

USAIRE - AIRBUS GROUP CONFERENCE

The digital transformation in Airbus is a transversal activity regarding all its divisions: Helicopters, Space & Defense and civil aviation. The aim of the whole company is to innovate through digitalisation, a long journey that started in 1969 with the introduction of the Concorde, the first aircraft in history equipped with the fly-by-wire system. That was a major step for the use of electronic systems in the aeronautical industry.

The appearance of new competitors —besides the other big traditional company in the sector, Boeing, who also introduced a revolutionary aircraft in 1969: the 747— in Canada, Brazil, China and Russia caused a shrinking in the market share and obliged Airbus to respond through innovation as a way of performance.

The core of this digital transformation is focused on three main areas:

- Design: as an example, there is the use of CATIA not only for design purposes but also for a 3D digital model analysis.
- Manufacturing: the target here is to save time and reduce costs.
- Services: the concept of 'Industry 4.0' provides added value services.

These objectives are to be approached in three different ways: improving internal operations, through a further growth in services and improved products, and inventing disruption business models.

Now, we shall describe the concrete actions that Airbus considers paramount to be taken or introduced in the aforementioned sectors of their industry. The aspects to be considered in this digital ambition are the operational efficiency and profitability (e.g. being able to produce 2 aircraft per day), the improvement of products and introduction of added value services, the adoption of innovative and disruptive business models —that is, anticipating changes in economy—, and the agility in responding the customers' demands and providing services.

- **Design.** It is focused on 3D design and modelling —as an evolution of 2D, which is being gradually suppressed— and digital simulation, allowing a reduction in the time to execute a physical change in the product and also reducing development and certification cycles.
- **Manufacturing.** The main objectives are the introduction of 'Industry 4.0', robots, cobots and the extended use of big data. Possible technical and legal issues concerning the property of such content should be taken into account.
- **Services.** The most significant ones for digitalisation are maintenance and air-traffic control. As for the former, the aim is to save maintenance costs in order to achieve cost-effective processes. The latter needs a great improvement in communications, as for now, they are reduced to voice communication between the pilot and the tower.

Beyond that, changes in areas that have a support function to the industry also need to be addressed. These include procurement, sales, marketing, human resources and finance. Because ultimately, it is all about getting closer to the customers.

Dassault Aviation

Headquarters:

- CATIA software suite is used for the 3D mock up, with some Dassault extensions (aerodynamic, load and stealth computations)
- Virtual tour of airplane 1:1 accuracy
- Purpose of mock up is for design
- Issues can be identified early rather than at a stage that is too late
- Manufacturing purpose: For simple parts, automated or semi-automated manufacturing processes can be implemented
- Flight worthy parts quickly produced (excluding heat treatment)
- Projection of 3D digital mock up on physical parts (bolt and fastener references for example)
- Digital mock up used for Maintenance activities: How every single critical task will be performed on the real plane. Simulation on screen how it will be performed after manufacture. Perform design reviews on manufacturing tasks (scheduled and unscheduled).
- Before manufacturing of the aircraft the manufacturing department (facilitating manufacturing) look over the virtual design process to plan what manufacturing plant would be needed to build the plan.
- Collaboration of companies to efficiently work together on designs.
- No need for prototypes due to this method. No need for drawings or blueprints (although some companies still use them even if they have digital mock up)
- High protected encrypted data.
- Reduction of wind tunnel and mechanical tests as they can be carried out digitally

Conference:

- Improve quality of products (both transform processes and develop intuitive and ergonomic environments/methods); increase competitiveness of the company; develop client relationship (culture client) --> prepare products and services to come (wide range of customers --> need to match services to the types of clients thus understand needs)
- Digital mockup allows a holistic view of the aircraft (RFLP: Requirements, Logical Architecture, Functional Analysis and Architecture, Components and Schematics)
- Developments are managed through collaborations (aerostructure, subsystems etc...) --> huge ambition in terms of managing different partners
- Understand where the standards have to be defined --> need for a standard across the industry --> Thales, Safran etc created Boost Aersospace
- Develop the capacity in the early design stage --> optimization and study of critical points & feeding of information at an elementary/initial level
- Active immersion, design review, multidisciplinary simulations, detailed design and manufacturing simulations, simulations on the ground (superimposition of digital mockup)
- Introduction of digitalization in the manufacturing activities:
 - Insert the operator in an environment which provides him the necessary information as easily as possible to provide efficiency/ motivation and curiosity
 - The information has to be relevant for the controller at the right time and right place, easily accessible and useable on an ergonomic platform (ease of use)
- The themes of digitalization:
 - Flexibility (reduction of cycles)
 - Productivity (reduce costs)
 - Quality (reduction of costs but not quality)
 - Ergonomics (improving conditions of work)

