



# **SAFETY MANAGEMENT SYSTEM (SMS) FRAMEWORK**

**For:**

**Safety Management System (SMS) Pilot Project  
Participants and Voluntary Implementation of  
Organization SMS Programs**

**Federal Aviation Administration  
Flight Standards Service - SMS Program Office**

**Revision 2**

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## AVIATION SERVICE PROVIDER SAFETY MANAGEMENT SYSTEM (SMS) FRAMEWORK

### 1. Introduction and Background

A key objective of the Office of the Associate Administrator for Aviation Safety (AVS) and the Flight Standards Service (AFS) is to produce expectations, guidance, and tools that allow many types of aviation organizations to develop and implement safety management systems (SMSs) throughout their organizations. Since many organizations must interact with more than one regulator, AVS and AFS want to minimize the need for more than one management system.

AFS originally developed and published a set of SMS process requirements in Appendix 1 to Advisory Circular (AC) 120-92. That early SMS framework was considered essential for an aviation organization to develop and implement an effective, comprehensive SMS. As AVS and AFS work closely with U.S. aviation organizations, foreign authorities and businesses that have FAA-issued certificates, and other authorizations, AFS has revised and reorganized this SMS Framework to address four important needs:

1. To provide industry aviation organizations with one standard set of concepts, documents, and tools for the voluntary (i.e., the absence of a SMS rule) development and implementation of safety management systems (SMSs);
2. To make SMS implementation standards agree with AVS policy in FAA Order VS 8000.367, appendix B;
3. To make Flight Standards (AFS) documents and tools align with the structure and format of the *International Civil Aviation Organization (ICAO)* SMS frameworks; and
4. To make new documents and tools that are internally mapped in a manner that is easier to use than the first generation of tools.

Also, AFS has restructured the SMS Framework to align with FAA Order VS 8000.367 and the ICAO Framework:

1. The expectations in this document are not different from the original, except for minor changes in the titles and text, which were needed to align with the requirements in FAA Order VS 8000.367.
2. The expectations have been restructured to align more with the ICAO Framework. Because of this, some text has been moved from where it was originally found.

To make this document clearer, we have defined *components*, *elements*, and *processes* in terms of *functional expectations*, or how they would need to be used in order to contribute to a robust SMS. We further define these *functional expectations* in terms of *performance objectives* – what

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the process needs to *do* – and *design expectations* – what needs to be developed – to better align with current system safety and Air Transportation Oversight System (ATOS) models.

## 2. Purpose of This Framework

To provide one standard framework (basic conceptual structure) for aviation organizations to voluntarily (while an SMS rule is being considered) develop and implement an SMS.

## 3. Scope and Applicability

### 3.1 Scope

1. This Framework provides guidance for SMS development by aviation organizations (for example, airlines, air taxi operators, corporate flight departments, and pilot schools).
2. This Framework is not mandatory; it is not a *regulation*. Aviation organizations develop and implement SMS's *voluntarily*. While the Federal Aviation Administration (FAA) encourages each aviation organization to develop and implement an SMS, these systems *are not* substitutes for regulatory compliance of other certificate requirements, where applicable.

### 3.2 Applicability

This Framework applies to both certificated and non-certificated aviation organizations that want to develop and implement an SMS. An SMS is not currently required for U.S. certificate holders. However, the FAA views the objectives and expectations in this Framework as a minimum for an aviation organization to develop and implement an efficient and functional SMS.

1. This Framework describes the objectives and expectations for an aviation organization's Safety Management System (SMS) in the air transportation system.
2. This Framework is intended to address operational and support processes and activities that are related to *aviation safety*, not occupational safety, environmental protection, or customer service quality.
3. Aviation organizations are responsible for the safety of services or products they purchase or contract from other organizations.
4. This document establishes the minimum objectives and expectations for a robust SMS; organizations may establish additional requirements or stricter requirements, for their own organizations.

