

EASA Information Session CS-FSTD(A) Issue 2

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- Introduction
- Technical Challenges
- Improvements
 - in Training Aids
 - in Modelling
- CAE viewpoints & key lessons learnt
- Conclusion

Credit: Walter Loch, FSEMC Presentation

INTRODUCTION – CONTEXT

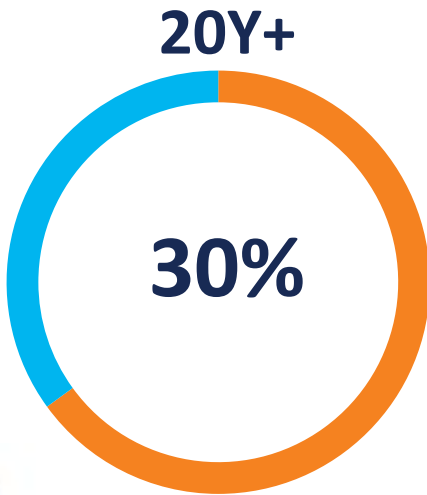
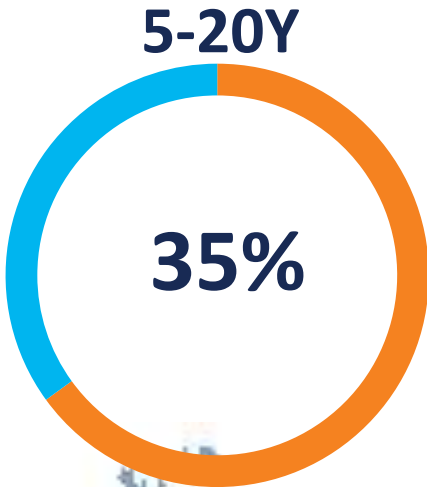
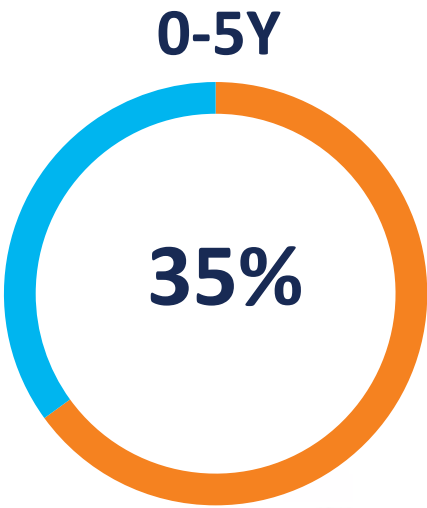
- 14CFR Part 60 Change 2 published May 2016 (FINAL)
 - Requirement – all new FSTD
 - Previously qualified FSTD to update per Directive 2 by March 2019
 - 500+ devices to update in 3 years in USA
- CS-FSTD(A) Issue 2 published May 3, 2018
 - European continent → 400+ devices
 - Approximately 1 year to update*
 - * Transition predicated by opinion 6, projected Jan/Feb 2020
- Rest of the world will follow.....
 - 600+ devices



