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RASG-AFI LOC-I and UPRT Workshop

10-11 November 2021)

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Sunjoo Advani's Presentations from Day 2

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First day, 10 November 2021		
14h00-14h10	Opening address	Regional Director
14h10-14h15	Introduction to the Workshop	ICAO-PIM
1 - UPRT in academic and simulator training during the pandemic		Jeffery/ Sunjoo
14h15-15h55	1.1 Competency fade during the pandemic	Sunjoo
15h55-16h35	1.2 Exemptions/Deviations granted and their impact	Jeff/Sunjoo
16h35-16h45	***Break***	
16h45-17h25	1.3 Experience in conducting training during the pandemic	Jeff/Sunjoo
2 - UPRT delivery using available resources, including unmodified simulators, and recognition/awareness as minimum training		Sunjoo/ Jeffery
17h25-18h05	2.1 Training programs for prevention & recovery	Sunjoo
18H05-18h25	2.2 Rwandair experience-Training Programme and SMS	Capt Kojo
18h25	***Closure for the first day***	

Second day, 11 November 2021		
2 - UPRT delivery using available resources, including unmodified simulators, and recognition/awareness as minimum training		Sunjoo/Jeffery
14h00-14h40	2.3 Advert practices on prevention and recovery	Jeff/Sunjoo
14h40-15h20	2.4 Instructor training and instructor standardization	Sunjoo
3 - Global Status of UPRT and lessons learned		
15h20-16h20	3.1 Issues arising during the past year	Jeff
16h20-16h30	***Break***	
4 - Review of accident reports, risks factors and tools		
16h30-17h00	4.1 UPRT preliminary thoughts on Sriwijaya Air Flight 182 accident	Jeffery/Sunjoo
17h00-17h30	4.2 UPRT in RPAS: early Considerations	Jeffery/Sunjoo
17h30-17h50	4.3 IATA-Fight Data Analysis and LOC-I	Blessing Kavai
17h50-18h15	4.4 KCAA- Inflight incapacitation in the era of COVID-19	Dr. Ilako
18h15-18h30	4.5 Updates on RASG-AFI Guidance and reporting tools Wrap-up	ICAO-PIM
18h30	***Closure of the Workshop***	Regional Director

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2.3 Discussion on Training Prevention & Recovery

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An ounce of prevention...

is worth a pound of cure

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What does UPRT require?

- Train pilots to **react appropriately** to upset threats in any condition (prevention and recovery)
  - Recovery is a nearly bullet-proof vest
  - Prevention ensures the gun is not loaded!
- **How do we create the right solution for the pilot?**
  - Train the instructor to **teach**
  - Train the pilot to **“listen to the airplane”**

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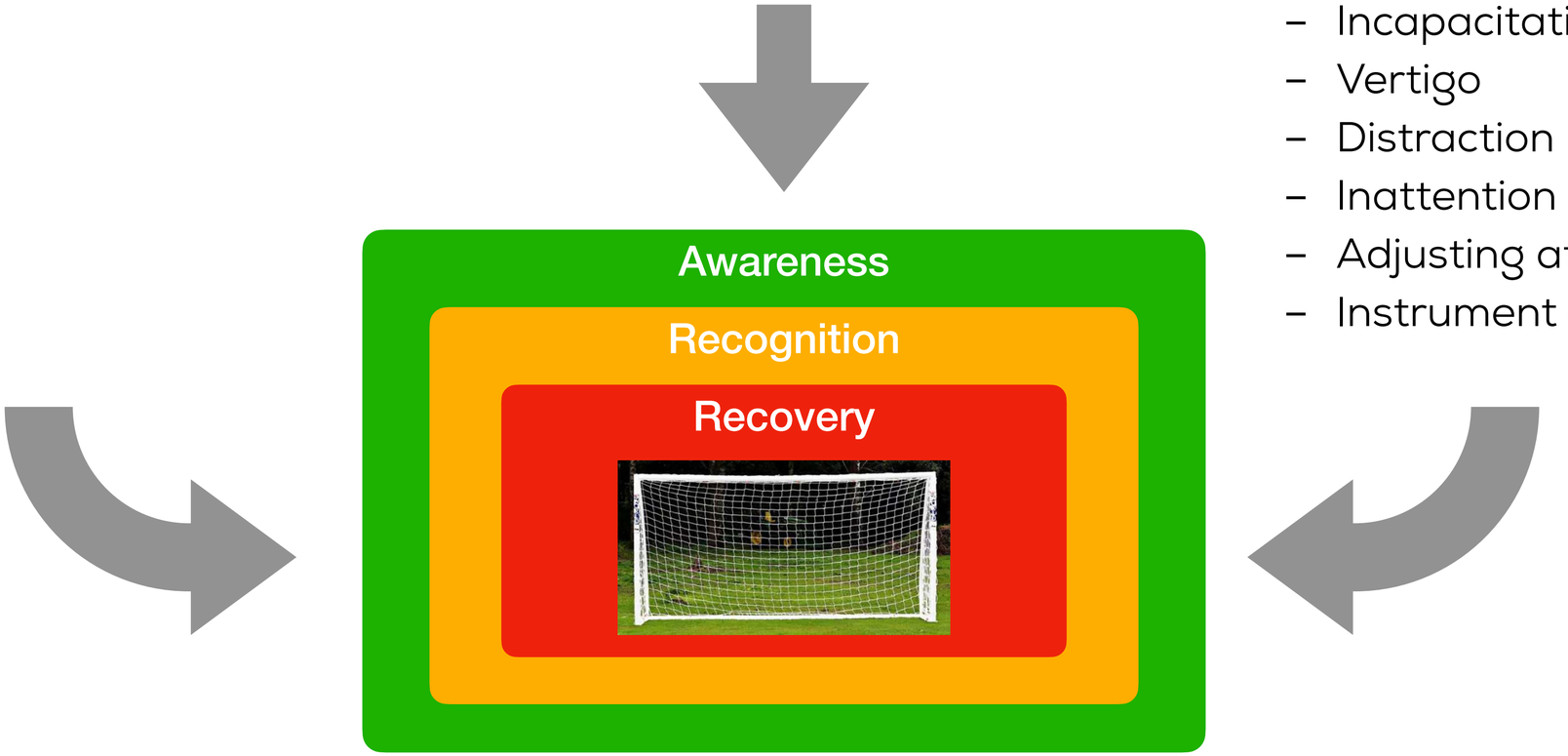
Causes of Upsets in Commercial Aviation

- **Environmental**
  - Wake vortex
  - Clear Air Turbulence
  - Mountain Wave
  - Thunderstorm
  - Icing
  - Microburst
- **System Anomaly**
  - Flight Instruments
  - Autopilot
  - Flight Control System
- **Pilot Induced**
  - Inappropriate use of A/P
  - Spatial Disorientation
  - Somatogravic Illusion
  - Pilot technique
  - Incapacitation
  - Vertigo
  - Distraction
  - Inattention
  - Adjusting attitude & PWR
  - Instrument crosscheck



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Prevention

- Mitigates faults and errors EARLY
- Mitigates escalation of stress, startle
- Recovery “Technique” is the same for both recovery and prevention:
  - Manage Angle of Attack
  - Manage Airplane Energy
  - Manage Startle
- ONLY possible when awareness and recognition properly trained
- Remember… UPRT is new!

