The Management of Programmes at Airbus

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Introduction

Three main organisation blocks at Airbus:

Focus on customer deliverables through **Programmes**

- Set the tempo for the rest of the business
- “Pull” deliverables towards the FAL
- Responsible for Programmes Profit & Loss, Cash
- Lead transversal processes of Develop, Fulfil and Support

Local empowerment through **Centres of Excellence**

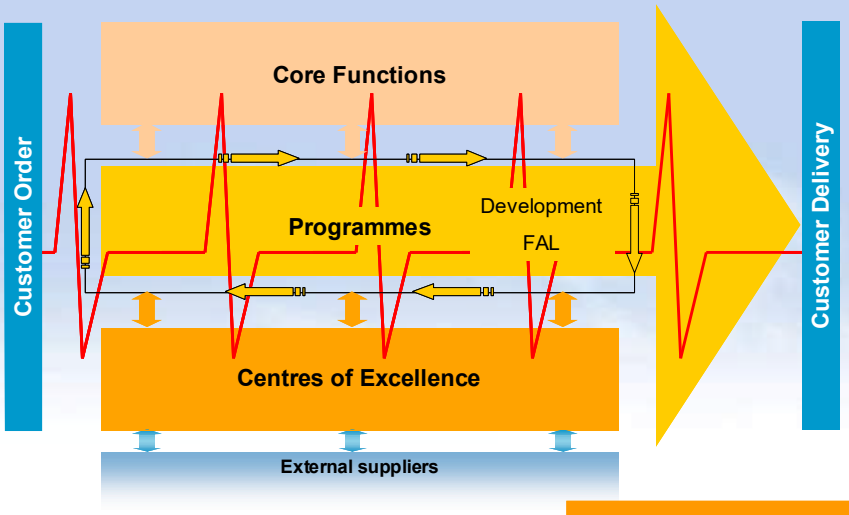
- Focus on section-level deliverables to the FAL
- Work in multi-functional communities
- Responsible for complete on-time, on-quality and on-cost delivery

Self-sustaining through **Core Functions**

- Manage Airbus’ overall competencies
- Drive the business through policies and guidelines
- Anticipate future trends
- Develop skills and resources
- Skills’ “Home Base”

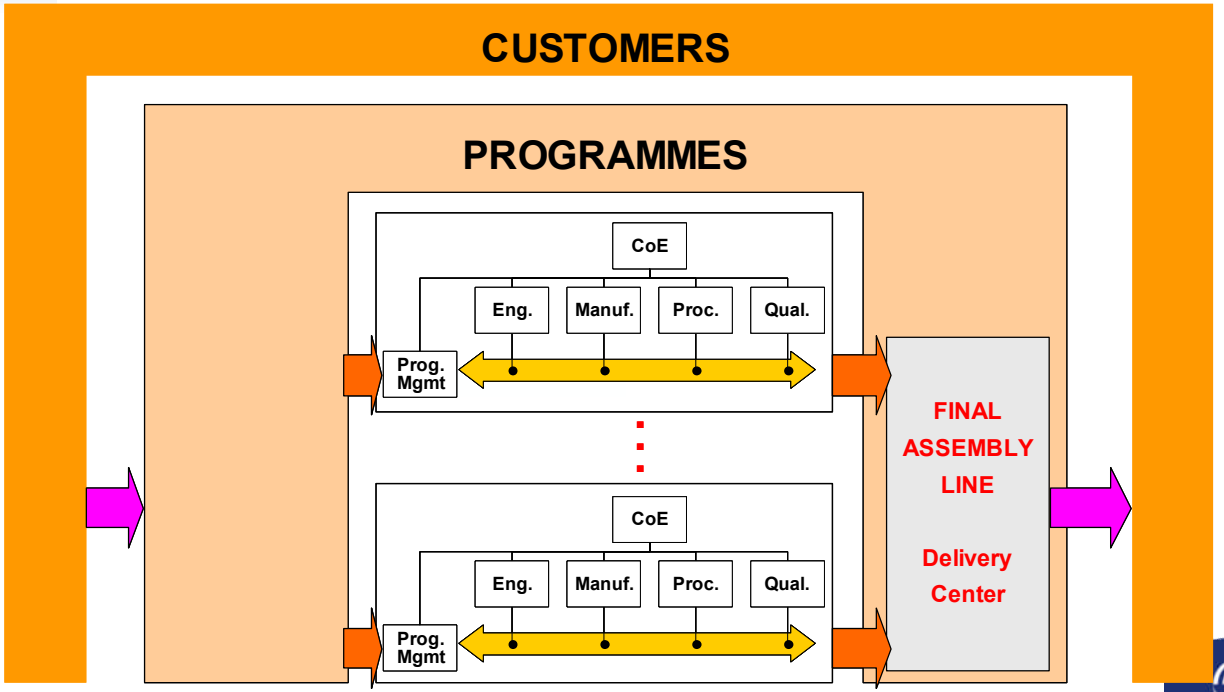
Continuous improvement and collective excellence to deliver value to the customer …

Introduction

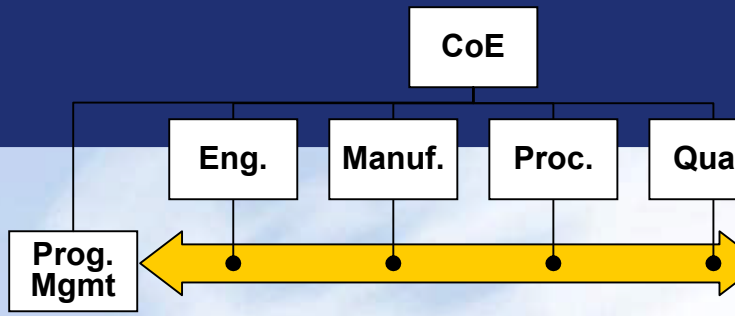


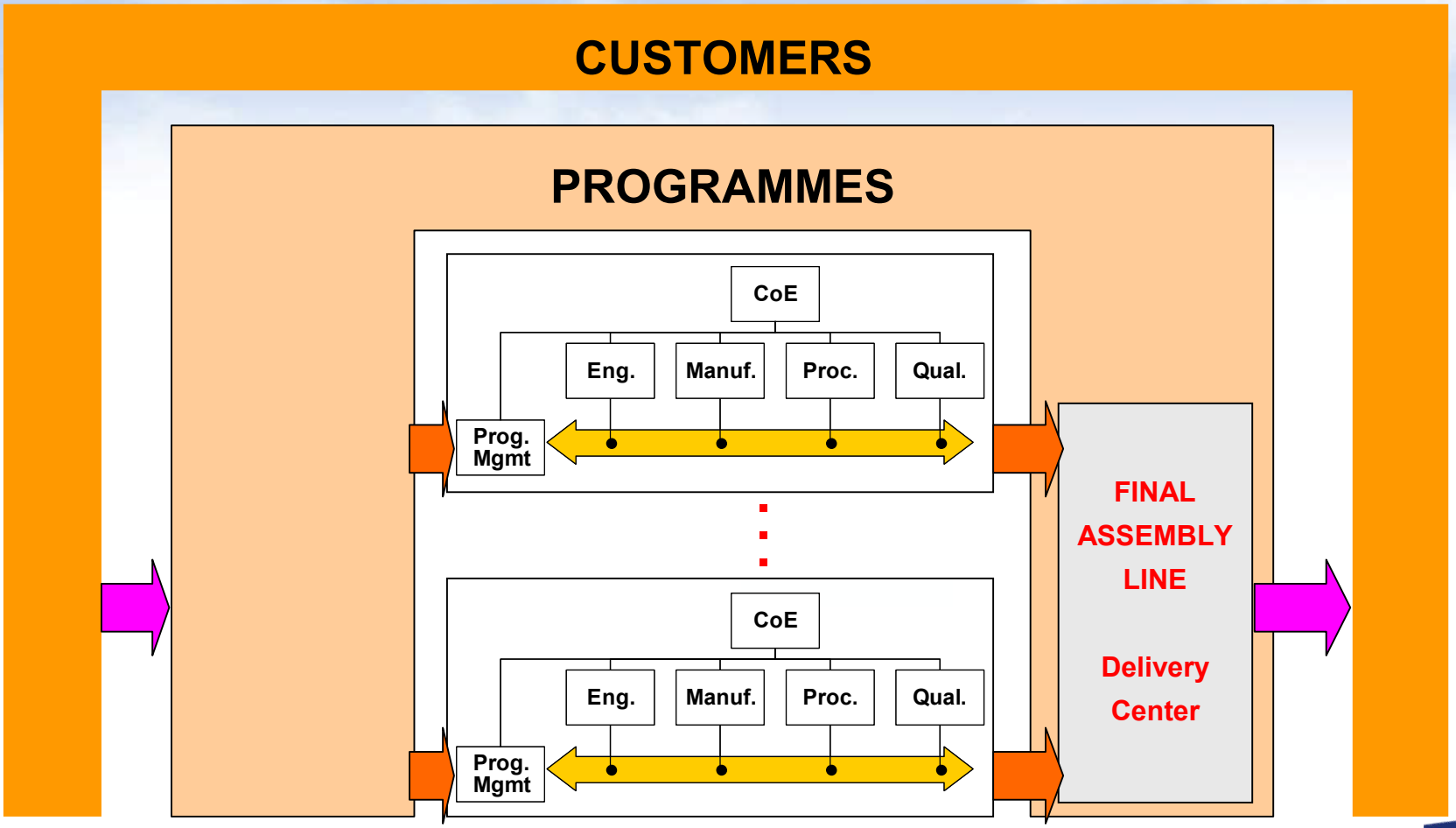
- Management of
  - Programme Integrated Planning (Drumbeat)
  - Configuration & Customer Definition
  - Aircraft Integration.

- FCO process
- Programme P&L's & cash drivers
- Chief Engineering
- Integrated FAL
- Product development
- Programme related risk management



