Safety Management System Program Manual

Austin-Bergstrom International Airport
Austin, Texas

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1.0 INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS (SMS)

1.1 Introduction

This Program Manual describes the application of Safety Management Systems (SMS) at the Austin Bergstrom International Airport (ABIA). It is a resource intended for the City of Austin Department of Aviation (DoA) executives, managers, safety officials, and all employees. This manual further establishes a systems approach to safety management which benefits both the safety and business aspects of the Airport. It describes the essential components of SMS and also incorporates the International Civil Aviation Organization (ICAO) and anticipated Federal Aviation Administration (FAA) policy for airport SMS programs. Furthermore, it includes valuable lessons learned from a June 2008 Gap Analysis in SMS implementation efforts at ABIA.

1.2 Background and Guidance on SMS

1.2.1 ICAO Requirement for SMS at Member Airports

In November 2005, the International Civil Aviation Organization (ICAO) amended Annex 14, Volume I (Airport Design and Operations) to require member States to have certificated international airports, establish an SMS Program. The FAA supports harmonization of international standards, and is working to make U.S. aviation safety regulations consistent with ICAO standards and recommended practices.

1.2.2 Current Initiatives Within FAA Regarding SMS

The FAA is beginning to implement SMS within its own organizational groups. Current initiatives include the following:

- Flight Standards: Flight Standards is assisting airlines and operators in developing SMS programs. They have developed an Advisory Circular (AC) 120-92, Introduction to Safety Management Systems for Air Operators.

- Air Traffic: Air Traffic has established Safety Risk Management (SRM) processes in their organization, with the publication of FAA Order 1100.161, Air Traffic Oversight. Air Traffic has begun nationally training their employees on Safety Risk Assessments, Analysis and Mitigation.

- Airport Operators: In 2007, the FAA Airports published AC 150/5200-37, Introduction to Safety Management Systems (SMS) for Airport Operators. This introduction provided the basic overview of SMS SRM principles. No formal implementation guidance was provided. The FAA later initiated grants to several certificated airports to develop SMS programs under an Airports Improvement Program Grant.

1.2.3. FAA Pilot Program for SMS at Airports

In 2007, the FAA established a pilot program for developing SMS at airports in the U.S. A total of 21 air carrier airports were selected by FAA for inclusion in the pilot program and each airport was provided with a $250,000 federal grant to fund their SMS program. ABIA was one of the airports selected by FAA to participate in this important pilot program that will help FAA develop a nationwide standard for SMS at airports with commercial air service. After receiving technical proposals and statements of qualifications, the Jacobs Carter Burgess Team was selected by ABIA to conduct a SMS study of the airport and prepare this program manual.

1.2.4. Potential Inclusion of SMS Into Part 139 Certification of Airports

The FAA is strongly considering the inclusion of Safety Management Systems into the Part 139. This process will require a Notice of Proposed Rule Making (NPRM) to incorporate it into federal law. This process may take as long as 2 to 3 years to become law and implemented by the FAA. In the interim, airports are being encouraged by the FAA, to look at their safety programs and consider implementing an SMS program that is tailored to their airport before the FAA adopts regulations mandating the implementation of SMS programs.

1.3 Purpose of SMS

Historically, aviation safety has been built upon the reactive analysis of past accidents and the introduction of corrective actions to prevent the recurrence of those events. With today's extremely low accident rate, it is increasingly difficult to make further improvements to the level of safety by using this approach. Therefore, a proactive approach to managing safety has been developed that concentrates on the control of processes rather than solely relying on inspection and remedial actions on end products. This innovation in aviation system safety is called a Safety Management System, an expression indicating that safety efforts are most effective when made a fully integrated part of the business operation.

It is now generally accepted that most aviation accidents result from human error. It would be easy to conclude that these errors indicate carelessness or incompetence on the job, but that would not be accurate. Investigations are finding that the human is only the last link in a chain that leads to an accident. These accidents will not be prevented by merely changing people; increased safety can only occur when the underlying causal factors are addressed. Enhancing overall safety in the most efficient manner requires the adoption of a systems approach to safety management. ***Therefore, every segment and level of an organization must become part of a safety culture that promotes and practices risk reduction.***

Safety management is based on the premise that there will always be safety hazards and human errors. SMS establishes processes to improve communication about these risks and take action to minimize them. This approach will subsequently improve an

organization's overall level of safety. The application of a systematic, proactive, and well-defined safety program (as is inherent in a SMS) allows an organization producing a product or service to strike a realistic and efficient balance between safety and production. The forecasted growth in air transportation over the next 20 years, will require new measures and a greater effort from all aviation producers - including airport operators - in order to achieve a continuing improvement in the level of aviation safety. ***The use of SMS at ABIA can contribute to this effort by increasing the likelihood that airport employees will detect and correct safety problems before those problems result in an accident or incident.***

1.4 ABIA SMS Program Manual

This ABIA SMS Program Manual provides the framework from which ABIA will begin to build their program. The program may require some additional outside resources to assist ABIA in maturing the program over the next several years. This SMS Program Manual describes a Safety Management System (SMS) and explains how a systems approach to safety management will benefit both the safety and business aspects of the Department of Aviation.

The SMS Program Manual for ABIA includes the following:

- A summary of the Gap Analysis that was conducted by the Jacobs Carter Burgess Team in June 2008 is provided in Section 2;
- A discussion on the importance of human factors in the development of an SMS for any organization is provided in Section 3;
- The four key components of SMS, Safety Policy & Objectives, Safety Risk Management, Safety Assurance, and Safety Promotion are presented in Sections 4, 5, 6, and 7, respectively;
- A discussion on the importance and usefulness of Non-Punitive Reporting is provided in Section 8; and
- A Program for SMS Implementation at ABIA is presented in Section 9.

2.0 GAP ANALYSIS

2.1 Overview

The purpose of the Gap Analysis was to document existing gaps or deficiencies in the airport's current procedures, policies, documentation, actions and operations, as outlined in the Airport Certification Manual (ACM). The 21 basic safety elements of SMS, were utilized in the evaluation, development and management of the SMS Manual and Program. Appendix 2 provides additional information regarding the 21 SMS safety elements.

2.2 Airport Certification Manual (ACM)

Airports with certificated air carrier service must be certified under the Federal Aviation Administration (FAA) guidance under the Code of Federal Regulations, Title 14, Part 139, Certification of Airports. Under the approval of the FAA, Airports establish an airport certification that is tailored for their airport, which is in compliance with Part 139. This manual establishes the standards and documented processes by which airport operators manage and monitor the safety of their airport.

While the ACM address critical safety elements of an airport, they typically do not address the means, processes and analysis for optimal system safety, as an SMS program does.

2.3 SMS GAP Analysis at ABIA

The Gap Analysis performed at ABIA compared current status relative to the 21 elements of the SMS Manual and Program in the FAA SMS Pilot Study Participants Guide. The Gap Analysis was conducted from April through May 2008 by the Jacobs Carter Burgess Team. The Gap Analysis was accomplished through:

- various interviews with airport staff;
- review of current documentation;
- published guidance & best practices;
- observation of operations at ABIA;
- surveys; and
- comparison of the data collected to the ACM, 14 CFR Part 139, and the 21 safety elements of SMS.

The GAP Analysis Report identified which of the 21 elements matched the FAA's SMS guidance materials and which of those did not. The report then recommended changes that would create continuity with the elements of SMS.

The GAP Analysis Report was provided to ABIA management, in a separate document, for their review and reference, as they begin to implement their SMS program.

3.0 HUMAN FACTORS (HF)

Human Factors is the area of study that seeks to maximize the relationship between people and systems in order to improve performance, safety, and reliability. Human Factor systems involve the interaction between people, equipment, and organizations. Systems include equipment, procedures, or organizations or teams. The integration of Human Factor awareness into the SMS processes will create a solid foundation for successful and continuous safety improvement.

People: The quality of airport operations is dependent upon the numbers of personnel available for operations (manpower), the aptitude, skill, experience, and training of those employees (personnel quality), and a keen awareness of human information processing issues that have significant affects on safety (attention, memory, fatigue, visual and audio perception, team communication, etc).

Equipment: The design of equipment, and/or procedures on how to use equipment, may also have significant impact on system safety. Awareness of Human Factors involved in the equipment used by an organization, especially new equipment, is critical in identifying issues might result in a safety incident.

Organizations: Organizations are also systems. ABIA is composed of different departments, divisions, offices, crews, and tenant organizations that all work and interact together. Each develops and operates under many policies and procedures, some shared, and some individual for each particular group. Human Factors plays a role when procedures from one group are unknown or unclear to the others, interact unexpectedly with other procedures, and can have detrimental affects on overall safe operations.

SMS and Human Factors are inextricably linked. All employees should be vigilant in the detection of system "design vulnerabilities", (people, equipment, or organizational). Department of Aviation personnel must continuously monitor for system parameters at "critical mass", i.e. fatigue, physical requirements, stressors, numbers and quality of personnel or equipment, and organizational issues (values, norms, climate, etc.). Each of these factors can degrade safety climates slowly, but surely, if they are not identified and action taken in a timely manner.

Employees will be responsible to monitor and communicate safety issues and concerns. This SMS Manual provides the guidance to establish those methods, processes, principles and practices to achieve an improved recognition of human factors.

Additional information on Human Factors is available in Appendix 2, Human Factors.

4. 0 SAFETY POLICY & OBJECTIVES

4.1 System Safety and SMS

System safety is the application of engineering and management principles, criteria, and techniques to achieve an acceptable level of safety throughout all phases of a system.

Achieving this definition of system safety is the primary objective of SMS. A well-structured SMS provides a systematic, explicit, and comprehensive process for managing risks. This process includes goal setting, planning, documentation, and regular evaluation of performance to ensure that goals are being met.

4.2 Safety Policy

The Aviation Department Safety Policy defines the fundamental approach to managing safety that is to be adopted within the organization. The Safety Policy further defines the organization's commitment to safety and overall safety vision, and empowers the organization to fulfill the values and commitments of top management. The Department's new safety policy is:

> ***"The City of Austin Aviation Department is committed to implementing a Safety Management System and maintaining a safe, healthy and sustainable working environment for our people, our customers, our partners and contractors, and those we are employed to serve. Employees of the City of Austin Department of Aviation are responsible for promoting a safe environment at Austin-Bergstrom International Airport."***

This safety policy is the cornerstone for safety within the Department of Aviation and operation of the airport. It provides the framework for management to put in place the organization and arrangements for carrying it out. The Department of Aviation will actively encourage employee adherence to this policy and the adoption of a similar policies by all companies and State and Federal agencies operating on airport property.

4.3 Safety Goals & Objectives

4.3.1 Safety Goals

The City of Austin Department of Aviation is committed to achieving the following ***safety goals***:

1. Implement and maintain an appropriate Safety Management System with a structure to manage, supervise and safely accomplish all aspects of aviation activities which fall within the Department of Aviation's area of responsibility;

2. Achieve the highest levels of aviation safety performance by meeting or exceeding local, state and federal legislative and regulatory requirements regarding airport operations;

3. Seek to achieve no harm to people and minimal impact on the environment through our business operations;

4. Systematically manage aviation safety matters through periodic and rigorous audits and reviews of the safety implications of all our aviation activities;

5. Consult with staff and encourage active participation at all levels within our businesses;

6. Learn and benefit from our experiences and the experiences of others;

7. Promote a culture in which all Department of Aviation employees share these commitments; and

8. Increase safety awareness among our business partners and encourage their participation in the program.

4.3.2 Safety Objectives

To achieve these goals, the City of Austin Department of Aviation will establish, develop, implement and maintain effective aviation safety objectives, that should incorporate the following:

- Identify, access, and manage hazards, impacts, and risks from aviation activities;

- Train and deploy competent people and allocate responsibilities and tasks commensurate with individual skills;

- Set, achieve and report against objectives and measurable safety performance indicator targets to demonstrate continual performance improvement;

- Identify areas for improvement through comprehensive incident reporting and investigation; and

- Maintain a culture that encourages the free and honest reporting of safety issues.

4.3.3 Safety Accountability

The long term success of SMS is based on the assignment of responsibilities by Department of Aviation top executives. Department of Aviation supervisors must understand when safety risk management processes are necessary, and when to elevate decisions and the supporting information to a higher management level.

Key elements of SMS accountability within an organization are;

- The SMS Program Manual chapter on safety policy addresses the responsibility and accountability, including written guidance regarding the safety authorities and responsibilities of all key personnel assigned to the airport.

- Identification of staff that is responsible for administration of the overall SMS. Responsible staff report to the highest level of Department of Aviation management to assure appropriate consideration of all reports, recommendations, and issues.

- Personnel who are responsible for SMS are employed by the Department of Aviation and are provided with the necessary resources to fulfill their duties.

- The responsibilities associated with SMS are clearly defined within job descriptions of Department of Aviation staff along with identified lines of communication within the organization.

- The Department of Aviation has established a safety council. The safety council acts as a source of expertise to the Department of Aviation and is co-chaired by the organizations top management and the predominant airline.

4.3.3 Safety Responsibilities

Safety management responsibility and accountability are intertwined. Each Department of Aviation employee acknowledges the importance of safety and takes a leadership role in the continual development of the principles of SMS in their duties and assignments. Although individuals must be accountable for their own actions, top management is accountable for the overall performance of the Department of Aviation employees that report to them.

