

Gapless verification with the „Digital Thread“ – state of the art and practical challenges

Modern space systems are increasingly complex and must meet stringent requirements to ensure safety and mission success. Towards this, regulations and standards such as ECSS define numerous technical requirements. However, essential questions around process dependencies and communication in the supply chain remain unanswered and are often the source of inconsistencies. For example: Were all requirements correctly refined and allocated in subsystems? Is the implementation complete and correct w.r.t. requirements? Are all assumptions and technical interfaces between different components and development teams consistent? Are design decisions consistently traceable? Answering these questions is usually time-consuming and costly and typically requires manual and error-prone intervention. The "Digital Thread" promises a solution by enabling continuous, automatic and consistent communication between all process steps, while also taking into account process dependencies. The idea is to create digital and semantic interfaces between stakeholders and process steps, and getting away from manual, oftentimes erroneous human communication. In this talk we shed more light on what is already possible today, and which challenges are remaining. Using concrete projects (NASA DART, Solar Orbiter, ...), we demonstrate the Digital Thread in action and the time and quality gains that were achieved.