U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Safety Management Systems for Airports

Date: DRAFT

Initiated by: AAS-300

AC No: 150/5200-37A

CHANGE:

1. Purpose. This Advisory Circular (AC) presents the concepts of a Safety Management System (SMS) and provides detailed guidance about developing and implementing SMS on an airport.

An SMS enhances safety, ensures compliance with applicable regulatory standards, and can be integrated into all aspects of airport operations, including business and management practices. This AC explains how SMS will help airports develop an explicit, pro-active, and engaged process for identifying and quantifying potential hazards and risks and for managing them in a systematically coherent, logical, and reasonable way.

2. Applicability. This AC applies to all civil airports, when adapted to the size, activity level, staff level, and resources of each facility. In addition, this AC establishes guidelines for SMS implementation for and by airport operators at airports certificated under title 14 Code of Federal Regulations (CFR) part 139, *Certification of Airports* (part 139).

The AC focuses on airport operational safety in the airfield environment. However, airport operators can apply these principals anywhere on their airports (including the landside environment) to address safety concerns.

3. Background. The United States is a member state of the International Civil Aviation Organization (ICAO). In November 2005, ICAO amended Annex 14, Volume I *(Aerodrome Design and Operations)*, to require member states to have certificated international airports establish SMS. The Federal Aviation Administration (FAA) supports harmonization with international standards and has worked to make FAA aviation safety regulations consistent with ICAO standards and recommended practices. The implementation of SMS at U.S. airports is designed to meet the intent of the ICAO standard in a way that complements existing part 139 airport safety requirements and standards.

SMS encompasses the activities of every level of airport personnel – from the executive level to those who perform the many daily, routine tasks required to operate the airport. Applying a systematic, proactive, and well-defined safety program (as is inherent in an SMS) allows airports to strike a realistic and efficient balance between safety and service.

The forecast growth in air transportation requires new measures and greater effort from all aviation service providers – including airport operators – to achieve continuing improvements to aviation safety. The use of an SMS at an airport can help this effort by increasing the likelihood that the airport operator will detect and correct safety problems before they result in an aircraft accident or incident.

4. Related Reading Material. Appendix B lists additional documents that will help airport operators understand SMS. Appendix A defines terms and acronyms used in this AC.

5. Point of Contact. Send comments or suggestions for improving this AC to:

Manager, Airport Safety and Operations Division
Federal Aviation Administration
ATTN: AAS-300
800 Independence Avenue SW
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6. Availability. The FAA makes this AC available online at http://www.faa.gov/airports/resources/advisory_circulars/.

Michael J. O'Donnell
Director of Airport Safety and Standards

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Chapter 1. Safety Management Systems (SMS) Overview

1. Background.

The FAA is committed to improving safety in air transportation. As the demand for air transportation increases, the impacts of additional air traffic and surface operations, changes in air traffic procedures, and airport construction can heighten the risks associated with aircraft operations. While FAA regulations and technical operating standards have effectively addressed many of these risks, they can still leave gaps best handled by enhanced airport safety management practices.

Airports best understand their own unique operating environments, so they are in the best position to address their safety issues. The FAA will continue to conduct regular annual inspections at airports certificated under part 139, but SMS will provide both certificated and other airports with a powerful tool for identifying hazards and mitigation strategies, communicating safety issues, promoting safety, and reducing the potential for accidents and incidents.

2. What is SMS.

ICAO defines SMS as a "systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures."[1] SMS is comprised of four basic components:

- Safety Policy,
- Safety Risk Management,
- Safety Assurance, and
- Safety Promotion.

The four components serve as the "basic building blocks of an SMS" (ICAO, 2009). Figure 1-1 defines these components and shows how they relate to each other. Safety Policy serves as the foundation of SMS; it documents the airport's means of deploying the SMS. Safety Risk Management (SRM) and Safety Assurance (SA) are the two operational components of SMS. Safety Promotion encompass all three of the other components by ensuring that individuals with a role in SMS are properly trained and that safety issues identified through any of the activities associated with the components are communicated.

[1] International Civil Aviation Organization (ICAO), Safety Management Manual, at 6.5.3 ICAO Doc. 9859-AN/474 (2nd ed. 2009).

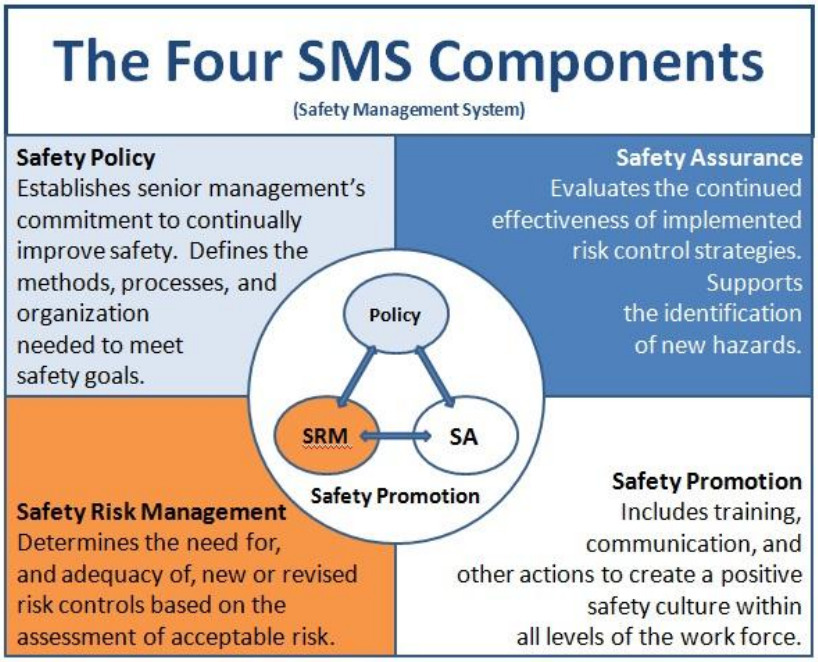

Figure 1-1. Four SMS Components

Components are then subdivided into elements. Elements represent subprocesses, policies, or procedures that support each of the four components. For example, Safety Policy typically includes a minimum of seven supporting elements. Safety Risk Management typically includes a minimum of four supporting elements.

3. History.

SMS emerged as a recognized safety methodology about 30 years ago, as investigative inquiries after accidents began to focus on preventing accidents rather than just reacting to the causes of specific accidents. The "reactive mode" often resulted in "fixing" one series of causal factors supposedly related to a single accident and often led to severe restrictions and changes in regulations. This kind of investigation could show "who" had the accident and "what" happened, but gave less attention to identifying "how" and "why" it happened.

Industry started to accept the concept that failures, especially human failures at the operational level, can trigger latent conditions that can then breach a system's safety defenses. It became evident that by monitoring the organizational process and identifying and addressing these latent conditions, corrections could be made before an incident or accident occurred.

The "how" and "why" of incidents and accidents has become much clearer due to the creation of James Reason's "Accident Causation Model,"[2] shown in Figure 1-2. Reason used this model to transform thinking about safety and accident investigation. Rather than focusing on an isolated event (the "who," "what," and "when"), Reason shifted the focus to "organizational decisions" or "layers" of events that ultimately resulted in an accident. Of course, there are limits to the application of the Reason model, so it must be seen as a theoretical framework and not a cure-all. However, it is a tool that helps identify the chain of events leading to an incident or accident.

[2] James Reason, Human Error, Cambridge University Press (1990).

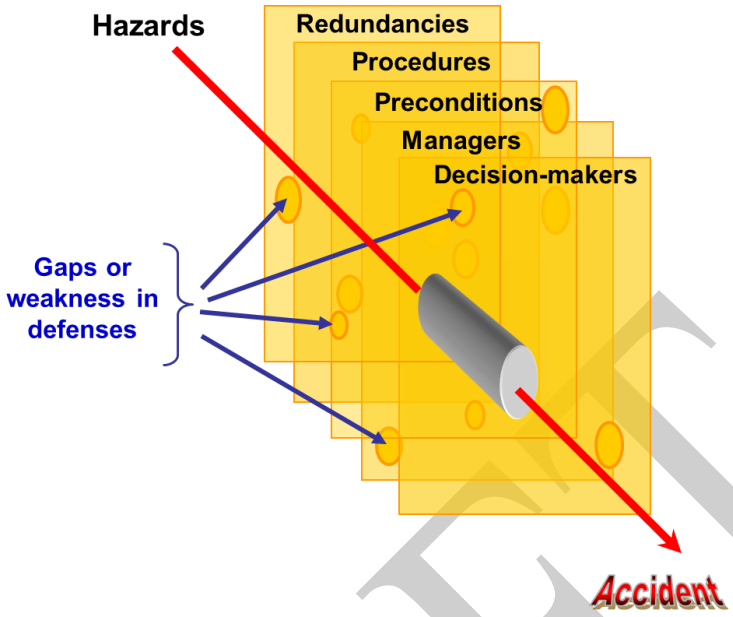

Figure 1-2. Reason's Accident Causation Model (Adapted)

Reason's model was the true beginning of safety management. It relied on collecting data, identifying hazards and trends, determining risk severity, mitigating risk to an acceptable level, and establishing a safety culture—the basic components of SMS. The United States became a strong proponent of SMS and supported ICAO's introduction of SMS and the amendment of Annex 14, *Aerodromes*, to require member states to implement SMS.

4. Current Applications of SMS.

SMS supports a pro-active approach to safety through a framework of tools and methodologies to address safety issues. It also establishes a safety-conscious environment and culture. It encompasses all personnel in any operational area since observation, evaluation, and reporting are integral to achieving effective safety-related outcomes. In short, it implies there is a system with components that, when managed and directed accurately, can achieve an improved level of safety and eliminate or mitigate the conditions that can result in accidents. Having an SMS does not mean an airport will be accident-free, but when implemented, it facilitates a safer airport and aviation system.

This AC focuses on developing and implementing SMS in the airport environment (including airport movement and non-movement areas). Under SMS, the interdependencies within the airport operational environment become much more apparent. However, airport operators can apply these principals anywhere on their airports (including the landside environment) to address safety concerns.

While there are costs associated with implementing an SMS, the Transportation Research Board's Airport Cooperative Research Program (ACRP) 2009 report[3] identified the following as potential benefits:

- Reduced likelihood of accidents,

[3] Transportation Research Board. (2009). Airport Cooperative Research Program Report 1, Safety Management Systems for Airports, Volume 2: Guidebook [Adobe Digital Editions version]. Retrieved from http://www.trb.org/Publications/Blurbs/162491.aspx.

- Reduced costs related to accidents and incidents,
- Assurance that a systematic process is in place to monitor and address safety issues in a transparent and informed way,
- The potential for reduced insurance and liability costs,
- Competitive advantage and the possibility of more business opportunities,
- Improved regulatory compliance,
- Improved employee morale and performance,
- Identification of the best use of limited resources,
- Reduced reliance on a few key personnel,
- Improved control, and
- Consistency.

5. Format of this AC.

The AC contains six chapters. Chapter 2 explains how to begin developing an SMS and the required documentation. Appendices C, D, E, and F include a sample Implementation Plan, SMS Manual, and Safety Dashboards.

Chapters 3 through 6 address the four components of SMS: Safety Policy, Safety Risk Management, Safety Assurance, and Safety Promotion. Each chapter begins by defining the component and examining how it could be applied on the airport. The chapters also include examples to help operators of each type of airport understand the component better and determine what is appropriate for, and applicable to, their facilities.

6. Scalability.

Airports are each unique, not only in physical layout but also in management structure and, often, in management style. Therefore, a one-size-fits-all approach to SMS is not advisable. This AC stresses the importance of recognizing that small, medium, and large airports have different operational environments and different levels of resources. Airport operators of small airports can use simple methods for conducting the processes within the SMS. Medium and large airports may require more detailed processes within the SMS.

At airports that have only a manager and perhaps minimal support staff to carry out daily responsibilities, this AC suggests a common sense approach to the SMS. The manager may handle most of the SMS processes alone. At medium and large airports, the complexity and departmentalization of duties on the airport may require that more personnel be involved in the SMS. Regardless of airport size, many certificated airports will find their existing processes and procedures can serve as the foundation for portions of their SMS.

Chapter 2. Getting Started

1. Introduction.

Shifting from a reactive to a proactive approach to safety management takes time and considerable effort. Therefore, an airport should methodically develop an SMS that utilizes existing policies and procedures as much as possible and document and communicate changes related to SMS development and deployment. Managers, employees, and tenants may resist change, so training and communication will be crucial to gaining buy-in and participation in the SMS.

Airports may find it helpful to appoint an individual or team to coordinate the development and deployment of SMS-related processes. This individual, commonly referred to as an SMS Champion[4], does not need to be the individual ultimately responsible for daily oversight of the SMS but should have credibility and authority throughout the airport and with its stakeholders. Similarly, if a team approach is used, the team should comprise individuals with a variety of backgrounds and authority throughout the airport to facilitate wide-spread buy-in and support for the SMS.

Regardless of the initial approach, it is essential that airports establish certain documentation requirements to build a solid foundation for SMS implementation and operation.

2. Documentation.

There are three levels of documentation in an SMS: implementation-related documentation, deployment-related documentation, and ongoing documentation. Later chapters address documentation related to SMS requirements like Safety Risk Management, which are developed on an on-going basis.

Typical documentation required for SMS development and deployment include an SMS Implementation Plan and an SMS Manual. Certificated airports may also choose to incorporate the requirements of SMS directly into their Airport Certification Manuals instead of creating separate SMS Manuals.

3. SMS Implementation Plans.

The airport should create an SMS Implementation Plan early in the development of its SMS. The SMS Implementation Plan should clearly identify a realistic strategy for implementing SMS through a framework and series of steps. By documenting this strategy, the airport can ensure consistency in its implementation.

Some airports may find it helpful to conduct a gap analysis as a way to understand what the airport does today related to safety and what it needs to do in the future to satisfy an SMS. The gap analysis can be as simple or complex as the airport desires. In its simplest form, a gap analysis identifies existing processes and procedures required by regulation or established for safe operations and then compares them to SMS requirements. This process identifies and highlights gaps between the two. The ACRP's SMS for Airports Volume 2: Guidebook and ICAO's Safety Management Manual provide examples of gap analysis tools and documentation.

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[4] ACRP's SMS for Airports Volume 2: Guidebook, identifies the SMS Champion as the individual or team responsible for coordination and promotion of SMS related implementation. The main role of the SMS Champion is project management for SMS implementation and this individual or team may be different from the manager appointed to provide daily oversight of the SMS once operational.

Regardless of whether a gap analysis is used, the airport should identify and use existing processes and procedures as much as possible when developing the SMS. This will add value and credibility to the SMS since employees will already be familiar with them. It may also lessen implementation costs. Table 2-1 includes examples of existing processes and procedures that can serve as the foundation for SMS components and elements.

Table 2-1. Examples of Existing Processes and Procedures

Existing Policy/Procedure/Practice	Adaptability to SMS
Policy Statement	**Safety Policy.** Many airport governing bodies have policy statements. These preexisting statements may include safety-related initiatives or may be geared solely toward employee safety. Using this policy as a foundation or revising it to address operational safety (and not just employee safety) can help in the development of a Safety Policy Statement.
Daily Self-Inspections	**Safety Assurance.** Daily self-inspections performed to meet part 139 requirements or airport-imposed requirements are good means of identifying safety hazards.
Airport Committees	**Safety Promotion & Safety Risk Management.** Many airports have preexisting airport committees made up of airport staff and managers or stakeholders like air carriers, fixed-base operators, and airport tenants. These committees can serve two roles under SMS. They can help communicate important safety issues and initiatives as part of Safety Promotion. Also, they can identify individuals needed for safety risk assessments as part of Safety Risk Management.
Airport Intranet or Internet Website	**Safety Assurance & Safety Promotion.** Airport internet or intranet websites provide excellent means for distributing safety information to employees and tenants as part of Safety Promotion. These sites can also house portals to the airport's hazard reporting system as part of Safety Assurance.
Training	**Safety Promotion.** SMS training and safety awareness can be included in preexisting training programs, saving time and reducing implementation costs.
Recordkeeping	**Safety Risk Management & Safety Promotion.** Preexisting recordkeeping practices can serve as

	the foundation for documentation and tracking of Safety Risk Management findings and training/communication performed under Safety Promotion.

Appendix C includes a sample Implementation Plan. Note that an SMS Implementation Plan is more than just a checklist or table; it allows the airport to explain its approach to implementation, discuss any strategies or challenges concerning deployment, and identify major milestones. The accompanying checklist can be tailored to the airport's needs. The sample includes a "Status" column, allowing it to serve not only as a one-time plan, but also as an ongoing tool for communicating implementation status to management. Therefore, airports should update their SMS Implementation Plans frequently and consider using them to update executives on the status of developing and implementing the SMS.

4. SMS Manual.

An airport may choose to develop an SMS Manual to document how it complies with the four components of SMS and their elements. ACRP's SMS for Airports Volume 2: Guidebook describes the SMS Manual as follows:

> *The SMS Manual describes the SMS elements and how they will be established and will function. It is a document that may resemble the ACM. Whereas the ACM describes how the airport operates, the SMS manual describes how the SMS functions.*

Appendix D provides an example showing the preferred arrangement of an SMS Manual. However, not all SMS Manuals will look alike. Manuals will vary in size, specificity, and scope. The airport should tailor the manual to meet its unique operational and governance needs.

This AC focuses on SMS application on the airside; however, airports may choose to apply SMS to their landside or terminal environments, as well. If so, the SMS Manual can discuss these additional areas, but landside or terminal discussions should be kept separate from airside applications. Also, some airport governing bodies with multiple airports in their system may choose to develop one SMS Manual for the entire system instead of individual SMS Manuals for each airport. This method is acceptable as long as all included airports understand how the manual applies to them.

The SMS Manual should remain a living document. The airport should review and update it as needed and communicate changes to all individuals with a need to know.

5. ACM Revision.

Because SMS is not currently required under part 139, airports should keep SMS related documentation such as SMS Manuals and Implementation Plans separate from their Airport Certification Manuals.

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Chapter 3. Safety Policy

1. Introduction.

Safety Policy, the first of the four SMS components, provides the foundation or framework for the SMS. Safety Policy is the statement and documentation adopted by an airport that defines its commitment to safety and its overall safety vision. Airport management develops, documents, and communicates a Safety Policy that demonstrates its commitment to providing a safe and secure environment for the passengers, employees, and users of the airport's services.

