



# A380 Advanced Cabin Line Maintenance

Highlights of modern Airbus Line maintenance

# Why **Cabin** Line Maintenance?



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A380 Cabin including Cabin maintainability has been designed in Hamburg



Cabin is for the airlines one of their core competencies enabling airline branding

# Categories of Maintenance

Type	Frequency
Pre-Flight	Pre-Flight
Terminal Check	Each terminal
Service Check	8 Cal days
1 A-Check	750 FH
A-Check	1500 FH

**Scheduled maintenance**  
covering hidden failures (MPD) and  
preventive maintenance



**Unscheduled maintenance**  
unforeseen safety-related failures or  
commercial NO GOs

# Airline Maintenance Organization



## Hangar maintenance

Scheduled Maintenance

Heavy maintenance

Component shop maintenance



## Line maintenance

Transit

Overnight

(Unscheduled and Scheduled Maintenance)

# Unscheduled Line Maintenance



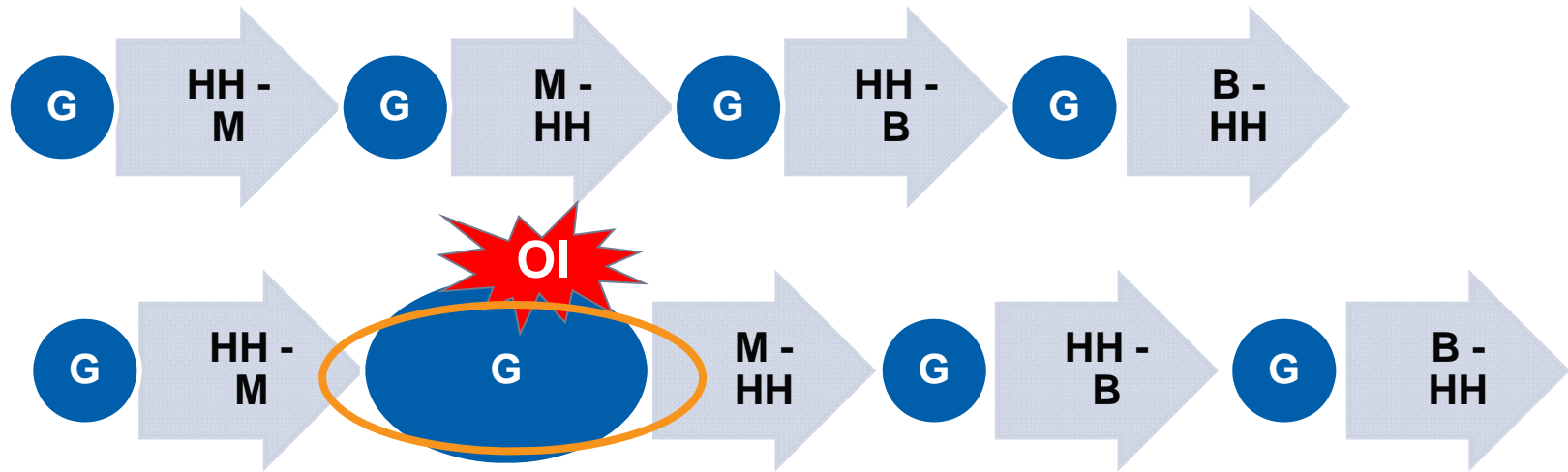
## Scope:

- Keep the aircraft airworthy and eliminate commercial NO GOs

## Constraints:

- No flight delay or cancelation are generated

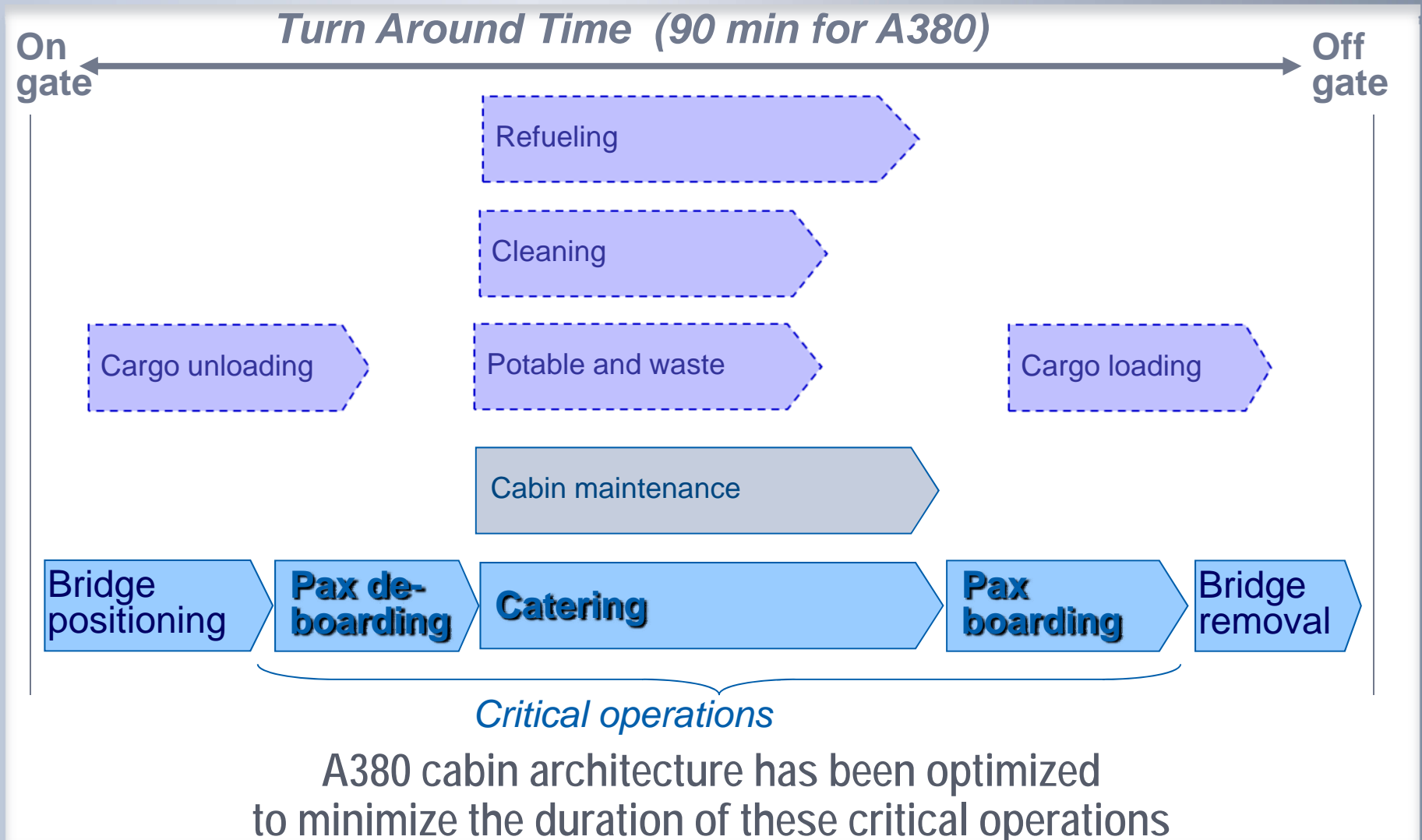
# Unscheduled Line Maintenance is time-critical