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Training Prevention without Recovery

… and hoping for the best

- Prevention is not bullet-proof
  - Unknown, unintended or unexpected causes of upsets
  - Recovery is a final safety net
- Risk of depriving pilots of **confidence**
- Risk of accidents due to inability to recover

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Training Recovery without Prevention

… and still hoping for the best

- While recovery may resolve a significant problem, **prevention arrests the escalation of errors**
- Intervention of “early recovery” will likely prevent escalation
- When errors escalate, the mind already freezes
- Startle management starts with prevention
- Prevention should be integrated in all flight training
- You can conduct prevention training and much recovery training within the valid envelope of current devices - ***and start today!***

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It’s still an airplane

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Industry Adoption of Prevention & Recovery

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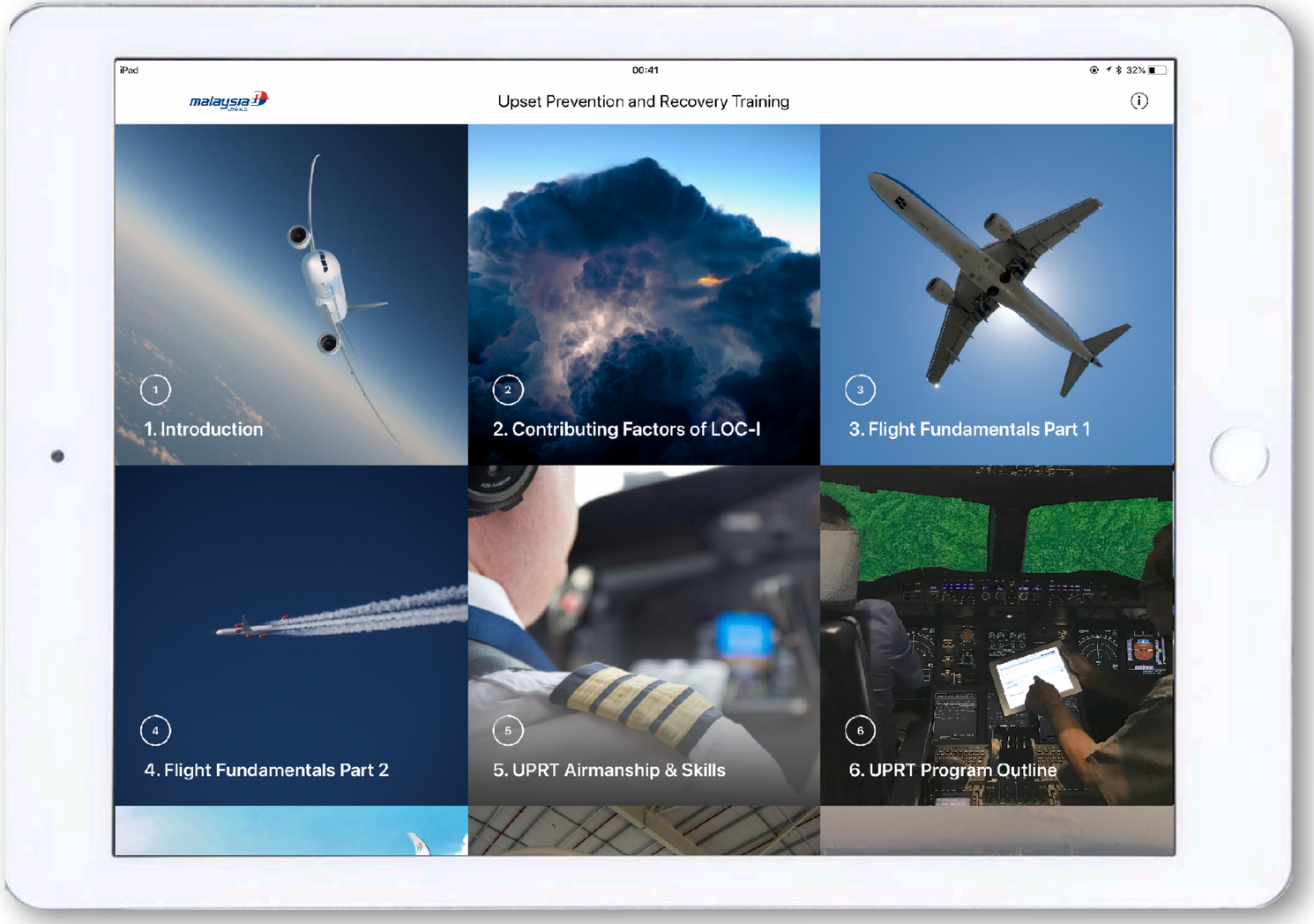
Integrated Rev 2 (AURTA) & Rev 3 (AUPRTA)



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Prevention or Recovery?

There is no choice

We need both!

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You choose.

Awareness

Prevention

Recovery

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Fire Safety

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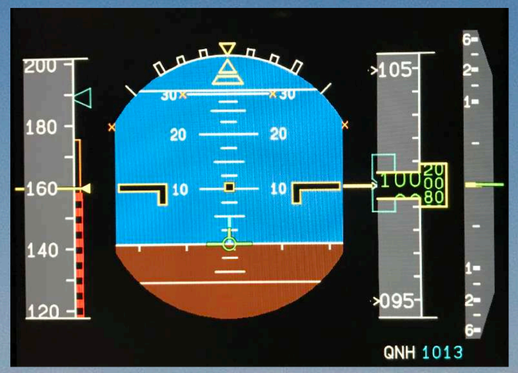
UPRT Threat & Error Management

Detect → **Recognise** → **React**

Awareness &
Anticipation of Threats

Recognition of Errors



Mitigation through
- CRM
- Appropriate Intervention

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2.4 Instructor Training & Standardisation

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Choose the “best” instructor

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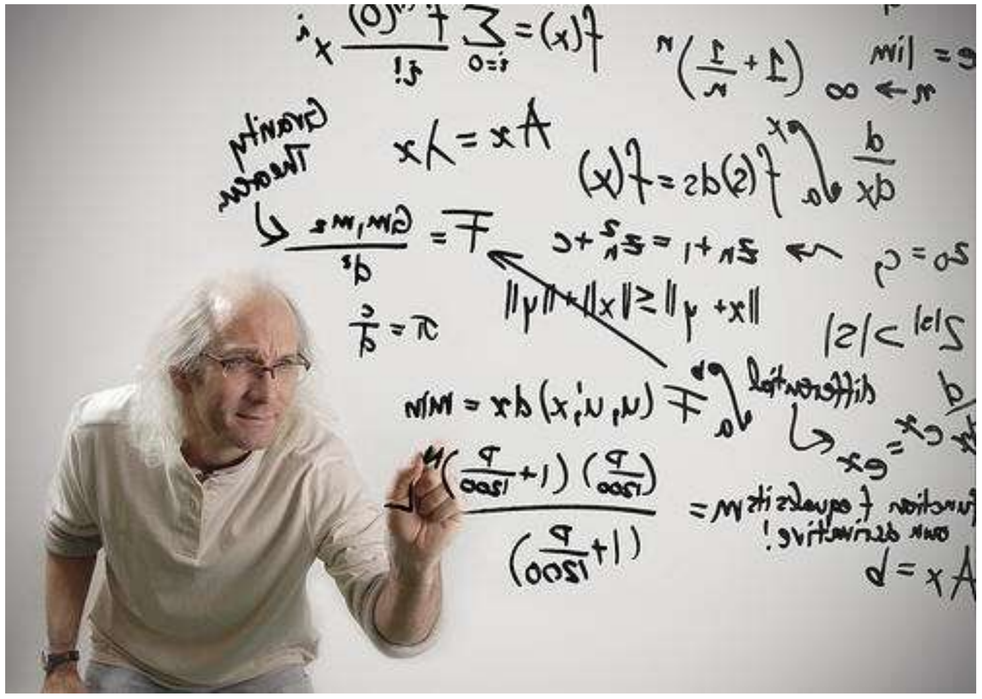

