

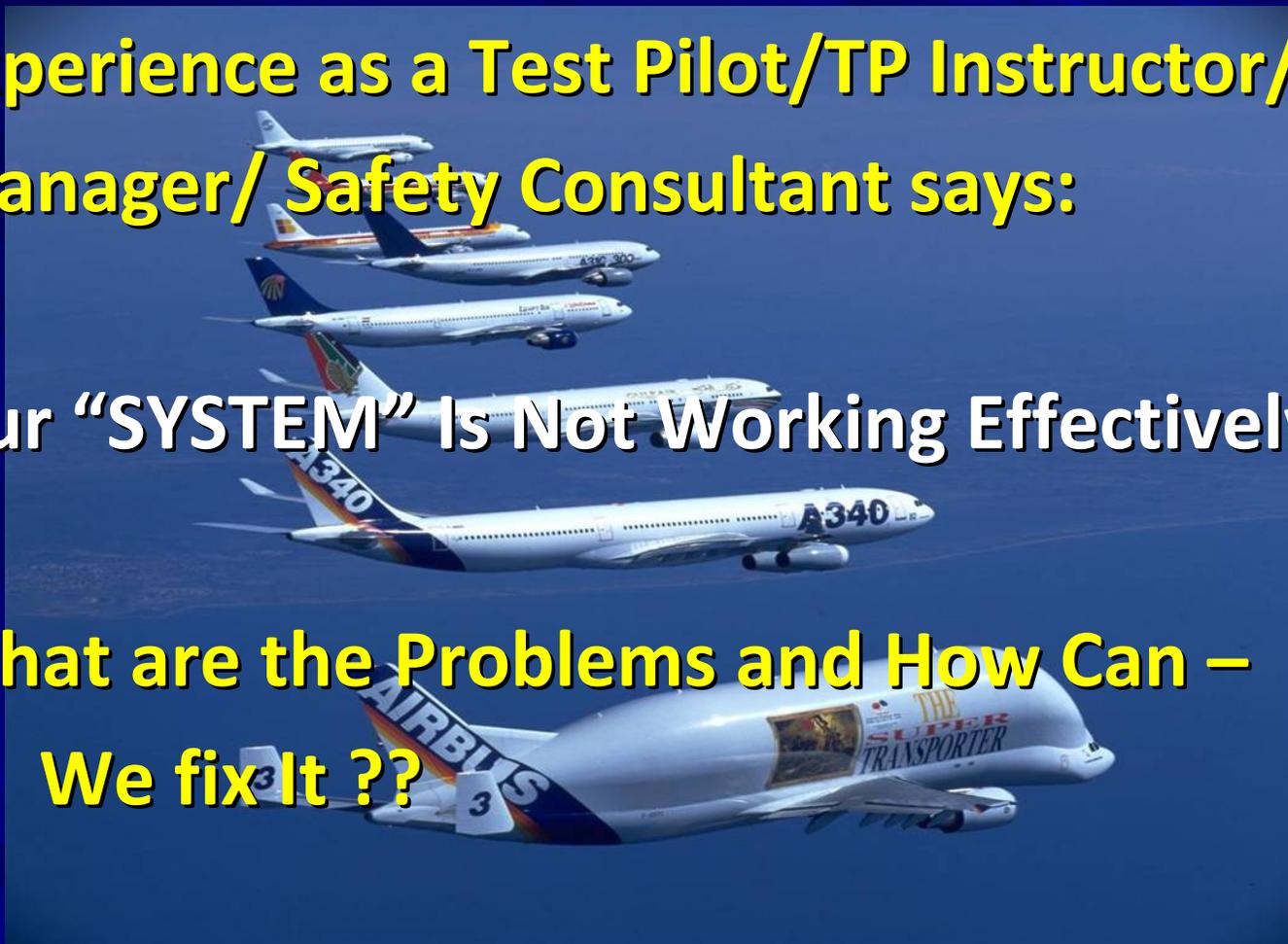
# **LOSS OF CONTROL - INFLIGHT**

**TRAINING + AUTOMATION:  
A WINNING COMBINATION**

**SETP/SFTE SAFETY WORKSHOP - 2012**

# BACKGROUND AND PURPOSE

- Experience as a Test Pilot/TP Instructor/ Manager/ Safety Consultant says:
- Our “SYSTEM” Is Not Working Effectively
- What are the Problems and How Can – We fix It ??