- Aircraft availability
- Pax satisfaction
- Aircraft revenue

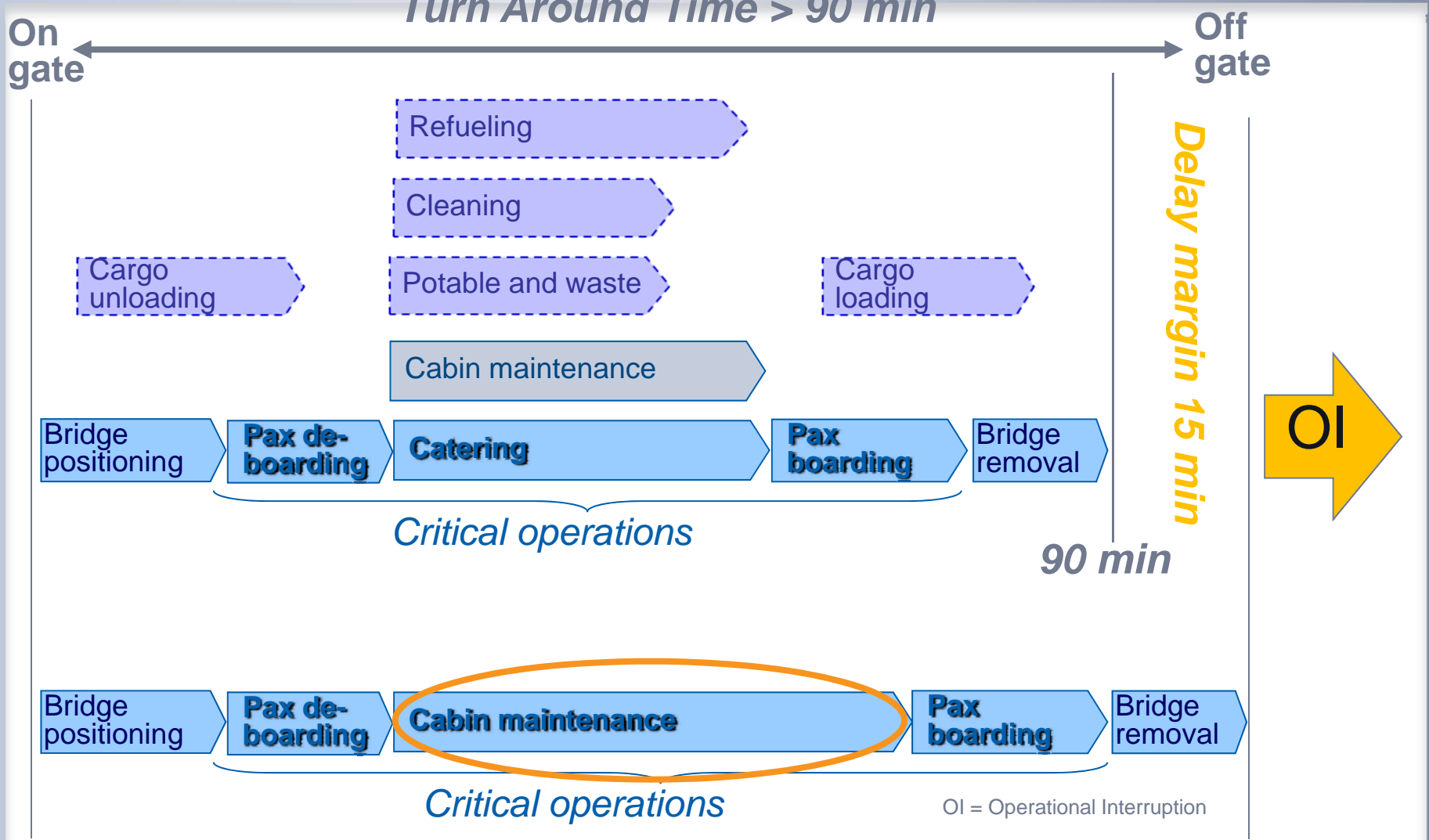
OI = Operational Interruption

# Critical path for turn around of large aircraft



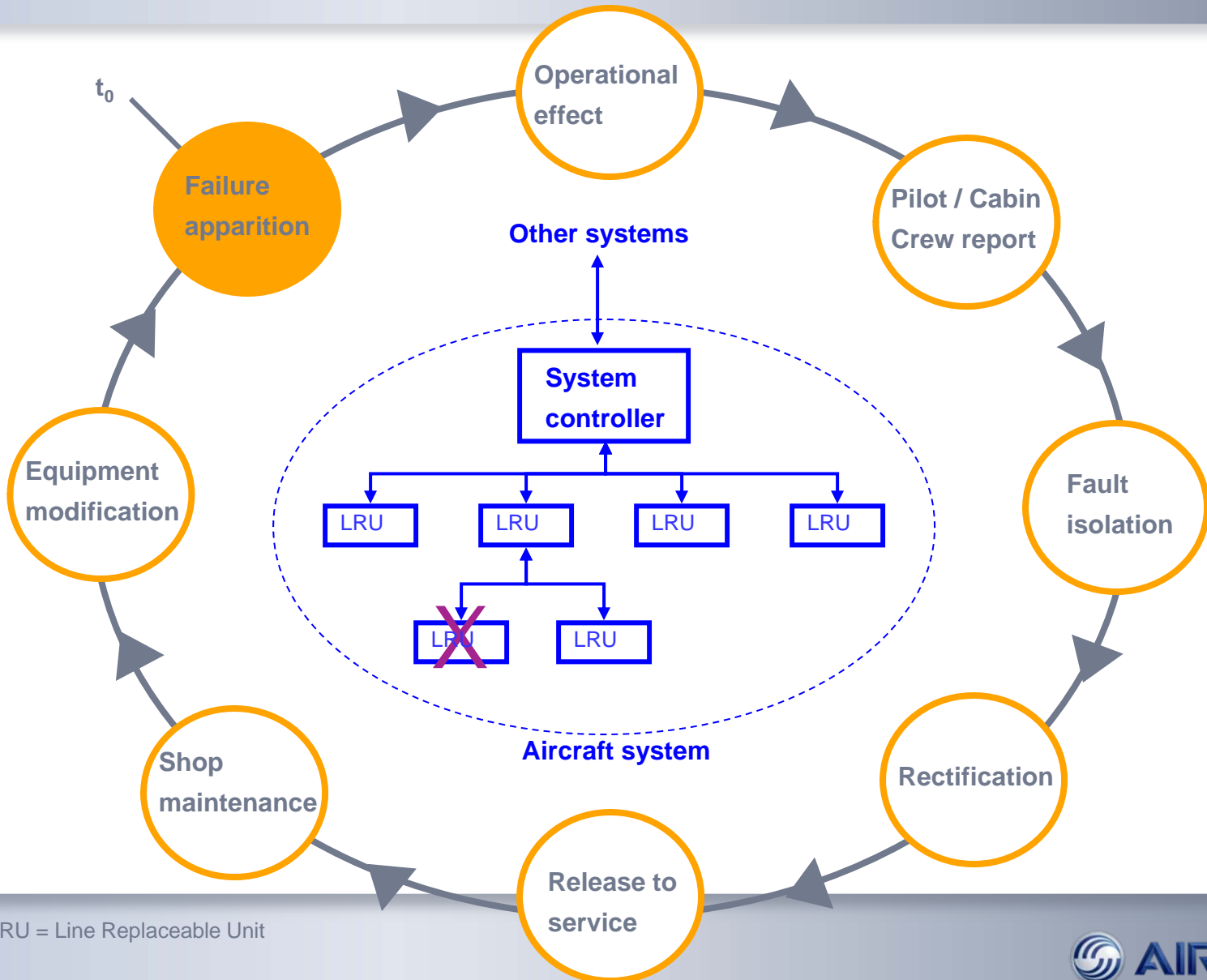
# Unscheduled Line Maintenance is time-critical

*Turn Around Time > 90 min*



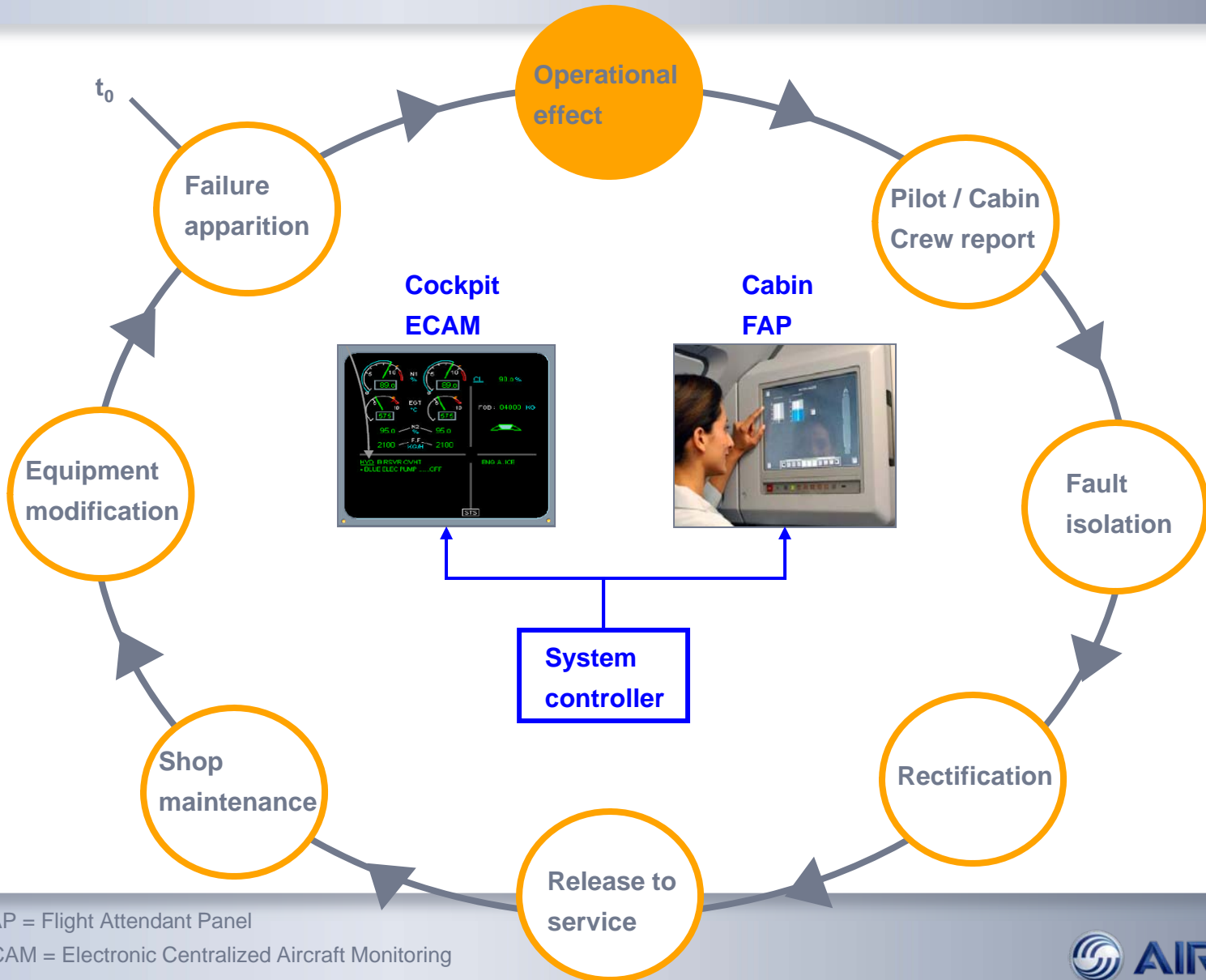


# Unscheduled Line Maintenance / End-to-End process



LRU = Line Replaceable Unit

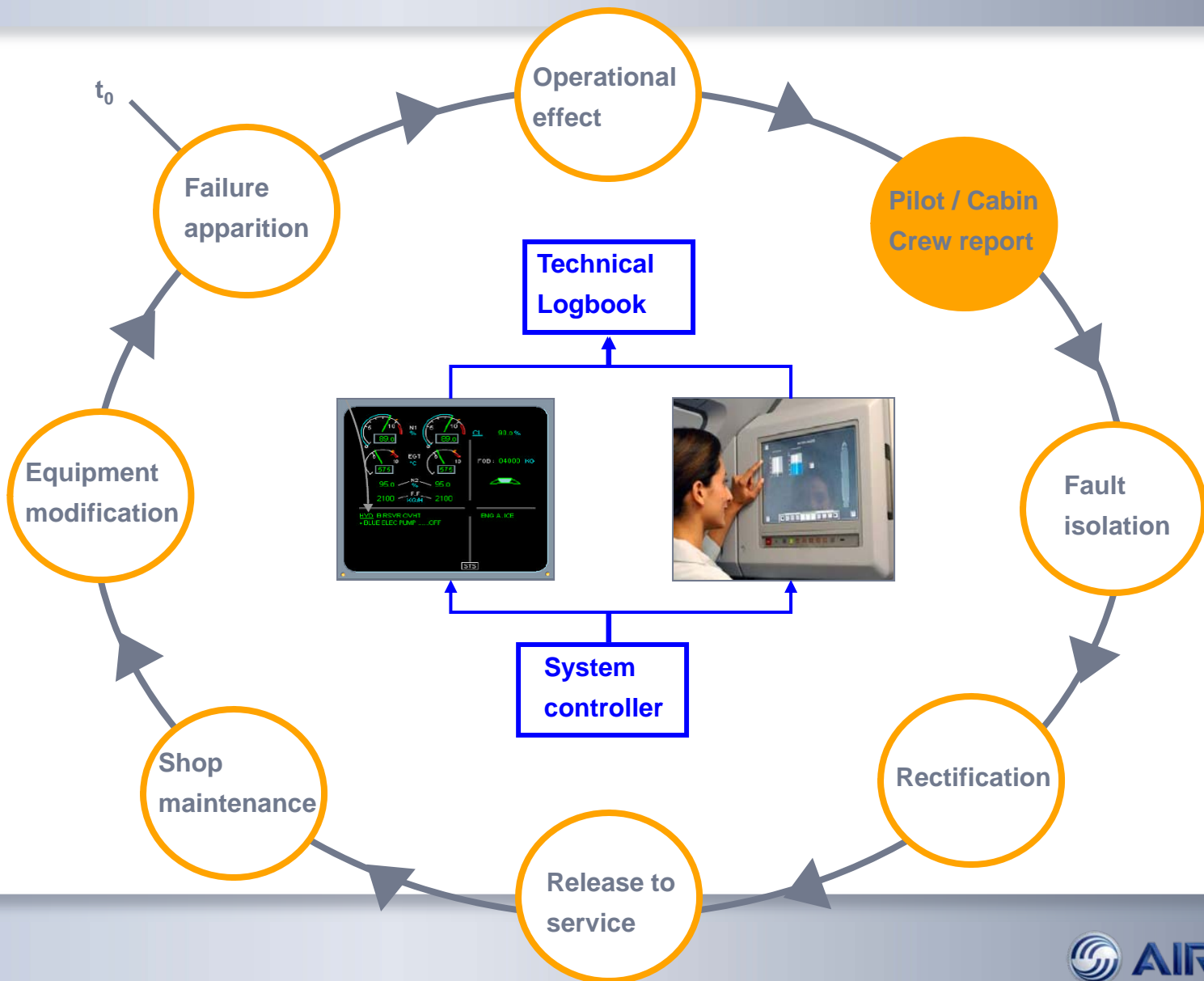
# Unscheduled Line Maintenance / End-to-End process