Qualities we seek in instructors

Which would you consider important?

- A “Guru” - expert in the field
- Knowledgable
- Enjoys teaching
- Professional yet approachable
- Adapts to student’s learning style
- Allows students to make mistakes and help correct them
- Admits when they are wrong or don’t know the answer

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How are instructors selected?

- How do YOU select who should instruct?
- Senior, experienced airmen, or enthusiastic, motivated and still learning?
- Do senior pilots accept younger instructors?

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Learning must be non-punitive

however, we DO need to validate

- Training versus Checking
- Training based on ability and pace of the trainee
- Adjust the PROGRAM to meet pilot needs:
- “IBT” - Individualised-Based Training

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Lessons Learnt

- Be clear about your goals/lessons
- Good instructor extracts the best out of the candidate
- Calibrate/standardize your instructors

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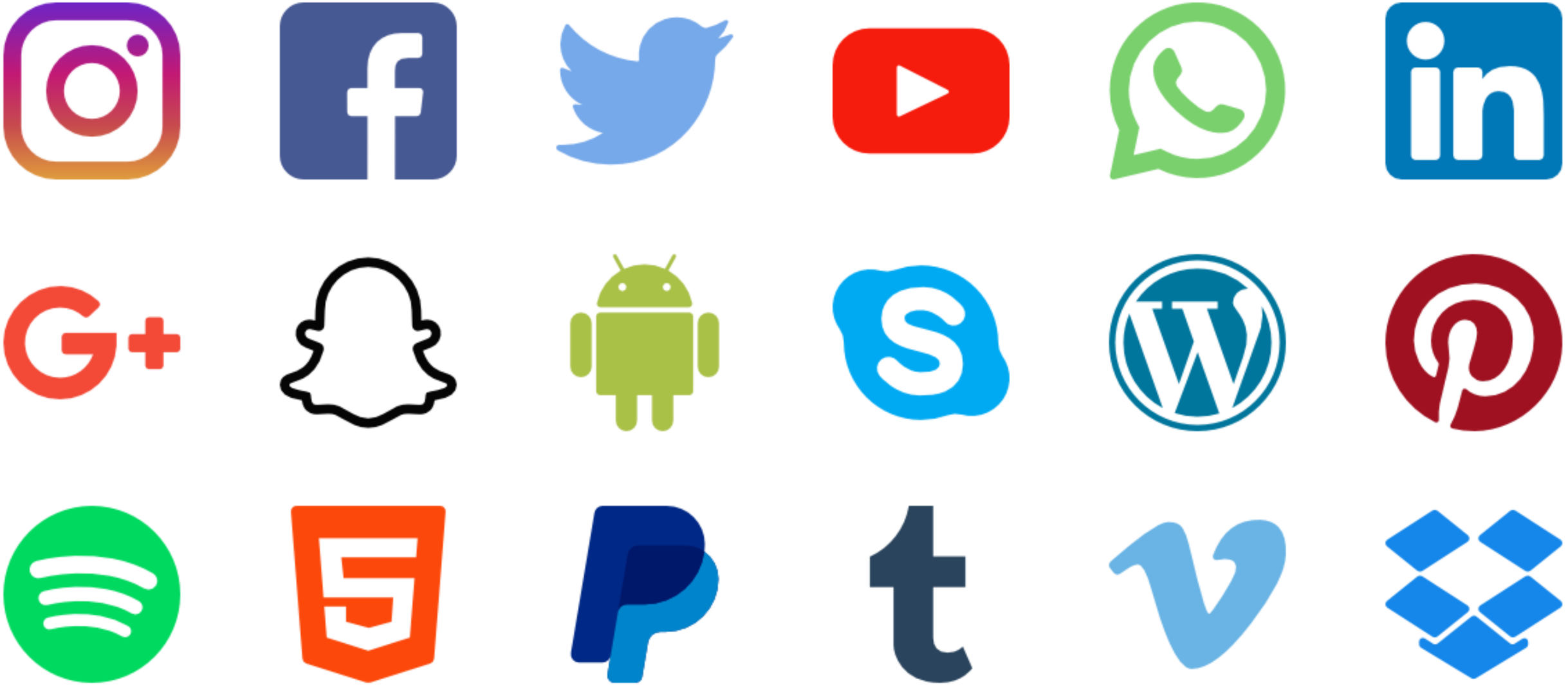
Today's Society



Glory days of aviation

What has it become today?

Where's the exotic life gone?