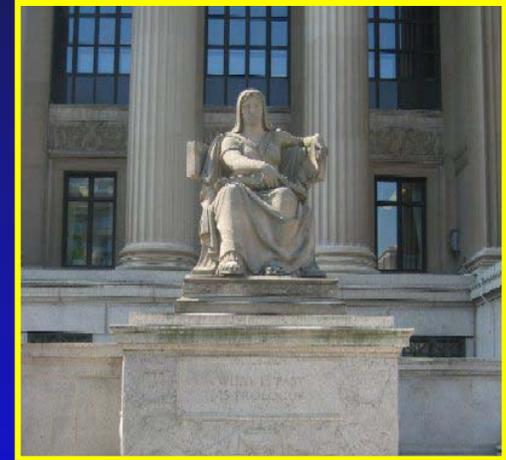
*From Complexity and Uncertainty -  
Order and Excellence*

copyright 2005

# WHY LOOK BACK IN HISTORY ?

**“ What is Past is Prologue ”**

\* William Shakespeare



**“ The Future ”**

**“ Those Who do not Learn from History are Doomed to Repeat it ”**

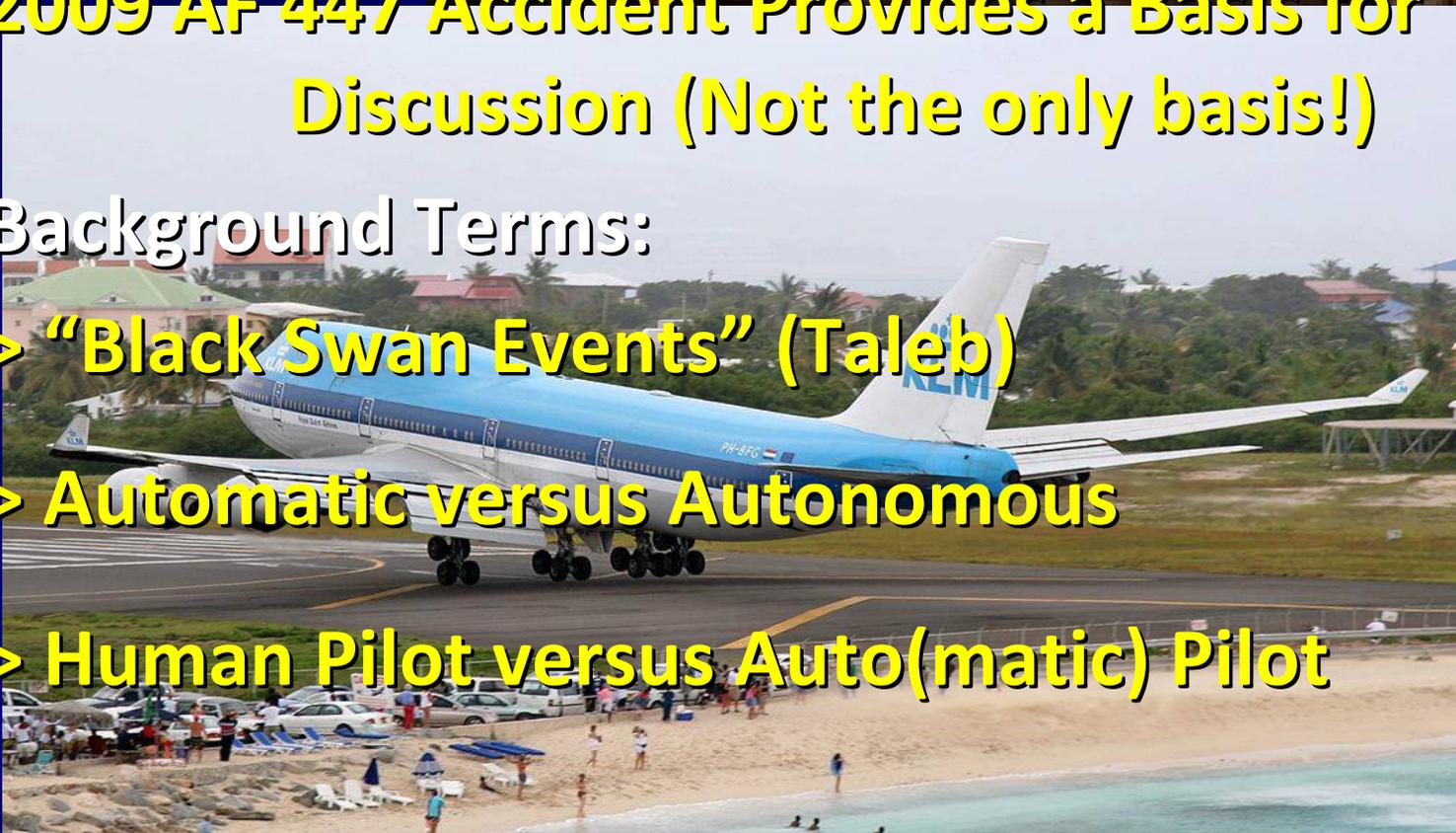
\* George Santayana

## MAIN REFERENCE SOURCE

- **Single Most Important “TAKE AWAY” for ALL of YOU!!**
- **Dr. Simon Bennett ([sab22@le.ac.uk](mailto:sab22@le.ac.uk))**  
**University of Leicester**
  - > **The Aerospace Professional, RAeS,**  
**“Out of the Fog” July and October 2012**

