![UAST - UNMANNED AIRCRAFT SAFETY TEAM]

Unmanned Aircraft Safety Team (UAST)
Recommendations for using Safety Management Systems (SMS) in UAS Operations

Introduction

The Unmanned Aviation Safety Team (UAST) advocates the use of Safety Management Systems (SMS) for Unmanned Aircraft Systems (UAS) operations because using an SMS is a structured means for individuals and/or organizations to make informed safety risk management decisions. An SMS provides an accountable way to manage safety before a system failure occurs. In addition, an SMS can deliver increased confidence in risk controls through structured safety assurance processes. Finally, the safety promotion framework within an SMS can be used to build and support a sound safety culture.

A safety management system is composed of four functional components:

- Safety Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion

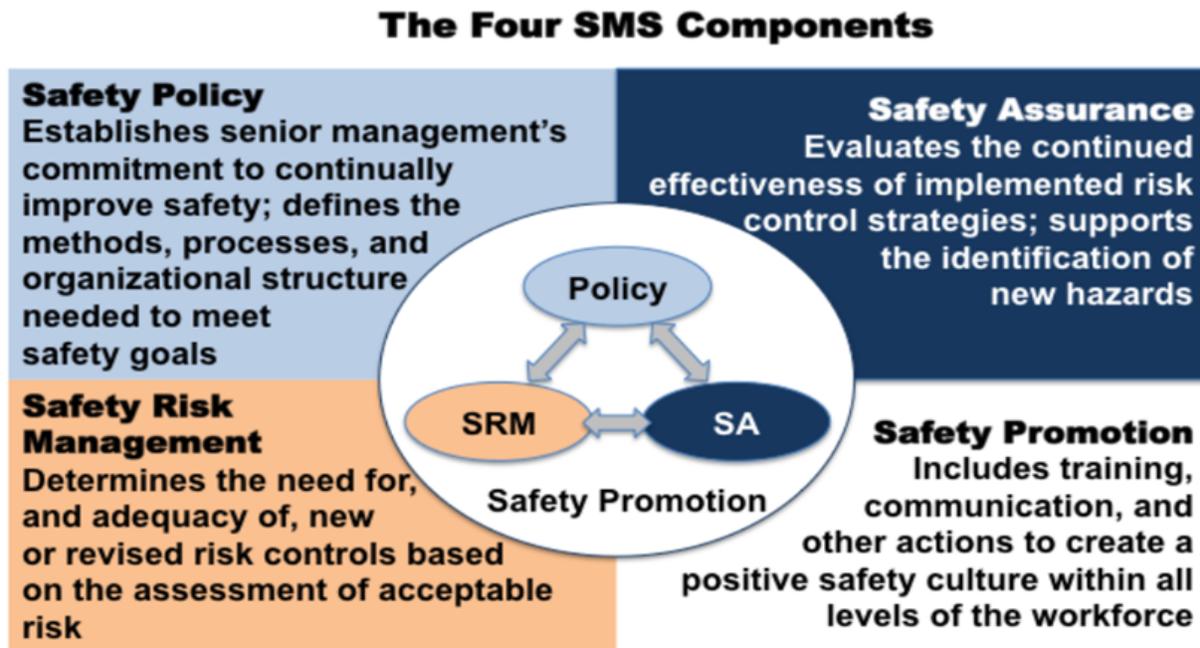The FAA definitions of each of the four components are found in the diagram below (See Fig 1.)

The Four SMS Components

Safety Policy
Establishes senior management's commitment to continually improve safety; defines the methods, processes, and organizational structure needed to meet safety goals

Safety Assurance
Evaluates the continued effectiveness of implemented risk control strategies; supports the identification of new hazards

Safety Risk Management
Determines the need for, and adequacy of, new or revised risk controls based on the assessment of acceptable risk

Safety Promotion
Includes training, communication, and other actions to create a positive safety culture within all levels of the workforce

Figure 1: FAA Safety Management System (SMS) Components

Purpose

This guidance and the recommended SMS frameworks that can be voluntarily used to develop formal safety-related systems, procedures and best practices for commercial Unmanned Aircraft Operations particularly when operating under CFR 14 Part 91, 107, or Part 135. This information fills the gap between the minimal operating regulations and the need for a uniform level of proficiency, training, and risk management based on the level of risk of the operation.

This guidance is a structured practical approach to establishing customized, proactive safety management systems which will help operators identify and mitigate risks for 3 different levels of operational complexity: Low, Medium and High. The following SMS guidance may be followed in a modular fashion, or, in its entirely. Broad use and acceptance have the potential to help build public trust and acceptance in the technology and in the organizations striving to improve safety.

The recommendations that follow are derived from regulatory and advisory documents, accredited industry standards, and recognized international standards for unmanned aircraft operations. The FAA regulatory source documents are included in the Addendum section of this document, and other standards references include ISO, ASTM, ANSI, NIMS, NFPA, OSHA, RTCA, ICAO, IEEE and more. Therefore, following this guidance will help commercial operators of all sizes, with varying scopes of operations, to use broader methods in executing best-in-class safety practices.

