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HOLISTIC SUBORBITAL-SPECIFIC OPERATION RISK ASSESSMENT METHODOLOGY.

Abstract

A traditional certification-centric approach (approving the design, issuing an airworthiness approval and type certificate) will take decades to expand suborbital flight. Therefore, an operation-centric, risk-based, and performance-based approach could be considered to accelerate the deployment of suborbital operations in the short and middle term. Experimental operational authorisations could be issued based on a holistic risk assessment process for space missions and operations, identifying and mitigating potential hazards. It would cover all phases of the missions: launch/Take-off, ascent, descent, re-entry/landing, and recovery. Moreover, it would consider ground, air, space, and crew risks. For this purpose, a methodology such as SORA (Specific Operation Risk Assessment), developed by JARUS (Joint Authorities for Rulemaking on Unmanned Systems) for Uncrewed Aerial Vehicles operations, could be considered as a framework that would include all natures of threats associated with a specified hazard, the relevant design, and the proposed operational mitigations for a specific operation. The SORA [] process follows a comprehensive safety risk management approach that examines all aspects of an operation and the potential risks involved. It takes into account various factors such as the environment, systems and equipment, personnel, and procedures to identify potential hazards and assess their likelihood and severity while defining the role and level of involved personnel, especially the crew, which would be crucial. Based on this evaluation, the SORA process then provides a set of proportionate requirements that must be met to ensure that the operation achieves a desired target Level of Safety (TLOS).

The proposal of a holistic suborbital-specific operation risk assessment methodology developed upon the SORA principles may support the authorisation of experimental suborbital operations integrating a balanced quantitative and qualitative approach to safety. It would consider factors like mission duration, crew safety, training, vehicle reliability, and external threats. It would emphasise the importance of a systematic approach to risk management to ensure the success and safety of experimental suborbital missions. When conducting a hazard analysis, it is important to consider additional factors such as System Safety Data, Configuration Management, Quality Assurance, and System Safety Data.