A350 XWB – training for the future

Next Generation of Aviation Professionals Symposium
Montreal, 1-4 March 2010
Development schedule – Training Input from start

Family Target Milestones

- Design Freeze
- Detailed Definition Freeze
- Final assembly start
- First flight
- EIS -900
- EIS -800
- EIS -1000

Programme Launch

- Manufacturing & Assembly 3 years
- Flight Tests 15 months

Design
Development to maturity
Ramp-up
A350 XWB – Introduction of new technologies

• Structure:
  - Intelligent Airframe
  - Composites

• Wing:
  - Finest aerodynamics
  - Efficient High Lift devices
  - Differential Flap settings variable camber

• Engines:
  - Latest engine technology
  - Lowest fuel burn & emissions

• Systems:
  - Simple & mature
  - Large scale integration
Systems

**Flight Controls**
- Electrical back-up

**Hydraulics**
- Only 2 circuits, 5000 psi

**Fuel Systems**
- Only 3 tanks, less pumps/valve

**Landing Gear**
- Robust and simple design

**Electrical System**
- Variable frequency generator
- Ethernet technology

**IMA**

**Air Systems**
- Simpler architecture

**Cockpit**
- Commonality + innovations
Airbus cockpit family story

Innovation

Commonality

Fly-By-Wire
Side-stick
Non back driven Thrust Levers

EFIS
ECAM
FMS
Dark cockpit

A320
A330
A340
A350

Interactivity
Onboard Information System
Airport Navigation
Vertical Display
Integrated Radio Management Panel
Electronic normal C/L & not-sensed procedures
Video

Large displays flexibility
Extended interactivity
Class 2 EFB flexibility

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.... Cockpit evolution
Flight Deck organization

Cockpit functions are distributed in the cockpit while respecting the basic crew’s tasks:

- Fly
- Navigate
- Communicate
- Manage systems

Manage Mission
FLY – Flight interfaces

Commonality in flight steering
- Side-stick
- Rudder pedals
- Non back-driven thrust levers
FLY – Flight interfaces

Commonality in flight steering
- Side-stick
- Rudder pedals
- Non back-driven thrust levers

Commonality in config. management
- Flaps and Speedbrakes levers
- Landing Gear and Braking controls
NAVIGATE – Pilots interfaces

- Navigation Display
- Up to now:
  - Navigation Display
- From A380:
  - Enhanced EFIS control panel
- Vertical Display
NAVIGATE – Pilots interfaces

- FMS pages
  - INIT page
  - Active FPLN
  - Position/Navaids

Surveillance
COMMUNICATE – Voice Com pilots interfaces

- Integrated Radio Management Panel (RMP)
- A380: MCDU (Satcom pages, Data Link Status pages)
- A380: ACP

**Voice Com from A380:** Integrated Radio Management Panel
COMMUNICATE – Data Link pilots interfaces

- 2 DCDUs
- ATC Datalink
- From A380
- Shared central Mail Box
- ATC COM page on MFD
MANAGE SYSTEMS – Pilots interfaces

Overhead Panel

Commonality:
same layout and procedural flows
MANAGE SYSTEMS: NORMAL CHECK LISTS

Normal Checklists
- New Check List page on MFD
- KCCU shortcut & interactivity

![Normal Checklist Display](image)
Abnormal procedures
- Sensed and not-sensed alarms on ECAM Warning Display
- New deferred procedures management
- Improved Conditions management
- Improved interactivity and ECP
  - Scroll wheels
  - Yes/No selection, overflow management,
- Memo and Limitations
  - Full list on Warning Displays
  - Subset below PFD

System Display
- System synoptic and Status
- Cockpit door, Cabin, ETACS video
- SD pages rotary selector
## Supplementary Procedures

- Available on OIS in Flight Ops Manual Consultation application
- Sharing Supp Proc between Crew Members by displaying OIS on Centre
- KCCU and OIS Keyboard interactivity

### START VALVE MANUAL OPERATION

Advise ground crew to prepare for manual start valve operation.
Use cockpit handset to establish communication with ground crew on the engine.

1. **When ground crew is ready:**
   - START ENGINE 1 or 2 or 3 or 4
   - ENG START selector
   - ENG MASTER lever
   - "START VALVE OPEN AND KEEP OPEN"
   - ORDER
   - IGN
   - ON

   *If not maintained in OPEN position by the ground crew, the start valve closes.*

2. **When N3 is at 50%:**
   - "START VALVE CLOSE"
   - ORDER
   - Resume normal procedure.