SIGNIFICANT VOLUME OF DEVICES TO UPGRADE IN SHORT PERIOD OF TIME

TECHNOLOGY BASED ON FSTD AGE

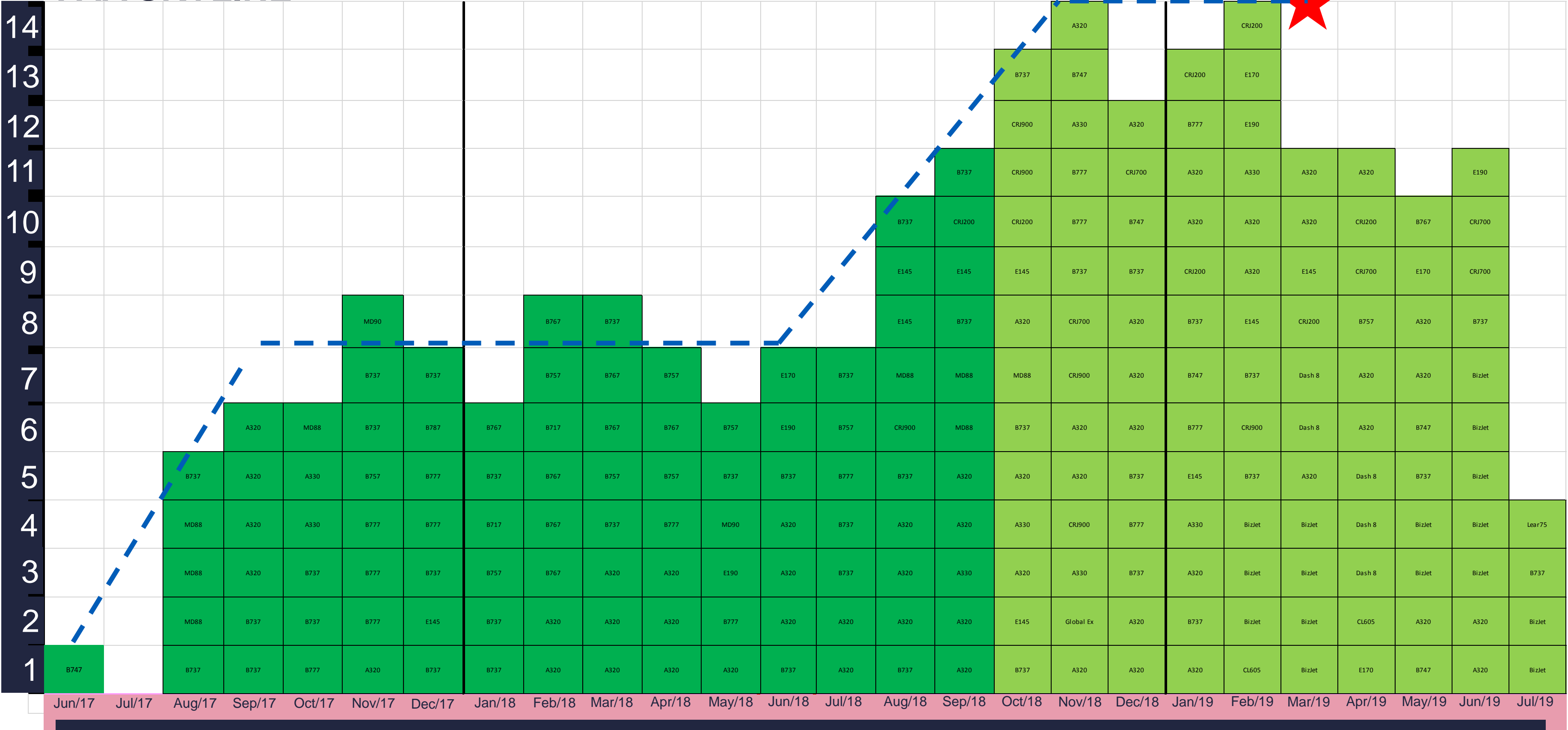
AVERAGE AGE OF
SIMULATORS



CAE
OTHER



FAA SKYLINE



SURGE IN REQUESTS IN THE MONTHS PRIOR TO DEADLINE



FSTD REQUIREMENTS

| | | | | | | | | | | | | |
|--|---|--|---|---|--|---|---|---|---|---|---|---|
|  APPROACH TO STALL |  AERODYNAMIC STALL |  UPRT MBT + SBT |  ICING Engine & Airframe |  CROSSWIND With Gusts |  BOUNCED LANDING | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | |
| <ul style="list-style-type: none">Stall identification devicesType SpecificStall entry at 1g & Turning FlightAdds High Altitude CruiseCCA Normal, to Protections &CCA Non-Normal, to RecoveryPusher validation test * Requires accurate icing model | <ul style="list-style-type: none">Aerodynamic Stall modelingStall Identification to +10 AOAType SpecificStall entry at 1g & Turning FlightAdds High Altitude CruiseCCA Normal, to Protections &CCA Non-Normal, to RecoveryPusher validation test | <ul style="list-style-type: none">Maneuver Based Training (MBT)Scenario Based Training (SBT)Alpha / Beta PlotsV-n DiagramFlight Controls SchematicFlight Instruments SchematicData Recording | <p>Representative Aerodynamic Effects</p> <ul style="list-style-type: none">Changes in pitching momentIncrease in dragEffect on stall angle of attackEffect on control effectivenessEffect on control forcesEffect on stall buffet characteristics and threshold perceptionEffects on engine power reduction/variation, vibration, etc. | <p>Takeoff & Landing</p> <ul style="list-style-type: none">Evaluated by F&S TestingCrosswind at Max Demonstrated | <p>Instructor Led / Shallow & High Bounce</p> <ul style="list-style-type: none">Evaluated by F&S TestingInstructor May Callout Bounce | | | | | | | |
| Training: | FSTD: | Training: | FSTD: | Training: | FSTD: | Training: | FSTD: | Training: | FSTD: | Training: | FSTD: | |
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An FSTD used to conduct this training must be qualified for the task.

TECHNICAL CHALLENGES

- Number and Variety of Technology Platforms

- Vax, Gould, AIX, Linux, Windows
- Fortran vs. C vs. C++
- IOS platform evolutions



- Number and Variety of Aircraft Platforms

- Old Boeing Data Revision → Latest Revision
- Airbus Pre-STD vs. Airbus Obsolete STD vs. Airbus latest STD
- OEM no longer in existence

