Getting high value by spreading IT services

Interconnecting heterogeneous information systems, says **Dr Franck Duluc**, Engineering & Maintenance Research Manager at Airbus, is a way to enable our customers to fly more with the lowest operating and maintenance costs

IN 2018, THE value of the Maintenance Repair and Overhaul (MRO) market is projected to reach $140 billion *(Ref: Stewart 09)*. To gain market share, aircraft manufacturers will have to differentiate themselves from the market norm by offering their customers a way to fly more hours with the lowest operating (exploitation) and maintenance costs.

THE CHALLENGE

While considering the development of a new aircraft program and the duration of the aircraft in service phase (more than 30 years), manufacturers tend to look for the following objectives:

- Significantly shorten the development cycle to reduce costs and produce aircraft that match the latest state-of-the-art.
- Reduce pollution to achieve socially acceptable levels of environmental responsibility.
- Offer a reliable way to track and trace configurations (as-designed, as-built, as-maintained and as-flying) to ease the aircraft configuration management burden for the OEMs, MROs, airlines and operators.
- Develop turnkey and integrated solutions for reducing aircraft downtime, supplying parts when and where needed, and providing technical assistance and training to aircraft operators.
- Provide authorities with in-time relevant data for continuous airworthiness management.

In order to fulfill these objectives it is necessary to be able to retrieve and exchange relevant information between all aircraft life-cycle stakeholders. Additionally, manufacturers can obtain feedback from experience and in service data to optimize the design, reduce costs and improve environmental performance to more acceptable levels.

THE SOLUTION

simid

It was with this in mind that Airbus teamed up with aircraft manufacturers, MRO centers, information and technology providers as well as recognized laboratories to work on SIMID (Système d'Information de Maintenance Intégré et Distribué — in English 'Integrated and Distributed Maintenance Information System'), an innovative research and development project. Launched in March 2011 for a three-year term and with an overall budget of more than $8 million (€6 million), SIMID aims to provide a demonstrator for a secure and scalable system enabling the interconnection of heterogeneous information systems as an enabler for MRO stakeholders to propose valuable services and contributing to:

- Increased aircraft availability;
- Reduced operating and maintenance costs;
- Increased flight safety.

"Nowadays our job must go beyond helicopters sales and support. We have to follow aircraft business evolution trends in order to simultaneously help our customers in reducing their exploitation and maintenance costs while increasing our turnover and efficiency." — EADS Eurocopter.

"The size of the Falcon fleet has significantly increased these past 10 years and will keep growing as all other business-jets fleets. MRO centers network is evolving accordingly. For Dassault Aviation, SIMID is intended to be a key differentiator to scale MRO network properly and provide efficient support with high quality standards." — Dassault Aviation

"SIMID will help us in strengthening our partnership with our providers and customers. This will lead to the optimization of our business approach and increase our customers' satisfaction." — Mr. Jérôme Thulliez, Industrial & Quality Director, EQUIP'AERO SERVICES.

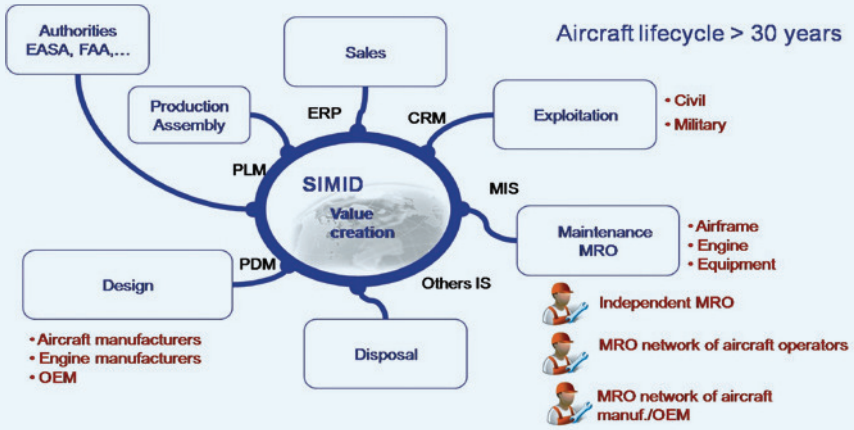

Figure 1: SIMID concept overview

SIMID Key technical challenges consist in:

- Interconnecting heterogeneous information systems: stakeholders in the aircraft maintenance process are numerous and all using different information systems (different purposes, different technologies, and different standards and processes).
- Providing a secure, scalable and flexible system: SIMID's key focus is on reducing, or even deleting, any integration costs while offering a business opportunities enabler. Additionally, SIMID aims to develop new services but without the expenditure of effort and money in redesigning existing information systems architecture.
- Coping with a high volume of data: aircraft maintenance data are often very big data sets and are subject to numerous updates and exchanges.
- Performing distributed data mining tasks: information search and analysis often involve data that are produced or stored by different information systems.
- Promoting win-win cooperation between MRO stakeholders through a better use and exchange of the aircraft maintenance data.

