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Pilot Monitoring vs Pilot Managing



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معاً إلى كل مكان
Going places together



Captain Historically



Problem Statement



“The modern airplane is the product of a program of research, development and refinement in detail that no other structure or mechanism has ever matched. The results have been so remarkable that there is always danger of forgetting that these extraordinary craft still have to be operated by men, and that the most important test they have to meet is still that of being operable without imposing unreasonable demands or unnecessary strains on the flight personnel.”

Edward P. Warner , 1946

President ICAO : 1947-1957

**“History repeats itself
because nobody listens”**

John Lennon

Problems with Monitoring

- “Throughout the flight, pilots are required to monitor many functions, the state of the aircraft, aircraft configuration, flight path and the actions of the other pilot in the cockpit. Thus, the number of opportunities for error is enormous – especially on challenging flights”.

Foreword – A Practical Guide for Improving Flight Path Monitoring – FSF - 2014

- Two major Safeguards – Checklists and Monitoring.

Industry Concern regarding Monitoring

- **2010** – “Checklists and Monitoring in the Cockpit: Why Critical Defenses sometimes fail”. Dismukes, R.K. & Berman, B. NASA
- **2013**: RAeS Flight Operations Group – Aircraft Commander in the 21st Century: “Pilot Monitoring – Cultivating a Healthy Unease”
- **2013**: CAA Paper 2013/02: “Monitoring Matters - Guidance on the Development of Pilot Monitoring Skills”
- **2014**: Flight Safety Foundation: “A practical Guide for Improving Flight Path Monitoring”

Flight Safety Foundation: Practical Guide to Flight Path Monitoring - November 2014

Challenges in Monitoring

- Human Factors:
 - The human brain has difficulty with sustained vigilance
 - The human brain has quite limited ability to multitask
 - Humans are vulnerable to interruptions and distractions
 - Humans are vulnerable to cognitive limitations that affect what they notice and do not notice.

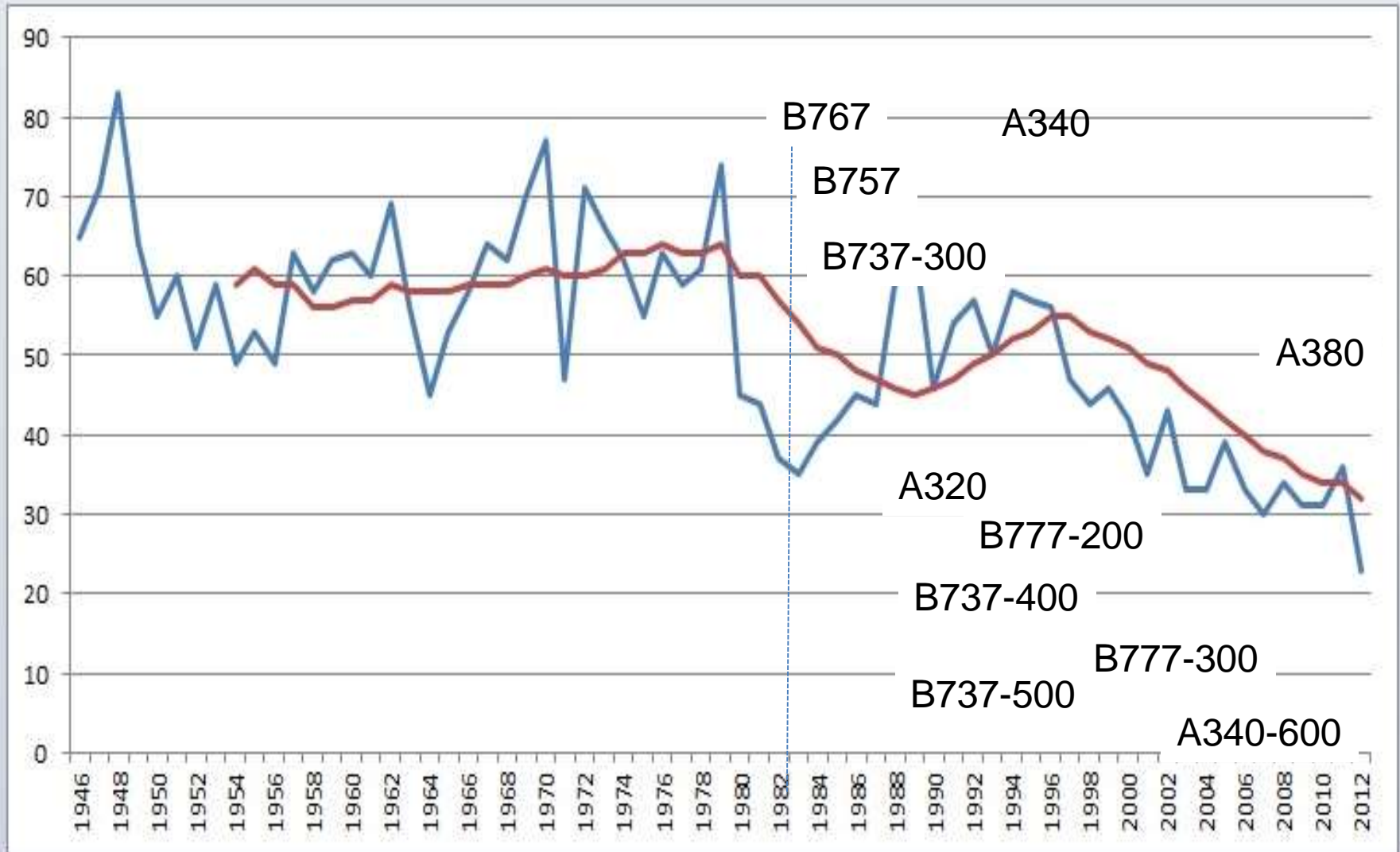
Flight Safety Foundation: Practical Guide to Flight Path Monitoring - November 2014