## 4. References

This Framework, as revised, is in accordance with the following documents:

- Annex 6 to the Convention on International Civil Aviation, *Operation of Aircraft*
- International Civil Aviation Organization (ICAO) Document 9859, *ICAO Safety Management Manual (SMM)*
- ICAO Document 9734, *Safety Oversight Manual*

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- FAA Order 8000.369, *Safety Management System Guidance*
- FAA Order VS 8000.367, *Aviation Safety (AVS) Safety Management System Requirements*

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## 5. Definitions

### 5.1 Terms and Acronyms

**Accident** – an unplanned event or series of events that results in death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.

**Analysis** – the process of identifying a question or issue to be addressed, modeling the issue, investigating model results, interpreting the results, and possibly making a recommendation. Analysis typically involves using scientific or mathematical methods for evaluation.

**Assessment** – the process of measuring or judging the value or level of something.

**Attributes** – System Attributes, or the inherent characteristics of a system, are present in any well defined organization and apply to an effective SMS. While the six system attributes were first applied with Air Transportation Oversight System (ATOS) fielding, there are conceptual differences when applied to SMS, as discussed below:

- **Responsibility and Authority:**
- **Responsibility:** who is accountable for management and overall quality of the process (planning, organizing, directing, controlling) and its ultimate accomplishment.
- **Authority:** who can direct, control, or change the process, as well as who can make key decisions such as risk acceptance. This attribute also includes the concept of empowerment.
- **Procedures** – ISO-9001-2000 defines “procedure” as “a specified way to carry out an activity or a process” – procedures translate the “what” in goals and objectives into “how” in practical activities (things people do). Procedures are simply documented activities to accomplish processes, e.g. a way to perform a process. The organization should specify their own procedures for accomplishing processes in the context of their unique operational environment, organizational structure, and management objectives.
- **Controls** – controls are elements of the system, including hardware, software, special procedures or procedural steps, and supervisory practices designed to keep processes on track to achieve their intended results. Organizational process controls are typically defined in terms of special procedures, supervisory and management practices, and processes. Many controls are inherent features of the SMS Framework. Practices such as continuous monitoring, internal audits, internal evaluations, and management reviews (all parts of the safety assurance component) are identified as controls within the design expectations. Additionally, other practices such as documentation, process reviews, and data tracking are identified as controls within specific elements and processes.

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- **Process Measures** – are ways to provide feedback to responsible parties that required actions are taking place, required outputs are being produced, and expected outcomes are being achieved. A basic principle of safety assurance is that fundamental processes be measured so that management decisions can be data-driven. The general expectations for Component 1, Policy, specify that SMS outputs be measured and analyzed. These measurements and analyses are accomplished in Component 3, Safety Assurance. Outputs of each process should, therefore, be identified during Component 3 activities. For example, these outputs should be the subjects of continuous monitoring, internal audits, and internal evaluation.
- **Interfaces** - this aspect includes examining such things as lines of authority between departments, lines of communication between employees, consistency of procedures, and clearly delineating lines of responsibility between organizations, work units, and employees. Interfaces are the “Inputs” and “Outputs” of a process.
- **Interfaces in Safety Risk Management and Safety Assurance** - Safety Risk Management (SRM) and Safety Assurance (SA) are the key processes of the SMS. They are also highly interactive, especially in the input-output relationships between the activities in the processes. This is especially important where interfaces between processes involve interactions between different departments, contractors, etc. Assessments of these relationships should pay special attention to flow of authority, responsibility and communication, as well as procedures and documentation.

**Audit** – scheduled, formal reviews and verifications that evaluate whether an organization has complied with policy, standards, and/or contract requirements. An audit starts with the management and operations of the organization and then moves to the organization's activities and products/services.

- **Internal audit** – an audit conducted by, or on behalf of, the organization being audited, e.g., the flight training department audits the flight training department.
- **External audit** – an audit conducted by an entity outside of the organization being audited, e.g., the flight operations division audits the flight training department.

**Aviation system** – the functional operation or production system used by an organization to produce an aviation product or service (see *System* and *Functional* below).