Since accountability is a two-way street, Department of Aviation directors, managers and supervisors are also accountable for ensuring that their subordinates have the resources, training, experience, etc. which is needed for the safe completion of their assigned duties.

The following describes key management responsibilities for SMS:

Department of Aviation Executive Director:

Subject to the direction and control of the City Manager and Assistant City Manager, the Executive Director has overall responsibility for the safety of passengers and Department of Aviation employees. The Executive Director also has an overall safety consultation, facilitation and monitoring role for the airport's tenants, concessionaires, airlines, contractors, suppliers, and service providers.

The Executive Director's areas of responsibility include the following:

- Ensure that the safety policy and management system is produced, kept up to date and meets Department of Aviation policies and procedures.
- Take a leadership role in the airport's safety program and ensuring that safety never becomes subordinate to financial matters.
- Develop an annual business plan (i.e. including the capital program) that is sufficiently resourced to achieve compliance with the airport safety policy and management system.
- Appoint safety conscious managers, monitor their performance and ensure that safety is given a high priority within their training and development plans.
- Consider safety issues when making changes in the airport's organization structure and business processes.
- Clearly define accountabilities and responsibilities for all staff for the delivery of safety performance.
- Set and enforce policies, standards and procedures that contribute to the success of the airport's safety policy and management systems.

Director, Airport Operations and Maintenance:

The Director is accountable for defining, deploying and monitoring SMS strategy and compliance processes to enable the Department of Aviation to have safety focused strategic plans and compliance management. The Director has prime responsibility for supporting the Executive Director to comply with their duties.

The Director's areas of responsibility include the following:

- Provide a leadership role in Department of Aviation safety program.
- Ensure that safety does not become subordinate to financial matters.
- Champion safety at the Department of Aviation meetings.
- Support all departments and functions to monitor safety performance across lines of responsibility.
- Ensure safety improvement objectives are set and implemented.
- Ensure the Operations and Maintenance division policies, standards, procedures and practices contribute to the success of Department of Aviation Safety Policy and Safety Management System.
- Appoint safety conscious direct reports, monitor their performance and ensure safety is given the highest priority within their training and development plans.
- Ensure Planning and Engineering coordinate with Operational divisions to incorporate safety during maintenance and construction projects.
- Consider safety when making or recommending changes in the airport organizational structure and business process.
- Ensure proper liaison takes place between the activities of Airport police officers and TSA in so far as their shared risk activities fall under the jurisdiction of the Executive Director.
- Ensure there is coordination with those who have operational functional responsibilities which might affect safety.
- Enforce compliance with all safety related legislation applicable to the management of the airport and facilities.

SMS Coordinator

The SMS Coordinator is accountable to the Director - Airport Operations and Maintenance for defining, deploying and monitoring the Operations department's strategy and compliance process to enable the department to have safety focused plans and compliance management. The SMS Coordinator is also responsible for maintaining a safe operating environment at the Airport.

The SMS Coordinator's areas of responsibility include the following:

- Manage staff and resources to ensure compliance with and maintenance of airside safety standards and recommended practices in accordance with the requirements of the Federal Aviation Administration, International Civil Aviation Organization, Title 14 CFR Part 139, the ABIA Airport Certification Manual and Airside Directives.

- Set a compelling purpose and vision for the Operations Division.

- Lead the Airport's Safety Management System, including emergency planning, and co-ordinate, supervise and control resources during emergency incidents, aircraft recovery operations, adverse weather conditions, equipment service issues and unscheduled movements.

- Use best efforts to ensure safety does not become subordinate to financial matters.

- Set objectives for safety improvement and provide support to achieve them.

- Use best efforts to ensure policies, standards, procedures and practices are aligned at all times.

- Recruit, motivate and monitor safety conscious direct reports, identifying suitable development plans.

- Notify management of all operational matters that may influence or impact their areas of control.

- Maintain and develop constructive relationships with all stakeholders in the safe and efficient operation of the airfield.

- Use best efforts to ensure Operations business plans are sufficiently resourced to achieve compliance with the safety management system.

- Use best efforts to ensure "best practice" operational standards and procedures are identified, documented and implemented.

- Use best efforts to ensure the safe movement of aircraft by coordinating with the Airport Traffic Control Tower, meteorological office, airlines, airport fire/rescue and police, especially when affected by adverse weather conditions, equipment, incidents, emergencies or other disruptions.

- Regulate aircraft ground engine running, night movement, airfield/ramp construction, airfield obstruction safeguarding and airfield congestion in accordance with statutory regulations and Department of Aviation policy.

4.3.4 Department of Aviation SMS Organizational Line of Communications

The fundamental success of SMS relies upon unobstructed lines of communications throughout the organization. This communication, whether it be horizontal or vertical, reflects the desire of top management to support safety at every level.

The Department of Aviation is organized in a manner intended to be resilient to hazardous situations and its ability to reduce risks. Lines of succession have been established across the organization to ensure responsible safety management. The organizational flow chart, shown in Figure 3.1 below, is intended to provide for the orderly approach to documentation and information management.

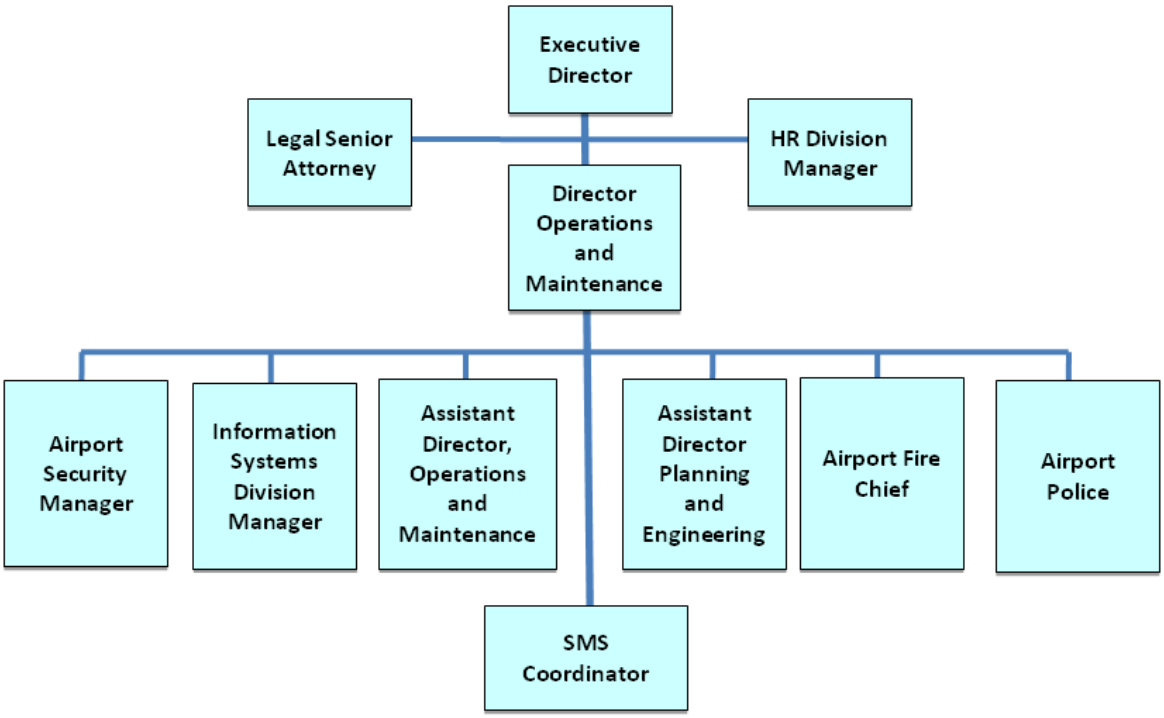

Figure 4.1 - Lines of Succession for Safety Management Systems (SMS)

Austin Bergstrom International Airport – Aviation Department

5.0 SAFETY RISK MANAGEMENT

5.1 Overview

Risk is defined as the possibility of loss or injury. Safety Risk Management (SRM) is the proactive process that can be used to identify, assess, and mitigate risks or potential hazards that may lead to loss or injury.

SRM is both reactive from a historical perspective and proactive from a speculative or anticipatory analysis. By reviewing past occurrences and considering changes in progress, a probability and severity assessment can be reached utilizing the risk matrix process and charts.

SRM is utilized as an immediate resolution to a dangerous hazard or in planning during procedural changes, implementation of new equipment, expanded or new personnel responsibilities and physical changes at the airport, etc. When changes are proposed or occur within an organization, managers must decide to what extent the SRM process will be initiated. The mitigation of the risks, revisions, modifications, and contingency arrangements requires conscious management decisions to approve, fund, schedule, and implement one or more risk strategies. Any changes to existing procedures or systems can introduce added hazards which may result in increase risks.

SRM provides the process for evaluation of the various risks and the systematic analysis, mitigation and corrective course of action to eliminate the risk or reduce the probability and severity of the risk to an acceptable level. The process can be implemented in:

- The design of systems, procedures, and/or organizations;
- Any proposed changes to existing systems, procedures, equipment, personnel and/or environment; or
- Hazards identified during operations or safety assurance functions.

5.2 Safety Risk Management Process

A project, regardless of size, may have hazards inherent to the planning and developing stages before implementation ever begins. The system may involve analysis and understanding of hardware considerations such as, equipment, machinery, electronic equipment, furnishings or physical areas such as locations, both inside and outside, terminal or AOA spaces as well and human factors involvement.

An organization, whether a small shop or the entire airport may be susceptible to hazards due to incomplete understanding and/or personnel training, improper planning, inattention to rules and regulations, and ineffective management.

Furthermore, the description and definition of the operational context of a hazard under consideration must be as accurate as possible**,** as the identification phase of the process begins. A full description of the physical area and/or activity area is of utmost importance to understanding how procedures and processes function within the physical environment.

The Safety Risk Management process consists of five functional phases:

Phase 1: Describe the procedure, project, system, and/or organization;

Phase 2: Identify the hazard;

Phase 3: Analyze the risk;

Phase 4: Assessing the risk; and

Phase 5: Mitigation/treatment of the risk.

These five phases are the heart of the SRM process and define the methodologies and strategies to successfully prepare for a historical eventuality or the unseen realities of new events. A comprehensive breakdown of each of the five phases of SRM are listed below, showing the systematic process, including the intent, scope, identification, evaluation levels, mitigation strategies, and the final treatment of the risk and process itself.

5.2.1. SRM Phase 1: Describe the Procedure, Project, System, and/or Organization.

- Define the use, intended function, configuration and/or task;
- Define the scope, objectives, and utilization interactions;
- Examine Human Factors considerations; and
- Examine information technology (hardware/software) components.

The first phase of SRM is a descriptive and thorough explanation of procedures, projects, systems and organizations can assist all personnel in procedural understanding. This leads to proper training**,** eliminating predetermined incorrect assumptions, procedures or actions. A hazard may exist within a procedure, or set of procedures, that can be mitigated by a simple one or two word change to that procedure.

5.2.2. SRM Phase 2: Hazard Identification

- From reports of hazards, safety concerns, evaluations of system procedures;
- Data collection – paper/electronic documentation;
- Analysis and assessment of tracked and historical data;

- Considerations of lessons learned and previous experiences; and
- Communication of collected data throughout the process.

The second phase of SRM is the identification of hazards. Of primary importance to the identification of the hazard is the accuracy of perceptions derived in the planning discussions of new systems, procedures, projects, organizations and/or safety reports. Hazards may be as obvious as the "smoking gun" or buried in a maze of statistical history. Frequent review of historical database information reinforces the importance of accurately and consistently adding information to established database programs.

5.2.3. SRM Phase 3: Analyze the Risk for each Hazard

- Identify existing controls;
- Determine severity and likelihood of risk;
- Ask the open-ended questions – What if…?, Why did…?; and
- Determine trigger mechanisms and various outcomes.

The third phase of SRM is the analysis of risk. Once the confines of the hazard area have been defined and the hazard has been identified, analysis of the hazard can begin. Depending on the area and identification, existing controls for the procedure, project, system /or organization must be identified and reviewed. Asking the open ended questions like "Why did…?" and "What if…?", will assist in finding the cause for an event occurring and/or preparing for the crucial decision-making process or operational changes. Embedded within are various "trigger mechanisms", precipitating events, or certainties of various outcomes. Through the analysis of each risk, the severity and likelihood of the risk can be determined.

5.2.4 SRM Phase 4: Assess the Hazard

- Assess the severity and likelihood of occurrence;
- Prioritize the risk and results;
- Select hazards requiring detailed risk mitigation;
- Ascertain the management level for decision-making authority; and
- Identify the party responsible for the risk acceptances.

The fourth phase of SRM is assessing the hazard or degree of risk. With the determination of the severity and likelihood of the hazard, assessment using the Risk Matrix table can define the risk and assist in assigning a priority to the risks or to each individual risk involved. Some risks will require detailed risk mitigation and other may have a more simplistic solution. Management levels of decision-making authority should be set forth and recognized within the SRM process. Management will also be

responsible for identifying and assigning managers responsible for the risk acceptances.