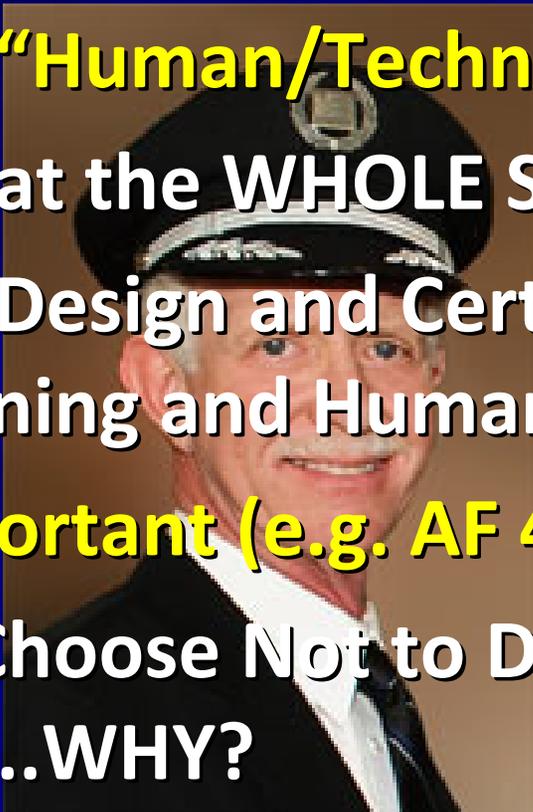
# CURRENT “SYSTEM” STATUS

- **2009 AF 447 Accident Provides a Basis for Discussion (Not the only basis!)**
- **Background Terms:**
  - > **“Black Swan Events” (Taleb)**
  - > **Automatic versus Autonomous**
  - > **Human Pilot versus Auto(matic) Pilot**



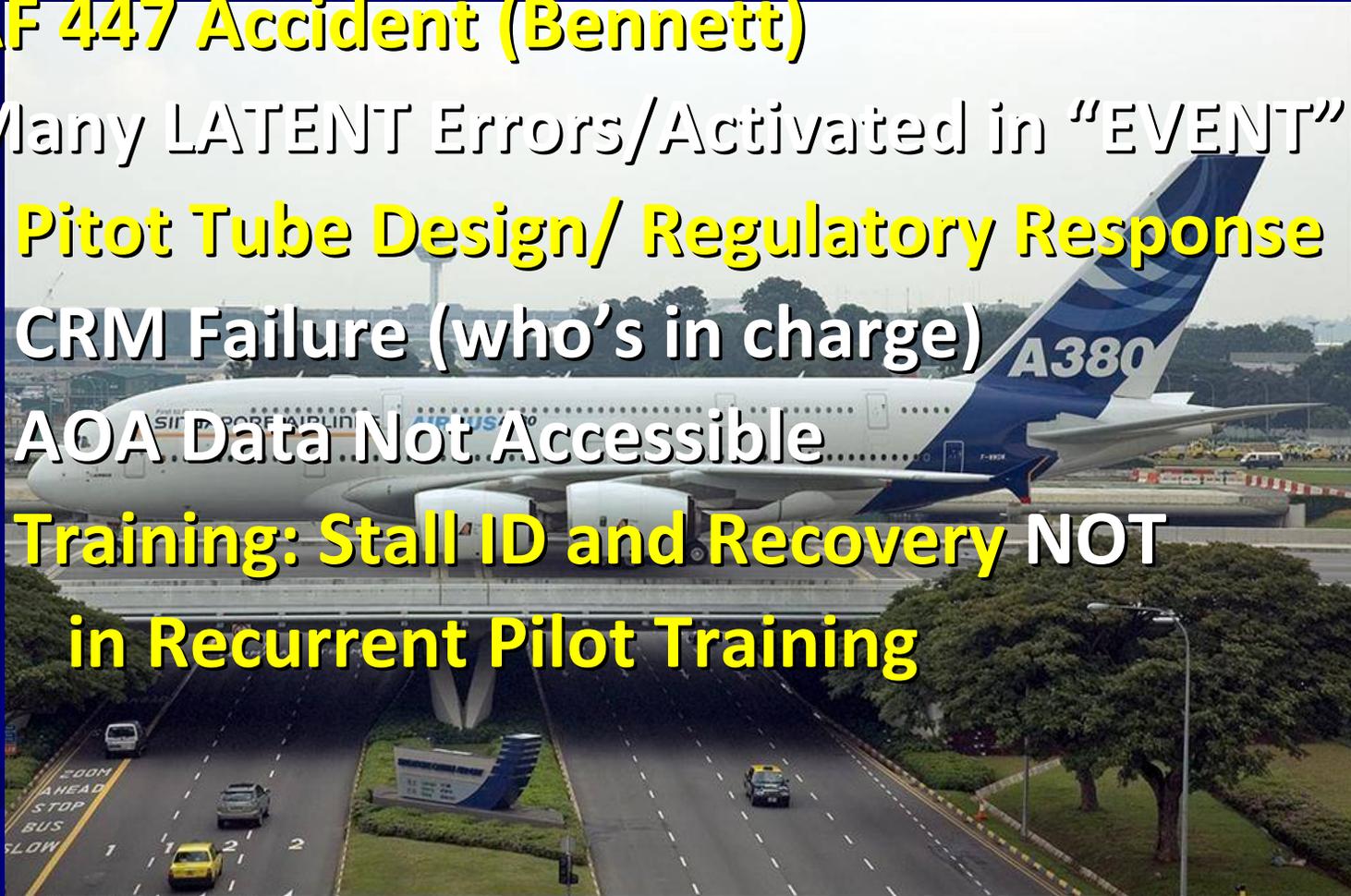
## CURRENT STATUS (cont'd)