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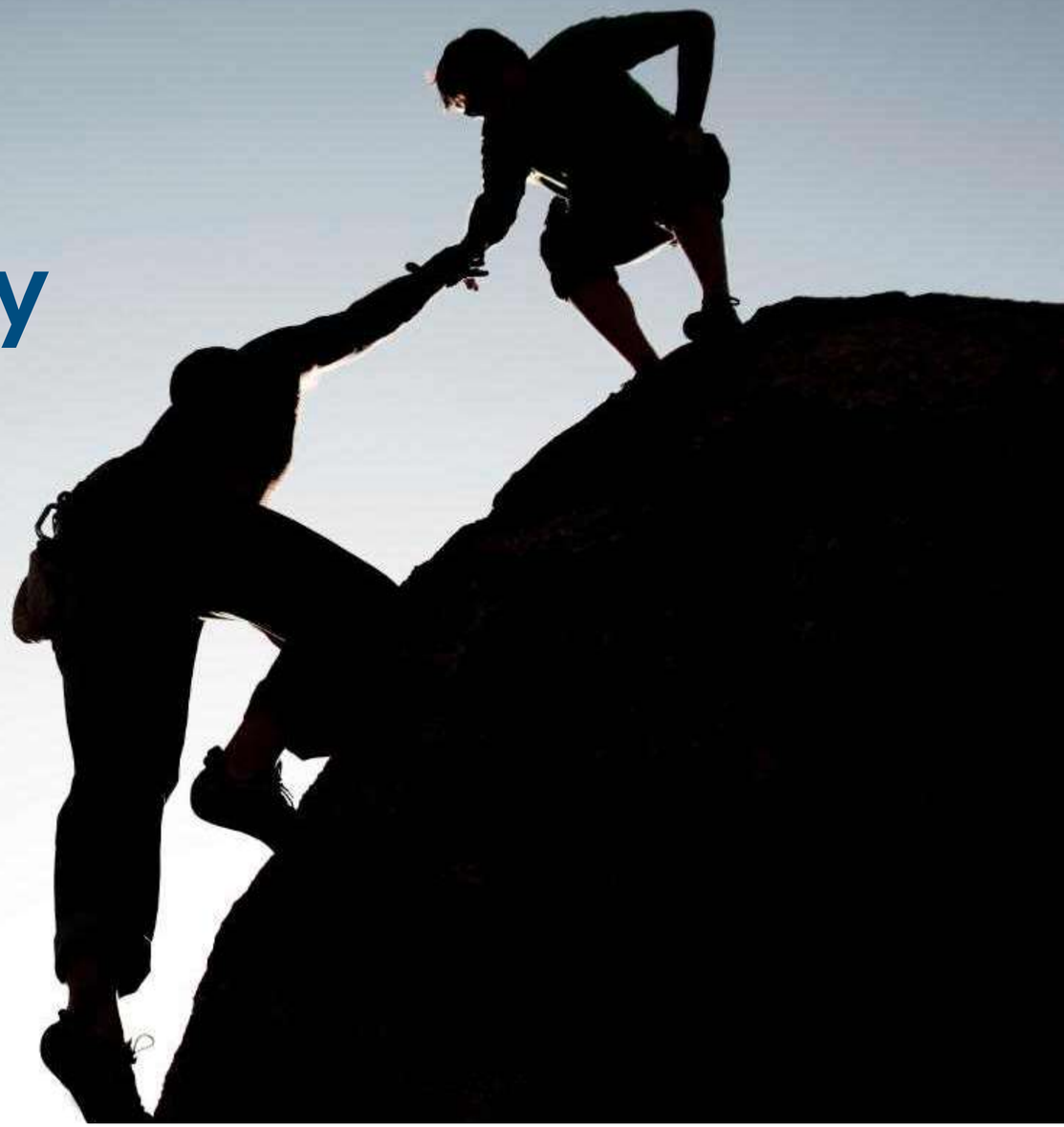
“Mentoring”-to-Proficiency



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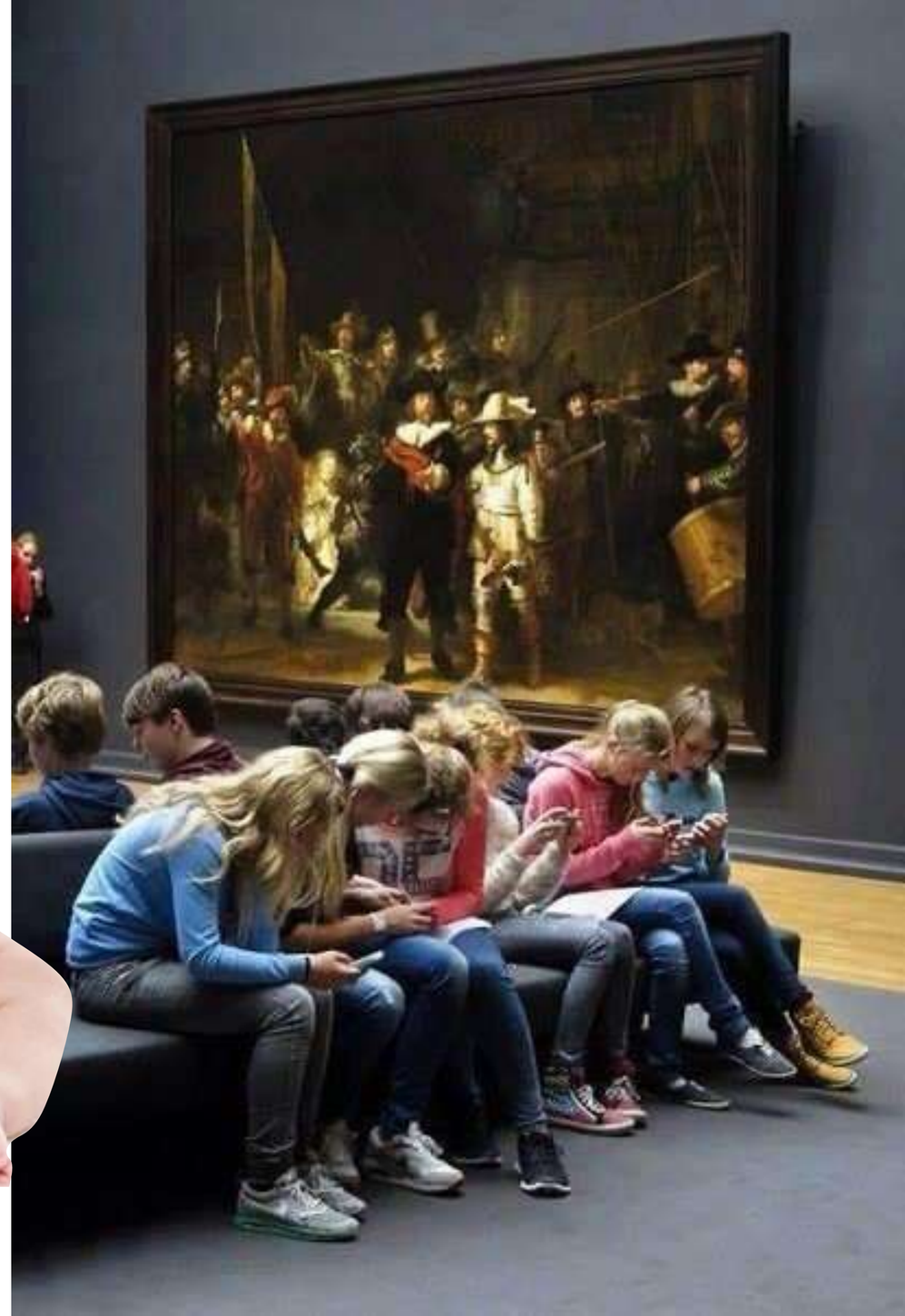
Media & Culture

The way of teaching must adapt

- Technology evolution
- Instant gratification
- Dynamic, not static
- Learn-by-doing



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Realities
of today

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UPRT Instructor Competency

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The Airline Instructor Paradox

Skills & Knowledge

Airline skills + knowledge

Basic Skills & Knowledge

Typical Airline Instructor Selection

Flight school

Airline operations

Time

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Simulator Capabilities and Limitations

- Math model
- Only onset motions
- All cues are simulated
- The bridge always comes down
- Instructor has IOS (possibly with UPRT)

- Real aerodynamics
- Onset and continuous motions
- Cues are real; cannot be attenuated
- What goes up must come down
- No IOS or instructor on board

