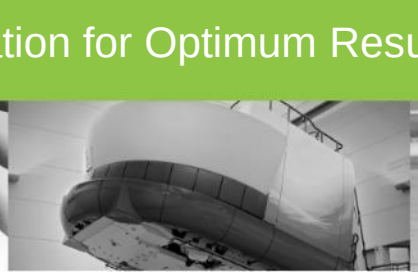
AVIATION PERFORMANCE SOLUTIONS

Integrated Upset Prevention and Recovery Training

Combining Live Flying and Simulation for Optimum Results



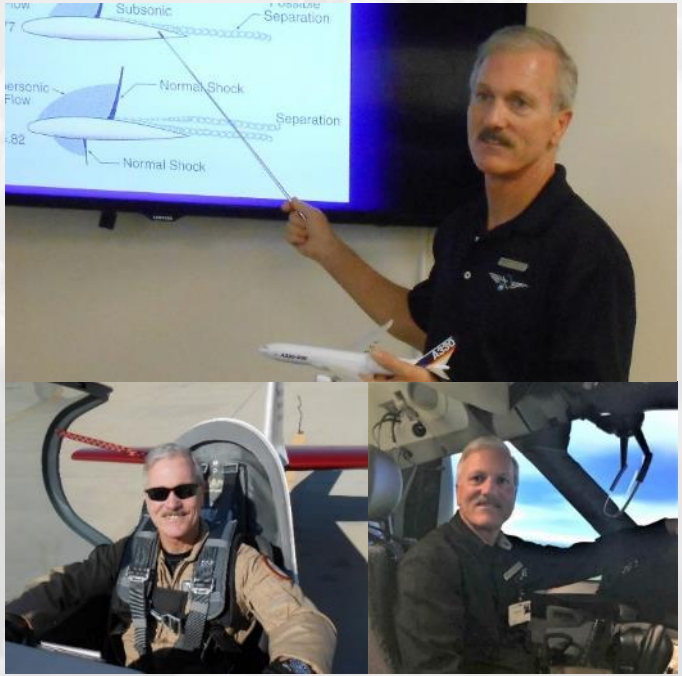


THANK YOU FOR THE OPPORTUNITY

Randall Brooks

VP Training and Business Development

- **UPRT since 2006**
- **Over 600 pilots trained on aircraft**
- **Over 80 simulator Instructors trained**
- **Over 20 simulator types used**
- **randall.brooks@apstraining.com**



Spring Flight Simulation Conference

Flight Simulation Technology: Future Potential

40th Anniversary of the First RAeS International Symposium

Wednesday 9 – Thursday 10 June 2010

No.4 Hamilton Place, London W1J 7BQ, UK

Sponsored by:

BAE SYSTEMS

CAE

Honeywell

OPINICUS

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THALES

FINAL QUESTION POSED

“Has there been any study of the extent to which psychological factors may play a role in the effectiveness of training in the simulated environment, with respect to certain high threat situations or tasks?”