Figure 3-1 shows the numerous elements that make up Safety Policy:

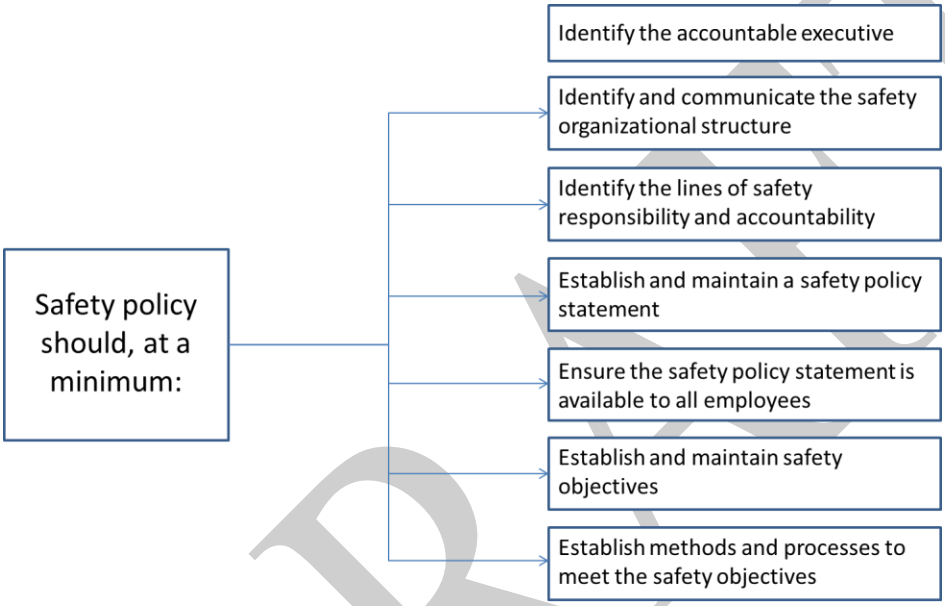

Figure 3-1. Safety Policy

2. Developing and Implementing the Safety Policy.

a. Identify the accountable executive.

The accountable executive is the person designated by the airport to act on its behalf for the implementation and maintenance of the SMS. The support of a senior executive is essential; otherwise, there is little incentive for employees and tenants to actively participate in SMS activities and initiatives. The accountable executive should have sufficient control over human and financial resources for the airport to ensure that enough personnel and funding are available to develop and implement the SMS. A key point of SMS is ensuring that top management within the airport is aware of the safety issues and hazards identified on the airport. In many cases, the accountable executive will have minimal daily hands-on management of the SMS. However, at times this person may need to make decisions related to particular safety issues and hazards.

Airports that are governed by larger entities such as city councils, airport authorities, or governing boards may find it challenging to identify a single individual to act in this role. However, an airport should strive to identify a single individual in a senior executive leadership position within the airport management structure. Ideally, this individual could be one of the following: the Airport Director, the Airport Manager, or the Chief Executive Officer.

The accountable executive should not delegate overall responsibility for SMS oversight. However, this individual may wish to delegate responsibility for daily oversight and the administration of SMS-related processes or initiatives to an SMS Manager, SMS Coordinator, or SMS Administrator. (The airport should refrain from calling this supporting position the Safety Manager because it might infer or imply that managing safety is the responsibility of that division or manager alone and not of any other airport department.) The ICAO Safety Management Manual (2009) and ACRP's SMS for Airports Volume 2: Guidebook (2009) provide characteristics, job descriptions, and tasks for this supporting position.

Smaller airport organizations may choose to identify only an accountable executive. Larger airports with more complex organizational structures may choose to identify an accountable executive and support staff, including an SMS Manager, for the daily implementation and oversight of the SMS. Either method is acceptable as long as the accountable executive is regularly apprised of:

- Pertinent safety information, including the airport's performance toward its safety objectives (see section f below);
- Critical safety information communicated to employees and tenants;
- The status of ongoing mitigations required under the airport's SRM policies (see Chapter 4); and
- The status of SMS implementation.

b. Identify and communicate the safety organizational structure.

It is important to identify the positions and offices within the airport organization that have responsibility for or play a role in the safety of airport operations. This includes the "chain of command" and the means by which airport employees report their safety concerns, hazards, and other safety-related information.

Identifying the safety organizational structure begins with the accountable executive and flows from there through the organization. Typically, this structure includes airport operations departments as well as Maintenance and Public Safety. It may also include any Human Resources divisions responsible for employee safety issues.

At a small airport, with a flattened management structure and few employees, there may be straight-line reporting to the accountable executive. At medium and large airports, there usually is a more detailed reporting structure in place, with department supervisors or line managers first in line to receive and act on information about safety concerns, hazard reports, and other safety-related items.

Each manager accountable for safety and with responsibilities under SMS should be identified, and each employee should know the point of contact for particular safety issues. This identification ensures that senior management is aware of the daily activities of the various departments and can play an active role in airport safety or the management/direction of SMS initiatives.

An organizational chart can provide the simplest means of communicating the safety organizational structure. Figure 3-2 provides a sample organizational chart for safety oversight.

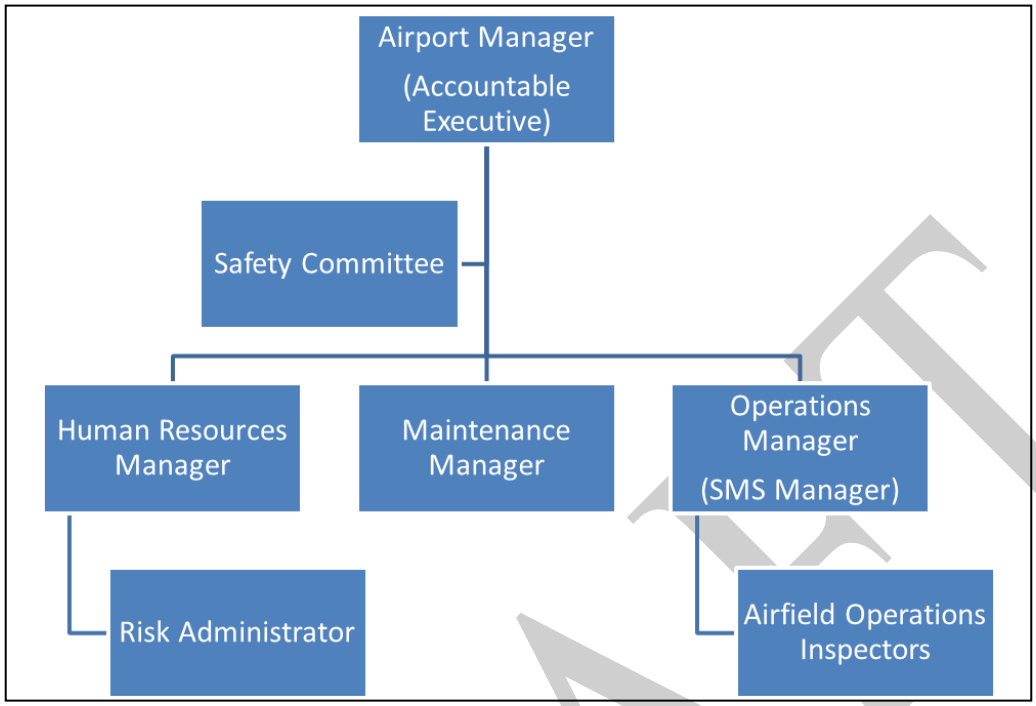

Figure 3-2. Sample Organizational Chart for Safety Oversight

If the airport establishes a Safety or SMS Committee to help promote SMS initiatives, make decisions, or perform other SMS activities, the chart should include the SMS Committee. Safety Committees are usually made up of members of airport departments, tenant organizations, and airport stakeholders and are often chaired by the accountable executive or the SMS Manager. Depending on the complexity of the committee's structure, the airport may find it useful to include a separate organizational chart identifying committee members and showing how the committee interacts with airport management.

c. Identify the lines of safety responsibility and accountability.

Once the airport identifies the positions and divisions with roles in ensuring safe operations, it should ensure their responsibilities and accountabilities are clearly defined and documented. The airport should create position descriptions for each position and division with safety oversight. For example, employees with airfield access play a role in safety; they report hazards and identify safety issues to the proper point of contact or the airport's hazard reporting system. Additionally, airfield operations specialists or inspectors conducting daily self-inspections play a role; they identify safety issues through the course of their inspections and so also contribute to safety oversight.

While the safety organizational structure may best be depicted in an organizational chart, safety responsibilities and accountabilities are best described in the SMS Manual. Once these descriptions are developed, the airport must make them available to all identified individuals so they understand their responsibilities under the SMS.

When describing responsibilities and accountabilities, only include those items related to safety and the implementation and oversight of SMS-related initiatives. General job descriptions are best kept in human

resource documents, not the SMS Manual. However, if new positions are created to support SMS development and implementation, the airport may choose to incorporate these job descriptions and tasks into this section since they specifically relate to safety oversight and the SMS.

Figure 3-3 depicts an excerpt from the Safety Responsibilities section of an SMS Manual. Notice that it includes descriptions for all positions/divisions identified in the organizational chart shown in Figure 3-2. It also contains a broad concluding statement that encompasses the responsibility every individual with access to the movement and non-movement area has for hazard reporting.

Safety Responsibilities

Accountable Executive: The Airport Manager is the Accountable Executive for SMS development and deployment. The Airport Manager will ensure that the necessary assets and financial support are available for successful SMS implementation and continuous safety improvement. The Airport Manager will…

SMS Manager: The Operations Manager is designated as the SMS Manager for the airport and chair of the Safety Committee. The Operations Manager is responsible for daily oversight and implementation of the SMS. The Operations Manager will ensure that incidents and accidents on the airport are investigated and findings are reported to the SMS Committee and Accountable Executive.

Safety Committee: The Safety Committee is chaired by the SMS Manager and comprised of members from the airlines, FAA, TSA, corporate aviation, FBO, Maintenance Manager, and Risk Administrator. The safety committee meets monthly and is charged with the following responsibilities:

- Review all incidents and accidents that took place on the airport for the previous month.
- Review the results of all safety audits. Recommend actions.
- Identify participants for Safety Risk Assessments requiring integrated analysis (e.g., a subject matter expert panel format).

Maintenance Manager: The Maintenance Manager is responsible for ensuring that all maintenance requests are completed in a timely manner and reporting any ongoing maintenance issues that could impact safety or impact mitigations required under the SRM policies or decisions to the SMS Manager and Accountable Executive. The Maintenance Manager will also participate as a member of the Safety Committee and participate in Safety Risk Assessments when required.

Airport Operations Inspectors: In carrying out their normal duties, the Airport Operations Inspectors will ensure that any hazards identified are properly reported. In cases where immediate action is required to ensure the safety of operations, the Airport Operations Inspector has the authority…

Risk Administrator: The Risk Administrator shall work with the SMS Manager to ensure that all employee related incidents and accidents with an impact on operational safety are reported and investigated. The Risk Administrator will participate as a member of the Safety Committee and participate in Safety Risk Assessments when required.

Every individual with access to the movement and non-movement areas of the airfield shall report any hazard found in those areas to the Airport's Hazard Reporting System or to one of the individuals identified in the Safety Responsibilities Section above.

Figure 3-3. Sample Safety Responsibilities

d. Establish and maintain a Safety Policy Statement.

Normally established early in SMS development, the Safety Policy Statement documents airport management's commitment to providing a safe airport. Frequently confused with the overall Safety Policy component, the Safety Policy Statement is just one element of many that encompass the Safety Policy component.

By developing, accepting, and giving visibility to the Safety Policy Statement early in SMS development, airport management and the accountable executive show their support for SMS and its development and deployment. This assures airport personnel that management is leading the effort to make safety a priority and assures the travelling public that airport management and airport personnel are striving to improve safety. The accountable executive signs this statement to formally express airport management's commitment to the SMS as well as its processes and initiatives. Alternatively, the Safety Policy component, as documented in the SMS Manual, outlines the methods and processes the airport will use to achieve the desired safety outcomes.

The statement should be easily understood by managers, employees, and tenants and take into account the airport's complexity and structure. When developing the Safety Policy Statement, airports should look to existing Policy Statements, Mission Statements, or other high-level concept documents as models. For example, many airports owned by municipalities may already have Safety Statements from their local governments. The airport may be able to build on or replace these preexisting documents but should consult its legal department before doing so.

Internal policies or regulations may prevent some airports from using the terms "Policy" or "Statement". If so, it is acceptable to call the Safety Policy Statement by another name, as long as it includes the necessary commitments to SMS implementation and operations.

There is no prescribed length for a Safety Policy Statement; they typically range from one paragraph to one page in length. A Safety Policy Statement ***should*** contain the following items:

- A commitment to make airport safety the highest priority.
- The commitment of senior airport management to implement SMS.
- A commitment to continually improve safety on the airport.
- The encouragement of employees to report safety issues without fear of reprisal.
- A commitment to provide the necessary resources needed for safe operations.
- A commitment to comply with all regulatory requirements related to safety.

(Adapted from ACRP's SMS for Airports Volume 2: Guidebook)

A Safety Policy Statement ***should not*** include:

- Unrealistic commitments, such as a zero accident rate. SMS will help facilitate a safer airport and aviation system. It does not guarantee the airport will be accident or incident free.
- The airport's safety objectives and goals (see Section f below). These objectives and goals may change frequently over time; the Safety Policy Statement should not.

Figures 3-4 and 3-5 provide examples of Safety Policy Statements. Figure 3-4 shows a statement that would be appropriate for a small airport. It is simple, concise, and expresses the core principles of SMS.

EXCELSIOR AIRPORT

1 Airport Boulevard
Monterey, CA 90293

June 7, 2012

The Excelsior Airport is committed to the implementation of a Safety Management System (SMS) that enables its management, employees, the airlines, tenants, and other business partners to operate in a safe environment. Safety is among the Airport's highest priorities. The Airport is dedicated to creating an environment that minimizes exposure to hazards and risks, expects continuous safety improvement, and encourages confidential reporting of any safety related situation, incident, or accident. We will ensure that necessary policy direction and resources are available to enable the success of the SMS, compliance with standards and regulations, and enhanced operational safety.

John R. Smith

John R. Smith
Airport Manager

Figure 3-4. Simple Safety Policy Statement

Figure 3-5 presents a more complex statement more suited to an airport where several departments have responsibilities for separate but interdependent functions on the airport. Without identifying each department, the statement makes clear there are many types of airport personnel with safety-related roles. It also explains that an office charged with safety oversight is necessary to meet the wide-ranging responsibilities of the SMS.

XYZ AUTHORITY

SUPERIOR INTERNATIONAL AIRPORT

100 Lake Shore Blvd.
Minocqua, WI 54548

April 1, 2012

Superior International Airport employees and tenants shall systematically integrate safety into management and work practices at all levels so that airport operations are accomplished safely. The application of an effective Safety Management System (SMS) is integral to all of our airport activities with the objective of achieving the highest levels of safety standards and performance. Safety is the responsibility of everyone and the participation of airport and tenant employees is paramount to the success of the SMS. Our commitment is to:

- Continuously promote a safety culture across all airport operations that recognizes the importance of safety in our daily activities and the value of an effective SMS. Encourage confidential hazard reporting by all employees and tenants.
- Ensure all staff members are aware of their responsibilities and accountabilities in the execution of and participation in the SMS. Provide adequate and appropriate safety information and training.
- Provide skilled and trained personnel and other resources necessary to ensure the effectiveness of the SMS.
- Analyze and manage risk(s) associated with airport-related operations, incidents, or accidents.
- Comply with local, State, and Federal legislative and regulatory requirements and standards. Continue to improve our safety performance.

Jane L. Doster
Aviation Director

Figure 3-2. Complex Safety Policy Statement

e. Ensure the Safety Policy Statement is available to all employees.

Making the safety policy statement available to all airport personnel and tenants confirms management's intention to prioritize safety. The airport can issue the statement to each airport employee, make it available online, and/or post it in prominent locations throughout the airport. The airport should also give it to tenants since their employees should understand their role in reporting hazards and contributing to airport safety. Mentioning the policy statement frequently and periodically adding excerpts of it to bulletins and other documents confirms airport management's continuing commitment and reinforces its safety focus to the entire airport community.

f. Establish and maintain safety objectives.

Under Safety Policy, the airport establishes and maintains safety objectives. These objectives will help focus employees and management when developing and implementing the various processes and procedures under SMS. Articulating objectives and sharing related metrics allow the airport, its stakeholders, and the FAA to verify achievements or progress toward the airport's safety improvement. The airport should tie its safety objectives to its Safety Assurance activities (see Chapter 5.) That is, when the airport conducts its evaluations to verify safety performance, it should do so with these objectives in mind.

Safety objectives should be specific to the airport but can be tied to national-level objectives set by the FAA, state aviation organizations, or industry groups (e.g., national effort to reduce the number of vehicle/pedestrian deviations). Additionally, airports may choose to develop more specific goals or targets related to these objectives. "Examples of Safety Objectives and Goals" illustrates the differences between an objective and a goal.

The airport should keep the following points in mind when developing the airport's safety objectives:

- **Specific:** The objective should be focused on one thing only.
- **Measurable:** It should be possible to measure whether the airport meets the objective.
- **Achievable:** The objective should be within the airport's capabilities.
- **Relevant:** The objective should be something of importance or significance to safety.
- **Timed:** There should be a defined deadline for meeting the objective.

Examples of Safety Objectives and Goals

Safety Objective 1: Reduce the number of accidents on the airport by x% in x years.

Safety Objective 2: Reduce the number of foreign object debris (FOD) occurrences by x% in x months.

Safety Objective 3: Reduce the number of vehicle/pedestrian deviations by x% in x years.

- Goal 3.1: Increase the number of driver training sessions by x% in x years.
- Goal 3.2: Develop and promote a driver training promotion program within x months.

(Adapted from ACRP's SMS for Airports Volume 2: Guidebook)

As discussed in Chapter 5, Safety Assurance, the airport should establish processes to report progress on the airport's safety objectives on a regular basis. Once objectives are met, the airport should develop new safety objectives and communicate them throughout the airport community.

Chapter 4. Safety Risk Management (SRM)

1. Introduction.

SRM is the second component of SMS and considered a core operational component because of its related elements. SRM uses a set of standard processes to identify hazards formally in a proactive manner, analyze and assess potential risks, and design appropriate risk mitigation strategies. Figure 4-1 depicts the minimum elements of SRM. When properly implemented, SRM processes also promote productive communication among stakeholders and a positive safety culture within and around the airport environment.

A comprehensive SMS using SRM provides management with a tool for identifying hazards and risks and prioritizing their resolution. While each airport's SRM processes may be unique to the airport's operations, physical geometry, history of incidents, and organizational structure, the airport should develop processes and procedures for hazard identification and analysis appropriate to the airport's operating environment. As previously stated, SMS processes and procedures should be scalable; the airport's SRM program should be scalable, as well.

