

# A350 XWB

Presented by:

**Capt. Michel LANDRIN**  
Head of Flight Crew Training  
AIRBUS TOULOUSE



## A350 XWB – training for the future

Next Generation of Aviation Professionals Symposium  
Montreal, 1-4 March 2010



# Contents

1

Defining New Technology

2

Cockpit

3

Mission

4

Training

5

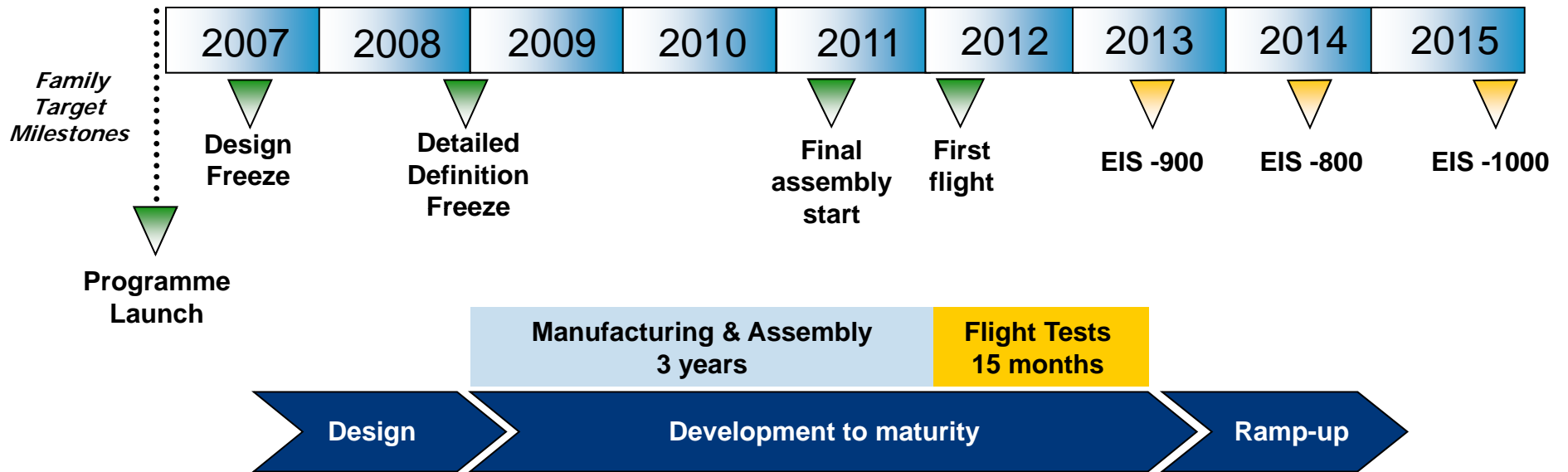
Conclusion

# Contents

- 1** Defining New Technology
- 2** Cockpit
- 3** Mission
- 4** Training
- 5** Conclusion



# Development schedule – Training Input from start

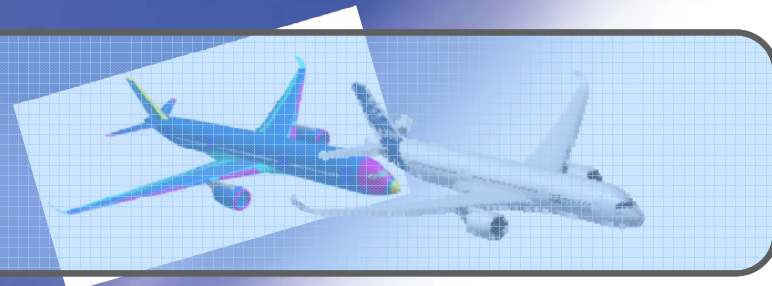




# A350 XWB – Introduction of new technologies

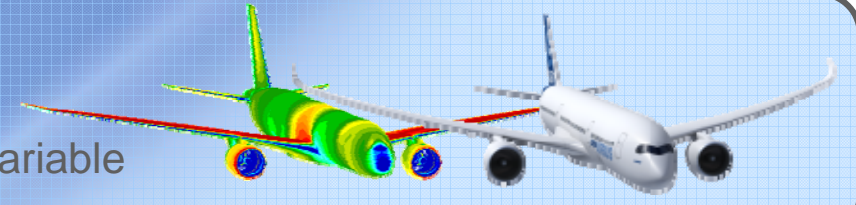
## • Structure:

- ▶ Intelligent Airframe
- ▶ Composites



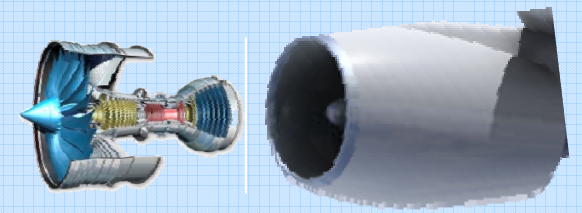
## • Wing:

- ▶ Finest aerodynamics
- ▶ Efficient High Lift devices
- ▶ Differential Flap settings variable camber



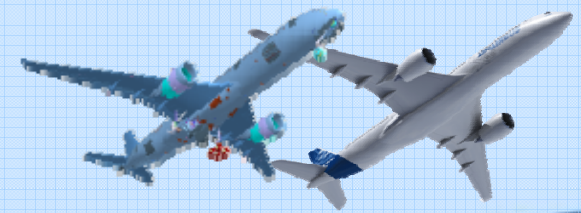
## • Engines:

- ▶ Latest engine technology
- ▶ Lowest fuel burn & emissions



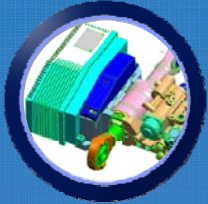
## • Systems:

- ▶ Simple & mature
- ▶ Large scale integration



# Systems

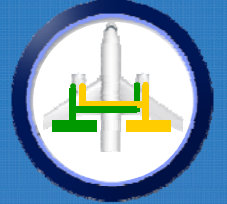
## Flight Controls



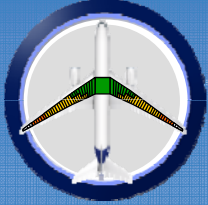
● Electrical back-up

● Only 2 circuits, 5000 psi

## Hydraulics



## Fuel Systems



● Only 3 tanks, less pumps/valve

● Robust and simple design

## Landing Gear



## Electrical System



● Variable frequency generator

● Ethernet technology

## IMA



## Air Systems



● Simpler architecture

● Commonality + innovations

## Cockpit





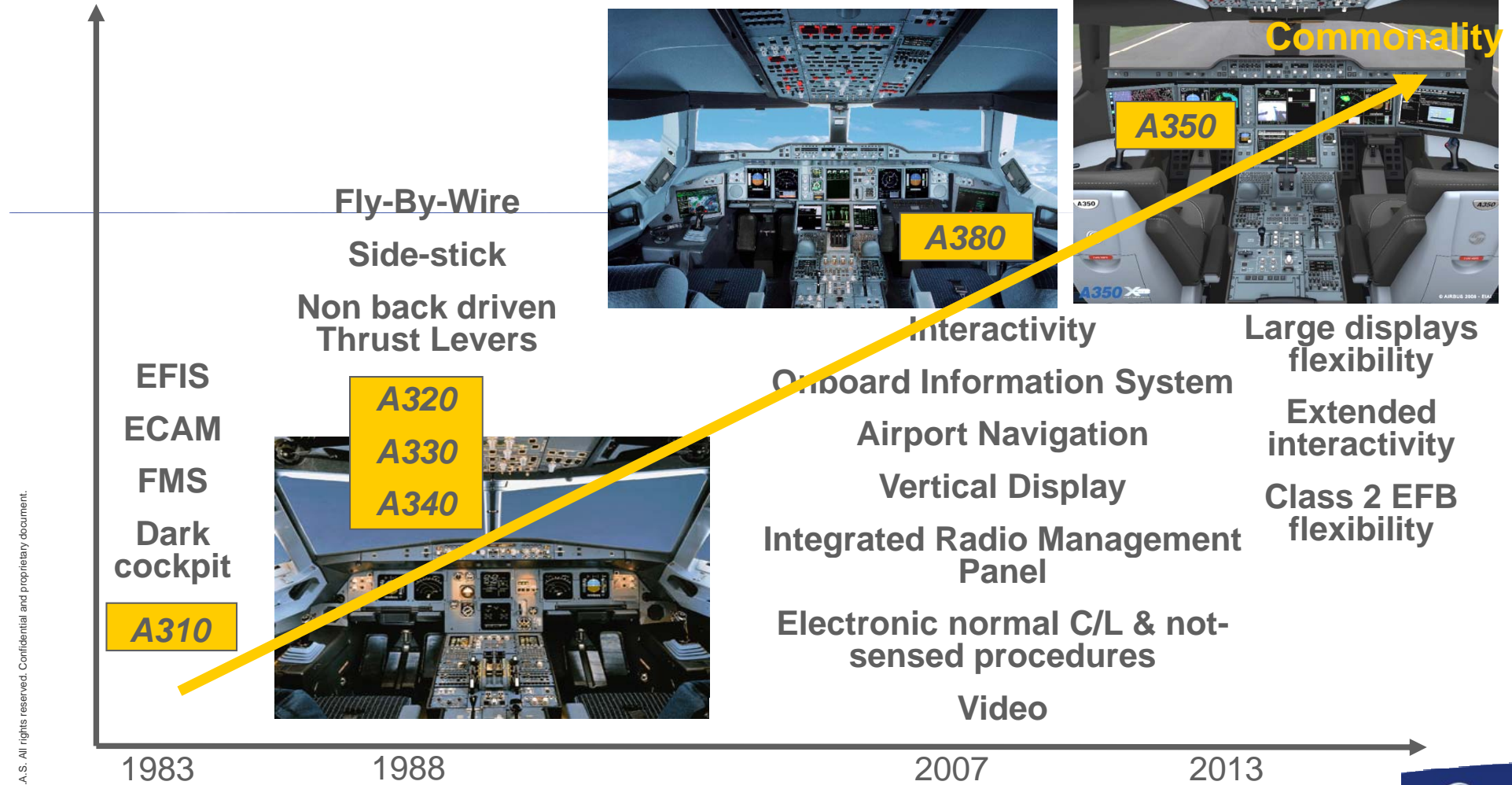
# Contents

- 1 Defining New Technology
- 2 Cockpit
- 3 Mission
- 4 Training
- 5 Conclusion



# Airbus cockpit family story

Innovation





# .... Cockpit evolution



# Flight Deck organization

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

- Fly
- Navigate
- Communicate
- Manage systems





# FLY – Flight interfaces



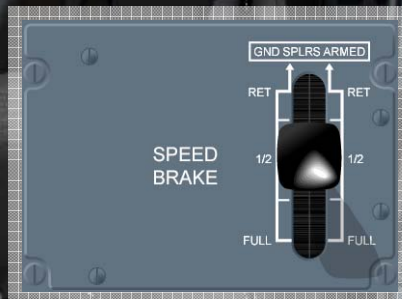
- Commonality in flight steering
  - Side-stick
  - Rudder pedals
  - Non back-driven thrust levers



# 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

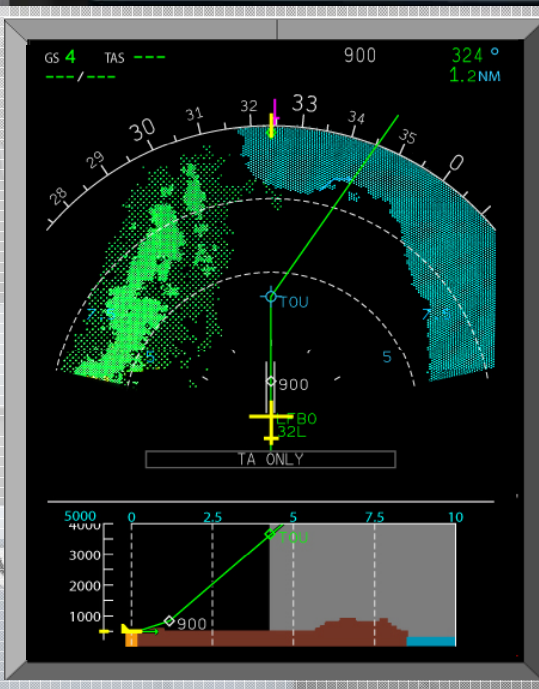




# NAVIGATE – Pilots interfaces



- Navigation Display
- Up to now:
  - Navigation Display
- From A380:
  - Enhanced EFIS control panel
  - Vertical Display