SIMIDs technical approach is based on:

- Data rationalization and standardization.
- Generating connectors capable of interconnecting heterogeneous information systems such as PDM (Product Data Management), ERP (Enterprise Resource Planning), MIS (Maintenance Information Systems).
- Distributed data mining algorithms.

"… manufacturers can obtain feedback from experience and in service data to optimize the design, reduce costs and improve environmental performance to more acceptable levels"

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IN PRACTICE

The demonstrator will be tested and validated through application to several use cases, which gather together the experiences of several MRO stakeholders.

These use cases are:

- Aircraft configuration control and management: configuration control and management is key to MRO activities as it conditions, among other things, the continuous airworthiness monitoring, the spares management and allowance, and the quality of the Technical Data.
- Aircraft repairs collection and management: airworthiness authorities are becoming increasingly stringent on the repairs recording and management.
- In-service event data collection: real-time follow-up of aircraft events will enable a faster preparation and answer to any problems that occur. Data required for decision making are often located in different places (information systems and/or stakeholders)
- Scheduled maintenance follow-up and optimization: nowadays maintenance planning update and optimization often require a heavy data collection process which can, in turn, work to the detriment of update cycles and optimization justification to the authorities. Also, with more data the different operators' profiles may be better taken into account in the maintenance planning process.

The following tables and figure sum up the second case (aircraft repairs collection and management) as an example:

The different use-cases have been modeled using Business Process Modeling Notation] (BPMN) and a SIMID actor has been identified enabling the identifications of the services that are to be provided through the SIMID platform. A scenario has also been described for the use-case.

Through this scenario (not the most complex one that might be encountered) it can be understood that a lot of people and a lot of information systems are interacting and exchanging a lot of data.

Many interfaces have to be put in place and if they are not available a lot of activity is lost in paperwork or multiple keying in within the various information systems. Also, in the case of stakeholders' changes these interfaces often have to be rebuilt.

With the approach as defined by SIMID…

- The interaction between the different stakeholders and their information systems will be facilitated and therefore will be faster and cheaper.
- Integrating new stakeholders or services will be possible at the lowest cost.

CONCLUSION

After its first year, SIMID will run for two more years to define and demonstrate a solution fulfilling its objectives. All partners are contributing enthusiastically to the project and would agree with the following words from Eva Randria, 2MoRO Solutions, R&D Project — Innovation Manager: "SIMID is a turnkey solution to spread out IT MRO services in

JULIA

AIR ALFA – AIRLINE
Maintenance Support department.
Aircraft exploitation – performs some aircraft maintenance and repair tasks.

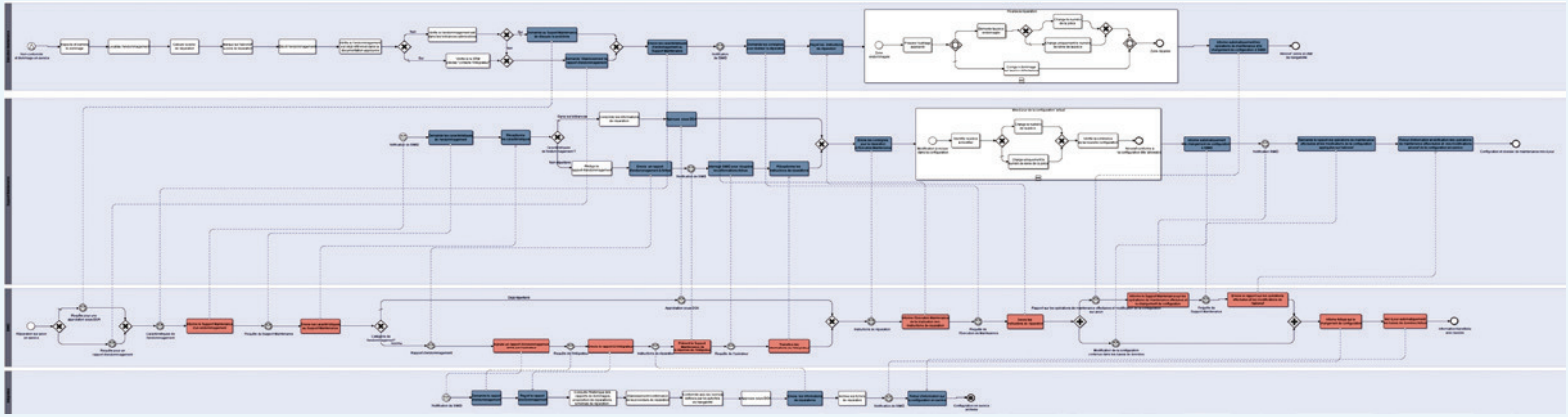
BOB

BETA INDUSTRY – MRO CENTER
It has a contract with Air Alfa to perform their aircraft scheduled maintenance tasks and heavy repairs.