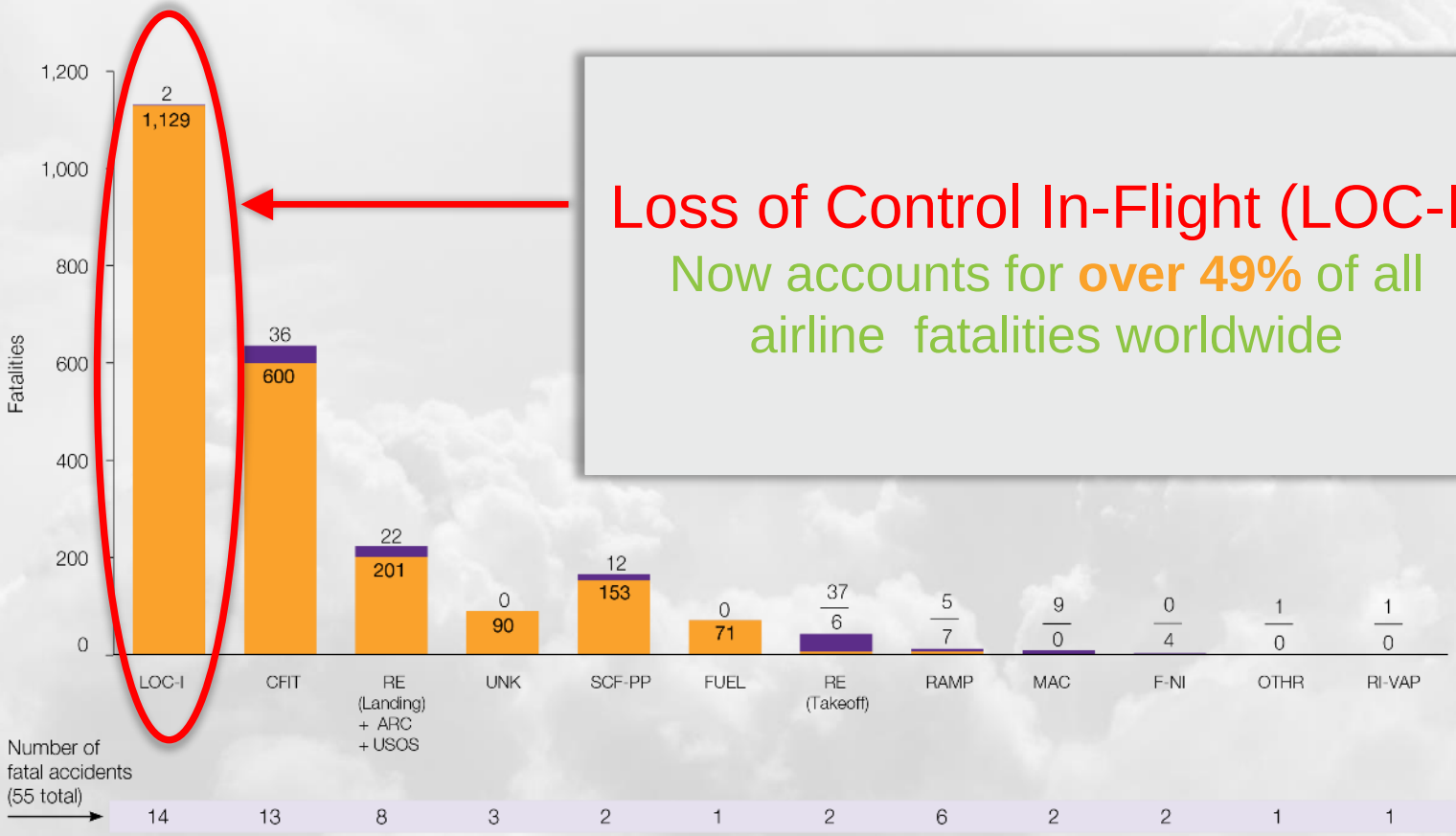
The Psychological Boundaries of Flight Simulation