A350

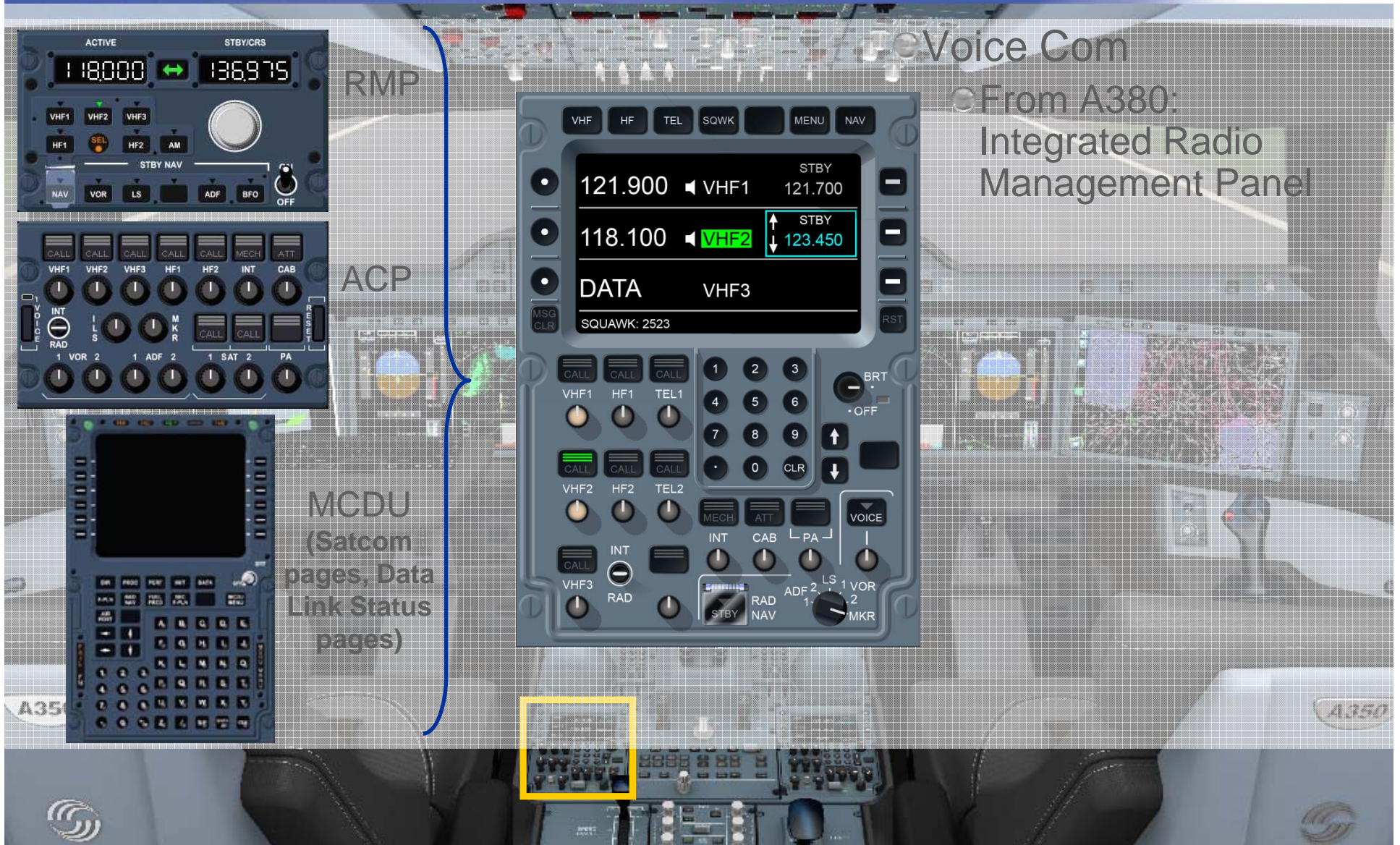


# NAVIGATE – Pilots interfaces





# COMMUNICATE – Voice Com pilots interfaces





# COMMUNICATE – Data Link pilots interfaces





# MANAGE SYSTEMS – Pilots interfaces



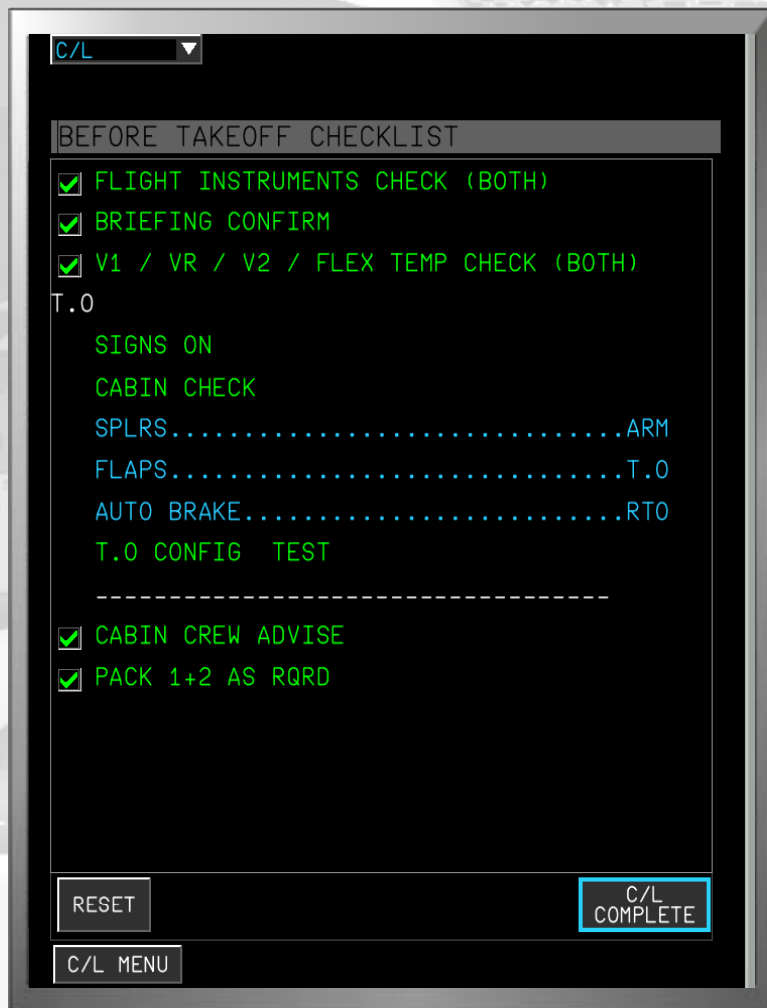
Overhead Panel

Commonality:  
same layout and  
procedural flows

