Evolution of Aircraft Maintenance and Support Concepts – French Armed Forces Perspectives

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ABSTRACT

This paper presents some evolutions in aircraft maintenance concepts introduced by the SIMMAD as well as innovative procedures applied to improve availability and reduce support costs of the Rafale.

1.0 THE SIMMAD (STRUCTURE INTEGREE DU MAINTIEN EN CONDITION OPERATIONNELLE DES MATERIELS AERONAUTIQUES DU MINISTERE DE LA DEFENSE)

1.1 SIMMAD's Genesis

At the end of 90's, the French armed services had to face the double impact of a decrease of operational availability and an increase in support costs. This superposition of negative effects resulted of three different types of adverse factors:

- Contextual factors that affected the whole military aeronautical market (loss of economies of scale, a monopolistic situation marked by wide ranging industrial restructurings and strategic orientations towards more lucrative civilian market segments).
- Structural factors like the ageing of military aircraft fleets as well as budget cuts and low support spending.
- Last but not least, domestic factors of organisational nature hampered the in-service support for air systems which was shared among many agencies within the French MoD.

To solve those latest, the decision was taken to merge all In-Service Support (ISS) managing agencies into a new joint one that gathers in all the previous functions that were scattered around the defence establishment.

Thus by the end of December 2000, SIMMAD (Structure intégrée du maintien en condition opérationnelle es matériels aéronautiques du ministère de la défense) was brought into being.

As it is stated in its creation decree, the SIMMAD is responsible for directing the In-Service Support for all air systems in the French inventory, as well as for such things as ground support equipment (GSE – handling equipment, airport safety vehicles and so forth), radars and air-delivered munitions.

Overall, this implies being responsible for the support and maintenance of some 1900 aircraft in the four services (Air Force, Navy, Army and Gendarmerie) which costs some €1.6-billion to be kept in good working order(excluding such things as fuel, infrastructure and manpower).

An integral part of SIMMAD's mission is also to perform an expertise consultancy on the benefit of the French Ministry of Defence in order to ensure consistency among In-Service Support actions and thus to propose corresponding optimisation measures.

1.2 SIMMAD's Position in its Institutional Environment

SIMMAD's mission implies a close coordination between development and support, which means between DGA's and SIMMAD's activities.

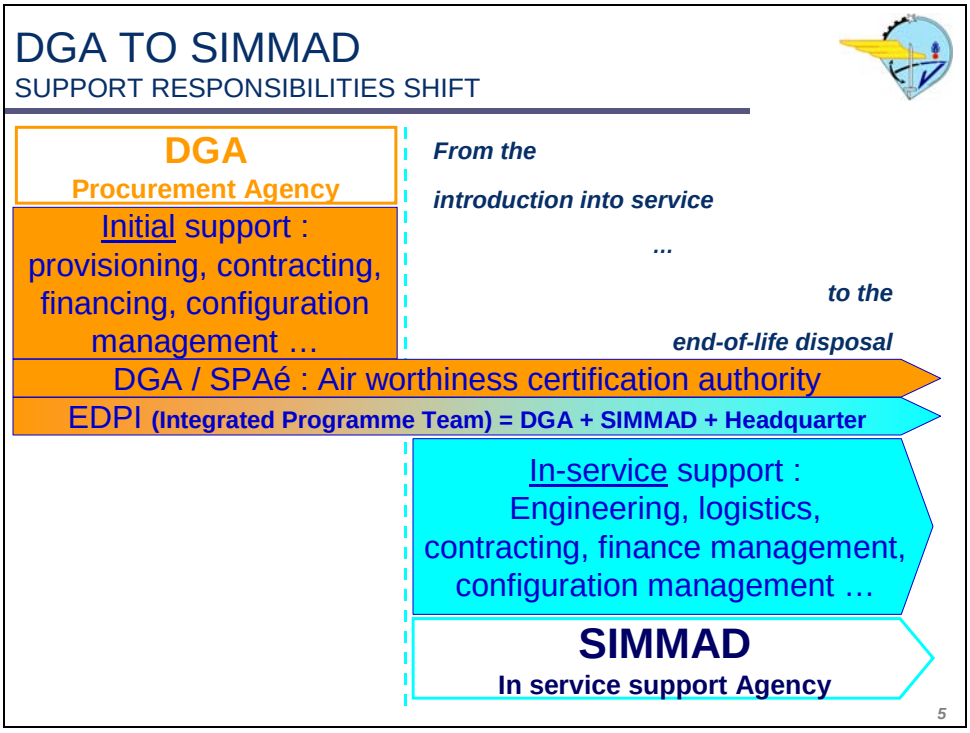

Figure 1: DGA to SIMMAD – support responsibilities shift.