SMS Frameworks

The UAST has identified 3 different levels of operational complexity and risk: Low, Medium and High (See Fig 2 below). Low Complexity Operations will benefit from a Basic SMS which is designed to help inform the operator how to prepare and act safely.

Medium Complexity Operations will benefit from building on a Basic SMS to establish an Intermediate SMS which is designed to help standardize safety throughout the operator's organization.

High Complexity Operations can benefit from being guided by an Advanced SMS that is built upon the foundation of an organization's Intermediate SMS and is designed to help a UAS operator to continuously improve safety within their organization.

Figure 2: UAST Safety Management System Guidance Framework Chart

Low Complexity Operations:

A. **The UAST recommends that operations conducted under the following conditions should be classified as Low Complexity Operations (LCO):**

   A.1. Routine operations in accordance with FAR Part 107 without a waiver requirement.

   A.2. Routine operations in controlled airspace at or below standard pre-approved altitudes on the facility maps using UAS LAANC or approved authorization methods.

Building Safety from the Ground

Operational Risk

ADVANCED

INTERMEDIATE SMS

BASIC SAFETY MANAGEMENT SYSTEM
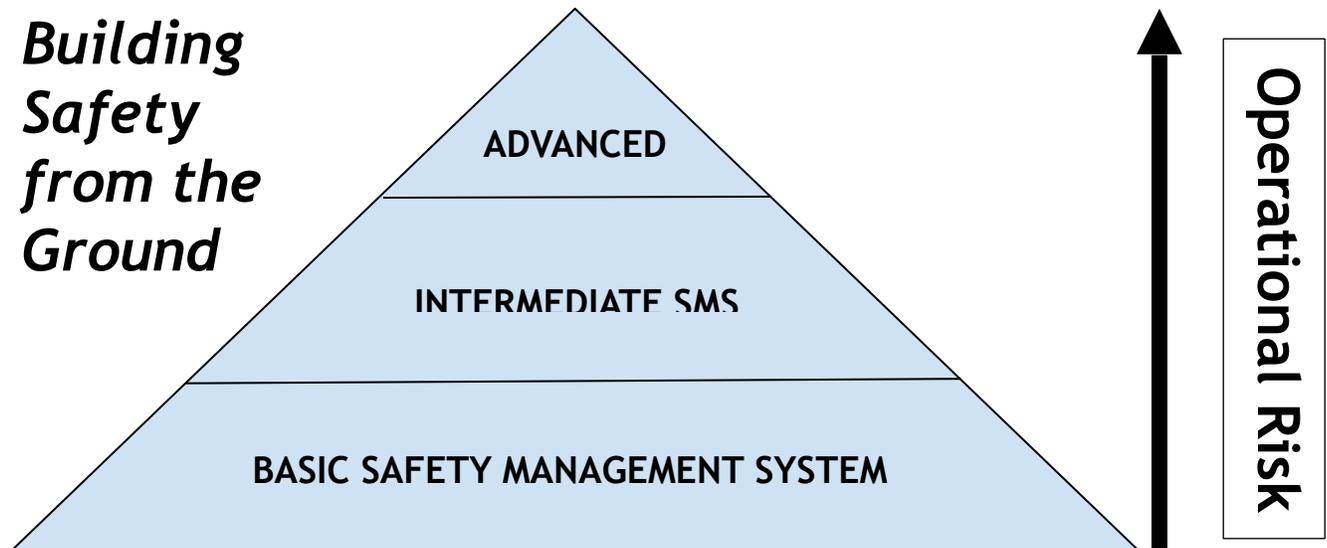
A.3. Operations that are not carried out under any of the conditions mentioned in the following sections involving "Medium" or "High Complexity Operations."

SMS Framework Recommended for LCOs: BASIC: The "Basic" SMS Framework suggests the following actions be implemented within each of the SMS components (which are underlined below) to mitigate the lower levels of risk typically found in these types of operations:

Safety Policy:

1. The operator adheres to an organizational safety policy or follows documented safety principles.

Safety Risk Management:

1. The operator is trained and competent in operating their UAS equipment.

2. The operator understands the airspace risks associated with the area of operation and has a collision avoidance plan.

3. The operator has operating procedures and checklists, for normal/abnormal/ emergency situations

4. The operator conducts a job safety assessment for every operation.

5. The operator has appropriate safety equipment for the type of operations:

5.1. The equipment is located in the appropriate location to respond to the emergency (on and/or off base).

5.2. Equipment is appropriate for operational tasks and identified hazards.

5.3. Equipment is in good condition, within validity dates and operational.

6. The operator has a process to ensure access to safety equipment.

7. The operator has an emergency response plan to deal with immediate actions following a mishap, injury, fly-away, etc.

Safety Assurance:

1. The operator maintains a list of potential hazards and reviews past performance on a regular basis.

2. The operator records all accidents and incidents.

3. The operator has a system in place to support required reporting of accidents and incidents.

Safety Promotion:

1. The operator has, or has participated in, a safety training program.

Medium Complexity Operations:

B. The UAST recommends that operations conducted under the following conditions fall into the Medium Complexity Operations (MCO):

B.1. Non-continuous operations in accordance with FAR Part 107 that require a Beyond Visual Line of Sight (BVLOS) and/or Operation over People waiver and/or airspace authorization/waiver (except LAANC).

