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EVALUATION OF THE LEARNING PROCESS OF A DATA-DRIVEN SYSTEMS ENGINEERING
METHODOLOGY IN A WORKSHOP ENVIRONMENT

Abstract

Since its official introduction by INCOSE in the “Systems Engineering Vision 2020” (2007), Model Based System Engineering (MBSE) has become a standard during the design process of complex systems and has brought about vast improvements compared to traditional, document-based engineering.

Nevertheless, MBSE tools can still become complex, in an effort to tackle the many problems faced by systems engineers. One of the main issues remains the handling of data and its propagation throughout the design, as the underlying calculations of the models are not continuously executed and therefore consistency between models, documents and simulations is not assured. To tackle this and other issues, an emerging approach was conceived to work beside MBSE that has huge potential to reduce complexity of the design process, enhance collaboration and significantly decrease necessary learning time: Data Driven System Engineering (DDSE). With DDSE, engineering data and associated structures, links and connections constitute the foundation of the systems engineering process. Data is constantly updated, shared and accessible from all the people involved in the design, while integrating and updating simulations and documents. The design is not a stack of separated inanimate objects, but a dynamic living organism, where all the parts contribute to the project: with DDSE, MBSE can realise its full potential.

With the rise of interest towards the use of satellites, and with the introduction of new actors, such as universities and other entities with limited access to previous designs and knowledge, it is necessary to produce a new software tool that fills the gap between the conceptual phase and the hardware design phase, allowing a clear view of the system for multiple users. This paper presents the main results of a workshop held for university students, to analyse their first impact with system engineering and with a newly defined browser-based software stack that is available to the engineers in this field. The research focuses on the comparison between DDSE and document based engineering during a case study, observing users’ reactions and their learning process, and collecting opinions about the usage of the software. A more in depth analysis of the software stack was presented at the International Astronautical Congress (IAC) 2018 in the work entitled “A Hardware Development Tool Stack for Future Space Exploration - Tool Selection Criteria” (Lindblad et al., 2018).