



Flight Crew Procedure Development and Modification

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Flight Crew Procedure Development and Modification

Overview

- **Flight Deck Design Support of Procedures**
- **FAA/JAA Pilot Coordination**
- **Crew Procedures and Checklists Development and Validation**
- **Maintenance of Procedures and Checklists**
- **Additional Support to Operators**
- **Flight Crew Training Manual Evolution**



Flight Deck Design Support of Procedures

- **Flight Deck Design Team**
- **Pilot design review meetings**
- **EICAS message audits**
- **Nomenclature Standardization Review Board**
- **Customer meetings**
 - **Formal reviews**
 - **Simulator sessions**
 - **Individual and group reviews**



FAA/JAA Pilot Coordination

- **For new and variant airplanes:**
 - **Establish schedules for training initial cadres of Boeing, FAA, JAA pilots**
 - **Develop training program “footprints”**
 - **Determine validation and training required in the Engineering Simulator**
 - **Support lesson profile development**
 - **Determine training levels (A, B, C, D, E) for variant airplanes**



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Crew Procedures and Checklists Development and Validation

- **Establish operational philosophy**
- **Develop preliminary procedures**
- **Coordinate Engineering and pilot reviews**
- **Validate**
- **Training program “hands-on” experience**
- **Maintain procedures/checklists**
- **Customer support**



Key Elements of Boeing Flight Deck Design Philosophy

Flight deck design philosophy leads to the operational philosophy of the procedures and checklists

- **Apply automation as a tool to aid, not replace, the pilot**
- **Address fundamental human strengths, limitations, and individual differences—for both normal and non-normal operations**
- **Use new technologies and functional capabilities only when:**
 - **They result in clear and distinct operational or efficiency advantages, and**
 - **There is no adverse effect on the human-machine interface**



Key Elements of Boeing Flight Deck Design Philosophy (Cont'd)

Flight deck design philosophy leads to the operational philosophy of the procedures and checklists

- **The pilot is the final authority for the operation of the airplane**
- **Both crew members are ultimately responsible for the safe conduct of the flight**
- **Flight crew tasks, in order of priority, are: safety, passenger comfort, and efficiency**
- **Design for crew operations based on pilots' past training and operational experience**
- **Design systems to be error-tolerant**
- **The hierarchy of design alternatives is: simplicity, redundancy, and automation**



Crew Procedures Validation Process

Key Questions

- **Why are the procedures validated?**
- **Who uses crew procedures?**
- **How are the procedures developed?**
- **How are the procedures validated?**
- **When are procedures validated?**
- **Who validates procedures and where?**



Why Are Procedures Validated?

- **Procedures are validated to assure:**
 - **The procedure steps work with the airplane systems as built**
 - **Indications to the crew consistently lead to correct crew action**
 - **The procedures accommodate certification requirements**



Who Uses Crew Procedures?

System Design Engineers and DERs

- Failure Modes and Effects Analysis and Fault Hazard Assessment
- Detailed test procedures

Flight Training/Flight Publications

- Part 121 training program
- 7X7 Ops Manual and Flight Crew Training Manual
- Checklists
- Simulator Design