- **What Does Capt. “Sully” Sullenberger Say:**
  - > **We have a “Human/Technology System”**
  - > **Must Look at the WHOLE SYSTEM:**
    - **Aircraft Design and Certification,  
Training and Human Factors**
  - > **AOA is Important (e.g. AF 447 accident)**
  - > **Generally Choose Not to Do It (Fix it)**  
.....WHY?



## CURRENT STATUS (cont'd)

- **AF 447 Accident (Bennett)**
- Many LATENT Errors/Activated in “EVENT”
  - > **Pitot Tube Design/ Regulatory Response**
  - > CRM Failure (who's in charge)
  - > AOA Data Not Accessible
  - > **Training: Stall ID and Recovery NOT in Recurrent Pilot Training**

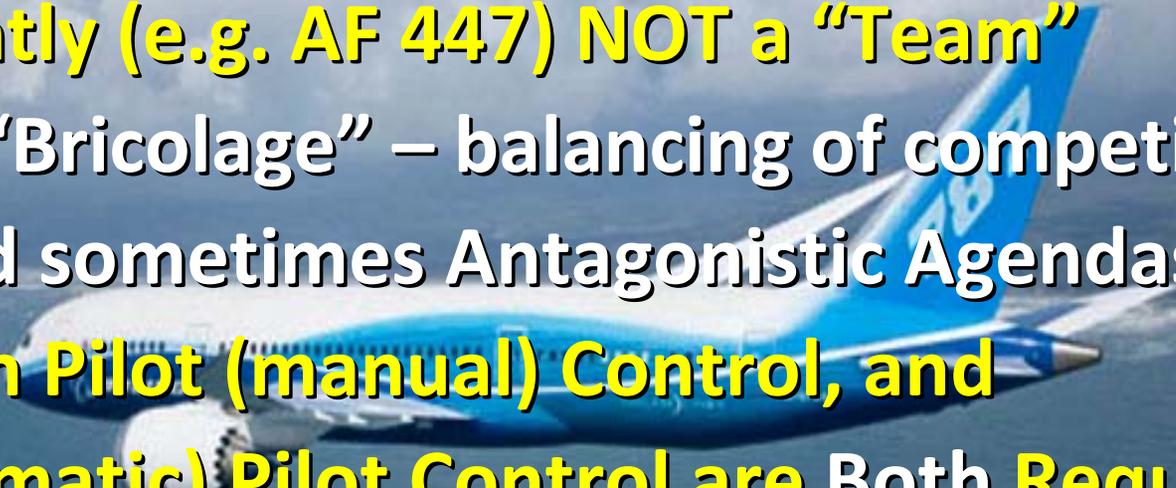


# AF 447 NOTES

- **Bottom Line:**
  - > **“Activated” Latent errors overwhelmed the Aircraft System Defenses and the Capabilities of the 3 Man Crew**
- **James Reason: Latent Errors Originate in:**
  - > **Supervision Practices (CRM failures)**
  - > **Operational Conditions (AOA missing)**
  - > **Organizational Dynamics (Training, Failure of Regulatory Oversight)**

# TRAINING AND AUTOMATION

**An Essential “Team” to Prevent LOC-I  
Currently (e.g. AF 447) NOT a “Team”  
Need “Bricolage” – balancing of competing  
and sometimes Antagonistic Agendas  
Human Pilot (manual) Control, and  
Auto (matic) Pilot Control are Both Required  
for Human/Technology System to Function  
Safely !!**

A blue and white airplane is shown in flight, viewed from a low angle. The aircraft is flying over a dark blue body of water. The sky is a pale, hazy blue. The tail of the aircraft is visible, featuring a blue and white design.