Introduction





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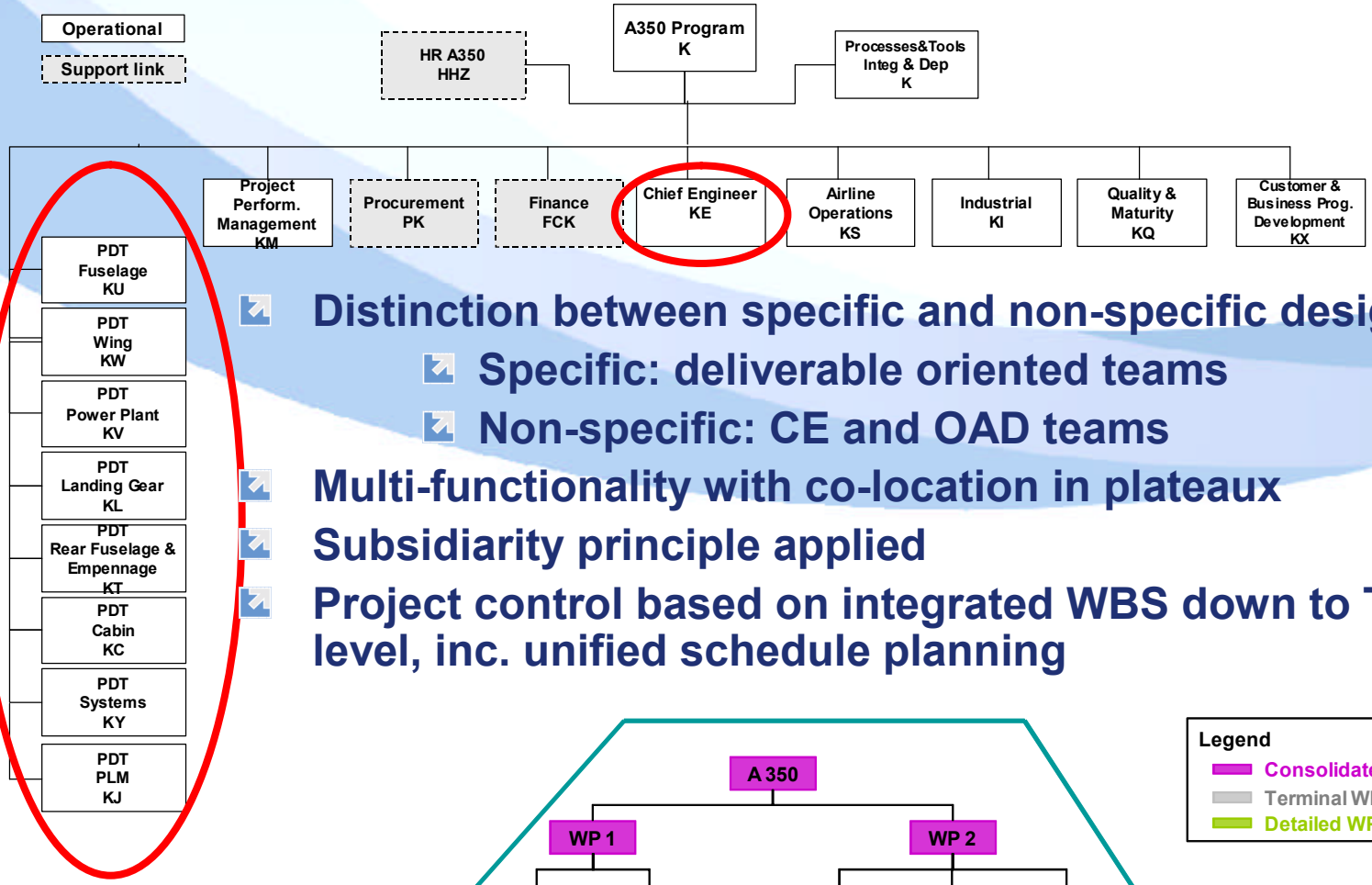
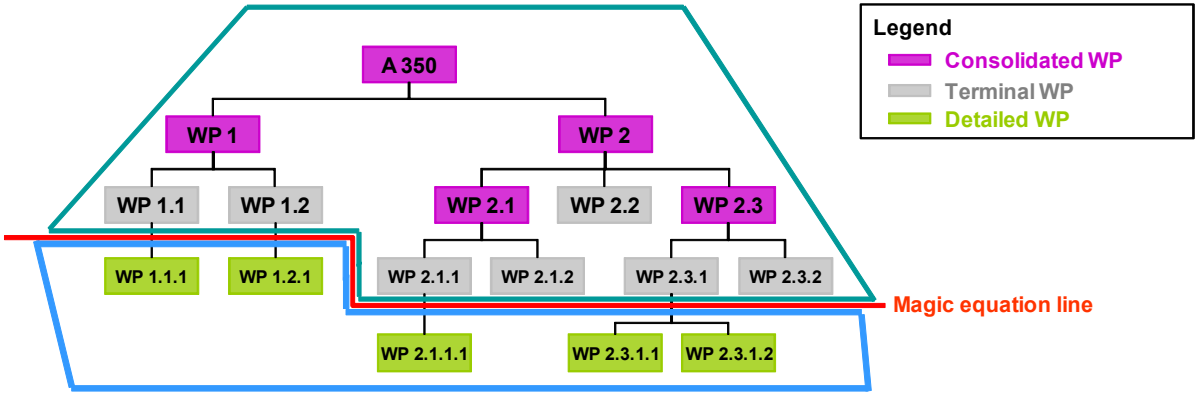
Principles for Managing Programmes (Dev. A/C)



- Distinction between specific and non-specific design work
  - Specific: deliverable oriented teams
  - Non-specific: CE and OAD teams
- Multi-functionality with co-location in plateaux
- Subsidiarity principle applied
- Project control based on integrated WBS down to Terminal WP level, inc. unified schedule planning



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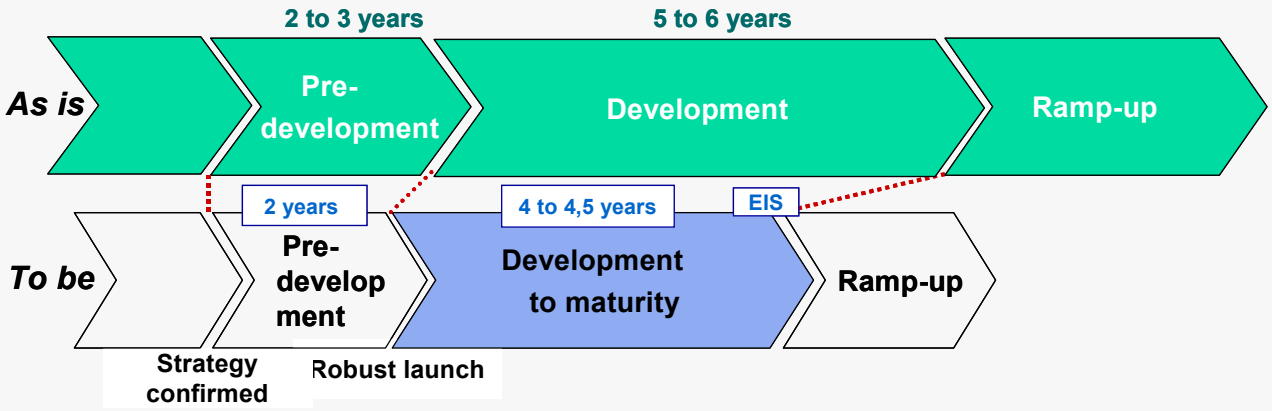
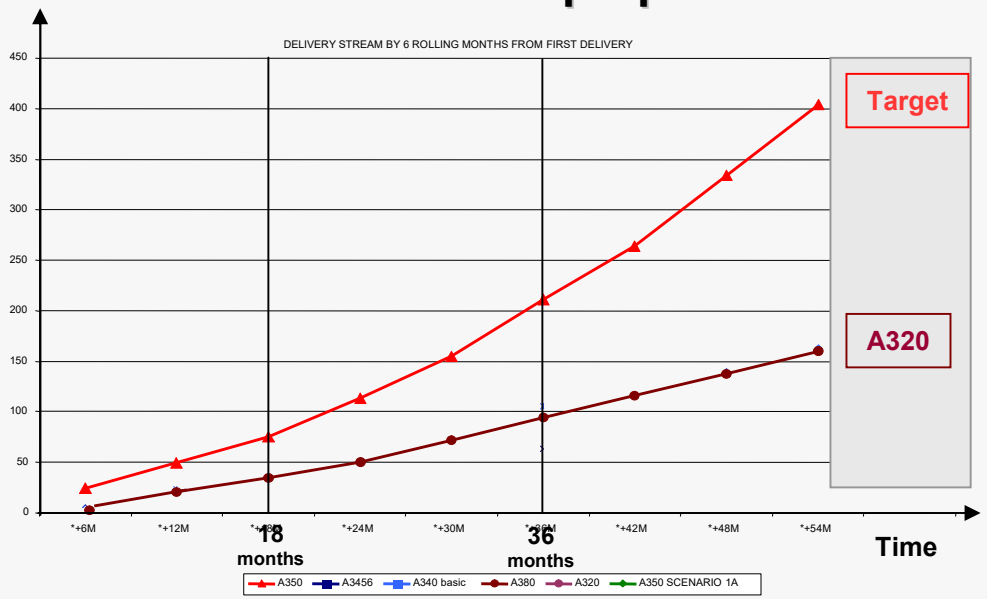
A350: A new logic for development through DARE

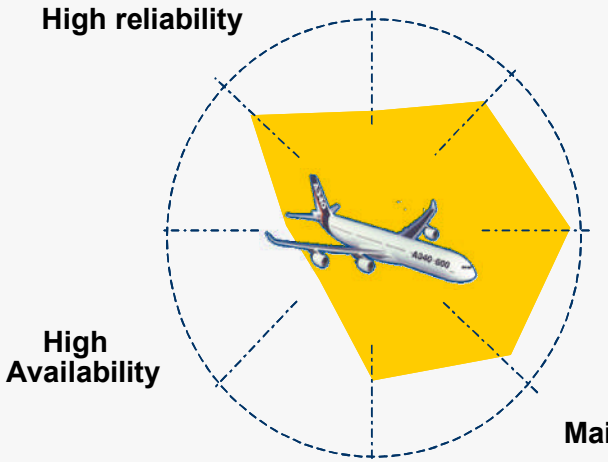
1. Benchmark lead time



2. Faster ramp-up



3. Maturity at Entry into service



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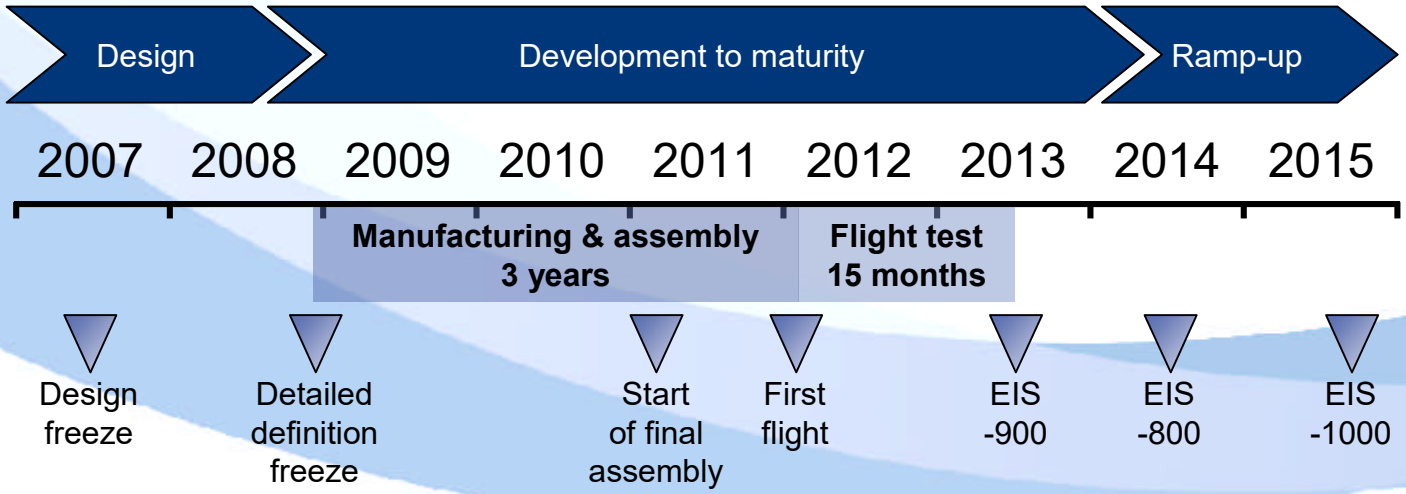
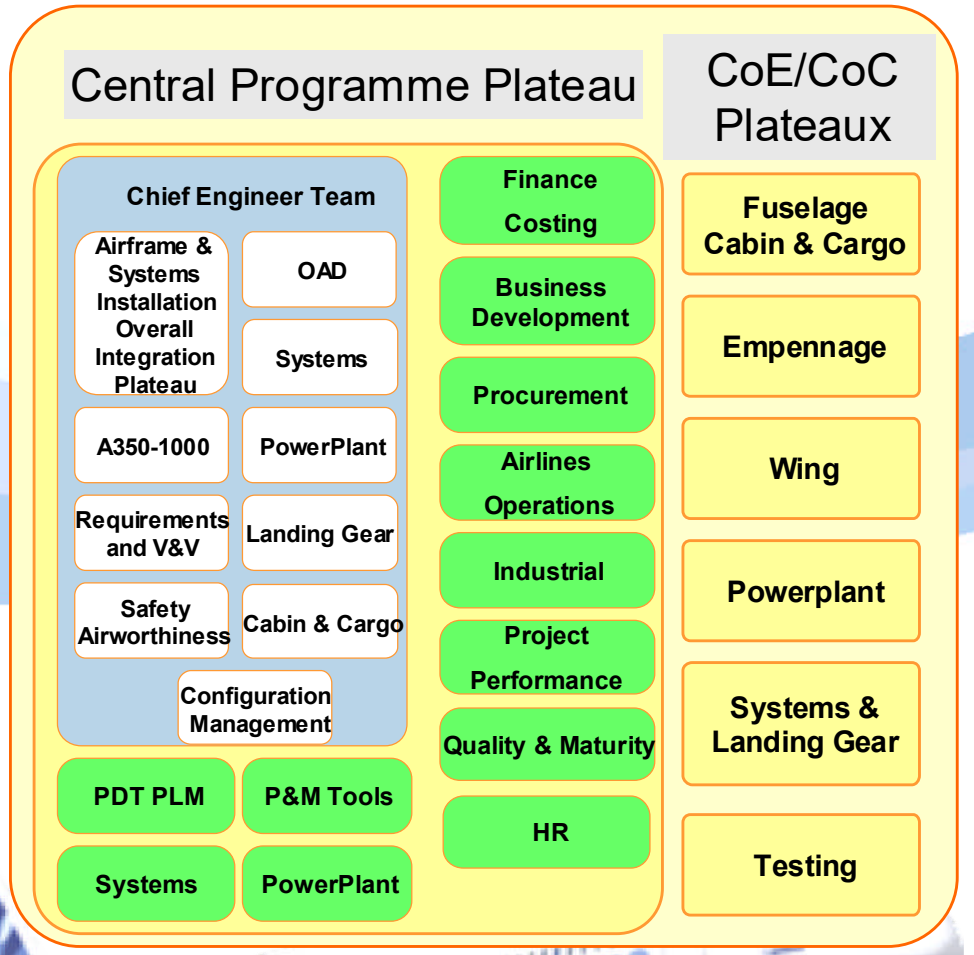
A350: XWB Development Master Schedule



- **Stronger management of milestones.**
- **Peer review.**
- **Close involvement of key suppliers (e.g. joint change management boards)**

A350: XWB Plateaux

- The Central Programme functions and support functions are co-located in Toulouse.
  This constitutes the A350XWB Central Programme Plateau.
- The management teams of the PLM PDT and Systems PDTs are also part of the Central Plateau.
- For detailed design activities:
  The activities related to sections and to the systems equipment are decentralized in CoC / CoE plateaux under their leadership.