**Complete** – nothing has been omitted and what is stated is essential and appropriate to the level of detail.

**Conformity** – fulfilling or complying with a requirement [ref. ISO 9001-2000]; this includes but is not limited to complying with Federal regulations. It also includes complying with company requirements, requirements of operator developed risk controls, or operator policies and procedures.

**Continuous monitoring** – uninterrupted (constant) watchfulness (checks, audits, etc) over a system.

**Corrective action** – action to eliminate (remove) or mitigate (lessen) the cause or reduce the effects of a detected nonconformity or other undesirable (unwanted) situation.

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**Correct** – accurate without ambiguity or error in its attributes.

**Documentation** – information or meaningful data and its supporting medium (e.g., paper, electronic, etc.). In this context, *documentation* is different from *records* because *documentation* is the written description of policies, processes, procedures, objectives, requirements, authorities, responsibilities, or work instructions; where as *Records* are the evidence of results achieved or activities performed.

**Evaluation** – an independent review of company policies, procedures, and systems [ref. AC 120-59A]. If accomplished by the company itself, the evaluation should be done by a person or organization in the company other than the one performing the function being evaluated. The evaluation process builds on the concepts of auditing and inspection. An evaluation is an anticipatory process designed to identify and correct potential problems before they happen. An evaluation is synonymous with the term “systems audit.”

**Functional** - The term “function” refers to “what” is expected to be incorporated into each process (e.g., human tasks, software, hardware, procedures, etc.) rather than “how” the function is accomplished by the system. This makes for a more performance-based system and allows for a broad range of techniques to be used to accomplish the performance objectives. This, in turn, maximizes scalability while preserving standardization of results across the aviation organization communities.

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

**Incident** – a near-miss episode with minor consequences that could have resulted in greater loss. An unplanned event that could have resulted in an accident or did result in minor damage. An incident indicates that a hazard or hazardous condition exists, though it may not identify what that hazard or hazardous condition is.

**Lessons learned** – knowledge or understanding gained by experience, which may be positive, such as a successful test or mission, or negative, such as a mishap or failure. Lessons learned should be developed from information obtained from inside and outside of the organization and/or industry.

**Likelihood** – the estimated probability or frequency, in quantitative or qualitative terms, of an occurrence related to the hazard.

**Line management** – the management structure that operates (controls, supervises, etc) the operational activities and processes of the aviation system.

**Nonconformity** – non-fulfillment of a requirement (ref. ISO 9001-2000). This could include but is not limited to, noncompliance with Federal regulations, company requirements, requirements of operator-developed risk controls or operator-specified policies and procedures.

**Objective** – the desired state or performance target of a process. Usually it is the final state of a process and contains the results and outputs used to obtain the desired state or performance target.

**Operational life cycle** – period of time from implementation of a product/service until it is no longer in use.

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**Organization** – indicates both certificated and non-certificated aviation organizations, aviation service providers, air carriers, airlines, maintenance repair organizations, air taxi operators, corporate flight departments, repair stations, and pilot schools.

**Outputs** – the product or end result of a SMS process, which is able to be recorded, monitored, measured, and analyzed. Outputs are the minimum expectation for the product of each process area and the input for the next process area in succession. Each of the outputs of a process should have a method of measurement specified by the organization. Measures need not be quantitative where this is not practical; however, some method of providing objective evidence of the attainment of the expected output is necessary. A table of SMS Process Outputs is at Figure 1, at the end of this definitions section.

**Oversight** – a function performed by a regulator (such as the FAA) that ensures that an aviation organization complies with and uses safety-related standards, requirements, regulations, and associated procedures. Safety oversight also ensures that the acceptable level of safety risk is not exceeded in the air transportation system.

**Preventive action** – preemptive action to eliminate or mitigate the potential cause or reduce the future effects of an identified or anticipated nonconformity or other undesirable situation.