## TRAINING ISSUES

**Currency versus Proficiency**

**Need “Excess Workload Capacity” to perform under Stress**

**Need for Required SA (Situational Awareness)**

**Recurrent Training (Stall/ Stall Recovery),  
Not enough if TASK SATURATED!**

**Required Training is a Major Challenge for  
Ground Simulators: Stress/“Startle Factor” ?**

# Case Study: The X-22A and Me !

Loss of Individual SA /  
Excess Workload  
Capacity



# Situational Awareness ??



**Under STRESS !!**

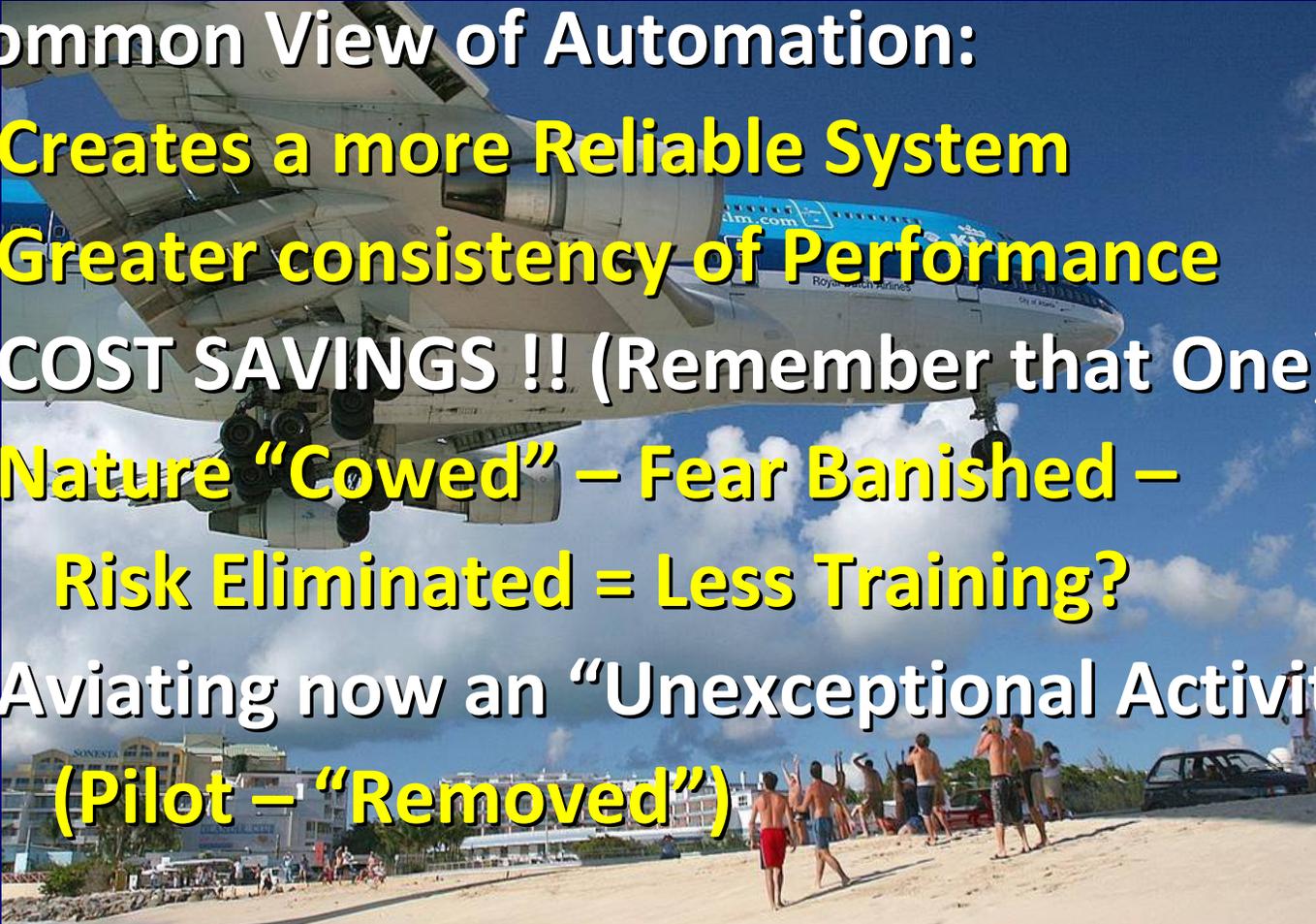
**Practice (PROFICIENCY) makes \_\_\_\_?**

**Permanent**

# AUTOMATION ISSUES

Common View of Automation:

- > **Creates a more Reliable System**
- > **Greater consistency of Performance**
- > **COST SAVINGS !! (Remember that One)**
- > **Nature “Cowed” – Fear Banished – Risk Eliminated = Less Training?**
- > **Aviating now an “Unexceptional Activity (Pilot – “Removed”)**



