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ASSESSMENT OF THE REALIZATION OF VALUE AND BENEFITS OF IMPLEMENTING AGILE
MBSE FOR ENTERPRISES IN THE NEWSPACE INDUSTRY

Abstract

In the fast-paced landscape of technology and innovation, achieving safety and rapid market delivery necessitates the quantification of digital resources to minimize risks and enhance the maturity level of technology and product development. Among established space agencies, MBSE maturity has been achieved through decades of customized and integrated practices, leveraging multiple tools and synchronized techniques. However, implementing MBSE in small satellite missions, such as CubeSat projects, presents challenges for university developers and start-up owners due to resource constraints. In the NewSpace ecosystem, where the demand for agile digital engineering is increasing, MBSE must be applied in a targeted, flexible, and effective manner. Prior research highlights that MBSE's comprehensive nature can limit agile attributes, which are critical for small teams and emerging enterprises. Our previous work proposes an objective-driven approach that aligns the lifecycle stage with core MBSE processes and activities. These phases serve as anchors for MBSE implementation, ensuring a structured framework that defines the objectives and scope of the model, facilitating measurable, achievable, and quantifiable applications. Additionally, the incremental nature of Agile, combined with the digital thread of MBSE artifacts, will be analyzed to establish metrics that evaluate digital engineering efforts against target objectives. This hybrid approach breaks down the MBSE process into measurable steps, providing indicators of sufficient system information to support decision-makers throughout the concept, production, space deployment, and operational phases. To maximize the utility of MBSE artifacts, a metric-driven modeling approach will align efforts with critical decision-making milestones. The inclusion of project managers, quality management, procurement, and production teams in the planning process is essential to achieving optimal results. However, these metrics may not serve as a one-size-fits-all solution, but rather as an effective organizational tool to meet stakeholder needs and ensure maximum utilization of technical resources. This study investigates whether Agile MBSE implementation, within organizational strategies, effectively meets the demands of the NewSpace industry by supporting both technical and operational frameworks. The assessment underscores the transformative potential of Agile MBSE, positioning it as a key methodology for evolving the NewSpace industry and enhancing enterprise-level digital engineering.