Certification Authorities

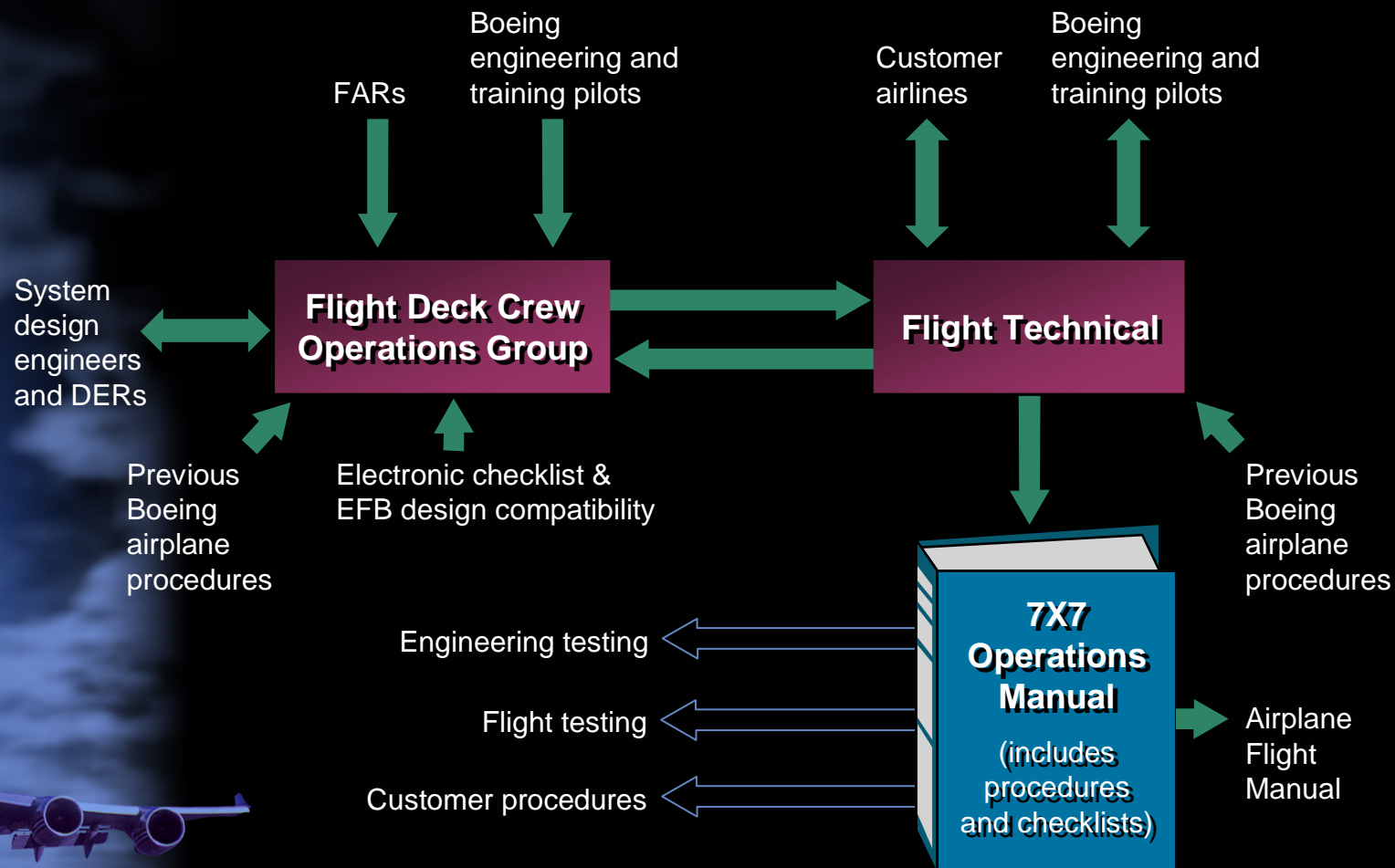
- FAR 25.1585 operating procedure (Airplane Flight Manual and Summary Cert Document)
- FAR 25.1523 minimum flight crew (workload)