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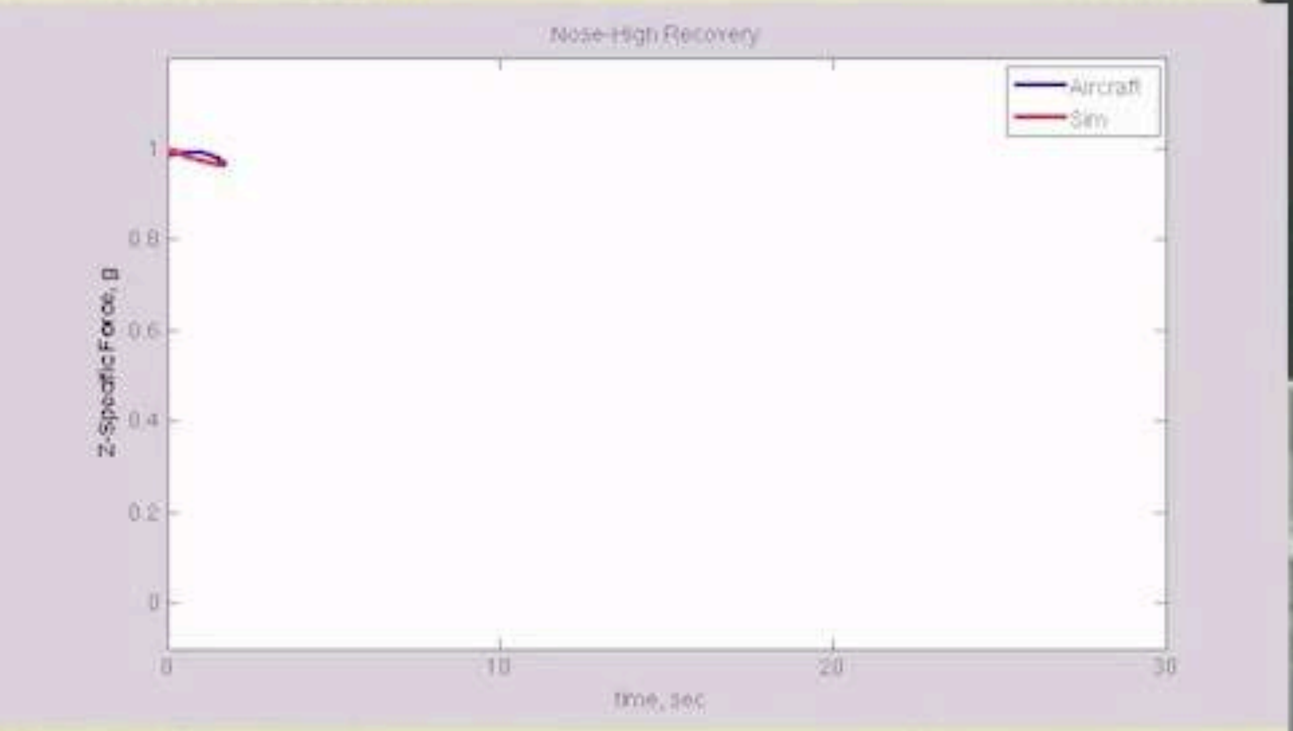
Simulator Limitation: g-loads



EASA simulator instructor requirements (1)

Training should ensure that personnel providing FSTD UPRT:

- Are able to demonstrate the correct upset recovery techniques for the specific aeroplane type.
- Understand the importance of applying type-specific Original Equipment Manufacturers (OEMs) procedures for recovery manoeuvres.
- Are able to distinguish between the applicable SOP's and the OEMs recommendations (if applicable).
- Understand the capabilities and limitations of the FSTD used for UPRT, based on the applicable FSTD training envelope.

EASA simulator instructor requirements (2)

- Are aware of the potential of negative transfer of training that may exist when training outside the capabilities of the FSTD.
- Understand and are able to use the IOS of the FSTD in the context of effective UPRT delivery.
- Understand and are able to use the FSTD instructor tools available for providing accurate feedback on flight crew performance.
- Understand the importance of adhering to the FSTD UPRT scenarios that have been validated by the training program developer.

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EASA simulator instructor requirements (2)

- Understand the missing critical human factor aspects due to the limitations pf the FSTD and convey this to the flight crew receiving the training.

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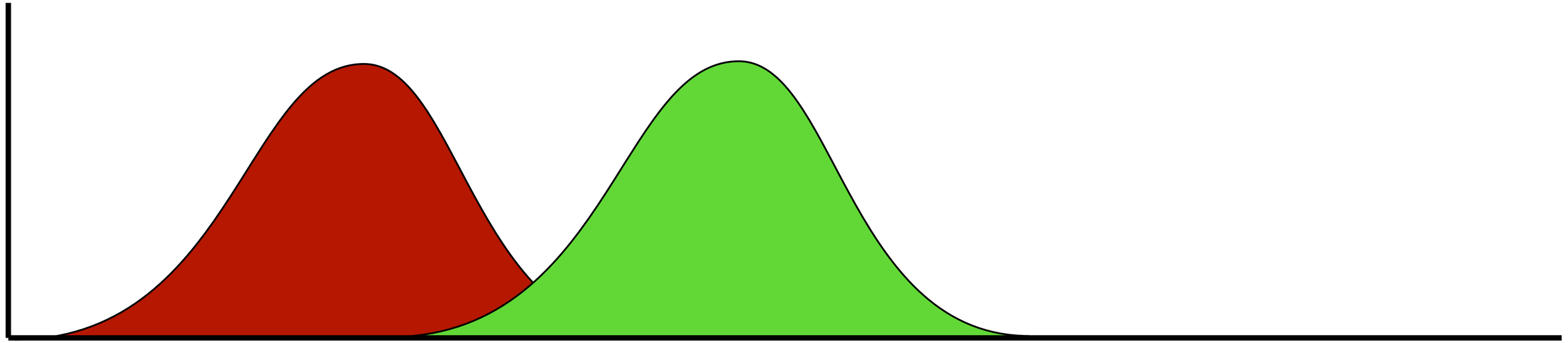
Standardisation

- How do we detect this?
- How do we correct it?



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Flight Envelope: the V-n diagram