PETER

AIRCRAFT MANUFACTURER – SUPPORT ENGINEERING DEPARTMENT
In charge of designing a certified repair solution

Figure 2: SIMID use case: the stakeholders



SIMID use case: example of Repair use-case BPMN model (SIMID action in the lower layer) (above). Example of Scenario (below).

Step	Action	Interface	Description
1	Execution		During some scheduled maintenance execution at Beta Industry, the damage is detected.
2	Execution		Bob, maintenance worker characterized the damage and its location.
3	Execution		Bob assesses that the damage is above the limits given by the Structure Repair Manual. There is no way to release or repair the aircraft without contacting the aircraft manufacturer.
4	Execution	SIMID (to Support)	Through SIMID, Bob informs Air Alpha Maintenance Support department of the damage and the need to contact the aircraft manufacturer.
5	Execution	SIMID (to Support)	Bob sends through SIMID the damage information he has collected to the Maintenance Support.
6	Support	SIMID (from Execution)	Julia, Air Alpha Maintenance Support, receives the notification and the damage information.
7	Support		Julia acknowledges that the damage is above the limits and that the aircraft manufacturer has to be contacted and provided with the information.
8	Support		Julia writes a damage report from the information she has collected from Beta Industry.
9	Support	SIMID (to A/C Manufacturer)	Through SIMID, Julia sends its report to the A/C manufacturer.
10	A/C Manufacturer	SIMID (from Support)	Peter, Customer Services engineer at A/C manufacturer, receives the report.
11	A/C Manufacturer		Peter analyses the damage and defines the repair procedure, which is approved under the A/C manufacturer DOA.
12	A/C Manufacturer	SIMID (to Support)	Through SIMID, Peter sends the repair instructions to air Alpha.
13	Support	SIMID (from A/C Manufacturer)	Julia receives the repair instructions
14	Support	SIMID (to Execution)	Through SIMID, Julia transfers the repair instructions to Bob.
15	Execution	SIMID (from Support)	Bob receives the repair instructions
16	Support		Julia prepares, in the Air Alpha MIS, the configuration change consecutive to the repair (replacement of a structure part).
17	Execution		Beta Industry embodies the proposed repair.
18	Execution	SIMID (to Support and A/C Manufacturer)	Through SIMID, Bob sends the maintenance execution report for the repair together with the configuration change.
19	Support	SIMID (from Execution)	Julia receives the information related to the repair execution (configuration change and job card completion) and stores them.
20	A/C Manufacturer	SIMID (from Support)	A/C Manufacturer receives the information related to the repair execution (configuration change and job card completion) and stores them.

order to increase MRO stakeholders' efficiency and competitiveness. Since our creation in 2004, our R&D team has been working on technology and services to comply with current and future Aerospace and Defense (A&D) trends. Today, we are proud to bring our experience and technology to make SIMID an upcoming reality". ■

REFERENCE

(Stewart 09) Stewart, D., AeroStrategy (2009). "The attractiveness of the aeronautics Maintenance Repair and Overhaul (MRO) and its segmentation."

AIRBUS
AN EADS COMPANY

DR FRANCK DULUC
ENGINEERING & MAINTENANCE RESEARCH MANAGER, AIRBUS.

Having graduated from INSA Toulouse (1995) and holding a PhD diploma in Computer Sciences/ Database from the Toulouse University, Franck Duluc has worked for Airbus for 16 years in different activities related to Engineering and Maintenance activities. He is responsible for R&T activities within the Engineering and Maintenance department of Airbus Customer Services as well as the definition and alignment of Airbus Customer Services' R&T activities with the defined strategy. A lot of these activities are considering the various internal and external information systems that support the day-to-day activities of Airbus Customer Services, its customers and the MROs. Major issues are interfacing the different information systems bricks and the data standardization, reuse and analysis.

Franck Duluc has also participated in different Industry standardization bodies (ATA and ASD) and is currently involved in the AIA/ASD ILS Handbook standardization group (Integrated Logistic Support – ASD SX000i).

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