Less Pilot Monitoring Duties ???



Airline Accidents and Trend

Fatal accidents per year (moving 10-yr average in Red)



معاً إلى كل مكان

Going places together

Source: Flight Safety Foundation

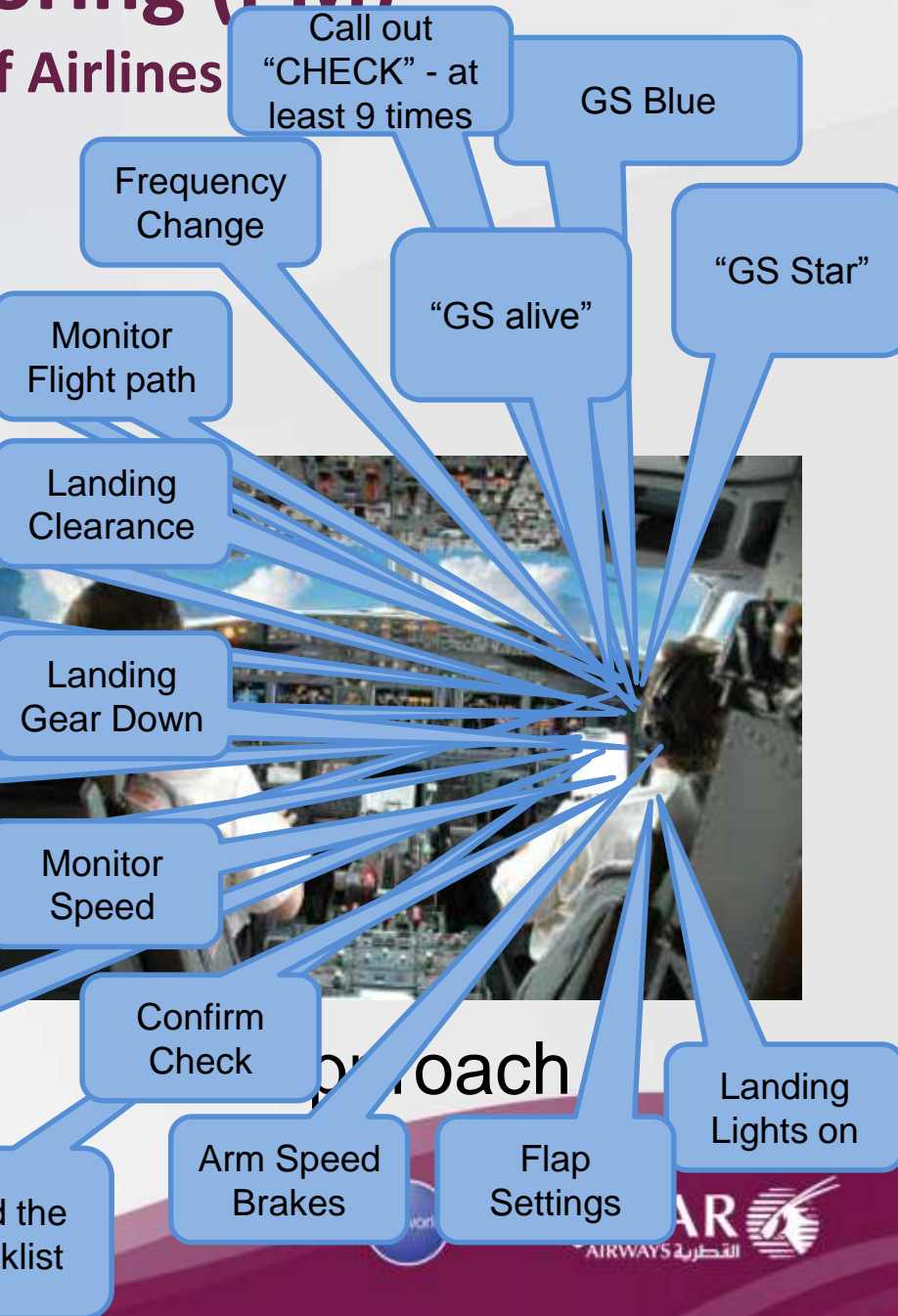


Pilot Monitoring (PM)

Majority of Airlines

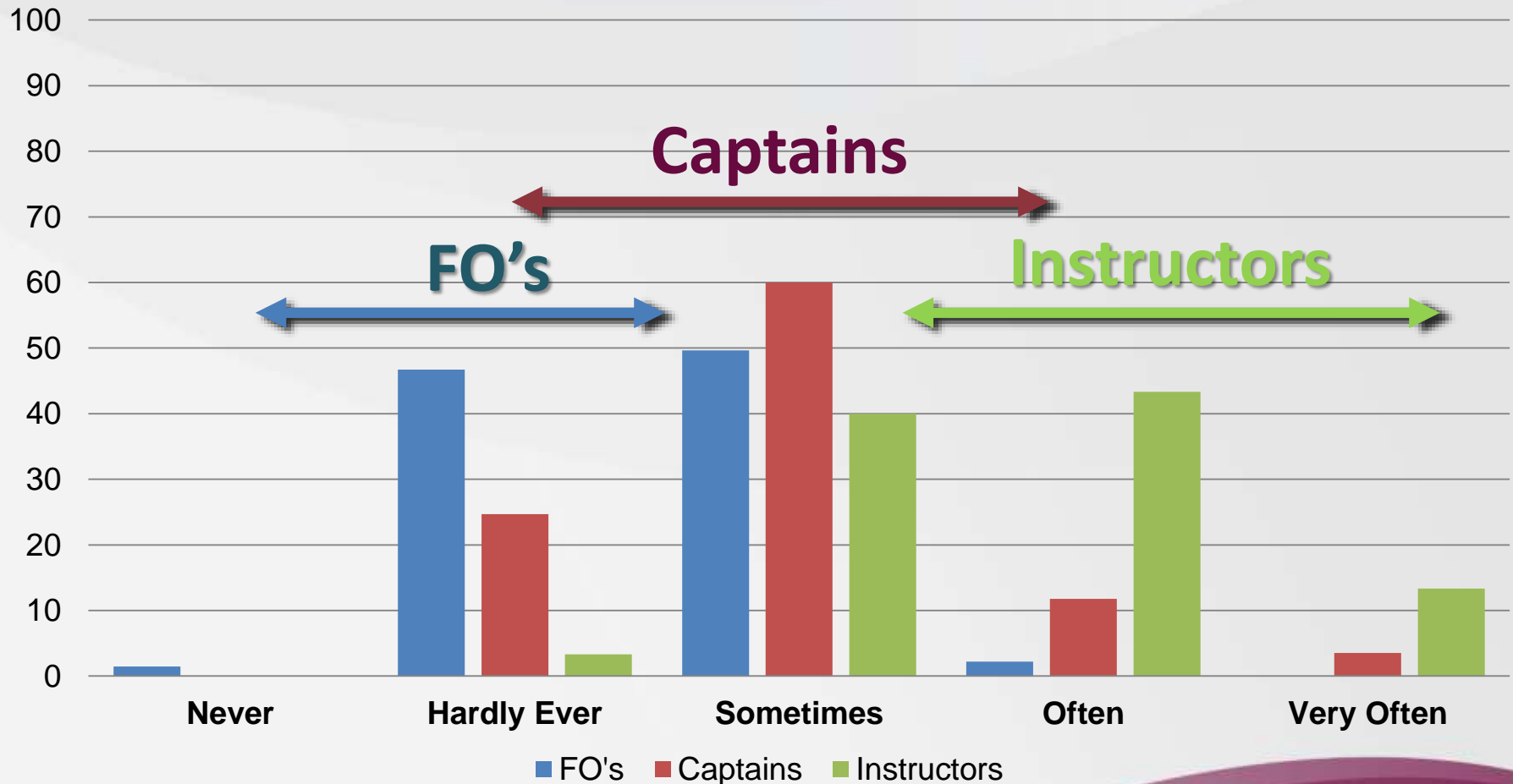
The general PM phase of flight responsibilities are:

- List
- "GS"
- "Managed speed"
- "Cabin crew calls"
- "LOC"
- "Missed approach altitude set"
- AP 1+2
- "LOC blue"
- Localiser alive



Effective Monitoring

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



BEA Trident AWO Project 1968/9

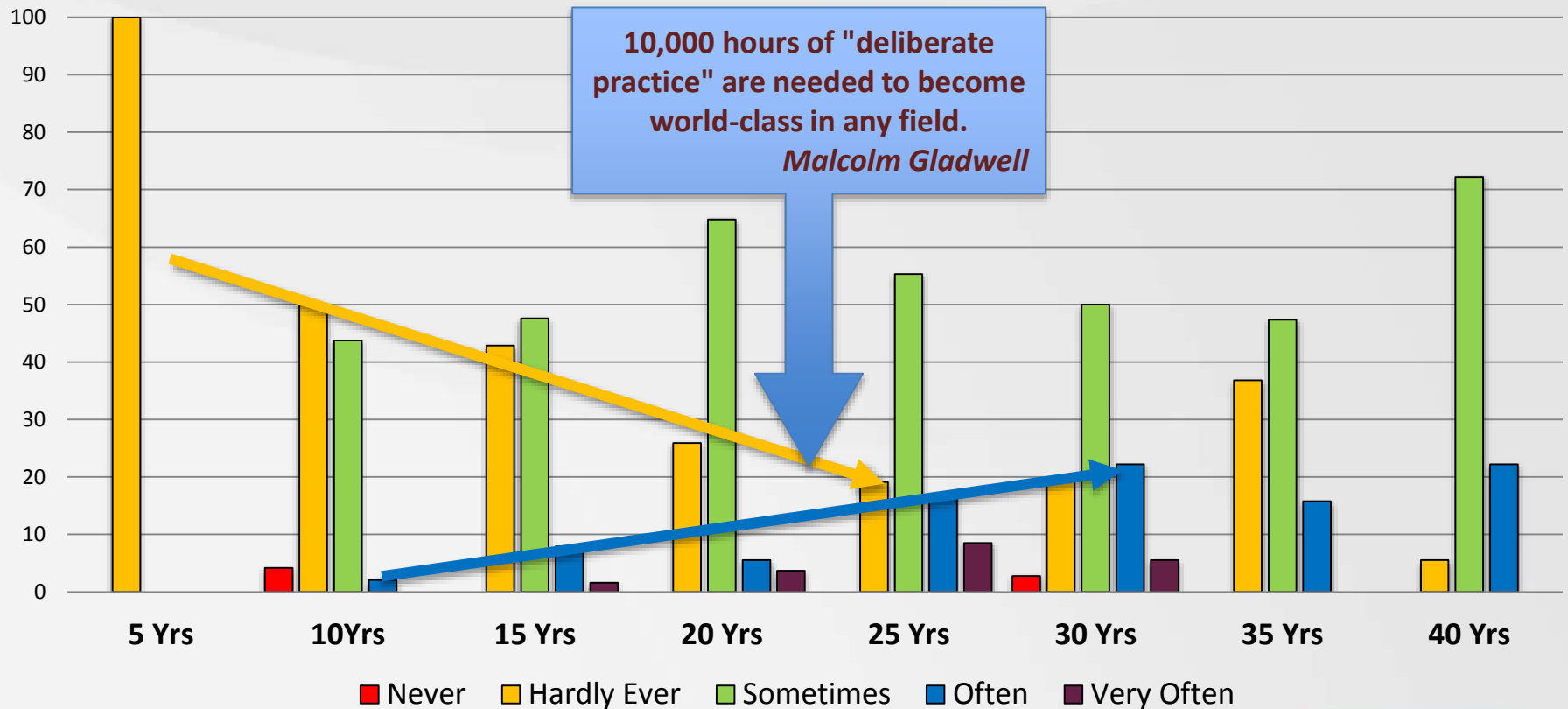
- Under the auspices of John “Cats Eyes” Cunningham (Hawker Siddeley Test Pilot) and David “Guy” Thomas – developed an AWO procedure for the Trident
 - Left Seat – Senior Handling Pilot
 - Right Seat – Junior Handling Pilot
 - Jump Seat – Commander
- 50 Simulator sessions with positive crews response
- Not implemented – Unions and CAA anti (maybe ahead of it's time).