Randall L. Brooks
Sr. Director of Flight Training
OPINICUS *Corporation*

8-9 June 2011
Royal Aeronautical Society
Flight Simulation Group

OPINICUS
Corporation

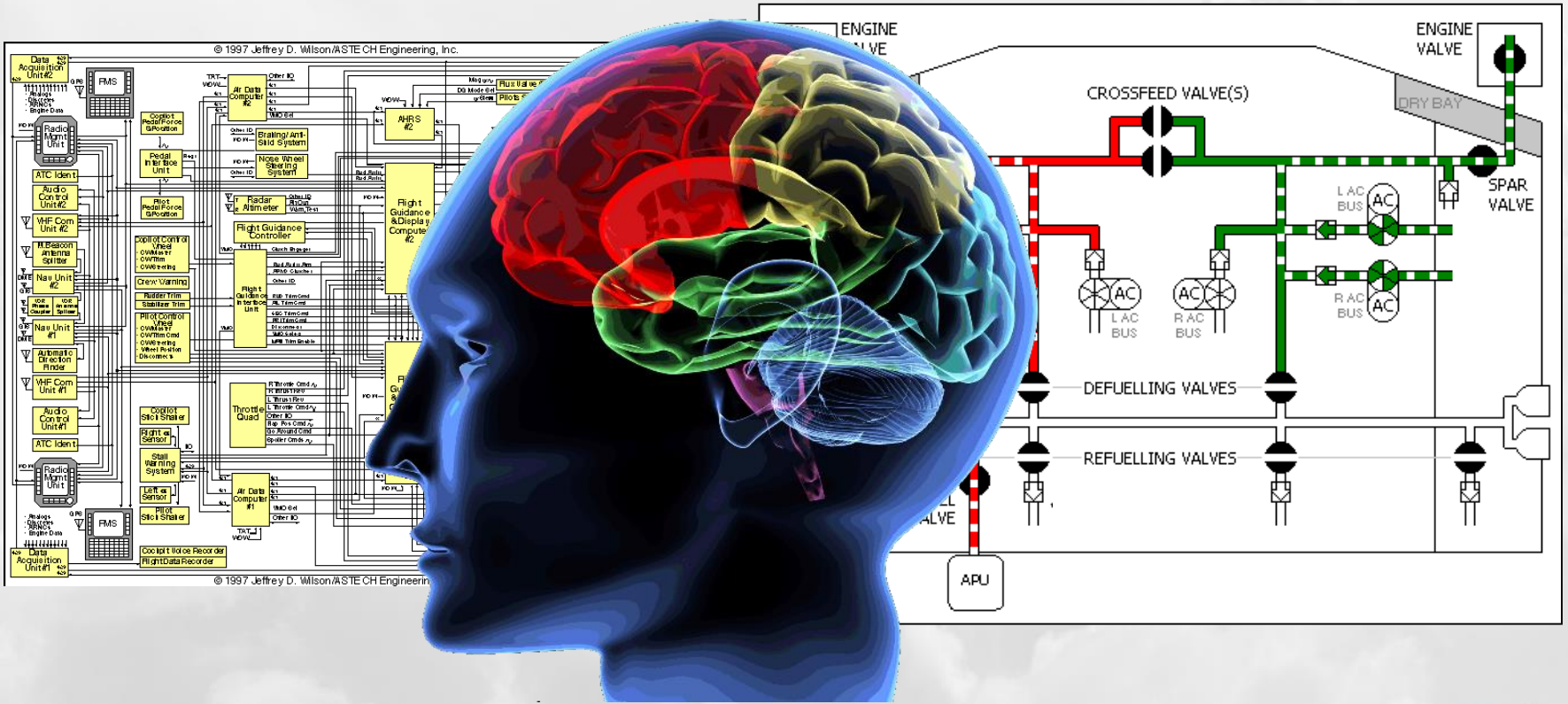
WORLDWIDE FATAL ACCIDENTS 2008-2017



Loss of Control In-Flight (LOC-I)

Now accounts for **over 49%** of all airline fatalities worldwide

THE BRAIN AS AN AIRCRAFT SYSTEM



AVIATION PERFORMANCE SOLUTIONS

Flight Simulation Training Devices

Effectiveness of the Tool





Inside the Normal Envelope

- Designed for use in this range
- Highly accurate and generally flight tested
- Aerodynamics are generally linear and steady here
- No prolonged accelerations
- Higher Order cognition is in effect (prefrontal cortex)
- Excellent for preparing for normal flight operations