FAP = Flight Attendant Panel

ECAM = Electronic Centralized Aircraft Monitoring

# Unscheduled Line Maintenance / End-to-End process



# Input for Unscheduled Line Maintenance

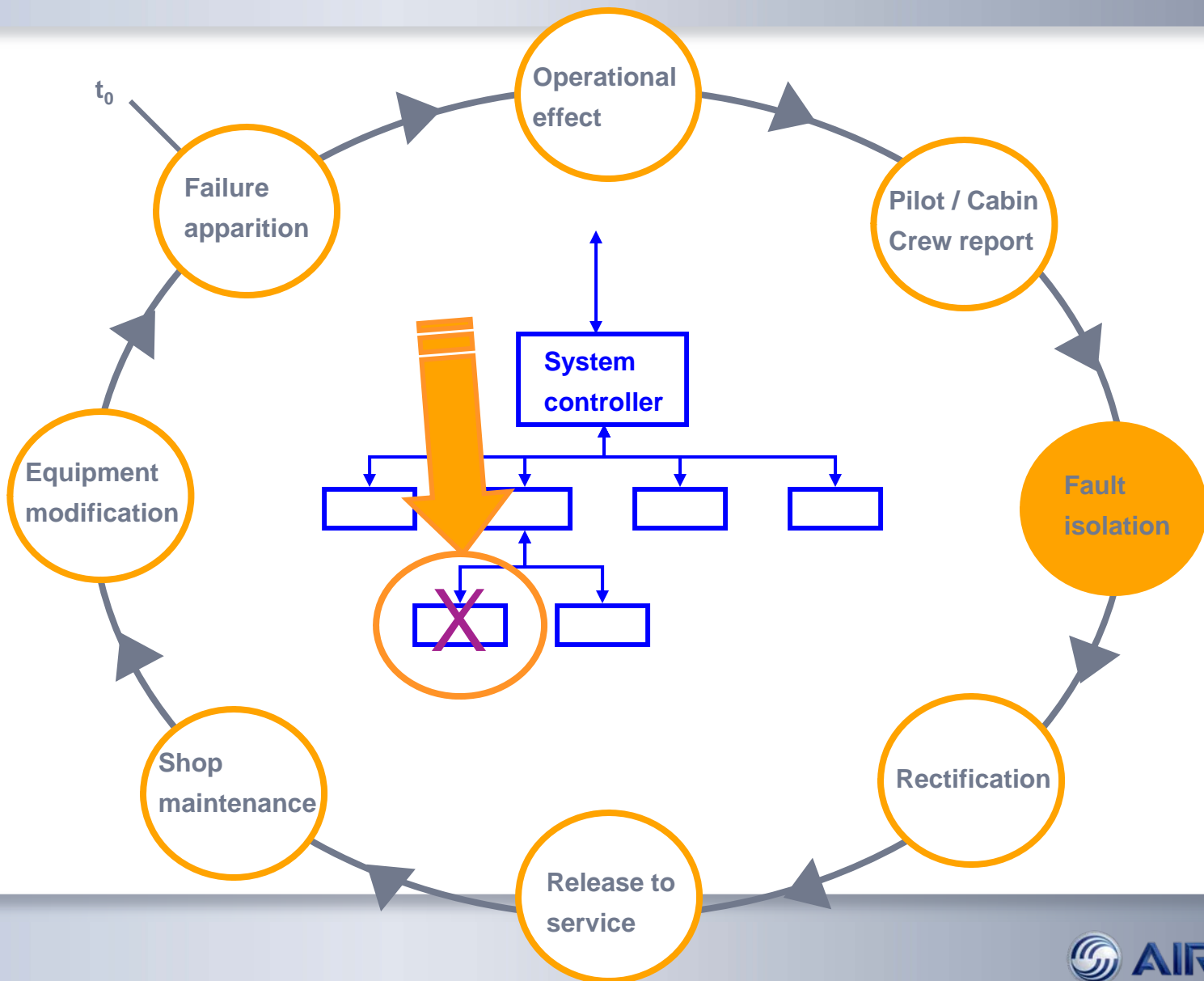
## Example of a PIREP "on paper" Logbook

FLIGHT No.	DEP STA	A/C REG	D	D	M	M	Y	Y	SEQ. No.	JAA FORM ONE No.	ATA:	POS	COMP IDENT No.	SERIAL No. IN	SERIAL No. OUT	DEL															
6990	PO	100	20	09	28				83																						
Subject										MEL ITEM	A	B	C	D	FINAL DATE	MRS	EXTENSION														
FLIGHT CONTROLS																															
Complaint	SLATS LOCKED										Action	SINGLE MOTOR OPERATION CODE 032																			
	- WIND TIP BRK ON											WTB RESET AND TESTED.																			
SLAT SYS 2 FAULT										SFCC RTS AND SLAT/FLAP FUNCTIONS PERF. ALL PASSED.																					
DE/ANTI-ICING:										JAR 145.50 release to service by:										AUTH. No.:	ID:										
Sign. <i>Luten</i>										RFOB: 3360/1611										Action STA	D	D	M	M	Time	Sign.					
COMPLAINT (IMM CODE)										FLIGHT TIME	RP	FAIL CLASS	E1	E2	E3	E4	APU	Release STA	D	D	M	M	Time	Sign.							
										212							ZRH	20	09												
28	71	73	74	75	76	77	78	79	21	30	35	36	49	25	27	29	32	38	52	56	53	24	25	26	33	22	34	45	23	31	34
	72		80																		57										

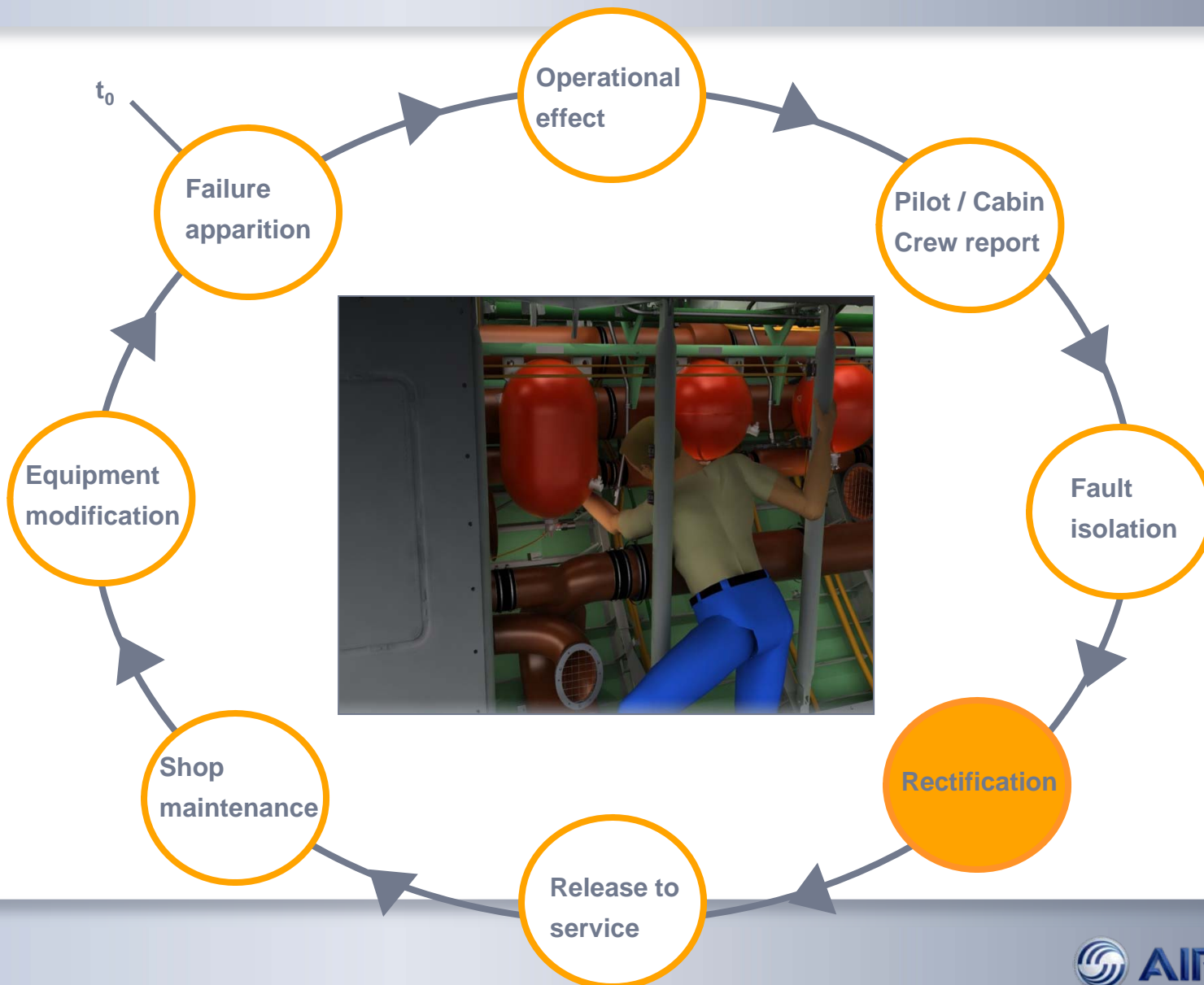
PIREP = Pilot REPort



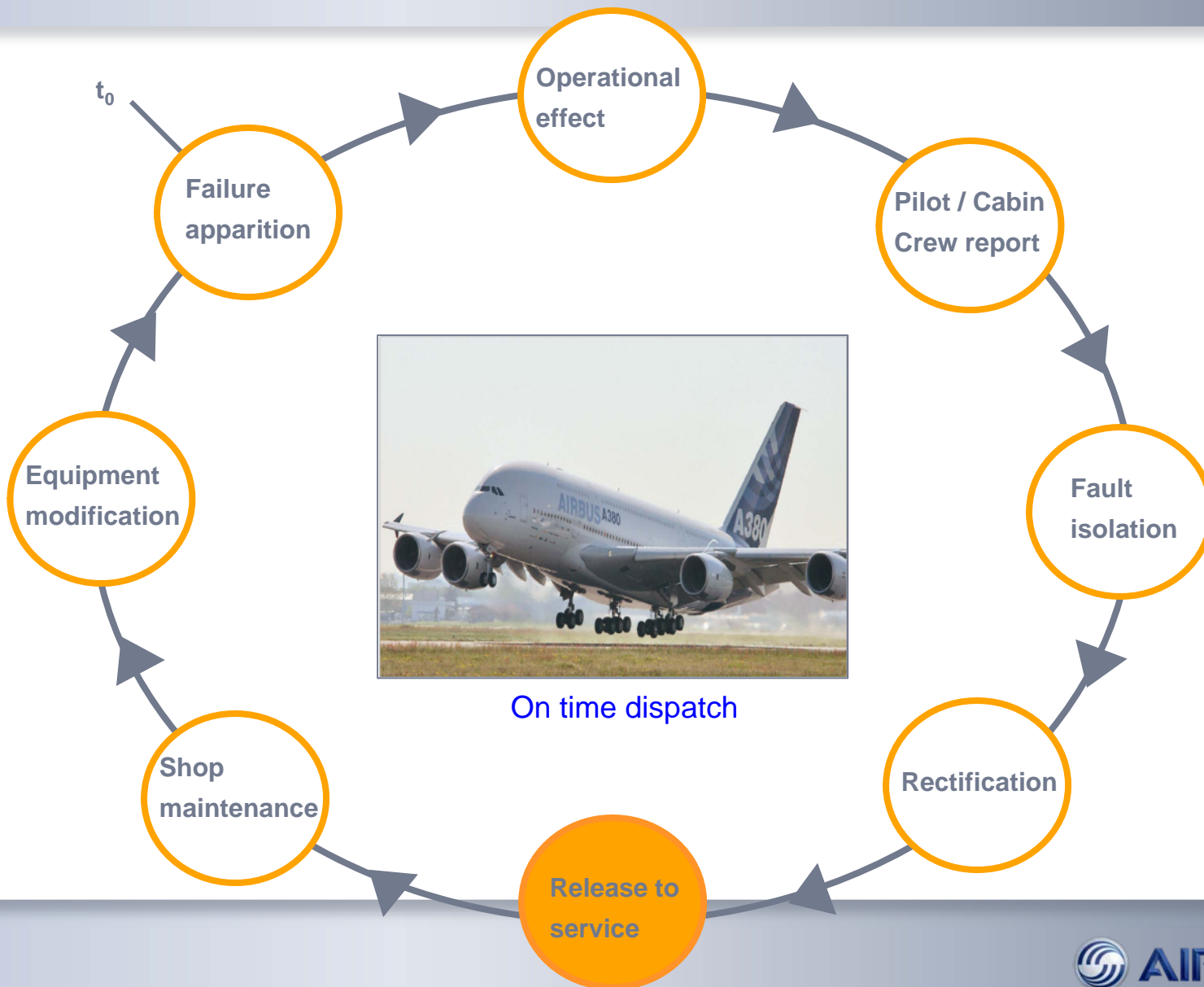
# Unscheduled Line Maintenance / End-to-End process