A320: Std 1.7+
A330: Std 2.3+



Unlike today's technology industry, TDM cannot drop support of older technology

IMPROVEMENTS - TRAINING AIDS

UPRT/BOUNCED LANDING/GUSTING CROSSWIND

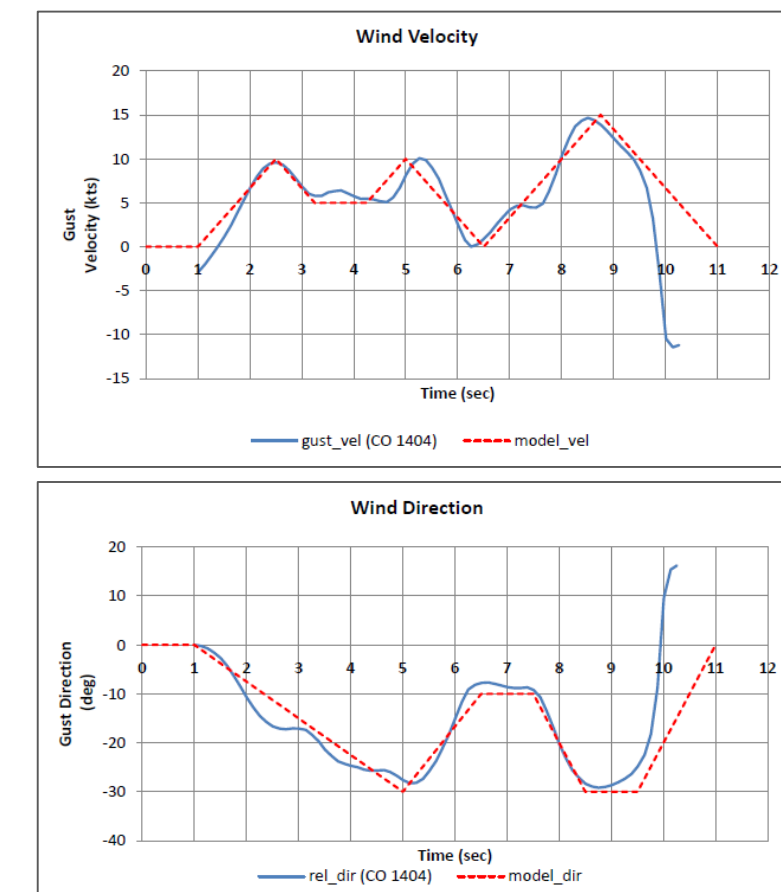
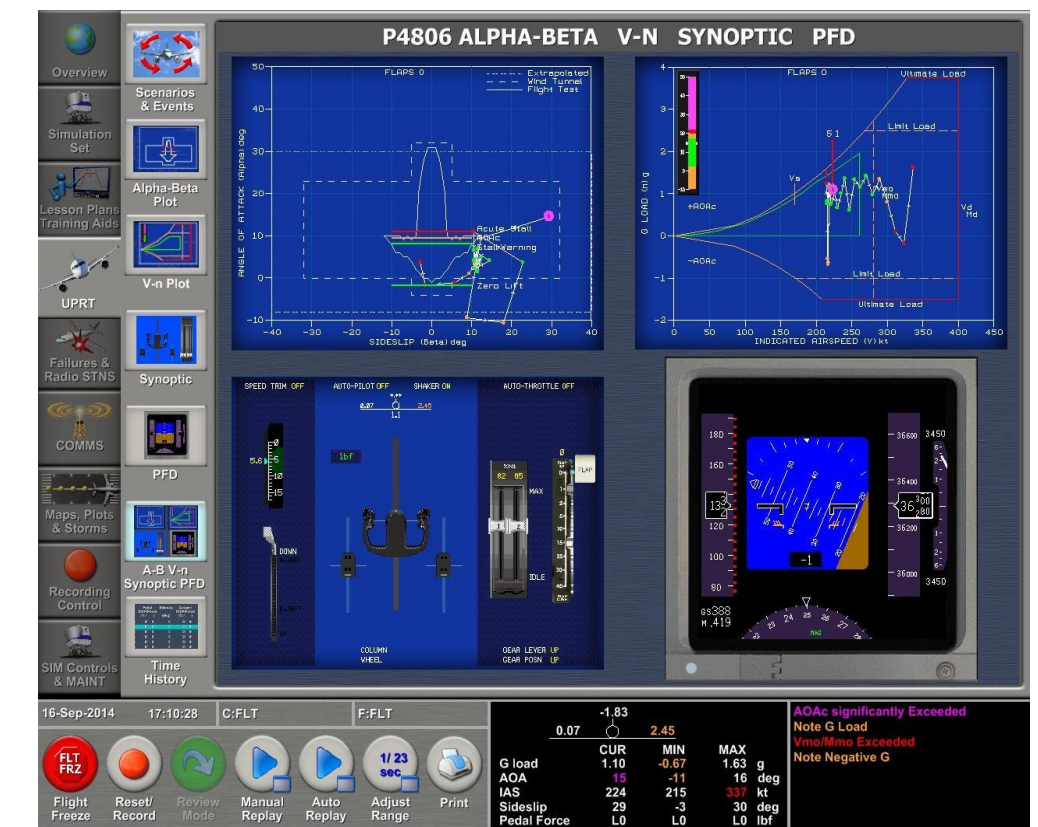
■ UPRT

- VIEWS II or Windows Tablet
- Recording feature of interest outside of USA



■ Gusting Crosswind/Bounced Landing

- IOS buttons
- C Model and Fortran Model
- Subjective assessments varied
 - FAA Gust model is time-based
 - Bounced landing via environmental factor



STANDARDIZATION – maximize re-use of a proven solution

IMPROVEMENTS - MODELLING AERODYNAMIC STALL AND ICING

STALL

- Solution customized for each device
 - Non-standardized solution across Aircraft OEM
 - Technology base not common
 - Installed performance models ranging many revisions