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Outside the Normal Envelope

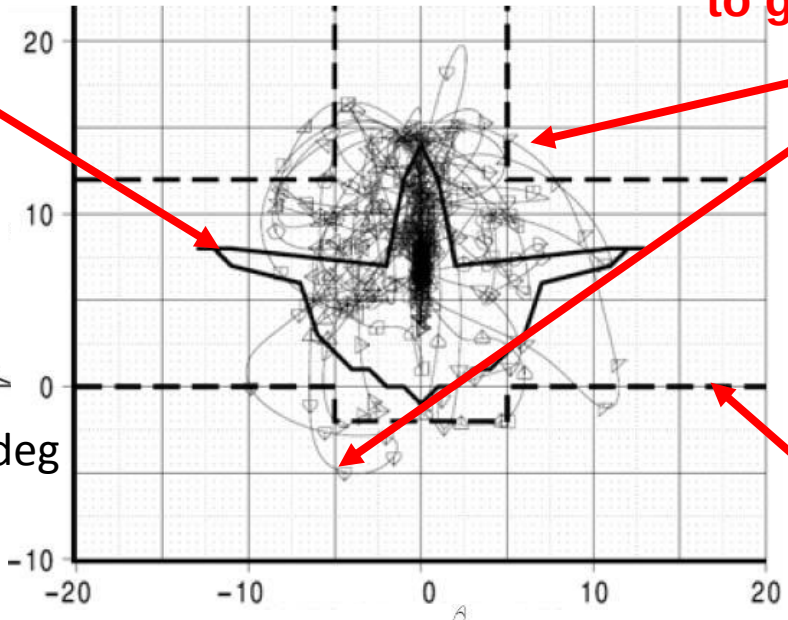
- Not originally intended for use in this domain
- Aerodynamics may not be properly modeled (extrapolated)
- Unsteady, non-linear aerodynamics
- Accelerations can be continuous, and higher order
- Very different from normal operations
- Inadequate for *comprehensive* preparation for flight beyond the normal envelope

SIMULATION VS. THE REAL WORLD

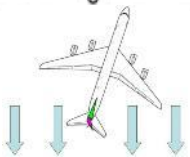
Where aircraft are likely to go in an Upset Event

