

IAF SPACE SYSTEMS SYMPOSIUM (D1)  
Space Systems Engineering - Methods, Processes and Tools (2) (4B)

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CASE STUDY: HOW THE NEW SPACE INDUSTRY IS SWITCHING TO DATA-DRIVEN  
ENGINEERING - FULL OVERVIEW FROM REQUIREMENTS ENGINEERING TO TESTING AND  
DOCUMENTATION: HOW TO WORK THE AGILE WAY ANNO 2021

### Abstract

This paper describes how the New Space industry is switching to data-driven engineering. A few examples of new space pioneers such as Momentus, OrbitFab and Nanoracks are showcased to demonstrate their motivations behind setting up a digital thread along the engineering lifecycle in its different phases. It exposes how New Space companies are organising their processes, and the reader is guided through the hardware development process in a chronological and data-driven fashion. Along the way, clear examples on how to implement these methods to improve their own processes are presented.

In the body of the paper, we summarize the best practices of setting up a modern digital engineering workflow by implementing Data-Driven Systems Engineering (DDSE). After learning how to set up the Technical Project Management processes, the reader gets a deepdive on Requirements Engineering: how to trace, break down, and prepare for verification. The true power of DDSE is highlighted by showcasing how verifications can be linked directly to requirements and the system design itself, as well as other advantages which are directly connected to the model. In a next step is exposed how to set up Design Studies and Manage Tradeoffs as the development progresses, leveraging data-driven methods to see the impact on the overall model immediately. Subsequently, Simulations are discussed: keeping technical data in a single source of truth while connecting simulation tools, with special highlight on the advantages of integrating the complete engineering toolchain and how to benefit from today's possibilities of digital handover of data between departments and their tools. Once the phase for Verification and Testing is reached, the engineering team can leverage all the work which has been done so far and the power of the full traceability of the digital thread is shown. One important example highlighted here is showing how automatic verification can be achieved directly on the model.

The ultimate objective is to educate engineers and managers building products both within the New Space industry, as well as inspire those active in traditional engineering organisations and equipping them with practical knowledge on how to implement novel engineering concepts.