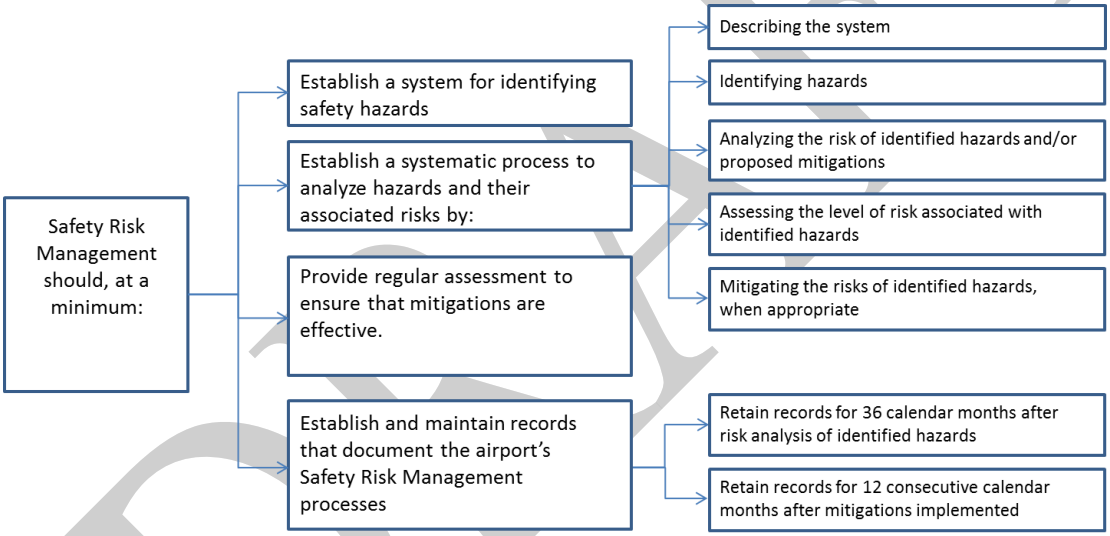

Figure 4-1. Elements of SRM

The SRM component is sometimes used synonymously with one of its elements—the systematic process to analyze hazards and their associated risks (i.e., the "5-step process"). While a very important part of SRM, the 5-step process is not the only part of a comprehensive SRM program.

2. Developing and Implementing Safety Risk Management.

a. Establish a system for identifying safety issues.

Identifying safety issues is an essential step in proactive risk management. While the airport may have processes in place that support the identification of safety issues, it should ensure these processes are documented and communicated for further assessment. The airport should implement identification processes and procedures that reflect the management structure and complexity of the airport environment.

The term "hazard" will confuse many individuals. Therefore, the system put in place under this requirement should identify safety issues or changes to the airport's operations or geometry that could create hazards.

Safety issues can be identified through the following:

- The airport's hazard reporting system (see Chapter 5, Safety Assurance);
- Airport self-inspections;
- Maintenance activities; or
- Manager or tenant meetings.

Furthermore, the evaluation of certain activities or events may identify safety issues. These include:

- Airport accidents or incidents;
- Airfield changes (including geometry, construction, conversion from movement to non-movement areas, airfield procedures, and pavement marking modifications);
- Irregular operations or events;
- Winter weather operations;
- Tenant operational changes (including new servicing equipment and aircraft using airport); and
- Ramp operations (including use of ramp for activities not originally intended).

b. Establish a systematic process to analyze hazards and their associated risks.

Using the SRM process, airports can develop an approach appropriate to their operational environment. Any of the items listed above could potentially introduce new hazards in the airfield environment. Therefore, airport management should formally determine whether those hazards create a level of risk that the airport is willing to accept. For those hazards with unacceptable risk, the airport should ensure mitigations are in place or stop the operation. The airport should have processes in place to ensure events that could produce hazards automatically trigger the 5-step hazard assessment process. For example, the 5-step process should be triggered if an airport tenant notifies the airport of a change in the type of aircraft servicing the airport. The airport's 5-step process should also be triggered for hazards reported through the airport's hazard reporting system.

The 5-step hazard assessment process provides a framework and guidance that serve all airports, from those whose operational environments are simple and uncomplicated to those whose are complex and extensive. Since resources are involved, the scalability of this effort is key to making it work. Figure 4-2 shows the 5-step process.

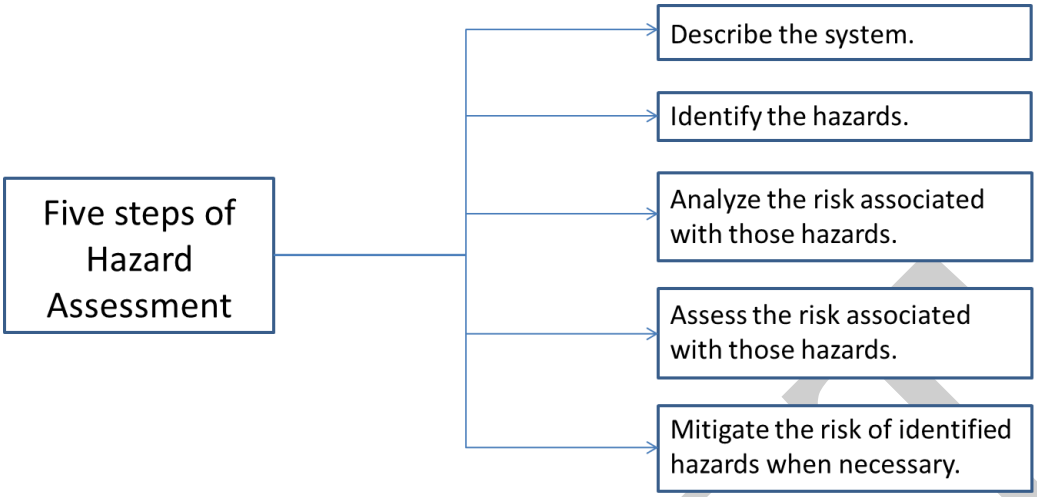

Figure 4-2. Five Steps of SRM

The airport should identify who conducts the 5-step process. Anyone operating on the airfield can identify hazards. However, individuals responsible for conducting or leading the 5-step hazard analysis process should have proper training and oversight to ensure that the process is completed correctly and consistently.

In some cases, the airport may want more than one individual completing the 5-step process, usually when more subject-matter expertise is required for adequate analysis. In these cases, the airport may want to ensure that individuals receive proper instruction on how to complete the process, the airport's risk analysis tools, and the airport's risk acceptance procedures. The airport's SMS Manual should clearly explain how the airport will select individuals or organizations to participate in the 5-step process.

(1) **Describe the system.** The first step of the 5-step process is to describe the system. The system description depicts the operating environment in which the hazards will be identified. The description of the system sets the boundaries for hazard identification. Questions that help define this description could include the following:

(a) What are the meteorological conditions (e.g., VMC or IMC?)

(b) Are seasonal conditions involved and are they abnormal?

(c) Are there known defects or deficiencies (e.g., paved area problems, safety area problems, deteriorated marking, missing or deficient signs, or lighting deficiencies)?

(d) Is time of day or night a factor?

(e) Is traffic volume involved (peak activity or low activity)?

(f) Do normal operations prevail or are there abnormal conditions like construction or a closed runway or taxiway?

(g) What type of infrastructure or media is involved (e.g., runway, taxiway, apron, or drainage facility)?

Airports can choose from several models to help define their operational environments. For example, the 5M Model is used to deconstruct the proposed change or condition for analysis to distinguish elements that are part of, or impacted by, the proposed change or condition. These elements later help identify sources, causes, hazards, and current and proposed hazard mitigations. The 5M Model analyzes five elements for impacts: Mission, Man, Machine, Management, and Media (see Figure 4-3). These elements are defined as follows:

- Mission – A clearly defined role of the SRM panel, describing, in detail, the operation or change.
- (hu)Man/Person – The human operators or maintainers.
- Machine – The equipment used in the system, including hardware, firmware, software, human-to-system interface, and avionics.
- Management – The procedures and policies that govern the system's behavior.
- Media – The environments in which the system is operated and maintained (i.e., the airport).

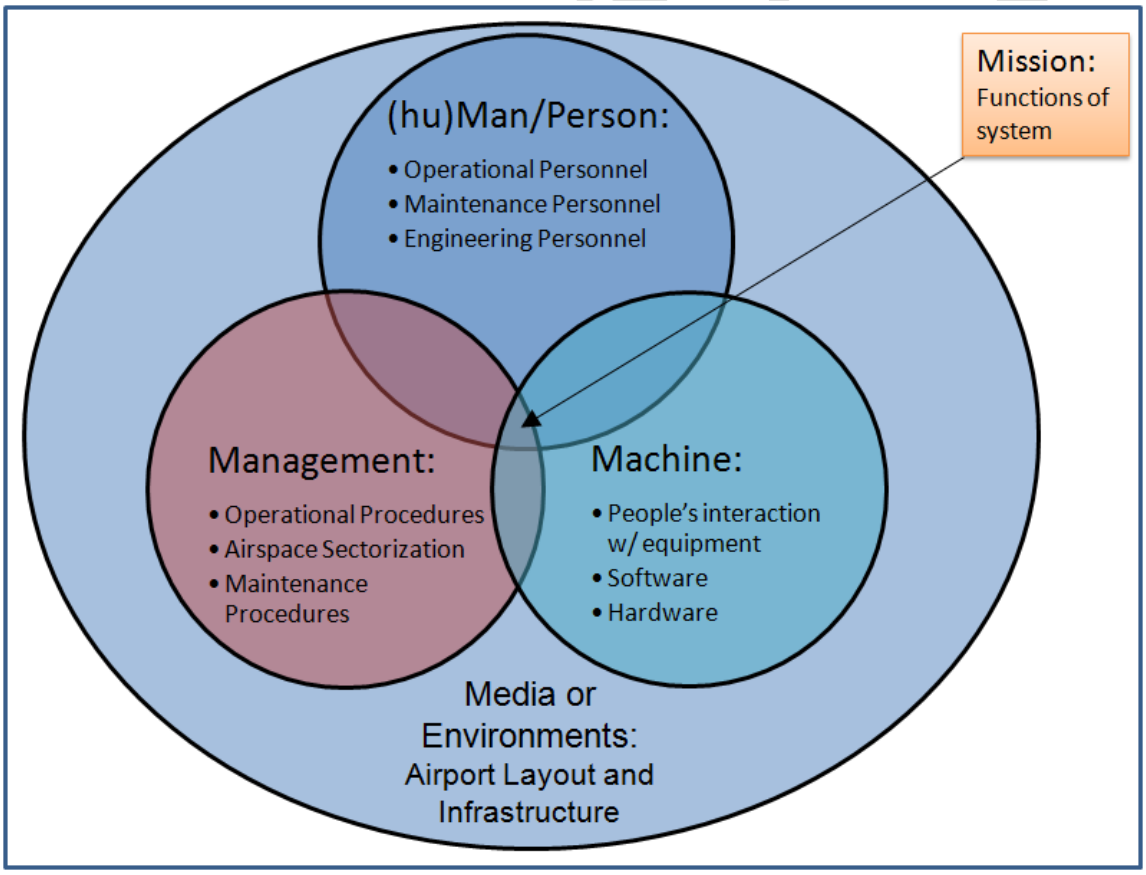

Figure 4-3. The 5M Model

(2) **Identify the hazards.** The second step of the hazard assessment process identifies hazards in a systematic way based on the system described in the first step. A hazard is any condition that could foreseeably cause or contribute to an aircraft accident as defined in title 49 CFR 830.2, Notification and

Reporting of Aircraft Accidents or Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo, and Records: Definitions.

The term hazard is often misused, so it is important that the airport's training program for those individuals conducting the 5-step process (see Chapter 6, Safety Promotion) clearly defines and provides examples of hazards. A simple example of a hazard is snow or ice on active runways. A hazard could also be a construction vehicle entering an active runway without clearance or a pilot's loss of visibility on final approach due to dust from construction. Hazards must be considered with respect to the original system description. For example, a construction vehicle entering an active runway would only be reasonable if there is ongoing construction and the runway is in use. When identifying hazards, all possible sources of system failure should be considered. Depending on the nature and size of the system under consideration, these sources could include:

- Equipment (e.g., construction equipment operating in or near the movement area),
- The operating environment (e.g., weather conditions, season, or time of day),
- Maintenance procedures (e.g., nightly movement area inspections), and
- External services (e.g., ramp traffic by tenants or law enforcement vehicles).

It may be best to identify the cause and effect to verify whether the hazard is actually a hazard. For example, if there is snow on an active runway, the cause would be accumulation of freezing precipitation and the likely effect would be limited braking action.

The use of a simple but well-defined hazard analysis tool ensures thorough assessment and documentation of SRM. There are many tools available, including the Preliminary Hazard Analysis, Operational Safety Assessment, Comparative Safety Assessment, Fault-Hazard Analysis, What-If Analysis, Scenario Analysis, and the Fault Tree Analysis. Airports may find it useful to use the Preliminary Hazard Analysis, since this is the primary analysis tool used by FAA Airports. Figure 4-4 depicts the Preliminary Hazard Analysis Tool. Once the airport selects a tool, it should use it continuously throughout the 5-step process. The tools are not interchangeable.

1 Hazard ID	2 Hazard Description	3 Causes	4 System States	5 Existing Controls	6 Justification/ Supporting Data	7 Effects	8 Severity	9 Severity Rationale	10 Likelihood	11 Likelihood Rationale	12 Initial Risk	13 Mitigation	14 Mitigation Responsibility	15 Predicted Residual Risk
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Figure 4-4. Preliminary Hazard Analysis Worksheet

(3) **Analyze the risk of identified hazards.** During the third step of hazard assessment, the airport analyzes the risk associated with each of the hazards identified in the previous step. For each

hazard, the airport should consider the worst credible outcome (harm), which is the most unfavorable condition that is believable and possible given the system state described in step one.

It is important to remember that in identifying hazards, airports should strive for ***reasonable*** assessments that cite credible outcomes. Not all hazards could technically result in a catastrophic accident. The airport should strive for quantitative or real-life examples of outcomes based on the hazard. Using examples from airports of similar size and operations may help add credibility.

Using the previous example of snow on the active runway, the worst credible outcome based on the system description (e.g., daytime versus nighttime operations or VFR versus IFR operations) is established. The worst credible outcome without consideration to the unique airport environment is likely a runway excursion. Whether that excursion results in significant damage or loss of life will be determined based on the system description. For example, at an airport that lacks standard safety areas or has non-frangible objects in the safety areas, the end result of a runway excursion could be worse than at an airport with standard safety areas.

Based on the worst credible outcome of each hazard, the airport then determines the severity and likelihood of that outcome using qualitative and/or quantitative methods. To do this, the airport should have pre-defined Severity and Likelihood levels. These levels are typically unique to each organization, since they are management's means of defining what constitutes acceptable and unacceptable levels of risk. The airport should develop these levels commensurate with its operational needs and complexity.

Severity and Likelihood levels and definitions should reflect both quantitative and qualitative values. In some cases, the airport may have data to draw on to establish a quantitative value for things like likelihood. In others, it may have to rely on the subject-matter expertise of those individuals completing the analysis.

Again, the airport should develop its own definitions and categories based on its unique operating environment. However, many airports may find it useful to use a standard five-level or three-level system. Tables 4-1 and 4-2 depict two samples of five-level Severity and Likelihood definitions.

Table 4-1. Sample Severity and Likelihood Definitions

Severity				
Negligible	**Minor**	**Major**	**Hazardous**	**Catastrophic**
No first aid required injury/illness; no lost work time; none to very limited operational impact (less than 1 hour); none to minimal equipment loss (less than 1 day out of service); no environmental impact; none to minimal budget impact	Injury/illness (first aid required); little to no lost work time (less than 2 days); none to very limited operational impact (less than 4 hours); none to minimal equipment loss (less than 2 days out of service); contained with none to limited impact to environment; minimal budget impact	Injury/illness (1 to 5 persons); death (less than 2 persons); lost work time (less than 1 week); loss of total operations (less than 2 hours); loss of partial operations (less than1 day); equipment loss (less than 1week); non-contained (manageable/ mitigated within 1 day); moderate budget impact	Injury/illness (6 to 49 persons); death (less than 5 persons); lost work time (1 week to 1 month); loss of total operation (2 to 12 hours); partial loss of operation (48 hours or less); equipment loss (less than 30 days); non-contained, resulting in environmental impact (1 to 30 day); serious budget impact	Injury/illness (greater than 50 persons); death (greater than 5 persons); lost work time (greater than 1 month); loss of total operation (greater than 12 hours); loss of partial operations (greater than 48 hours); total loss of equipment; non-contained resulting in long-term environmental impact (greater than 30 days); grave budget impact
Likelihood				
Extremely Improbable	**Extremely Remote**	**Remote**	**Probable**	**Frequent**
Almost impossible; possibly only once in 10 to 100 years	Conceivable but highly unlikely; possibly once in every 5 to less than 10 years	Possibly once a year or multiple times from 1 year to less than 5 years; unlikely but possible to occur	Likely to occur multiple times per year or once per month; regularly expected to occur in the system	Likely to occur once a day or multiple times per week; continuously expected to occur in the system

Table 4-2. Sample Severity and Likelihood Definitions

Severity			
	People	*Assets*	*Reputation*
Catastrophic	Fatality	Loss of an aircraft/or over $1 million in damage/or loss of critical system(s) for an extended period of time	An event or series of events resulting in the community not using the airport for an extended period of time
Hazardous	Severe injury (requiring hospitalization)	Damage to an aircraft taking it out of service for an extended period of time/or damage in	An event or a series of events resulting in the community lessening the use of the airport

		excess of $500,000/or disruption of critical services for extended period of time	causing negative financial or operational impacts
Major	Minor injury (requiring medical treatment)	Damage to an aircraft that is repairable/or damage to equipment or facility that is reparable within a short period of time	An event or a series of events resulting in the community lessening the use of the airport for a short period of time
Minor	Minor injury (not requiring medical treatment)	Minor damage to an aircraft, equipment, or facility not requiring it to be taken out of service	An event or a series of events resulting in the community questioning the reliability of the airport
No Safety Effect	No injury	No damage	No impact
Likelihood			
Frequent	Occurs once every month or 3,000 aircraft operations or 25,000 enplanements		
Probable	Occurs once every year or 34,000 aircraft operations or 300,000 enplanements		
Remote	Occurs once every 5 years or 170,000 aircraft operations or 1,500,000 enplanements		
Extremely Remote	Occurs once every 10 years or 340,000 aircraft operations or 3,000,000 enplanements		
Extremely Improbable	Occurs once every 10+ years or 340,000+ aircraft operations or 3,000,000+ enplanements		

The FAA developed Severity and Likelihood definitions, depicted in Figures 4-5 and 4-6, for its hazard assessments. Airports do not need to use the FAA definitions when developing their own, but they will need to reference them when participating in FAA-led hazard assessments. They should ensure that airport participants on FAA-led panels understand any differences (see section 4, Integrated SRM Efforts.).

