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ENABLING SEAMLESS COLLABORATION IN AOCS/GNC ENGINEERING: COOPERANTS PROJECT'S APPROACH TO CONTINUOUS INTEGRATION AND VERIFICATION OF COMPONENT MODELS

Abstract

This publication introduces the groundbreaking COOPERANTS project, a collaborative initiative uniting industry, SMEs, and research institutions in the aerospace sector. Addressing critical challenges in digital collaboration, COOPERANTS establishes a shared data space based on Gaia-X standards. Focused on the Advanced Smart Services domain, the specific task, "Component Models for Continuous Integration and Verification," aims to revolutionize the digital exchange between component manufacturers and system integrators in the AOCS/GNC domain of the space industry.

The current lack of developments facilitating a continuous digital exchange for the development and integration of space systems has prompted COOPERANTS to take the lead. While the European Space Agency (ESA) is exploring initial steps with Electronic Data Sheets (EDS) for components, an accepted and final standard is yet to be defined. COOPERANTS seeks to bridge this gap by developing data structures and models, forming "Digital Twins," enabling the seamless exchange and integration of components throughout the development cycle.

The primary objective of this project is to establish a systematic foundation for creating and exchanging functional "Digital Twins". These facilitate the generation and configuration of equipment models for the development and validation of onboard software. These software models, crucial for numerical simulations across various stages of development (MiL, SiL, HiL), contribute to the continuous integration of the overall system.

The publication outlines the goals of the project, emphasizing the creation of a systematic basis for the generation and exchange of functional "Digital Twins." These models provide crucial insights into component behavior, accuracy, and potential error scenarios throughout the development cycle, significantly enhancing efficiency and reducing project costs and risks. The pilot project with a component manufacturer showcases the successful integration of component models into the development cycle, demonstrating the project's viability.

The proposed solution involves defining requirements, establishing interfaces and data structures for model and model-data exchange, and implementing a generic interface for exchanging individual model components. The process culminates in the execution of a pilot project. This publication provides an insightful overview of COOPERANTS' innovative approach and initial outcomes, paving the way for a new era of collaborative and digitally integrated space development.