5.2.4. SRM Phase 5: Mitigate and Treat the Risk

- Identify mitigation options – Select best response and risk treatment plans;
- Define management levels required to ascertain risk decisions;
- Document risk options and treatment;
- Hazard reduction or elimination;
- Reapply SRM process on substituted or eliminated risks
- Track changes and monitor for effectiveness;

The fifth phase of SRM is mitigating and treating the risk. Regardless of the method of notification of a hazard or the upcoming risk associated with proposed changes, the SMS Coordinator will consider best response options. Depending on the severity of the hazard or the complexity of an upcoming project, the SMS Coordinator will respond to the appropriate level of management required and implement the notification process. Each step of the process, regardless of the complexity, will be documented on the Safety Risk Management Document Report (SRMDR), which will certify that the hazards were properly identified, analyzed, assessed and mitigated. If the SRMDR results in a judgment of no risk or is of such severity as to cause a Safety Risk Management Panel (SRMP) to be convened, the process will acceptably reduce or eliminate the hazard. Upon completion, the SRM process will be reapplied on the substituted or eliminated risks to validate the thoroughness of the process. The mitigation changes will be continually tracked for their effectiveness and, if required, training and retraining shall be implemented.

5.2.5 Safety Risk Management Life Cycle

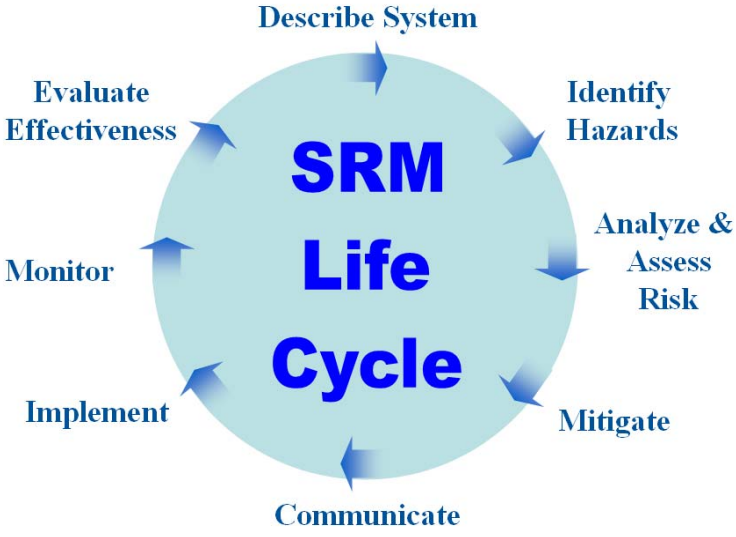

Figure 5.2 - The SRM Life Cycle

Safety Risk Management is a continuous cycle that must be repeated to ensure the systems integrity. The five phases of SRM provided guidance from the beginning of hazard identification through the mitigation of those hazards. An effective SRM program is further enhanced with the continuous assessment of the system to ensure that mitigation

implemented is effective and that no new hazards are being introduced as a result of that mitigation implementation.

Figure 5.2, The SRM Life Cycle, illustrates the continuous SRM Life Cycle process that must be implemented to complete the system safety process.

5.3 Risk Assessment

Each hazard identified for assessment shall be evaluated from the standpoint of both severity and likelihood of occurrence. Each hazard will be plotted on the Risk matrix to determine their initial Risk and then their resulting Mitigated Risk. Mitigated Risks with a remaining HIGH rating is unacceptable.

Using the Predictive Risk Matrix shown in Figure 5.1, the severity and likelihood values will identify a chart position to determine the level of risk associated with the hazard. The definitions of Likelihood and Severity are provided in Figures 5.2 and 5.3, respectively. This simple to use four by four Predictive Risk Matrix block chart has been developed for ABIA to facilitate the assessment of the level of risk.

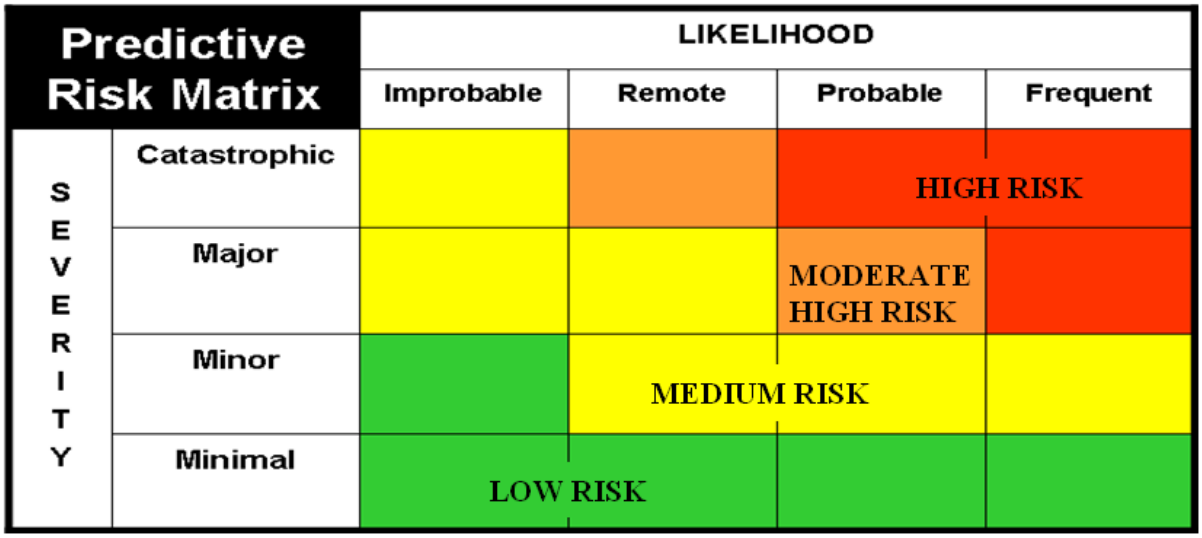

Figure 5.1 - Predictive Risk Matrix

.**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.

Figure 5.2, Likelihood Levels, provides definitions for different levels of likelihood: Improbable, Remote, Probable, and Frequent. When assessing the Likelihood of each hazard, the use of these definitions will provide the most consistent results for multiple hazard assessment.

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

Figure 5.2 – Likelihood Levels

Figure 5.3, Severity Levels, provides definitions for different levels of severity: Catastrophic, Major, Minor, and Minimal. When assessing the Severity of each hazard, the use of these definitions will provide the most consistent results for multiple hazard assessment.

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

Figure 5.3 – Severity Levels

5.4 Safety Risk Reporting

Safety reporting methods are an essential tool for tracking and collecting critical information for analysis and mitigation of hazards. Consistency in collecting critical data is best performed through the use of well designed reporting forms, which details the specific information essential for further analysis. Collected data can then be integrated into airport electronic records for long term trend analysis.

Effective safety risk reporting methods include:

- Safety reporting forms with associated policies defined and printed on the safety reporting forms and displayed at distribution points;
- Safety reports containing Date, Time, Description, and any extenuating conditions, such as weather. Reports will contain Name, Department, phone and e-mail contacts which will be detached from the report by the SMS Coordinator. Anonymous reports will be accepted, but discouraged;
- Computer safety reporting programs that are separate from log-in, access and personal computer modes**;**
- Safety Reporting forms distributed to all departments and openly displayed;
- Collection boxes available at numerous locations for ease in collection;
- A published telephone HOT Line for reporting safety concerns; or
- In person

5.5 Communications

The SRM lifecycle is shown in Figure 5.2. The communication of safety issues and risk resolutions are critical elements of SRM program. Information sharing of what risk existed, how it was identified, why it occurred, and how the risk was mitigated better educates all personnel to develop a keen awareness of safety hazards. This in turn develops a strong safety culture throughout the organization and develops trust and appreciation for making a safer working environment for all.

Communicating feedback can be accomplished through:

- Safety recognition and/or awards programs;
- Stakeholder meetings, such as Safety Council, SMGCS Working Group, Wildlife & BASH, Emergency Plan, Snow & Ice and Project Coordination or Construction meetings;
- Bulletin boards;
- Newsletters;
- Computer briefings at sign-in; and
- E-mails to personnel.

- NOTAMS

5.6 Benefits of SRM

The proactive management of risks and continuous safety monitoring through the SRM Life Cycle process will provide a formalized and proactive approach to systems safety at ABIA. Incident reporting programs, including self-inspections, are necessary to identify immediate hazard concerns and latent human, equipment, and procedural deficiencies existing before accidents occur. Information gathered from SRM reporting systems leads to internal feedback and trend monitoring programs**,** allowing the measurement and assessment of hazards and the methods to proactively counteract the risk before accidents/incidents occur.

6.0 SAFETY ASSURANCE

There are several different methods to assure that safety goals and objectives are being met. These methods include:

- Performance Indicators
- Trend Analysis
- Safety Data
- System Safety Audits
- Corrective Action

Each of these methods elaborated in more detail below.

6.1 Performance Indicators

Identification and tracking of performance indicators is critical to any program or system, and even more so with a safety system such as SMS. With SMS however, the intent is to not be anchored in the past, but rather to look ahead and identify and resolve issues before they result in accidents/incidents.

In the initial stages of implementing SMS, the selected performance indicators and the data to support them must be those that focus on the degree of compliance with regulatory requirements and the successful implementation and existence of the new system. As the system matures, the performance indicators and the data to support them need to evolve into areas that more fully evaluate system effectiveness. Performance indicators should identify potential areas of weakness so that SMS efforts can be properly focused.

Initially, as SMS is being implemented, the performance indicators will be more global in nature. As the system becomes more mature, the performance indicators can be expanded based on workforce selected issues. In the most mature stage of implementation, performance indicators will be much more diverse with individual work centers developing their own set of performance indicators and identifying the data necessary to support them. At any stage in system development though, performance indicators and the data needed to support them can constitute a smattering of indicators across the entire development spectrum. Simply put, SMS data requirements must be established in support of selected performance indicators and revised as the indicators change with system development.

In the area of regulatory compliance, the Airport currently collects an abundance of data concerning the airfield through the Airport Security and Operations Compliance System (ASOCS) and the Computerized Maintenance Management System (CMMS) databases. That data can adequately support performance indicators centered on regulatory compliance. Data to support performance indicators that concern SMS implementation are less readily available and in most cases will have to be developed.

The following performance indicators will be used initially as a minimum to measure implementation of the ABIA SMS:

- Management's visible participation in safety;
- Employees' understanding of the SMS;
- Employees' evaluation of management's commitment to SMS;
- Voluntary Safety/Lessons Learned Reporting;
- Employee Safety Surveys;
- Audit Findings; and
- SMS Training

The data to support the first three will come primarily from employee surveys, and data for SMS training will be available in the Training Registration and Administration IntraNet (TRAIN) database. New record keeping or analysis systems will have to be developed and implemented for the others.

Table 6.1, Examples of Performance Indicators, presents 14 examples of potential performance indicators for ABIA. Also shown in Table 6.1 are the specific

Table 6.1
Examples of Performance Indicators
SMS Program Manual for ABIA

No.	Performance Indicator	Specific Measures	How to Measure	Responsibility
1	**Management's Visible Participation in Safety**	• Employees' perceptions of the effectiveness of safety visits to work centers by senior managers from employee surveys • Employees' perceptions of management commitment to safety from employee surveys	Employee Surveys	SMS Coordinator SMS Coordinator
2	**Senior Manager Safety Visits**	• Number completed vs. number scheduled • Employees' perception of their effectiveness	Employee Surveys	SMS Coordinator SMS Coordinator
3	**Employees' Understanding of SMS**	• Percent of correct answers on random follow-up survey 30 days following training and periodically thereafter	Employee Surveys	SMS Coordinator
4	**Safety Committees**	• Effectiveness of safety committees (are they more than a coffee break) • Number completed vs. number scheduled	Employee Surveys Meeting record(s)(e.g. sign-in sheet, meeting agenda)	SMS Coordinator
5	**Voluntary Safety Hazard Reporting**	• Number of submissions • Number of issues acted upon/closed by initial suspense • Average time to close		SMS Coordinator SMS Coordinator SMS Coordinator
6	**Voluntary Lessons Learned Reporting**	• Number of submissions		SMS Coordinator
7	**Safety Audits**	• Number completed vs. number scheduled		SMS Coordinator
8	**Safety Surveys**	• Number completed vs. number scheduled		SMS Coordinator
9	**Safety Survey/Audits Findings**	• Number closed by initial suspense • Average time to close		SMS Coordinator SMS Coordinator

performance measures, how they should be accomplished, and who has the responsibility for collecting and reviewing the performance indicator information. As shown, the SMS Coordinator has the responsibility for gathering, compiling, and analyzing the performance indicator data.

