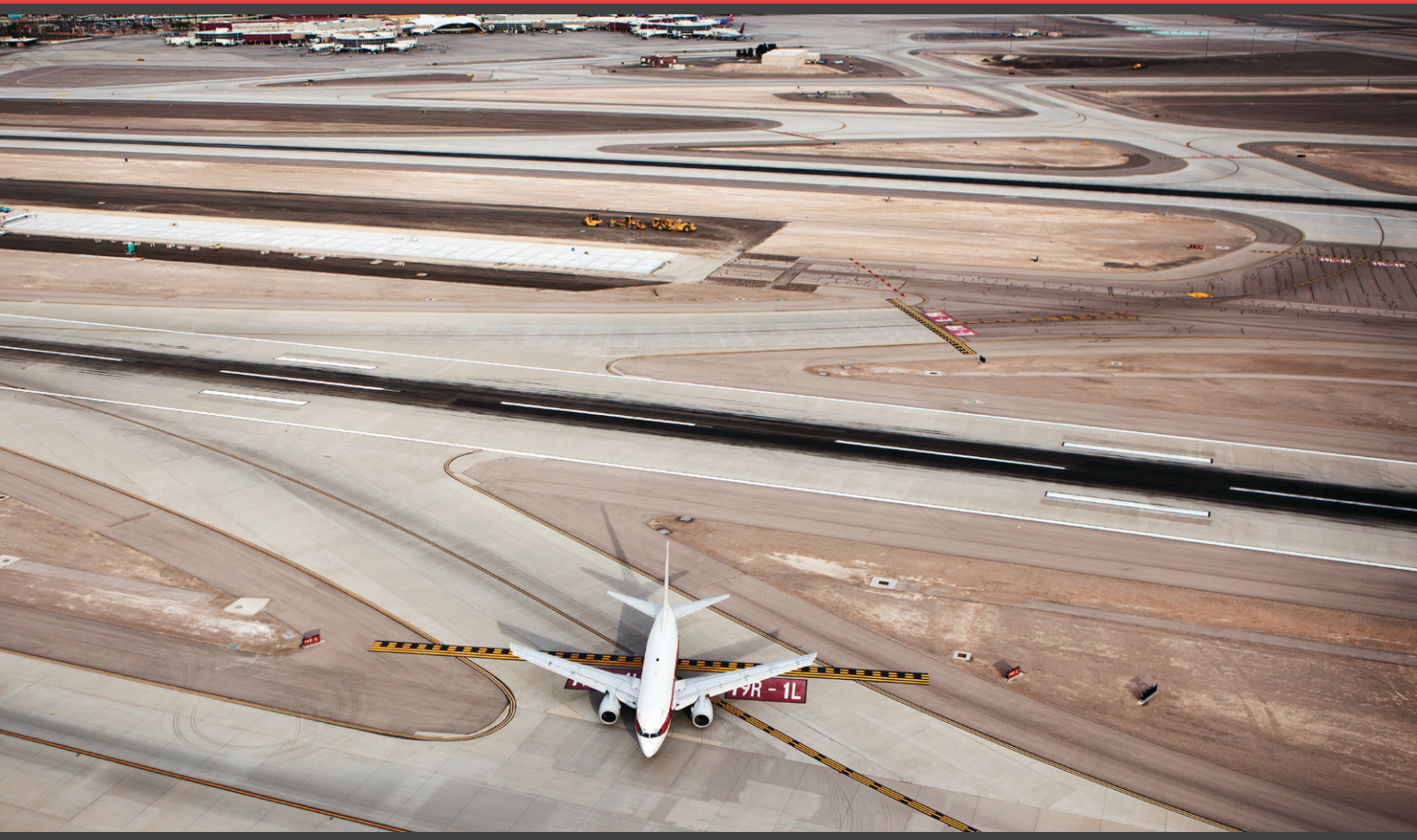
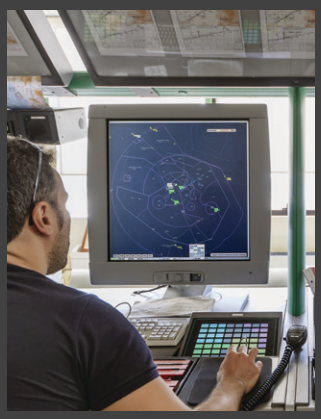
PRACTICAL SAFETY MANAGEMENT SYSTEMS