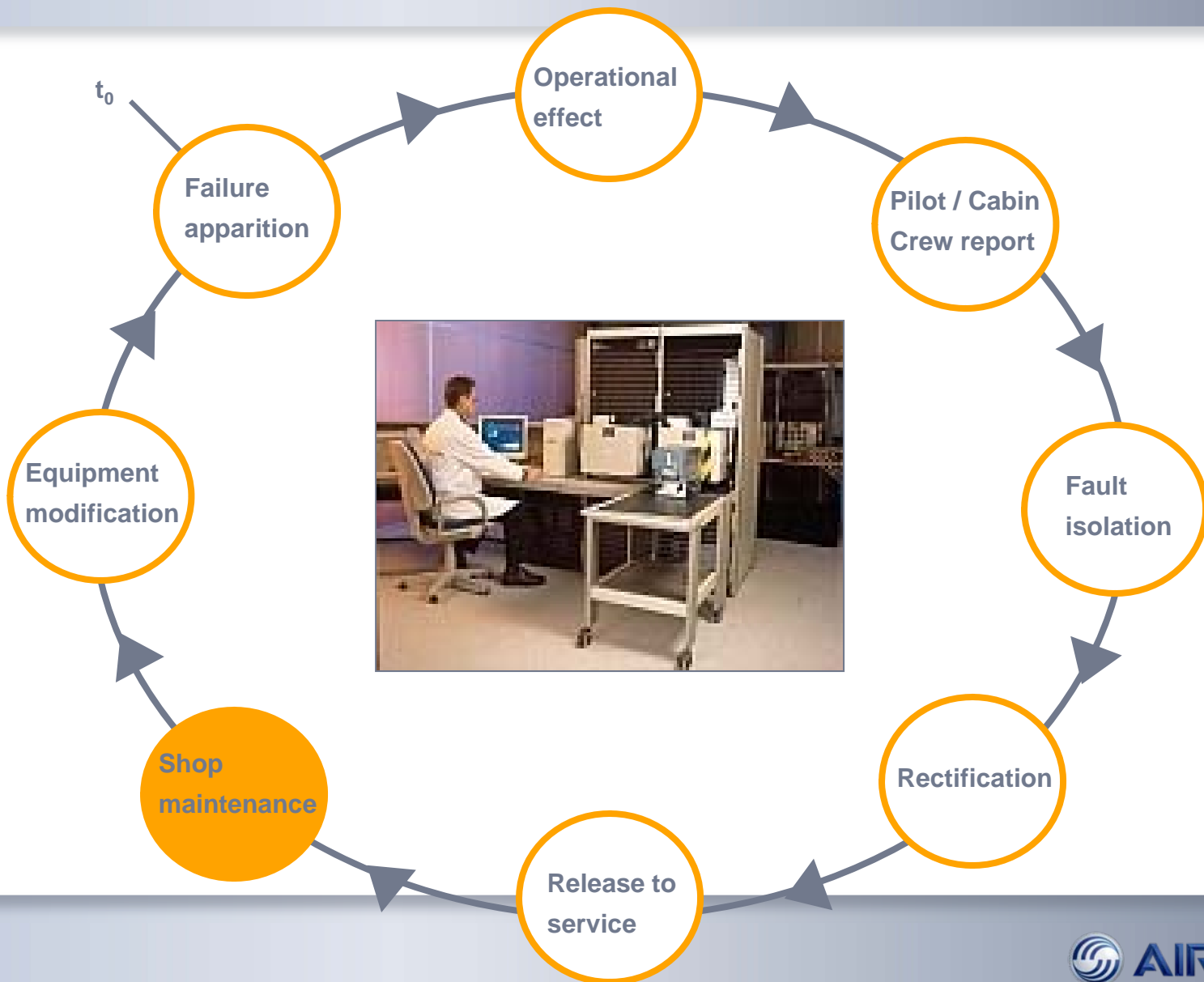
# Unscheduled Line Maintenance / End-to-End process



# Unscheduled Line Maintenance / End-to-End process

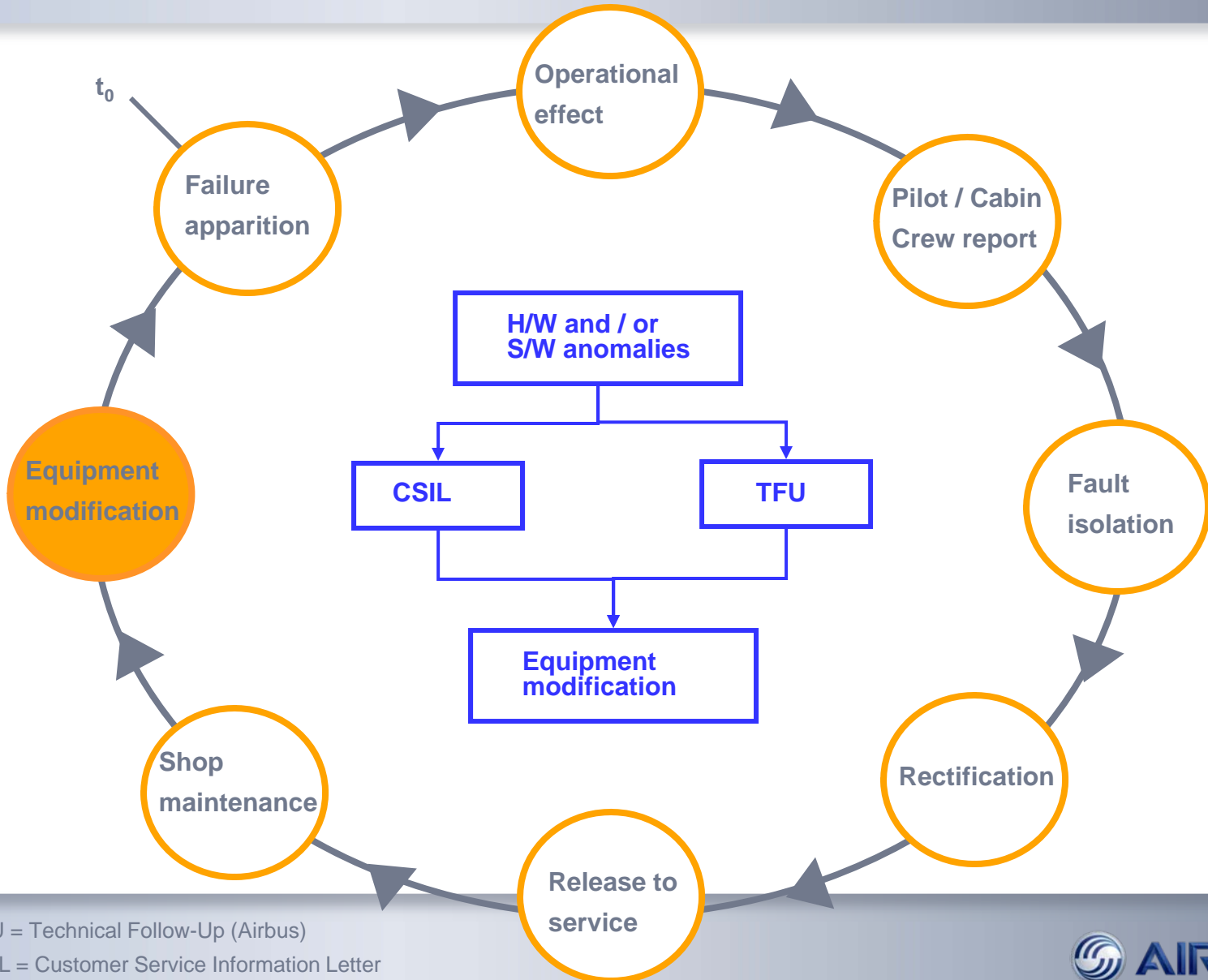


# Unscheduled Line Maintenance / End-to-End process





# Unscheduled Line Maintenance / End-to-End process



# Aircraft Dispatch under Minimum Equipment List (MEL)

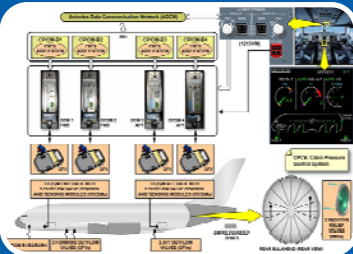
21-30-05	Outflow Valve		
Issue: M 21 30 000 256 000 101 10-MY100			
Applicable to: ALL			
21-30-05A			
Repair interval	Nbr installed	Nbr required	Placard
C	4	3	No
(a) One may be inoperative provided that it is indicated closed on the CAB PRESS SD page.			
Reference(s):			
(b) Refer to OpsProc: 21-30-05A Outflow Valve condition 21-30-05A			
Continued on the following page			

FAR 121.628 states:

“...the Minimum Equipment List and procedures for continuing flight beyond a terminal point with equipment...inoperative may be included in the Certificate holder’s manual...”



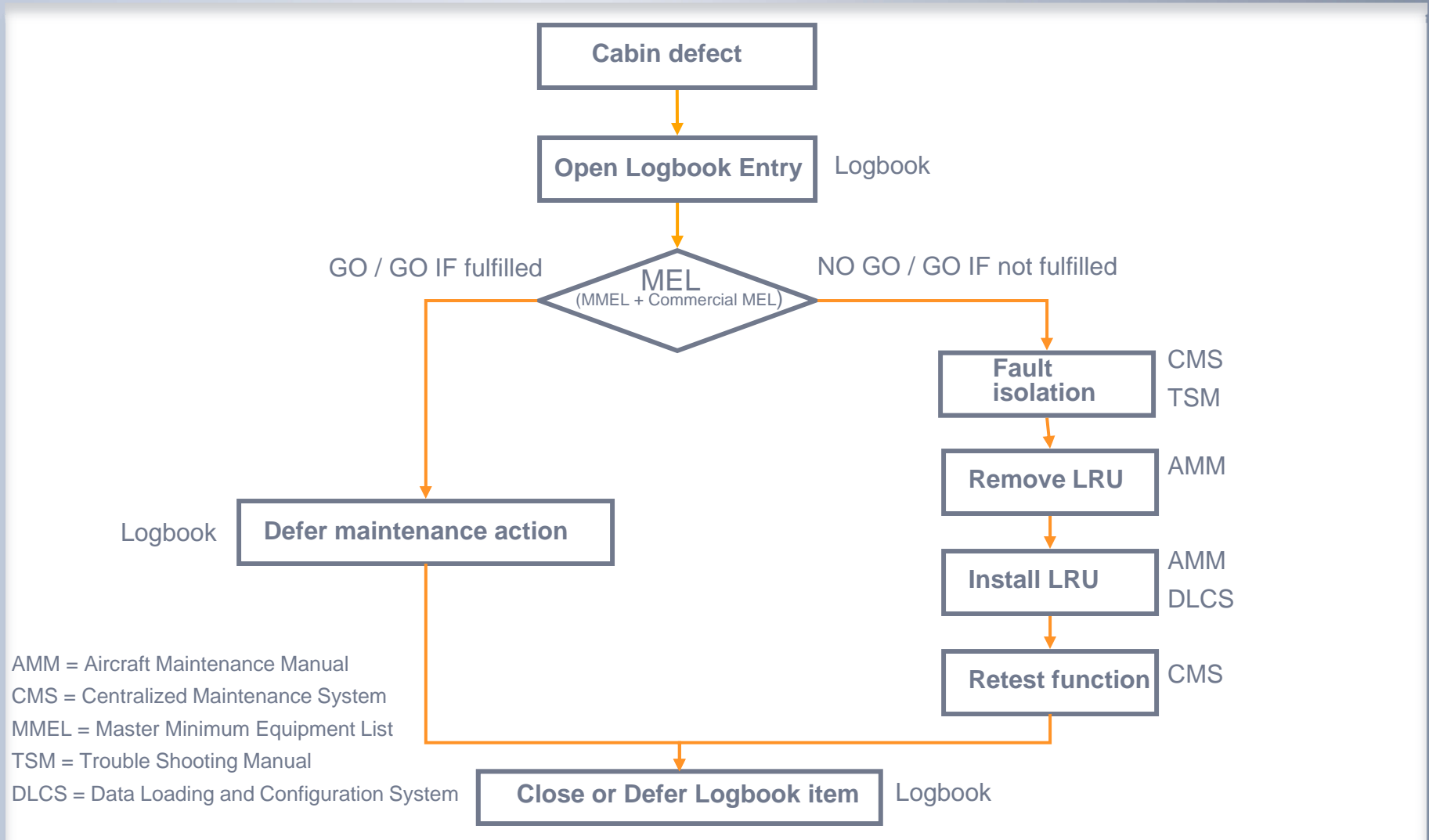
MEL allows, safe, continued operation with some systems or equipment inoperative, in specified conditions and for a limited period of time