A350: Extended Enterprise Policy

- Through the A350 Extended Enterprise, Airbus and its suppliers :
  - Follow the same development logic
  - use the same tools
  - Use the same methods & processes
  - exchange Electronic Data
  - run a common Change Process
  - develop a reinforced collaborative mindset

- A350 Extended Enterprise policy is a structured approach deployed across Airbus in an homogeneous way and a step towards a reinforced partnership

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A400M: Background

- Long lasting sales campaign dating from FLA.
- Launch date came out at the worst point for Airbus.
- Lack of non specific design activity in previous Airbus partners.
- Multi mission role leads to a complex set of requirements.
- Lack of experience in Airbus for High Wing, “T” tail, turbo prop aircraft and military qualification.
- Strong pressure from Nations to adopt the EPI engine as opposed to the cheaper and less risky Pratt and Whitney solution for the most powerful engine propeller combination ever developed.
- Fixed Price Contract (“Commercial Approach”) with unbalanced Risk taking.

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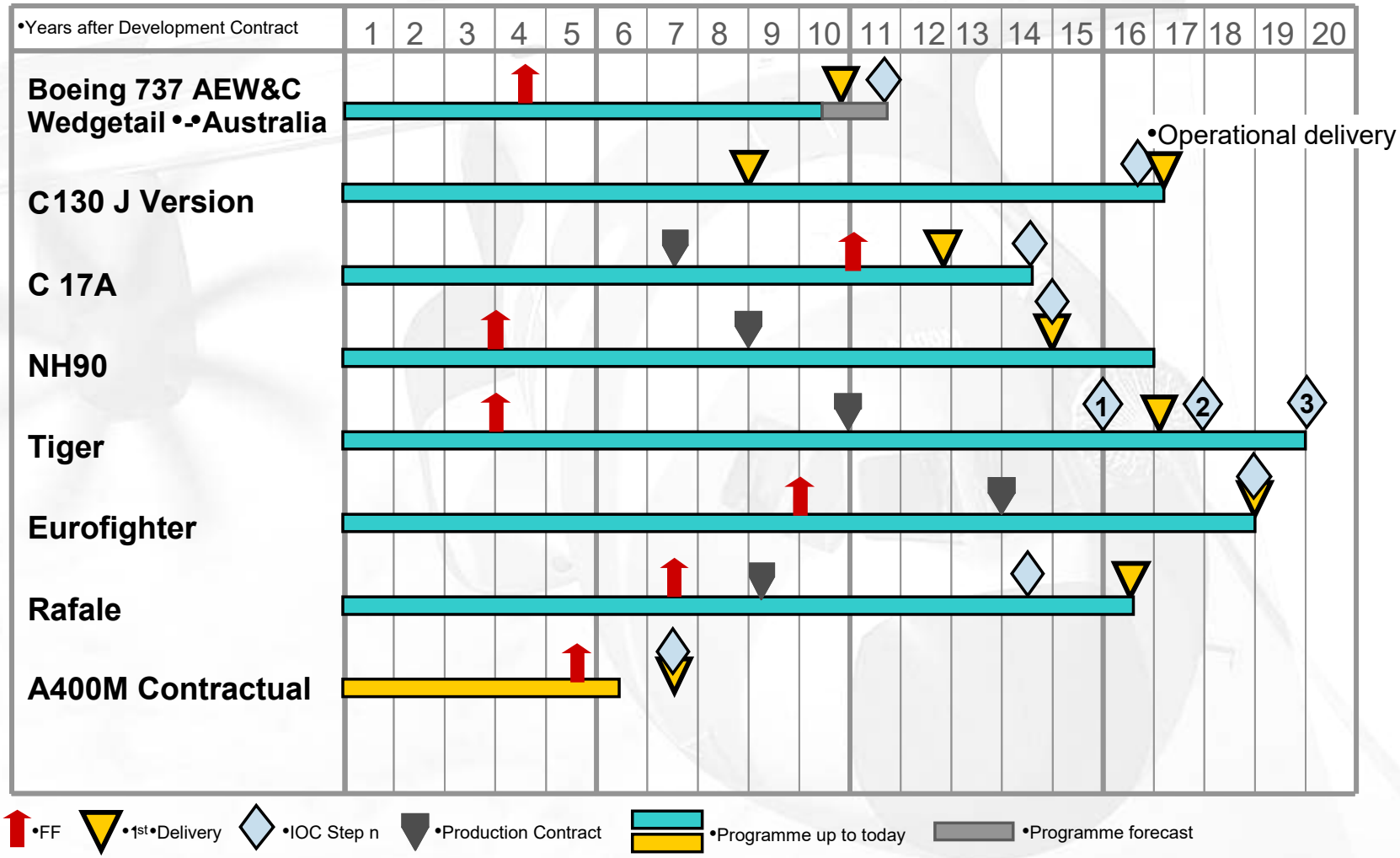
A400M: Military Programmes Comparison



A400M: Programme Execution

- Complex work share
- Still using the National Company based development teams.
- Better integration of design tools and Product Data Management (PDM).
- Significant early changes in aircraft configuration.
- Integrated Fuselage Assembly (IFA) represents a major stretch for the local team (a mini FAL), they were not sufficiently supported by the Airbus organisation.
- EPI not organised as a proper programme management organisation, causing long delay on hardware and control software delivery and hence postponing the first flight and the flight test programme.

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A400M: Key Challenges for 2009

- Recover the engine hardware and control software delays.
- Achieve first flight.
- Manage the suppliers on the critical systems to re-establish the schedule.
- Manage the improvement of internal Airbus Programme re-organisation and governance system, including the integration of MTAD
- Conclude the negotiation with customers for contract adjustments on schedule, technical specification and finance.
- 4 prototype aircraft in the Final Assembly Line

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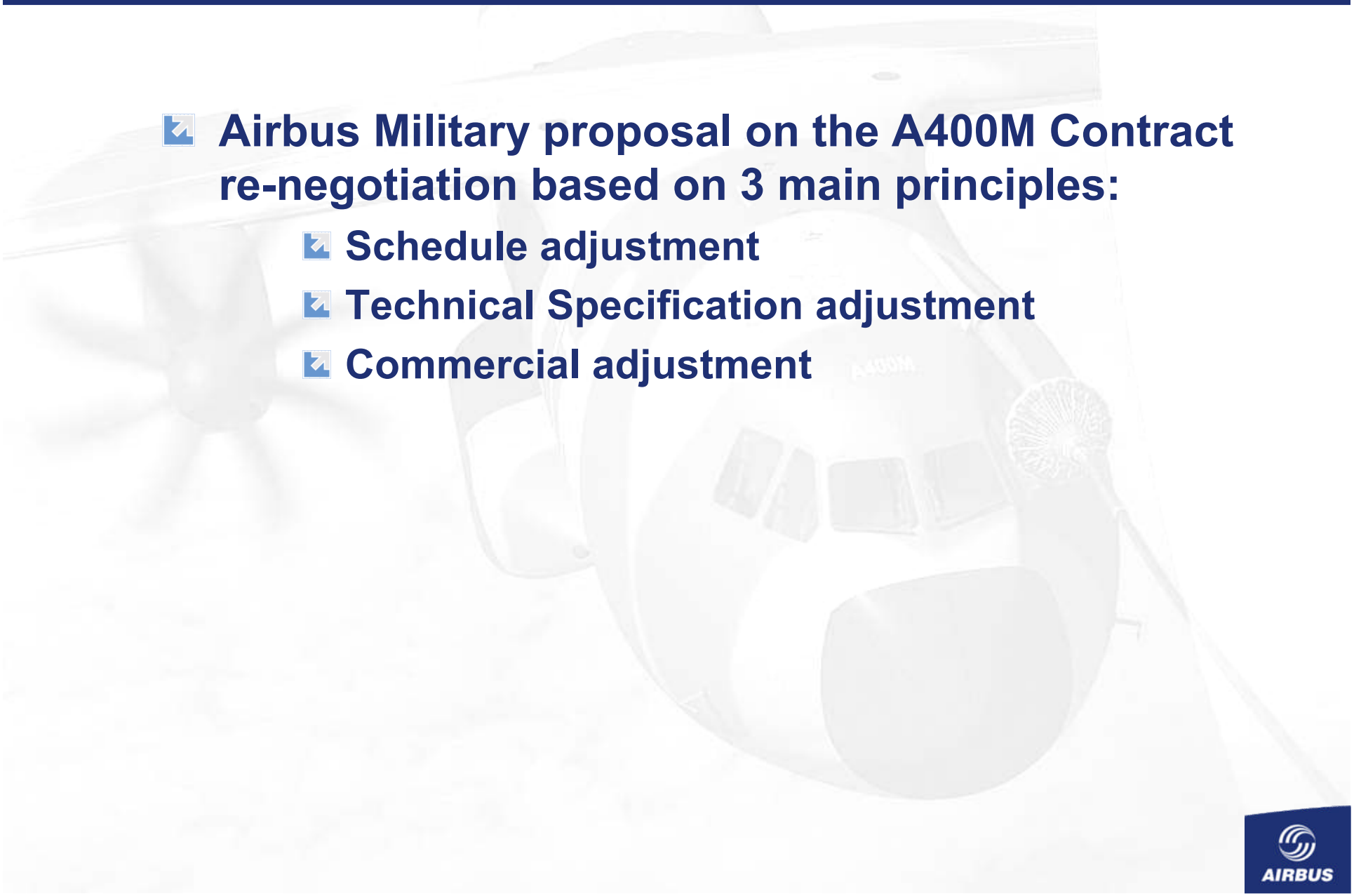
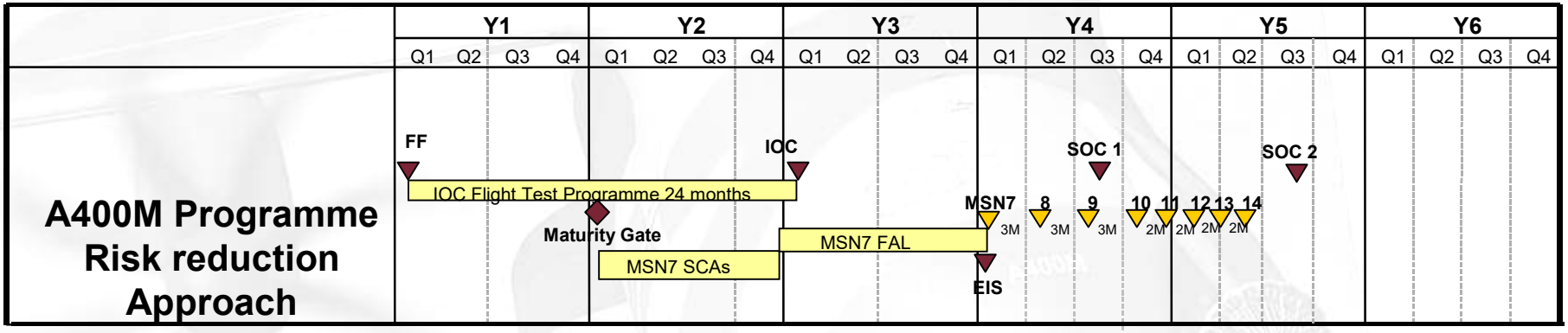
A400M: Contractual Re-negotiation

- Airbus Military proposal on the A400M Contract re-negotiation based on 3 main principles:
  - Schedule adjustment
  - Technical Specification adjustment
  - Commercial adjustment



A400M: Programme with Risk Reduction Approach



- based on the time Zero approach

A400M: Supporting Actions

- Highest level of programme commitment from EADS.
- New programme organisation in EPI - Better programme commitment and engagement after EADS Audit with EPI.
- New Airbus Military organisation, integrating MTAD
- Stronger support at Powerplant management through the Airbus CoC (Centre of Competence) Powerplant
- High level focus through weekly reviews with CEO.