SECOND EDITION





The practical guide to transforming your safety program into a functioning safety management system

PAUL R. SNYDER & GARY M. ULLRICH

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by Paul R. Snyder and Gary M. Ullrich

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INTRODUCTION

PRACTICAL SAFETY MANAGEMENT SYSTEMS provides an up-to-date practical guide to transform your safety program, regardless of size and scope, into a functioning safety management system (SMS). This book moves beyond the theoretical discussion and engages you through hands-on exercises designed to apply SMS concepts and principles to your organization.

The International Civil Aviation Organization (ICAO) requires that an SMS address safety risk in air operations, maintenance, air traffic services, and airports. These ICAO requirements have been expanded to include flight training and the design and production of aircraft. SMS has literally affected all areas of the aviation industry worldwide, including independent contractors who provide services to the aviation industry.

The FAA published the long awaited 14 CFR Part 5 "Safety Management Systems" on January 8, 2015. The rule went into effect on March 9, 2015, requiring all Part 121 certificate holders to develop and implement an SMS within their organizations. Additionally, the new Part 5 cancelled the SMS Pilot Project and created the SMS Voluntary Program (SMSVP), based on the SMSVP Standard. The SMSVP meets "state" recognition requirements as defined in ICAO Annex 6. Any organization that wants to voluntarily implement a program must meet the SMSVP Standard if they want to implement an SMS accepted by the FAA. This textbook covers the requirements for both Part 5 and the SMSVP Standard.

Many profess to have an understanding of SMS, yet very few organizations have practical hands-on experience in applying SMS concepts for their particular organization. The SMS must be tailored to meet the size and scope of each organization. An SMS is a systematic approach to managing safety, including the necessary organizational structure, accountabilities, policies, and processes of each organization. It cannot be purchased from an outside vendor and placed on a shelf, but must be adapted to each organization and continuously improved to meet the mission of the organization while reducing risk to the lowest practical level.

ABOUT THE AUTHORS

Paul R. Snyder

Professor Snyder is an assistant professor for the John D. Odegard School of Aerospace Sciences at the University of North Dakota (UND). He continues to be active in aviation education with previous experience as an FAA Designated Pilot and Instructor Examiner, an OEM certified Insitu ScanEagle UAS pilot, and UND Chief Flight Instructor. As a DOT-certified SMS trainer, Professor Snyder is an active member of UND Executive SMS Committee and Events Review Team (ERT), analyzing flight data and conducting safety risk assessments to reduce risk within the organization. He has been a leader in working with the FAA to be recognized as meeting active conformance for UND's Part 141 Pilot School and Part 145 Maintenance Repair Station under the FAA SMS Voluntary Program.

Professor Snyder also actively teaches safety management systems, aviation safety, unmanned aircraft systems, and various advanced flight courses for the UND. Related research activities include FAA Industry Training Standards (FITS) scenario-based training, human factors considerations of UAS procedures and control stations, UAS beyond visual line of sight, UAS test site collection and analysis, UAS parameters, exceedance, and recording rates for ASIAS. He holds a degree in Aeronautical Studies and Master of Science in Educational Leadership.

Gary M. Ullrich

Before joining the University of North Dakota, Professor Ullrich was a test group pilot for FlightSafety, adjunct assistant professor for Embry Riddle Aeronautical University, and Chief of Safety/Instructor/Evaluator Pilot with the United States Air Force. While at FlightSafety, he helped to create their ISO 9001 program.