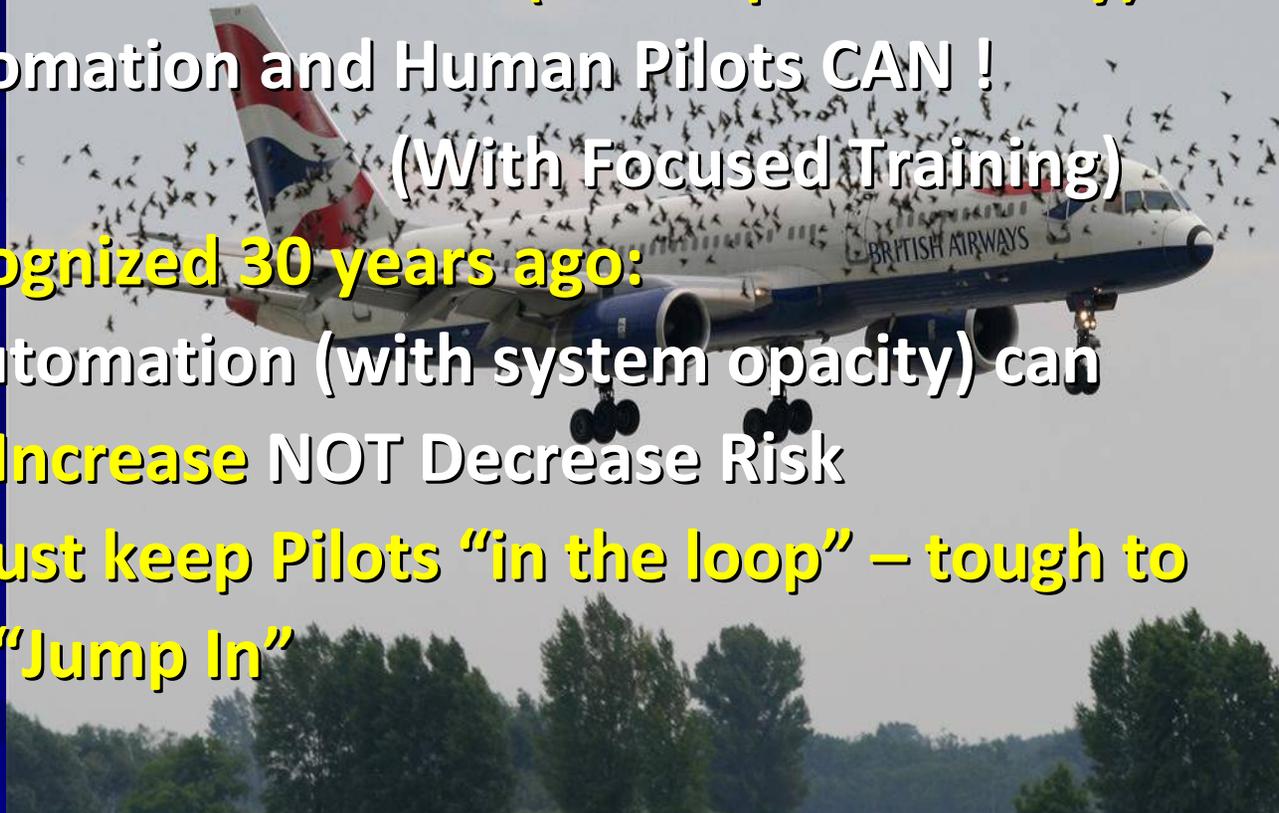
## And...THE TRUTH IS:

Training **CANNOT** cover the highly improbable –  
“Black Swan” Events (Retrospective only)

Automation and Human Pilots **CAN** !  
(With Focused Training)

Recognized 30 years ago:

- > Automation (with system opacity) can  
**Increase** NOT Decrease Risk
- > **Must keep Pilots “in the loop”** – tough to  
“Jump In”



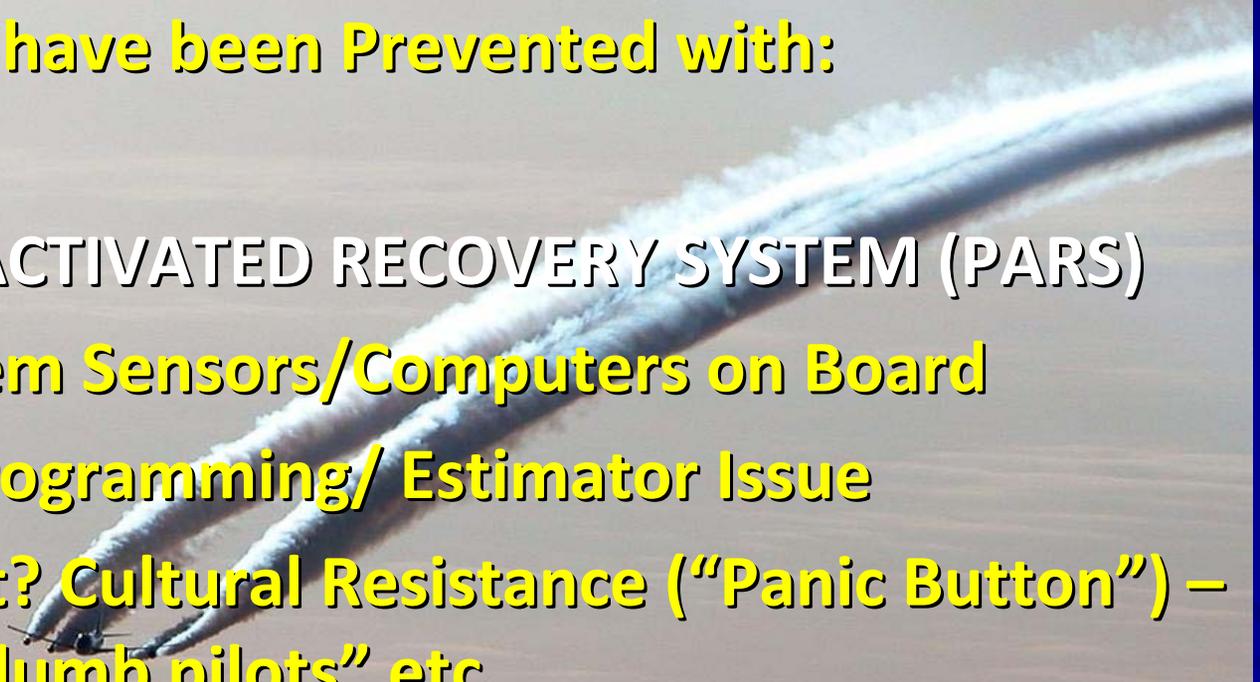
## And...THE TRUTH IS: (cont'd)

