

57th IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE
ACTIVITIES (D5)

For a successful space program: Quality and Safety! (1)

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University of Toronto Aerospace Team (UTAT), CanadaASSESSING THE SUSTAINABILITY OF ARTIFICIAL INTELLIGENCE SYSTEMS DEPLOYED IN
OUTER SPACE**Abstract**

The integration of artificial intelligence (AI) into aerospace operations, including Earth observation, satellite navigation, and spacecraft autonomy, presents a dual imperative for the space industry. The potential to significantly enhance the efficiency and capability of a space mission encounters a complex landscape of ethical, legal, and environmental challenges. Though adept at evaluating the sustainability of various aspects of space missions, current frameworks do not address the unique demands of AI systems. This discrepancy becomes critical as the technology evolves more rapidly than the regulation by which it is governed, posing significant implications for risk management. To bridge this gap, we introduce a holistic methodology aimed at investigating factors affecting the training and development of AI in aerospace contexts. Rooted in the principles of responsible AI, this framework diverges from traditional regulatory approaches by offering a preemptive, adaptable assessment that maps the impacts of AI technologies throughout the entire Machine Learning Operations (MLOps) life cycle. By consolidating relevant themes from existing standards with insights from interviews with stakeholders from the public and private sectors, the assessment framework aims to catalyze a collaborative ecosystem amongst developers and regulators where there is shared responsibility for the sustainable development of AI in space. With this approach, our aim is to lay the groundwork for governance to evolve in tandem with technological advancements, ensuring the aerospace sector's adherence to ethical and sustainable practices.