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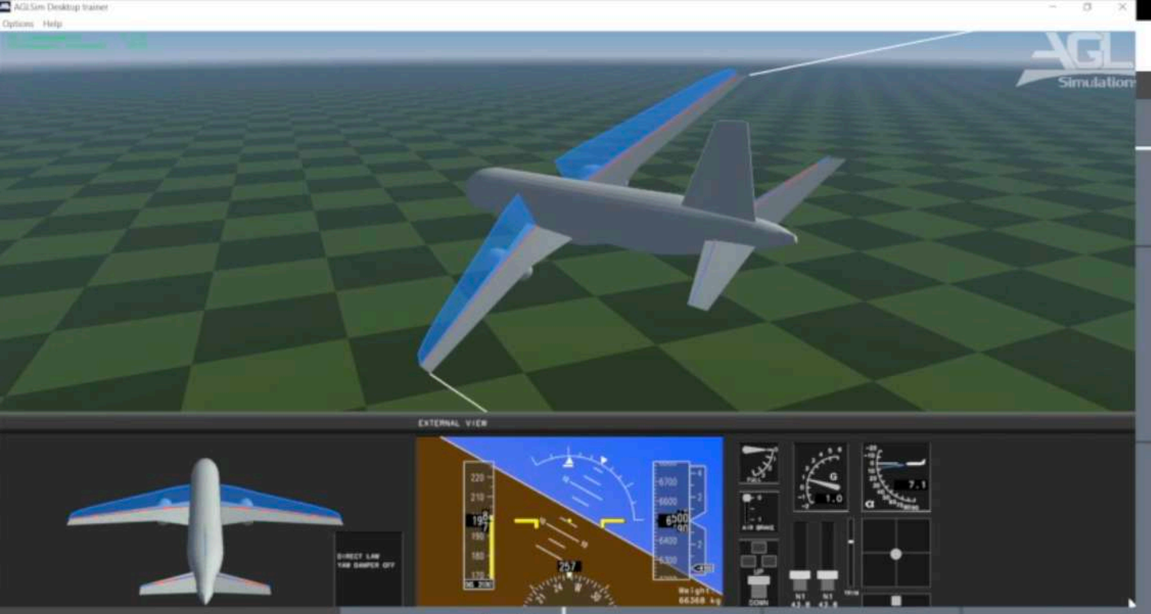


UPRight

REC

1.0

0.0

-1.0

198 kts

1.0 g

VLS

VMO

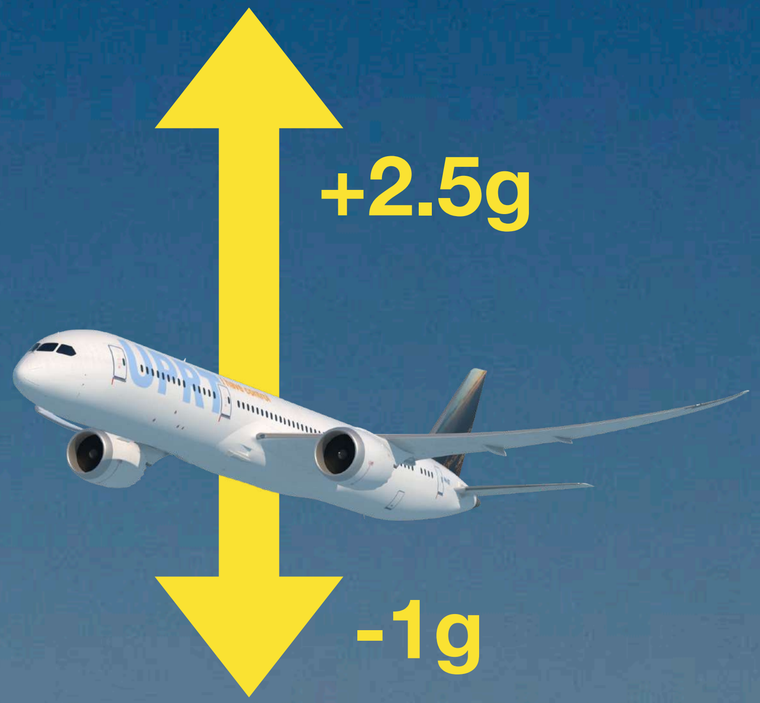
0 50 100 150 200 250 300 350 IAS

48/67 sec

TRIAL LICENSE 11184 DAYS LEFT

The Flight Envelope

Positive & Negative g-limits



CLEAN CONFIGURATION

FLAPS CONFIGURATION

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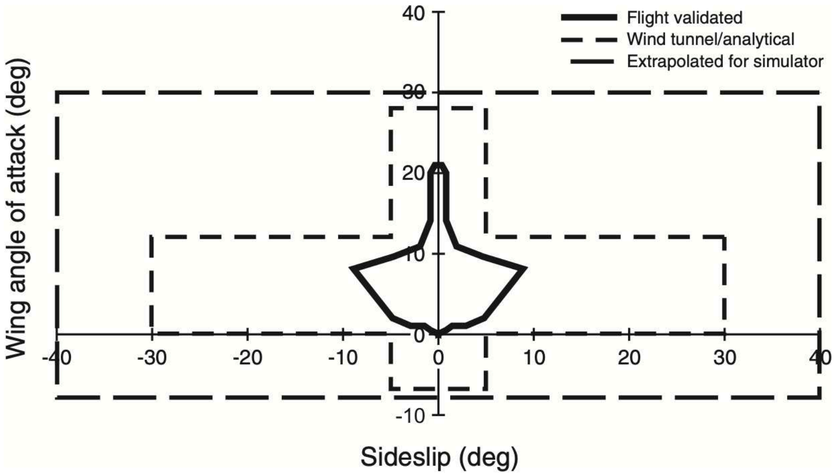
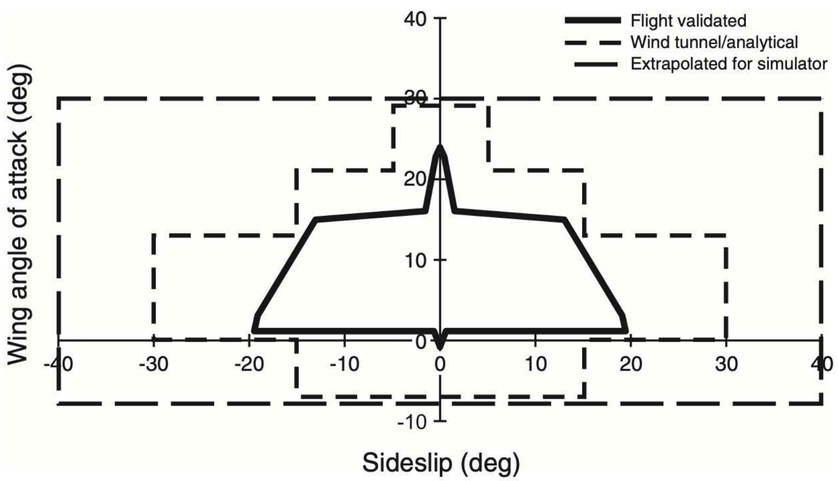
Validated Training Envelope

- Levels of confidence in the flight model

737 Flaps Up Alpha/Beta Envelope



737 Alpha/Beta Envelope



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Non-upgraded simulators

- Are flight controls being applied correctly?
- Are you in the allowable flight envelope?
- Are you in the valid training envelope?

Requires careful program design, and additional instructional techniques

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UPRT Techniques for Instructors

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Simulator Training Tips

- Always respect the simulator envelope!
- Understand how the IOS tools operate
- Follow the syllabus
- Take time to explain the issues
- Use simple tools to demonstrate concept
- **TRAIN TO PROFICIENCY!**

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Upset Recoveries - Recommendations

- **The first step is to identify that there actually is an upset**
- By clearly identifying this step:
  - **Clear statement of RECOGNITION**
  - **Crew Co-ordination & Communication**
- The pilot who may have brought the airplane into the upset may not be the best person to perform the recovery!

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Recoveries

- If awareness and prevention have failed
  - Stalls/upsets, 3 stages:
  - recognition
  - co-ordination
  - recovery
- Undesired airplane states tend to deteriorate quickly

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Template (EASA)

As published by legislators

- ICAO
- FAA
- EASA
- etc.