A400M: Powerplant Development Status

- Engine Test Programme – flight clearance target mid 2009
- Flying Test Bed – 50 FH target Q2 2009
- Improved Engine Hardware delivery to MSN001 – Q2 2009
- MSN001 Static engine ground run – Q3 2009
- FADEC Software – the Critical path for MSN001 first flight
  - Flight clearance by EPI expected early Q3 2009
  - Airbus system integration test with FADEC early Q4 2009
  - MSN001 flight clearance acceptance by EASA Q4 2009
- Final date for first flight to be confirmed.

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A400M: Operational Capabilities

- **Not withstanding the immediate challenges ahead the A400M will meet the demanding requirements of both operational and humanitarian missions because:**
  - **A400M provides true Logistic (Inter-Theatre) Airlift:**
    - → **High Cruise Speed, Long Range, Outsize Load Capacity**
  - **A400M is a better Tactical Airlifter than current fleets:**
    - → **Greater Manouvrability…Softer Field Capability…Better Self-Protection**
  - **A400M has a built-in Air-to-Air Refuelling capability**
    - → **Fast / high enough for fast-jets…plus slow / low enough for helicopters**

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Principles for Managing Programmes (Series A/C)

- Management of Programme Integrated Planning, Configuration & Customer Definition and Aircraft Integration.
- Accountability for the overall industrial process of the A320 Family Programme
  - balancing the internal and external production capabilities with the market demand;
  - propose adjustment of the industrial capabilities if necessary; and
  - drumbeat the whole industrial system to achieve on-time delivery of the aircraft in the right configuration.
- Life-Cycle Management:
  - Continuous upgrade to secure competitiveness
  - Business development around existing product
  - Eventual closure

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Principles for Managing Programmes (Series A/C)

- Ensure Airbus' competitiveness and accountable for
  - the business plans agreed with CoEs, CoCs and Procurement;
  - the development and implementation of Programme Policies; and
  - acting as the sole Programme interface towards the Customer.

- Accountability for the POA (aircraft configuration and customization) and the Risk Management for the Programme by delegation from the Programme Director.

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A380: Production Status

- 35 customer aircraft are assembled.
- 15 aircraft have been delivered:
- 7 for Singapore Airlines (SIA)
- 5 for Emirates Airlines (UAE)
- 3 for Qantas Airlines (QFA)
- 8 aircraft are in various stages for cabin furnishing/painting in Hamburg,
- 12 are in the Final Assembly Line (FAL) process in Toulouse.
- Two new customers, Air France and Lufthansa will start their service with A380 aircraft by end of 2009 and beginning of 2010

A380 Production Ramp-up is under way

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A380: Maturity

- Customers have high expectations.
- All new high technology aircraft.
- 22.000 coded pieces of equipment.
- Small fleets with very high levels of utilisation.
- High level of focus within Airbus.
- Close co-operation with customers.
- Major “meet and greet” activity at key airports.

A380: Some lessons learned

- Development and certification more or less on time (6 months late)
- Stumbling point was “Customisation”
  - Too rich specifications
  - Too many special choices for customers
  - Different design and PDM tools across Airbus entities
- Lack of skills and experience

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A330/A340: Superior Wide-Body Aircraft

- 138 A330/A340 A/C Net orders in 2008 leading to a backlog of more than 450 A/C, representing more than 5 years production
- 85 A330/A340 A/C delivered in 2008 :
  - with 91% On time Delivery and 94% Customer satisfaction
- Production rate: capped at 8.5 A/C per month and being reviewed according to the market demand
- Milestones in 2009:
  - 100th operator and 1,000th delivery
- Major developments:
  - A330-200 Freighter
  - Multi Role Tanker

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A320: A Mature Programme full of Innovation

- Over 3700 A/C in operation – very large, growing fleet!
- 472 A320 family A/C Net orders in 2008 leading to a backlog of more than 2598 A/C, representing more than 6 years production
- 386 A320 family A/C delivered in 2008 :
  - with 93% On time Delivery and 93% Customer satisfaction
- Production rate : currently at 36 A/C and from Oct 09 (St 40) at 34 A/C per month and being reviewed according to the market demand
- Milestones in 2009 :
  - 500th delivery of A321 in February
  - 1st delivery of an A/C produced in FAL China in June
  - 4000th delivery of A320 family in August
- Major developments:
  - Extended Service Goal
  - 78t MOTW certification
  - Adapted Winglets for more fuel saving

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A320: A Mature Programme full of Innovation

- Extended Service Goal
  - Approval of first life-extension step (ESG 1) due in Oct. 2010.
  - Second step, extending beyond by up to another 50%, aimed at Oct. 2012.
  - Structure fatigue tests have reached 75% of ESG 1 and going strong.
  - Systems justification is ongoing.
- IAE Select One and CFM Tech Insertion engines successfully introduced into service.
- Electronic Flight Bag class 2 to be certified in 2010.
- A318 certified for operations at London City Airport.
- Testing for operations at –54 deg C in preparation.
- MTOW (Max Take-off Weight) increased to 78t – almost 20 % increase on original MTOW!
- Winglets
  - Wing tip designs are under investigation to innovatively improve drag performance.
- Aerodynamic improvements in Naca inlet in operation.
- Aerodynamic improvements on pylon and belly fairing in development.
- Continuous weight reduction development in progress.

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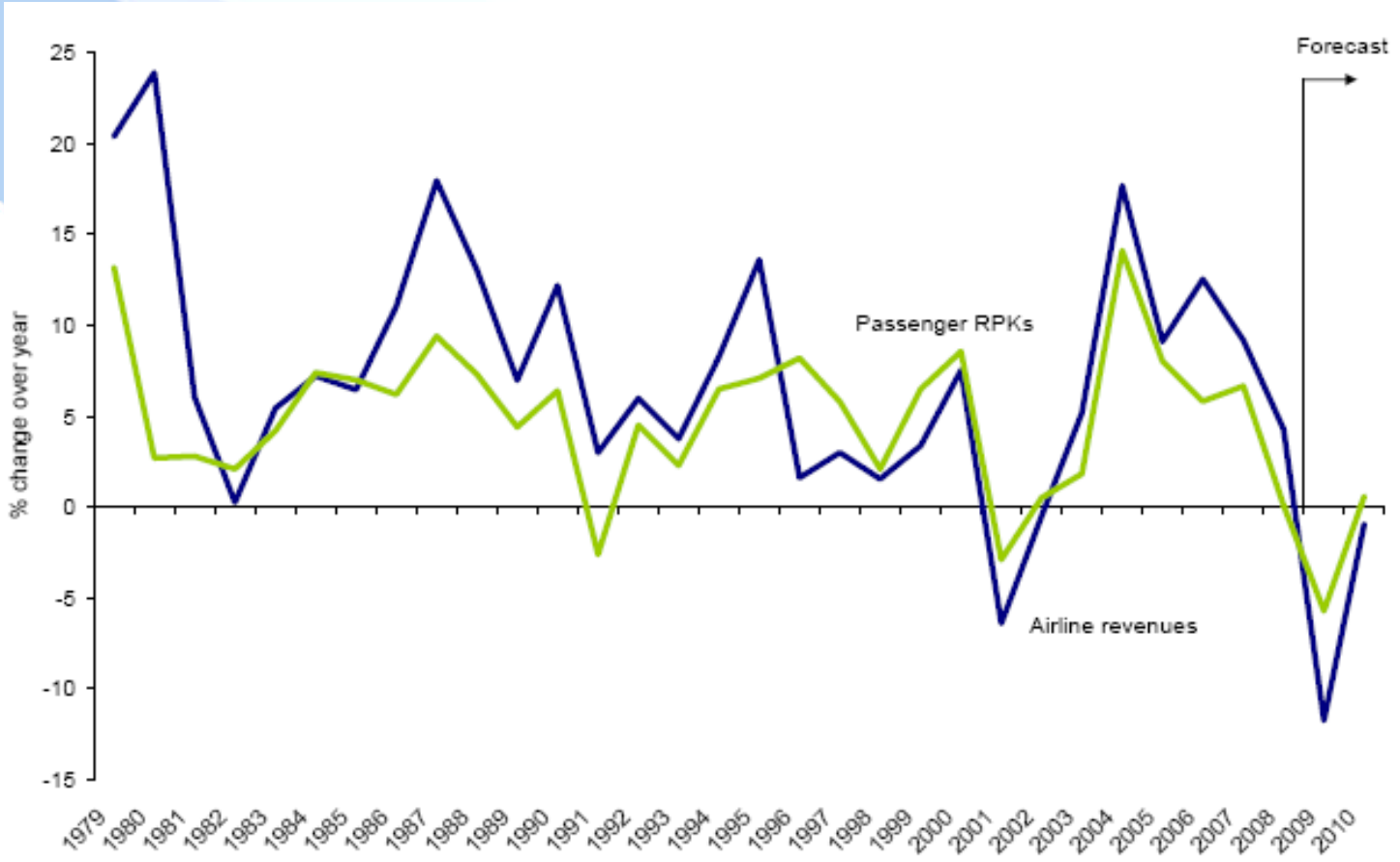
How do we deal with Market Change?

International passenger traffic:



Source:
ICAO,
IATA

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How do we deal with Market Change?

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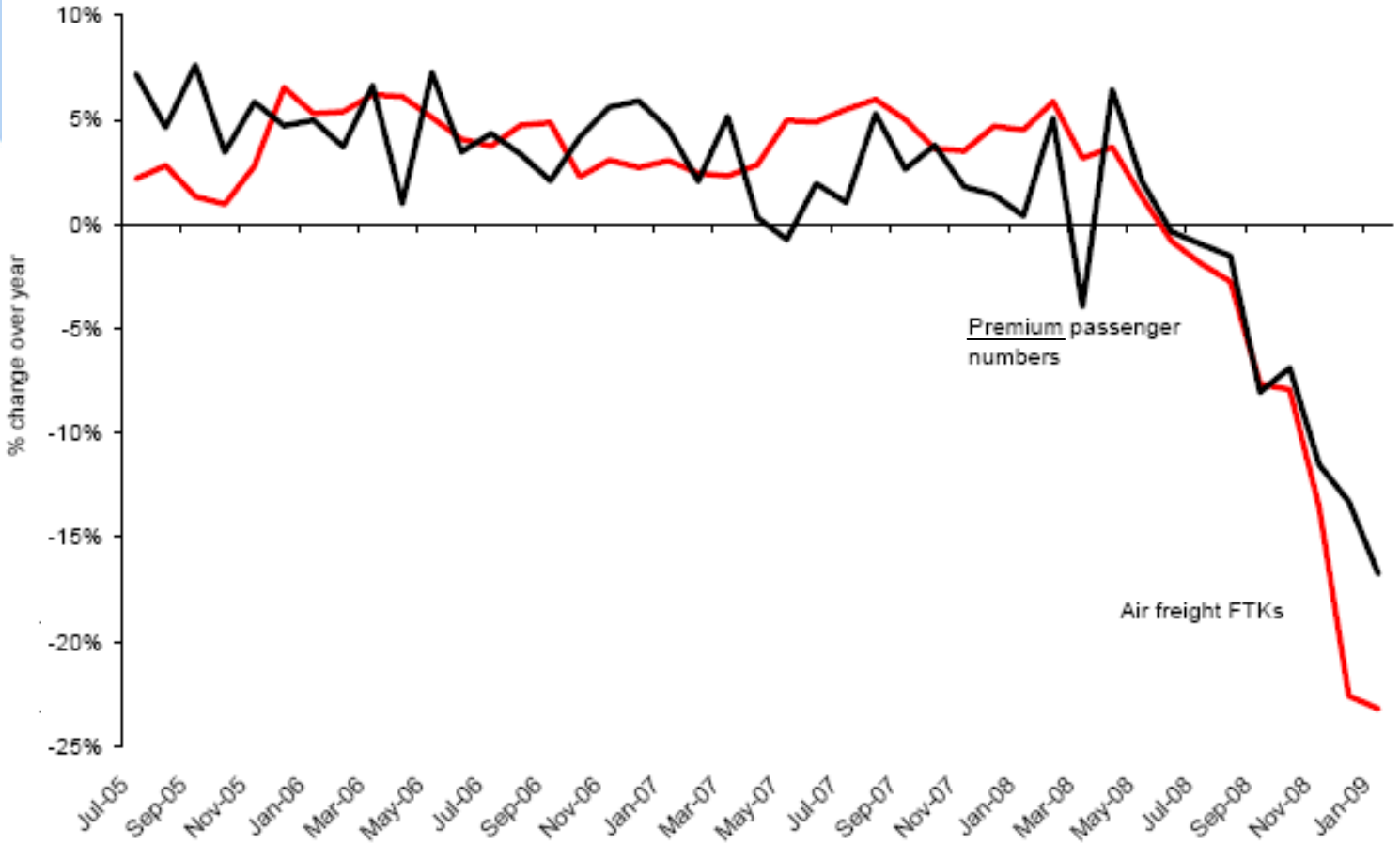