**Procedure** – a specified way to carry out an activity or a process.

**Process** – a set of interrelated or interacting activities that transform inputs into outputs.

**Process Measures** – refer to definition for Process Measures under the *Attributes* definition, above.

**Product/service** – anything that is offered or can be purchased that might satisfy a want or need in the air transportation system.

**Records** – evidence of results achieved or activities performed.

**Residual safety risk** – the safety risk that exists after all controls have been implemented or exhausted and verified. Only verified controls can be used for assessing residual safety risk.

**Risk** – the composite of predicted severity (how bad) and likelihood (how probable) of the potential effect of a hazard in its worst credible (reasonable or believable) system state. The terms *risk* and *safety risk* are interchangeable.

**Risk Control** – steps taken to eliminate (remove) hazards or to mitigate (lessen) their effects by reducing the severity and/or likelihood of risk associated with those hazards.

**Safety Assurance** – a formal management process within the SMS that systematically provides confidence that an organization's products/services meet or exceed safety requirements. A Safety Assurance flow diagram (Figure 2, found in section 5.4) includes the Framework element/process numbers and other notes to help the reader visualize the Framework in terms of a process flow (with interfaces), and understand the component/element/process expectations.

**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

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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 (as described in this document it includes safety risk management, safety policy, safety assurance, and safety promotion).

- **Product/service provider Safety Management System (SMS-P)** – the SMS owned and operated by a product/service provider.
- **Oversight Safety Management System (SMS-O)** – the SMS owned and operated by an oversight entity.

**Safety objective**<sup>1</sup> – a goal or desirable outcome related to safety. Generally based on the organization’s safety policy, and specified for relevant functions and levels in the organization. Safety objectives are typically measurable.

**Safety planning**<sup>2</sup> – part of safety management focused on setting safety objectives and specifying needed operational processes and related resources to fulfill these objectives.

**Safety risk** – the composite of predicted severity (how bad) and likelihood (how probable) of the potential effect of a hazard in its worst credible (reasonable or believable) system state. The terms *safety risk* and *risk* are interchangeable.

**Safety risk control** – a characteristic of a system that reduces or mitigates (lessens) the potential undesirable effects of a hazard. Controls may include process design, equipment modification, work procedures, training or protective devices. Safety risk controls must be written in requirements language, measurable, and monitored to ensure effectiveness.

**Safety Risk Management (SRM)** – a formal process within the SMS that describes the system, identifies the hazards, assesses the risk, analyzes the risk, and controls the risk. The SRM process is embedded in the processes used to provide the product/service; it is not a separate/distinct process. A process flow diagram of Safety Risk Management is presented in Figure 1, found in section 5.3.

**Safety promotion** – a combination of safety culture, training, and data sharing activities that support the implementation and operation of an SMS in an organization.

**Separate Aviation Maintenance Organizations** – are independent maintenance organizations such as, but not limited to, certificated repair stations, non-certificated repair facilities and separate maintenance organizations. This does not include an air operator’s maintenance organization and is not intended to duplicate 1.0 B) 1) a) 3) of an air operator’s organization.

**Severity** – the degree of loss or harm resulting from a hazard.

**Substitute risk** – a risk unintentionally created as a consequence of safety risk control(s).

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<sup>1</sup> Adapted from definition 3.2.5 in ISO 9000-2000 for “quality objectives.”

<sup>2</sup> Adapted from definition 3.2.9 in ISO 9000-2000 for “quality planning.”

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**System** – an integrated set of constituent 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 other support facets.

**System Attributes** – refer to definition for *Attributes*, above.

**Top Management** - the person or group of people who direct and control an organization [ref. ISO 9000-2000 definition 3.2.7]. In many large organizations, this can be the CEO or the board of directors; in smaller organizations, this might be the owner of the company.

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## 5.2 Process Outputs

A functioning SMS is comprised of four *components*, twelve *elements* and seventeen *processes*. Each *element* and *process* in an SMS – like “hazard identification” – generates an *output*, or result. This output could be a document (a *plan*, for example) or it could be an activity, a finding or a conclusion (*evidence* or *collected data*, for example).