Effect On: ↓	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
ATC Services	Conditions resulting in a minimal reduction in ATC services, or a loss of separation resulting in a Category D Runway Incursion (RI), Operational Deviation (OD) or Proximity Event (PE)	Conditions resulting in a slight reduction in ATC services, or a loss of separation resulting in a Category C RI, or Operational Error (OE)	Conditions resulting in a partial loss of ATC services, or a loss of separation resulting in a Category B RI or OE	Conditions resulting in a total loss of ATC services (ATC Zero), or a loss of separation resulting in a Category A RI or OE	Conditions resulting in a collision between aircraft, obstacles, or terrain
Flight Crew	-Flight crew receives TCAS Traffic Advisory (TA) informing of nearby traffic -PD where loss of airborne separation falls within the same parameters of a Class D OE or PE -Minimal effect on operation of aircraft	-Potential for PD due to TCAS Preventive Resolution Advisory (PRA) advising crew not to deviate from present vertical profile -PD where loss of airborne separation falls within the same parameters of Category C OE -Reduction of functional capability of aircraft but does not impact overall safety (e.g., normal procedures as per AFM)	-PD due to response to TCAS Corrective Resolution Advisory (CRA) issued advising crew to take vertical action to avoid developing conflict with traffic -PD where loss of airborne separation falls within the same parameters of a Category B OE -Reduction in safety margin or functional capability of the aircraft, requiring crew to follow abnormal procedures as per AFM	-Near mid-air collision (NMAC) results due to proximity of less than 500 feet from another aircraft or a report is filed by pilot or flight crew member that a collision hazard existed between two or more aircraft -Reduction in safety margin and functional capability of the aircraft requiring crew to follow emergency procedures as per AFM	Conditions resulting in a mid-air collision (MAC) or impact with obstacle or terrain resulting in hull loss, multiple fatalities, or fatal injury
Flying Public	Minimal injury or discomfort to passenger(s)	-Physical discomfort to passenger(s) (e.g., extreme braking action; clear air turbulence causing unexpected movement of aircraft causing injuries to one or two passengers out of their seats) -Minor injury to greater than zero to less or equal to 10% of passengers	-Physical distress on passengers (e.g., abrupt evasive action; severe turbulence causing unexpected aircraft movements) -Minor injury to greater than 10% of passengers	Serious injury to passenger(s)	Fatalities, or fatal injury to passenger(s)

Effect On: ↓	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Airport	No damage to aircraft but minimal injury or discomfort of little consequence to passenger(s) or worker(s)	-Minimal damage to aircraft -Minor injury to passenger(s) -Minimal unplanned airport operations limitations (e.g., taxiway closure) -Minor incident involving the use of airport emergency procedures	-Major damage to aircraft and/or minor injury to passenger(s)/ worker(s) -Major unplanned disruption to airport operations -Serious incident -Reduction on the airport's ability to deal with adverse conditions	-Severe damage to aircraft and/or serious injury to passengers(s)/ worker(s) -Complete unplanned airport closure -Major unplanned operations limitations (e.g., runway closure) -Major airport damage to equipment and facilities	-Complete loss of aircraft and/or facilities or fatal injury to passenger(s)/ worker(s) -Complete unplanned airport closure and destruction of critical facilities -Airport facilities and equipment destroyed

Minor Injury	Any injury that is neither fatal nor serious.
Serious Injury	Any injury which: (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second-or third-degree burns, or any burns affecting more than 5 percent of the body surface.
Fatal Injury	Any injury that results in death within 30 days of the accident.

Figure 4-5. FAA Office of Airports' Severity Definitions[5]

[5] Adapted from FAA Order 5200.11, *FAA Office of Airport Safety Management System*. Incorporates changes to FAA Air Traffic Organization definitions from April 2008.

	NAS Systems & ATC Operational	NAS Systems		ATC Operational		Flight Procedures	Airports
	Quantitative	Qualitative					Airport Specific
		Individual Item/System	ATC Service/ NAS Level System	Per Facility	NAS-wide		
Frequent A	Probability of occurrence per operation/ operational hour is equal to or greater than $1x10^{-3}$	Expected to occur about once every 3 months for an item	Continuously experienced in the system	Expected to occur more than once per week	Expected to occur more than every 1-2 days	Probability of occurrence per operation/ operational hour is equal to or greater than $1x10^{-5}$	Expected to occur more than once per week or every 2500 departures, whichever occurs sooner
Probable B	Probability of occurrence per operation/ operational hour is less than $1x10^{-3}$, but equal to or greater than $1x10^{-5}$	Expected to occur about once per year for an item	Expected to occur frequently in the system	Expected to occur about once every month	Expected to occur about several times per month		Expected to occur about once every month or 250,000 departures, whichever occurs sooner
Remote C	Probability of occurrence per operation/ operational hour is less than or equal to $1x10^{-5}$ but equal to or greater than $1x10^{-7}$	Expected to occur several times in the life cycle of an item	Expected to occur numerous times in the system life cycle	Expected to occur about once every year	Expected to occur about once every few months	Probability of occurrence per operation/ operational hour is less than or equal to $1x10^{-5}$ but equal to or greater than $1x10^{-7}$	Expected to occur about once every year or 2.5 million departures, whichever occurs sooner
Extremely Remote D	Probability of occurrence per operation/ operational hour is less than or equal to $1x10^{-7}$ but equal to or greater than $1x10^{-9}$	Unlikely to occur, but possible in an item's life cycle	Expected to occur several times in the system life cycle	Expected to occur about once every 10-100 years	Expected to occur about once every 3 years	Probability of occurrence per operation/ operational hour is less than or equal to $1x10^{-7}$ but equal to or greater than $1x10^{-9}$	Expected to occur once every 10-100 years or 25 million departures, whichever occurs sooner
Extremely Improbable E	Probability of occurrence per operation/ operational hour is less than $1x10^{-9}$	So unlikely that it can be assumed that it will not occur in an item's life cycle	Unlikely to occur, but possible in system life cycle	Expected to occur less than once every 100 years	Expected to occur less than once every 30 years	Probability of occurrence per operation/ operational hour is less than $1x10^{-9}$	Expected to occur less than every 100 years

Figure 4-6. FAA Office of Airports' Likelihood Definitions[6]

Based on these definitions, the airport can determine a Severity and Likelihood of the worst credible effect for each hazard. Generally, Severity is established first for each worst credible outcome since it

[6] Adapted from FAA Order 5200.11, *FAA Office of Airport Safety Management System*. Incorporates changes to FAA Air Traffic Organization definitions from April 2008.

should be independent of likelihood. Next, the Likelihood, or the expression of how often an event is expected to occur, is established for the worst credible outcome.

(4) **Assess the level of risk associated with identified hazards**. In the fourth step of hazard assessment, the airport uses the Severity and Likelihood values assessed in the third step and compares it to the organization's acceptable and unacceptable levels of safety risk. This is considered "initial risk" since it does not consider any mitigations.

As airport management develops the SMS Manual, it should identify what acceptable and unacceptable risk is for the airport. As discussed above, SMS does not mean accident free. Some risk should be accepted or the airport would never operate.

The number of levels of risk is really an airport decision. The simplest system will only have two levels: acceptable and unacceptable risk. FAA Airports typically uses a three-level predictive risk matrix that includes high, medium, and low risk. The airport must document its risk levels, train individuals responsible for conducting the 5-step process on the meaning of these levels, and ensure individuals who accept risk understand their responsibilities.

There are numerous tools available to quantify and/or qualify risk. For example, using a predictive risk matrix, the airport operator can determine whether the hazard presents a low, medium, or high risk of causing damage or compromising safety. A predictive risk matrix (see Figure 4-7) graphically depicts the various levels of Severity and Likelihood as they relate to the levels of risk. On a typical predictive risk matrix, Severity and Likelihood are placed on axes on a graph (i.e., the X- and Y-axes). The severity and likelihood assessed during the third step of hazard assessment can then be plotted on the risk matrix grid for each of the hazards to be assessed. Figure 4-8 depicts FAA's predictive risk matrix.

When developing a risk matrix, the airport should consider the following characteristics:

- The matrix should fit the airport's needs based on its size and complexity.
- It should be simple and easy to use and understand.
- You should not need extensive knowledge of quantitative risk tools to be able to use it.
- It should clearly define acceptable and unacceptable risk levels and any procedures required based on those definitions.

(Adapted from ACRP's SMS for Airports Volume 2: Guidebook)

The important part of this third step is to understand and accurately position on the matrix what kind of threat the hazard is to the safety of the airport, the users, and the airport's total operational environment. The individuals making this determination should use common sense to ensure their judgment prioritizes safety but is not unreasonable.

When the Severity and Likelihood of a hazard's effect are plotted on the risk matrix, the airport can see whether the hazard's safety risk is acceptable to the organization. Generally, as the Severity and Likelihood increases, the risk increases. It is important to graph risk appropriately and pay attention not only to those hazards with severe risks, but also to those hazards that are likely to occur more frequently, even though their severity may be low.

Figure 4-7. Sample 4x4 Predictive Risk Matrix with Likelihood and Severity Definition and Two Levels of Risk: Acceptable and Unacceptable

Severity / Likelihood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A					
Probable B					
Remote C					
Extremely Remote D					
Extremely Improbable E					*

High Risk
Medium Risk
Low Risk

* Unacceptable with Single Point and/or Common Cause Failures

Figure 4-8. FAA Office of Airports' Predictive Risk Matrix

The individual or persons conducting the analysis should not pre-judge or try to manipulate the analysis to keep the hazard and its outcome from being "unacceptable" or "high risk."

(5) **Mitigate the risks of identified hazards, when appropriate.** The fifth step is only used if the initial risk of the hazard's outcome, as determined in step four, is unacceptable or if the airport requires mitigation of certain types of acceptable risk. For example, FAA Airports considers high risk unacceptable and requires mitigation. Medium risk is acceptable, but mitigation is preferred when possible.

There are a variety of risk mitigation strategies the airport can use to decrease the severity or likelihood of the hazard's outcome. According to ICAO (2009), these approaches include:

- **Risk Avoidance** – The operation or activity is cancelled because the safety risks exceed the benefits of continuing the operation or activity (e.g., cancelling rather than allowing construction during low visibility night operations).

- **Risk Reduction** – The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the accepted risks (e.g., limiting construction to daytime hours during low-traffic operations).

- **Segregation of Exposure** – Action is taken to isolate the impacts of the hazard or redundancy is built in to protect against the impacts (e.g., conducting additional FOD sweeps before operations during periods of construction).

Mitigation measures should be appropriate, timely, and cost-effective. Further, if an airport puts in place a requirement to mitigate acceptable risk, not just unacceptable risk, the airport should only take the mitigating action if it is practicable.

ACRP's SMS for Airports Volume 2: Guidebook (2009) offers a variety of examples of mitigations to reduce Likelihood and Severity. The following are ways to reduce the outcome's likelihood:

- Raising awareness and/or control [e.g., safety campaigns, notices to airmen (NOTAMs), or briefings].
- Providing training (e.g., on-the-job training, recurrent training, or improving skills).
- Establishing procedures (e.g., avoid operations under certain conditions, develop or modify standard operating procedures, or intensify frequency of sweeping areas subject to FOD).
- Avoiding risk by ceasing the activity (e.g., close taxiway for operations during maintenance activities).
- Increasing supervision (e.g., escorting non-airport employees or conducting additional inspections).
- Improving infrastructure (e.g., improved signage or taxiway layout).

The ACRP Guidebook also suggests mitigations for reducing severity:

- Improving emergency response (e.g., additional vehicles or positioning).
- Improving infrastructure (e.g., extending runway safety areas or removing obstacles).
- Establishing standard operating procedures (e.g., define procedures for strong wind conditions).
- Creating special programs (e.g., speed rules for non-movement areas).

Once a mitigation is established, the airport should have processes in place to assign responsibility for ensuring the mitigation is completed (sometimes called verification). Also, the individual or persons responsible for the 5-step process should re-analyze the hazard based on the mitigation to establish the "residual risk". Residual risk is the risk that remains after all risk mitigations have been implemented and their completion verified. If the residual risk of the hazard's outcome still places it in an unacceptable risk level, then the airport should identify additional mitigations or stop the operation or change causing the hazard.

The airport's Safety Assurance processes (see Chapter 5) should include procedures to trigger re-evaluations of the hazard if data or hazard reports indicate a mitigation is not effectively reducing the risk of the hazard's outcome. For example, if an airport put in place a mitigation to decrease the likelihood of a runway incursion but safety performance data then showed an increase in runway incursions after the mitigation was put in place, then the mitigation may not be effective.

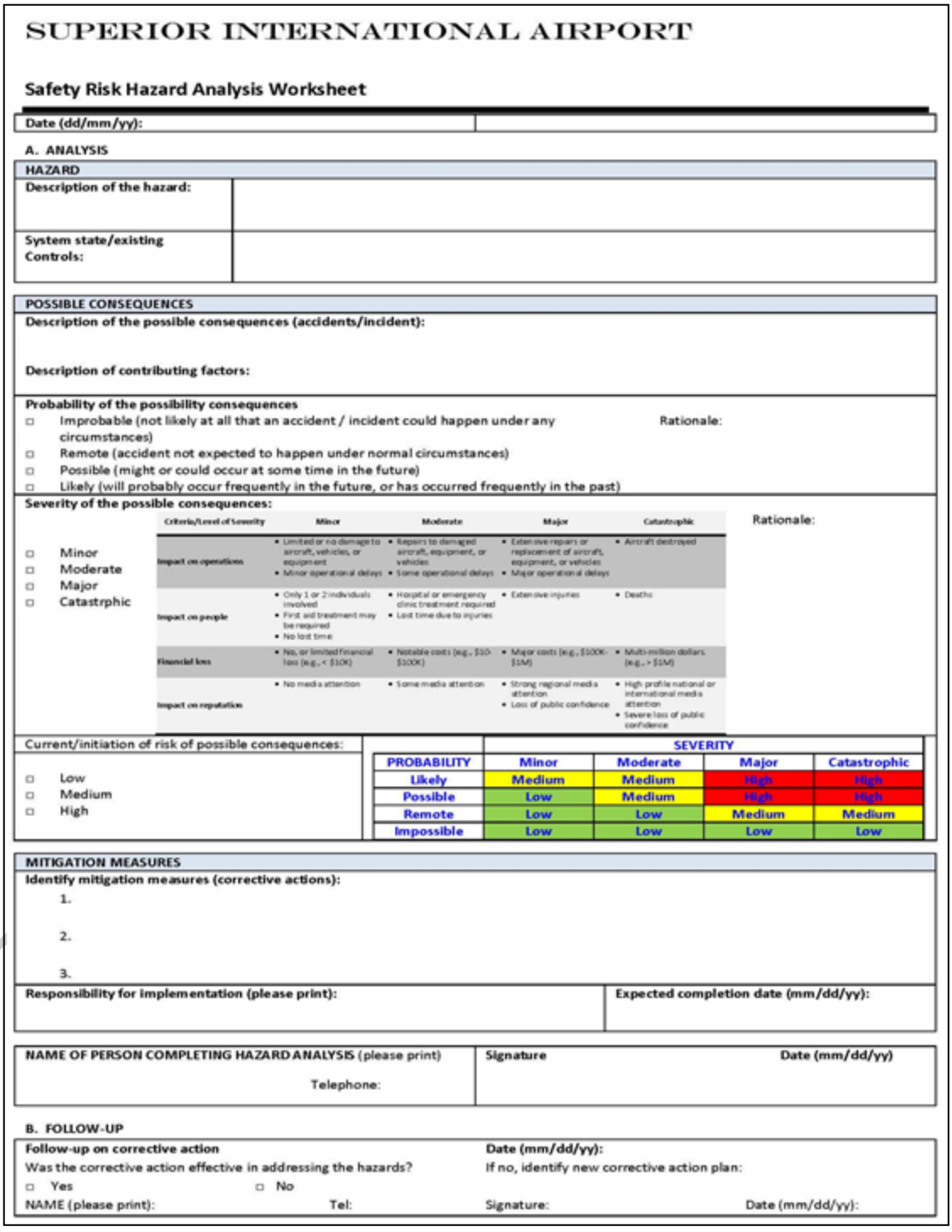
c. Documentation.

The formalized, proactive identification and analysis of hazards, as is found under SRM, provides airport management with a tool to make decisions about safety, but only if the process and hazards are documented. Airport management should establish its documentation process and procedures early in SMS development and include them in the SMS Manual.

Documentation also allows meaningful analysis of operational safety-related trends on the airfield and of overall airport system safety. Documentation provides historical information that can be used when making decisions in the future.

Airports have a range of options to document SRM. Some larger airports or airports with more complex operations may choose to purchase or create software that guides individuals through the SRM process or even integrates hazard reporting, identification, analysis, and documentation. While this technological approach is not required, it may prove more timely and cost-beneficial for some airports.

Other airports may find it easier to establish forms or databases to track mitigations and document the 5-step process. Figure 4-9 depicts a sample hazard assessment form. The airport should establish record retention policies for these documents. However, the documents should be maintained for at least the life cycle of the operation, change, or mitigations. The airport may also want to consult with its legal department to determine the best means for using and retaining these documents.