B.2. Routine operations in accordance with FAR Part 91 using a Special Airworthiness Certificate or Type Certificate.

B.3. Routine operations involving critical infrastructure inspections and industrial sites.

B.4. Operations which require an exemption under the Special Authority for Certain Unmanned Systems (49 U.S.C. §44807).

B.5. All Public Safety operations (PD, FD, SAR, Disaster Response, etc.).

SMS Framework Recommended: INTERMEDIATE: The "Intermediate" SMS Framework suggests that operators understand Safety Management, adhere to ALL components of the previously described "Basic SMS," and that the following actions to mitigate risks typically found in increasingly complex operations are in place:

Safety Policy:

1. The operator has a documented "Just Culture" statement and philosophy for safety reporting.

2. The operator keeps a document library of the relevant records and reports mentioned in all SMS component areas (i.e. relevant Material Safety Data Sheets).

Safety Risk Management:

1. The operator has a documented Emergency Response Plan (ERP) appropriate for each type of operation conducted available at all locations.

2. The operator has supporting Quick Reference Checklists (QRCs) for each ERP.

3. The operator has contact numbers and persons in its QRCs or another source.

4. The operator tests their ERP once per year (self-declaration).

Safety Assurance:

1. The operator maintains safety assessments for hazard and risk tracking.

2. The operator maintains a master hazard and risk register.

3. The operator retains all records and reports for at least 2 years.

Safety Promotion:

1. The operator has a system to report safety hazards and risks both anonymously and open.

2. The operator provides briefing and training on appropriate ERP to their crews.

3. The operator has a documented illustration of what needs to be reported to the FAA/NTSB and within appropriate timeframes.

High Complexity Operations

C. The UAST recommends that operations conducted under the following conditions fall into the High Complexity Operations (HCO) category:

C.1. Ongoing operations in accordance with FAR Part 107 that require a Beyond Visual Line of Sight (BVLOS) and/or Operation over People waiver and/or airspace authorization (except LAANC) or under Part 135.

C.2. Operations categorized as Group 3 risk by JO 8130.34D (in the U.S.).

C.3. Operations under the "certified" category, as defined by EASA.

C.4. Critical infrastructure inspections and industrial sites

C.5. Operations in toxic, noxious, flammable or explosive environments.

C.6. All counter UAS operations, particularly around aircraft landing areas.

SMS Framework Recommended: ADVANCED: The "Advanced" SMS Framework is recommended to identify and mitigate risks associated with these "HCO" types of operations. This framework suggests that operators use all of the components found in the "Intermediate" SMS to develop and draft a formal Safety Management Manual (or, at a minimum, a dedicated section of their operations manual devoted to safety). This document will establish accountability and will ensure that all four of the safety components (*Safety Policy, Safety Risk Management, Safety Assurance, and Safety Promotion*) previously developed in the "Basic" and "Intermediate" phases are formalized, documented, and tracked within a single source that also includes, but is not limited to the following:

1. A statement of management commitment and responsibility.

2. Safety accountabilities.

3. A safety manager role and responsibility.

4. A safety committee (roll and responsibilities if applicable).

5. Safety meetings schedule.

6. A safety reporting process (documents).

7. A policy for continual improvement and change management.

8. Policy and process for monitoring and tracking safety performance.

9. Continuous improvement strategies.

10. Safety training and education.

11. Safety communications.

12. Records accidents and incidents in accordance with industry standards.

Conclusion:

The UAST welcomes any feedback by UAS operators, manufactures and service providers regarding this recommended guidance. Continuous improvement is a goal for any SMS, and continually improving this important guidance is a goal of the UAST.

Addendum: SMS Reference Documents:

Listed below, <u>in order of hierarchy of authorship</u>, are foundational resources for use in the development and implementation of an SMS:

- International Policy (International Civil Aviation Organization; ICAO)

  - [ICAO Annex 19](#) – Link to more information and a downloadable Executive Summary

  - [Overview of ICAO Annex 19](#) (PDF) (Presentation)

  - [Safety Management Manual (SMM) – Doc 9859](#) – Link to with more information on how to obtain guidance material on safety management principles and concepts, State Safety Program, and SMS

- National Policy

  - [United States State Safety Program (SSP) Document](#) (PDF)

  - [FAA Order 8000.369B, Safety Management System](#)

  - [FAA Order 8040.6 - Unmanned Aircraft Systems Safety Risk Management Policy](#)

  - [FAA Order VS 8000.370, Aviation Safety (AVS) Safety Policy](#)

  - [FAA Order VS 8000.367, Aviation Safety (AVS) Safety Management System Requirements](#)

- Air Operators/MROs/Flight Training (Oversight by Flight Standards)

  - [AC 120-92B – Safety Management Systems for Aviation Service Providers](#)

  - [CFR Part 5](#)

  - The SMS Implementation Guide and the SMS Voluntary program guide are available through the Flight Standards Information Management System (FSIMS).