Table 6.1
Examples of Performance Indicators
SMS Program Manual for ABIA

No.	Performance Indicator	Specific Measures	How to Measure	Responsibility
10	**SMS Training**	Number and/or percentage of personnel trained		SMS Coordinator
		• Percent of correct answers on Random follow-up survey 30 days following training		SMS Coordinator
11	**Ad Hoc Training (training resulting from SRM decision reports, etc.)**	• Percentage of required individuals trained within 30 days of establishing requirement.		SMS Coordinator
		• Percent of correct answers on random follow-up survey 30 days following training		SMS Coordinator
12	**Weekly Employee Safety Meetings**	• Number conducted vs. number scheduled	Meeting record(s)(e.g. sign-in sheet, meeting agenda)	Shift Supervisor SMS Coordinator
		• Effectiveness of safety meetings from employee surveys (are they more than a coffee break)	Employee Surveys	
13	**Corrective Actions**	• Number of Part 139 discrepancies open beyond 30 days. (It is no longer considered to be "routine" if a discrepancy is open beyond 30 days.)		SMS Coordinator
		• Percent of corrective actions that were closed on or before the target date.		SMS Coordinator
		• Number of corrective actions that are still open beyond original target date.		SMS Coordinator
		• Average number of days beyond original target date it took to close corrective actions.		SMS Coordinator
14	**Lessons Learned**	• Number of Lessons Learned provided compared to the number disseminated.		SMS Coordinator
		• Number of Lessons Learned implementing actions completed within original target date compared to total implemented actions.		SMS Coordinator
		• Number of repeat incidents in Lessons Learned compared to the total number of incidents.		SMS Coordinator
		• Number of repeat incidents in Lessons Learned compared to the total number of Lessons Learned distributed.		SMS Coordinator
		• Total number of Lessons Learned generated by management compared to the total generated.		SMS Coordinator

Source: Jacobs Carter Burgess Team, October 2008

Table 6.1 is additionally provided in full size in Appendix 3, Performance Indicators.

6.2 Trend Analysis

Trend Analysis is an integral part of any SMS performance indicator program and an extremely valuable tool for the timely identification of embryonic hazards allowing timely analysis and mitigation before these hazards result in accidents/incidents. It is, however, essential that trend analyses be based on properly identified and tracked performance indicators both “lagging or trailing” and “leading,” and it must be understood that these indicators will have to be modified or changed over time to

continue to produce realistic snapshots of an organization's safety program effectiveness.

Trailing or lagging indicators recount history – past events. They can include such things as accident/incident numbers, runway incursions, bird strikes, etc. Trailing indicators are the most common indicators used by airports in tracking the success or failure of their safety programs, but they do so in hindsight. They do little in the way of providing proactive, look ahead forecasting of potential safety problems and program performance. That is not to say that they cannot be of some assistance in identifying trends.

Future trends can sometimes be identified by using the performance of trailing indicators if done so over longer periods of time and projecting that trend forward. For instance, a trailing indicator could numerically remain well within the acceptable guideline or performance standard for each month over a period of a couple of years giving a sense that the system is in good shape and nothing needs to be done. But showing that same data in a two-year trend analysis could indicate a trend that shows performance, though still acceptable, has actually been trending downward with the ever increasing potential of an unacceptable accident/incident occurring in the not too distant future if that trend is not reversed. In this way lagging indicators can be used as a forecasting tool, but they are not as effective as a good set of leading indicators especially when evaluating overall safety program performance.

Leading indicators look at things that do not necessarily affect system performance as it presently exists. Instead, they provide an evaluation of conditions and activities that precede and affect the occurrence of accidents or incidents in the months or years to come. Such things include changes in the operational and safety environments, training and management involvement in safety. The following are good examples of leading indicators for analyzing an organization's safety program:

- The degree of commitment to safety and health;
- How highly both management and workers value a safe workplace;
- The level of awareness that workers and management have of job related risks;
- Whether inspection and preventative maintenance programs are followed;
- The level or quantity of training provided;
- Total hours of training provided; and
- The degree of activity of the Safety Council, Committees and Panels.

All of these can be leading indicators that show trends toward a continuation of acceptable or improving safety levels or issues that need to be evaluated and potentially mitigated. For instance, there may be a situation where all mandatory

training is being accomplished satisfying one of the trailing indicator performance standards or benchmarks, but the number of hours of additional safety training has been declining over the last couple of years. This may portend a lessening of safety and an increased potential for accidents or incidents that will not show up by solely analyzing trailing indicators until actual accidents/incidents occur. However by identifying this adverse trend through the tracking of a leading indicator such as "Total Training Hours," a thorough evaluation can be conducted thorough the Safety Risk Management (SRM) review process and appropriate mitigation or changes to previous mitigation implemented.

Trend analyses should normally be performed with "Quantitative" data. This means survey questions should be multiple choice, true or false, rank order or constant sum. Survey questions that have textual input (Qualitative) should normally be avoided when the data is intended for use in a trend analysis since that introduces subjectivity into the process. ***However, sometimes textual input can point to an area(s) that would benefit from further, in-depth investigation.***

The key in any trend analysis is the selection of the most appropriate indicators, both trailing and leading, with which to evaluate a system and have enough data to produce valid analyses.

6.3 Safety Data Development & Management

6.3.1 Existing Databases

The Aviation Department utilizes several non-integrated database programs and database tools, as shown in Figure 7.1, ABIA Data management Systems. Those affecting operations on the airfield are:

- TRAIN (Training, Registration and Administration Intra Net);
- TMA CMMS (TMA Computerized Maintenance Management System);
- ASOCS (Airport Security and Operations Compliance System);
- RMS (Records Management System);
- VERSADEX Computer Aided Dispatch (CAD);
- Microsoft Excel;
- SQL (Structured Query Language).

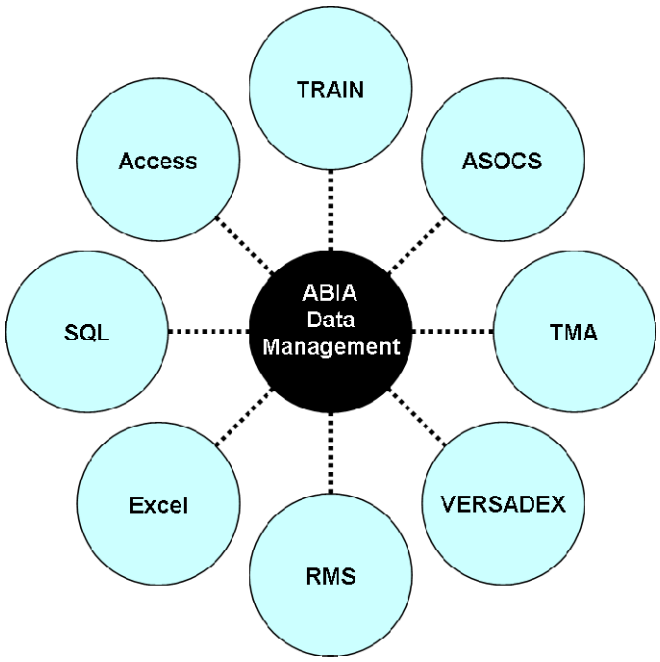

Figure 7.1, ABIA Data Management

In the cases of TRAIN and ASOCS, these programs have only limited statistical functions, but reports from these programs can be imported into Excel for further processing and SQL can be used for more complex processing if necessary. Microsoft Access is also available for use at the Airport.

TRAIN is a program that was developed within the City of Austin Information Technology Department about 12 years ago to fill a need the Department had to track training of their personnel. Since that time, use of the program has expanded to every department in the City including the Department of Aviation. There are abundant choices of reports available within the program, and additional reports can be developed to meet specific needs as has been done for other city departments in the past.

This program will continue to be used for scheduling and documenting training except in those cases where other proprietary systems must be used such as for the Non-Movement Area Training which is a proprietary system.

TMA CMMS is a computerized maintenance work order system that collects a vast amount of data on maintenance activities throughout the airport. An abundance of standard reports are available from this system and the system also has the capability to generate "third party" or ad hoc reports.
This system can effectively provide needed data in support of numerous potential SMS performance indicators.

ASOCS is used by Airfield Operations as the official record of 14 CFR Part 139 activities and also by Operations Security personnel. The two users of this system each have dedicated servers so there is no integration between them. This system has a good capability to generate user defined reports to satisfy a multitude of needs in support of SMS and to be an effective source of data to support numerous potential SMS performance indicators.

RMS is used by Fire and EMS for their official records. It contains a vast amount of data on fire and EMS events that occur on the Airport, but there is no segregation between airside and landside events as there is only one "address" for the entire airport. Additionally, the Federal Health Insurance Portability and Accountability Act (HIPAA) rules limit availability of medical information for incident analysis beyond those investigations conducted by the Fire Department and EMS themselves to whether an individual was "injured, treated and/or transported." This provides only minimally useful information for any incident analysis or "lessons learned" program.
The system is operated and controlled by the City of Austin Fire Department and any possibility of gaining approval for someone outside–that Department to access the system directly is extremely doubtful. However, it may be possible that reports from this database can be made available to an SMS Coordinator.

VERSADEX is used for police functions. It contains a vast amount of data on police events that occur on the Airport, but like RMS, there is no segregation between airside and landside events as there is only one address for the entire airport. As with RMS, HIPAA rules severely limit medical information available for incident analysis outside of

a police investigation and use in any “lessons learned” program. When a review of the daily police “blotter” reveals an incident that may be of interest to an airport department, the basic information from that incident is shared with the appropriate airport department(s), but no monthly reports concerning incidents/accidents on the Airport are produced.

The system is operated and controlled by the City of Austin Police Department, and like the Fire Department’s RMS, it is extremely doubtful that approval could be gained for anyone outside the Department to have direct access.

A significant amount of data is warehoused in several non-integrated database systems that have the potential to adequately support many of the data needs of SMS once the performance indicators and the data needed to support them are determined. Their full potential will be utilized before other systems are considered, especially in the initial stages of SMS Development.

6.3.2 Available Databases

There are several aviation specific statistical databases or business intelligence tools on the market, but none have been identified as being used in any airport safety environment as yet. Rather, they are generally focused on airline and other aircraft operator applications. It is, however, anticipated that the industry will respond with a number of offerings specifically for airport use once the FAA establishes a requirement for Safety Management Systems nationwide.

The programs currently available and which are envisioned to be the ones that would be modified to more fully satisfy the needs of airport operators are very capable programs that can access most major database resources. But, history indicates that they require experienced personnel to properly and efficiently utilize them. They have been shown to need considerable staff time to set up and run the analyses that may not be justified from a cost/benefit standpoint for individual airports especially at this early point in the FAA’s roadmap to establishing airport SMS requirements. Therefore, it is doubtful that ABIA would provide the level of demand to justify neither the direct cost for such tools nor the cost to keep personnel adequately familiar with their operation for this embryonic program that is initially limited to the airfield portion of the airports.

On the positive side, there is one database program that was initially developed for airline use that appears very attractive if it could be revised to better serve the specific needs of airports. This program is the Aviation Safety Information System (AVSiS) that was originally developed for use by airline safety managers in Great Britain to give them the “big picture” of safety within their organizations. It was purchased by the National Air Transport Association (NATA) here in the United States for use by its member Part 135 carriers. This system is currently being investigated by the Port of Seattle for its use in the airports application, but even they acknowledge that it will require major modifications to effectively accommodate the needs of airports. To pursue this or at least determine if such changes can be made, the Port of Seattle through its SMS Team conducts regular teleconferences with other interested parties

is forming an Airports Working Group to work with NATA who appears enthusiastic about the prospect of expanding its use to airports to line out the changes and enhancements needed to meet airport needs. If successful, this is a program that ABIA should consider as a safety enhancement measure if the data for all of the Airport's safety programs can be hosted on the system.

Hosting all of the Airport's safety data on this system would not necessarily mean that there would be a single person overseeing safety programs throughout the Airport. Rather, it would mean is that there is a central electronic repository for safety data that could be accessed by various approved managers for their use in monitoring and improving safety performance across the Airport.

An alternative and perhaps more cost-effective approach would be for the FAA to sponsor the safety database system, with all airports providing data. Ideally, under this approach both airports and the FAA could run analyses. The FAA would have the ability to use data from individual airports, to compile data on a regional and nationwide scale, with benchmarks and trend analysis standards established within the program.

In summary, the programs currently available and which are envisioned to be the ones that would be modified to more fully satisfy the needs of airport operators require experienced personnel to properly and efficiently utilize them. Considerable staff time is also required to set up and run the analyses. Therefore, the Department of Aviation cannot presently justify either the programs or the personnel to operate them.

6.3.3 Safety Data Development and Management Implementation

The various databases available in the Department of Aviation are adequate to support initial SMS requirements, and should be utilized to their full capabilities before new systems are considered. Slight changes in Performance Indicators themselves may allow existing databases to adequately support SMS as well when that would not otherwise be possible. To accomplish this, the SMS Coordinator as the individual responsible for safety data development and management for SMS shall:

- Identify what data is needed to support individual performance and trend indicators,
- Determine which databases contain the needed data,
- Identify what existing reports can be used to extract the data or develop new reports that may be required,
- Adjust performance measures, if feasible, to allow use of existing data and reports,
- Develop new reporting requirements when needed data is not already available, identify the database to be used for warehousing the data and develop reports to extract the data.

6.4 System Safety Audits

The goal of the SMS audit program is not to focus on actual physical conditions. Rather, it is to focus, at least initially, on evaluating the SMS management practices that are in place and determine if the system is being implemented at a level consistent with industry best practices.

6.4.1 Audit Program

The Department of Aviation will develop an SMS Audit program that utilizes a checklist based on the Twenty-One elements of SMS contained in the Safety Management System Pilot study Participant's guide that was published by the FAA's Office of Airport Safety and Standards (dated April 6, 2007). These Twenty-One elements are listed in detail, in Appendix 5, The Twenty-One Elements of SMS. These audits will be performed no less frequently than annually with the first one occurring within twelve months following publication of the SMS Manual.