SUPERIOR INTERNATIONAL AIRPORT

Safety Risk Hazard Analysis Worksheet

Date (dd/mm/yy):	

A. ANALYSIS

HAZARD	
Description of the hazard:	
System state/existing Controls:	

POSSIBLE CONSEQUENCES

Description of the possible consequences (accidents/incident):

Description of contributing factors:

Probability of the possibility consequences

- ☐ Improbable (not likely at all that an accident / incident could happen under any circumstances)
- ☐ Remote (accident not expected to happen under normal circumstances)
- ☐ Possible (might or could occur at some time in the future)
- ☐ Likely (will probably occur frequently in the future, or has occurred frequently in the past)

Rationale:

Severity of the possible consequences:

- ☐ Minor
- ☐ Moderate
- ☐ Major
- ☐ Catastrphic

Rationale:

Criteria/Level of Severity	Minor	Moderate	Major	Catastrophic
Impact on operations	• Limited or no damage to aircraft, vehicles, or equipment • Minor operational delays	• Repairs to damaged aircraft, equipment, or vehicles • Some operational delays	• Extensive repairs or replacement of aircraft, equipment, or vehicles • Major operational delays	• Aircraft destroyed
Impact on people	• Only 1 or 2 individuals involved • First aid treatment may be required • No lost time	• Hospital or emergency clinic treatment required • Lost time due to injuries	• Extensive injuries	• Deaths
Financial loss	• No, or limited financial loss (e.g., < $10K)	• Notable costs (eg., $10-$100K)	• Major costs (eg., $100K-$1M)	• Multi-million dollars (e.g., > $1M)
Impact on reputation	• No media attention	• Some media attention	• Strong regional media attention • Loss of public confidence	• High profile national or international media attention • Severe loss of public confidence

Current/initiation of risk of possible consequences:

- ☐ Low
- ☐ Medium
- ☐ High

PROBABILITY	SEVERITY			
	Minor	Moderate	Major	Catastrophic
Likely	Medium	Medium	High	High
Possible	Low	Medium	High	High
Remote	Low	Low	Medium	Medium
Impossible	Low	Low	Low	Low

MITIGATION MEASURES

Identify mitigation measures (corrective actions):

1.

2.

3.

Responsibility for implementation (please print):	Expected completion date (mm/dd/yy):

NAME OF PERSON COMPLETING HAZARD ANALYSIS (please print) Telephone:	Signature	Date (mm/dd/yy)

B. FOLLOW-UP

Follow-up on corrective action	Date (mm/dd/yy):
Was the corrective action effective in addressing the hazards? ☐ Yes ☐ No	If no, identify new corrective action plan:
NAME (please print): Tel:	Signature: Date (mm/dd/yy):

Figure 4-9. Sample 4x4 Hazard Assessment Form

d. Provide for regular assessment to ensure that mitigations are effective.

Successful mitigations, which are tied to achieving safety objectives, are the incremental steps toward improving the level of safety at an airport. Consequently, the airport should review its mitigations periodically to evaluate their status and ensure their continued effectiveness or recognize a need to modify them in terms of meeting identified safety objectives. The airport should include data collection and analysis specific to verifying mitigations as part of its Safety Assurance activities (see Chapter 5). If this analysis suggests mitigations are not working, the airport should have processes in place to trigger re-evaluation of the hazard and its mitigations for effectiveness. The airport should also use data from accident or incident investigations on the airport or at airports with similar operations (when this information is made available) to spot ineffective mitigations.

3. Scalability of SRM.

As with other components of SMS, the airport should establish SRM processes and procedures in a scalable manner. Hazard assessment processes should be understandable and timely and not disrupt the airport's operations. Processes also should be effective in identifying and quickly assessing hazards so that unacceptable changes or operations are stopped quickly.

Larger airports could be well-served by establishing two types of hazard assessment: hazard triage and integrated SRM. Integrated SRM is discussed in the next section.

In hazard triage, the SMS Manager or other Operations staff is sufficiently trained and given autonomy to review identified safety issues or hazards and determine if immediate action must be taken. These individuals can conduct the 5-step process, typically using a form to direct and document their actions. For more complex issues, these individuals forward hazards to airport management, a safety committee, or other body to conduct hazard assessments using subject matter experts representing impacted stakeholders such as other airport divisions, tenants, the FAA, or other airport users.

Smaller airports may choose to route all identified hazards through the accountable executive, SMS Manager, or Operations department. Again, the hazard assessment process must be streamlined to prevent assessments from getting bogged down. While smaller airports may choose to have an individual conduct much of their hazard assessments, they should ensure that findings and mitigations are discussed and communicated with applicable stakeholders.

4. Integrated SRM Efforts.

Airports are not the only sector of the aviation industry using SRM or SMS-related initiatives. Many air carriers, fixed-base operators, aircraft manufacturers, and training organizations are also actively developing and implementing proactive, risk management procedures for their organizations. Military tenants have similar programs, such as Operational Risk Management, active on their property. In many ways, airport management can use these developments to help shape and promote their SMS initiatives. Airport management should meet early in the airport's SMS development with tenants, especially those with SMS, to develop procedures for sharing hazard information, conducting integrated hazard assessments, and verifying mitigations.

Similarly, the FAA has integrated SMS concepts and processes and SRM into its operations. To reduce redundancy, the airport may participate in FAA-led SRM activities instead of conducting its own hazard assessment. FAA Airports takes the lead on SRM activities for the following activities:

- FAA review of airport development projects (e.g., Airport Layout Plan changes).

- Approval of part 150 Noise Compatibility Program modifications that may impact aviation safety.

- FAA review of modifications of airport design standards.

- FAA review of Construction Safety Phasing Plans.

FAA's Air Traffic Organization or NextGen Office may also lead SRM-related activities on the airport. When FAA is the lead, the airport is not responsible for facilitating the 5-step process. However, the airport may be asked to secure a third-party facilitator, provide data or documents needed for quantitative analysis, or provide subject matter experts for the integrated assessment.

When conducting integrated SRM efforts, the panel uses the lead organization's Severity and likelihood definitions. Therefore, for FAA-led assessments, the panel uses the FAA's severity and likelihood definitions and predictive risk matrix for the assessment. Any documentation required by the lead organization is used. For example, FAA Airports requires the use of a Safety Assessment Screening (SAS) Form by the FAA Project Manager to document the project, panel members, and assessment findings. The SAS form, Project Proposal Summary, Hazard Assessment Tool, narrative, and any pictures are combined to form the assessment documentation (see FAA Office of Airports SMS Desk Reference (June 2012) available at http://www.faa.gov/airports/airport_safety/safety_management_systems/internal]).

5. Example #1 of SRM.

Seratame Airport in Wicker, Alaska is operated by the Wicker Airport Authority. The Authority holds a Class I AOC and is Index E. Seratame is served by a regional carrier that operates 2 daily Beech 1900 roundtrip flights to its hub. Seratame provides all the services and employees to turn-around the aircraft. The carrier recently notified the Authority that it plans to replace the Beech 1900's with Bombardier CRJs. The change in aircraft operating at the airport triggers the airport's SRM processes and the Operations Manager conducts a hazard assessment. Since the Authority's employees service the aircraft, the Operations Manager determines there is no need to include the carrier in the initial assessment.

(1) Describe the system. The airport has two runways, Runway 12/30, which is a 7,000 foot paved, grooved, and marked for an ILS approach, and Runway 9/27 which is a 3,500 foot rolled grass runway primarily used by experimental and general aviation aircraft. There is no active construction on airport at this time.

The airport's existing facilities including the runways and taxiways meet design specifications for the CRJ. The airport has standard markings in the movement area. However, non-movement area markings are specific to the Beech 1900.

Other than the regional carrier, the airport is used by general aviation aircraft.

Identify the hazards. The Operations Manager bounds out the movement area from the analysis since the runway and taxiway meet design specifications for the CRJ. Based on the system description, the Operations Manager identifies two hazards

(a) Incorrect aircraft parking at gate (caused by old markings); and

(b) Misalignment of aircraft on ramp (caused by old markings).

(2) **Analyze the risk.** Using the airport's Severity and Likelihood definitions (see Figures 4-5 and 4-6), the Operations Manager examines the worst credible outcome of each hazard.

(a) Potential for aircraft collision with servicing equipment and/or jetway bridge most likely during nighttime conditions. Based on existing controls, severity is Minor since aircraft is at extremely low speed. Based on an analysis of past incidents in the non-movement area, the Operations Manager categorizes the likelihood of this effect as Remote.

(b) Potential for aircraft collision with other parked aircraft or vehicles during nighttime conditions. Based on existing controls, severity is Major since taxiing speeds could result in major damage if aircraft impacts another aircraft or vehicle unexpectedly. Based on an analysis of past incidents in the non-movement area, the Operations Manager categorizes the likelihood of this effect as Probable.

(3) **Assess the risks.** Using the airport's risk matrix (see Figure 4-8), the Operations Manager determined the following results:

(a) The risk associated with incorrect parking at gate results in Low Risk.

(b) The risk associated with misalignment of the aircraft in the gate area results in High Risk.

(4) **Mitigate the risks.** All High Risk must be mitigated under the Authority's Safety Policy. Therefore, the Operations Manager develops a risk mitigation strategy that includes short-term and long-term solutions. In the short term, the Authority will establish temporary parking restrictions for aircraft in the non-movement area to ensure clearance for the CRJ as it transits from the movement to the non-movement area. In the long term, the Authority will remove the old non-movement area markings and re-paint to accommodate the CRJ. These mitigations reduce the risk from High to Medium. Additionally, repainting eliminates both hazards, once complete.

6. Example #2 of SRM.

As the fixed-base operator (FBO) for Timmons Municipal Airport, Flying Flag Incorporated has provided all ramp and fuel services on the airport for years. Flying Flag's responsibilities include servicing general aviation aircraft, the three weekly air carrier flights, and occasional charter flights. The FBO also maintains the on-airport fuel farm.

Recently, the owner of Flying Flag decided to close the FBO after his unsuccessful attempts to find someone to take over the business. The airport is reviewing proposals from two companies to replace Flying Flag but both are relatively new operations. The airport manager is concerned that a new FBO will lack experience in ramp and fuel operations. She decided to proactively identify the hazards associated with the new operator.

(1) **Describe the system.** The airport holds a Class I Airport Operating Certificate with Index A ARFF services. Air carrier flights only recently picked up and the airport operates on a very tight budget with a relatively small staff. Most services, field maintenance, and aircraft servicing and fueling are provided by the FBO.

The airport has two runways, 7,250 foot long runway for air carriers and one smaller general aviation runway. Although there are three air carrier flights a week with Beech 1900 aircraft, general aviation operations make up the bulk of Timmons traffic. During yearly events at the local race track and golf course, general aviation traffic increases dramatically and the airport relies on the FBO to also manage

ramp and parking operations. These events increase traffic and parking to the point that the airport's ramp is at capacity.

A contract air traffic control tower operates 14 hours per day from 0600 to 2000 hours, seven days a week. Air carrier flights operate during these times, except for the occasional charter flight. The airport published a prior permission request requirement (RPR) for air carrier flights outside of normal operating hours.

Other than the regional carrier, the airport is used by general aviation aircraft.

(2) **Identify the hazards.** To help identify hazards, the airport manager decided to use a panel of subject matter experts that includes local pilots, the air carrier station manager, and members of the airport manager's staff. The panel of experts identified three potential hazards generated by a change of FBO.

(a) Reduction in experience levels and potential confusion in ramp operations,

(b) Reduction in experience levels and potential confusion in parking/apron management and ground loading of passengers, and

(c) Reduction in experience levels and potential confusion in fueling operations.

(3) **Analyze, Assess, and Mitigate the Risk.** Using the airport's Severity and Likelihood definitions and Predictive Risk Matrix, the panel used the airport's Risk Assessment Worksheet to assist their analysis and determined the following:

Timmons Municipal Airport Risk Assessment Worksheet							
#	Hazard	Risk	Severity	Likelihood	Resultant Risk	Mitigation	Residual Risk
1	Reduced experience and confusion in ramp operations	Collision of ground support equipment with aircraft.	Minor	Remote	Low	Redesign ramp driving training program and require new FBO personnel to complete.	Low
		Aircraft to aircraft collision.	Major	Remote	Medium	Limit number of aircraft on ramp by SOP. Conduct survey of ramp needs and develop new ramp marking plan from that survey. Remark ramp as appropriate.	Low
		FOD damage to aircraft	Minor	Probable	Medium	Perform FOD walks. Develop FOD awareness training course and require new FBO personnel to attend. Develop FOD awareness	Low

Timmons Municipal Airport Risk Assessment Worksheet							
#	Hazard	Risk	Severity	Likelihood	Resultant Risk	Mitigation	Residual Risk
						campaign under the direction of airport manager. Develop FOD log and require FBO to use and maintain.	
2	Reduced experience and confusion in fueling operations	Fuel spills. Inadequate grounding/bonding causes fire.	Minor Major	Probable Extremely remote	Medium Low	Require training of FBO personnel IAW FAA Part 139 to be completed and verified before contract assignment. Require independent safety audit of fuel delivery procedures within 90 days of FBO beginning operations Audit FBO	Medium Low
3	Reduced experience and confusion in passenger operations & loading	Passenger injury due to jet-blast/prop-wash. Passenger injury caused due to contact with turning propeller.	Major Catastrophic	Remote Extremely improbable	Medium Low	Provide ramp agent awareness training Mark ramp and provide cones for movement of personnel. Define by SOP limits of passenger movement on ramp area. Require FBO to provide passenger escort at all times. By written SOP require parked aircraft with turning propeller to have turning prop on side opposite of ramp.	Low Low

Chapter 5. Safety Assurance

1. Introduction.

Safety Assurance is the third component of SMS and serves as checks and balances for the SMS. Under Safety Assurance, the airport operator should establish processes and procedures to verify and monitor the effectiveness of the SMS. To do this, the airport should develop and implement a method for monitoring safety performance, establish and maintain a confidential hazard reporting system, and develop processes to report pertinent safety information to the accountable executive (see Figure 5-1). A key outcome of Safety Assurance is continuous improvement.

Safety Assurance activities also:

- Help the airport evaluate the continued effectiveness of implemented risk mitigation strategies under SRM.
- Support the identification of new hazards.
- Systematically provide confidence that the airport is meeting or exceeding its safety objectives through continuous improvement.
- Provide the foundation for data collection, which help airport management with decisionmaking.

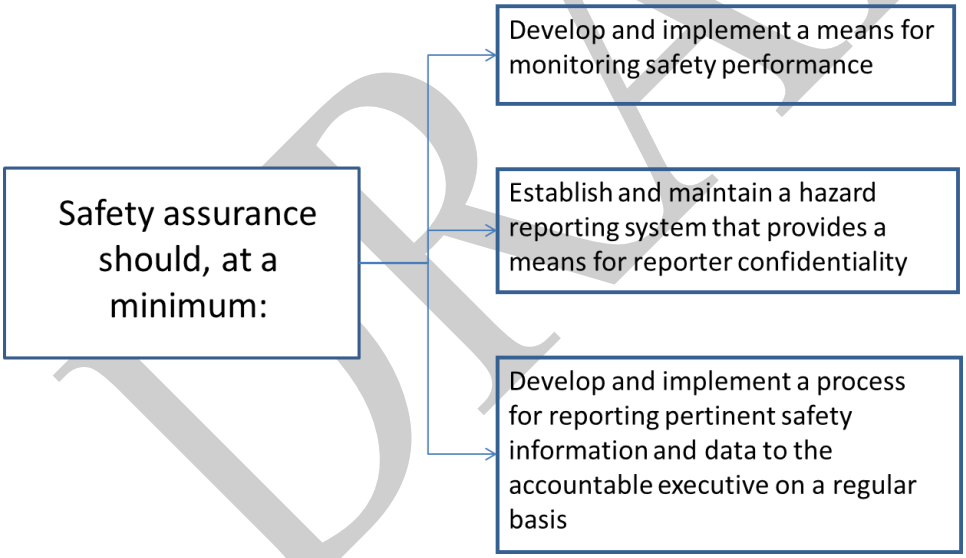


Figure 5-1. Safety Assurance

The Safety Assurance and SRM components are closely linked. As discussed in Chapter 4, SRM ensures hazards and their associated risks are identified, analyzed, and assessed and mitigations are put in place when necessary. Safety Assurance processes then take over, using data to evaluate whether the mitigations are having the desired effect. Figure 5-2 depicts the SRM/Safety Assurance relationship.

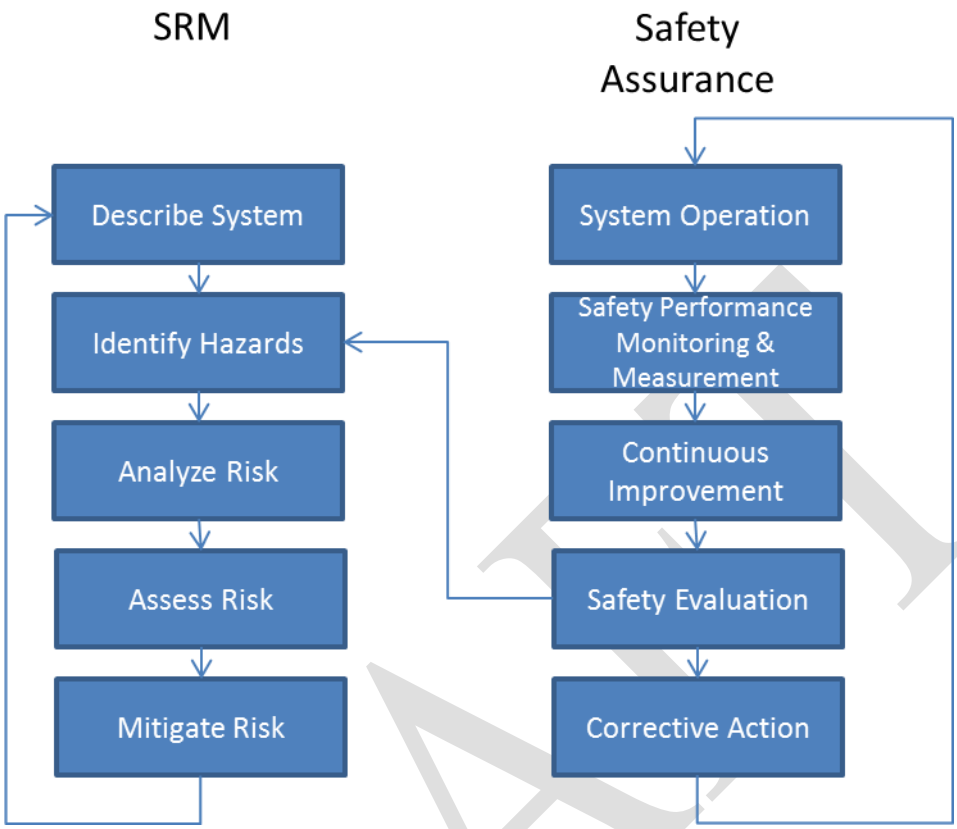


Figure 5-2. SRM/Safety Assurance Relationship

2. Developing and Implementing Safety Assurance.

a. Establish and maintain a hazard reporting system that provides a means for reporter confidentiality.

A hazard reporting system broadens the airport's ability to capture information that airport management might not otherwise observe. Airport employees are typically the first to become aware of hazardous situations in the movement and non-movement areas of the airport. Similarly, pilots, airfield tenants, airline employees, and other individuals on the airfield may identify hazards, so the airport should provide a system that allows these individuals to report hazards. An airport should develop the kind of system that is best for its operational environment.

