UNIVERSITY OF Southampton
School of Engineering Sciences

# Value Driven Design in the CRESCENDO Project

UTC for Computational Engineering
Hakki Eres and Jim Scanlan, CEDG, School of Engineering Sciences

## Introduction

Collaborative and Robust Engineering using Simulation Capability Enabling Next Design Optimisation (CRESCENDO) is a large-scale collaborative project funded by the Seventh Framework Programme of the European Union. The CRESCENDO consortium consists of 62 industrial and academic partners with a vast portfolio of experience and knowledge in aerospace engineering, software development, and information technologies.

The CRESCENDO project addresses specific targets of the aeronautical industry's strategic research agenda:

1. CRESCENDO will lay the foundations for the Behavioural Digital Aircraft (BDA). This will be based on the experience and results from the EU VIVACE project. The main components of the BDA are: the model store, the simulation factory, the quality laboratory, and the enterprise collaboration capabilities. The BDA will be validated through use cases and test cases concerning "Power Plant Integration", "Energy Aircraft", "Thermal Aircraft" and "Value Generation" design problems and viewpoints during the preliminary design, detailed design, and test and certification phases of a generic aircraft product life-cycle.
2. The BDA will become the new backbone for the European aerospace simulation world. This is considered a challenging area for research and innovation for the next decade. Hence, the CRESCENDO results will provide the aeronautics supply chain with the means to realistically manage and mature the virtual product in the extended/virtual enterprise with all of the requested functionality and components in each phase of the product engineering life cycle.
3. CRESCENDO will make its approach available to the aeronautics supply chain via existing networks, information dissemination, training and technology transfer actions.


Figure 1: Visualisation of the Airbus A350 XWB ©AIRBUS S.A.S. 2009.

## Value Driven Design

The main objective of the value driven design workpackage (WP2.2) within CRESCENDO is to test three major innovative mechanisms impacting value generation in preliminary design of any aerospace product, namely:

- Customer Expectations: Capturing, modelling, simulating and visualising the needs and expectations of the customer.
- Value Modelling: Identifying and modelling value aspects to enable trade off studies and impact analyses.
- Value Indicators for Product Development: Enabling engineering design and product development to be driven and evaluated with respect to customer value contribution.

WP2.2 will contribute to high-level objectives of the CRESCENDO project such as reduction of development lifecycle duration and cost, reduction in rework, and reduction in the cost of physical tests. The ambition is to identify, develop and test new work methods/processes and tools that enable organisations to make value a clear driver for development rather than a parameter for evaluation. The underlying intention being that better and alternative design decisions can be made as early as possible with resulting reduction in rework, lead-time, and cost.

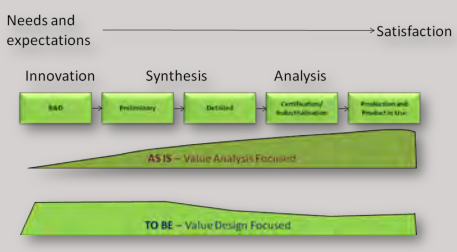


Figure 2: Value analysis to value design.

The Southampton UTC will investigate possible changes in the way product development is initiated by developing the following innovative mechanisms:

- To capture, model and understand customer's, and stakeholders, needs and expectations
- To incorporate the value dimension into preliminary design in the virtual extended enterprise
- To identify criteria and indicators that can be used in preliminary design studies that affect customer perceived value

The above will provide the BDA components with competitive methods and processes for capturing value generation in terms of models and simulation technology.
The developed solutions will be validated through the "Requirement Establishment and Value Generation" test case.

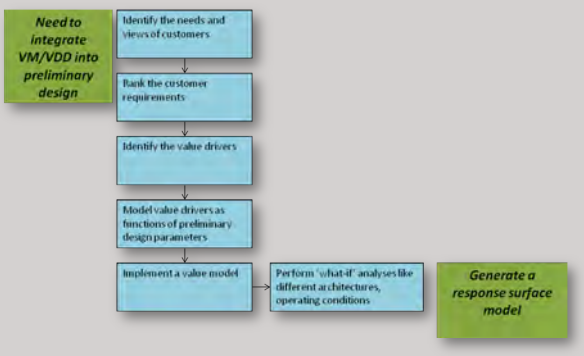


Figure 3: Workflow diagram of the test case scenario.

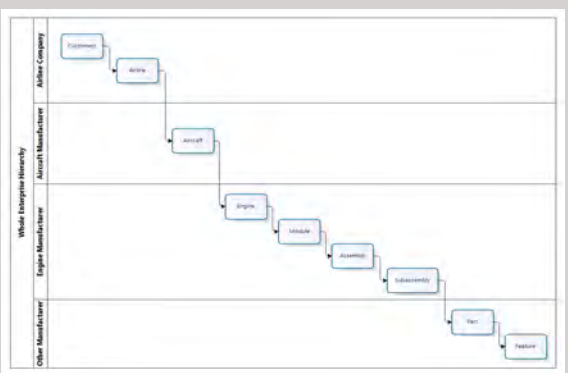


Figure 4: Whole enterprise hierarchy diagram.

## Acknowledgments

This work is supported by the CRESCENDO project (EU Seventh Framework Programme, Grant agreement no.: 234344).

**www.soton.ac.uk/ses/research/ced/posters.html** | email: j.p.scanlan@soton.ac.uk
Computational Engineering and Design Group, University of Southampton, SO17 1BJ, UK