Flight Test

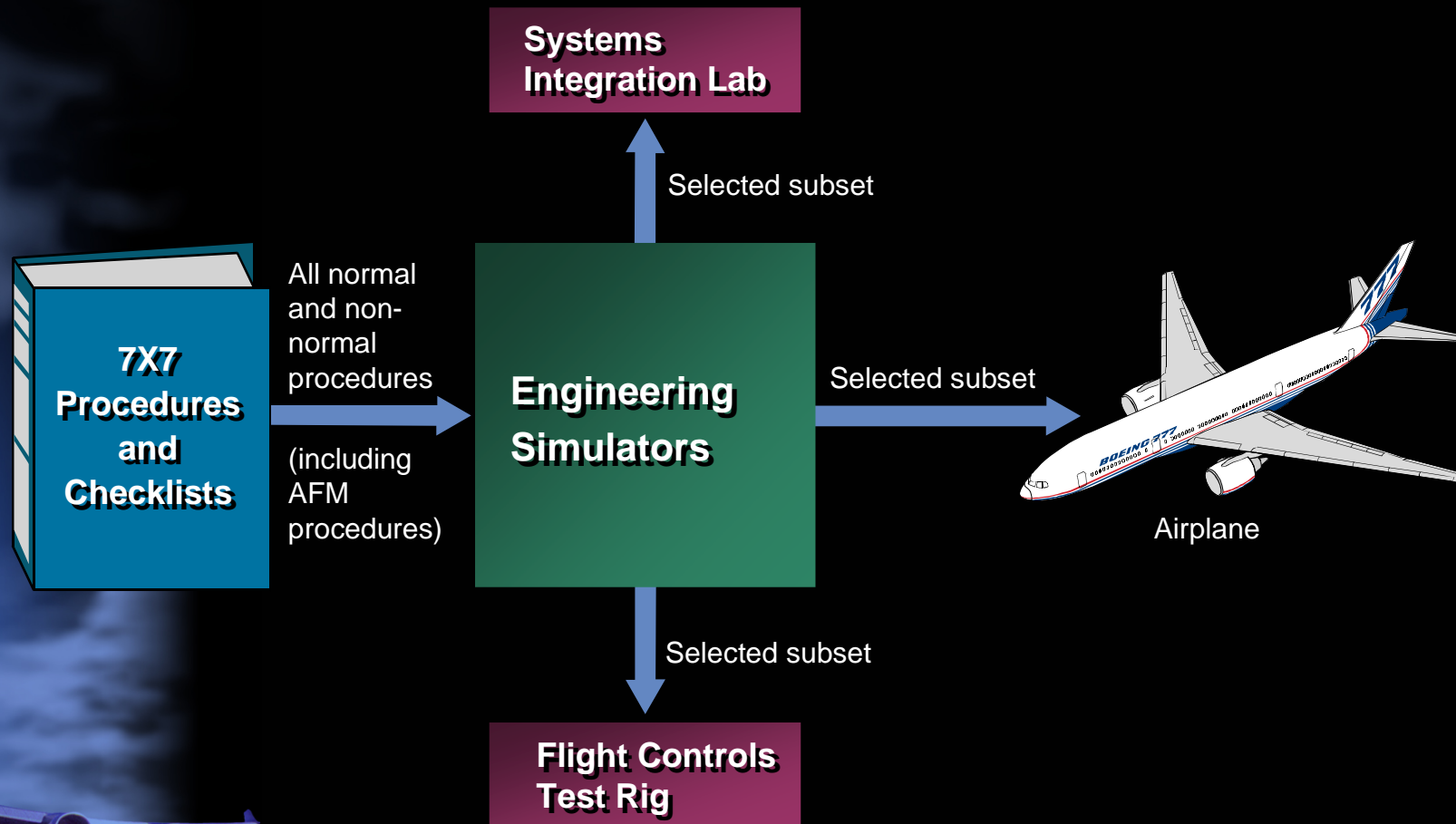
- Airplane flight test engineers and pilots
- Engineering simulator evaluation
- System design validation