Flight test validated data

Angle of attack, deg

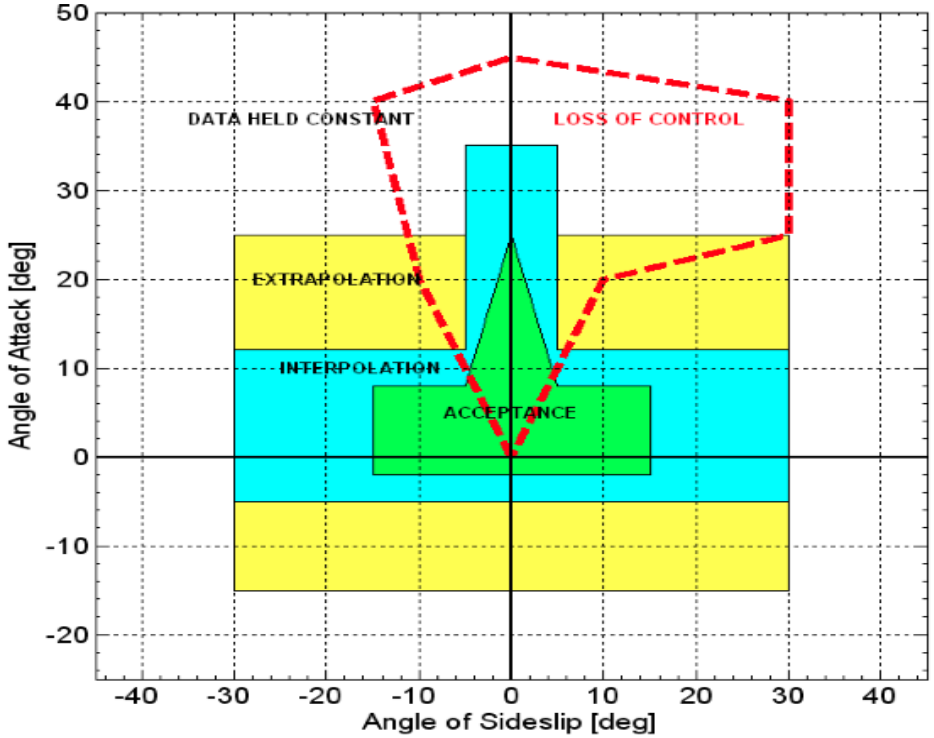


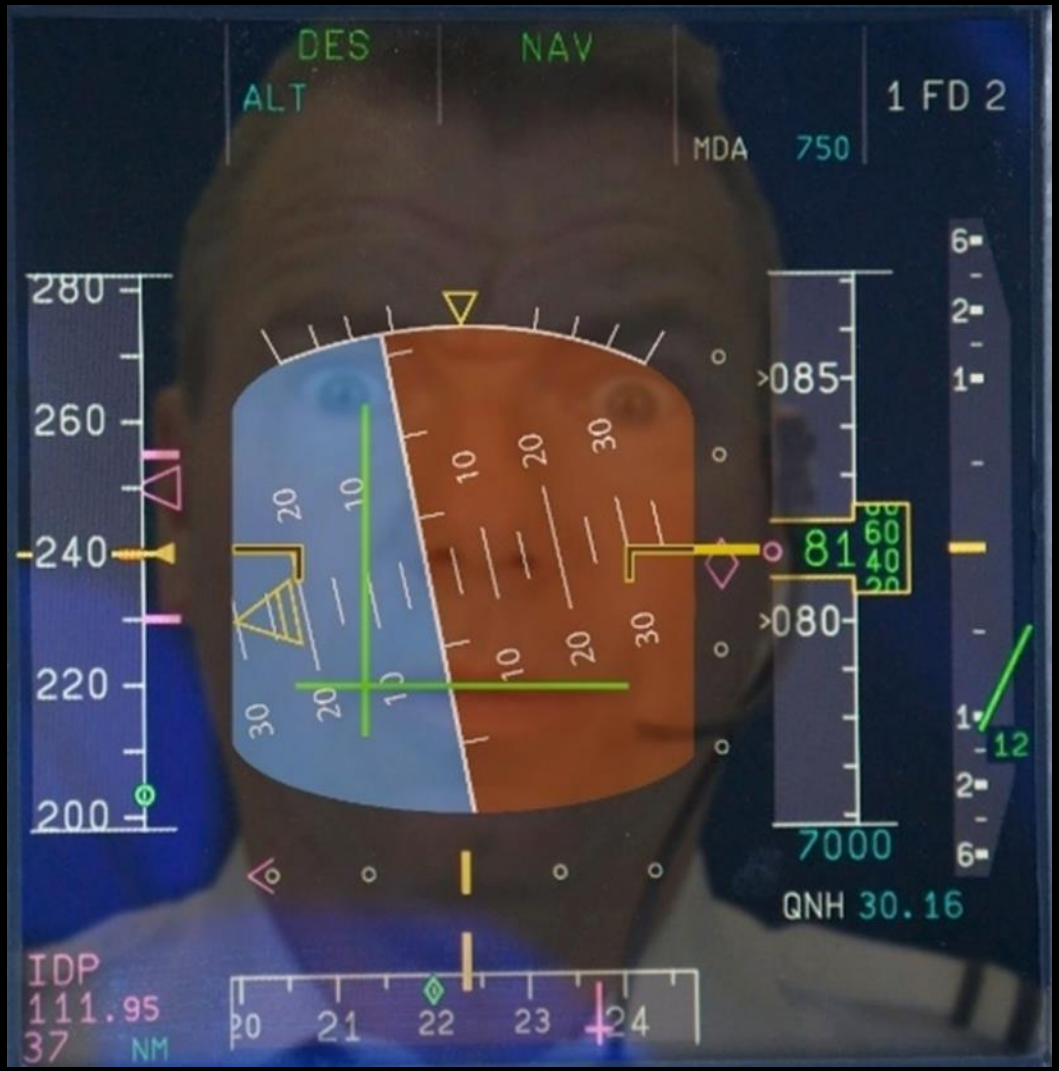
Wind tunnel validated data



Sideslip, deg

MODELING GAPS




DES
NAV
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200
085
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81
60
40
7000
QNH 30.16
12
IDP
111.95
37 NM
20
21
22
23
24

HOW THE BRAIN WORKS UNDER THREAT

OH MY GOD

It's a Shark.