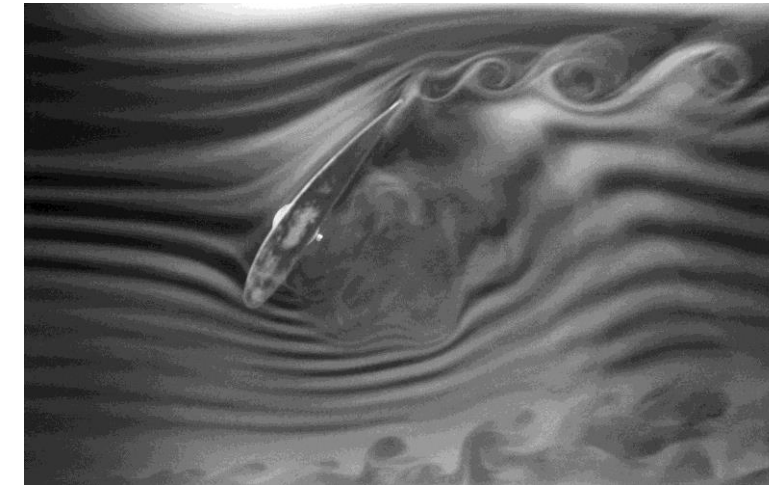


Formal OEM modelling solutions:

- **Boeing**
 - Supplemental package (1 step or 2 step)
- **Airbus**
 - Natural Flight Loop (NFL) was provided (some AB Standards)
 - Complete Airbus STD Update
- **Embraer**
 - Some data available, greater involvement of SME and footprint tests
- **Bombardier**
 - Full replacement of existing MatrixX model

IMPROVEMENTS - MODELLING AERODYNAMIC STALL AND ICING (CONT'D)

- No Formal OEM modelling solutions:
 - Fokker 100, Dornier 328, SAAB 340, B737-300...
 - Model extension with SME support
 - 3rd party solution



ICING

- Many existing models already include required fidelity
 - Drag increase
 - Impact on Critical AOA/Stall Warning
 - Engine vibrations
 - **Be wary of increase in weight**



MODELLING SOLUTIONS – to be tailored for each device

CAE VIEWPOINTS

- Increased Reliance on SME pilots
 - Required where data does not exist
 - BUT - also being turned to when data is cost prohibitive
 - More permissive than when formal data is used
- Motion buffets in stall very pronounced
 - Concerns over equipment failure rate
 - Concern that SME “tuning” of motion buffets will not match aircraft
- Unexpected Surprises
 - “First-of” deployment more risky
 - Quick reaction times required from OEM to support



SAFETY CANNOT BE COMPROMISED

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CS-FSTD(A) ISSUE 2 – Q&A

- Approach to Stall:
 - When buffet is first indication, should 2C8 QTGs include buffet?
- SMEs
 - Variation between OEM SME & 3rd Party SME for devices at different standard/load
 - “Qualified SME” needs further explanation (FAQ’s); acceptability of SME created footprint data
- Compliance Requirements - Existing Devices Versus New Devices
 - Compliance for FAA is clear, i.e. FSTD Directive 2; for EASA AMC9 to AMC13 of CS-FSTD(A) Issue 2
 - E.g. Qualification Basis JAR STD 1A Amendment 3; compliance to CS-FSTD(A) Issue 2 AMC 9 to 13
- Motion Buffet Intensity
 - Customers requesting, due to severity, decreased buffeting from OEM data
- Compliance Date
 - Customers remain unclear on this, FAQ needs to be specific
- EASA FAQs
 - .Need for expanded FAQs similar to FAA guidance document (Itash to share presentation on Part 60)

AMBIGUITY IN REQUIREMENTS – CLARIFICATIONS REQUIRED

CONCLUSION

- CS-FSTD(A) Issue 2 published
- Other global regions to follow
 - Finding evidence of uncertainty in some regions
 - Need to collaborate better as a global industry
- For operators with simulators requiring updates:
 - Plan early!
 - Understand your needs
 - Be aware of deadlines
 - Approach TDM as early as possible
- Collaboration between OEM, Operator, TDM, and Regulatory Body



ALL NEED TO WORK TOGETHER TO MAKE AIR TRAVEL SAFER!

QUESTIONS

