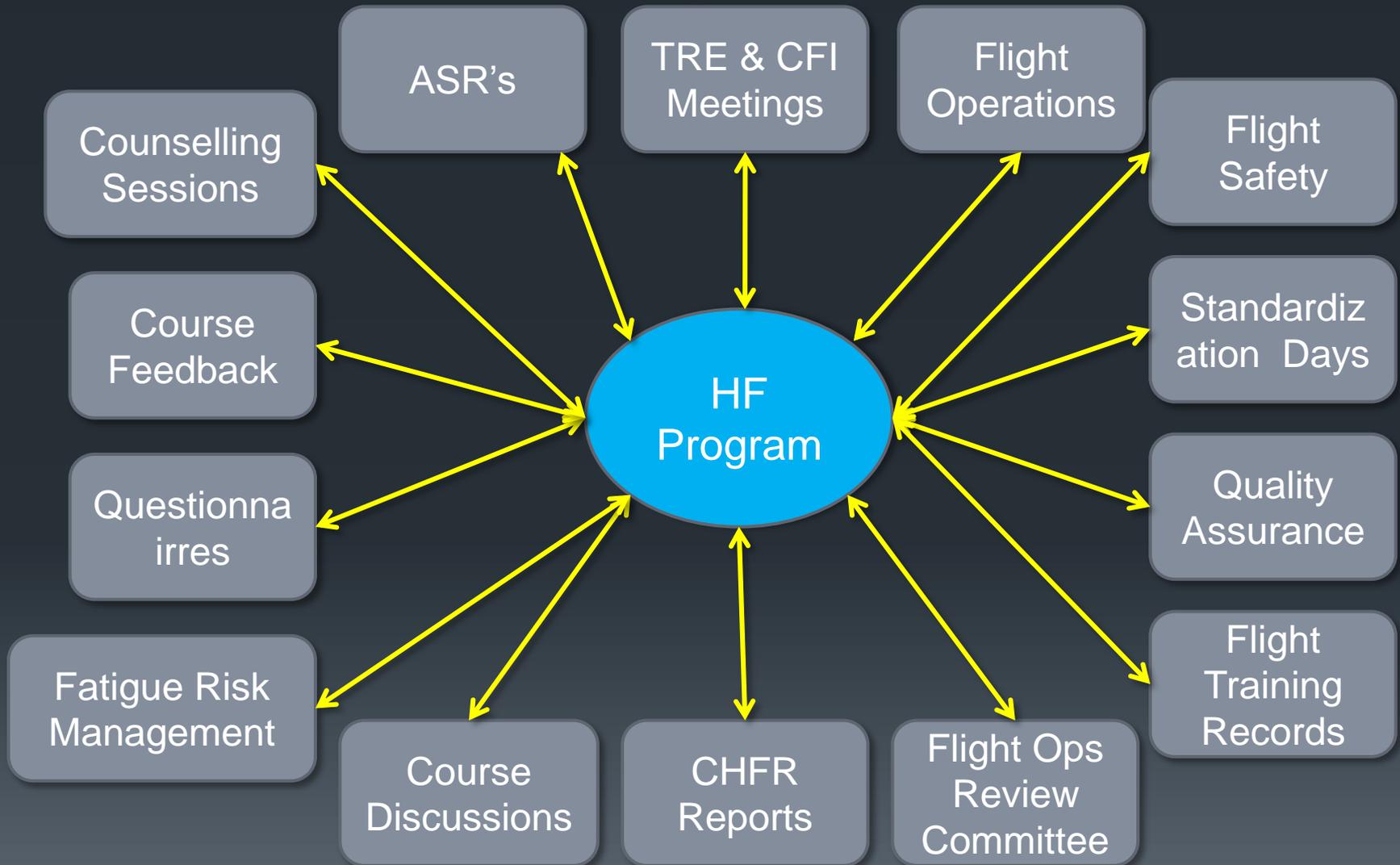
# PAM's Example: Communication

- Communication is very effective.
  - Briefings are clear, concise and timely.
  - Very high standard of SOP calls, RT phraseology and RT discipline.
  - Actively shares information and encourages team communication.
  - Asks relevant and effective questions and consistently verifies correct understanding.
  - Listens actively and patiently.

