Methodological approach to support aircraft MDO with knowledge-based technology

Background
Multidisciplinary Design Optimization (MDO) can provide designers with the structured approach and mathematical formulations to further improve the performance of already mature solutions, and to support the exploration of innovative complex designs, fully considering interactions between disciplines [1]. Although the very first MDO implementations have been presented about 50 years ago, the discipline is not yet fully exploited at industrial level [2].

Some of the reasons for the limited exploitation of MDO in industry are:
1. Lack of adequately flexible, accurate and robust parametric models to support MDO using high fidelity simulations.
2. Limited availability of computation resources to solve complex problems of industrial interest.
3. Intrinsic complexity of such discipline and its mathematical foundations.
4. Lack in awareness and understanding of the many available MDO architectures and their specific suitability to problem of different nature.

Advances in knowledge-based parametric CAD modelling, e.g. Knowledge Based Engineering (KBE) applications [3], and robust pre-processing tools to support High Fidelity analysis seem to successfully address the first issue.

References