Professor Ullrich joined UND Aerospace in 2006. In 2014, he helped UND Aerospace achieve their FAA-recognized SMS Level 3 status. He currently teaches aviation safety, safety management systems, aircraft accident investigation, advanced aerodynamics, and long range navigation and international procedures. He is a commercial pilot with multi-engine, instrument, and Boeing 720/707 type ratings.

Both Paul R. Snyder and Gary M. Ullrich were co-recipients of the University Aviation Association's *2017 John K. Lauber Safety Award* in recognition of outstanding achievement to aviation safety.

CHAPTER 1

Overview and History of Safety Management Systems

OBJECTIVES

- Define the definition of Safety Management System (SMS).
- Recall the history which led to the international requirement for an SMS Program.
- Describe the United States statuary requirement to establish an SMS Program.
- Explain the history of the SMS Pilot Programs.
- Summarize the important parts of 14 CFR Part 5.
- List and define the three levels of the SMS Voluntary Program (SMSVP).
- Recall the four components of SMS.

KEY TERMS

- 14 CFR Part 5
- FAA Certificate Management Team (CMT)
- ICAO Annex
- ICAO Standards and Recommended Practices (SARPs)
- International Civil Aviation Organization (ICAO)
- Safety Assurance (SA)
- Safety Management System (SMS)
- Safety Policy
- Safety Promotion
- Safety Risk Management (SRM)
- SMS Pilot Project
- SMS Voluntary Program (SMSVP)
- SMSVP Active Applicant
- SMSVP Active Conformance
- SMSVP Active Participant

WHAT IS SMS?

A **safety management system (SMS)** is the formal, top-down, business-like approach to managing safety risk, which includes a systemic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures.

Safety management systems are becoming a standard throughout the aviation industry worldwide. SMS is recognized by the **International Civil Aviation Organization (ICAO)**, the Civil Aviation Authority (CAA), the Interagency Planning Office (IPO), and many product and service providers as the next step in the evolution aviation safety. SMS is also becoming a standard for the management of safety beyond aviation. Similar systems are used in the management of other critical areas such as quality, occupational safety and health, security, and environment.

Safety management systems for product/service providers (certificate holders) and regulators integrates modern safety risk management and safety assurance concepts into repeatable, proactive systems. SMS emphasizes safety management as a fundamental business process to be considered in the same manner as other aspects of business management.

By recognizing the organization's role in accident prevention, an SMS provides:

- A structured means of safety risk management **decision-making**.
- A means of demonstrating safety **management capability** before system failures occur.
- Increased confidence in **risk controls** though structured safety assurance processes.
- An effective interface for **knowledge sharing** between regulator and certificate holder.
- A safety promotion framework to support a sound **safety culture**.

Technology and system improvements have made great contributions to safety. Part of being safe is about attitudes and paying attention to what your surroundings are telling you. Whether through data or through the input of employees and others, recognizing that many opportunities exist to stop an accident is the first step in moving from reactive to predictive thinking.

Safety begins from both the top down and the bottom up. Everyone from the receptionist, ramp worker, pilot, supervisors, managers, the chief executive officer, and FAA Inspector has a role to perform.

SMS is all about safety-related decision-making throughout the entire organization. Thus it is a decision-maker's tool, not a traditional safety program separate and distinct from business and operational decision-making. It can be a complex topic with many aspects to consider, but its defining characteristic is that it is a decision-making system. An SMS does not have to be an extensive, expensive, or sophisticated array of techniques in order to do what it is supposed to do. Rather, an SMS is built by structuring safety management around four components:

- **Safety policy**;
- **Safety risk management (SRM)**;
- **Safety assurance (SA)**; and
- **Safety promotion**.

Safety Policy

Safety policy consists of setting objectives, standards, and assigning responsibilities. It is also where management conveys its commitment to the safety performance of the organization to its employees. As SRM and SA processes are developed, the organization should come back to the safety policy to ensure that the commitments in the policy are being realized and that the standards are being upheld.