The majority of these audits will be conducted with internal resources, principally the SMS Safety Coordinator. In the event a more disinterested resource is desired, use of the Department of Aviation's internal auditor or some other City resource will be considered before utilizing an audit resource external to the Department and the City of Austin.

6.4.2 Audit Program Implementation

To implement the SMS Audit Program that will identify deficiencies, identify corrective actions and monitor those actions to completion, the SMS Coordinator as the individual responsible for administration of the SMS Audit Program and evaluation of audit findings shall:

- Develop an Audit Checklist based on the Twenty-One Elements of SMS;
- Develop a tracking system to monitor correction of audit findings;
- Establish appropriate performance indicators to gage the effectiveness of the audit program and identify data necessary to support them.

6.5 Corrective Action

A corrective action is a change implemented to address a weakness identified in a system, normally a management system. Effective management of corrective actions provides a vehicle for effective management actions to improve safety and overall performance.

6.5.1 Corrective Action Program

Corrective actions can come from a multitude of sources and can get quite numerous. Those that come from sources such as a Safety Risk Management (SRM) Process, SMS audit or self-inspection, after action reviews (incident, accident, project, etc.) will need to be monitored through utilization of a tracking system. Routine corrective actions such as those resulting from discrepancies identified during Part 139 Airfield Inspections will be specifically tracked by SMS if the item is open more than 30 days

The fundamental rules for any corrective action are:

- Clearly state the corrective action required
- Identify the responsible party or office
- Establish an aggressive but attainable target date for completion
- Monitor progress toward meeting that date

A simple tracking system will be developed utilizing Microsoft Excel or a similar program to monitor progress toward closing corrective actions. Whatever the choice, the chosen system must allow for an adequate level of analysis and performance tracking.

The establishment and tracking of appropriate performance indicators to evaluate the Department of Aviation's performance in meeting target dates for Corrective Actions is essential to a successful program.

6.5.2 Corrective Action Program Implementation

To implement a SMS Corrective Action Program that will track corrective actions to completion, provide monthly progress reports and measure performance, the SMS Coordinator as the individual responsible for administration of the SMS Corrective Action Program shall:

- Develop a Corrective Actions tracking system;
- Establish appropriate performance indicators to measure effectiveness of the Corrective Action Program;
- Include SMS Corrective Actions will be included as a standard agenda item for all meetings of safety committees involving airfield stakeholders.

6.6 Lessons Learned

"Lessons Learned" is knowledge acquired from human error or an adverse experience. In some instances, lessons learned can also result from innovation. The knowledge derived from lessons learned provides the foundation for employees within an organization to improve a process or activity to work safer, more efficiently, and with a higher quality product.

6.6.1 Lessons Learned Program

A Lessons Learned Program is an important component of ABIA's Safety Management System (SMS). It allows for continuous system improvement and feedback, and like other aspects of SMS, there must be a means of measuring results. Lessons Learned do not come solely from such things as after accident/incident reviews, after project reviews or some management related activity as is often the perception although they are prime sources. Instead, there are a multitude of sources both inside and outside an organization that can provide valuable knowledge to improve the safety environment.

Individuals within an organization are good sources of lessons learned, especially when it comes to offering innovation or better ways to accomplish a task. Therefore, it is essential in any Lessons Learned Program to provide a means for individuals to make submissions in the same way as they are afforded the opportunity to report hazards or potential hazards they may observe or otherwise become aware of. No matter what the source of the Lesson Learned, it must be significant, valid, and relevant to the organization.
The Lesson Learned process itself is relatively simple. It calls for:

- Identifying Lesson Learned validity and applicability to the organization;
- Determining target group(s) for distribution;
- Determining appropriate distribution method(s);
- Making timely distribution;
- Accepting feedback; and
- Measuring results.

Dissemination is one of the most important elements of any Lessons Learned Program. It is essential that target groups be properly identified along as well as the most efficient method for dissemination of information. While distribution by email may be the preferred method to get Lessons Learned to management levels of the organization, it will not work well for non-management employees who do not have convenient access to computers. In the latter case, posting the information on a bulletin board in their work center, including a pre-shift/post-shift briefing or safety meeting may be the most appropriate method.

When disseminating Lessons Learned, it is beneficial to keep the form of that document relatively standard so that the information is easily assimilated by the target audience time after time. The document (paper or electronic) will state:

- The purpose of distributing the Lesson Learned (intended for use in future safety meetings, provide immediate information to employees to prevent reoccurrence, inform employees of innovations allowing them to work safer;

- The source of the Lesson Learned (accident/incident review, submitted Lesson Learned, etc.);

- What Happened (a short, simple summary of the accident/incident, submitted Lesson Learned, etc.);

- What went right (stating positive things provides reinforcement for actions);

- What was learned (where did things go wrong);

- Recommended Corrective Actions or How to Prevent Reoccurrence (recommendations to prevent reoccurrence to include target dates for any necessary actions and the responsible individual or office for each); and

- Consideration should also be given to adding a section on Best Work Practices (a list of incident related best practices that will reinforce positive work habits) and providing contacts where the reader can get help or more information (Supervisor, SMS Coordinator, Safety Office, etc.). Note: When it comes to Recommended Corrective Action or How to Prevent Reoccurrence, a restating or paraphrasing an existing policy, process, procedure, etc. is inadequate and does not qualify as a legitimate Lesson Learned.

The Department of Aviation currently operates a Lessons Learned Program through use of accident or incident reviews at Safety Committee Meetings and posting of accident/incident reports on Safety Bulletin Boards that contain the essential elements of a Lessons Learned Program (root cause, contributing factors and recommendations). The inclusion of Airfield SMS related Lessons Learned on these bulletin boards in appropriate work centers will be an effective and economical means of getting SMS Lessons Learned to those who need this information, but do not have convenient access to a computer. In a similar manner, the addition of SMS Lessons Learned to the agendas of the airfield related Safety Committee Meetings will provide an efficient means of disseminating this information to committee members and generating committee discussion/feedback. Relevant Lessons Learned will be given in appropriate employee training courses. In this way, a Lesson Learned becomes a longer term tool to improve safety.

Efficiently soliciting Lessons Learned or feedback on published Lessons Learned from airfield stakeholders will be established. Safety Reporting forms, which are normally readily available to airport employees and many non-employees alike, will provide a simple, readily available means for an individual to report a lesson learned input or

provide feedback on a publicized Lesson Learned. It is essential that Lessons Learned Program performance indicators be identified and monitored. Those indicators for ABIA are:

- Number of Lessons Learned provided compared to the number disseminated;
- Number of Lessons Learned implementing actions completed within original target date compared to total implemented actions;
- Number of repeat incidents previously discussed in Lessons Learned compared to the total number of incidents;
- Number of repeat incidents previously discussed in Lessons Learned compared to the total number of Lessons Learned distributed; and
- Total number of Lessons Learned generated by management compared to the total generated.

For a Lessons Learned Program to be successful, the following points must be kept in mind. Lessons Learned:

- Must be kept simple;
- Need management support at all levels;
- Need to involve every affected person (organizations and individuals);
- Distribution must be tailored in terms of target audience(s) and method(s);
- Needs a process to receive feedback;
- Performance needs to be measured; and
- May not produce 100% success .

6.6.2 Lessons Learned Program Implementation

The Department of Aviation will implement a Lessons Learned Program that provides a simple process to identify knowledge that would be of benefit to an organization and/or the individuals within it, disseminate that knowledge to the appropriate groups, accept feedback and measure program effectiveness. To implement our Lessons Learned Program, the following will be accomplished:

- The SMS Coordinator will be the responsible individual to review, evaluate, and disseminate Lessons Learned and measure program effectiveness through the establishment and tracking of appropriate performance indicators;

- Make Lessons Learned a fundamental element of any after-project/after incident review activity;
- Include appropriate Lessons Learned in appropriate employee training courses;
- Expand the Airport Safety Office Hazard Reporting Form to include Lessons Learned reporting;
- Allow SMS Lessons Learned information to be included on the Safety Office Bulletin Boards in appropriate work centers;
- Include SMS Lessons Learned as a standard agenda item for all meetings of safety committees involving airfield stakeholders; and

Establish and track appropriate performance indicators to measure effectiveness of the Lessons Learned Program.

7.0 NON-PUNITIVE REPORTING SYSTEM

In 1992, the FAA developed the Aviation Safety Action Program (ASAP) found in Advisory Circular (AC) 120.66b, for pilots and aircraft maintenance personnel at selected air carriers. The program has been a remarkable success, and has exceeded the goal of a confidential safety reporting system. Non-punitive reporting is an integral segment of the Safety Management System (SMS) and has been implemented in the FAA Air Traffic Organization (ATO). A non-punitive reporting system is a fundamental component of SMS.

The benefits of a non-punitive reporting system are:

- Provides strong incentives to report safety concerns;
- Establishes direct-line communications of safety information to managers;
- Reveals a more accurate view of airport operations safety issues.
- Reporting is confidential without fear of reprisal; and
- Builds mutual trust between management and employees;

To create an open culture with safety excellence in the forefront, organizations must avoid an overly punitive reaction to events and errors. The employee must be encouraged to report errors without fear of recrimination. This will lead to learning opportunities and embracing changes for promotion of the overall safety at ABIA. A strong safety culture is one that reinforces accountability across all levels of the organization. It is a system of accountability that does NOT focus on the human error or the unintended consequences but rather focuses on the quality of our decision making process.

7.1 Non-Punitive Reporting Process

Department of Aviation employees are expected to report any event or observation they feel represents a potential hazard. All Safety Reports shall be submitted to the SMS Coordinator for processing as described in Section 5.6, Safety Risk Reporting.

The specific components of the non-punitive reporting systems may vary. Initially, the implementation of general guidelines will establish a foundation for a successful program.

7.2 Policy Statement

The Department of Aviation will establish a policy that identifies the elements of the non-punitive reporting program. It should include the means and method for reporting potential or real safety issues; time limits for reporting; and under what circumstances the non-punitive reporting program would not apply.

7.3 Reporting Time Frame

The time frame for reporting a hazardous situation should be as soon as possible but should not to exceed a reasonable time period from the time the submitter becomes aware of a hazard.

7.4 Types of Reports

The report of an unsafe or hazardous situation may be made orally or in writing. If the hazard represents an imminent risk or a severe safety concern, immediate notification to the proper authorities is expected.

7.5 Tracking

The SMS Coordinator will track non-punitive reports in accordance with established policies until the risk has been mitigated or accepted.

7.6 Non Qualifying Reports

Reports that involve criminal activity, substance abuse, intentional disregard for rules and regulations or falsification will be referred to the appropriate supervisor for further handling.

The qualification process will be determined through a panel consisting of some or all of the following subject matter experts as appropriate;

- Law Enforcement
- Fire Safety / ARFF
- Human Resource
- Operations
- Maintenance
- SMS Coordinator

8.0 SAFETY PROMOTION

8.1 Culture

The main goal of safety promotion is to create a "safety culture" that allows SMS to succeed. Culture is management's representation of what the organization believes and practices. Safety is a collective commitment that, with the proper implementation, places the responsibility for safety in the hands of every employee. The result is an environment that encourages the identification, reporting, and correction of safety issues at every level.

The safety culture of the Department of Aviation is defined as a product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior. Culture is relatively stable, enduring, and resistant to change.

Organizations that wish to create a positive and effective Safety Culture must have organizational values and beliefs are shared by all. The essential values in a positive and effective safety culture include integrity, honesty, initiative, innovation, responsibility, openness in sharing information, and commitment to constant improvement and continuous learning.

An organization with these values will provide an environment where the employee's sense of self is woven into the organization's values, and where the employees feel they are "a part" of something important, good, and larger than self.

8.2 Training & Education

8.2.1 SMS Training and Development

The success of any program is measured by the success of its training and educational expertise. All Department of Aviation employees will be provided with a clear understanding of SMS policies and procedures to perform their duties safely.

Training is the cornerstone of the Department of Aviation safety and accident prevention program. All division managers are responsible for developing personnel training programs that ensure adherence to the policies and procedures within their areas of responsibility and that are properly aligned for the skills and competencies necessary for each person to perform their duties in an effective and safe manner. Division Supervisors and above are responsible for continued development of training programs that address changes to the organizations policies, goals, and objectives.

Training programs include the process by which an assessment of potential hazards related to an employee's job descriptions might be revealed. The commitment to train all employees, regardless of their professional discipline, is an indication of the Department of Aviation's dedication to implement Safety Management System.

Division Managers will review its safety and training, periodically, to identify problem areas, determine specific safety objectives and re-develop coordinated, focused training programs.

8.2.2 SMS Coordinator

The SMS Coordinator will work with each Division Manager to identify SMS-specific training needs and, to the extend practical, the delivery of training sessions. To achieve that objective, training programs will be developed by:

- Identifying the jobs and the tasks associated with each job, and determining the related knowledge and skills required to safely perform those tasks;
- Defining the training objectives and the methods by which training will be delivered, and designing test items and testing methods to establish whether training objectives have been met; and
- Establishing the sequence in which the training topics will be presented, development of lesson plans, development and assembly of training manuals, gathering all required training materials, and assigning instructors.