How Are Procedures Developed?

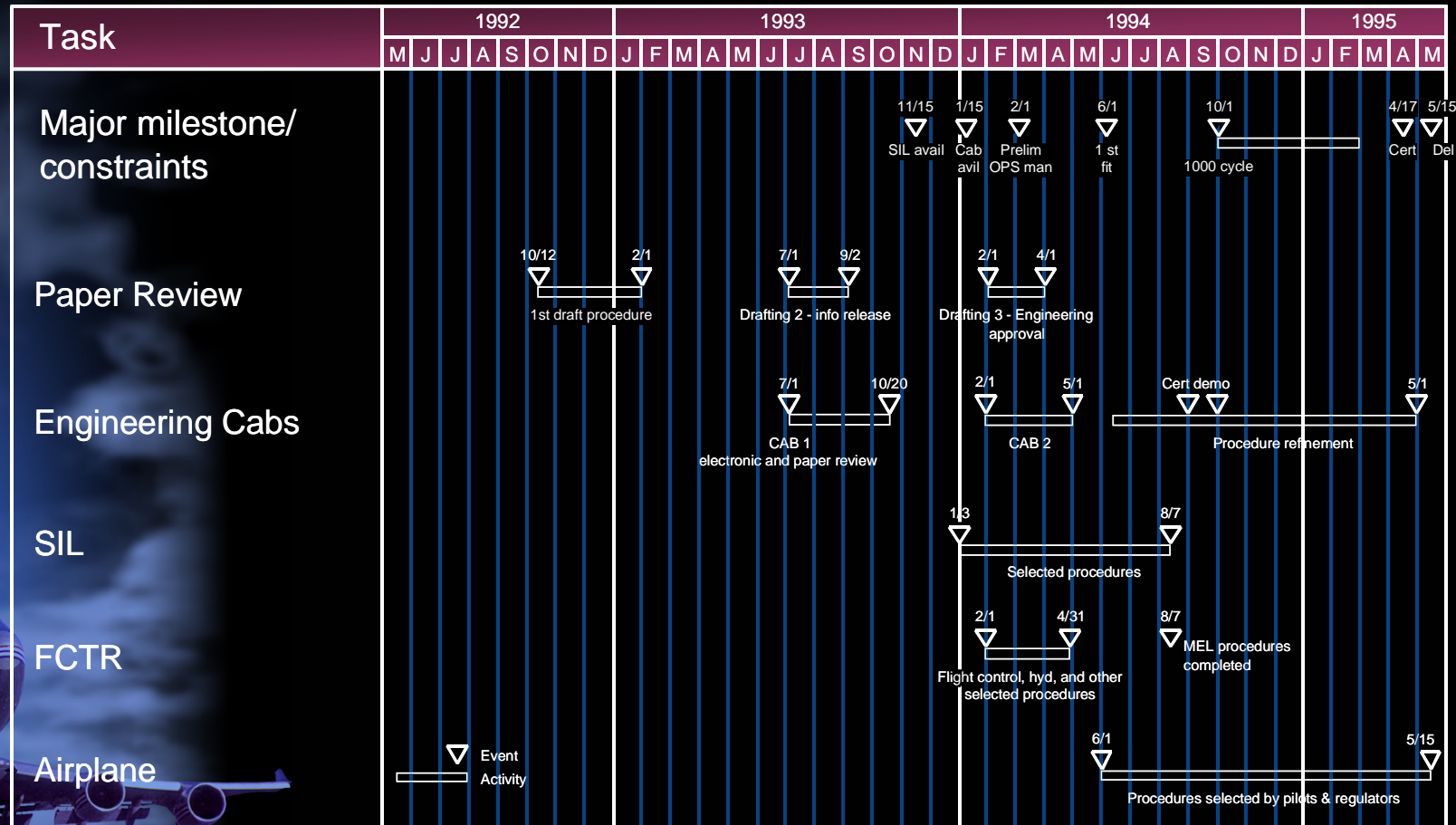


How Are Procedures Validated?



When Are Procedures Validated?

Objective: Validate all procedures prior to flight test



Training Program Experience

- **Boeing and Regulatory Agency students give feedback to procedure developers**
- **Flight Training Instructors and initial customer students give feedback to procedure developers**
- **Procedures refined and simplified**



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Maintenance of Procedures and Checklists

- **Main Sources of Procedure Changes**
 - **Airline/Operator Input**
 - **Boeing Engineering**
 - **Boeing Flight Test**
 - **Engine Manufacturers**
 - **Flight Training**
 - **Incidents or Accidents**
 - **Commonality Reviews**



Maintenance of Procedures and Checklists

- **Changes via the “Procedure Change Process” (CS-3)**
- **Procedures Manager normally Initiates**
- **Technical Review Board**
 - **Engineering**
 - **Publications Group**
 - **Flight Test Pilots**
 - **Training Department**
- **Flight Operations Review Board (FORB)**
 - **Management Approval**



Maintenance of Procedures and Checklists

Results of procedure changes:

- **New or modified procedure incorporated in next scheduled Operations Manual Revision**
- **“If the FORB determines an unacceptable delay would be imposed by waiting for the scheduled revision period, an Operations Manual Bulletin will be considered.”**



Operations Manual Bulletin

- **Authorized only to:**
 - **Address safety-related procedural changes**
 - **To match the delivery of airplanes with unique configuration features not previously covered in the Operations Manual**



Operations Manual Bulletin

- **Requirement Normally Identified by:**
 - Airplane Certification
 - Engineering Model Chief Pilot
 - Flight Deck
 - Flight Operations Engineering
 - Flight Technical Publications
 - Regulatory Agencies
 - Training, Technical & Standards
- **Target Flow Time:**
 - 5 to 10 Days



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Additional Support to Operators

- Respond to procedural questions
- Regulatory Support
- Technical reviews of customer unique procedures



No Technical Objection

- **An NTO is offered, upon request, to a Customer's Procedure if:**
 - **Technically Accurate**
 - **Same in effect as the Boeing Procedure**
 - **No significant compromise to Safety**



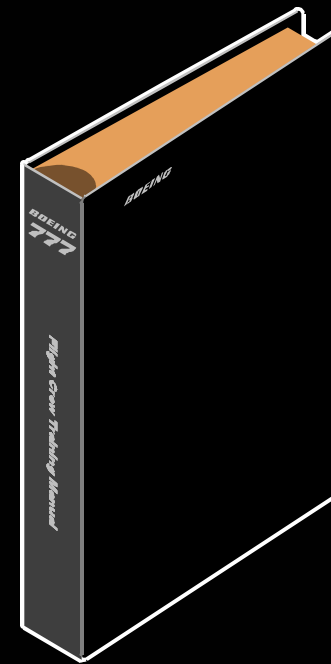
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Flight Crew Training Manual (FCTM) Evolution

- Provides amplification of Ops Manual procedures and training information
- Customer feedback resulted in “Phase of Flight” format
- Added two new Sections:
Maneuvers
Non-Normal Operations
- Moving toward greater commonality/standardization



Boeing Training, Technical & Standards

Summary

- **To minimize the effort required by each airline's flight technical group, Flight Training, Technical & Standards is involved from the beginning of each program in:**
 - **Flight deck design development**
 - **Flight training program development**
 - **Flight Crew procedures and checklists development and validation**
 - **Flight Crew Training Manual development and validation**



 **BOEING**



Questions?