A350

A350

# MANAGE SYSTEMS: NORMAL CHECK LISTS

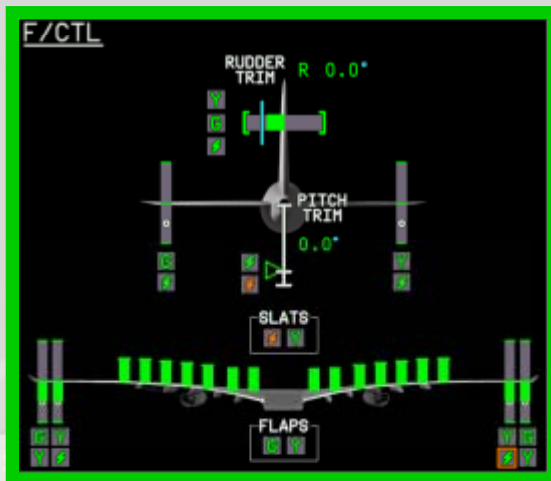


## Normal Checklists

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



# MANAGE SYSTEMS: ABNORMAL PROCEDURES



## 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



# MANAGE SYSTEMS: SUPP. PROCEDURES

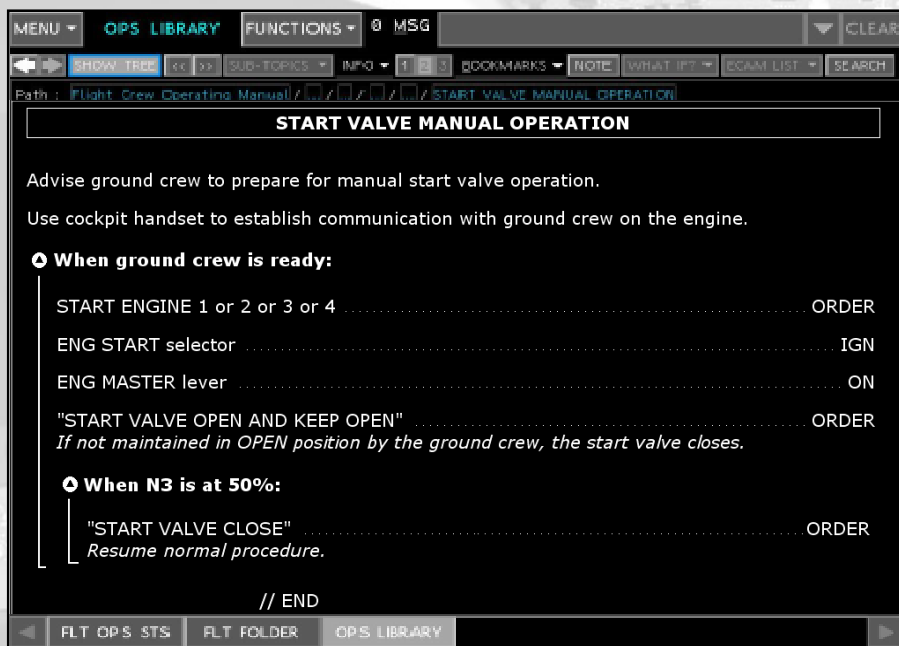
