A Concept of Operations (ConOps) of an

In-time Aviation Safety Management System (IASMS) for Advanced Air Mobility (AAM)

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1. **Introduction**

The growth of new emerging operations involving Advanced Air Mobility (AAM) necessitates developing a perspective for an In-time Aviation Safety Management System (IASMS). This perspective advances from the National Academies report on IASMS and its recommendation for developing a Concept of Operations (ConOps) for IASMS. A ConOps has been developed for In-time System-Wide Safety Assurance (ISSA) from which the IASMS ConOps pivots to provide a robust scope commensurate with the broad vision defined by the National Academies.

The IASMS ConOps focuses on emerging operations and spans innovations in Unmanned Aircraft System (UAS) and an increasingly complex ecosystem comprised of a widening mix of vehicles and technologies, Urban Air Mobility (UAM) with industry-federated services, traditional operations, as well as new supersonic aircraft and space launch systems. The challenge for the IASMS ConOps is to be broad to encompass innovations in the coming years and decades while agile to ensure levels of safety compatible with operational and certification requirements of the National Airspace System (NAS).

The IASMS ConOps interweaves increasing complexity of operational safety capabilities and unlocking UAS Maturity Levels (UMLs). The relationships between increased complexity of automation and automated systems, fewer operators who are not as traditionally higher skilled, more complex operational environments, and aviation operations management with mixed aircraft and equipage pose a multi-dimensional space for IASMS capabilities essential for safety assurance and risk management.

Instantiating IASMS capabilities and how they would be integral to AAM operations and increasing maturity of UAM could be accomplished through a series of Safety Demonstrators. These Safety Demonstrators could provide increased understanding and insight into use of controls for risk mitigation, means of compliance for certification, and operational experience with safety services such as in relation to contingency management.

The IASMS capabilities can be viewed as initially residing with the vehicle, airspace, and Supplemental Data Service Provider (SDSP). For example, vehicle capabilities include communications including the command and control link, Remote Identification (ID), conflict advisory/alerting, and UAS system monitoring. These capabilities monitor and assess data such as battery health, aircraft state, and human performance.

Complexity of ISAMS capabilities depends on a number of factors. These factors are intended only as a notional categorization with the purpose being to reflect the complexity of the AAM ecosystem that would drive up the complexity of ISSA capabilities including systems, sensors, models, standards, and controls. Factors could include the Vehicle Flight Management, Environment, Airspace, and Contingency Management. Each of these factors can be comprised of multiple sub-factors that contribute to increasing complexity. For example, Airspace at a lower level of complexity could be dedicated to UTM operations that are unmonitored, and at a higher level of complexity could involve mixed UTM and ATM operations

The IASMS concept includes safety services that provide data and information to different participants in AAM. The roles and responsibilities of participants can be defined using the Responsible-Accountable-Consulted-Informed (RACI) analysis. For example, for the safety service involving the Remote ID, the Operator would be accountable for providing the data, the Vehicle would be responsible for transmitting it, and the USS, SDSP, Vertiports, FIMS (FAA), and Public Entities such as safety services would be informed by receiving the data.

The IASMS ConOps identifies the capabilities needed for risk mitigation and safety assurance in the increasingly complex national airspace. The ConOps serves as a pathway for engaging with industry to gain operational experience including through the Safety Demonstrator series, the RACI analysis, and operational complexity factors. The ConOps serves to integrate these different perspectives to build a cohesive and cogent approach to an AAM safety management system.