# Ideal State of the Operator



# Integrated HF Program



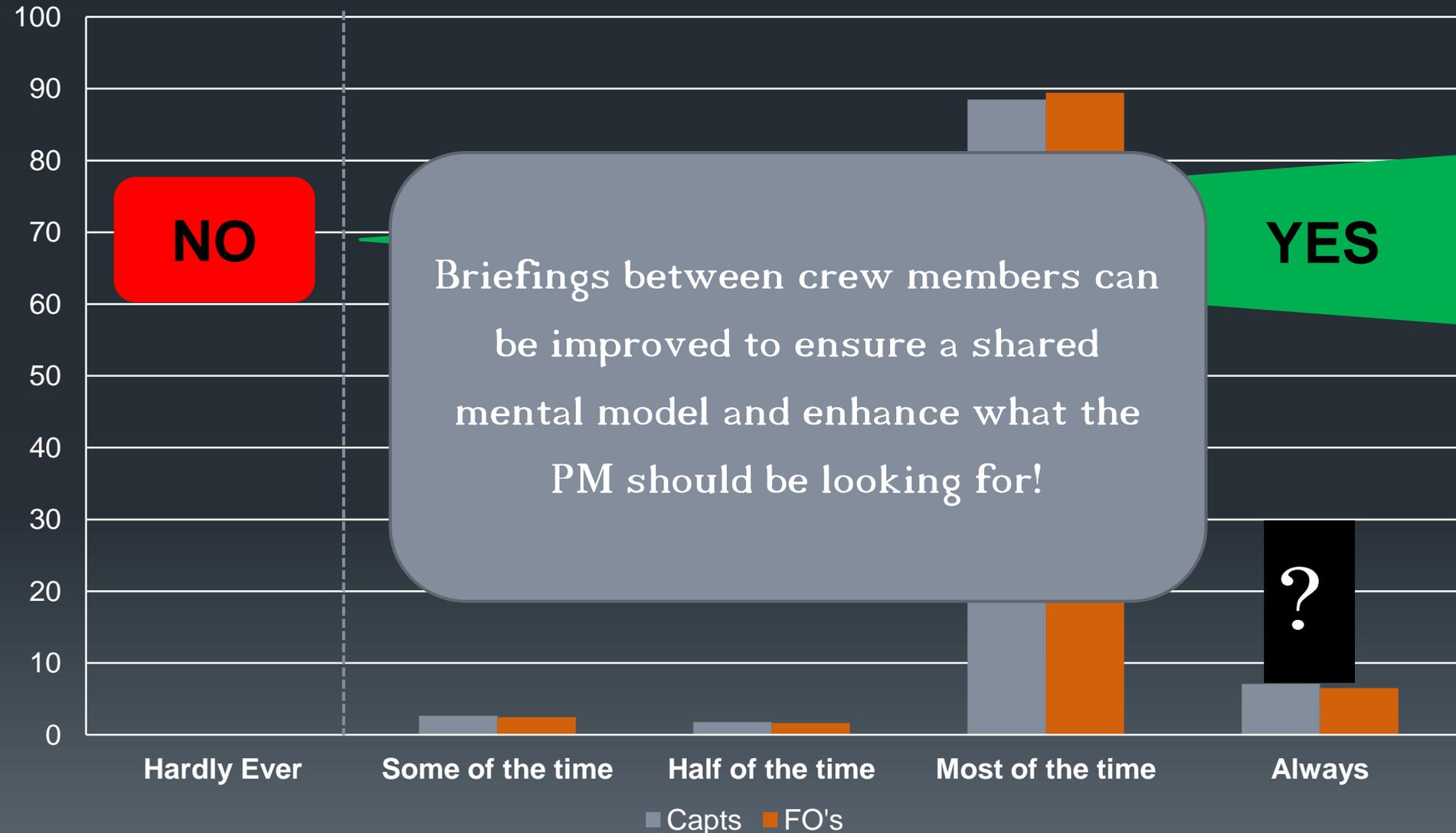


# Using Questionnaires

- From data provided from various forums
- Create a questionnaire relative to next training theme
- Use the CRM Recurrent days for data collection (100% return)
- Use demographics in your questionnaires
- Some Examples:

# What to Monitor?

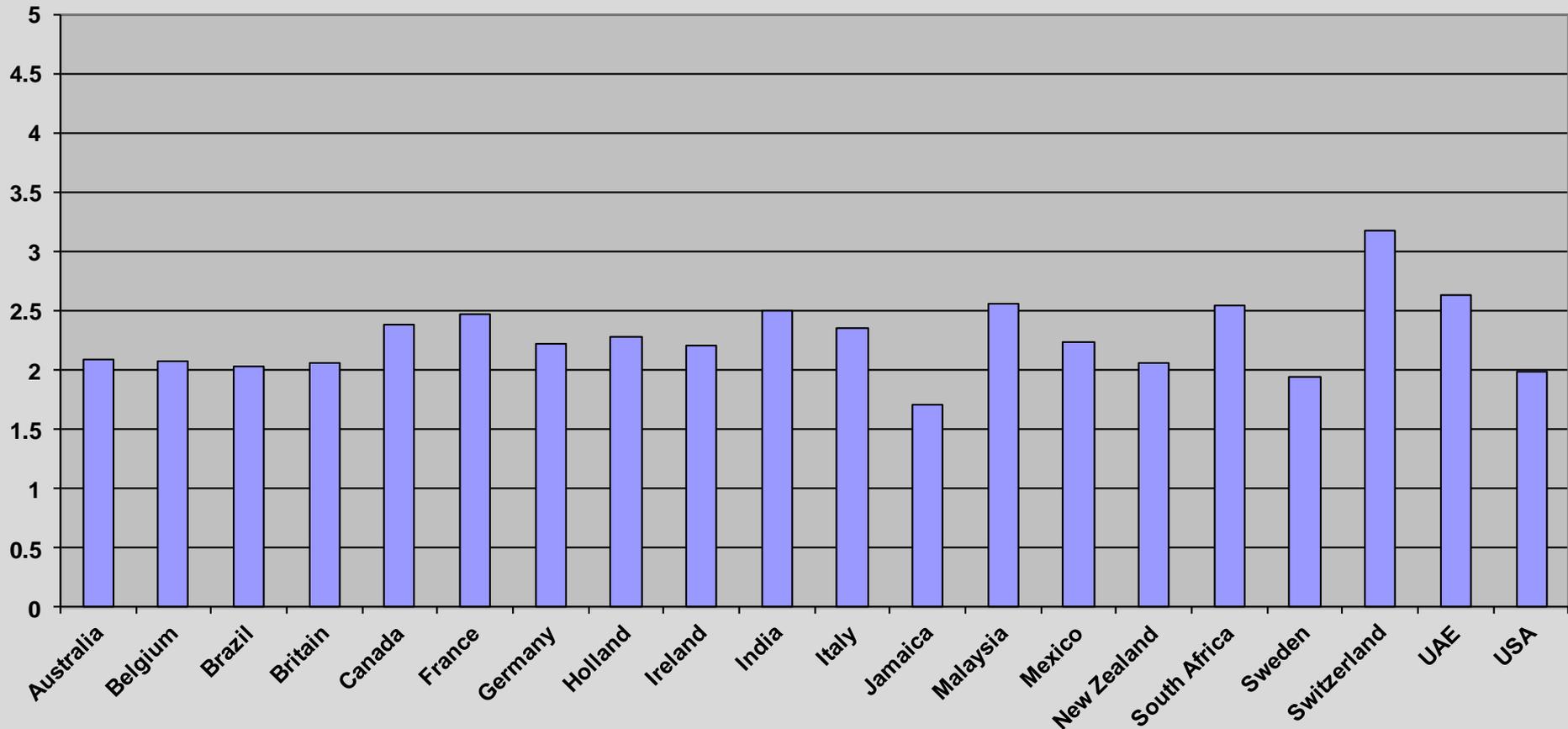
"During each phase of flight, I know what the other pilot intends to do regarding the flight path of the aircraft"



# Power Distance



**Q25: "Crew members should not question the decision of the Captain except when they threaten the safety of the flight"**