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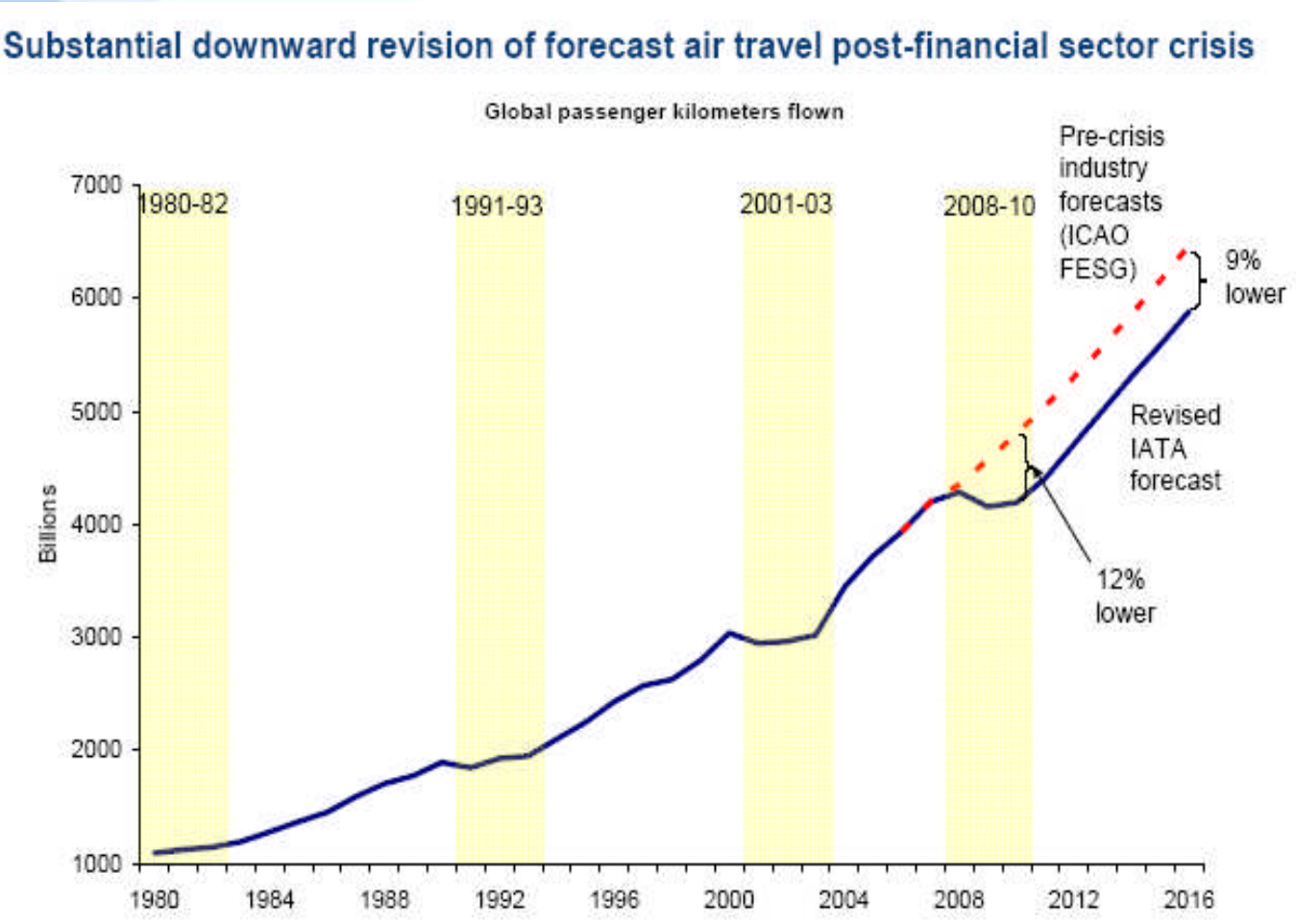

Source: ICAO, IATA

How do we deal with Market Change?

- Airbus five-fold strategy:

  1) Backlog Management
  2) Flexibility
  3) Flexibility Monitoring
  4) Continuous Improvement
  5) Supply Chain Management

- … leading to sound production rate decisions

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How do we deal with Market Change?

1. **Backlog Management:**
   - Weekly meetings inc. Programmes, Commercial, FAL, Delivery, Finance
   - Airline Screening, using the „watchtower“ + additional information
   - Special Focus:
     - PDP status, BFE status, critical Long Lead Time options, deferral/ advancement request, financing status, economical outlook
   - Agree on late allocation to increase flexibility/reactivity
   - Use advancement/ postponement/ type change requests from airlines to manage the overbooking and balance risks & opportunities
   - Measures in case of short term (<7m) customer risk/ failure:
     - Airbus Financing Support, Rapid Reallocation.

A/L risk assessment process established to mitigate current risk arising from economical crisis.

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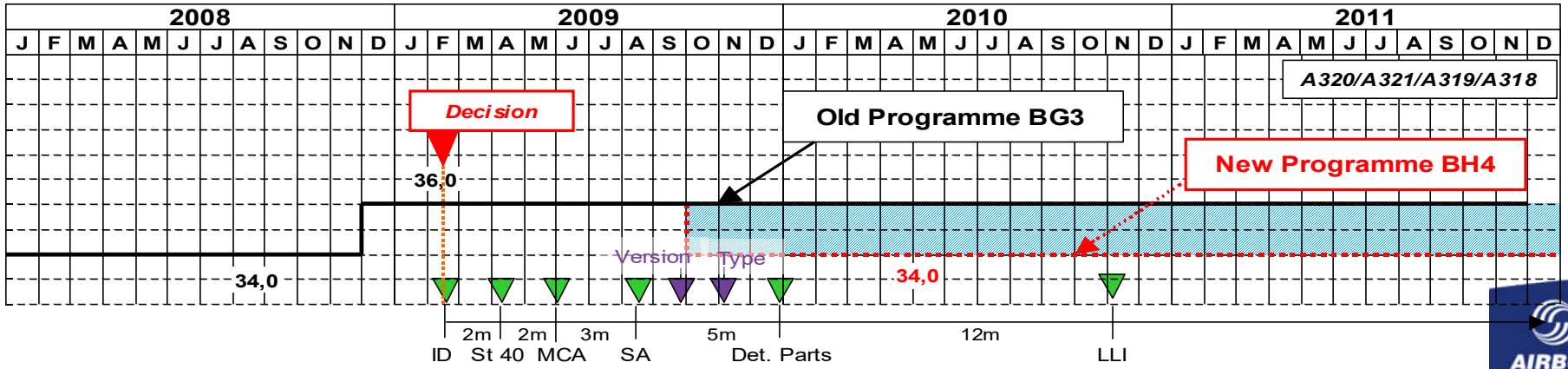
How do we deal with Market Change?

1) Backlog Management (cont'd):

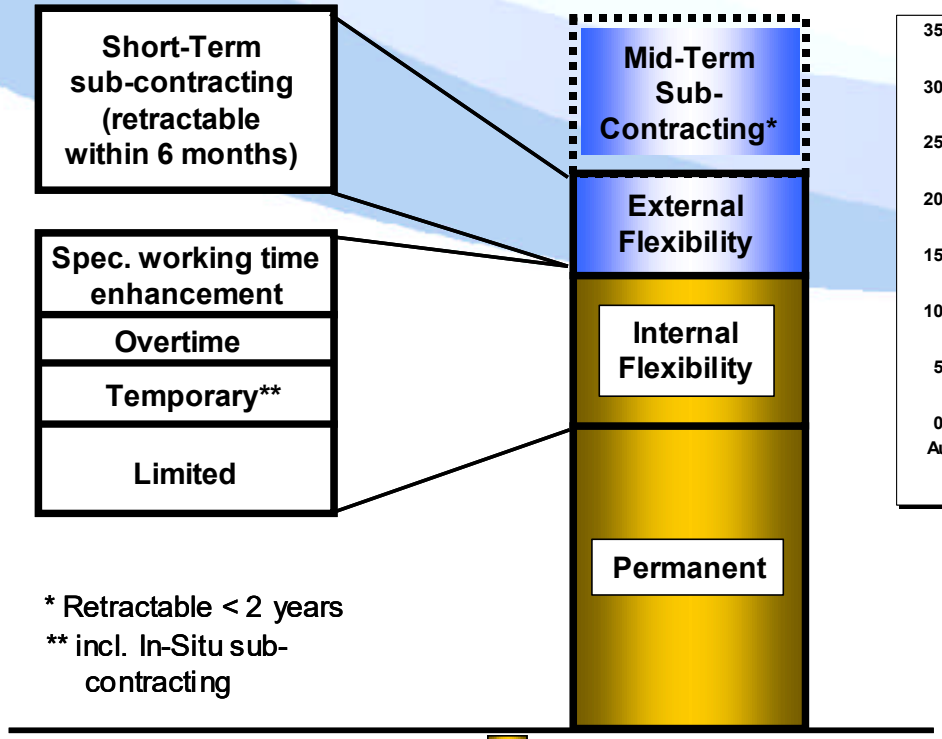
- Production output (quantitative and qualitative) is determined by
  - Provisioning of raw material
  - Availability of Long Lead Items
  - CapEx in CoEs and FAL
  - Hiring / training of staff
  - Aircraft type choice A318...321
  - Customization lead-times
- Typical lead-time for ramp-up is up to ~2 years with investment required, for ramp-down ~ 9 months

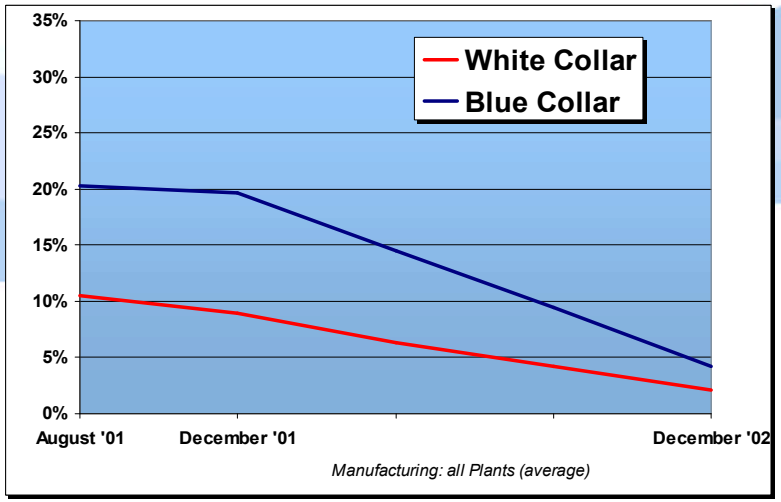


How do we deal with Market Change?

2) Flexibility:

- There is sufficient built-in flexibility in Airbus Production System, which can be released quickly





Note:
Average figures, levels of Flexibility varying by production site

How do we deal with Market Change?