### Illustration: A380 supplementary procedure

![A380 cockpit view with OIS interface](image)
Contents

1. Defining New Technology
2. Cockpit
3. Mission
4. Training
5. Conclusion
Flight Deck organization

- Fly
- Navigate
- Communicate
- Manage systems

Manage Mission
MANAGE MISSION

Onboard Information System

- Improves access to pilots' operational information and simplifies some of their tasks
- Reduces the quantity of paper documents in the cockpit and replaces them with electronic ones:
  - improving information access and search
  - enabling quicker and easier updates
MANAGE MISSION – Flight Ops applications

- Modular and scalable offer according to Airline policy:
  - Airbus offer (multi-programme)
  - Hosting capability for third party applications

Examples of applications:
- e-DOC
- FCOM
- FCTM
- CCOM
- MMEL
- AFM / CDL

Performance:
- Takeoff
- In-Flight
- Landing
- W & B

Mission:
- e-Flight Folder
- e-Charts (*)
- e-logbook
- AOC (*)

(*) not included in standard Airbus offer
Displays Configuration

- CDS = 6 identical Large Display Units (DU) – 15.4’ W (wide) 16:10
- Flexible reconfigurations
- Enhanced Dispatch capabilities
Management of Available Information.
Airbus Aircraft – continuous improvement

Toulouse, 22nd February 1987

Today's customized Airbus

- HUD (Head up display)
- FLS (FMS Landing System)
- RNP-AR (RNP Authorization Required)
- LVO – CAT IIIB No DH
- BTV (Brake to Vacate)
- ROW/ROP (R/W Over-run Protection)
- OIS (On-board Info. Systems)
- ETOPS/LR OPS
- MNPS and RVSM
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A350 XWB – Building on the A380

Cockpit is a further refinement of the A380

Therefore:

Training experience from the A380 is fully applicable

A350 XWB – commonality and innovation
Training Headlines

- Human Factors, HF
- Crew rest tested!
- ITQI
- IATA Training and Qualification Initiative
- Handling
- Autopilot availability
Training Questions

• Understand aircraft more than know the aircraft

• System test: Closed book or open book?

• Teach methodology ......not failures as such

• Highlight memory items

• Re-focus on basic handling

• Where and when do we train to manage the mission?
## A350 XWB Flight Crew Training Objectives

1. **Training to achieve a Competence**
2. **Take benefit of A380 experience**
3. **Take benefit of Customers feedback**
4. **Consider distance learning**
5. **Consider appropriate Training Aids and Training Media**
   - Training days on-site/ off-site
   - Training Solutions for Training Centers and Airlines
6. **Enhance synergies between Flight Ops documentations and Training Media**
A350 XWB Training Need Analysis Methodology

- **Training Courses Design Philosophy**
  - Define the rules for the design of courses
  - Output of the database, in accordance with Airbus Course design philosophy → **When** to train each task in the training phases

- **Training Courses Definition**
  - Determine the most suitable training aids to be used for each task → **How** to train

- **Training Media Analysis**
  - Determine the training gap → **What** should be trained for **Who**

- **Training Needs Analysis**
  - Determine who should be trained for **Who**

- **Task List Inventory**
  - Analyze the overall job and not only the training part → **Structured** architecture
A350 XWB Flight Crew Training Footprint

Licensing Training (BASIC)

Operational Training (OPTIONS)

Course Footprint

Ground Phase (GP)          Handling Phase          Handling Phase
Knowledge                 Procedure               Skill

ST  BT  Ops               IOE

Training Aids

CBT  TM  FP-FTD  FFS  Aircraft (AC)  CBT  FFS

2D tool  3D tools

Off-site  Training Center  Airline

Ops:
LVO, ETOPS, FANS, RNP, MEL, E-logbook, cold WX, Security, MNPS/Polar...

FP-FTD – Flat Panel FTD
TM – Training Media (as FMS trainer)
## CONCLUSION

| Technology of the A350 will not be the main driver in the new training concept |
| Feedback and experience from the A380 will be used to improve existing training concept |
| Availability of new technology in the training media is an important element |
| Industry efforts on training will be implemented |
| Customers and authorities will be part of the whole conception process |
Thank you...

Efficiently Yours