LOSS OF CONTROL - INFLIGHT

TRAINING + AUTOMATION:
A WINNING COMBINATION

SETP/SFTE SAFETY WORKSHOP - 2012
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
• Single Most Important “TAKE AWAY” for ALL of YOU!!
• Dr. Simon Bennett (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
• 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
• **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)
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 !!
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!
Situational Awareness ??

Under STRESS !!
Practice (PROFICIENCY) makes ____?

Permanent
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!
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?
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
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