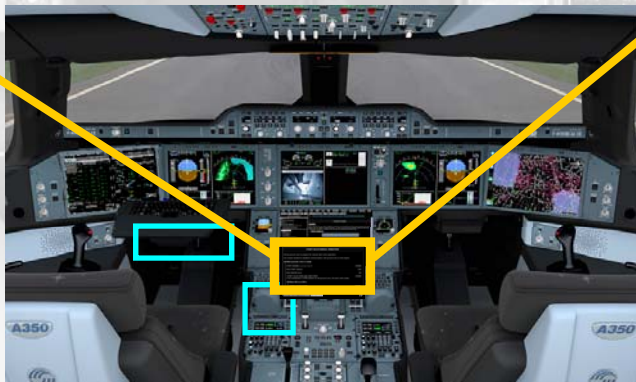


Illustration : A380 supplementary procedure



## 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





# 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

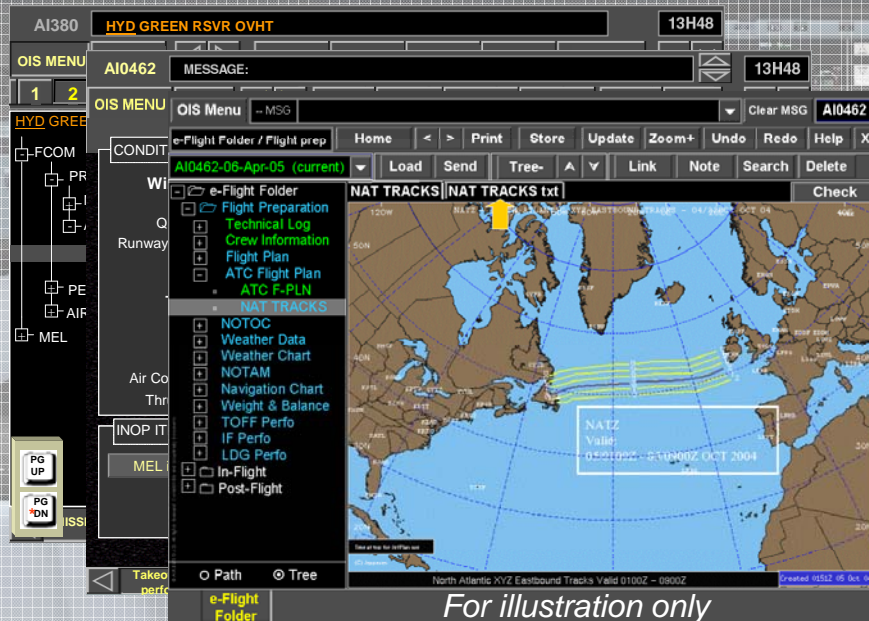
- ✓FCOM
- ✓FCTM
- ✓CCOM
- ✓MMEL
- ✓AFM / CDL