Smaller airports with few employees and less turnover may find formalized hazard reporting difficult to establish. Employees at these airports may be used to directly reporting safety issues to airport management. While direct communication may have worked in the past, it fails to formally document the issues or provide a means for the airport to track trends and systemic problems. At airports where informal reporting has been the norm, airport management should continually re-affirm its commitment to the new formal reporting system until its use becomes standard practice.

An airport can establish a reporting system in a variety of ways. Airport management can receive hazards reports via:

- Hardcopy forms and dropboxes throughout the airport;
- Internal and/or public websites with reporting capabilities;
- An airport hotline;
- Manager/tenant meetings; and/or
- Daily inspections.

The airport should base its hazard reporting format choice on the size and complexity of the airport's operations. A smaller airport with few employees and tenants may find it cost-beneficial to use dropboxes throughout the airport. Whereas, a larger airport with many employees and tenants may need multiple reporting formats and/or an information technology solution such as an online reporting tool.

Daily inspections ***should not*** be the primary means of receiving hazard reports since there are many more individuals with access to the airfield, beyond the airport's own staff, who can identify hazards.

Regardless of the format, a good hazard reporting system should:

- Be voluntary, impartial, and confidential (to the extent practicable).
- Be easily accessed by all airport employees and tenants.
- Provide feedback to reporters.
- Formally document reports.
- Safeguard confidentiality.
- Provide prompt notification to management.
- Be administered by one individual or department that is responsible for managing the status of a report and investigating the identified hazard(s).
- Provide trust and encourage reporting.
- Be scalable.

(Adapted from ACRP's SMS for Airports Volume 2: Guidebook)

The airport may use its reporting process to report incidents and accidents as well as safety issues and hazards. The airport should ensure that reporters understand the definitions of these terms and how to use the report forms. Figure 5-3 includes a simple hazard report form that airports could use for incident and accident reporting.

Confidential Hazard/Incident/Accident Reporting Form

This form should be used to report any airside hazard that has caused or could cause an accident or incident. Place in any labeled "Hazard Reporting Dropbox" on the airport or send to the airport's SMS Manager as soon as possible.

HAZARD OR EVENT DESCRIPTION

(To be completed by person reporting the event)

DATE: / / Time: AM/PM

LOCATION: _____

DESCRIPTION: _____

_____

_____

_____

WITNESSES: _____

REPORTER NAME (optional): _____

REPORTER POSITION (optional): _____

CONTACT NUMBER/EMAIL ADDRESS: _____

Confidentiality Commitment

You can choose to report anonymously by omitting name, position, and other identifying details. If you provide your name, only the SMS Manager will see it and potentially use it to gather additional information about the even and discuss follow-up actions if required. Under no circumstances will your identity be disclosed to any person or organization without your express permission. However, these confidentiality commitments do not apply to any willful disregard of regulation or negligent acts committed on the airport.

Figure 5-3. Sample Confidential Hazard Reporting Form

(1) **Confidentiality concerns.** While there has been much emphasis in the past on establishing non-punitive hazard reporting systems, U.S. airports may find it difficult to prevent punishment of non-airport employees (e.g., tenant employees). Therefore, the airport should establish a confidential hazard reporting system that protects the reporter's identity. Furthermore, airports may wish to include statements on their reporting forms explaining that the airport cannot provide confidentiality to individuals who willfully disregard regulations or participate in negligent acts. Airport management should consult with legal counsel when deciding whether to add such language.

Airport management should also consult with its legal counsel on the applicability of state open records laws commonly known as "sunshine laws". State open records laws are different from the Federal Freedom of Information Act (FOIA). FOIA only applies to records obtained by the Federal government. Therefore, an airport's confidential hazard reports would not be subject to Federal FOIA protections.

Due to differences in data protection laws from state to state, some airports may find it difficult to convince tenants to encourage their employees to use the hazard reporting system. In these cases, airports may work with these tenants to educate them on disclosure policies and means of protecting confidentiality. **Note:** Where tenants remain resistant, airports may also consider including clauses in future lease agreements requiring use of the system.

(2) Feedback to reporters. Airports should also keep in mind when establishing hazard reporting systems that reporters should get feedback on the resolution of their reports. While it may not be possible under a confidential reporting system to provide direct feedback, the airport should establish a process, usually linked to communications under Safety Promotion (see Chapter 6), to provide feedback. For example, an airport could communicate feedback by including it in safety bulletins, posting information on a safety bulletin board, discussing it during management meetings, and/or posting feedback on a dedicated area of the airport's internal website.

If the airport chooses a technology-based approach to reporting, it should consider the following when building the reporting tool:

- Determine whether existing information technology systems used by the airport, such as asset or fleet management software, have reporting capabilities or whether a new system must be developed. In cases where new systems are developed, the airport may want to link existing and new systems.

- Determine who will report and from whom the airport will accept reports. Will the airport accept reports from the general public? If so, a public reporting interface on the airport's website may be a viable solution. It may not be advisable to require reporters to sign into the system to report hazards because they may worry about confidentiality.

- Use pre-defined fields or drop-down menus for data entry to help standardize reporting and analysis. This will also aid in timely review and action.

- Where possible, link hazard location descriptions to an airport layout plan or allow tagging through the airport's Geographical Information System (GIS).

- Ensure the system automatically notifies a designated airport management official, such as the SMS Manager, when a report is submitted.

- Determine who will host the data. Will it be hosted offsite by a third party? If so, does the airport have sufficient rights to retain the data once any contracts with the third party are complete?

- Design scalability into the system to ensure it can be expanded to track more issues, allow reporting from more sources, and be connected to other airport systems.

b. Develop and maintain a means for monitoring safety performance.

To facilitate continuous improvement, an airport should set baselines and measure its performance against those baselines. To do this, the airport should develop and maintain a means for monitoring safety

performance that ensures the airport meets the safety objectives identified under the Safety Policy component (see Chapter 3), ensures the airport meets the requirements of its SMS, and verifies the effectiveness of the mitigations established under SRM.

To accurately monitor safety performance, the airport should:

- Collect data;
- Analyze collected data;
- Evaluate the SMS processes and procedures; and
- Monitor mitigations developed under SRM.

(1) Data collection. While the airport may use processes such as internal evaluations, safety reviews, and similar methods to monitor safety performance, it should measure changes in performance by first collecting and analyzing data. This monitoring goes well beyond self-inspections, as required under part 139, because the airport proactively looks for safety issues, trends, and failures.

Safety data may come from many sources. Certificated airports already collect it through self-inspection reports, maintenance logs and tracking, and accident/incident investigations. Under SMS, hazard reports and Hazard Assessments will also provide the airport with safety data it can use to track performance. The data collected can and should relate to the airport's safety objectives, but the airport may collect additional data.

Data collection and analysis can be as simple or as complex as necessary. ACRP's SMS Guidebook and ICAO's Safety Management Manual both provide in-depth discussions on data collection, analysis, and measurement. Essentially, the airport should use data to determine whether there are safety trends or failures in the system. (See "Example A: Using Safety Assurance to Monitor the Effectiveness of Mitigations.")

Example A: Using Safety Assurance to Monitor the Effectiveness of Mitigations.

Airport XYZ conducts a Hazard Assessment using its SRM requirements for a construction project. In order to accept the risk of the project, the airport puts in place a mitigation to increase the number of FOD sweeps of the taxiways. However, data gathered through self-inspections during the construction project shows an increase in FOD on the taxiways that was supposed to have been removed during the additional FOD sweeps. Through its Safety Assurance process, the airport discovers this mitigation (additional FOD sweeps) is not having its desired effect. It decides to re-evaluate the mitigation and consider additional mitigations or more oversight.

(2) **Safety evaluations.** Performance monitoring should take into account both short-term and long-term goals and look at both individual safety objectives and bigger systematic issues such as overall SMS implementation and effectiveness. The airport may conduct safety evaluations (also referred to as safety audits) to assess the implementation and effectiveness of SMS components and initiatives, including safety objectives, as well as the SMS as a whole. (See "Example B: Using Safety Evaluations to Track Safety Objectives.")

The SMS Manager or accountable executive may conduct the safety evaluations. However, other levels of airport management or divisions within the airport can also conduct periodic evaluations to assess their operations and implementation of SMS provisions. Some airports may also find it helpful to use third-party evaluators or other airports when evaluating SMS implementation as a whole.

Example B: Using Safety Evaluations to Track Safety Objectives.

Airport XYZ selects a safety objective related to decreased V/PDs. Based on data collected during performance monitoring, the airport finds the number of V/PDs has increased. The airport decides to evaluate the incidents and look for contributing factors, root causes, and ways to meet the safety objective in the future.

The airport should establish timing and processes appropriate to the complexity and size of the airport. For example, a smaller airport may choose to conduct quarterly or semi-annual evaluations due to resource limitations. Larger airports, with various divisions and layers of management, may wish to conduct multiple levels of evaluations, culminating in a third-party or external evaluation to gain a more objective review of the SMS's effectiveness.

Regardless of how often the airport chooses to evaluate itself, it should ensure that data including hazard, incident, and accident reports is constantly being reviewed and make adjustments to the program when necessary.

c. Develop and implement a process for reporting pertinent safety information and data to the accountable executive on a regular basis.

Since the accountable executive is responsible for overall airport safety, this person should receive sufficient safety information to ensure priorities are set appropriately, resources are allocated correctly, and decisions are made on actions that often must be coordinated with several affected parties.

The accountable executive should receive briefings on the following safety information and data:

- Performance with safety objectives established under the airport's Safety Policy,
- Safety critical information distributed under the airport's Safety Promotion activities,
- Status of ongoing mitigations required under the airport's SRM policies and procedures, and
- Status of the airport's schedule for developing or implementing initiatives under the SMS.

Airport management should determine the appropriate length of time between briefings and document this schedule in the SMS Manual. Briefings may range from weekly to monthly. While quarterly reporting alone is not advisable, some systemic reporting may be done on a quarterly basis. Some accountable executives may want to be updated more regularly than others. A smaller airport, where the accountable executive may be the same individual responsible for overseeing and maintaining this information, may not need to establish a process for regular updates.

There are many methods the SMS Manager or others may use to communicate safety information to the accountable executive. Some may choose more formalized reports, while others may choose verbal presentations. Airports may find it helpful to use a visual "dashboard" to track progress toward the

organization's safety objectives and other pertinent safety information. Appendix F includes a sample dashboard.

Chapter 6. Safety Promotion

1. Introduction.

The fourth component of SMS, Safety Promotion, establishes processes to foster a safety culture. This includes safety training for all individuals with access to the airfield and communication of important safety information (see Figure 6-1). A safety culture is defined as:

> "[T]he product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, the organization's management of safety. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventative measures" (ACRP, 2009).

While all SMS components contribute to a strong safety culture, "Safety Promotion sets the tone that predisposes both individual and organizational behavior and fills in the blank spaces in the organization's policies, procedures and processes, providing a sense of purpose to safety efforts" (ICAO, 2009). Through communications and training, individuals will understand their responsibilities under the SMS and accept and trust the SMS initiatives. Safety culture is not easy to quantify, but an airport will know it is on the right path when people begin reporting hazards. (See ACRP's SMS for Airports Volume 2: Guidebook for more information on the elements of a safety culture.)

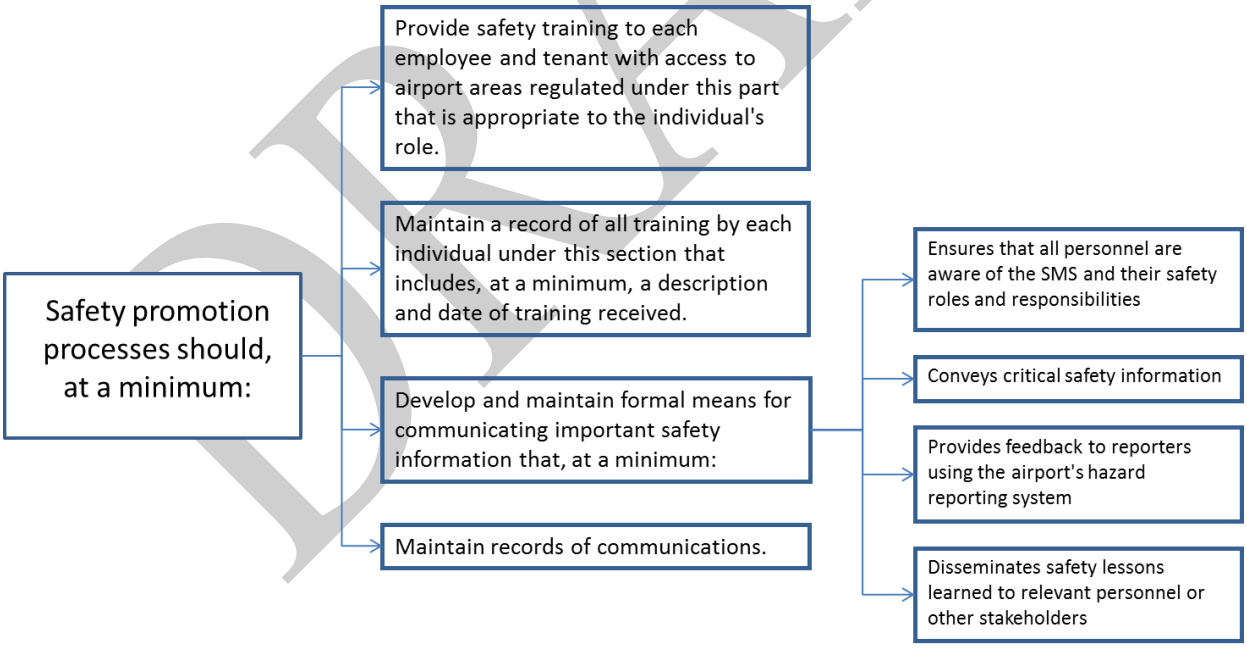


Figure 6-1. Safety Promotion

Certificated airports already have numerous training and communications programs and processes in place for compliance with part 139. Existing part 139 programs focus on training those individuals with

specific roles in implementing part 139 requirements, such as operations inspectors, firefighters, and individuals with access to the movement areas. Similarly, part 139 communications requirements focus on informing stakeholders, including airlines, about information specific to part 139, such as pavement condition, emergency plans, or operational changes. These existing requirements serve as the foundation for SMS training and communications, but they must apply to all individuals with access to the movement and non-movement area and address more than the technical requirements of part 139. SMS assumes everyone has a role in promoting and enhancing operational safety on the airport, and SMS supports this assumption through role-specific training and communications.

Even where training and communications programs already exist, airports should anticipate some resistance to change, especially when there is little or no turnover of employees. These airports may have to work especially hard to show employees, who might ask "Aren't we already safe?", why they should accept SMS. To counter resistance, the airport could use case studies to show how close the airport may have been to an accident in the past. Such real-life example can help employees understand the need for SMS. Further, the airport may want to show how existing processes and procedures did not catch systemic issues or how documentation and trend analysis can reduce workload.

2. Developing and Implementing Safety Promotion.

a. Provide safety training.

The success of SMS initiatives depends on individuals understanding their roles and responsibilities. While the Safety Policy component provides for documenting these roles and responsibilities, training provides the essential tools needed to put these roles and responsibilities into practice. The goal of safety training is to ensure that individuals are competent to perform their responsibilities under the SMS.

Similar to the other SMS elements, SMS training should reflect the complexity and needs of the airport. If they lack internal expertise, airports may want to seek the help of consultants or academics when developing these training programs.

Airports should have at least two tiers of training: specialized SMS training for individuals and managers with operational roles under SMS and safety awareness/orientation for all other individuals.

(1) **Specialized SMS training** for individuals and managers with operational roles under SMS will typically consist of one or more courses specific to their SMS-related responsibilities. At smaller airports, this may be one course covering all facets of the airport's SMS requirements. Larger airports that spread oversight and implementation responsibilities over numerous staff and management positions may find it helpful to have numerous, role-specific courses (e.g., one multi-day course on hazard analysis and the 5-step SRM process; one high-level, 3-hour course on the airport's SMS requirements; and a short course on developing safety objectives). Regardless of the approach, the airport should ensure it provides the courses to individuals in a logical manner and over a reasonable time period.

(2) **Safety awareness/orientation** provides all other individuals (besides those requiring specialized SMS training) with access to the airfield an understanding of what constitutes a safety hazard, how to report safety issues and hazards, and where to find safety-related information. Unlike specialized SMS training, safety awareness/orientation can be accomplished through written communication like brochures, which can be handed out during indoctrination training or badging processes.

Safety awareness training should answer the following questions:

- What is a hazard?

- How are hazards reported? Can hazards be reported confidentially?
- What happens to hazard reports and how will the airport provide feedback?
- How will the airport communicate important safety information?

(3) **Training format.** The airport should decide how to deliver SMS training. However, airport management should recognize that some courses/topics will demand different approaches for maximum effectiveness. For example, hazard assessment and SRM courses may be best taught using a lecture format and case studies with hands-on applications during the course. Whereas, a high-level course about SMS requirements designed for the accountable executive and other top managers may work best as computer-based training.

(4) **Recurrent training.** Recurrent training should also be an important part of the airport's overall SMS training program. This training should incorporate any new processes, procedures, or safety objectives developed through the SMS's continuous improvement efforts.

(5) **Review of training materials.** The airport should also periodically review training materials to verify their applicability and currency.

b. Maintain training records.

A key result of SMS is documentation, which can be reviewed to ensure compliance and to monitor safety performance. This documentation includes training records, so the airport should have a process to ensure it records completed training.

The records for individuals, including managers, requiring specialized SMS training or recurrent training should include details such as training dates and copies of course documents including quizzes and rosters. It may be cumbersome, however, to keep detailed records for individuals who only need safety awareness/orientation. For these individuals, the airport should just have a process in place to ensure they receive the awareness/orientation.

The airport should keep records of all training sessions, attendance rosters, test results (if applicable), and syllabuses for a period of time that provides data for Safety Assurance activities. A good practice would be to keep records for at least 24 months after the training takes place.

Further, it should periodically verify that its training record process is effective and captures the correct information for all those being trained. An airport may wish to incorporate this review into its safety evaluations under the Safety Assurance component.

c. Develop and maintain means for communicating important safety information.

Communicating safety information is essential to promoting a safety culture. When deciding what information to communicate, the airport should consider the following:

- **Awareness of SMS and its initiatives** – Not all individuals need to understand what the SMS does, but they should understand its functions and expected outcomes. Safety Promotion should clearly explain processes and procedures for proactive hazard identification and results aimed at continuous improvements in operational safety. It should then reaffirm both through visible actions.