In this perspective, the air support responsibilities can be split in two successive time periods:

The DGA (Délégation générale pour l'armement), our national procurement agency, bears the responsibility for the early stages of any procurement programme. It therefore fulfils all support functions until the aircraft is turned into service. However, since initial options taken during the very first development steps deeply influence the future in-service-support architecture, a SIMMAD representative is involved in this process to have future ISS aspects taken into account.

With the introduction into active service, a shift of support responsibilities occurs and the SIMMAD becomes in charge till the end-of-life disposal. Nevertheless, the DGA remains the air worthiness certification authority for all flying equipments of the Ministry of Defence, be it before or after the introduction into operational service.

Beside the organic responsibilities of the single services and the operational command exercised by the joint staff on the allocated contingents, SIMMAD works at the managing level in the realm of air in-service support.

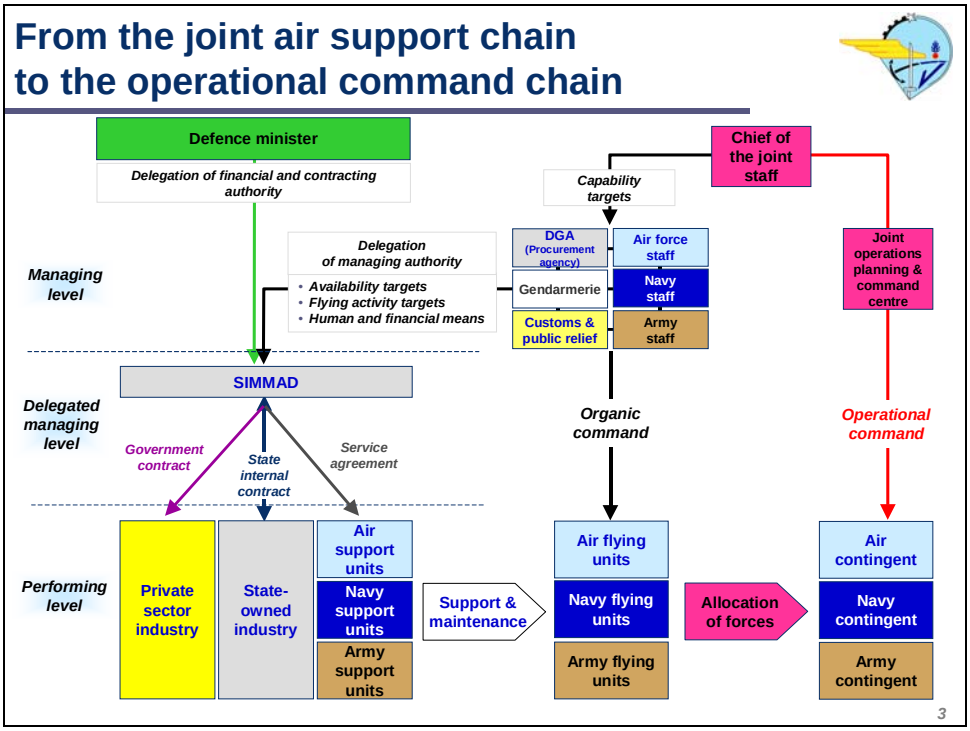

Figure 2: From the joint air support chain to the operational chain.

It is the depository of the delegated contractual and financial responsibilities of the Ministry of Defence, and is also the delegated directing body for aeronautical systems maintenance and logistics.

Its steering committee gathers at least once a year under the presidency of the chief of the joint staff and defines the availability and flying activity targets to be pursued as well as allocated human and financial resources.

The SIMMAD in turn establishes contractual relationship with the different In-Service Support performing agencies from either the private industry or the public sector. Private and public contractors then deliver the adequate service to the flying units.

2.0 INNOVATIVE MAINTENANCE CONCEPTS

Being the single, unified aeronautical ISS organisation requires the SIMMAD to take forward the agenda of exploring what might lead to significant evolutions in maintenance and logistics.

2.1 The Case for Outsourcing

While many armed forces seek to out-source their support and maintenance quite rapidly, the French MoD takes a more graduated approach since the advantage of out-sourcing depends notably upon the type of aircraft. Taking into account both German and British experiences, work is in hand to assess the feasibility and potential benefits of focused outsourcing moves. We are particularly working on identifying which

sovereign capabilities are to be maintained in public hands and assessing economic and operational impacts of transferring air support functions to an outside supplier.

Such a decision must remain coherent with our need for military maintenance teams that must be able to deploy out of area and perform maintenance tasks wherever it is needed. To this regard, we are presently exploring ways to swap personnel between private and public sectors in a pretty comparable way to the German “cooperative model”.