Safety Risk Management

The SRM component provides a decision-making process for identifying hazards and mitigating risk based on a thorough understanding of the organization's systems and their operating environment. SRM includes decision making regarding management acceptance of risk to operations. The SRM component is the organization's way of fulfilling its commitment to consider risk in their operations and to reduce it to as low a level as possible. In that sense, SRM is a design process, a way to incorporate risk controls into processes, products, and services, or to redesign controls where existing ones are not meeting the organization's needs.

Safety Assurance

SA provides the organization with the necessary processes to give confidence that the systems meet the organization's safety objectives and that mitigations or risk controls developed under SRM are working. In SA, the goal is to watch what is going on and review what has happened to ensure that objectives are being met. Thus, SA requires monitoring and measuring safety performance of operational processes and continuously improving the level of safety performance. Strong SA and safety data analysis processes yield information used to maintain the integrity of risk controls. SA processes are thus a means of ensuring the safety performance of the organization, keeping it on track, correcting it where necessary, and identifying needs for rethinking existing processes.

Safety Promotion

The last component, safety promotion, is designed to ensure that an organization's employees have a solid foundation regarding their safety responsibilities, the organization's safety policies and expectations, reporting procedures, and a familiarity with risk controls. Training and communication are the two key areas of safety promotion.

An SMS does not have to be large, complex, or expensive in order to add value. If there is active involvement by the operational leaders, open lines of communication up and down the organization and among peers, vigilance and assurance that employees know that safety is an essential part of their job performance, the organization will have an effective SMS that helps decision makers at all levels.

EVOLUTION OF SAFETY MANAGEMENT

Safety management systems are the product of a continuing evolution in aviation safety. Early aviation pioneers had little safety regulation, practical experience, or engineering knowledge to guide them. Over time, careful regulation of aviation activities, operational experience, and improvements in technology have contributed to significant gains in safety. Next came the second major phase of safety improvement, a focus on individual and crew performance known as "human factors," which further reduced accidents.

The history of progress in aviation safety can be divided into three areas: the technical era, the human factors era, and the organizational era (Figure 1-1).

Figure 1-1 Evolution of safety.

The Technical Era—From the Early 1900s Until the Late 1960s

Aviation emerged as a form of mass transportation where known safety deficiencies were initially related to technical factors and technological failures. The focus of safety endeavors was placed on the investigation and improvement of technology. By the 1950s, improvements had led to a gradual decline in the frequency of accidents. Safety processes were broadened to encompass regulatory compliance and oversight.

The Human Factors Era—From the Early 1970s Until the Mid-1990s

In the early 1970s, the frequency of aviation accidents was significantly reduced because of major technological advances and enhanced safety regulations. Aviation became a safer mode of transportation, and the focus of safety endeavors was extended to include human factors.

Despite the investment of resources in error mitigation, human performance continued to be cited as a recurring factor in accidents. The application of human factors science tended to focus on the individual, without fully considering the operational and organizational context. It was not until the early 1990s that it was first acknowledged that individuals operate in a complex environment with multiple factors potentially affecting behavior.

The Organizational Era—From the Mid-1990s to the Present Day

During the organizational era, safety began to be viewed from a systemic perspective, encompassing organizational factors in addition to human and technical factors. It considered the impact of organizational culture and policies on the effectiveness of safety risk controls. Additionally, a new, proactive approach to safety supplemented traditional data collection and analysis efforts, which had been limited to the use of data collected through investigation of accidents and serious incidents. This new approach is based on the routine collection and analysis of data using both proactive as well as reactive methodologies, meant to monitor known safety risks and detect emerging safety issues. This monitor-and-detect logic is the core of a modern SMS approach.

Each development has led to significant gains in safety. Even with these significant advances, however, we still have opportunities to take preventative action against accidents. The question for the aviation community is, "what is the next step?"

Careful analysis typically reveals multiple opportunities for actions that could have broken the chain of events and possibly prevented an accident. These opportunities represent the organization's role in accident prevention. The term "organizational accident" was developed to describe accidents that have causal factors related to organizational decisions and attitudes. SMS is an approach to improving safety at the organizational level.