- **Safety-critical information –** Airport management determines what constitutes safety-critical information based on the airport's unique operating environment. The airport may want to use information required by regulations such as part 139 as the foundation for its list of safety-critical information.

- **Feedback about actions taken** – To support continuous reporting of hazards, the airport should inform reporters of actions taken because of their reports. Such feedback will encourage reports from individuals who may have been initially apprehensive or skeptical about reporting. If the airport's hazard reporting system is not able to communicate directly with confidential reporters, the airport can provide feedback via bulletin boards, safety bulletins and newsletters, or other means. Even when the airport can provide feedback directly to reporters, it should consider sharing the feedback broadly.

- **Reasons for new or revised safety procedures** – If the airport changes procedures or develops new ones based on lessons learned, it should communicate this information to encourage adoption of the safety procedures and support of SMS initiatives.

- **"Nice-to-know" information that fosters support for the SMS** – General safety information helps convey and support the airport's safety objectives and goals. However, the airport should use different channels to share "nice-to-know" information and safety-critical information so employees and tenants understand the difference.

(Adapted from ICAO Safety Management Manual, 2009)

When establishing the SMS, the airport should evaluate when to use verbal communication instead of written communication. Further, the airport should determine the specific type of communication for different types of information. For example, the airport may:

- Decide a memorandum or safety bulletin is a better way than a newsletter to communicate safety-critical information to employees and tenants.

- Choose to relay time-sensitive information or information for management at monthly manager or tenant meetings.

- Use its public or internal websites or topic-specific posters to share "nice-to-know" or SMS awareness information, depending on its relevance and sensitivity.

d. Maintain communications records.

As with other SMS elements, the airport should periodically review communications and evaluate their effectiveness. Over time, this will help the airport identify those methods that work best. The airport should keep communications records for a sufficient period of time to support periodic evaluations. A good practice would be at least 12 months. These records will help with evaluation and compliance as well as trend and historical analysis.

Appendix A. Definitions and Acronyms

Aircraft accident – An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. As defined in title 49 CFR 830.2.

Accountable Executive – A person designated by the airport to act on its behalf for the implementation and maintenance of the airport's Safety Management System. The accountable executive has sufficient control of the airport's human and financial resources for airport operations.

Airport Safety Management System – An integrated collection of processes and procedures that ensures a formalized and proactive approach to system safety through risk management.

Gap Analysis – A comparison between existing systems, processes, and procedures and SMS requirements.

Hazard – A condition that could foreseeably cause or contribute to an aircraft accident as defined in title 49 CFR 830.2.

Hazard Assessment – A systematic, comprehensive evaluation of a change, operation, system, or safety issue.

Incident – An occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations. As defined in title 49 CFR 830.2.

Movement Area –The runways, taxiways, and other areas of an airport that are used for taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas. As defined in title 14 CFR 139.5.

Non-movement Area – The area, other than that described as the movement area, used for the loading, unloading, parking, and movement of aircraft on the airside of the airport (including ramps, apron areas, and on-airport fuel farms).

Risk – The composite of predicted severity and likelihood of the potential effect of a hazard. Severity is the measure of how bad the results of an event are predicted to be; usually determined by the worst credible outcome. Likelihood is the estimated probability or frequency, in quantitative or qualitative terms, of a hazard's effect; it is often an expression of how often an effect is expected to occur.

Risk Analysis – The process during which a hazard is characterized for its likelihood and the severity of its effect or harm. Risk analysis can be either quantitative or qualitative; however, the inability to quantify or the lack of historical data on a particular hazard does not preclude the need for analysis.

Risk Mitigation – Any action taken to reduce the risk of a hazard's effect.

Safety Assurance – The process management functions that evaluate the continued effectiveness of implemented risk mitigation strategies, support the identification of new hazards, and function to systematically provide confidence that an organization meets or exceeds its safety objectives through continuous improvement.

Safety Evaluation – Procedures to monitor performance with safety objectives, SMS requirements, or initiatives.

Safety Objectives – A measurable goal or desirable outcome related to safety.

Safety Policy – The statement and documentation adopted by the airport that defines its commitment to safety and provides its overall safety vision.

Safety Promotion –The combination of safety culture, training, and communication activities that support the implementation and operation of an SMS.

Safety Risk Management (SRM) – A formal process within an SMS that describes the system; identifies the hazards; and analyzes, assesses, and mitigates the risk.

Acronyms

AC	Advisory Circular
ACM	Airport Certification Manual
ACRP	Airport Cooperative Research Program
FBO	Fixed-base Operator
FOD	Foreign Object Damage or Foreign Object Debris
FOIA	Freedom of Information Act
GIS	Geographical Information Systems
ICAO	International Civil Aviation Organization
SMS	Safety Management System
SRM	Safety Risk Management

Appendix B. Related Reading Material

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Flight Safety Foundation. (2005, November/December). Unlocking the Potential of a Safety Management System. *Flight Safety Digest*. Retrieved from http://flightsafety.org/fsd/fsd_nov-dec05.pdf.

International Civil Aviation Organization. (2009). Safety Management Manual (Doc 9859) [Adobe Digital Editions version]. Retrieved from http://www2.icao.int/en/ism/Pages/GuidanceMaterials.aspx.

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Transportation Research Board. (2007). Airport Cooperative Research Program Report 1, Safety Management Systems for Airports, Volume 1: Overview [Adobe Digital Editions version]. Retrieved from http://www.trb.org/Publications/Blurbs/159030.aspx.

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Appendix C. Sample SMS Implementation Plan Template and Checklist

This appendix contains a sample SMS Implementation Checklist.

[*Insert Airport Name*] Safety Management System
Implementation Plan

[Instructions: Use this Implementation Plan Template to summarize the airport's plans for implementing SMS. The template includes areas for narrative descriptions and a checklist with common implementation steps. Expand the template where necessary to reflect your unique operating environment and programs.]

SMS Development and Deployment Strategy:

[Instructions: In this section, provide a detailed proposal on how the airport will develop its SMS. Use the subsections to guide your description and add subsections where necessary. Each subsection includes lists of items to include in the narrative.]

I. SMS Development

- *How will the airport develop its SMS Manual? Will it procure consultant assistance or develop it in-house?*
- *Will the airport conduct a formal gap analysis? If so, what is the timeline for completion?*
- *Are there any existing programs, policies, or practices that the airport plans to use as a foundation for the SMS elements?*

II. SMS Deployment Strategy

- *Does the airport plan to use a phasing strategy? If so, what will be phased (i.e., phasing the SMS into the movement area first and then into the non-movement area or phasing the components and elements of SMS)?*
- *Will the airport include its landside operations in the SMS? If so, how will landside requirements be kept separate from airside requirements?*

III. Procurement

- *Does the airport plan to acquire any new systems or technology that will require procurement? If so, how long does the airport anticipate that procurement taking?*

Approved by: [*signature*]
Date: [*insert date*]

[*Insert Airport Name*] Safety Management System
Implementation Plan

Schedule for SMS Development and Deployment:

[Instructions: In this section, document the major milestones and any potential challenges to implementation.]

I. Major Milestones

[List the major milestones associated with SMS development and deployment. This can be in narrative or tabular format. A sample table is provided below. This section should summarize the airport's major milestones and the target date for completion. It can duplicate some of the entries in the checklist in the next section but should focus on higher-level milestones leading up to complete implementation.]

Milestone	Target Date
Conduct Gap Analysis	
…	
Finalize SMS Manual	
…	
Provide SMS Training	
…	
Deploy Hazard Reporting System	
…	
Full Implementation of SMS	
Conduct first evaluation of SMS implementation	

II. Challenges

[List and explain any challenges the airport may face that could impact these target dates (e.g., lease or union negotiations or procurement schedules). Where possible, include a description of the methods the airport will use to mitigate these challenges where possible and track the status of these issues.]

Approved by: [*signature*]
Date: [*insert date*]

SMS Implementation Checklist:

[Instructions: The Implementation Checklist provides a guide for airports to use in developing and deploying the essential components and elements of an SMS. For efficiency, airports should look to existing systems, processes, and procedures to determine whether they can be used within the SMS. Additionally, the "status of implementation" column can be updated over time to communicate progress to the accountable executive. An airport could use this checklist as a means for updating the accountable executive on the progress of SMS implementation.]

Item	*Task*	*Description of Any Existing Systems/Processes Being Used to Meet the Task*	*Status of Implementation*	*Target for Completion*
1. Documentation				
1.1	SMS Manual (optional method)			
2. Safety Policy				
2.1	Identify the accountable executive			
2.2	Develop and distribute a Safety Policy Statement			
2.3	Make Safety Policy Statement available to all employees and tenants			
2.4	Identify organizational structure responsible for airport safety issues			
2.5	Communicate safety organizational structure to airport employees and managers			
2.6	Define airport management, including various levels throughout the organization, responsibilities and accountabilities for safety issues			
2.7	Establish a procedure to periodically review management responsibilities and accountabilities for safety issues			
2.8	Establish Safety Objectives			

[*Insert Airport Name*] Safety Management System Implementation Plan

2.9	Establish process or procedure to maintain and periodically review the Safety Objectives			
2.10	Define methods, processes, and organizational structure necessary to meet Safety Objectives			
3. Safety Risk Management				
3.1	Establish a system for identifying safety hazards			
3.2	Establish a systematic process to analyze hazards and their associated risks to an acceptable level			
3.3	Establish a system for regular assessment to ensure mitigations are effective			
3.4	Establish processes or procedures to document SRM efforts and retain those documents			
4. Safety Assurance				
4.1	Establish processes or procedures to monitor safety performance and safety objectives identified through Safety Policy			
4.2	Establish a hazard reporting system that provides a means for reporter confidentiality			
4.3	Maintain the hazard reporting system and establish a process for reviewing and analyzing reported hazards			
4.4	Establish a process or procedure for reporting safety information and data on a regular basis to the accountable executive			
5.0 Safety Promotion				
5.1	Develop training on airport's SMS requirements specific to the audience's roles and responsibilities			
5.2	Provide initial training to personnel with roles and responsibilities in airport's SMS			

Approved by: [*signature*]
Date: [*insert date*]

5.3	Develop processes or procedures to record training			
5.4	Develop informational material about hazard awareness and reporting			
5.5	Develop methods for communicating important safety information			
5.6	Establish a procedure to periodically review and update communication methods			
5.7	Develop processes or procedures to record safety communications			

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Appendix D. Sample SMS Manual

This appendix contains a sample SMS Manual for a small-to-medium-size airport.

Safety Management System Manual

Gambrills Regional Airport
Washington, DC

January 1, 2012

Table of Contents

Section 1: Introduction to Gambrills' Safety Management System (SMS)

1.1 **What is SMS**?
[Include a brief, plain language description of the SMS and what it means.]

A Safety Management System (SMS) is a systematic approach to managing safety, including all necessary organizational structures, accountabilities, statements, processes, and procedures.

SMS provides airport management with a set of tools to make safety related decisions. SMS also helps airport management identify safety risks associated with airport operations, development, and other changes to proactively address those issues before they result in accidents, incidents, injury, or damage.

It materializes itself through a series of complementary processes and procedures which are closely coordinated by a well-defined safety organizational structure, where the safety roles and responsibilities of everyone, including top management, are clearly defined and understood by all. Further, safety objectives and data analysis will facilitate continuous improvement throughout the airport.

….

1.2 Applicability
[Include a statement recognizing who this must following the SMS requirements.]

All individuals with access to the movement and non-movement areas of the airport must follow the policies and procedures identified in this Manual. Every individual with this access has a responsibility for safety. All tenants will ensure that employees with access to the areas identified in Section 1.3 receive proper training or awareness of their roles and responsibilities under the airport's SMS.

1.3 Scope
[Include a statement declaring the physical areas where the SMS initiatives shall apply. It may be helpful to include an ALP or graphical depiction of scope.]

All processes and procedures developed under the SMS apply to the movement and non-movement area. SMS initiatives do not apply to landside operations including inside the terminals.

Section 2: Safety Policy

2.1 Accountable Executive

[Identify the Accountable Executive by Position Title and include any specific responsibilities for the role.]

The [Insert Position] is the designated Accountable Executive for the Gambrills Regional Airport.

2.2 Safety Policy Statement

[Reference the Safety Policy Statement in this section. The document is usually inserted as an Appendix because it will be signed by the Accountable Executive and may need to be updated over time. A summary of that statement can also be included in this section. Also add any procedures for reviewing the Safety Policy Statement for currency.]

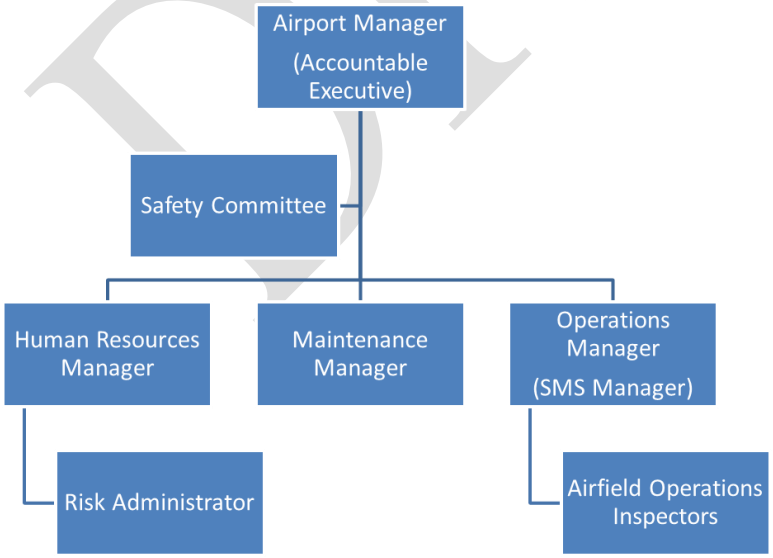
Gambrills Regional Airport is committed to ensuring that safety is a top priority of management. As declared in the airport's Safety Policy Statement (See Appendix 2), the airport encourages confidential hazard reporting and commits itself to communicating safety issues and resolution of reported hazards.

….

The Safety Policy Statement will be reviewed annually to ensure it remains current.

2.3 Safety Organizational Structure

[Identify the organization structure responsible for making safety related decisions on the airport. If a committee format is used for some of these processes, identify that organization.]



The Safety Committee is comprised of representatives of the three airport divisions and tenants on the airport including the regional airline, fixed-base operator, and flight school. The SMS Manager chairs the Safety Committee.

2.4 Management Responsibility and Accountability for Safety Issues
[For those positions or committees identified in 2.3, clearly list each position or committee's responsibilities and accountabilities for safety issues. This description should not include items outside the scope of the SMS.]

Accountable Executive
The Accountable Executive ensures that the necessary assets and financial support are available for successful SMS development, implementation, operation, and continuous improvement.

In carrying out those duties, the Accountable Executive is responsible for:

- Accepting and signing the Safety Policy Statement
- Providing adequate resources to ensure implementation and management of the SMS
- Providing leadership in safety related issues by actively participating in safety significant events
- Ensuring that all managers are aware of, and held accountable for their roles and responsibilities under the SMS
- Promoting and encouraging a positive safety culture within the airport
- Ensuring ongoing effectiveness of the SMS by facilitating, participating, or reviewing periodic reviews and evaluations
- Designating the airport's safety objectives
- Reviewing SMS related data provided by the SMS Manager

SMS Manager
The SMS Manager [Operations Manager] is responsible for the daily implementation, operation, and oversight of SMS related activities and initiatives.

In carrying out those duties, the SMS Manager is responsible for:

- Revising and maintaining the SMS Manual
- Chairing the SMS Committee
- ….

Safety Committee
The Gambrills Regional Airport establishes a Safety Committee comprised of representatives of the airport divisions and tenants and chaired by the SMS Manager. The Safety Committee meets at least quarterly. The Safety Committee is responsible for:

- Making safety recommendations to the Accountable Executive
- Establishing panel membership for complex Safety Risk Assessments requiring stakeholder subject matter expertise
- Reviewing major accident and incident investigations for the airport since the past meeting
- ….

Maintenance Manager

….

Risk Administrator

….

2.5 Gambrills' Safety Objectives
[Safety objectives should be quantitative. They may be attached as an appendix to allow easier revisions and dissemination. Be sure to include any processes or procedures for review, updating, tracking, and communicating.]

To facilitate continuous emphasis on improving safety, Gambrills Regional Airport establishes safety objectives. These objectives are quantitative and should reflect national and local safety goals.

The current objectives are attached in Appendix 3.

The Accountable Executive approves new safety objectives as recommended by the Safety Committee and the SMS Manager. Any revisions are communicated to airport employees and tenants.

….

Section 3: Safety Risk Management

Gambrills Regional Airport supports the proactive formal analysis of hazards as is key to Safety Risk Management (SRM) and SMS. SRM is defined as a formal process within SMS composed of describing the system, identifying hazards, analyzing, assessing, and mitigating risk.

Gambrills Regional Airport is committed to establishing and maintaining hazard identification and analysis processes as are discussed in this section. No unacceptable risk, otherwise referred to as "High Risk", is tolerated at the airport.

….

3.1 Hazard Identification

[Describe the processes and initiatives in place that identify and communicate hazards through the SMS.]

Hazards and safety issues are identified through the following means:

- Daily Self-Inspections
- Maintenance Logs
- Confidential Hazard Reporting System
- Monthly Managers/Tenant Meetings

The SMS Manager is responsible for hazard intake and initial processing and determines whether further action under the airport's SRM processes is required.

….

3.2 SRM Process

[Explain what processes will be used to formally assess hazards. What triggers this assessment? Who conducts it? When is a panel of subject matter experts used? Can individuals conduct hazard assessment? What are the airport's definitions and categories for severity and likelihood and is there a predictive risk matrix that should be used?]

Gambrills Regional Airport uses the 5-step process for hazard assessment which includes:

1. Describing the System
2. Identifying Hazards
3. Analyzing Risk
4. Assessing Risk
5. Mitigating Risk

The 5-step process is instituted for any operational change on the airport including changes in tenant operations within the movement and non-movement areas, and for changes in airfield infrastructure. The 5-step process is used when safety trends are identified through Safety Assurance activities or hazards are identified through self-inspection, maintenance logs, management meetings, or reported through the Confidential Hazard Reporting System. The SMS Manager has the authority to conduct hazard assessment for any other issue he or she deems necessary.

Hazard assessment takes two forms: hazard triage and integrated hazard assessment.

The SMS Manager has the authority to conduct or delegate hazard triage. All identified hazards, trends, or operational changes already being implemented go through hazard triage which is when the SMS Manager or their designee individually conducts the 5-step process to quickly determine if any hazards present unacceptable risk and require immediate mitigation.