Table 1: Recommended Stall Event Recovery Template

Stall Event Recovery Template
Pilot Flying - Immediately do the following at first indication of a stall (aerodynamic buffeting, reduced roll stability and aileron effectiveness, visual or aural cues and warnings, reduced elevator (pitch) authority, inability to maintain altitude or arrest rate of descent, stick shaker activation (if installed).) **–** during any flight phases *except at lift-off*.

	Pilot Flying (PF)	Pilot Monitoring (PM)
1.	**AUTOPILOT – DISCONNECT** (A large out-of-trim condition could be encountered when the autopilot is disconnected.)	**MONITOR** airspeed and attitude throughout the recovery and **ANNOUNCE** any continued divergence
2.	**AUTOTHRUST/AUTOTHROTTLE – OFF**	
3.	**a) NOSE DOWN PITCH CONTROL** apply until stall warning is eliminated **b) NOSE DOWN PITCH TRIM** (as needed) (Reduce the angle of attack (AOA) whilst accepting the resulting altitude loss.)	
4.	**BANK – WINGS LEVEL**	
5.	**THRUST – ADJUST** (as needed) (Thrust reduction for aeroplanes with underwing mounted engines may be needed)	
6.	**SPEEDBRAKES/SPOILERS - RETRACT**	
7.	When airspeed is sufficiently increasing - **RECOVER** to level flight (Avoid the secondary stall due premature recovery or excessive g-loading.)	

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Procedure (OEM)

As published by manufacturers

- Boeing
- Airbus
- Embrear
- etc.

BOEING

747 Flight Crew Operations Manual

Approach to Stall or Stall Recovery

All recoveries from approach to stall should be done as if an actual stall has occurred.

Immediately do the following at the first indication of stall (buffet or stick shaker).

Note: Do not use flight director commands during the recovery.

Pilot Flying	Pilot Monitoring
• Initiate the recovery: • Hold the control column firmly. • Disengage autopilot and disconnect autothrottle. • Smoothly apply nose down elevator to reduce the angle of attack until buffet or stick shaker stops. Nose down stabilizer trim may be needed.*	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend toward terrain contact.
• Continue the recovery: • Roll in the shortest direction to wings level if needed.** • Advance thrust levers as needed. • Retract the speedbrakes. • Do not change gear or flap configuration, except • During liftoff, if flaps are up, call for flaps 1.	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend toward terrain contact. • Set the FLAP lever as directed.
• Complete the recovery: • Check airspeed and adjust thrust as needed. • Establish pitch attitude. • Return to the desired flight path. • Re-engage the autopilot and autothrottle if desired.	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend toward terrain contact.

WARNING: *If the control column does not provide the needed response, stabilizer trim may be necessary. Excessive use of pitch trim may aggravate the condition, or may result in loss of control or in high structural loads.

WARNING: **Excessive use of pitch trim or rudder may aggravate the condition, or may result in loss of control or in high structural loads.

Nose High Recovery

Pilot Flying	Pilot Monitoring
Recognize and confirm the developing situation	
Disengage autopilot Disconnect autothrottle Recover: • Apply nose down elevator. Apply as much elevator as needed to obtain a nose down pitch rate. • Apply appropriate nose down stabilizer trim. * • Reduce thrust • Roll (adjust bank angle) to obtain a nose down pitch rate. * Complete the recovery: • When approaching the horizon, roll to wings level • Check airspeed and adjust thrust • Establish pitch attitude	Call out attitude, airspeed and altitude throughout the recovery. Verify all needed actions have been done and call out any conitinued deviation.

WARNING: * Excessive use of pitch trim or rudder can aggravate an upset, result in loss of control, or result in high structural loads.

Nose Low Recovery

Pilot Flying	Pilot Monitoring
Recognize and confirm the developing situation.	
Disengage autopilot Disconnect autothrottle Recover: • Recover from stall, if needed • Roll in the shortest direction to wings level. If bank angle is more than 90 degrees, unload and roll. * Complete the recovery: • Apply nose up elevator • Apply nose up trim, if needed * • Adjust thrust and drag, if needed.	Call out attitude, airspeed and altitude throughout the recovery. Verify all needed actions have been done and call out any continued deviation.

WARNING: * Excessive use of pitch trim or rudder can aggravate an upset, result in loss of control, or result in high structural loads.

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Technique/Strategy

- Can not deviate from procedure (OEM)
- Memory item; easy to recall
- Valid for all upsets; one fits all
- Integrates CRM and operational techniques
- Avoidance of hard targets:

Push versus Pull

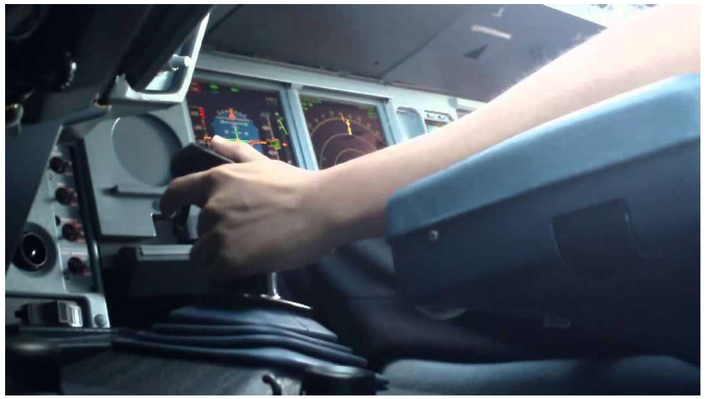
Pushing yoke/stick forward:

- **Reduces AOA**
- **Reduces G**
- **Reduces drag**
- **Pushes stall speed away**

Pulling yoke/stick aft:

- **Increases AOA**
- **Increases G**
- **Increases drag**
- **Pulls stall speed towards you**

- The first step is to identify that there actually is an upset
- By clearly identifying this step there is:
  - **Clear statement of RECOGNITION**
  - **Crew Co-ordination**



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Recoveries

- Sometimes autoflight can be the cause of the upset.
- In most cases, autoflight is unable to solve an upset
- Trained pilot can solve an upset quicker and better

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Reducing Angle of Attack

Why?

How?

How Much?

How Quickly?