WHY DO WE NEED SMS?

We are now in a time where accidents are diminishing in number. While it's a major success story, it's not a place to rest. When we find a cause of an accident that affects all of or part of a large population of operators or other aviation participants, we can address risk through rulemaking—a risk control that applies to everyone to address risks to which everyone is exposed. There will always be some of these risks and work will continue to find them and address them.

Many accidents that occur, however, are caused by the unique aspects of the operating environments of individual operators in narrow segments of the aviation community. The causal factors of these accidents aren't common to everyone; they must be found and addressed with methods that are sensitive to the nuances of the individual's situation. One of the defining characteristics of an SMS is its emphasis on risk management within the individual's environment and situation—it's a gap filler between the common risk factors that are addressed by traditional regulations and those that are more elusive.

HOW SMS ADDRESSES AN ORGANIZATION'S ROLE IN SAFETY

SMS requires an organization to examine its operations and the decisions around those operations. SMS allows an organization to adapt to change, increasing complexity, and limited resources. SMS also promotes the continuous improvement of safety through specific methods to predict hazards from employee reports and data collection. Organizations then use this

information to analyze, assess, and control risk. Part of the process includes the monitoring of controls and of the system itself for effectiveness. SMS helps organizations comply with existing regulations while predicting the need for future action by sharing knowledge and information. Finally, SMS includes requirements that enhance the safety attitudes of an organization by changing the safety culture of leadership, management, and employees. All these changes are designed to move an organization from reactive thinking to predictive thinking.

FLIGHT STANDARDS VOLUNTARY SMS PILOT PROJECTS (2007–2015)

The FAA Flight Standards organization conducted voluntary **SMS Pilot Projects** for external SMS, specifically for operators and product/service providers. Approximately 130 voluntary pilot project participants realized substantial safety and financial benefits through their development of a voluntary SMS.

There were three primary objectives of the SMS Pilot Projects:

- **Develop implementation strategies**;
- **Develop oversight interfaces**; and
- **Gain experience for FAA and service providers**.

Members of the voluntary SMS Pilot Project provided a two-way communication mechanism between the SMS Program Office and participants in voluntary implementation. It also provided a forum for knowledge sharing among participants. Pilot Project participants shared best practices and lessons learned with each other and the FAA SMS Program Office.

The SMS Pilot Project contained five levels (Figure 1-2) for the SMS journey. Level 0 was the entry point. Level zero was not so much a level as a status. It indicated that the service provider has not started formal SMS development or implementation. It indicated the time period between a service provider's first request for information from the FAA on SMS implementation and when the service provider's top management committed to implementing an SMS.

Figure 1-2 SMS Pilot Project: five levels of SMS implementation.

Level four status was a result of full implementation of all SMS components. At this point, processes were in place and their performance and effectiveness was verified. The complete SA process, including continuous monitoring, and the remaining features of the other SRM and SA processes were functioning. Level four became the major objective of any successful SMS to attain and, better yet, maintain for the life of the organization. The FAA Program Office conducted the external audits and issued a "Letter of SMS Recognition" at the successful completion of each audit.

AIRPORT SMS PILOT STUDIES

FAA Airports also initiated a number of airport SMS pilot studies to evaluate the development and implementation of SMS at airports of varying size and complexity. The pilot studies also allowed airports and the FAA to gain experience establishing airport-specific SMSs that were tailored for the individual airport.

More than twenty airports participated in the first round of the pilot studies, which were initiated in April 2007. The FAA published a presentation summarizing the findings of the first round in October 2008. In July 2008, FAA Airports initiated a second round with nine airports to focus on the development of SMS in our nation's smaller certificated airports. The FAA concluded the second round of studies and issued a final report on the combined pilot study findings.

In December 2009, the FAA initiated a Part 139 SMS Implementation Study to examine how airports implement SRM and SAv components throughout their airfield environment. Eligibility for the study was limited to airports that participated in the first or second studies. Fourteen airports participated.