8.2.3 SMS Training Evaluation

The effectiveness of training programs will be evaluated through:

- Post-training evaluation questionnaires; and
- Surveys of the effectiveness of training programs with randomly selected participants.

The SMS Coordinator will assist managers with this training evaluation process, and will maintain a central database of this effort for future consultations.

8.2.4 SMS Training Records

To insure responsible safety management, formal documentation is required to provide the authoritative basis for the SMS. Personnel training records must be updated within two weeks of the training being completed and is the oversight responsibility of the SMS Coordinator. Training records will be retained in accordance with Department of Aviation policies. Each Division Manager is responsible for sending safety related training records to the SMS Coordinator by the first of each month.

8.2.5 SMS Indoctrination Training Programs

All new Department of Aviation employees will complete SMS Indoctrination Training, as may be directed by the SMS Coordinator, during their probationary period. This indoctrination training includes safety management program policies and procedures

as well as individual responsibilities and accountabilities related to SMS. This training will include, but not be limited to:

- SMS policies and procedures;
- Safety Risk Management (SRM) risk assessment and hazard recognition;
- Safety Report filing procedures; and
- Non-punitive safety reporting policy and guidelines.

SMS Recurrent Training will be provided to each employee on an annual basis. Recurrent training materials will include “lessons learned” from previous SRM studies and SRMD filings.

SMS recurrent training will emphasize on the job awareness of job-specific safety hazards. It will cover at a minimum the following:

- Changes to policies, procedures, rules, and regulations;
- On the job hazards;
- Equipment and environmental safety procedures;
- Safety Reporting Protocols;
- Roles of key safety personnel;
- SMS communications and sharing of information; and
- Changes to Emergency Preparedness Plans.

Training programs will be updated when unforeseen or unexpected circumstances dictate, such as the results of an SRM process due to changes of equipment, procedures, physical property, and/or personnel.

8.3 Organizational Development

Organizational Development is a systematic process to optimize individual and organizational performance, is essential for SMS success. It consists of two major components:

- Leader Development; and
- Strategic Planning.

8.3.1 Leadership Development

Leadership Development is the continuous and deliberate process of developing leadership skills, knowledge, and behaviors. Quality leaders do not happen by

accident. Leadership is an observable set of skills and abilities that can be learned and fine tuned over a time. Skilled leaders:

- Model the Way **-** They are admired, respected and trusted because they**:**
    - Share sacrifices and risks;
    - Set the moral and ethical standard; and
    - Establish caring relationships with those they work with.
- Inspire a Shared Vision
    - Clearly articulate the vision;
    - Demonstrate commitment to the vision; and
    - Inspire and show enthusiasm and optimism.
- Challenge the Process
    - Stimulate & encourage innovation;
    - Allow subordinates to question assumptions; and
    - Mistakes are part of the learning process.
-
- Encourage & Enable others to Act
    - Personalized interaction;
    - Provide new learning experiences; and
    - Leadership by “Walking around”.

The above describes attributes of leadership. How do you propose that Leadership Development be performed in the organization?

8.3.2 SMS Strategic Planning

Strategic Planning involves purposeful long term planning and attention to:

- Identification of SMS Mission, Vision, Values, and Key Functions;
- Aligning of Internal Processes with Key Functions;
- Developing metrics to proactively rate performance of Key Functions and Internal Processes; and

- Incorporation of SMS Leader Development as a critical component for implementation.

Leader Development and Strategic Planning are integral to a viable and robust SMS Program.
Management must show true commitment to:

- Safety as #1 priority;
- Full Implementation of SMS;
- Continuous safety Improvement;
- Culture of openness and initiative; and
- Providing necessary resources.

These actions must be factored into leader development and strategic planning of the organization in order to ensure leaders create and commit to the values of a quality safety culture.

8.4 SMS Management Awareness

The Department of Aviation will develop safety management awareness and understanding throughout the entire organization communicating through:

- Safety seminars;
- Safety newsletters, notices and bulletins;
- Communicating safety lessons-learned;
- Bulletin boards and electronic reporting through email and a SMS website; and
- Safety campaigns on specific SMS issues identified and emphasized.

Supervisors will further educate themselves through specific a SMS training program that includes:

- Risk management;
- Accident/Incident investigation;
- Audits; and
- Performance measurement.

8.5 Communications

The Department of Aviation management encourages a free and open exchange of safety information across all levels of employees and between all departments. Keeping staff informed about current safety issues through relevant training, safety literature, participation in safety courses and seminars, etc. improves the safety health of the organization. Departmental managers, in cooperation with the SMS Coordinator, are to encourage interdepartmental discussions on common safety issues, whether in the planning of activities or in response to safety reports or concerns.

Employees are encouraged to bring up safety issues with their supervisor. The discouragement of safety reporting and communication, whether tacit or explicit, will not be tolerated. The SMS Coordinator will develop and coordinate an internal communication strategy aimed at promoting safety and the safe conduct of all Department of Aviation activities. In addition to written communications, it is important for employees to witness evidence of the commitment of top management to safety.

All supervisors shall actively and demonstratively support the internal safety communication strategy. The safety communication strategy should include, for example:

- Safety bulletin boards;
- Safety newsletters;
- Safety posters;
- Safety awards, recognitions;
- Safety events and
- Stakeholder meetings.

8.6 Safety Incentive Programs and Events

The Department of Aviation shall establish various incentive programs designed to recognize an employee's special effort to improve or enhance the organizations safety culture. The SMS Coordinator will oversee the development of programs that support the promotion of safety. The nature of these programs shall be defined and communicated to the ABIA community as they become available.

Safety incentive events such as safety stand-downs, safety fairs, and safety campaigns will be aimed at promoting safety and encouraging employee participation. The SMS Coordinator will endeavor to arrange these kinds of activities on a quarterly basis, and will seek the cooperation and participation of external stake-holders.

8.7 Safety Promotion and Training Checklist Summary

- Management recognizes that all levels of the organization require training in safety management and that the needs vary across the organization;
- Job descriptions reflect competency requirements;
- All personnel receive safety indoctrination training and participate in specific ongoing training for safety management;
- The organization has an effective program for the timely promotion of safety issues;
- Additional safety awareness training is provided when the operating environment changes (seasonal changes and changes in operational conditions, regulatory requirements, etc.; and
- Employees understand that safety management has nothing to do with attributing blame.

8.9 Safety Council

Safety Council's are vitally important to the organization by allowing discussion, input, and disagreements on safety performance and promotion to be voiced from various departments, tenants, airlines, and other interested parties. Membership should consist of representatives from both Department of Aviation staff and Airport tenants to provide a forum to discuss safety issues, policies, and procedures, both current and proposed.

9.0 SMS PROGRAM IMPLEMENTATION

The implementation of a Safety Management System into an organization will not be accomplished overnight. A well thought-out implementation plan will help ensure the programs' success, while not over burdening the organization's human and financial resources.

10.1 Department of Aviation Implementation Approach

The implementation of the Department of Aviation SMS Program will be a phased approach, starting with the Operations and Maintenance Divisions. These two organizations will implement SMS into their organizations first. As SMS knowledge, skills and abilities are mastered, additional SMS features and organizations will be added.

The Department of Aviation plans to expand SMS to other departments and Airport stakeholders as the program matures. This expansion may require additional resources and financial planning on the part of management to experience the full benefit of an improved safety culture.

10.2 SMS Staffing Requirements

All start-up programs, such as implementing SMS Program, can require a significant amount of an organizations time. The assistance of the SMS consultant has provided Department of Aviation a running start in the programs development and implementation. To ensure the programs success, the Department of Aviation will be required to devote the required resources to accomplish the SMS Coordinators' role in the organization.

10.3 Financial Implementation of the Department of Aviation SMS Program

The Department of Aviation's goal is to implement the SMS Program with existing staffing and resources. Eventually, SMS staffing support and resources are expected to grow as the program matures. Ultimately, the Department of Aviation community should have a SMS specialist, who's responsibility is to sustain a continued improvement in the safety culture by reducing the risk of accidents and incidents. Staffing a SMS professional (Department of Aviation or contract employee) is expected to cost $85,000.00 annually.

Additionally, the implementation and integration of software applications and hardware to measure performance metric criteria will also benefit the goal of long term success. Technology support for implementing SMS will require software applications, software development for databases, hardware and integration support. These technology support elements are planned to be a one-time expense, but should not exceed a capital investment between $150,000 and $200,000. Software programs and support

may also be a phased-in approach as performance measures and trend analysis activities become more defined.

10.4 Implementation Guidelines

The following list of implementation activities have been developed for the ABIA SMS Program implementation. These activities will provide a scheduled detailed sequential approach toward building the Safety Culture, employee Knowledge Base, and Confidence with implementing SMS.

Those activities are as follows;

Year One, First Quarter

1. Publish an organizational chart identifying positions and safety responsibilities of all key personnel.
2. Appoint the ABIA SMS Coordinator as the primary point of contact for all matters related to the implementation of SMS, maintenance of the SMS Handbook, and SMS training
3. Publish safety policy statement and describe how it is communicated to Department of Aviation employees.
4. Identify, describe, and recommend airport safety objectives.
5. Communicate to all Airport tenants the Safety Policy and Objectives, and commitment to SMS and improving the safety culture of the organization. Communicating feedback to staff and personnel can be accomplished through:

    - Safety recognition and/or awards programs
    - Staff meetings
    - Bulletin boards
    - Newsletters
    - Computer briefings at sign-in
    - E-mails to personnel

6. Provide SMS Overview and Safety Risk Management training to all Department of Aviation Operations and Maintenance employees.
7. Develop Initial trend analysis models.
8. Create self-inspection findings performance metrics.
9. Prepare recommendations for developing the databases, models, and analytical tools to be used for risk management.
10. Document process to identify training requirements for systems safety.
11. Identify or develop plan to validate training effectiveness and the process to gain training feedback, including useable metrics.
12. Identify or develop defined processes to communicate safety policies and objective throughout the organization.

13. Develop process for documenting and storing results of SRM.
14. Describe how existing quality and risk management activities will be integrated into the SMS.
15. Conduct training and education, safety communication, competency, and continuous improvement processes.

Year One, Second Quarter

1. Implement a plan for employee SMS orientation and training with outline of proposed curriculum and resources.
2. Implement how top management will follow-up on SRM to ensure risk mitigation strategies are appropriate.
3. Establish self-auditing processes.
4. Develop strategic plan to integrate the tailored SMS program into the overall operation of the airport.
5. Develop Final SMS Plan and Schedule for implementation along with anticipated costs.
6. Establish Safety Council to provide peer review of safety reports, hazard analysis, and safety communication.
7. Develop a plan to integrate apron safety management into the SMS.
8. Distribute copies of SMS Hand Book to Department of Aviation supervisors and tenant management

Year One, Third Quarter

1. Initiate lessons learned safety assurance program.
2. Publish the Department of Aviation Directive that formally establishes the systematic business processes for the identification of hazards and the analysis, assessment, and mitigation of safety risks.
    - Describe the system, procedure, and/or organization
    - Hazard identification
    - Analyze the risk
    - Assess the risk
    - Mitigate the risk

3. Establish Safety Performance Indicators to act as a benchmark for analysis of future improvements in safety culture.

Year One, Forth Quarter

1. Conduct internal audits of hazard assessments, risk analysis, and safety performance indicators.
    - Ensure planned remedial actions of a risk have been implemented
    - Monitor the effectiveness of the mitigation
    - Consider the future relevance of the mitigation
    - Establish an audit/assessment checklist with planned reviews

2. Create a high level Monthly Safety Report for the Department of Aviation.

Year 2, First Quarter

1. Conduct recurrent training of objectives and procedures.
2. Updated training materials to ensure employees know and comply with new safety requirements associated with their job and within the organization
    - Safety Risk Management Decisions
    - Human Factors
    - Team Building
    - Reaffirm understanding of SMS and its relevance to employees, to their positions and to the culture of the organization

Year Two, Second Quarter

1. Review performance indicators and the data to support them to ensure they are evolving into areas that more fully evaluate system effectiveness
    - Indicators that better identify areas of weakness so that efforts can be properly focused.
    - Indicators that are more Global in nature.
    - Indicators that have matured, becoming increasingly relevant to workforce selected issues.

2. Initiate a Employee Safety Survey to compare the results of the first survey accomplished in August of 2008. Measure any perceived safety culture changes and re-set targets as needed.
3. Synthesize the following leading indicators for analyzing Aviation safety program
    - The degree of commitment to health and safety
    - How highly both management and workers value a safe workplace
    - The level of awareness that workers and management have of job related risks

- Whether inspection and preventative maintenance programs are followed
- The level/quantity of training provided
- Total hours of training provided
- The degree of activity of Safety Committees

Year Two, Third Quarter

- Initiate a Department of Aviation Policy for a Non-punitive safety reporting system applicable to all Department of Aviation employees
- Identify the elements of the Volunteer Safety Reporting program
- Describe methods for filing safety reports;
  - Recipients of the report – who within the organization gets the report and what is done with the information
  - Time limits for reporting - reporting a hazardous situation as soon as possible but not to exceed 24 hours from the time the submitter becomes aware of a hazard
  - Under what circumstances the non-punitive reporting program would not apply – intentional acts, negligence, criminal behavior
  - Types of Reports - orally or in writing,
  - Safety Committee Review – perform SRM, implement corrective actions if applicable
  - Disseminate all factors to those who have a need to know.
  - Tracking progress of the corrective actions until the hazard has been eliminated to the fullest extent possible
  - Non qualifying reports that appear to involve criminal activity, substance abuse, intentional disregard for rules and regulations or falsification will be referred to the appropriate office for further handling.