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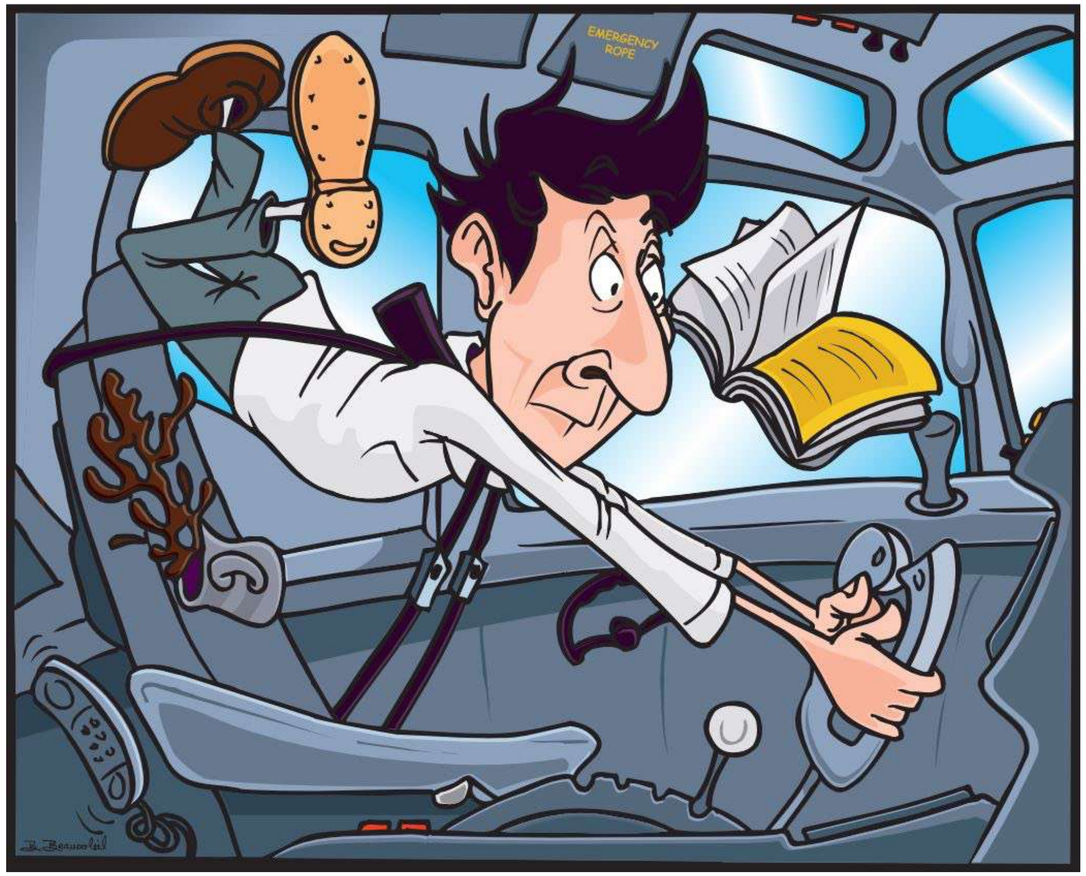
Excessive Unloading

- Unloading too much can lead to:
  - Structural problems
  - Systems problems
  - Injuries



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Negative Training Transfer

...some tips

- Significant threat due to instructor limitations!
  - Incorrect explanations
  - Misuse of the FSTD
- "Approved" programs with inherent errors (not checking with OEM, regulation, best practices)
- Programs that are too complex or rushed

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UPRT is NOT aerobatics

Aerobatics

- Intentional maneuvers
- Pilot is in control
- Always within flight envelope

Upset

- Not intentional
- Pilot/autoflight not in control
- Can be outside flight envelope

Nonetheless…

- Aerobatic maneuvers can be used to learn partial skills
- Aerobatic training gives good background knowledge

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What else is “UPRT”

- **U** also stands for “**U**nlearning” possible deficiencies:
  - Applying thrust / rolling wings level / pulling during stall event
  - Inability to assess aircraft AoA / Energy
  - Misunderstanding or mis-applying aircraft trim
- Learning takes time
- Unlearning takes more time

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Take-Away Message

- UPRT will focus on **Prevention**
- Manage and reduce **Angle of Attack** first
- Understand **capabilities and limits** of simulator
- UPRT is about **TRAINING**, not checking – it's an opportunity to learn!

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Understand and Manage Angle of Attack

Understand and Manage Aircraft Energy

Understand and Manage Startle Response

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Inspector Qualification

- Tailored on-site courses and workshops

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s.advani@UPRT.aero

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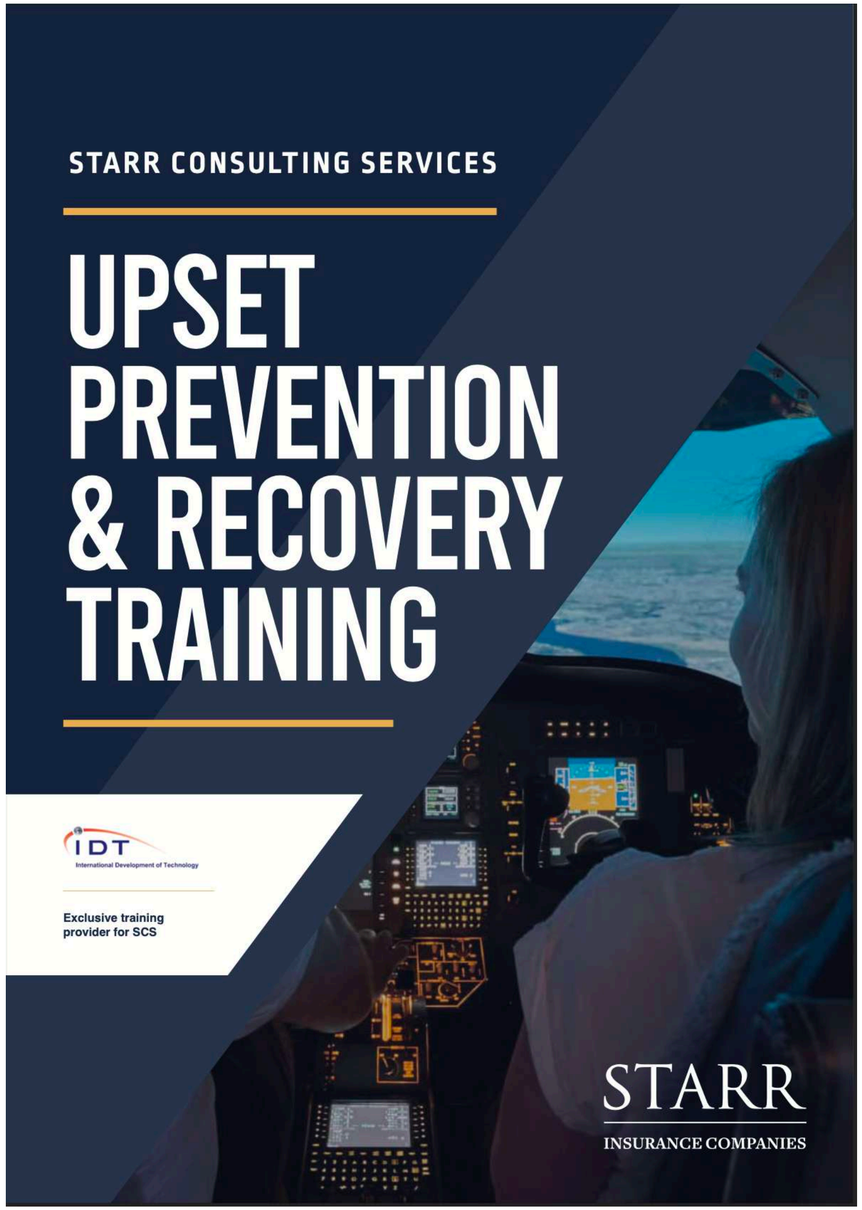
We are here to help you



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