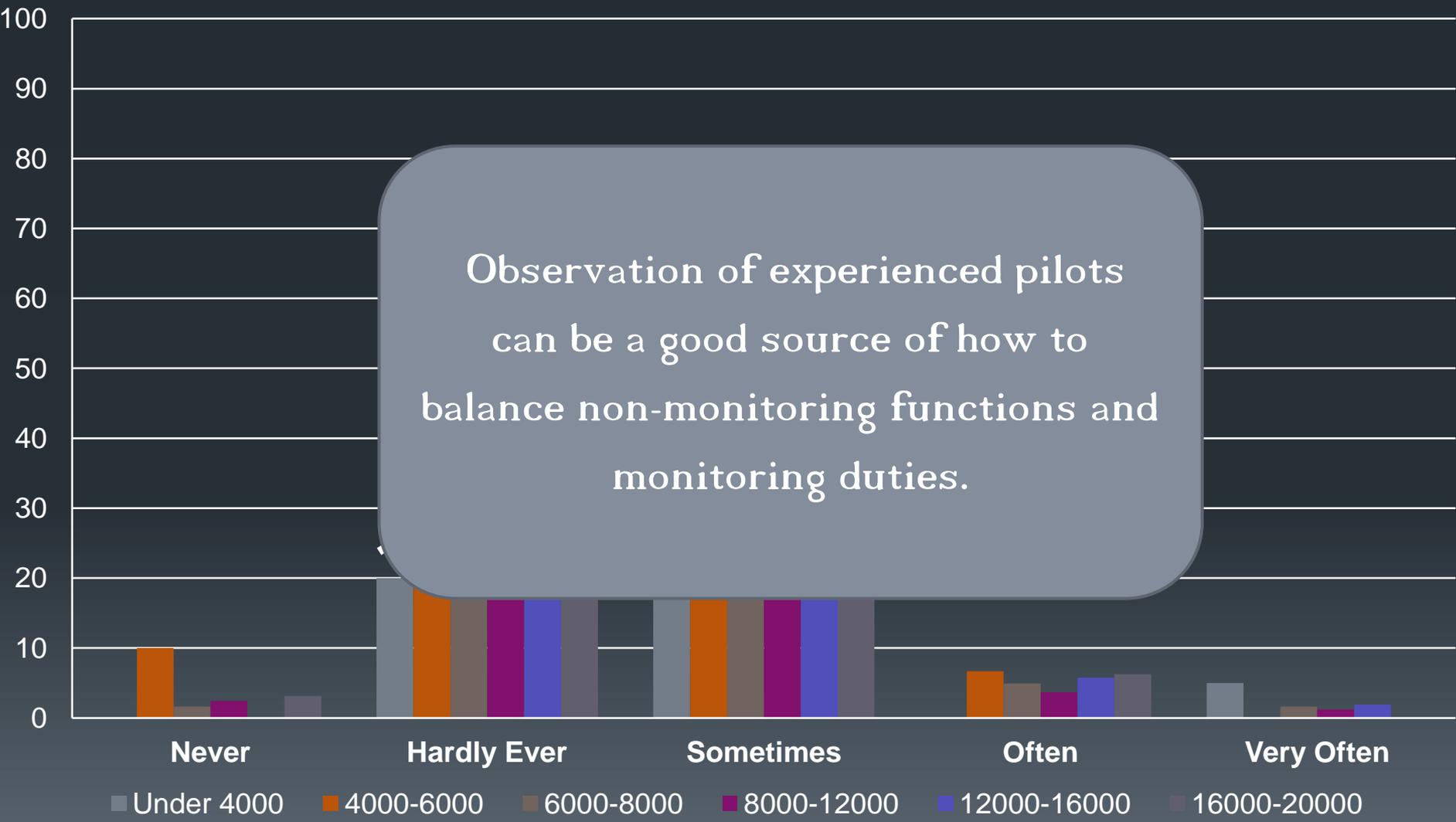


# Experience & Monitoring

"As Pilot Monitoring (PM), I also have duties which at times prevent me from monitoring the PF effectively"



Observation of experienced pilots can be a good source of how to balance non-monitoring functions and monitoring duties.



Source: EK Monitoring & Automation Questionnaire (326 Pilots : 145 Captains & 161 FO's)



# Setting up your CRM course

- It should take a team of 3-5 personnel 8 months to develop a one day training course
- Identify your main themes early
- Use questionnaires to prove or disprove assumptions
- Create case based studies and exercises
- Make videos where you can – using you own people can have consequences
- Test the course with SME's
- Final changes
- Once implemented, No changes for at least three months



# Summary

- Find out from you operators what their threats are.
- Ask them what errors they observe when dealing with the threats.
- Identify the human factor issues in the threats and errors
- Get relevant, recent and factual data to support your training
- Identify your main themes for your CRM courses
- Make it interactive – videos, case studies, exercises (Adults like to get their hands dirty)
- Train like you work – work like you train