Safety is maintained by:

- Operations limitations
- Appropriate design redundancies
- Reference to other instruments

# Fault Tolerant Architecture versus MMEL



# Unscheduled Line Maintenance



**Optimized maintenance costs**

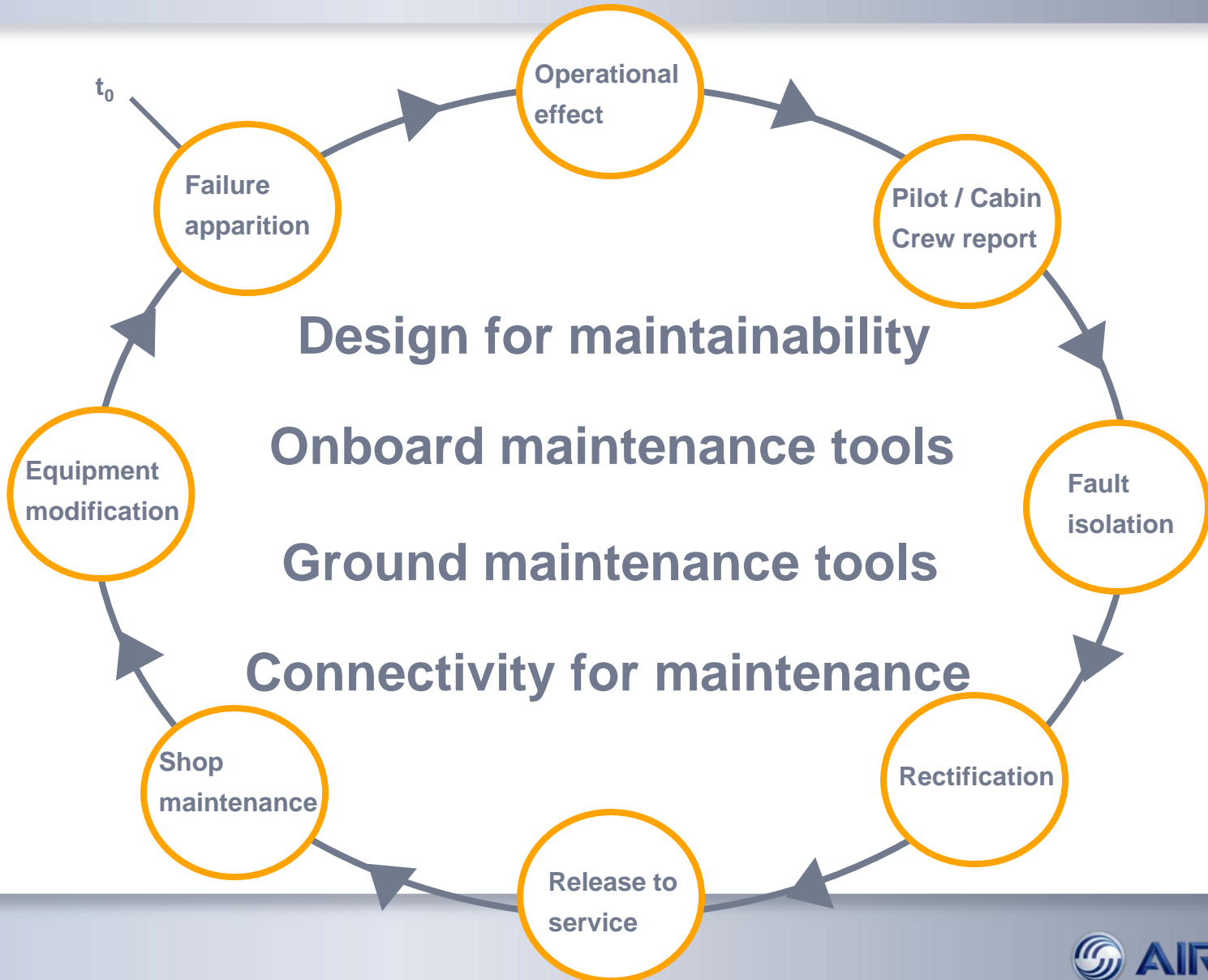
**Availability improvement**

**Paperless maintenance flow**

**Restore aircraft function**

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# Advanced Unscheduled Line Maintenance



# Maintainability versus Maintenance



## Maintainability

**CAPABILITY** for a system  
to be maintained

**Shall be implemented during  
system design**

**Concerns the system designer**



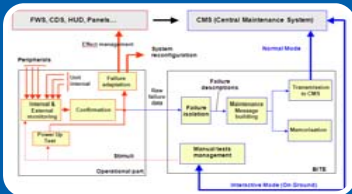
## Maintenance

**ACTIONS** to maintain or to  
restore a system in a nominal  
state

**Is implemented at Entry Into  
Service**

**Concerns the system operator**

# Design for Maintainability



## System BITE

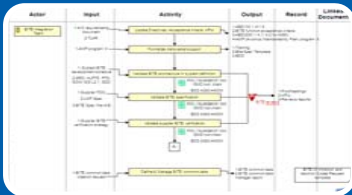
**AIRBUS**  
Equipment - Design - General  
Requirements For Suppliers

ADSD/RS 1.4  
PART 1 - PRODUCT  
CHAP 4 - MAINTAINABILITY

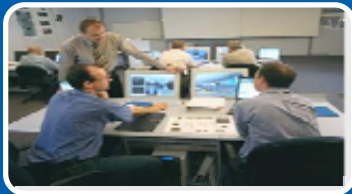
### Maintainability Requirements for Suppliers

**SCOPE**  
This directive establishes the design requirements for Airbus aircraft related to the maintainability of their equipment.  
The document takes into account all Airbus aircraft programs except the A350-900 programs.  
The Suppliers shall comply with the rules and requirements within this document. The document shall be used by the Suppliers for design and implementation of all equipment developed for components of the aircraft. The document includes technical data from the Suppliers in order to facilitate the process of entering the supplier of the equipment into the aircraft as well as before the maintenance process.

## Maintainability directives

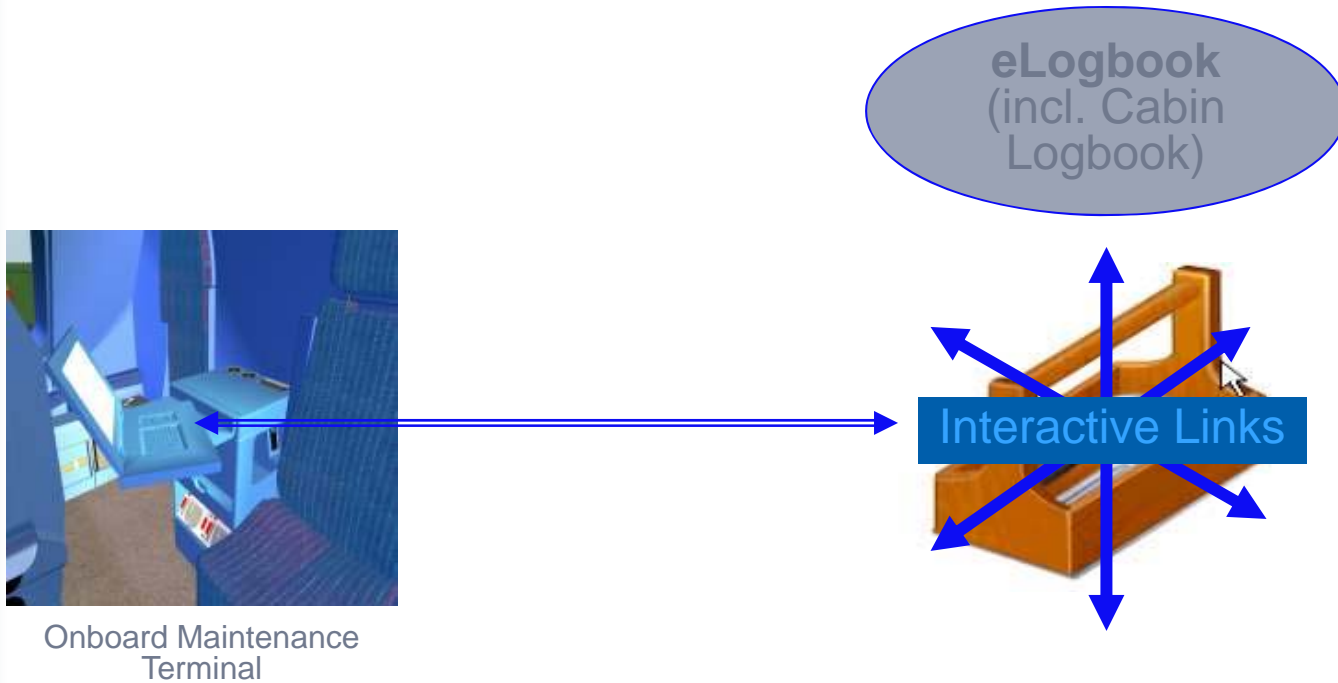


## BITE design process



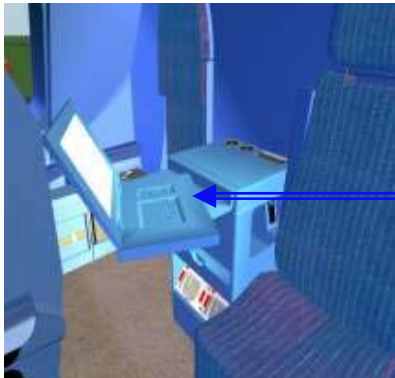
## Accessibility improvement of critical LRUs

# Onboard Maintenance Tools (Software Applications)





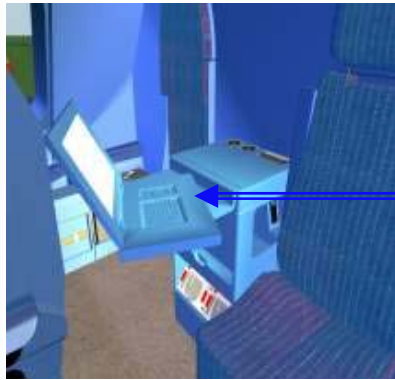
# Onboard Maintenance Tools (Software Applications)