11.0 APPENDICES

The following is a list of included Appendices;

Appendix 1 - Definitions

Appendix 2 - Human Factors

Appendix 3 - Performance Indicators

Appendix 4 - The 21 Elements of SMS

Appendix 5 - Safety Risk Management Document Report

Appendix 6 – SRMDR Supplemental hazard Analysis Worksheet

Appendix 7 - Forms

Appendix 1 - Definitions

Acceptable level of risk – risk determined by management that has been reduced to a level that can be accepted by the organization after considering all safety and legal obligations.

Accident – An unplanned event or series of events that results in death, injury or damage to, or loss of, equipment or property.

Apron (Ramp) – an area on an airport prepared for the purpose of providing aircraft with parking space for the embarkation and disembarkation of passengers, the loading or unloading of mail or cargo, aircraft servicing, or undergoing maintenance.

Audit – Objective assessments to evaluate conformity with policy, standards and contractual requirements. Internal audits are conducted within the department or organization and external audits can be conducted by regulatory offices or contractually through an outside vendor.

Best Practice – Method or procedure recognized by industry as being operationally effective in achieving stated objectives.

Cause – A reason, condition, task, or activity that brings about a hazardous act or state.

Comments – Notes, implementation or timeline requirements or other pertinent information.

Corrective Action – A change implemented to address a weakness identified in a system, normally a management system.

Current Risk – Level of risk attributed to the hazard. (High, Moderately High, Medium, Low)

Description – A word depiction of the real or perceived hazard.

Existing Control – System, process, procedure, or policy currently in place to counter the hazard.

Gap Analysis – Identification of existing safety components, compared to SMS program requirements. Gap analysis provides an operator an initial SMS development plan and roadmap for compliance.

Hazard – Any existing or potential condition that can lead to injury, illness or death to people; damage to or loss of a system, equipment or property; or damage to the environment. A hazard is a condition that is a prerequisite to an accident or incident.

Incident – An event that has the potential to lead to an accident.

Indicators, leading & trailing or lagging – leading indicators are predictors of future safety performance based on selected criteria. Trailing or lagging indicators are after-the-fact measures of safety performance.

Lessons Learned - Knowledge acquired from an innovation or an adverse experience that causes a worker or an organization to improve a process or activity to work safer, more efficiently or with higher quality.

Likelihood – The estimated probability or frequency, in quantitative or qualitative terms, of a hazard's effect. The frequency or regularity in which the hazard can occur, (frequent, probable, remote, improbable).

Oversight – A function that ensures the effective promulgation and implementation of safety standards, requirements, regulations and associated procedures.

Quality Assurance – planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for safety and quality.

Potential Effect – The effect(s) the hazard would have on the system state if not mitigated.

Records – Evidence of results achieved and activities performed. In this context, they are distinct from documentation as what is written is permanent and does not change over time.

Recommended Safety Mitigation – Additional procedures, actions, activities or processes imposed on the system state to lessen the likelihood and/or seriousness of the hazard.

Residual Risk – A re-measuring of the risk level once recommended safety mitigations are implemented.

Risk – the consequence of accepting a hazard.

Risk Assessment – process for evaluating the level of risk and comparing whether the analyzed risk level and the acceptable risk level is tolerable.

Safety – The condition to which environment, health, occupational and aviation risks are managed to acceptable levels.

Safety Assessment – A systematic and comprehensive evaluation of an implemented system to see if all safety requirements are met

Safety Assurance – SMS process management functions that systematically provide

confidence that organizational products/services meet or exceed safety requirements.

Safety Culture – The 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 preventive measures.

Safety Management System (SMS) – The formal, top-down business-like approach to managing safety risk. It includes systematic procedures, practices, and policies for the management of safety (including safety risk management, safety policy, safety assurance, and safety promotion).

Safety Objective – Safety goals or desired outcomes, which are measurable.

Safety Policy – Defines the fundamental approach to managing safety that is to be adopted within an organization. Safety policy further defines the organization's commitment to safety and overall safety vision.

Safety Promotion – A combination of safety culture, training, and data sharing activities that support the implementation and operation of an SMS in an organization

Safety Risk – The composite of predicted severity and likelihood of the occurrence defines the potential effect of a hazard.

Safety Risk Control – Any action that mitigates the safety risk of a hazard. Safety Risk Controls necessary to mitigate an unacceptable risk should be mandatory, written in requirements language, measurable, and monitored to ensure effectiveness.

Safety Risk Panel (SRP) – The SRP will consist of Aviation Department subject matter experts, either directly or indirectly involved with the change and as required, and representatives of airlines, concessionaires, or other ABIA tenants (external to Aviation Department employees) for their expertise and counsel, as appropriate. The involvement of these resources will help ensure that all aspects and consideration have been explored, debated, assessed, analyzed, and mitigated. A SRP will be sized for the specific safety issue presented and may consist of from 3 to 25 members. The SMS Coordinator will determine the level of participation required.

Safety Risk Management (SRM) – A formal process within the SMS composed of describing the system, identifying the hazards, assessing the risk, analyzing the risk, and controlling the risk. The SRM process is embedded in the operational system; is not a separate/distinct process.

Safety Risk Management Decision Report (SRMDR) – The SRMDR is the primary SMS report that will be completed for every assessment regardless of the complexity. This report must be retained for trend and data analysis. If subsequent or additional assessment is required for the same subject, then the subsequent SRMDR will be filed

with the previous report.

Self-Assessment Plan – A formal, management-approved document that describes an airport operator's self-assessment activities and how often they occur, provides a schedule for completing the assessments, and identifies the reports to be generated.

Serious Injury – an injury which is sustained by a person in an accident and which: (1) requires hospitalization; (2) results in a fracture of any bone; (3) involves lacerations which cause severe hemorrhage, nerve, muscle or tendon damage; (4) involves injury to any internal organ; (5) involves second or third degree burns on more than 5% of the body; (6) involves harmful exposure to radiation.

Severity – The consequence or impact of a hazard in terms of degree of loss or harm. The level or extent to which property damage, injury or loss of life is contributable to a hazard. (Catastrophic, Major, Minor, Minimal)

SMS Output – The result or product of an SMS process; in this context, it is the result of a process, which is intended to meet a requirement described in this Manual (e.g. results of safety risk analyses, safety audits, safety investigations, and trend analysis of safety performance indicators).

Supplemental Hazard Analysis Worksheet – This worksheet is utilized to assist teams assessing hazards by documenting their approach, assumptions, and findings. These worksheets should be kept with the Safety Risk Management Decision Report (SRMDR) as back-up material, if needed at a later date for such things as audits or investigations.

System(s) – An integrated set of elements that are combined in an operational or support environment to accomplish a defined objective. These elements include people, hardware, software, firmware, information, procedures, facilities, services and environment.

System State – The state of a system (or particular environment) and refers to that environment/system's condition at a particular moment in time or under certain conditions. The current configuration, policy, procedure, or process from within which the hazard exists.

Top Management – The person or group of people that directs and controls an organization. Sometimes it is also referred to as senior management

Tracking Number - A unique number assigned each hazard for the purpose of referencing the hazard during the analysis.

Trigger Mechanisms - Environmental component that causes or enhances the probability of a hazard to occur. Trigger mechanisms include (but are not limited to):

- **Personnel Quality issues**: aptitude, skill, experience, or training,
- **Manpower** issues: The number of people available to operate and maintain systems and procedures;

- **Weather conditions** (rain, snow, ice, wind, etc),
- **Fatigue**,
- **Distractions**,
- **Stress**,
- **Equipment** failures or use issues

Appendix 2 – Human Factors

Human Factors (HF) is the area of study that seeks to maximize the relationship between people and systems in order to improve performance, safety, and reliability. Systems include equipment, procedures, or organizations or teams. Purposely integrating HF into SMS creates a bedrock foundation for successful and continuous safety improvement. HF integration into SMS involves the overlap and interaction of three factors:

- People
- Equipment
- Organizations

PEOPLE: By taking advantage of what we know about how people process information and interact with each other we can better design the systems that we use in the workplace. Different aspects of human information processing include:

- Perception (seeing, hearing, etc)
- Attention and mental workloads (fatigue can play a crucial role)
- Memory (fatigue plays a role here too)
- Problem-solving and decision-making
- Communication:
    - Between individuals
    - Within and across groups
- Social interaction factors (sharing info or reluctance to share info)

For example, read the following sentence in Figure 5.1 and count the number of letter F's seen:

"FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS."

Figure 1, Perceptual Example No. 1

Many hundreds of people who read this sentence for the first time miss several of the "F's". The F's are all there, right in front of their eyes, but they just don't see them. For those who have seen this sentence before, it's harder to "trick" the brain, they usually spot all the F's right away. There are several theories as to why this happens which involve how the brain processes visual (and other sensory) information. The simple fact of the matter is that sometimes you just can't see what's right in front of you. (There are six F's in the above sentence.)

The implication for HF within SMS is to ensure that people within the organization always try to view operations and procedures from another vantage point. After the fact, it is quite easy to see that a dangerous procedure or situation was allowed to exist, but oftentimes, beforehand, it was not that noticeable. The saying goes something like this, "You can't see the forest, for the trees."

Sometimes perceptual processes cause us to "see" something that's not there. Figure 5.2 provides a simple example of a perceptual process. When looking at the graphic depicted in Figure 5.2 a defined, very bright white triangle may appear to float above the page. Is there really a white triangle floating above the page? Of course not, but….it does ***seem*** to be there.

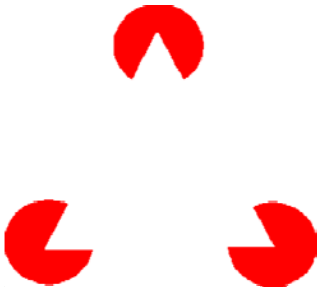

Figure 2, What Do You See?

As illustrated by these two perceptual examples….

"Sometimes we don't see what's there, and other times, we see something that isn't there!!!"

Personnel need to be on the lookout for the "F's we can't see" and the issues we think are perfectly fine, but just an illusion. HF concepts that deal with how people process both sensory, attention, and interpersonal communication information can be subtle and hard to pinpoint, however, awareness and vigilance is key in identifying these factors that can contribute to safety degradation.

Two other *People* issues in SMS must also be addressed. They include:

- Manpower: The number of people available to operate and maintain systems and procedures
- Personnel Quality: Aptitude, skill, experience, training, and other characteristics necessary to optimize safety and performance

These "People" issues have significant affects on the SMS. Skilled, high quality personnel, trained properly, in the right numbers, are key to high system safety.

Equipment: The design of equipment or procedures on how to use equipment, may also have significant impact system safety. An equipment system may be as simple as a radio or as complex as an Air Traffic Control Tower. Awareness of the HF issues involved in the equipment used by an organization, especially new equipment, is critical in identifying issues that may be degrading safety before these issues actually result in a safety incident.

For example, perhaps an older model vehicle used in operations has a history of popping out of gear when in "park". New vehicles cannot be purchased until the next fiscal year. It is known that as long as the emergency brake is employed, the vehicle is safely parked. Awareness of this safety issue can influence daily briefings, safety updates, training, and preventive maintenance inspections by users and mechanics. A general "awareness" across department "systems" helps guarantee, employees will be vigilant when parking this vehicle or maintaining it.

Organizations: Organizations are also systems. Different departments, divisions, offices, crews, and tenant organizations all work and interact together. Each develops and operates under many policies and procedures, some shared, and some individual for each particular group.

HF plays a role when procedures from one group are unknown or unclear to the others, and can have detrimental affects on overall safe operations. The more procedures and policy knowledge is shared and understood across and within groups, the greater the awareness and vigilance for procedural factors that might have serious safety implications.

In conclusion, SMS and Human Factors are inextricably linked. It is important to be vigilant in the detection of system "design" vulnerabilities, whether that system is a piece of equipment, a procedure, or crew or staff working together. Personnel must continuously monitor for system parameters at "critical mass", i.e. fatigue, physical requirements, stressors, numbers and quality of personnel or equipment, and organizational issues (values, norms, climate, etc.). All of these factors can degrade safety climates slowly, but surely, if they are not identified and action taken in a timely manner.