Effective Monitoring

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

Responses based on Years in Aviation



Gorilla Video Exercises

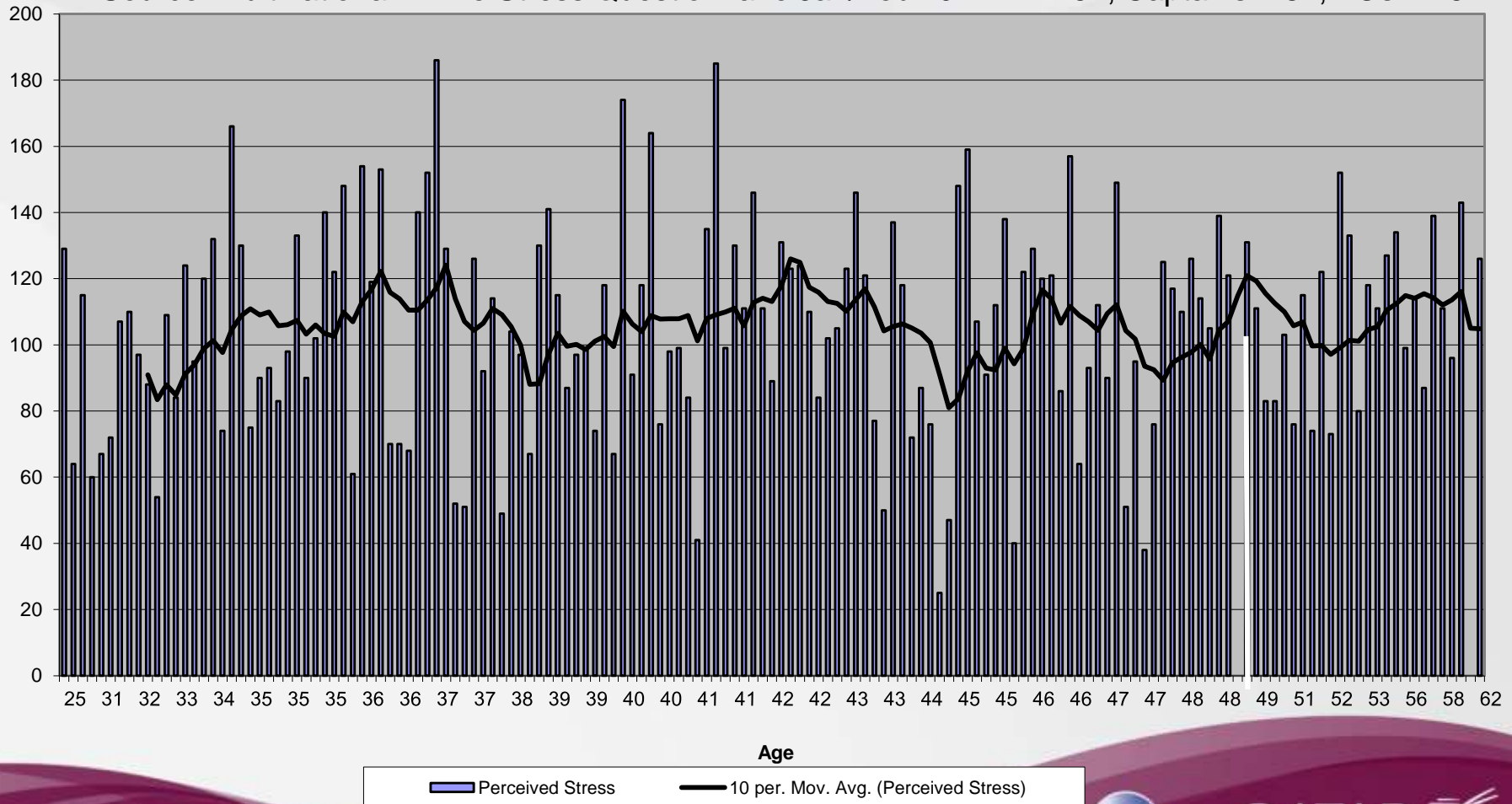
- Before video – assign pairs – one PF and the other PM.
- Video over:
 - PF – 14 X passes
 - PM – 14 X passes
- The novelty of the situation draws in both PF and PM
- Who then monitors the big picture?
- Are we training monitoring correctly?.