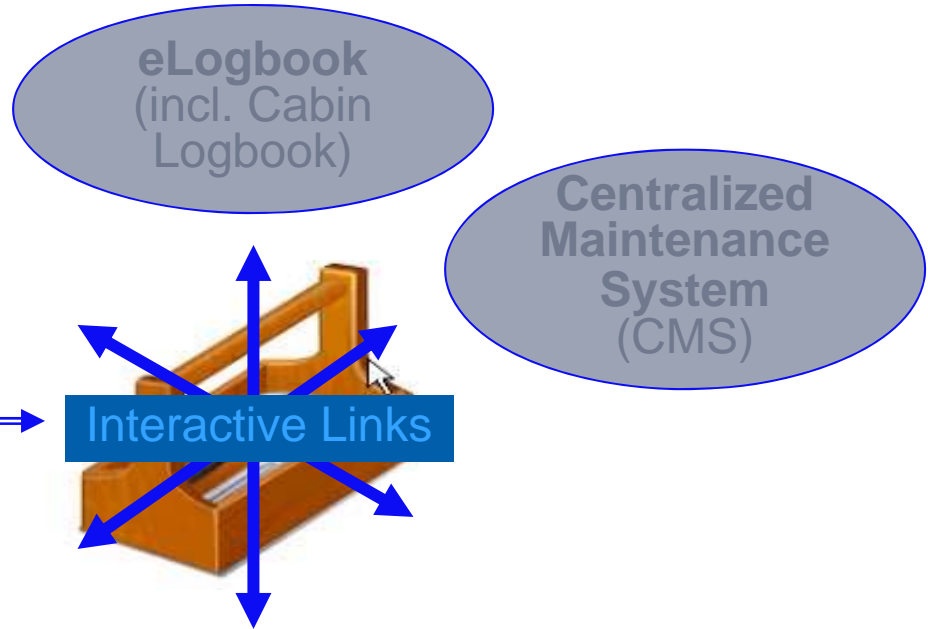
Onboard Maintenance Terminal



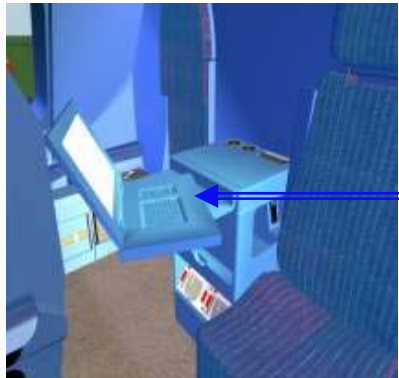
# Onboard Maintenance Tools (Software Applications)



Onboard Maintenance Terminal



# Onboard Maintenance Tools (Software Applications)



Onboard Maintenance Terminal

Context: Action 1 ▾ Tools ▾ Data ▾ Documents ▾ Utilities ▾

**Aircraft**  
 Tail number (ARN): [REDACTED]  
 Total Flight Hours (TFH): 1280

**Previous Leg**  
 From: London Heathrow (LHR) at: Jun 30, 2003 22:15  
 To: Singapore Changi (SIN) at: Jun 31, 2003 18:00

**Current time**  
 Aug 31, 2010 11:55:22

Close Print Back Messages [Open]

## Action 1

**Logbook**  
 Ref: The AUTO FLT FM1 Fault warning has appeared in cruise phase

**Correlated Flight Deck or Cabin Effects**

Date, Hour	Flight Phase	Effect type, title	Fault Code
Jun 31 2003 20:25	Cruise	Warning: AUTO FLT FM1 FAULT	2270 W 542

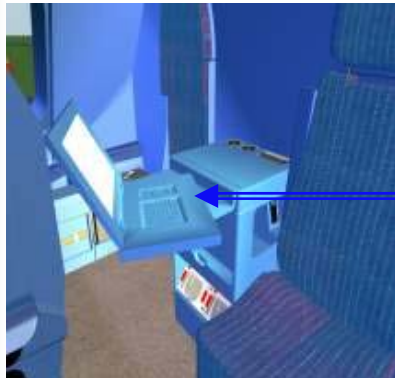
**Correlated Faults**

Date, Hour	Flight Phase	Source	Class, Regularity	Current State	Fault	Fault Code
Jun 31 2003 20:24	Cruise	FMGEC1 ATA22	C1: Cockpit effect Hard	Active	FMGEC 1(1CA1)WRG:E MON BUS FEEDBACK	2270 F 542

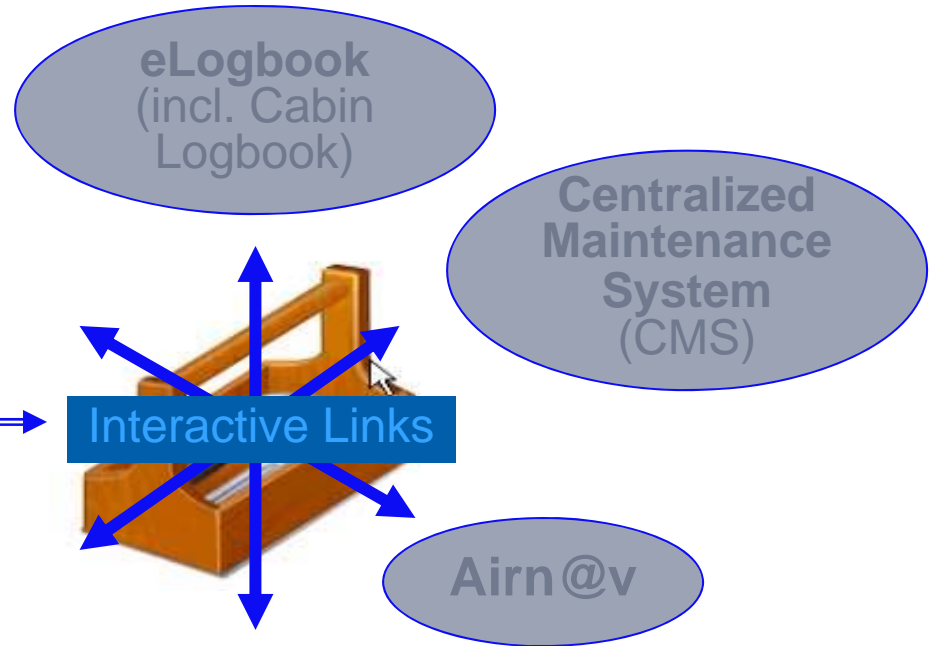
MEL TSM 227000810817 System parameters Report

Action 1

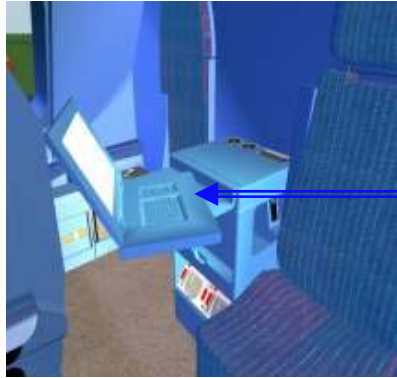
# Onboard Maintenance Tools (Software Applications)



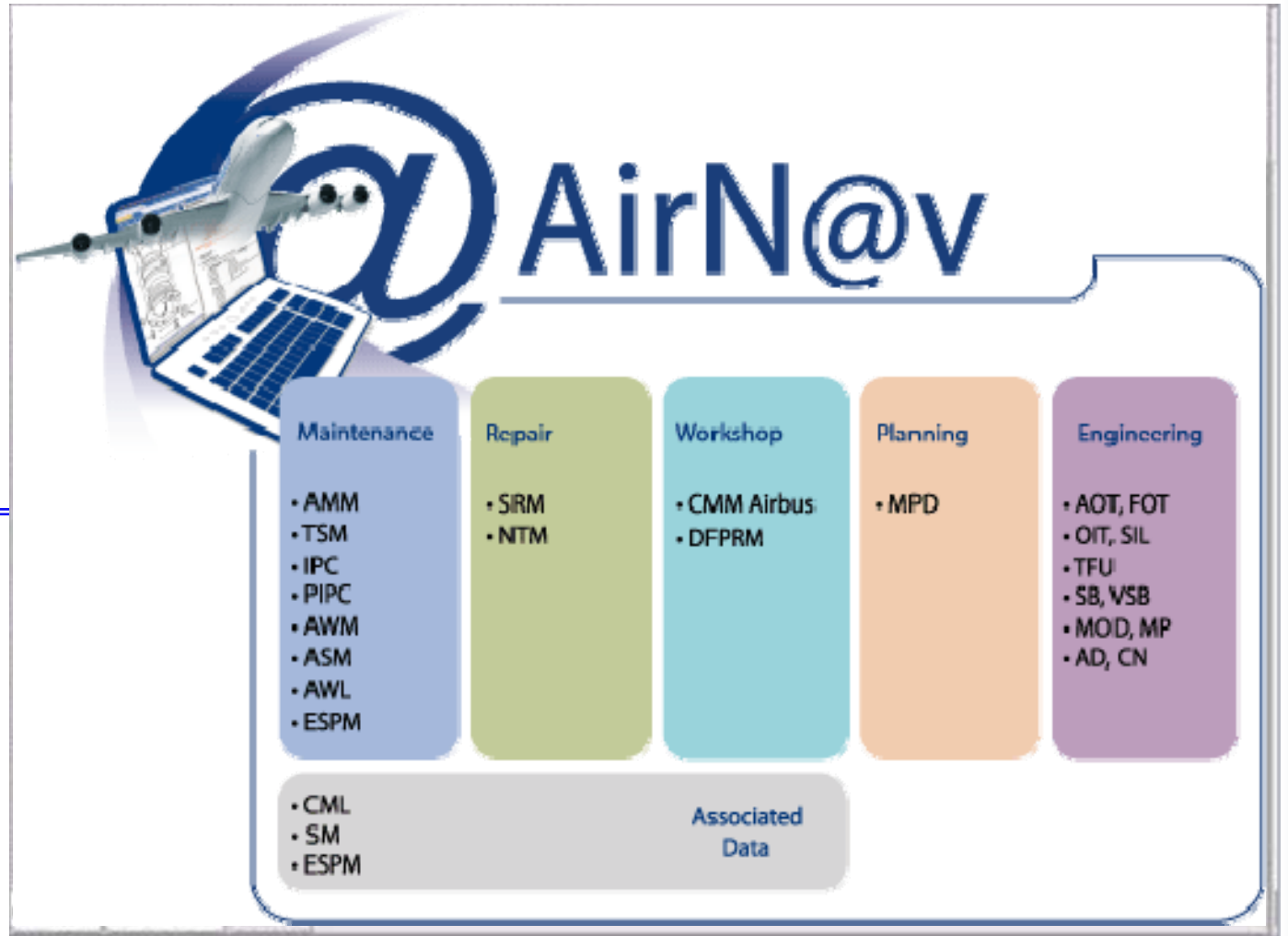
Onboard Maintenance Terminal



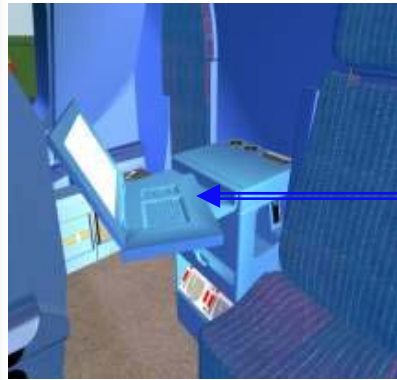
# Onboard Maintenance Tools (Software Applications)



