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Lessons Learned in Space Systems: Achievements, Challenges, Best Practices, Standards. (5)

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STANDARDIZING CUBESAT INTERIORS: SAFEGUARDING MISSIONS AND ADVANCING THE MARKET

Abstract

In recent years, CubeSats have emerged as a disruptive innovation by democratizing access to space for academic teams, developing countries, and new commercial entities. The affordability and rapid delivery of CubeSats are key drivers for their increased popularity, leading many to turn to readily available from different vendors commercial-off-the-shelf components to reduce costs. However, the rising popularity of CubeSats underscores the paramount importance of system compatibility, which is hindered by the absence of standardization in interiors. This issue impedes the timely delivery of satellites and can even lead to mission failure. Therefore, exploring options for implementing and utilizing standards within the industry is critical, considering their potential benefits and the possibility of creating new market opportunities. Thus, this paper explores the role of international standards in enhancing the compatibility of CubeSat components and their influence on business processes and the innovation cycle. The research also considers insights into the feasibility and desirability of standardizing CubeSats' interiors gained by surveying stakeholders in academia, government, and private industry. The paper first scrutinizes a theory of the innovation cycle and the application of standards in enhancing systems interoperability across several advanced industries. These findings are further employed within the context of CubeSats manufacturing. The adequacy of current practices is then assessed, alongside the timing of introducing new standards for CubeSats, while considering the potential constraints on overall innovation in this field. Additionally, this paper explores the necessity of standards in the context of sustainability and the promotion of responsible manufacturing on Earth and utilization in space. Finally, the study addresses the issue of standards' non-binding nature and proposes viable strategies for implementing these interface requirements within the industry through international organizations and coordinated efforts among stakeholders. In conclusion, this paper presents findings regarding the influence of standardizing CubeSat interiors on mission assurance and the overall advancement of the market.