## 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, 22<sup>nd</sup> 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



# Contents

- 1 Defining New Technology
- 2 Cockpit
- 3 Mission
- 4 **Training**
- 5 Conclusion



# A350 XWB – Building on the A380



● A380

● A350 XWB

**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

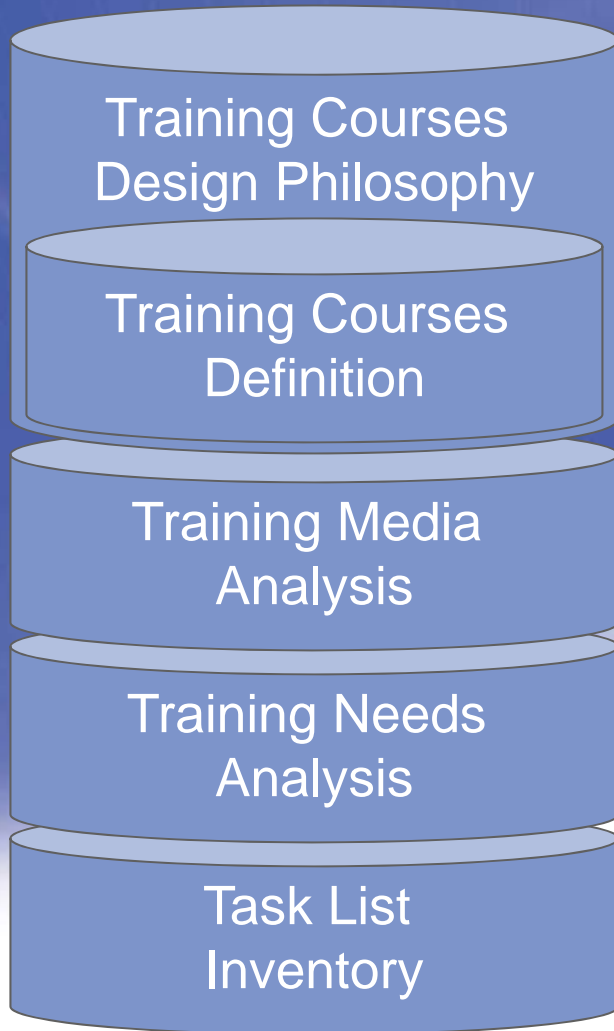
- **Understand aircraft more than know the aircraft**
- **System test: Closed book or open book?**
- **Teach methodology .....not failures as such**
- **Highlight memory items**
- **Re-focus on basic handling**
- **Where and when do we train to manage the mission?**



# A350 XWB Flight Crew Training Objectives

- **Training to achieve a Competence**
- **Take benefit of A380 experience**
- **Take benefit of Customers feedback**
- **Consider distance learning**
- **Consider appropriate Training Aids and Training Media**
  - Training days on-site/ off-site
  - Training Solutions for Training Centers and Airlines
- **Enhance synergies between Flight Ops documentations and Training Media**

