**A practical guide to agile mission design and spacecraft development with Data-Driven Systems Engineering (DDSE)**

**(Thematic Area: TA2. Processes & Methodology)**

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1. **Introduction**

Traditionally, hardware design has been a sequential process, requiring a specific number of deliverables, often documents, because of complexity in the products involved. Given this complexity and the increase in advanced and interdisciplinary designs, the hardware design community is always looking at better ways of working and is currently reaching a limit to what is possible with current tools and processes. This is comparable to what happened in the software industry [1, 2], where similar problems had to be solved in the past decades. In an era of agile ways of working in the software industry, it is valuable to bring these approaches to hardware design and present the idea of agile space hardware and mission design following a Data-Driven Systems Engineering approach.

1. **Agile aerospace**

This paper provides insights on how to move towards “agile aerospace”, starting from how to plan and structure a team all the way through the lifecycle of a mission for each phase. Moving away from the sequential “Waterfall Model” to a concurrent “Agile Model”, has shown key advantages such as saving cost and time [3], while allowing for higher level of interdisciplinary complexity of the final product [4]. Benefits will be discussed for a development approach storing all data in a single source of truth for requirements engineering, concurrent design studies, early design phases, later design phases and configuration management, baseline management, connectivity to other tools, as well as planning and preparing for reviews.

1. **Practical guidelines to agile mission design and spacecraft development**

In a second step, the paper provides organisations in the space industry practical guidelines which can be followed to benefit from the advantages of agile methodologies, particularly following the Data-Driven Systems Engineering approach. Many of the challenges which we face in the space industry are similar in teams working on other types of complex hardware. Therefore, this offers a compilation of lessons learned from a wide variety of interdisciplinary engineering organisations, building spacecraft, rockets, drones, nuclear fusion reactors, and cars.

1. **References**

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