14 CFR PART 5: SAFETY MANAGEMENT SYSTEMS

The long awaited **14 CFR Part 5 Safety Management Systems** rule was published on January 8, 2015. After the standard sixty-day waiting period, the rule became effective March 9, 2015, requiring all 14 CFR Part 121 certificate holders to develop and implement a safety management system within their organizations. This Part 5 rule mandated that SMS be required for all Part 121 certificate holders within six months from the effective date. Additionally, the SMS Pilot Program was cancelled.

All other certificate holders who choose to implement SMS continue to do so under the **SMS Voluntary Program (SMSVP)** using the SMSVP Standard. One of the primary differences between the SMSVP Standard and Part 5 is that the dates for implementation plan submission, approval, and acceptance (specified in §5.1) do not apply to those that are implementing SMS under the SMSVP.

Figure 1-3 Transition from the SMS Pilot Project to the SMS Voluntary Program.

A certificate holder may develop and implement an SMS in any manner it deems appropriate. When a certificate holder requests FAA recognition of its SMS, however, an implementation plan is submitted to the **Certificate Management Team (CMT)** for validation against the SMSVP Standard.

SMS VOLUNTARY PROGRAM

The SMSVP Guide (AFS-900-002-G201) replaced the five SMS Pilot Program levels with three new SMSVP levels:

1. **SMSVP Active Applicant.** The certificate holder and CMT have committed to sufficiently support the SMS implementation and validation processes.
2. **SMSVP Active Participant.** The certificate holder officially begins and maintains its implementation efforts. The certificate holder receives an acknowledgment letter.
3. **SMSVP Active Conformance.** The CMT and the SMS Program Office (SMSPO), located in Washington D.C., acknowledge full implementation of the certificate holder's SMS. The certificate holder receives an acknowledgment letter. The certificate holder is expected to use and continually improve their safety management processes.

Note: The SMSVP Guide is not publicly available for download. Contact your local FSDO for the most current edition.

THE INTERNATIONAL MANDATE FOR SMS

To fully understand international aviation operations, including aviation safety and policy, one needs to understand the ICAO and U.S. involvement with this organization.

World War II had a major impact on the technical development of aircraft, compressing twenty-five years of peacetime development into six years. There were many political and technical problems to resolve in support of a world at peace. Safety and regularity in air transportation made it necessary for airports to install navigational aids (NAVAID) and weather reporting systems. Standardization of methods for providing international services was vital to preclude unsafe conditions caused by misunderstanding or inexperience.

The ICAO established standards for air navigation, ATC, personnel licensing, airport design, and many other important issues related to air safety. Questions concerning the commercial and legal rights of developing airlines to fly into and through the territories of another country led the U.S. to conduct exploratory discussions with other allied nations during early 1944. On the basis of these talks, allied and neutral states received invitations to meet in Chicago in November 1944. The outcome of this Chicago Convention was a treaty requiring ratification by twenty-six of the fifty-two states that met. By ratifying the treaty, the contracting states agreed to pursue certain stated objectives, assume certain obligations, and establish the international organization that became known as the ICAO.

As a charter member of the ICAO, the U.S. has fully supported the organization's goals from its inception, especially its concerns with aviation safety. Through active support and participation in the ICAO, the FAA strives to improve worldwide safety standards and procedures.

The ICAO and the ICAO Annexes

Through international agreements, the **ICAO Annexes** identify the **standards and recommended practices (SARPs)** for all member nations to follow. Although the ICAO Annexes, or SARPs, are not mandatory, failure to follow ICAO recommendations can result in the expulsion from the ICAO as a member nation. The ramifications of losing membership to the ICAO would be economically disastrous to any nation.