# A350 XWB Training Need Analysis Methodology



## Design rules & Outputs

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

## Database gathering

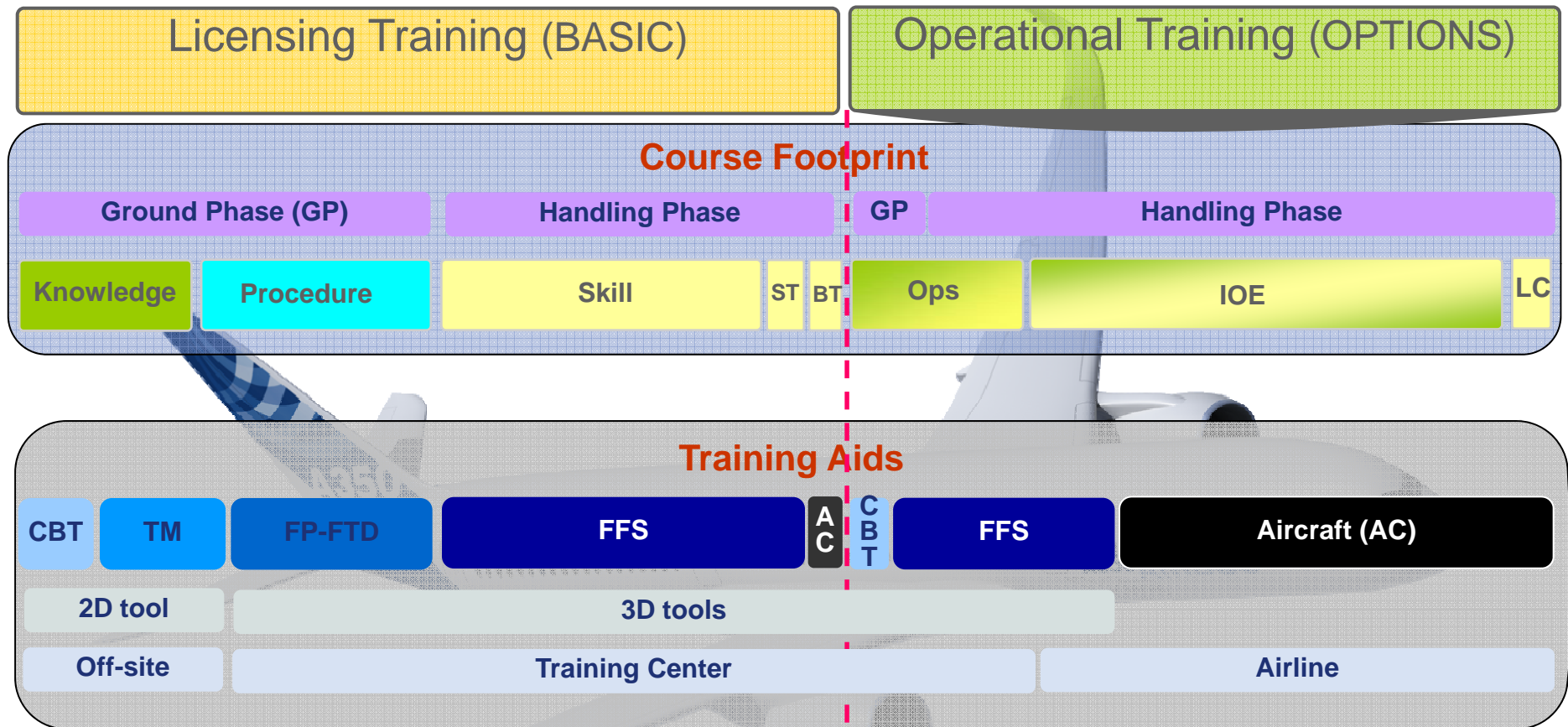
Determine the most suitable training aids to be used for each task → **How** to train

Determine the training gap → **What** should be trained for **Who**

Analyze the overall job and not only the training part → **Structured** architecture



# A350 XWB Flight Crew Training Footprint



**Ops:**

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

**FP-FTD** – Flat Panel FTD

**TM** – Training Media ( as FMS trainer)

# Contents

- 1 Defining New Technology
- 2 Cockpit
- 3 Mission
- 4 Training
- 5 Conclusion





# 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*



© AIRBUS S.A.S. All rights reserved. Confidential and proprietary document.

This document and all information contained herein is the sole property of AIRBUS S.A.S.. No intellectual property rights are granted by the delivery of this document or the disclosure of its content. This document shall not be reproduced or disclosed to a third party without the express written consent of AIRBUS S.A.S. This document and its content shall not be used for any purpose other than that for which it is supplied.

The statements made herein do not constitute an offer. They are based on the mentioned assumptions and are expressed in good faith. Where the supporting grounds for these statements are not shown, AIRBUS S.A.S. will be pleased to explain the basis thereof.

AIRBUS, its logo, A300, A310, A318, A319, A320, A321, A330, A340, A350, A380, A400M are registered trademarks.



**AIRBUS**

AN EADS COMPANY