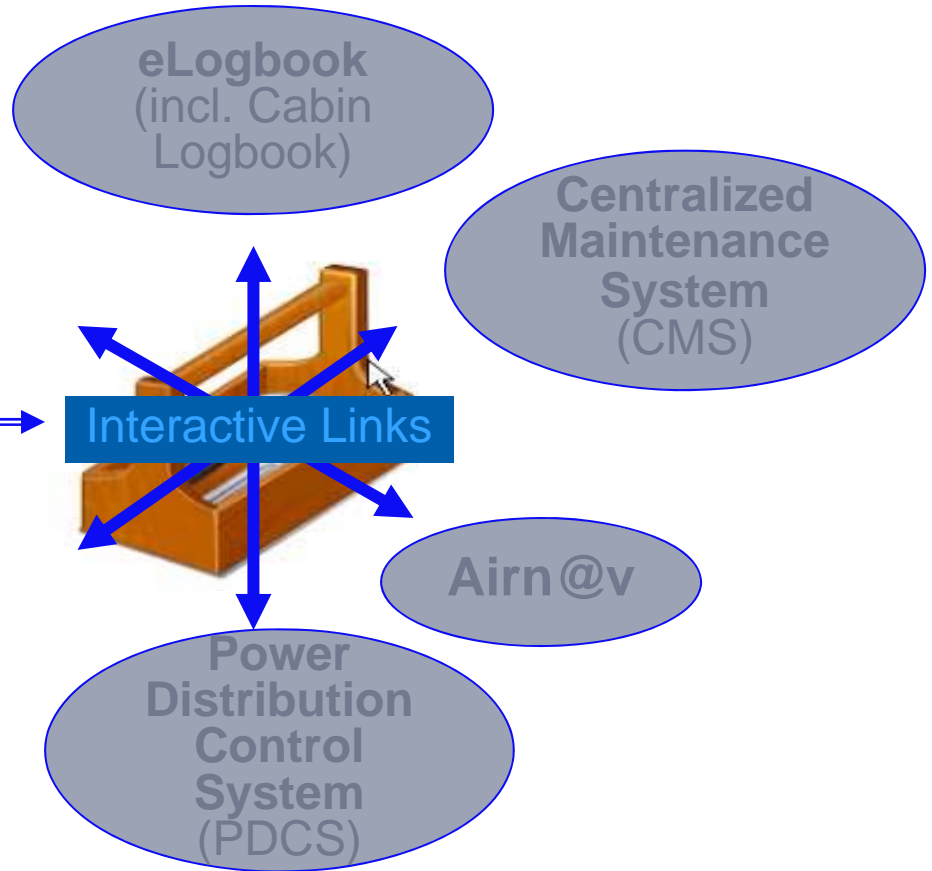
Onboard Maintenance Terminal



# Onboard Maintenance Tools (Software Applications)

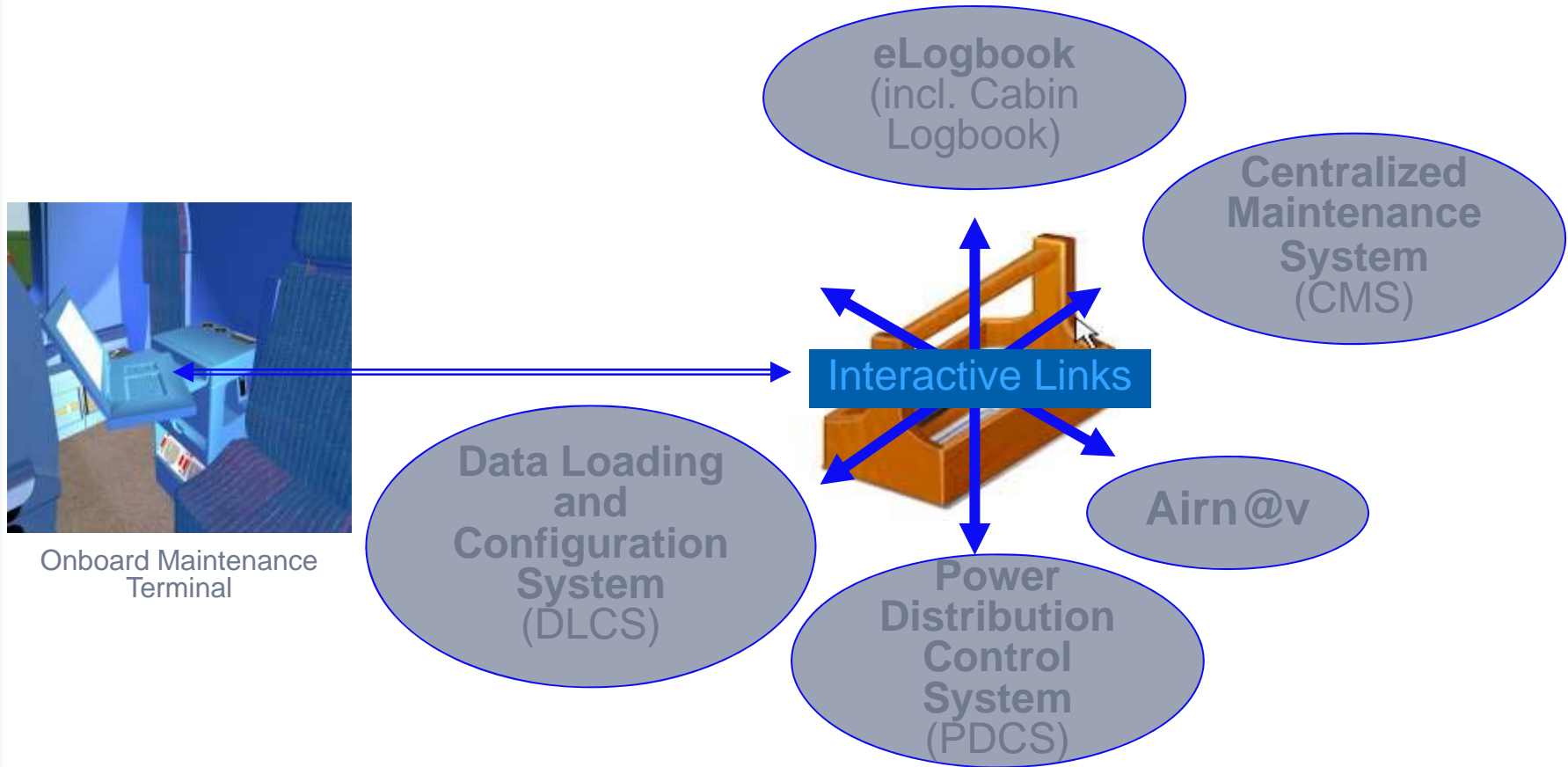


Onboard Maintenance Terminal



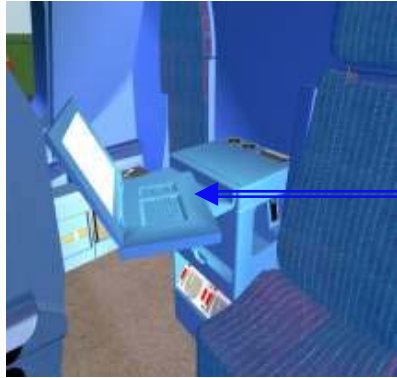


# Onboard Maintenance Tools (Software Applications)





# Onboard Maintenance Tools (Software Applications)



Onboard Maintenance Terminal

Context: Home Page About Tools Data Document Utilities

INFORMATION DISPLAYED NOT YET DEFINED

Current Time  
Mar 04, 2005 11:48:08

Close Print 0/1 Unread Clear

Back Exp... Open

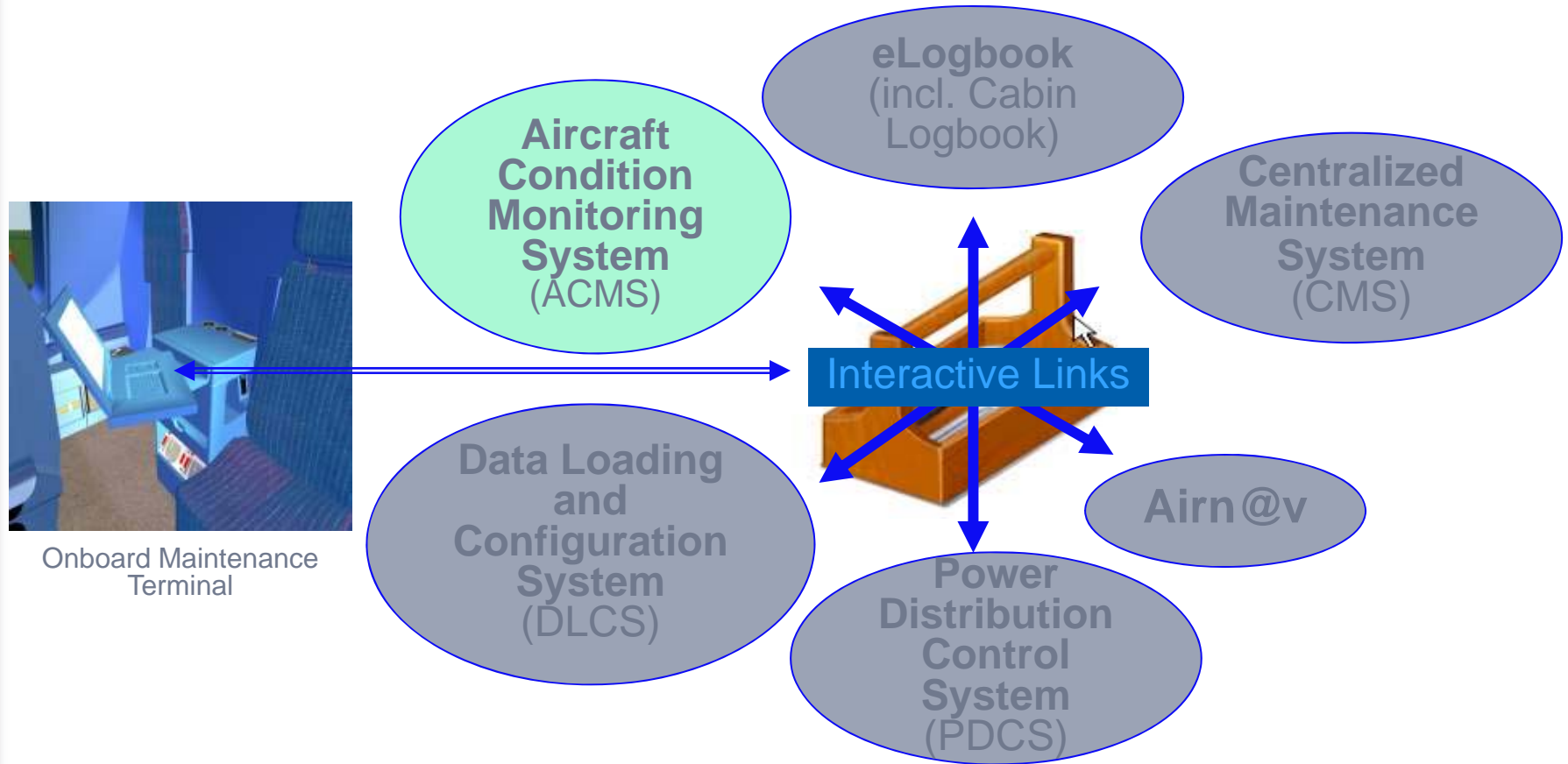
### Data Loading - Menu

~ Select a function ~

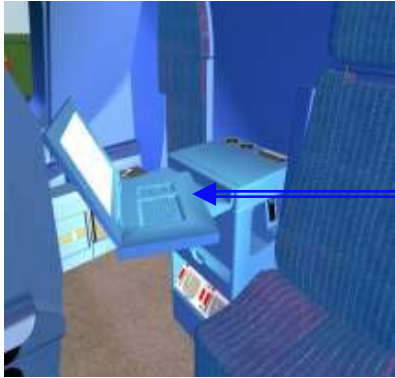
- Software upload
- Batch file upload
- NSS uninstall
- Download data