Perception of Stress by Multinational Pilots

Perceived Stress by Age

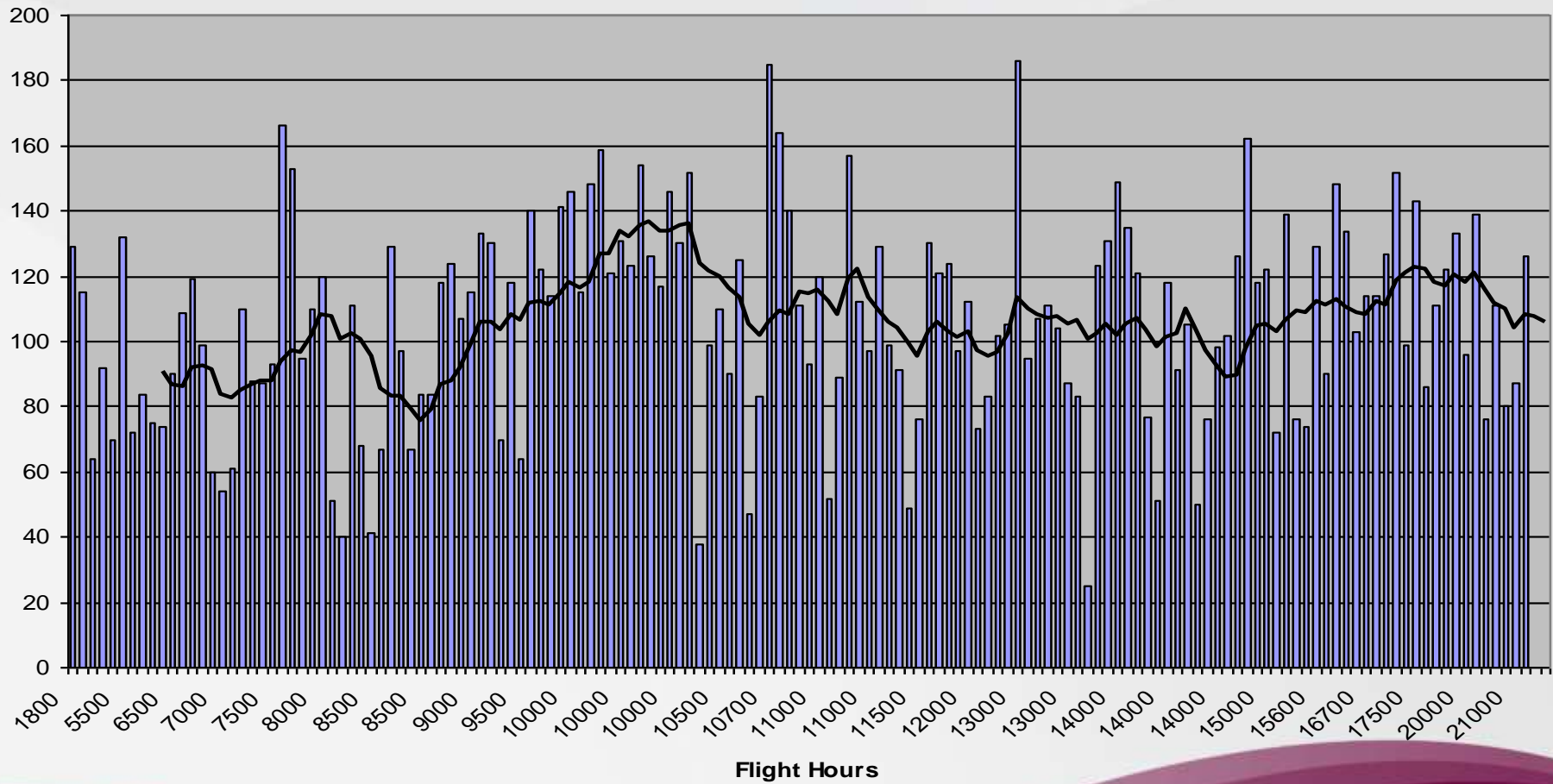
Source: Multinational Airline Stress Questionnaire Jan/Feb 2011: N= 154, Captains = 81, FOs = 73