3) Flexibility Monitoring:

- Installed flexibility in Plants / FALs largely driven by Overtime, Temporaries, On-Site Subcontracting, Tactical Subcontracting for both Blue & White Collars
- Full review of current flexibility by Plants / FALs performed in Q1 2009 to be prepared for any additional production rates reduction
- Current Plants / FALs operational flexibility will be reviewed every quarter to decide if additional measures need to be implemented depending on Series Programmes production rates decisions
- Additional flexibility could be exercised through attrition & additional measures if necessary
- Very limited hiring on Blue Collars focused on key competences to reduce exposure to Market deterioration
- A350XWB industrial ramp-up from 2011 onwards will compensate potential reduction of Series Programmes through redeployment of Blue & White Collars

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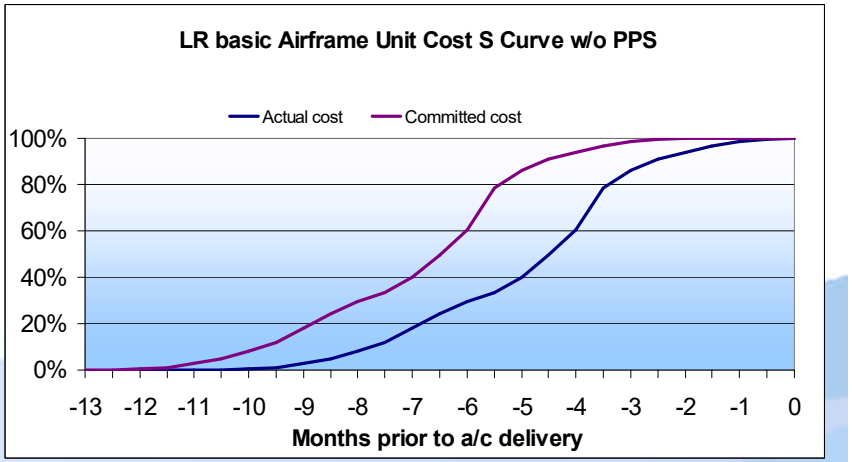
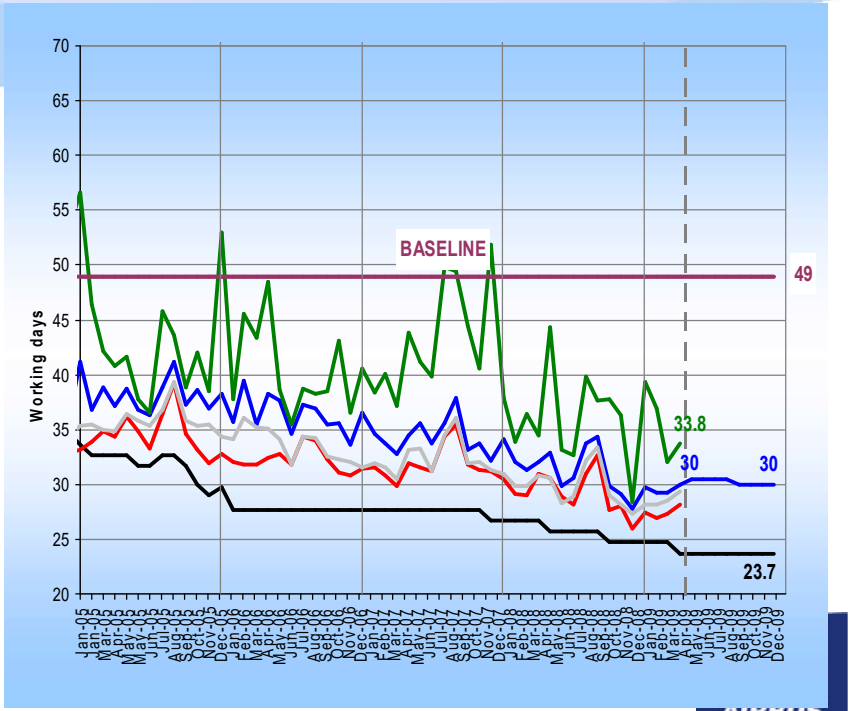
How do we deal with Market Change?

4) Continuous Improvement:

- **Improvement in supplier delivery and quality**
  - → pre-requisite for successful Lean implementation
- **Deployment of Lean Manufacturing:**
  - Reduction of production lead times
    → improved responsiveness;
  - Reduction of production costs
    → margins can be kept despite lower production rates
- **Aerostructure and Systems "re-design to cost"**
  - → higher commonality among parts





How do we deal with Market Change?

5) Supply Chain Management:

- The ramp up part of the cycle was carefully managed to reduce over capacity.
- We have a clear understanding of our 'core' and 'non core' activities.
- We have 'tactically' sub contracted our excess loads during the ramp up.
- Careful monitoring of our suppliers 'financial health'.
- Protect our ability for future ramp up.

	2009					2010					2011				
	Aerostruct. PA	Materials PM	Cabin PR	Equip. PC	Propulsion PV	Aerostruct. PA	Materials PM	Cabin PR	Equip. PC	Propulsion PV	Aerostruct. PA	Materials PM	Cabin PR	Equip. PC	Propulsion PV
SA	R36 (till Sep)					R34					R34				
B															
R	1		2			2									
Total	380	1201	248	250	3	380	1201	248	250	4	380	1201	248	250	4

Key **B** : Supplier not able to meet programme rate, no solution yet
R : Supplier could meet programme but has not committed to a plan or there is no confidence in the plan submitted
A : Procurement validated plan **G** : No significant risks **Total**: Number of first tier suppliers (PA, PR, PC, PV) & all PM suppliers

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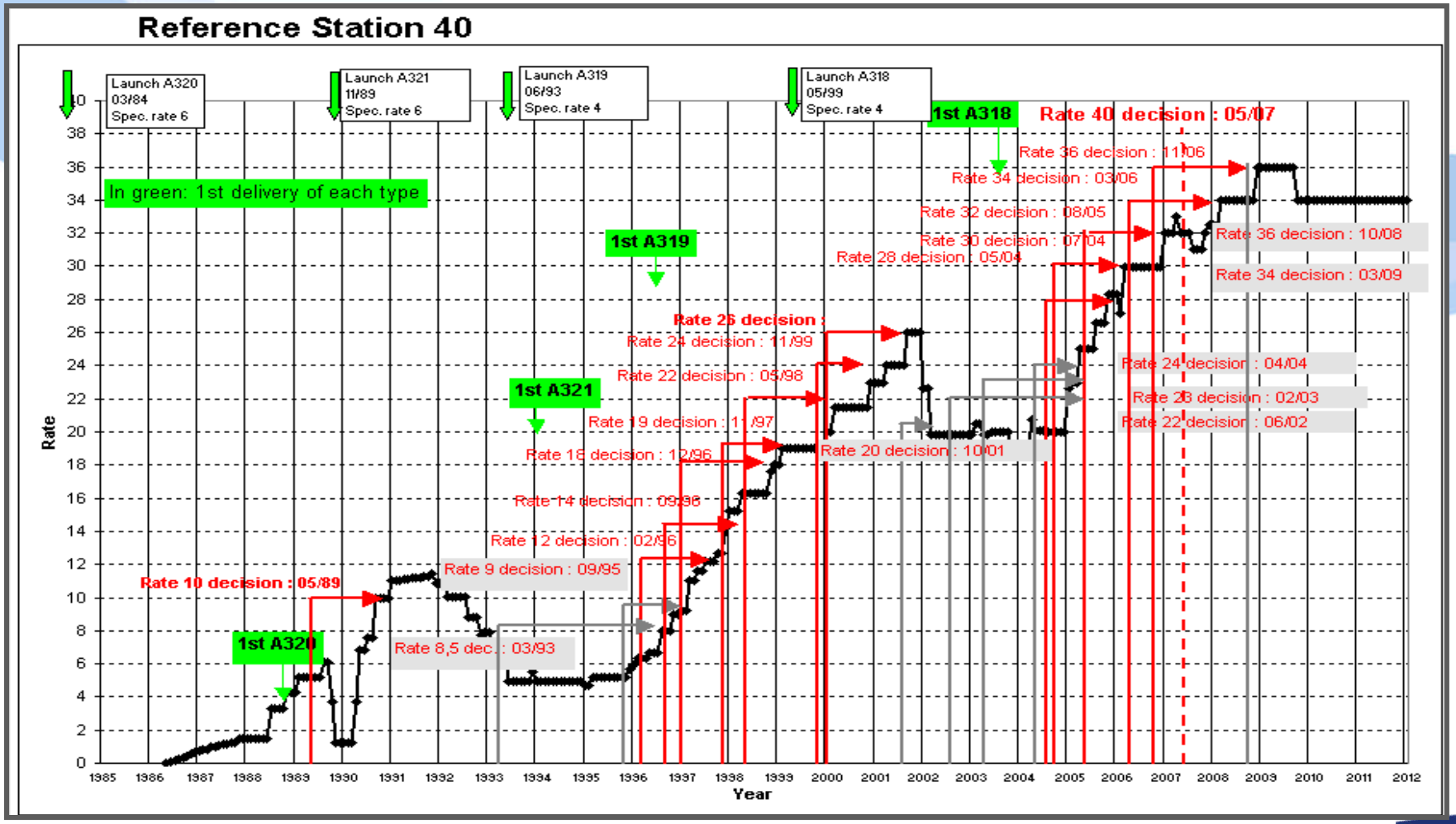
How do we deal with Market Change?

Production Rate Decisions are sound (here A320):



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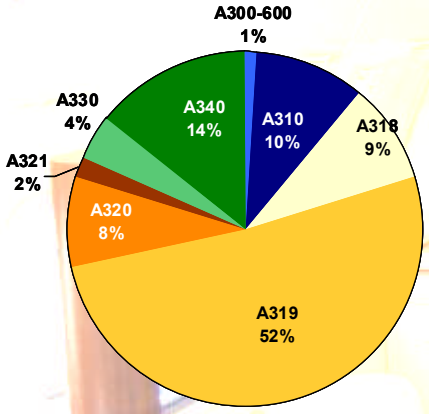
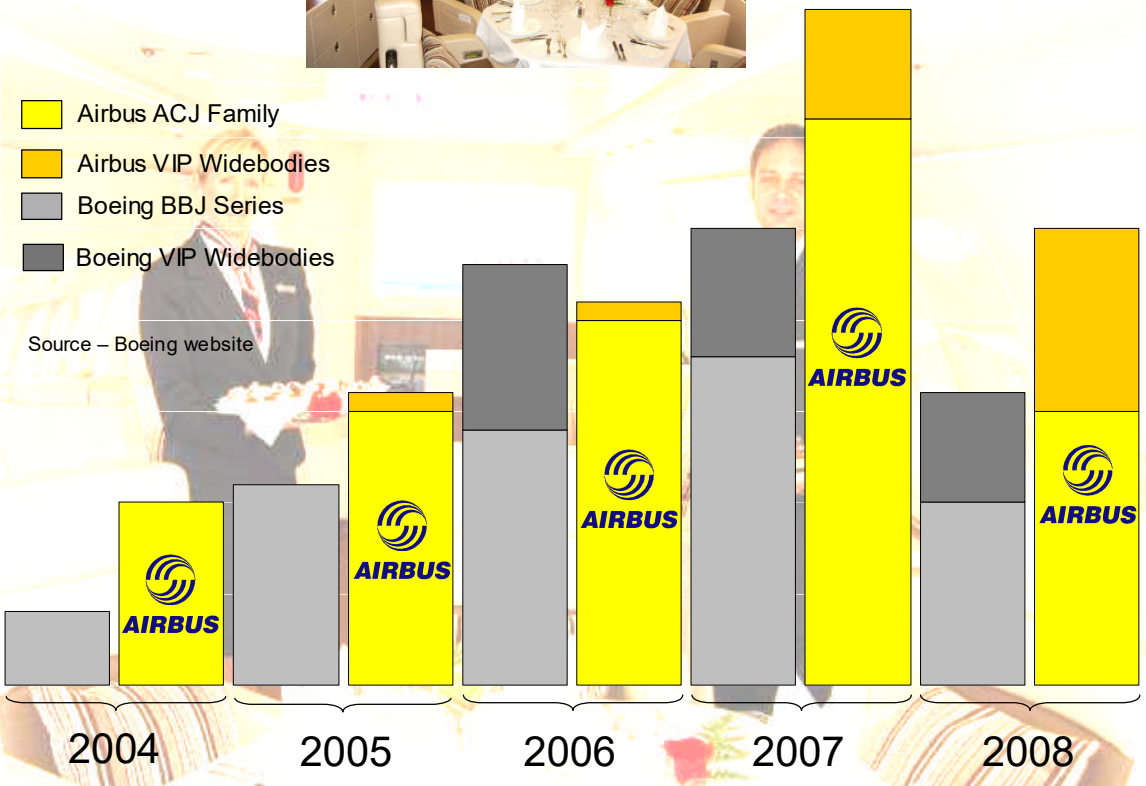
Aircraft Conversions: Corporate Jets and VIPs

98 aircraft delivered to
61 operators -
Having achieved over
350,000 FH





Airbus is leading Corporate Jet Sales

Aircraft Conversions: Corporate Jets and VIPs

- **Sales organisation:**
  - Dedicated to VIP aircraft worldwide and specialised in managing the specifics of this market segment.
  - Benefiting from Airbus sales & contract support.

