Paper ID: 60074
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IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Engineering - Methods, Processes and Tools (1) (4A)

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VISION OF A NEXT-GEN CONCURRENT DESIGN FACILITY

Abstract

The past few years have seen a big surge and renovated interest in the space industry globally. In addition to the setup of numerous NewSpace startups and commercial ventures, multiple national space agencies have been stablished by countries which were traditionally not actively involved in the space domain. The Grand Duchy of Luxembourg is one such nation which has established Luxembourg Space Agency (LSA) to establish its presence in the future of space economy.

As an initiative to develop and attract the best talent for the growth of the space sector, LSA in partnership with the Interdisciplinary Center of Reliability and Trust (SnT) from the University of Luxembourg has started a Interdisciplinary Space Master (ISM) program. This ISM program is structured as an higher educational and research platform to prepare next generation of space scientists, engineering and entrepreneurs. As a part of the ISM program, the SnT research centre has established an advanced space system design facility with the goal to investigate and design futuristic space missions and space systems concepts. The design facility is based on the concurrent engineering methodology platform and is known as the Concurrent Design Facility at Luxembourg (CDF-LU). It is currently being applied in the educational research under the ISM program and is planned to be used in commercial research applications advancing the budding commercial space industry landscape in Luxembourg.

Concurrent design is a relatively new methodology where design happens by parallel execution of the involved disciplines instead of the conventional serial execution framework. Due to its apparent advantages in faster execution time and increased accuracy, concurrent design methodology is being adopted by various agencies (NASA, ESA, DLR, JAXA, etc.), organisations (Aerospace Corp, Airbus, Lockheed etc) and educational entities. Consequently, several CDFs have been established in past few decades in these entities which enable implementation of the concurrent design engineering.

The current paper provides the overview of the vision, capability, application, and product domains of the CDF-LU. A design case-study executed in the CDF-LI is also presented. The most significant features of CDF-LU with details of its hardware and software systems are provided. In addition the capability criteria index and system engineering methods and processes as applied in the CDF-LU are addressed. This paper thus outlines a strategic process on how to develop such an advanced research laboratory.