The following are descriptions of the nineteen ICAO Annexes:

1. **Personnel Licensing.** Provides information on licensing and medical standards for flight crews, air traffic controllers, and aircraft maintenance personnel.
2. **Rules of the Air.** Contains rules relating to conducting visual and instrument flight.
3. **Meteorological Service for International Air Navigation.** Mandates rules for meteorological services for international air navigation and reporting of meteorological observations from aircraft.
4. **Aeronautical Charts.** Details specifications for aeronautical charts used in international aviation.
5. **Units of Measurement to be used in Air and Ground Operations.** Lists dimensional systems used in air and ground operations.
6. **Operation of Aircraft.** Enumerates specifications to ensure a level of safety above a prescribed minimum in similar operations throughout the world.
7. **Aircraft Nationality and Registration Marks.** Specifies requirements for registration and identification of aircraft.
8. **Airworthiness of Aircraft.** Specifies uniform procedures for certification and inspection of aircraft.
9. **Facilitation.** Provides for the standardization and simplification of border crossing formalities.
10. **Aeronautical Telecommunications.** Volume 1 provides for standardizing communications equipment and systems. Volume 2 standardizes communications procedures.
11. **Air Traffic Services.** Includes information on establishing and operating ATC, flight information, and alerting services.
12. **Search and Rescue.** Provides information on organization and operation of facilities and services necessary for search and rescue.
13. **Aircraft Accident and Incident Investigation.** Provides for uniformity in notifying, investigating, and reporting on aircraft accidents.
14. **Aerodromes.** Contains specifications for the design and equipment of aerodromes.
15. **Aeronautical Information Services.** Includes methods for collecting and disseminating aeronautical information required for flight operations.
16. **Environmental Protection.** Volume 1 contains specifications for aircraft noise certification, noise monitoring, and noise exposure units for land-use planning. Volume 2 contains specifications for aircraft engine emissions.
17. **Security: Safeguarding International Civil Aviation Against Acts of Unlawful Interference.** Specifies methods for safeguarding international civil aviation against unlawful acts of interference.

18. **The Safe Transport of Dangerous Goods by Air.** Contains specifications for labeling, packing, and shipping dangerous cargo.
19. **Safety Management System.** Specifies the requirement for all member states to require and recognize a safety management system for most all aviation service providers.

In its March 2006 amendments to the Annexes, the ICAO established that member states to mandate that each of these operators establish an SMS. Member states agreed to initiate compliance with amendments to the ICAO Annexes by January 1, 2009. The ICAO provides that each ICAO member state is the judge of whether its national SMS rules provide an acceptable level of safety. **If you are holding a certificate issued from the FAA, this guidance mandates the approval of your SMS from the FAA.**

Under ICAO Annex 19, each state shall require that the following service providers under its authority implement an SMS:

- **Approved training organizations** in accordance with Annex 1 that are exposed to safety risks related to aircraft operations during the provision of their services;
- **Operators of airplanes or helicopters** authorized to conduct international commercial air transport, in accordance with Annex 6, Part I or Part III, Section II, respectively. This includes international general aviation operators of large or turbojet airplanes in accordance with Annex 6, Part II, Section 3;
- **Approved maintenance organizations** providing services to operators of airplanes or helicopters engaged in international commercial air transport, in accordance with Annex 6, Part I or Part III, Section II, respectively;
- **Organizations responsible for the type design or manufacture of aircraft**, in accordance with Annex 8;
- **Air traffic services (ATS) providers** in accordance with Annex 11; and
- **Operators of certified aerodromes** in accordance with Annex 14.

United States Statuary Requirements for SMS

Congress, in the Airline Safety and Federal Aviation Administration Extension Act of 2010, directed the FAA to issue a notice of proposed rulemaking within 90 days of enactment, and a final SMS rule by July 30, 2012. In addition, the National Transportation Safety Board (NTSB) recommended the FAA pursue rulemaking to require the implementation of SMS. The FAA's Air Traffic Organization (ATO) has complied with the ICAO SMS mandate for several years. Additionally, the FAA published a new 14 CFR Part 5 in January 2015, applicable to Part 121 operations. The FAA is expected to issue final guidance for airports in 2016.

The high priority objective for the FAA is to comply with ICAO standards, fully address numerous NTSB recommendations, and comply with statutory requirements mandated by Congress.