Repository Management Data Loading

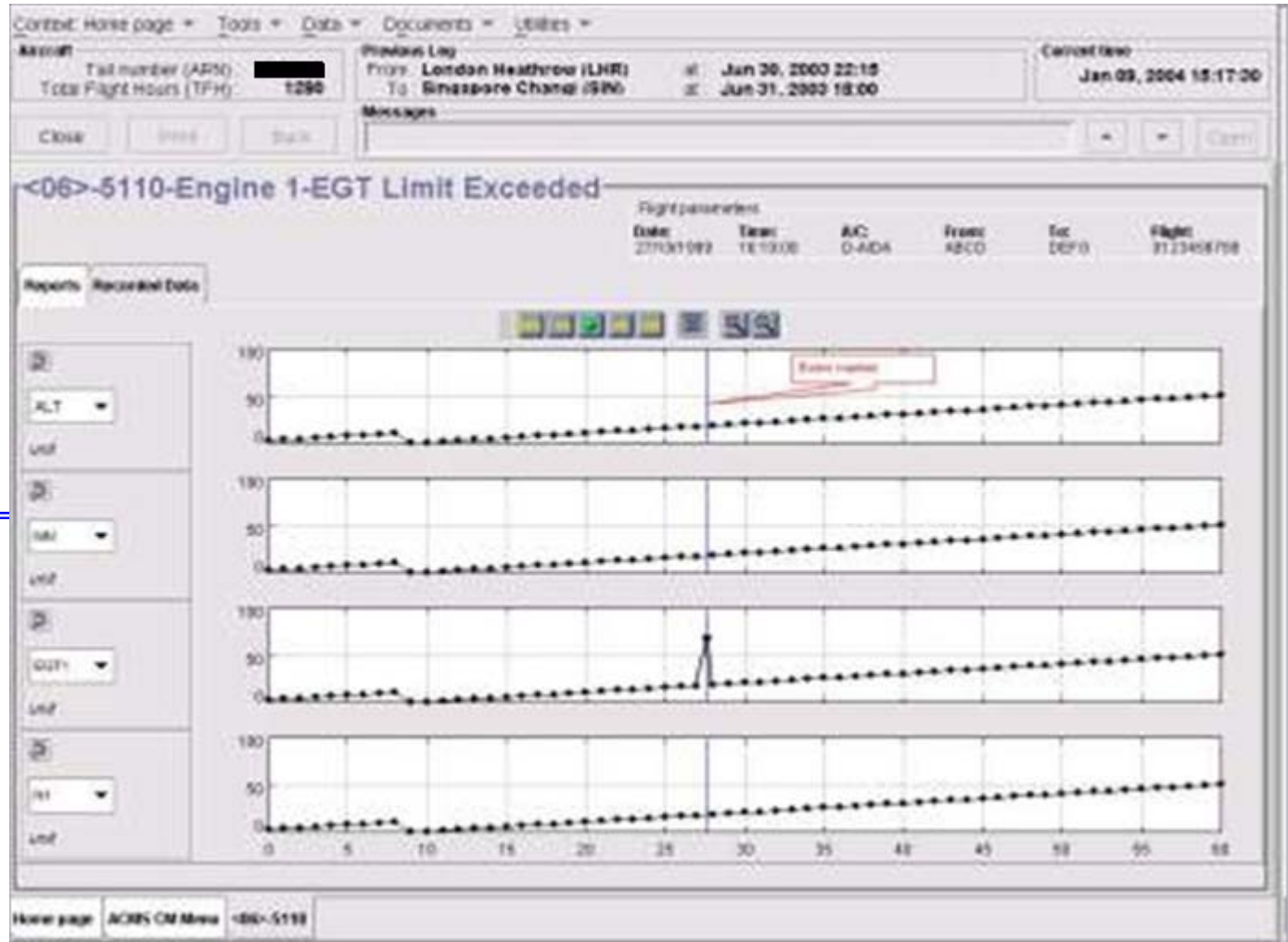
# Onboard Maintenance Tools (Software Applications)



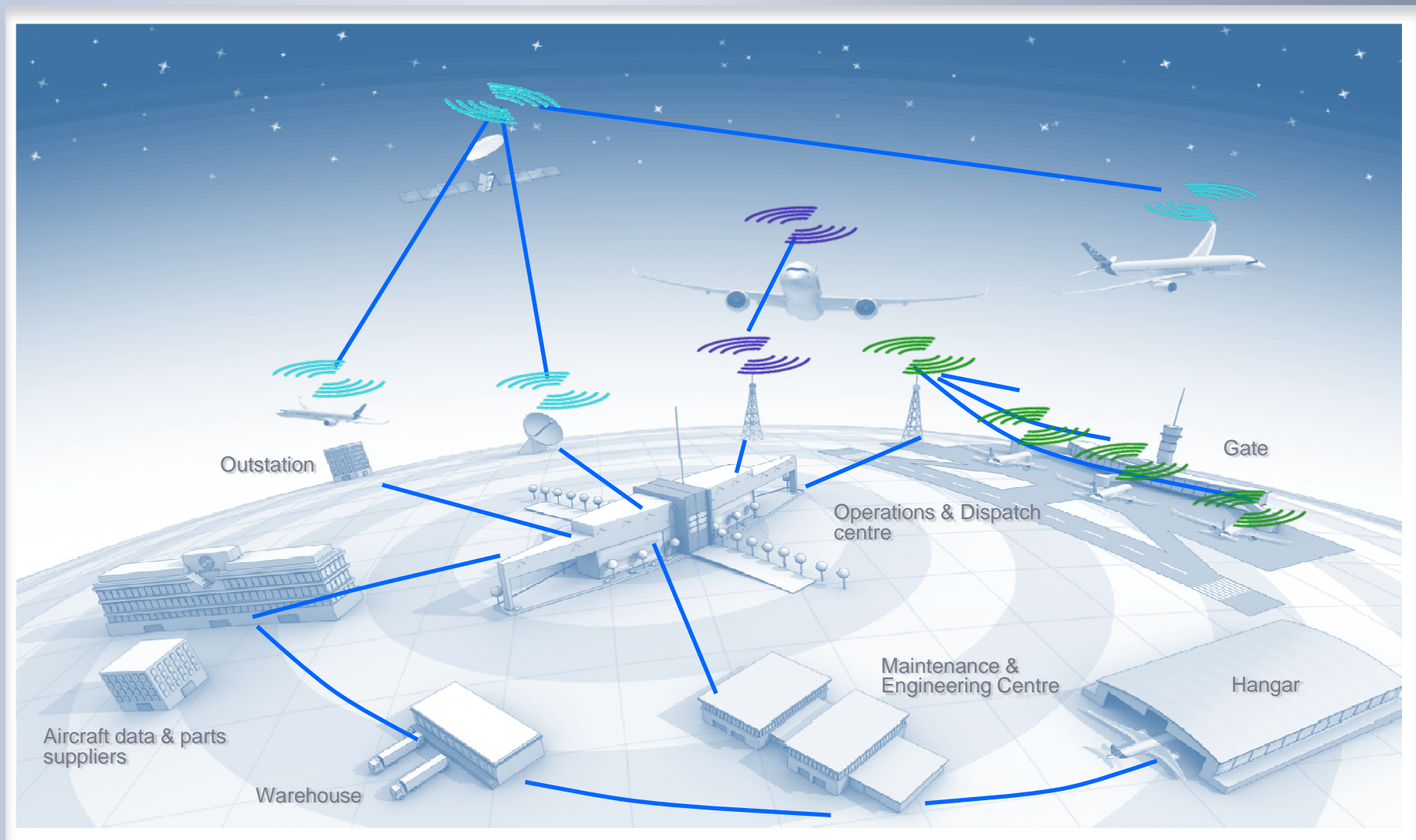
# Onboard Maintenance Tools (Software Applications)



Onboard Maintenance Terminal



# Connected Aircraft (already today)



# Connectivity for Maintenance



# Ground Maintenance Tools: Airman

Real-time  
fleet  
monitoring

Anticipates  
maintenance  
actions

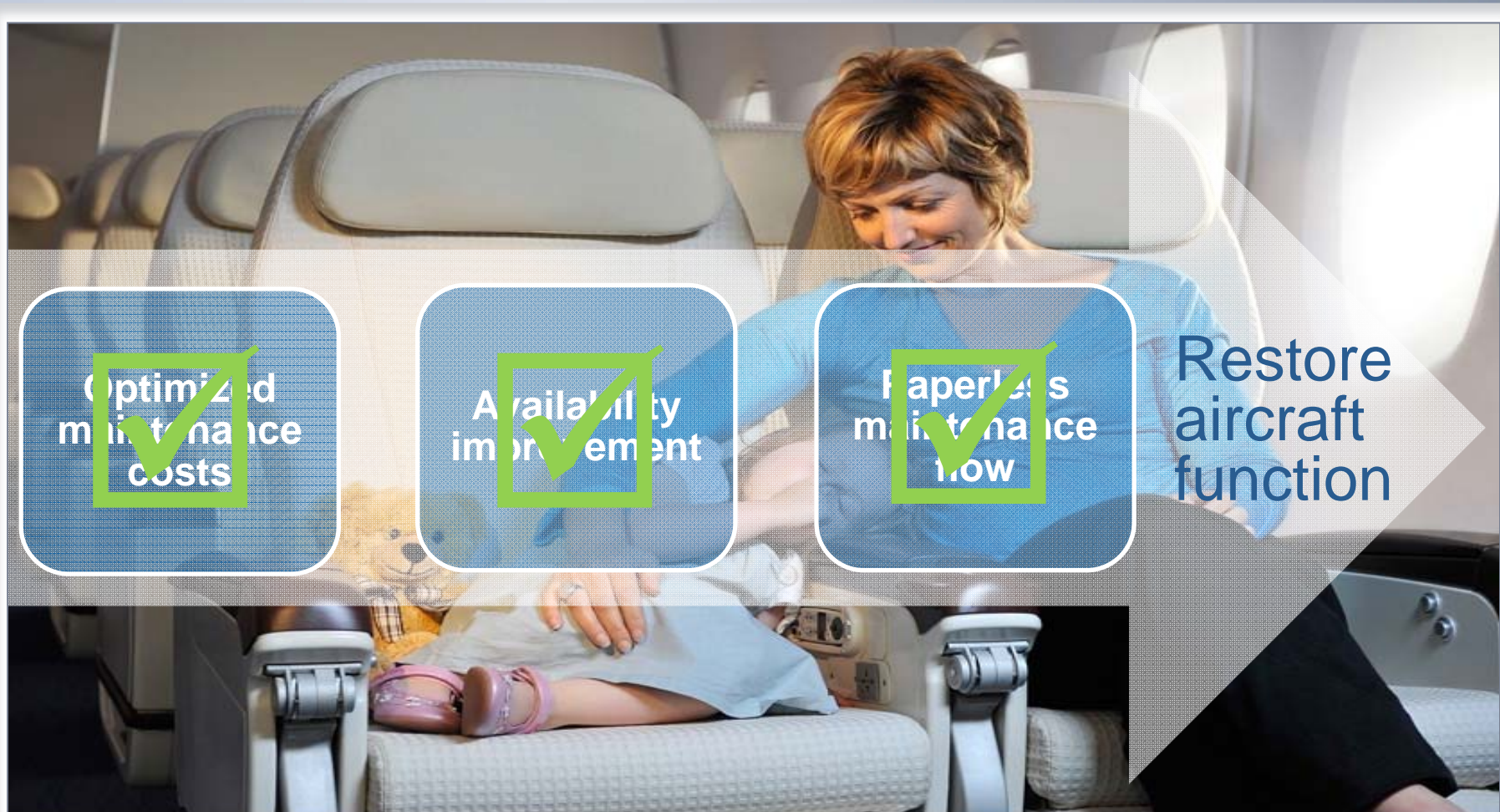
The screenshot displays the Airman software interface. At the top, there are navigation buttons and a menu bar with options like File, Flights, CMS, Logbook, ACPMS reports, Settings, Windows, and Help. Below the menu bar, there are flight data fields including Aircraft (FWW), From, Date (01.03.2010), UTC (1204), and an 'Enter a new Defect' button. The 'eLogbook Flight' section shows Flight Number (FWW), To (XXXX), Date (01.03.2010), and UTC (1230). The main interface has tabs for 'eLogbook', 'PFR', 'Work (0)', and 'ACMS (0)'. Below these tabs is a 'PFR Filter' field containing 'AEM30CMC0021000'. The 'Cockpit items' tab is selected, showing a table with columns for Nber, Context, Fault code, and Fault case description.

Nber	Context	Fault code	Fault case description
1/20	26 Feb 2010 12:39 Preflight	3290F797	Fault: SENSOR PRESS-RPSA,BUG LH WHEEL 14(22GV1) LGMS 2
2/20	01 Mar 2010 04:39 Preflight	4411W110	Warning: CAB COM CIDS CABIN COM FAULT
3/20	01 Mar 2010 05:30 Preflight	4411N111	Stop: UPPER DECK PA
4/20	01 Mar 2010 05:37 Preflight	4411F02x	Fault: DEU-TYPE A(2 22HR#5) CIDS
5/20	01 Mar 2010 05:37 Preflight	4411F02x	Fault: DEU-TYPE A(2 22HR#4) CIDS

Allows  
maintenance  
preparation

Follow-up  
of deferred  
faults

# Unscheduled Line Maintenance



Optimized  
maintenance  
costs

Availability  
improvement

Paperless  
maintenance  
flow

Restore  
aircraft  
function

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for your attention





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