Paper ID: 96623
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32nd IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Constellations and Distributed Systems (7)

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KEYNOTE: INNOVATIVE SPACE FACTORY: TRANSFORMING SMALL SATELLITE PRODUCTION

Abstract

The National Recovery and Resilience Plan (PNRR) builds upon Italy's strong space economy, which allocates over 1 billion dollars to the sector and stands as the third-largest contributor to the European Space Agency. Italy maintains a complete and integrated supply chain that spans from space access to satellite manufacturing, consumer services, and academic research hubs, with activities spread across the national territory. The country's industrial framework includes key international players, complemented by the emergence of small and medium-sized enterprises, including start-ups and spin-offs, which offer remarkable opportunities for expansion. This dynamic ecosystem is structured into aerospace competence centers and technological districts, ensuring coordination, consultation, and the consolidation of expertise across the sector. Within this thriving national landscape, the development of an advanced Space Factory—leveraging Industry 4.0 technologies—aligns with efforts to enhance national capabilities mostly in Earth observation satellite constellations, particularly in the X-band and optical domains, and in the communication sector, including optical communication. The main purpose of the initiative is to increase manufacturing capabilities reducing the integration time in order to support the deployment of a constellation within a reduced time-frame. The envisioned Space Factory 4.0 could also serve as a hub for testing services tailored to the needs of both industry and research, utilizing a Function-as-a-Service (FaaS) model. This capability is considered particularly important for small and medium enterprises when it's not possibile to invest in infrastracture. The full paper explores the concept, development, and operational framework of this innovative Space Factory, designed for the engineering, manufacturing, integration, and testing (AIT) of space systems, from cubesat to small satellites, providing the status of the project close to the end. Organized as a distributed and collaborative infrastructure across Italy, it aims to optimize the nation's space sector for institutional and commercial applications. A key objective is to streamline satellite production and integration timelines by implementing advanced automation, digital workflows, enhanced efficiency strategies, and multiple production lines. This initiative positions Italy to play a leading role in developing large satellite constellations, primarily composed of small satellites but adaptable to broader applications. Ultimately, this project strengthens the nation's strategic space capabilities while aligning with the goals set by the national strategic plan for space activities.