- **Program Organisation**
  - Multi-program integrated organisation.
  - Project oriented, based on VIP customers needs.
  - Ensuring basic aircraft definition & production within the Airbus standard process.
  - Capable of designing, subcontracting and managing VIP cabins for all Airbus types.
  - Ensuring the interface for engineering on the basic aircraft.

- **A limited number of approved outfitters has been selected worldwide for long-term partnerships inc. the Airbus Corporate Jet Centre**

ASSOCIATED AIR CENTER
A Landmark Aviation Company

STORK Fokker

Lufthansa Technik
VIP & Executive Jet Solutions

CORE DESIGN

AIRBUS
Corporate Jet Centre

JET AVIATION

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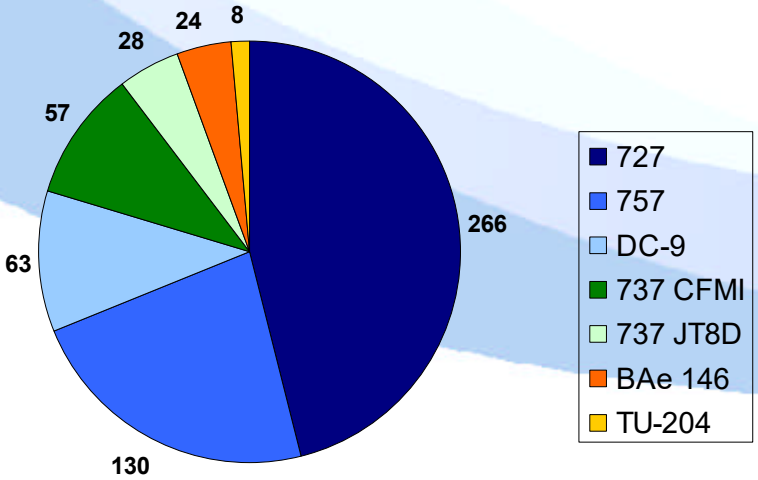
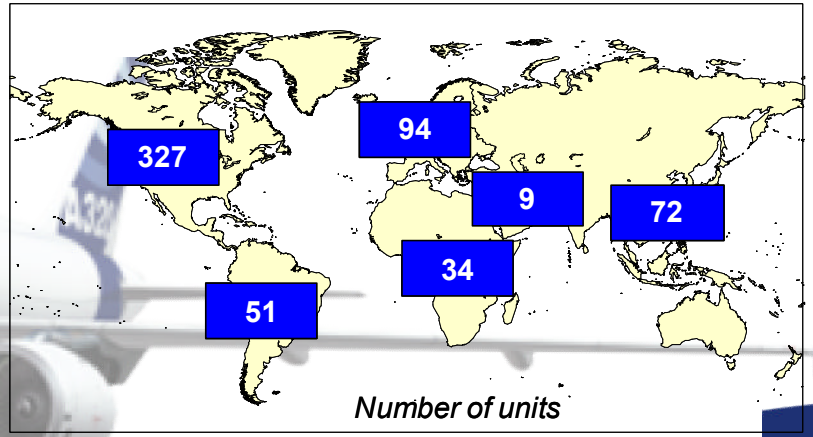
Aircraft Conversions: Pax-to-Freighter

There is a huge replacement market



Mainly with companies like FedEx, UPS, DHL…

727	31 years old
757	18 years old
DC-9	38 years old
737 CFMI	19 years old
737 JT8D	29 years old
BAe 146	20 years old
TU-204	9 years old



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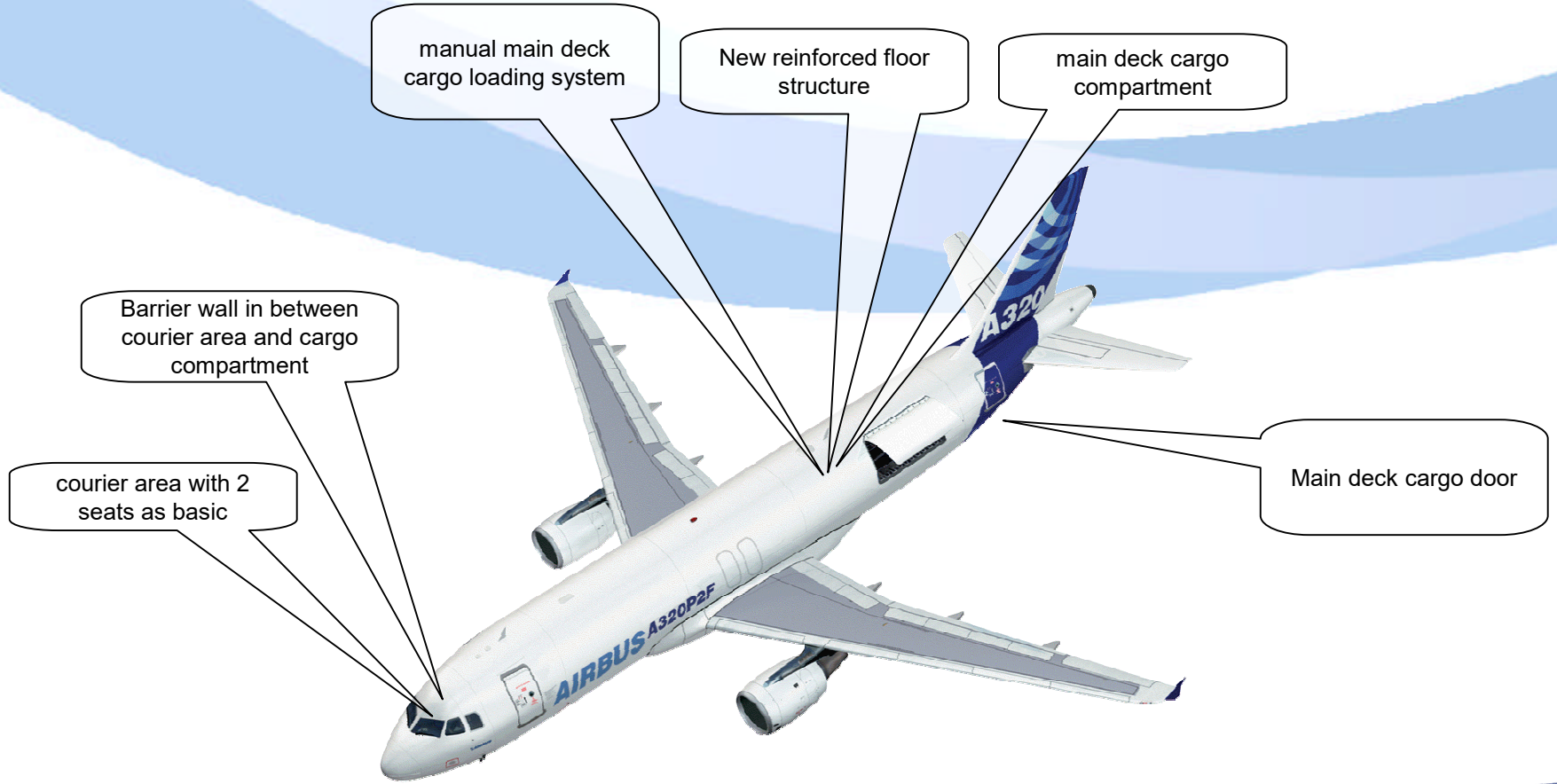
Aircraft Conversions: Pax-to-Freighter

What is to be converted? Example: Single Aisle



Aircraft Conversions: Pax-to-Freighter

- A Joint-Venture is created between the Russian Industrial Foundation, EADS-EFW and AIRBUS.

- A common project to develop and realize the conversion of the passenger aircraft to a freighter on the A320-200 & A321.
- Entry-into-service expected end 2012.

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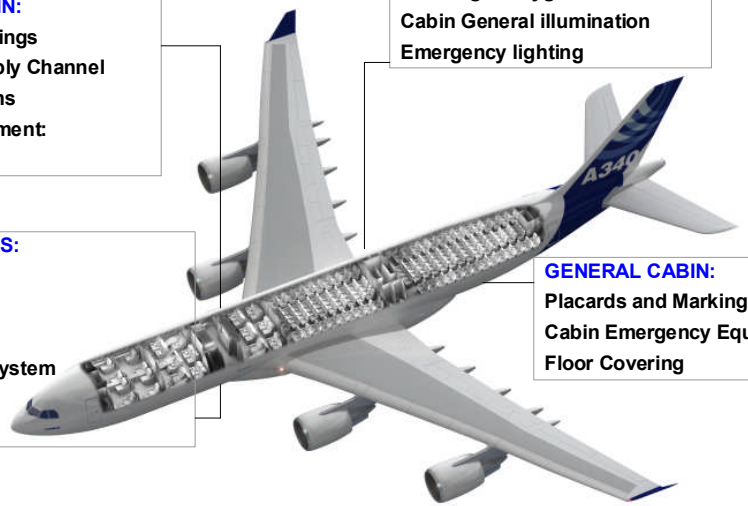
After-Sales Activities: Cabin Upgrades

Airbus Cabin Upgrades can modify the entire Cabin…

CABIN SYSTEMS:
Medical outlets
Passenger Oxygen
Cabin General illumination
Emergency lighting

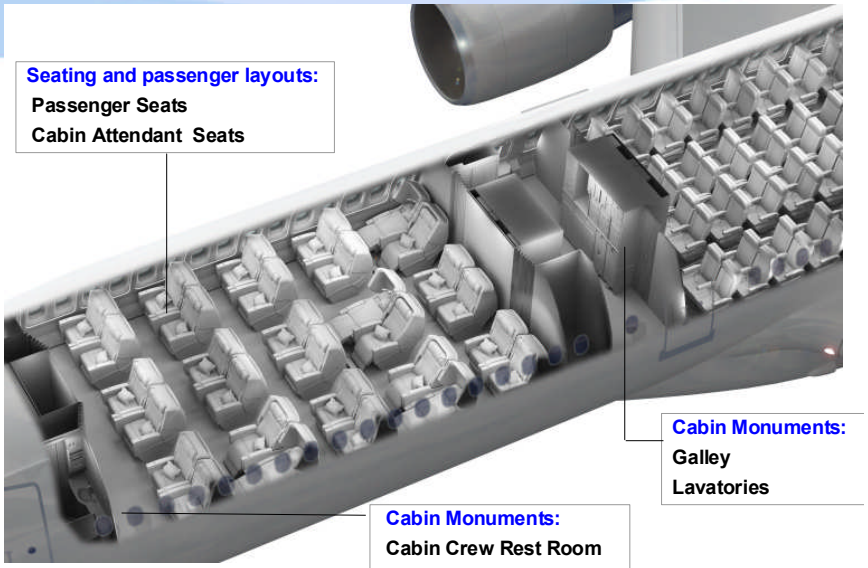
GENERAL CABIN:
Linings Furnishings
Passenger Supply Channel
Curtain Partitions
Ancillary Equipment:



CABIN SYSTEMS:
Connectivity
IFE
CIDS
In Seat Power System

GENERAL CABIN:
Placards and Marking
Cabin Emergency Equipment
Floor Covering

Seating and passenger layouts:
Passenger Seats
Cabin Attendant Seats



Cabin Monuments:
Galley
Lavatories

Cabin Monuments:
Cabin Crew Rest Room
Stowage

Advantage of the Airbus Cabin Upgrades solution for our customers

- Latest cabin design, technologies and features available for all their Airbus in-service aircraft
- Continuous aircraft configuration followup
- Update of all their associated Airbus aircraft publications
  - Eases any future upgrade
  - Coherent technical definition
- Airbus Safety and Quality stateof-the-art standards
- From simple to complex modifications, from light cabin refurbishing to full cabin conversions
- Fully approved by all local Airworthiness Authorities