Minutes of Digital Conference 06/07/2016 – James KORNBERG, Director Innovation at Air France KLM Engineering & Maintenance

AF KLM E&G introduction

- A multi-product MRO services provider
- Revenues: 4 billion €
- Large network: 200 international customers, 1500 aircraft supported

Insights about digitalization

- “Forty percent of businesses in this room, unfortunately, will not exist in a meaningful way in 10 years. 70% of companies will attempt to go digital but only 30% of those will succeed.”
John Chambers, CEO of Cisco
- All business can be disrupted, even the ones who seem the most robust
- Digitalization may be defined as the integration of digital technologies into everyday life (of a company) by the digitalization of everything that can be digitized. It is a very broad concept
- Digital transformation is not only an IT shift, it is a true company transformation
- Digitalization transformation is all about culture change: the key paradigm “faster, cheaper, simpler” requires agility to be in the DNA
- Why is it happening now? Because the technology is ready and since external and internal company’s stakeholders are pushing for that

Digitalization for Airlines may take 3 faces

- Customer: many different channels now exist to reach the customer (computer, smartphone...)
- Processes: a lot of processes can be reinvented thanks to new IT capabilities (revenue management, MRO management...)
- People: a new way-of-working can be implemented using digital tools (MRO tools, social networks...)

Focus on Big Data

- A great volume of data, with large variety and high velocity, is now being collected
- Many potential use can be considered, from a better understanding of consumers’ needs (to increase flight ticket revenues) to a better follow-up and anticipation of aircraft components evolution (to decrease MRO costs)

Examples of digital initiatives at AFI KLM E&M

- AFI Maintenance Control Centre for A380: scientific analysis of data collected from the 10 A380 operated in order to anticipate some failures and make significant cost reduction
- The MRO Lab Singapore: a co-innovation center created with Ramco Systems, in South East Asia, with the goal of designing and developing innovative and rapid-deployment solutions in MRO areas
- MRO 4.0 program: launch of experimentations and prototypes to eventually integrate the most promising ones in AFI KLM E&M digital activities

Memo on the D el egation G en erale de l'Aviation Civile (French Civil Aviation Authority)

Based on the presentation by Nathalie Domblides, Deputy Chief of Staff, DGAC,
on July 11th 2016

DGAC is a regulatory authority, a safety authority and an air navigation service provider. In the field of Air Traffic Management, digitalisation appears both as an opportunity and as a daily challenge.

1. Accompanying technological development

DGAC offers support to R&D to the aeronautical industry and as such embraces the challenges that have been exposed by the industry.

2. Air navigation services

Air navigation services is our most technological activity and an obvious playing field for digitalisation, seeing how current systems are heavily segregated. Digitalization cannot happen overnight for many reasons: the amount of investment needed, the compatibility with legacy and new systems, the adoption of robust and proven tech, the inclusion of cyberthreats.

Eventually, digitalisation in ATM means more data are provided to the ATCO, integrated and shared (radar, flight plan, tools, MTO in the future...), with more accuracy and more services in order to improve decision making. Man remains in the loop.

- This innovation relies increasingly on collaboration

Collaborative decision making concept has been developed between Airlines / Airports / meteorological services first at airports and now *en route*. It will allow optimised trajectory, flexible use of airspace and better treatment of special flights.

Military-civil collaboration is, in this context, very important. The integration of military needs in the next 4-Flight system will support military/civil coordination via a new organization of work and the use of common tools.

- Systems interoperability, with multiple data exchanges

Between controllers and pilot : data link, digitalisation also means more consistency between pilots and controllers situational awareness. The interoperability will also be extended between controllers of different ANSPs. In this regard, cloud computing could provide Air Traffic Management solutions.

- We also need to completely rethink our approach to communication, especially in times of crisis. Information are now available to the public and run very fast (see flightradar24).

3. Regulatory and Safety monitoring authority

Digitalisation is a challenge for the DGAC, which needs to accompany it and enable the industry to benefit from technological progress, without degrading safety. The DGAC cannot integrate digitalisation progress at the pace of Google, because aeronautics is not a just leisure tool. It is a matter of credibility.

However, we must take steps in order not to let the gap become too large between our regulations and practice, and the reality of what technology enables.

Other regulation challenges encompass drones (long range operations, integration into airspace) and even flightsharing (safety concerns).