- > **Automation (as in 447) can be a risk to Safety (Training, Stall Warning Fiasco)**
- > Automation used properly can provide A “Safety Plateau” (Defense) and enhance Safety
- > **Degradation of Automatic System MUST be Graceful !!**
- > In the Risk-Laden world of Aviation, the **PILOT** Remains the last line of Defense!

# AUTOMATION FOR RECOVERY

**AF 447 Accident ( $10^{-9}$ , “Black Swan” Event)**

**Could have been Prevented with:**

- 
- A PILOT ACTIVATED RECOVERY SYSTEM (PARS)**
  - > All System Sensors/Computers on Board**
  - > Just a Programming/ Estimator Issue**
  - > Why not? Cultural Resistance (“Panic Button”) – just “dumb pilots” etc**
  - > Not New !! : Mig 29, AFTI 16, Eurofighter, F-16 Block 60, All new F-16’s, Others?**

## **SO, WHAT ARE THE PROBLEMS ?**

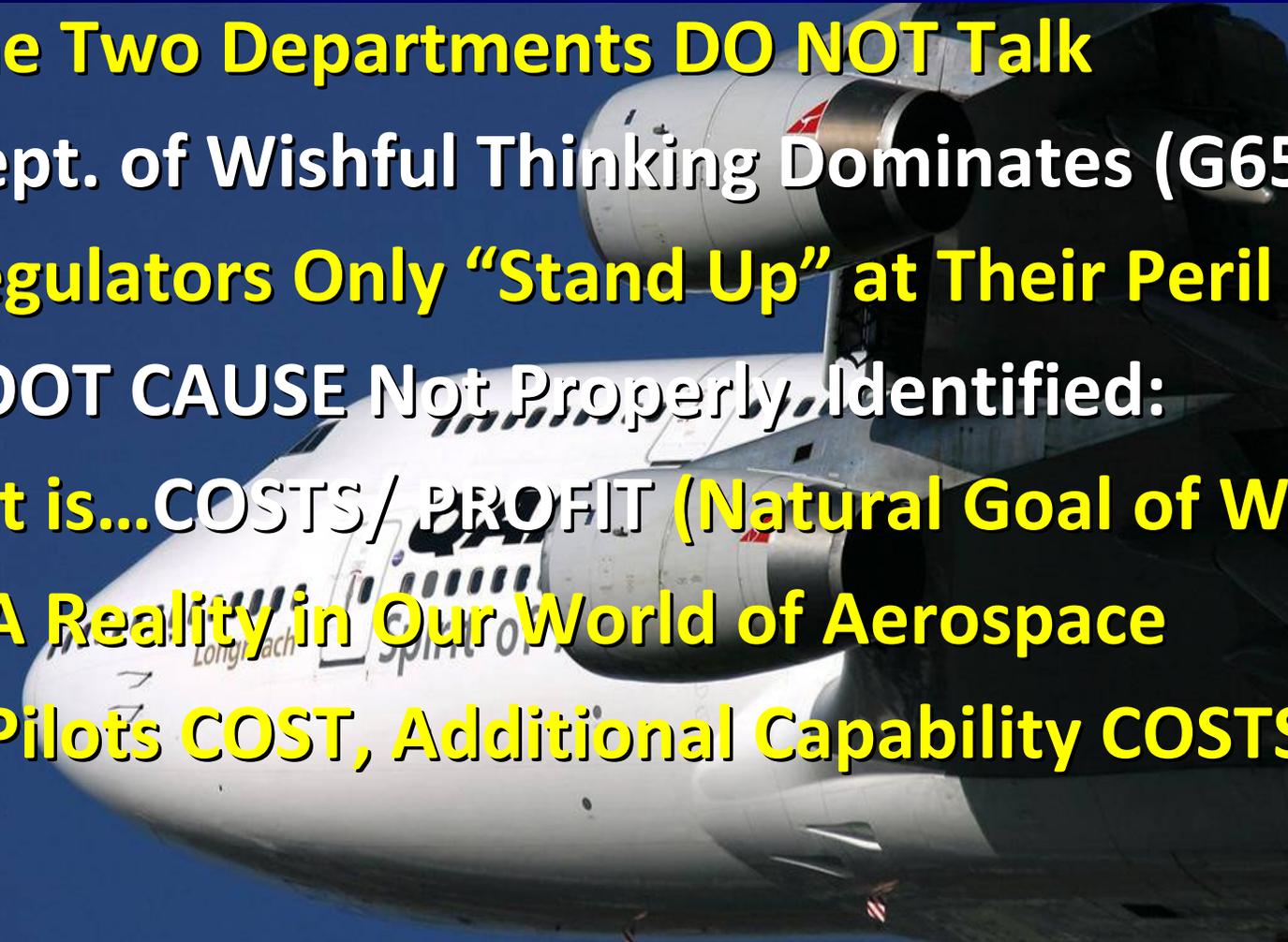
**All Companies (Big and Small) have Two Virtual Departments:**