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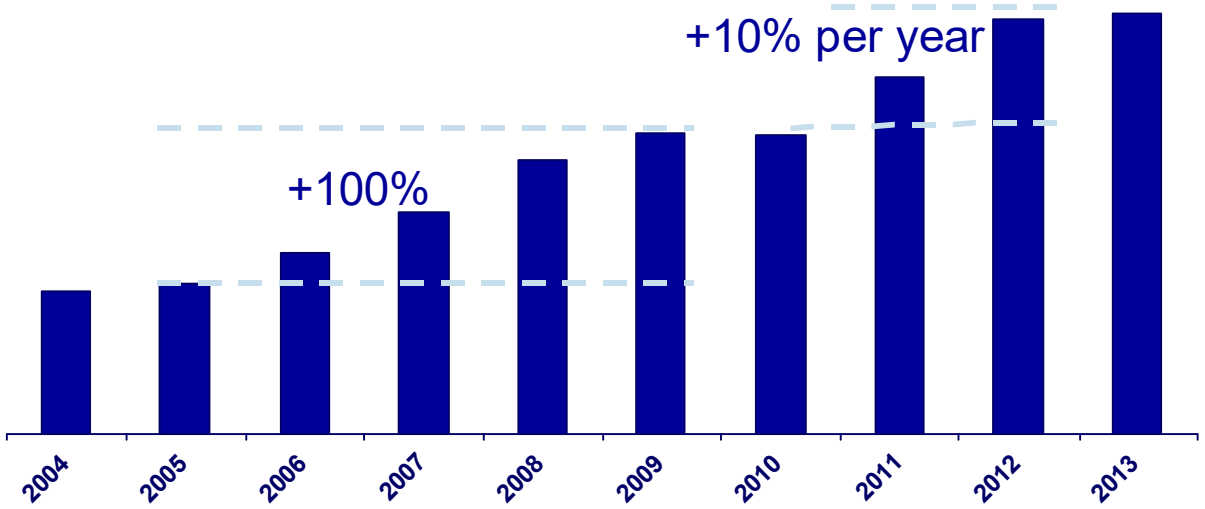
After-Sales Activities: Cabin Upgrades

- The Upgrade market has doubled between 2005 and 2009 and we expect that the market will grow at a compounded +10% annual rate in the future.
- Airbus Cabin Upgrades are growing faster than the market:
  - +50% growth in 2008
  - +28% growth expected in 2009

Cabin Upgrade Engineering & Certification Market

Airbus Aircraft, 2004 – 2013



After-Sales Activities: Customer Support

5,375 in-service Airbus aircraft mean :

More than 18 million flight hours per year

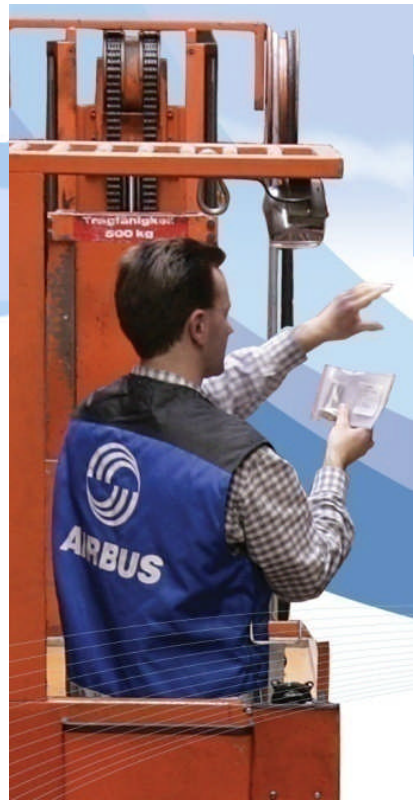
and an average of 18,000 flights per day

Resulting in high customer support activity:

- **Approximately 3,500 AOG supported**
  98% of engineering and repair queries answered in less than 4h
- **Training over 1,330 flight crews**
- **320,000 spare orders**
- **Over 5,700 warranty claims**
- **More than 9,000 Flight Operations queries**
- **More than 50,000 technical queries**

After Sales Activities: Customer Support

- 3 Domains of Expertise:
  - Engineering and Maintenance
    - Engineering Support
    - Maintenance Programmes & Services
    - Technical Data
    - Upgrade Services
    - Aircraft Embodiment Operations
  - Material, Logistics and Suppliers
    - Material Supply
    - Inventory Management Support and Services
    - Logistics Support and Services
    - Supplier Management Support
  - Training and Flight Operations
    - Flight & cabin crew training courses
    - Maintenance training courses
    - Training medias
    - Flight Ops support, documentation & services



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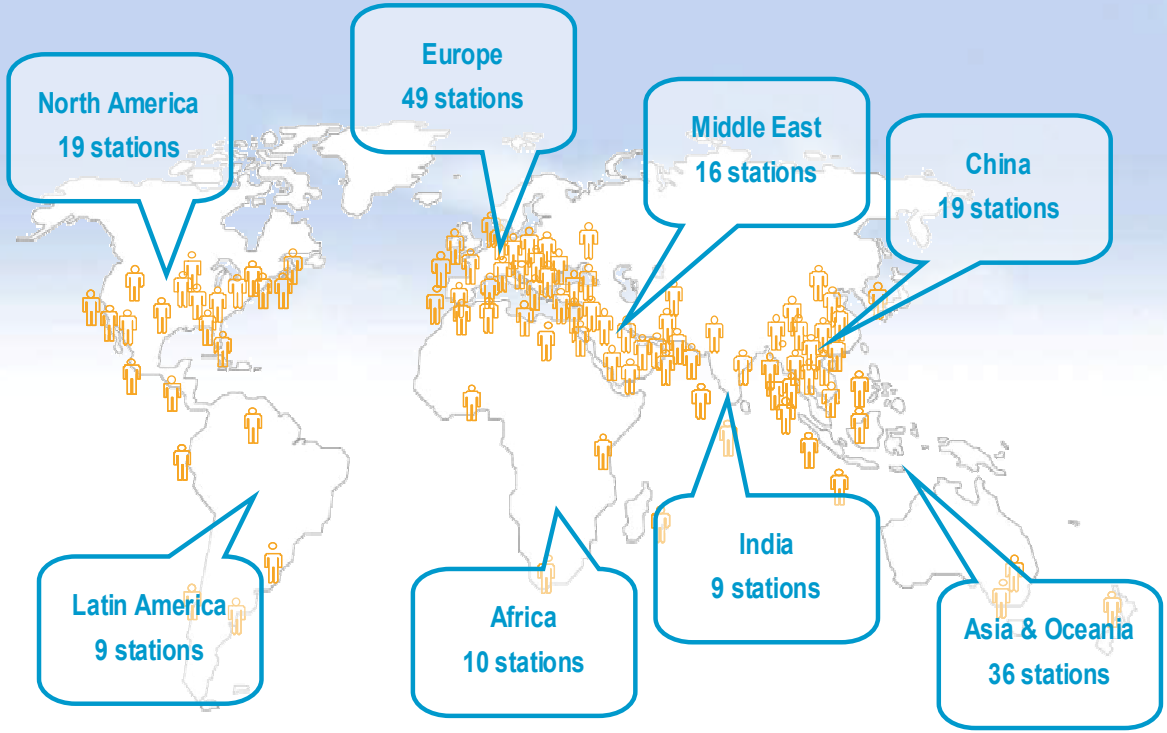
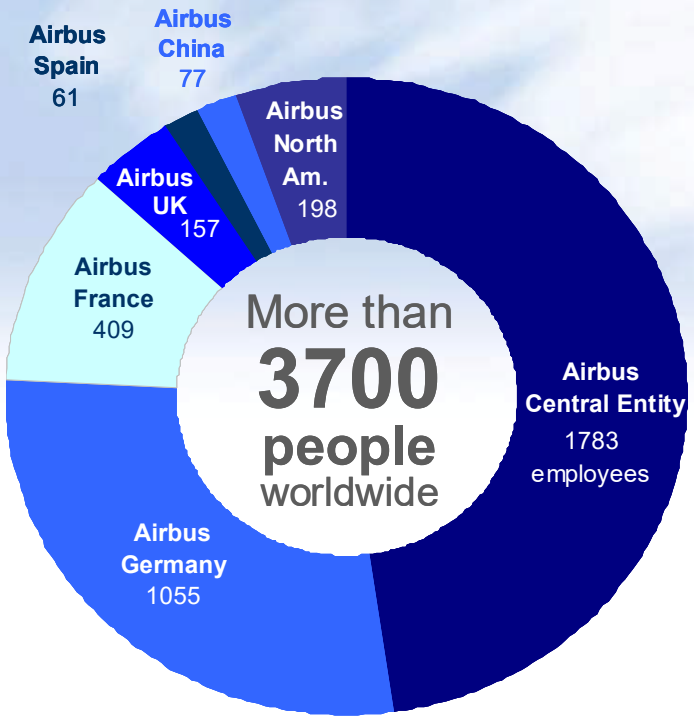
After Sales Activities: Customer Support





245 Airbus field representatives

located in more than **167** stations

After Sales Activities: Customer Support

3 Customer support centres

Washington

Toulouse

Beijing

5 Training centres

CAE

Miami

Toulouse

Hamburg

Bangalore

Beijing

4 Material & logistics centres

3 warehouses

Washington

Frankfurt

Hamburg

Dubai

Singapore

Beijing

Shanghai

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Aircraft Disposal

- 200 commercial aircraft reach the end of their lives every year
  - storage fields are becoming increasingly crowded
  - asset value represents huge business potential
- Over the next 17 years around 4,000 airliners are expected to be retired
- Material content measured in tens of millions of dollars.
- Airbus is leading research to develop procedures and standards for the environmentally responsible decommissioning of airliners

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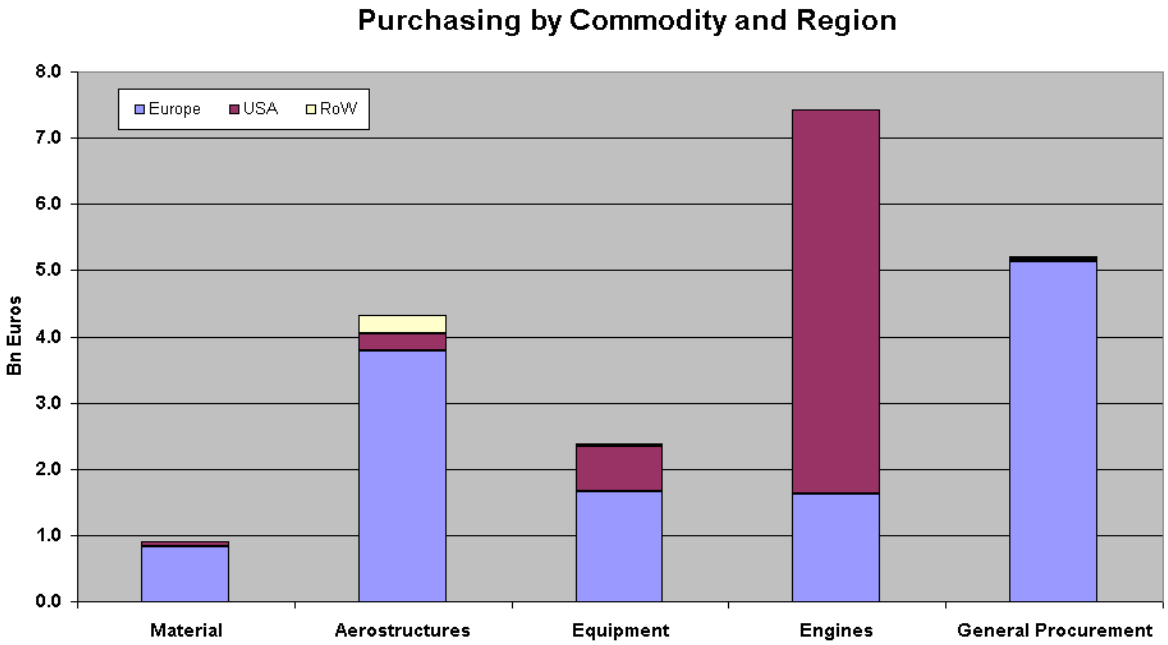
Globalisation

Worldwide Purchasing



- 60% of total volume invoiced in US$, inc. 38% of European volume
  - → measure to reduce dependence from $ exchange rate

Globalisation

Example: Wing Build in China

Globalisation

- **Example: Single Aisle FAL China**

- **First Flight 18th May '09**

Globalisation

- **Example: Future FAL A330 at Mobile, Alabama**

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Conclusions

- The Management of Programmes represents the core of Airbus business
- Programmes responds to market needs through
  - Product Policies
    - new aircraft or derivatives thereof
    - conversions of existing aircraft
    - upgrades of and for existing aircraft
  - Sales ←→ Production Matching
  - After-Sales activities
  - Globalisation
- Programmes is committed to drive the cost and leadtime reductions, quality improvements and delivery performance
- Programmes has the view of the full value chain to manage the risks

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THANK YOU!