Employees at every level need to monitor and communicate safety issues and concerns. They must be on constant look out for: ***"The alignment of nature and circumstances that create pathways in which accidents may occur."***

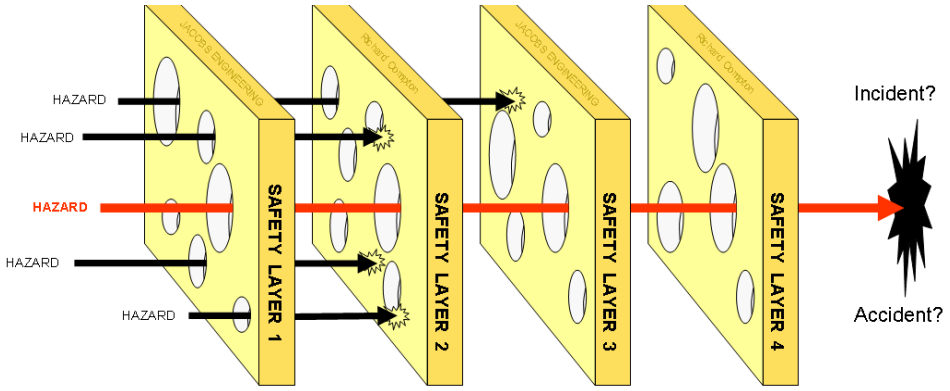

Figure 3, Swiss Cheese Multilayered Safety Model
Adapted from James Reason, the Reason Model

If one considers a working environment as a piece of Swiss cheese and the holes in the cheese line up, we allow circumstances to domino into a safety incident. The objective then is to keep the holes of the Swiss cheese out of order. It is important not to allow easy pathways to develop, where one factor after another is allowed to exist and set up the environment for a safety incident.

Appendix 3 – Performance Indicators

Table 6.1
Examples of Performance Indicators
SMS Program Manual for ABIA

No.	Performance Indicator	Specific Measures	How to Measure	Responsibility
1	**Management's Visible Participation in Safety**	• Employees' perceptions of the effectiveness of safety visits to work centers by senior managers from employee surveys • Employees' perceptions of management commitment to safety from employee surveys	Employee Surveys	SMS Coordinator SMS Coordinator
2	**Senior Manager Safety Visits**	• Number completed vs. number scheduled • Employees' perception of their effectiveness	Employee Surveys	SMS Coordinator SMS Coordinator
3	**Employees' Understanding of SMS**	• Percent of correct answers on random follow-up survey 30 days following training and periodically thereafter	Employee Surveys	SMS Coordinator
4	**Safety Committees**	• Effectiveness of safety committees (are they more than a coffee break) • Number completed vs. number scheduled	Employee Surveys Meeting record(s)(e.g. sign-in sheet, meeting agenda)	SMS Coordinator
5	**Voluntary Safety Hazard Reporting**	• Number of submissions • Number of issues acted upon/closed by initial suspense • Average time to close		SMS Coordinator SMS Coordinator SMS Coordinator
6	**Voluntary Lessons Learned Reporting**	• Number of submissions		SMS Coordinator
7	**Safety Audits**	• Number completed vs. number scheduled		SMS Coordinator

Table 6.1
Examples of Performance Indicators
SMS Program Manual for ABIA

No.	Performance Indicator	Specific Measures	How to Measure	Responsibility
8	**Safety Surveys**	• Number completed vs. number scheduled		SMS Coordinator
9	**Safety Survey/Audits Findings**	• Number closed by initial suspense • Average time to close		SMS Coordinator SMS Coordinator
10	**SMS Training**	Number and/or percentage of personnel trained • Percent of correct answers on Random follow-up survey 30 days following training		SMS Coordinator SMS Coordinator
11	**Ad Hoc Training (training resulting from SRM decision reports, etc.)**	• Percentage of required individuals trained within 30 days of establishing requirement. • Percent of correct answers on random follow-up survey 30 days following training		SMS Coordinator SMS Coordinator
12	**Weekly Employee Safety Meetings**	• Number conducted vs. number scheduled • Effectiveness of safety meetings from employee surveys (are they more than a coffee break)	Meeting record(s)(e.g. sign-in sheet, meeting agenda) Employee Surveys	Shift Supervisor SMS Coordinator

Table 6.1
Examples of Performance Indicators
SMS Program Manual for ABIA

No.	Performance Indicator	Specific Measures	How to Measure	Responsibility
13	**Corrective Actions**	• Number of Part 139 discrepancies open beyond 30 days. (It is no longer considered to be "routine" if a discrepancy is open beyond 30 days.)		SMS Coordinator
		• Percent of corrective actions that were closed on or before the target date.		SMS Coordinator
		• Number of corrective actions that are still open beyond original target date.		SMS Coordinator
		• Average number of days beyond original target date it took to close corrective actions.		SMS Coordinator
14	**Lessons Learned**	• Number of Lessons Learned provided compared to the number disseminated.		SMS Coordinator
		• Number of Lessons Learned implementing actions completed within original target date compared to total implemented actions.		SMS Coordinator
		• Number of repeat incidents in Lessons Learned compared to the total number of incidents.		SMS Coordinator
		• Number of repeat incidents in Lessons Learned compared to the total number of Lessons Learned distributed.		SMS Coordinator
		• Total number of Lessons Learned generated by management compared to the total generated.		SMS Coordinator

Source: Jacobs Carter Burgess Team, October 2008

Appendix 4 - The Twenty-One Elements of SMS

The 21 Elements of a Safety Management System (SMS) are as follows:

1. A written safety policy statement and description of how it is communicated to airport employees.

2. Identification and description of the airport safety goals.

3. A plan for employee SMS indoctrination and training. SMS indoctrination training should provide an outline of proposed curriculum and resources.

4. Documented process to identify training requirements for systems safety.

5. A plan to validate training effectiveness and the process to gain training feedback, including useable metrics.

6. A defined process to communicate safety policies and objectives throughout the organization. Include examples of how information will be communicated and any processes for follow-up.

7. A plan and description of employee non-punitive reporting systems, existing and planned.

8. An organizational chart identifying the names and safety responsibilities of all key personnel, such as the following:

    - Top Management

    - Safety Manager

    - Managers and Supervisors

    - Established Safety Committees and Chairpersons

9. Description of the safety risk management process, including application of "The Five Phases of SRM (safety risk management)," as discussed in AC 150/5200-37, *Introduction to Safety Management Systems for Airport Operators.*

10. Guidance on the use of SRM and trend analysis.

11. Defined process for documenting the results of SRM Decision Reports (SRMDR), including a description of how documents will be stored, i.e., electronic or paper.

12. Description of how top management will follow up on SRMDR to ensure safety mitigation strategies are appropriate.

13. A description of the airport quality management and/or risk management program (if applicable) and its integration into the airport SMS.

14. Description of a plan to integrate apron safety management into the airport SMS. (The FAA's review of the plan will be limited to measures for preventing accidents or incidents involving aircraft.) The plan could include the following:

    - A description of current apron safety management practices, such as reporting requirements to the National Transportation Safety Board (NTSB), Flight Standards, or the Occupational Safety Health Administration (OSHA).

    - An explanation of how current apron safety management practices meet the intent of SMS. This could include the safety plans and practices of tenants and operators at the airport, which should complement the airport SMS.

15. A detailed method to document self-auditing processes and their findings. Self-auditing may be part of the airport self-inspection process. If it is, explain how the self-inspection process addresses systems safety, i.e. if the self-inspection program identifies a hazard on the airport it should determine the risk and document the process for follow-up.

16. A detailed method to document self-inspection reviews, analysis, and findings.

17. A description or plan to integrate the tailored SMS program plan into the overall operation of the airport.

18. Documented plan for training and education, safety communication, competency, and continuous improvement processes.

19. Procedures to promote safety awareness and participation in non-punitive reporting systems.

20. Process to document and review lessons learned from within the organization.

21. Schedule for implementation and anticipated associated costs.

Appendix 5 – Safety Risk Management Decision Report (SRMDR)

1. **Report Date: 9/11/2008**
2. **Current System, Procedure, or Activity:**
3. **Proposed Change:**
4. **Project, Re-configuration, Operation, Equipment, Task or Activity:**
5. **Hazard Identification (real or perceived):**
6. **Risk Analysis:**
7. **Trigger mechanisms:**
8. **Existing controls:**
9. **Human Factors:**
10. **Risk Assessment:**
    a. **Severity:**
    b. **Likelihood:**
11. **Mitigation and/or Treatment of Risks:**
12. **Communications and Training Requirements:**
13. **Monitoring and Tracking Responsibility:**
14. **Safety Risk Management Decision Report Approval**

ABIA SMS Coordinator	Approval Date
Is Director Level Approval Required?	**Yes / No**
ABIA Director of Operations	Approval Date
ABIA Director of Maintenance	Approval Date

Appendix 6 - SRMDR Supplemental Hazard Analysis Worksheet

(To be completed for each identified hazard)

Date:

Hazard Tracking Number: Hazard Element Number:

Hazard Description:

Cause of Hazard:

System State:

Possible Effect:

Human Factors:

Existing Controls or Requirements:

Severity:

Severity Rational:

Likelihood:

Likelihood Rational:

Current/Initial Risk:

Recommended Mitigation:

Predicted Residual Risk:

Preliminary Hazard Analysis Worksheet Definitions

Tracking Number - A unique number assigned each hazard for the purpose of referencing the hazard during the analysis.

Description – A word depiction of the real or perceived hazard.

Cause – A reason, condition, task, or activity that brings about a hazardous act or state.

System State – The current configuration, policy, procedure, or process from within which the hazard exists.

Potential Effect – The effect(s) the hazard would have on the system state if not mitigated

Severity – The level or extent to which property damage, injury or loss of life is contributable to a hazard. (Catastrophic, Major, Minor, Minimal)

Existing Control – System, process, procedure, or policy currently in place to counter the hazard.

Likelihood – The frequency or regularity in which the hazard can occur. (Frequent, Probable, Remote, Improbable)

Current Risk – Level of risk attributed to the hazard. (High, Moderately High, Medium, Low)

Recommended Safety Mitigation – Additional procedures, actions, activities or processes imposed on the system state to lessen the likelihood and/or seriousness of the hazard.

Residual Risk – A re-measuring of the risk level once recommended safety mitigations are implemented.

Comments – Notes, implementation or timeline requirements or other pertinent information.

Preliminary Hazard Analysis Worksheet

ID	Description	Cause

Appendix 7 - Forms

The following Forms are included in this SMS Manual;

- SAFETY RISK MANAGEMENT SMS COORDINATOR DOCUMENTATION
- SAFETY REPORTING FORM
- LESSON LEARNED REPORTING FORM

SAFETY RISK MANAGEMENT SMS COORDINATOR DOCUMENTATION

Date Report Received: _____/_____/_____

Description of System – Procedure – Equipment – Personnel_____
_____

Hazard/Risk identified as reported_____
_____

Hazard/Risk Assessed/Analyzed_____
_____

Level of Risk Assessed as:_____

Additional Risks associated with hazard? – Y/N___ List as separate documents

By Manager(s) / Titles: _____, _____,

Change(s) Required? – Y/N ____ If No, Manager Approval_____

Change(s)/Action(s) Options_____

Mitigation Decision and Implementation Plan_____
_____
_____

Manager Approval _____Title/Management Level_____

Start Date Est._____ Completion Date Est._____

Entered in SRM Database?_____

Communications - Y/N - SMS Coordinator Responsibility

FAA_____ COA_____ ABIA Divisions _____ Stakeholders_____

ATO_____ Staff_____ Event Reporter_____ Employees_____

SAFETY REPORTING FORM

This form should be used to report any hazard or safety concern that has caused or could cause an accident or incident. Send to the ABIA SMS Coordinator as soon as possible after the hazard has been recognized, identified, and/or observed. Obviously, if the hazard is an emergency or severe safety concern, contact Operations and/or Director of Operations and Maintenance office immediately and/or ABIA emergency numbers – Include List - 911

EVENT DESCRIPTION

(To be completed by person reporting the event)

DATE:___/____/____ TIME: _____AM/PM

LOCATION:_____

_____

DESCRIPTION: _____

_____

_____

_____

_____

WEATHER CONDITIONS:_____

(SMS Coordinator: Tear here and discard securely before processing)

Your Name_____ **Division or Work**_____

Group _____

Contact number _____ **E-mail address**_____

Confidentiality Statement

Providing your name can help the ABIA Safety process by allowing yourself to be contacted for additional details regarding the safety concern. Your name will be known ONLY to the SMS Coordinator under the policy agreed to by the ABIA Executive Director and will NOT be released without your permission. You may also submit this reporting form anonymously by filling out the top section of the form with only the details of the event.

LESSON LEARNED REPORTING FORM
(Sample)

A Lesson Learned is knowledge acquired from an innovation or an adverse experience that causes a worker or an organization to improve a process or activity to work safer, more efficiently or with higher quality.

This form should be used by anyone desiring to report an innovation or adverse experience that others can learn from or to comment on a previously published Lesson Learned.

LESSON LEARNED DESCRIPTION
(To be completed by person reporting the event)

DATE:___/____/____ **TIME OF EVENT: _____AM/PM**

LOCATION:_____

WHAT HAPPENED or INNOVATION:_____
_____
_____

WHAT WENT RIGHT or ADVANTAGES:_____
_____
_____

WHAT WAS LEARNED:

_____
_____

RECOMMENDATION or COMMENTS:_____
_____
(use back of form if more space is needed)

……

(SMS Coordinator: Tear here and discard securely before processing)

Your Name_____ **Division or Work** _____

Group _____

Phone number _____ **E-mail address** _____

Confidentiality Statement
Providing your name can help by allowing you to be contacted for additional details regarding the Lesson Learned. Your name will be known ONLY to the SMS Coordinator under the policy agreed to by the ABIA Executive Director and will NOT be released without your permission. You may also submit this reporting form anonymously by filling out the top section only.

12.0 LIST OF FIGURES