- > “Dept. of Wishful Thinking” (Who??)
- > “Dept. of Reality” (Who??)

**Ideally, Balanced Inputs – What Do You Think? (I know you are correct!)**

**What About the Regulators (FAA, CAA, EASA?)- Real Conflicts of Interest ?**

## **And...THE PROBLEM (Cont'd) IS:**

- 
- The Two Departments DO NOT Talk**  
**Dept. of Wishful Thinking Dominates (G650)**  
**Regulators Only “Stand Up” at Their Peril**  
**ROOT CAUSE Not Properly Identified:**
- > It is...COSTS/ PROFIT (Natural Goal of WT's)**
  - > A Reality in Our World of Aerospace**
  - > Pilots COST, Additional Capability COSTS**

## A SOLUTION IS:

**The BEST of BOTH Worlds: HUMAN PILOT  
Control and AUTOPILOT Control**

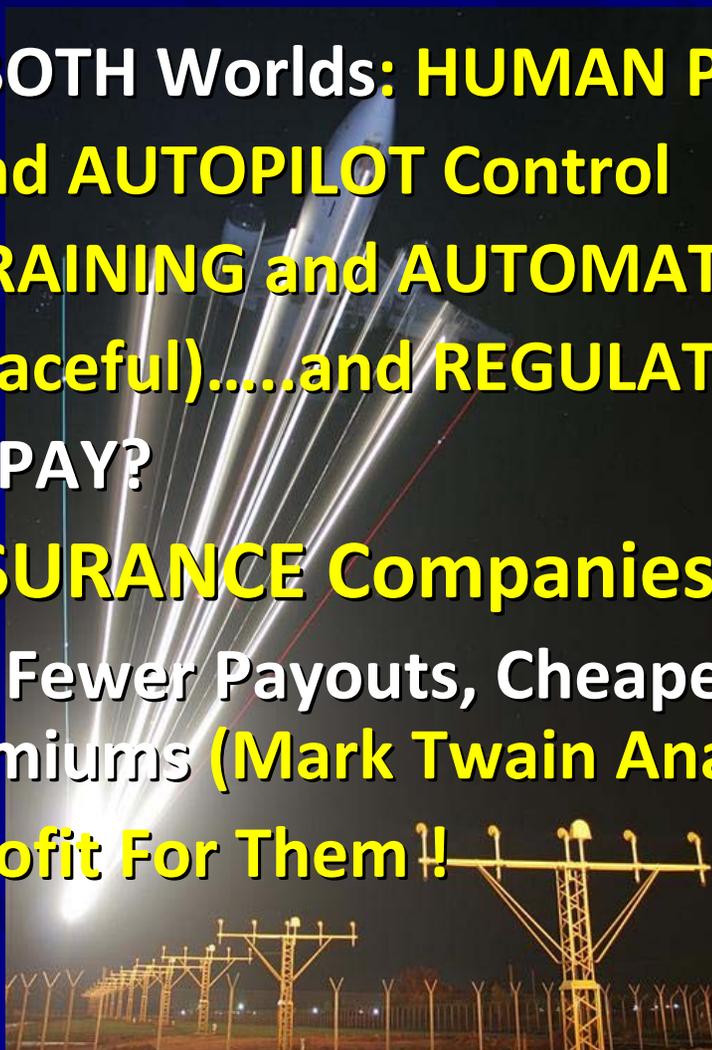
**> Improved TRAINING and AUTOMATION  
(PARS/ Graceful)....and REGULATION !**

**But Who Will PAY?**

**> The INSURANCE Companies?**

**> SAFER = Fewer Payouts, Cheaper  
Premiums (Mark Twain Analogy)**

**> More Profit For Them !!**



## **MY WINNING COMBINATION**

**COMMUNICATION (Two Departments)**  
**INDEPENDENT Regulatory Oversight**

**“IF You Think that SAFETY is Expensive.....  
Try an ACCIDENT!”**

**INTERACTION With INSURANCE PROVIDERS**

**> To Make the Financial Case**