AVIATION PERFORMANCE SOLUTIONS

The Integrated Approach

Combining Assets for Effectiveness

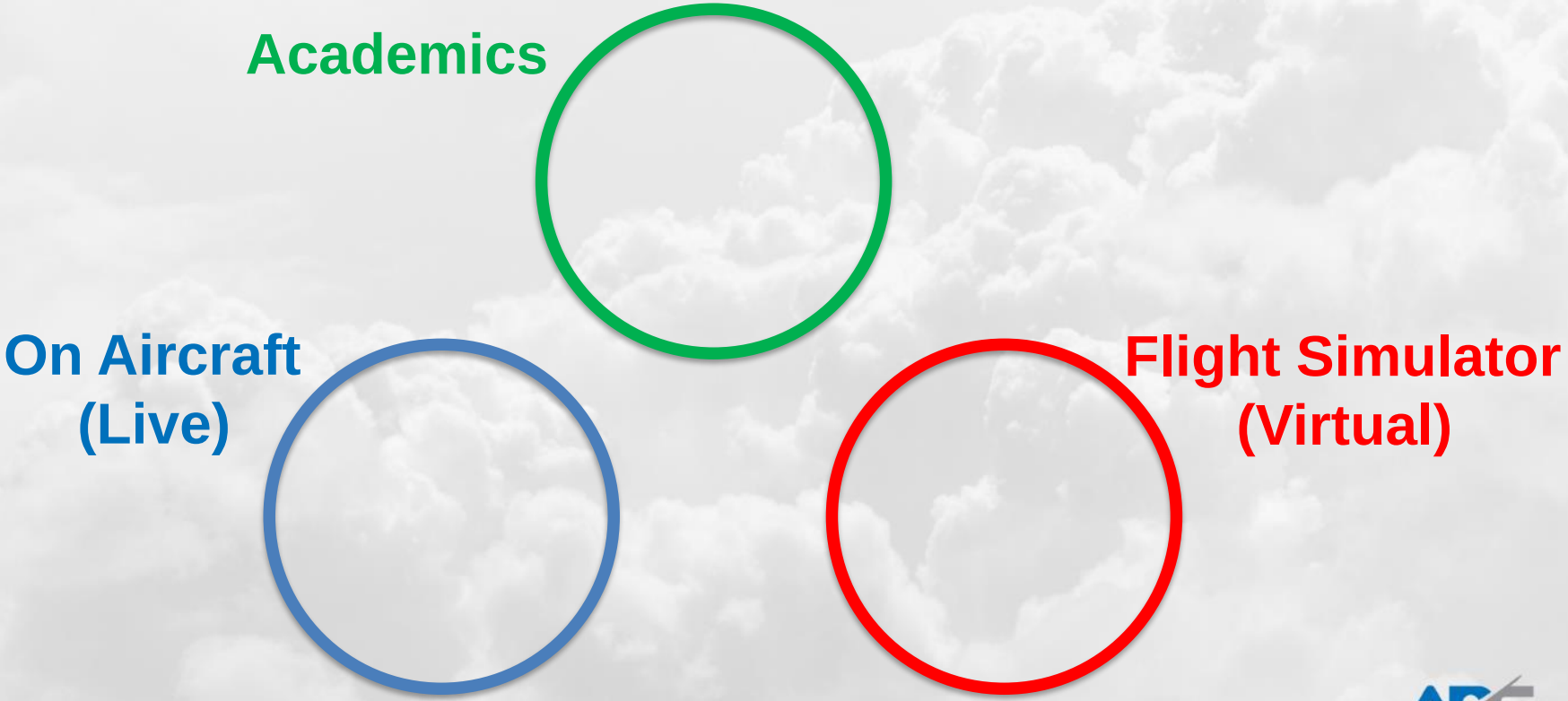




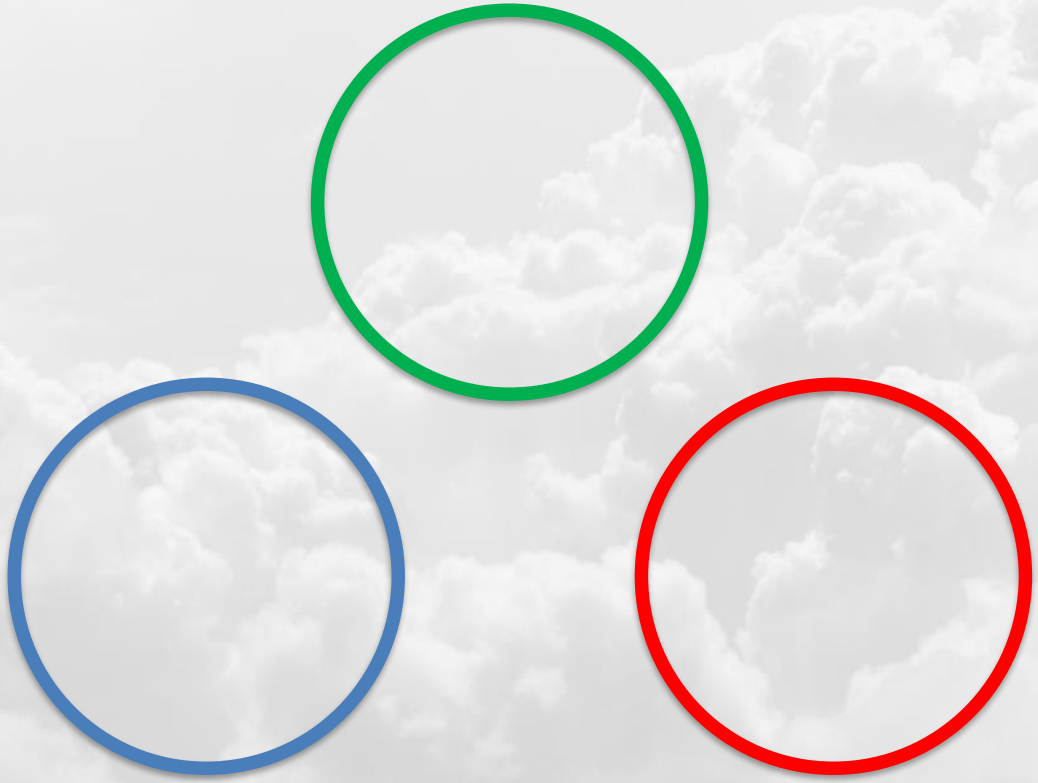
ADVOCATED BY ICAO / IATA

- **Document 10011**
- **Manual on Aeroplane Upset Prevention and Recovery Training**
- **IATA Guidance and Best Practices for the Implementation of UPRT**

COMPONENTS OF UPRT



INTEGRATED UPRT



COORDINATION OF ELEMENTS

Academics

On Aircraft
(Live)

Flight Simulator
(Virtual)

ROLE OF ACADEMICS IN UPRT

Academics

- Provides a foundational understanding prior to practical skill development
- Explains different aerodynamic behavior and characteristics in the upset domain
- Not likely accessible in an upset event

Which Comes First?

On Aircraft (Live)

Flight Simulator (Virtual)

ALL-ATTITUDE CAPABLE AIRCRAFT

CONTRIBUTION OF LIVE FLYING

On Aircraft (Live)

- Representative aerodynamics beyond the normal envelope
- Physiological: continuous accelerations (including less than 1G)
- Psychological: “Reality” factor; Perception of risk and threat of consequences in a *controlled* environment
- Development of pattern recognition

BOEING 717 (OUTSIDE SIM DOMAIN)


SLIPPING STALL
ALL-ATTITUDE UPSET RECOVERY

NOSE LOW / HIGH BANK ANGLE UPSET

FLIGHT SIMULATOR CONTRIBUTION

- Transfer of skills introduced in the all-attitude aircraft to CRM
- Differences: restricted view, slower control response, higher control forces
- Type-specific instrument indications, warnings, and cuing

Flight Simulator (Virtual)

AVIATION PERFORMANCE SOLUTIONS

RESULTS

Airline and Military Applications





US ARMY FIXED WING

Follows ICAO recommended integrated pathway

- **Academics**
  - **Classroom**
- **Primary Fixed Wing**
  - **Grob 120TP**
- **Full Flight Simulator**
  - **King Air/C-12/MC-12/RC-12**

AIRLINE INSTRUCTOR UPRT

UNITED

DELTA

Aer Lingus

SOUTH AFRICAN AIRWAYS

AirAsia

CATHAY PACIFIC

FEAR

It won’t help you get right-side up

THANK YOU FOR THE OPPORTUNITY

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