REVIEW QUESTIONS

1. How would you define SMS?
2. Explain how the United States Congress has passed a statutory requirement for implementing an SMS Program.
3. Is the United States a member nation of the ICAO?
4. Explain how the ICAO documents the standards and recommended practices to its member nations?
5. Explain how the ICAO has mandated the use of SMS.
6. What is the difference between the FAA's SMS Pilot Program and 14 CFR Part 5.
7. What is the difference between the FAA's SMS Pilot Program and the SMSVP?
8. For effective safety reporting people must be willing to report their errors and experiences.
   a. True.
   b. False.
9. Under a safety management system, what item would be found under safety policy?
   a. Procedures.
   b. Organization.
   c. Training.
   d. Both a and b.
10. Under a safety management system, what item would be found under safety risk management?
    a. Risk mitigation.
    b. Internal evaluation program.
    c. Communication.
    d. None of the above.
11. What ICAO Annex is directly related to SMS?
    a. Annex 1.
    b. Annex 6.
    c. Annex 17.
    d. Annex 19.
12. Which is a subculture of a safety culture?
    a. Indicating culture.
    b. Informed culture.
    c. Identifying culture.
    d. Educated culture.
13. The FAA established the SMS Voluntary Program prior to the FAA SMS Pilot Programs.
    a. True.
    b. False.

14. SMS is a structured process that obligates organizations to:
    a. Manage safety with higher priority than other core business processes are managed.
    b. Manage safety with the same level of priority that other core business processes are managed.
    c. Identify hazards and remove all risk from the organization.
    d. Manage safety with safety objectives that include minimizing expenses.
15. What are the four components of safety management systems?
    a. Safety policy, safety regulations, safety procedures, and safety culture.
    b. Safety policy, safety risk management, hazard identification, and safety assurance.
    c. Safety policy, safety risk management, safety assurance, and safety promotion.
    d. Safety policy, safety promotion, safety culture, and safety protection.

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The practical guide to transforming your safety program into a functioning safety management system

The advent of the safety management system (SMS) has affected all aviation sectors worldwide, and is now required for most domestic and international air operations, through either regulatory (14 CFR Parts 5, 119, or 121) or voluntary compliance. It's easy to be intimidated by the scope and complexity of SMS, but *Practical Safety Management Systems* distills the concepts and principles into a practical working format. Universities and training organizations will find guidance and resources to create, implement, and maintain a functioning SMS.

An SMS must be adapted and continuously improved to meet an organization's mission while reducing risk to the lowest viable level for flight departments, independent contractors servicing the aviation industry, air traffic services, and more. Beyond mere theory, this book encourages hands-on exercise and practical application of SMS concepts and principles to varied industry areas such as flight crews, maintenance, air traffic control, airports, and unmanned aircraft systems (UAS).

Beginning with an overview and history of SMS, chapters cover SMS components, costs and development process, approaches to safety culture, human factors, audits and evaluations, and more. Each chapter concludes with review questions. Extensive case studies and references are provided throughout, with additional reader resources supplied online. *Practical Safety Management Systems* is a useful guide for transforming your safety program into an up-to-date and beneficial safety management system.

PAUL R. SNYDER
An Assistant Professor for the John D. Odegard School of Aerospace Sciences at the University of North Dakota, Professor Snyder continues to be active in flight operations as an FAA Designated Pilot and Instructor Examiner, certified Insitu ScanEagle UAS pilot, and a UND Chief Flight Instructor. He holds a degree in Aeronautical Studies and Master of Science in Educational Leadership.

GARY M. ULLRICH
Before joining the University of North Dakota, Professor Ullrich was a Test Group Pilot for FlightSafety, Adjunct Assistant Professor for Embry-Riddle Aeronautical University, and Chief of Safety/Instructor/Evaluator Pilot with the United States Air Force. He is a commercial pilot with multi-engine, instrument, and Boeing 720/707 type ratings.

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