For those complex changes to airfield infrastructure or identified hazards that subject matter expertise outside the airport, then an integrated hazard assessment is conducted. The SMS Manager notifies the Safety Committee when an integrated hazard assessment is needed. The Safety Committee then establishes a panel of subject matter experts.

Individuals or panels conducting hazard assessment use the following definitions and tables for analysis. No High Risk is accepted without mitigation. The Accountable Executive is informed of any hazard assessment that results in High Risk. Where mitigation is not possible, the Accountable Executive is responsible for approving the continued operation.

SEVERITY LEVELS	
Catastrophic	Loss of aircraft, loss of structures, fatalities
Major	Damage to aircraft, structures, serious injuries
Minor	Slight damage, functional impairment, slight injuries
Minimal	Miniscule operating/personnel costs and damages

LIKELIHOOD LEVELS	
Frequent	Probability happening from a daily to weekly basis
Probable	Probability happening from a weekly to monthly basis
Remote	Probability happening on an annual basis
Improbable	Probability assumed unlikely to occur

Predictive Risk Matrix		LIKELIHOOD			
		Improbable	Remote	Probable	Frequent
SEVERITY	Catastrophic			HIGH RISK	
	Major			MODERATE HIGH RISK	
	Minor		MEDIUM RISK		
	Minimal	LOW RISK			

High Risk level occurrences are unacceptable and should be promptly mitigated to an acceptable level of safety.

Moderate-High level of occurrences, are generally unacceptable, but with the implementation of appropriate controls, the occurrence could become an acceptable risk.

Medium level of occurrences, are generally acceptable, providing the appropriate safety controls have been established.

Low level occurrences, pose little or no risk and have adequate levels of control established.

….

3.3 Means for ensuring mitigations are effective

[Describe the process or procedure that will be used to verify that mitigations are having their desired effect. This process or procedure will be closely tied to Safety Assurance. Who is responsible for this action and will the hazard assessment need to be re-verified?]

The SMS Manager is responsible for reviewing data through the airport's Safety Assurance program to verify that mitigations required under SRM are having their desired effect. In those cases where data indicates mitigations are ineffective, the SMS Manager re-verifies the hazard assessment and for those developed by a panel; determines whether the panel should re-convene.

….

3.4 Documentation and Record Retention

[Describe the documentation and retention policies for SRM related documents.]
All hazard assessments conducted either individually by the SMS Manager, their designee, or by a panel of subject-matter experts established by the Safety Committee, are documented using the Hazard Assessment Form (Appendix 4). Dissenting opinions or any additional narrative are included by attachment to the Form.

SRM related documents are retained electronically in the airport's shared network for the life of the change, operation, or as long as mitigations are being implemented.

….

Section 4: Safety Assurance

Safety Assurance is a critical part of the SMS since it includes processes that help determine the effectiveness of SMS initiatives and institute a Confidential Hazard Reporting System. Safety Assurance is the process management functions that evaluate the continued effectiveness of implemented risk mitigation strategies; support the identification of new hazards; and function to systematically provide confidence that an organization meets or exceeds its safety objectives through continuous improvement.

4.1 Safety Performance Monitoring

[Describe how safety objectives will be monitored. What data will be collected and how? Who's responsible for collecting and analyzing the data? Include any procedures for accident and incident investigations. Describe methods for safety evaluation including who conducts, how often, and what they should cover.]

The SMS Manager is responsible for overseeing data collection and analysis to look for safety trends, identify new hazards, and verify compliance with SMS requirements. Data analysis also is used to verify performance with safety objectives.

Data is collected from the following sources:

- Daily Self-Inspection Reports
- Maintenance Logs
- ….

Safety evaluations are conducted quarterly and annually. Quarterly evaluations focus on evaluating compliance with one aspect of SMS requirements. Annual evaluations verify airport-wide compliance with all SMS requirements and report on safety performance as it relates to established safety objectives.

….

4.2 Confidential Hazard Reporting System

[Explain how the airport will establish and maintain a confidential hazard reporting system. Include any clauses that except individuals from confidentiality such as intentional or reckless behavior. What format will reports be made? Who reviews the reports and is responsible for action? How will reporters get feedback?]

Gambrills Regional Airport encourages everyone who has access to the airfield to report any and all safety concerns, hazardous conditions, and incidents and accidents. Many incidents can be avoided if a concern is reported in a timely manner.

Employees and tenants have two ways to report safety concerns: in paper via drop-boxes throughout the airport and electronically through the airport's internet portal. A copy of the Hazard Reporting Form is available in Appendix 5. Reporters can submit the form anonymously or include their name and contact information.

Operations staff is responsible for checking drop-boxes daily and forwarding any forms found to the SMS Manager. The SMS Manager reviews the paper and electronic forms on a daily basis to identify immediate safety concerns requiring action through hazard triage or forwarding to the SMS Committee for panel review.

….

4.3 Reporting Safety Information

[Describe what types of information will be reported to the accountable executive. Who has responsibility for this task and what method or format will be used to communicate? How often is this information communicated?]

The SMS Manager reports weekly and monthly to the Accountable Executive regarding safety information.

On a weekly basis, the SMS Manager reports the following via written report:

- Number of hazard reports received with summary of status
- Summary and examples of safety related communications with tenants
- ….

On a monthly basis, the SMS Manager meets with the Accountable Executive to report the following:

- Performance with safety objectives
- Status of ongoing mitigations required under SRM
- Status of SMS implementation
- ….

….

Section 5: Safety Promotion

Safety Promotion means the combination of safety culture, training, and communication activities to support the implementation and operation of an SMS. At the Gambrills Regional Airport, employees have the resources necessary to carry out SMS initiatives including appropriate training. Further, airport management is committed to ensuring employees and tenants receive safety critical communications in a timely manner.

….

5.1 Training

[Describe what training will be provided and identify who receives what training. When will employees and tenants be trained? Can tenants train/inform their own employees? How will training be documented and how long will training records be kept? How often with the program be reviewed for currency? It may be beneficial to include the syllabus or course objectives of the training programs as an appendix to this section.]

Gambrills Regional Airport has a two-prong approach to training. All employees responsible for SMS implementation and oversight receive specific SMS training upon initial hiring and on an annual recurring basis. All other individuals, including tenant employees, with access to the airfield receive a safety orientation package upon hiring.

The SMS Manager is responsible for developing, implementing, and updating the training program and ensuing that tenants have safety orientation packages for all new employees.

….

5.2 Communication

[What constitutes safety related information that should be communicated? Describe the process for communicating information with employees and tenants including the method or format for communicating. How long will communications documentation be kept?]

Gambrills Regional Airport is committed to open and continuous communication of safety critical issues. The airport communicates safety issues using the following formats:

- Monthly Managers/Tenant Meetings
- Safety Bulletin Boards
- Direct email (via SMS Manager)

….

Appendix 1: Definitions and Acronyms

Appendix 2: Safety Policy Statement

Appendix 3: Safety Objectives

Appendix 4: Hazard Assessment Form

Appendix 5: Hazard Reporting Form

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Appendix E. Sample Safety Reporting Dashboards

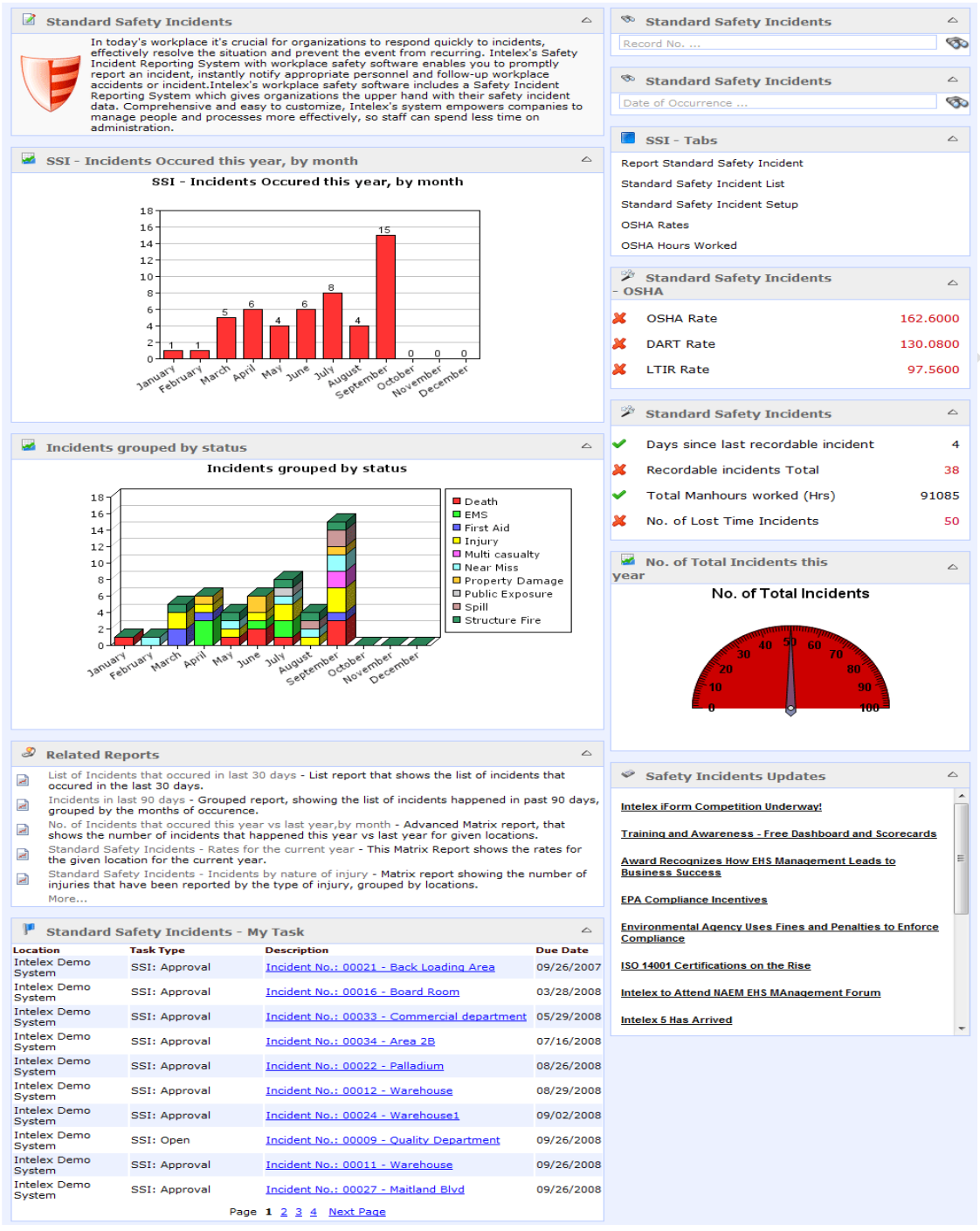

Figure AE-1. Sample Dashboard 1(Courtesy of San Antonio Airport System)

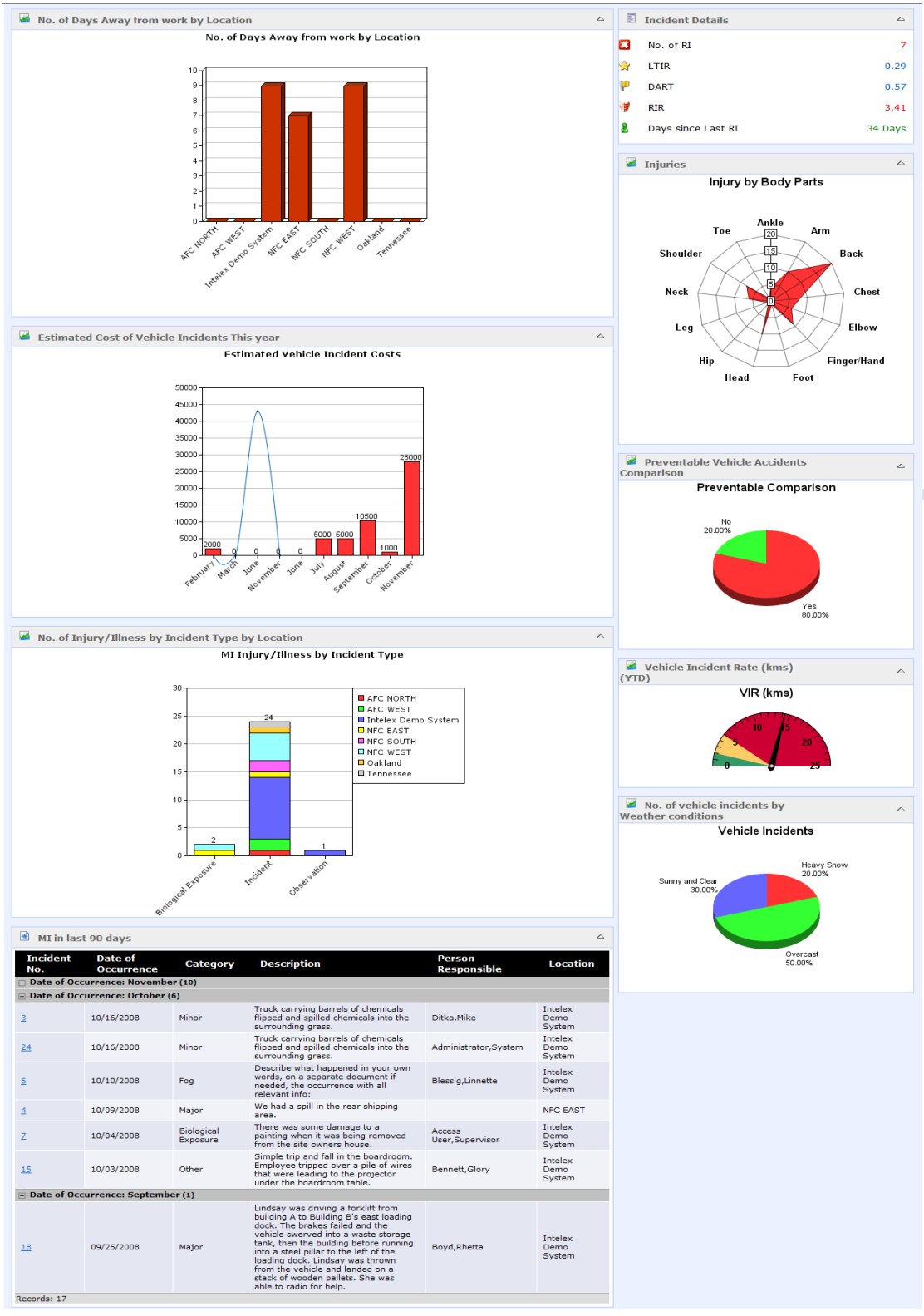

Figure AE-2. Sample Dashboard 2 (Courtesy of San Antonio Airport System)

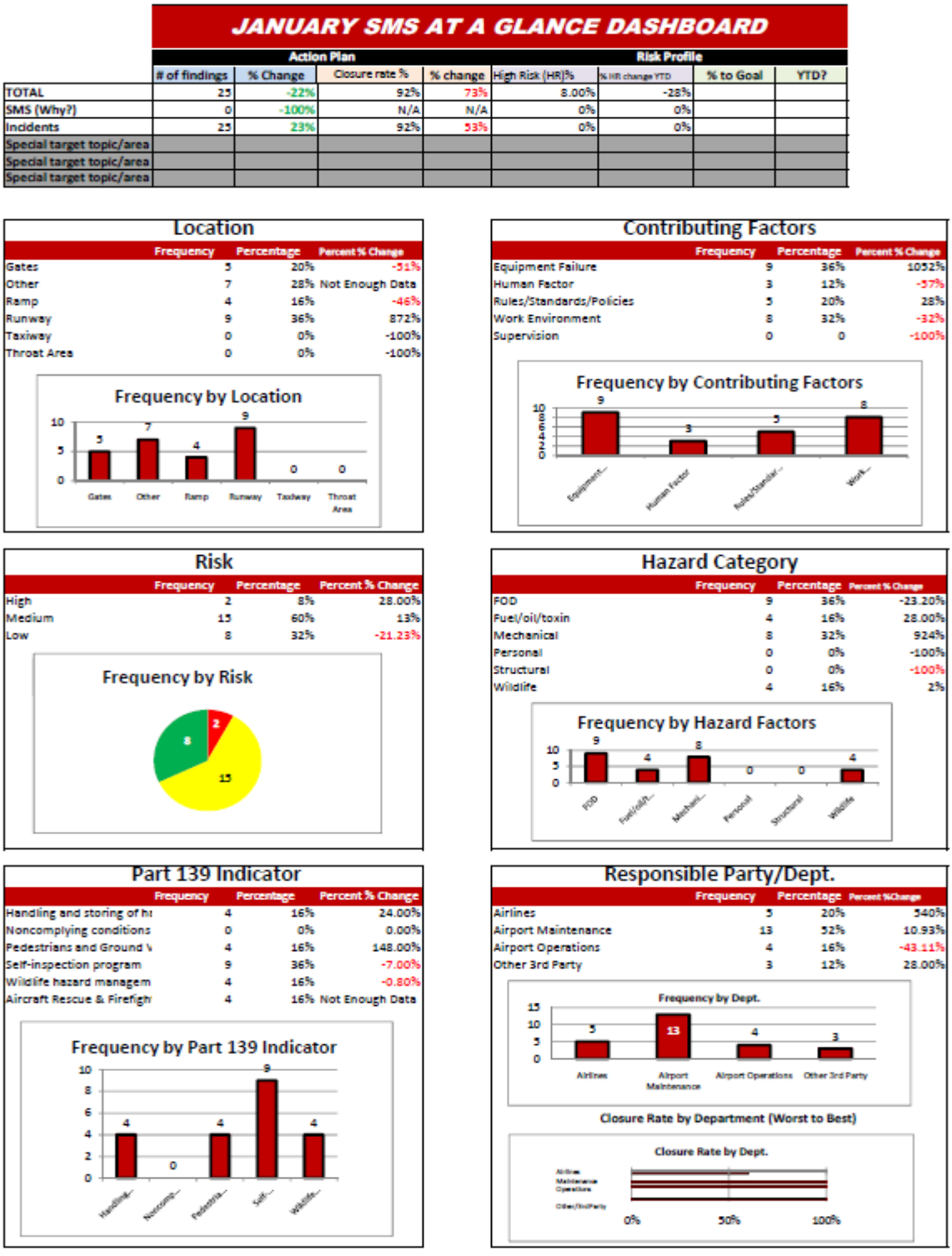

Figure AE-3. Sample Dashboard 3 (Courtesy of City of Atlanta)

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