The option to outsource already became reality in the area of initial pilot training. Four companies decided to tender for a contract that encompasses both flying and flight simulating assets. EADS won this competition and was awarded a 10-year contract to operate a mixed aircraft fleet composed of state-owned Epsilon as well as privately acquired Grob aircraft and new simulating assets. All in all, the air force expects a 35% cost decrease. EADS is moreover once a year expected to propose adaptations of the training syllabus or improvements to the associated technical, logistical, and maintenance processes. The achieved benefits would then be shared on an equal basis between Air Force and Industry.

Another example for a successful transfer to private contractors is the re-supply function of the thousands of aeronautical consumable spare parts which was handed over to an outside logistics operator whose task it also is to shorten the request-to-answer cycle and to reduce the stocks level when possible. Specific incentives have been introduced in this contract to turn the achievement of the desired availability and activity target into a shared objective for both defence and contractor. Here again, we were authorised to build a long-duration contract of 10 years.

2.2 Maintaining the Rafale

SIMMAD of course benefits of new technologies and maintenance concepts brought by last generation aircraft.

With the Rafale now in service in both the French Air Force and Naval Aviation, it is the first time that our maintainers benefit from an analytical isolation of all low MTBF (Mean Time Between Failure) equipments. This process allows the adequate targeting of technological development by the industry in order to achieve the requested reliability status. This new iterative method is also based on real time fault analysis achieved by the aircraft integrated testing systems and logically leads to on-condition maintenance as a rule.

Another improvement is that maintenance tasks of the O level have been segmented into elementary subtasks which are independently assessed. Therefore, and thanks to the modularity of this innovative system, parallel subsequent maintenance and repair subtasks can be organized, reducing significantly turnaround and unavailability times.

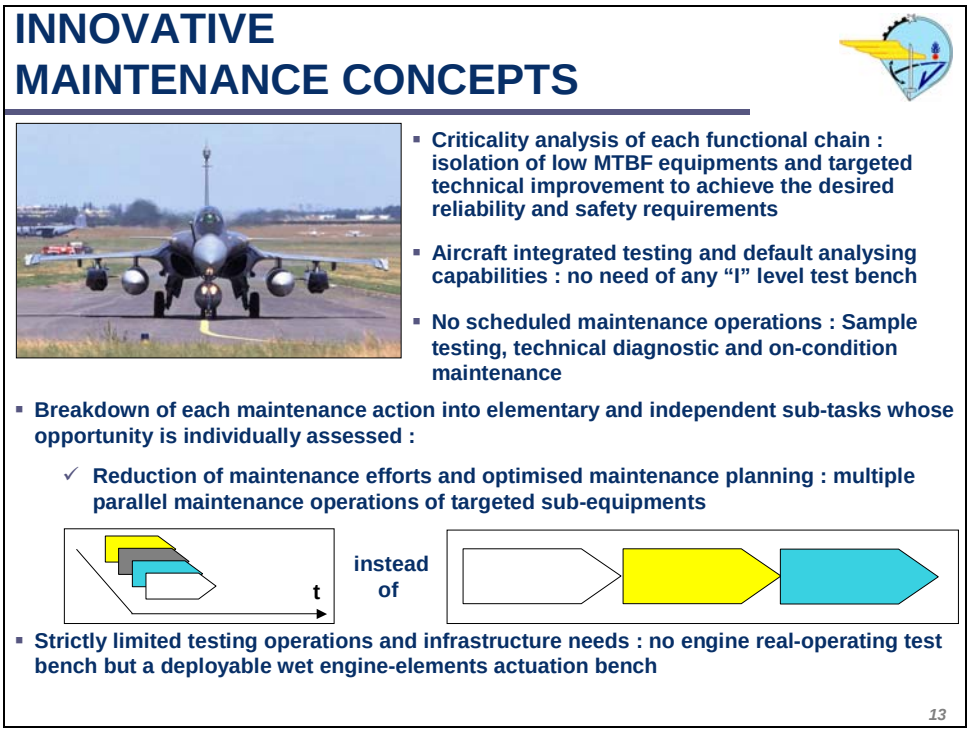

Figure 3: Innovative maintenance concepts.

During its development phase, the Rafale had to pass several tests to be carrier-operated, which meant adequately responding to severe constraints of weight and dimensions of its maintenance equipment. As a consequence, a single test bench is used to monitor the whole aircraft and the dimensions of GSE have been drastically reduced.

In an operational scenario, those technical characteristics contribute to reduce the deployed technical and human footprint, which in turn requires a slimmer and less vulnerable supply chain.

Moreover, those improved analysis and repair capabilities enable a minimization of the out of theatre flow of the SREs that previously had to be transferred back to France for inspection and fixing.

This means reduced costs, enhanced effectiveness and shorter unavailability periods.