Perception of Stress by Multinational Pilots

Perceived Stress by Hours (Experience)

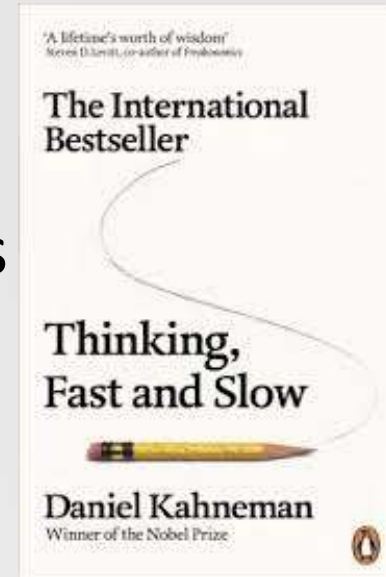
Source: Multinational Airline Stress Questionnaire Jan/Feb 2011: N= 154, Captains = 81, FOs = 73



Perceived Stress — 10 per. Mov. Avg. (Perceived Stress)

System 1 – Reactive Process (Intuition)

- Unconscious, intuitive & effort free
- Recognises patterns in a fraction of a second
- Automatically produces an adequate solution to the challenges – “jumps to conclusions”
- The Boss of our thoughts
- Most of the time - very good at what it does
- **But:**
 - Works in an oversimplified world,
 - Assumes “what you see is all there is”
 - Has no doubt whatsoever in its thinking process.



System II – Thinking Process

- Slow, conscious and analytical
- Takes time to analyse in depth
- Required for **Problem Solving and Decision Making**
- Represents the conscious self that makes choices and decides what to do



System 1: Fast, automatic, frequent, emotional, stereotypic, subconscious

System 2: Slow, effortful, infrequent, logical, calculating, conscious

So what now?

- Several monitoring functions automated
- Most workgroups rearrange existing procedures or set up additional or re-emphasise existing = mental overload
- Pilots: effective monitors at approx 10 000 hrs plus
- Novel distractions will capture attention of both pilots – suspicion/awareness
- Mental workload/stress subject to individual ability
- Cannot apply system I and system II thinking at the same time.

Abnormal/Emergency Events

- Memory Item – conduct as trained.
- All other:
 - FO – Pilot Flying:
 - max automation as available
 - Intuitive (System I) – mainly procedural memory
 - Capt – Pilot **Managing**: (use of knowledge & experience)
 - Slide seat back – enhances big picture
 - Engage System II
 - Problem Solving & Decision Making
 - Once new plan assessed and briefed – conduct landing as per company procedure

Consideration

- Pilot Flying:
 - Physically flies the aircraft as instructed by the PM
 - Responsible for correct & intended flight path
- Pilot Managing:
 - Manages the flight path and operation of the aircraft
 - Responsible for the safe and efficient operation of the aircraft
 - When managing – it is his/her sector
 - Takes ownership of the responsibility.

Back to the Future Captain?



Questions



Safety and Security.
It's in your hands