The table below lists outputs for each SMS process, as identified in this SMS Framework.

**Table 1. SMS Process Outputs**

Process	Reference	Output Expectation
<b>Component 1.0 – Safety Policy and Objectives</b>		
<i>There are no formal processes in the first component, Safety Policy and Objectives.</i>		
<b>Component 2.0 - Safety Risk Management</b>		
2.1.1 System Description / Task Analysis	2.1.1(B)(1)	System descriptions for the following situations:
	2.0(B)(2)(a)	<ul style="list-style-type: none"> <li>Initial designs of systems, organizational procedures, and products</li> </ul>
	2.0(B)(2)(b)	<ul style="list-style-type: none"> <li>Development of operational procedures</li> </ul>
	2.0(B)(2)(d)	<ul style="list-style-type: none"> <li>Planned Changes</li> </ul>
2.1.2 Hazard Identification	2.1.2(B)(1)b	Hazards documented
	2.1.2(B)(2)(a)	Hazards tracked
2.2.1 Risk Analysis	2.2.1(B)(1)(c)	Assignment of severity and likelihood for each hazard (as documented in 2.1.2)
2.2.2 Risk Assessment	2.2.2(B)(1)	Assessment of acceptability of each hazard (as documented in 2.1.2)
2.2.3 Risk Control	2.2.3(B)(1)	Risk control/mitigation plans for each hazard with an unacceptable risk (as assessed in 2.2.2)
<b>Component 3.0 - Safety Assurance</b>		
3.1.1 Continuous Monitoring	3.1.1	Objective evidence of monitoring activities in accordance with company policy
3.1.2 Internal Audit	3.1.2(B)(5)(b)(1)	Plans
	3.1.2(B)(5)(b)(3) & (4)	Reports/records
3.1.3 Internal Evaluation	3.1.3(B)(3)(d)(2)(a)	Plans
	3.1.3(B)(3)(d)(2) (c) & (d)	Reports/records
3.1.4 External Evaluation	3.1.4	Objective evidence of external audit findings (e.g., IOSA, IS-BAO, ACSF, CASE, FAA)
3.1.5 Investigations	3.1.5(B)(1)(a), (b) & (c)	Data collected (e.g., records, reports) for investigations of:

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Process	Reference	Output Expectation
		<ul style="list-style-type: none"> <li>• Incidents</li> </ul>
		<ul style="list-style-type: none"> <li>• Accidents</li> </ul>
		<ul style="list-style-type: none"> <li>• Regulatory violations (e.g. VDRP records)</li> </ul>
3.1.6 Employee Reporting System (ERS)	3.1.6(B)(1)	Evidence of system (e.g., report file, log, database)
	3.1.6(B)(3)	Evidence of monitoring of ERS data for hazards
	3.1.6(B)(4)	Evidence of analysis of ERS data
3.1.7 Analysis of Data	3.1.7(B)	Objective evidence of analysis processes for each data type
	3.1.7(B)(1)	
3.1.8 System Assessment	3.1.8(B)(4)	Records of system assessments
3.1.9 Preventive/Corrective Action	3.1.9(B)(1)	Corrective action plans
	3.1.9(B)(5)	Records of disposition and status of corrective actions
3.1.10 Management Review	3.1.10(B)(1)	Objective evidence of management reviews (e.g., minutes, log)
<b>Component 4.0 - Safety Promotion</b>		
4.1.1 Competency Requirements	4.1.1(B)(1)	Documented competency requirements in accordance with 1.2 (B)(3) & 1.3(B)(1)
4.1.2 Training	4.1.2(B)(1)	Plans/requirements
	4.1.2(B)(3)	Records
	4.1.2(B)(4)	Reviews

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## 5.3 Safety Risk Management Process Flow

The **Safety Risk Management** flow diagram (Figure 1, below) includes the Framework element/process numbers and other notes to help the reader visualize the Framework in terms of a process flow (with interfaces, i.e., inputs and outputs), and understand the component/element/process expectations.

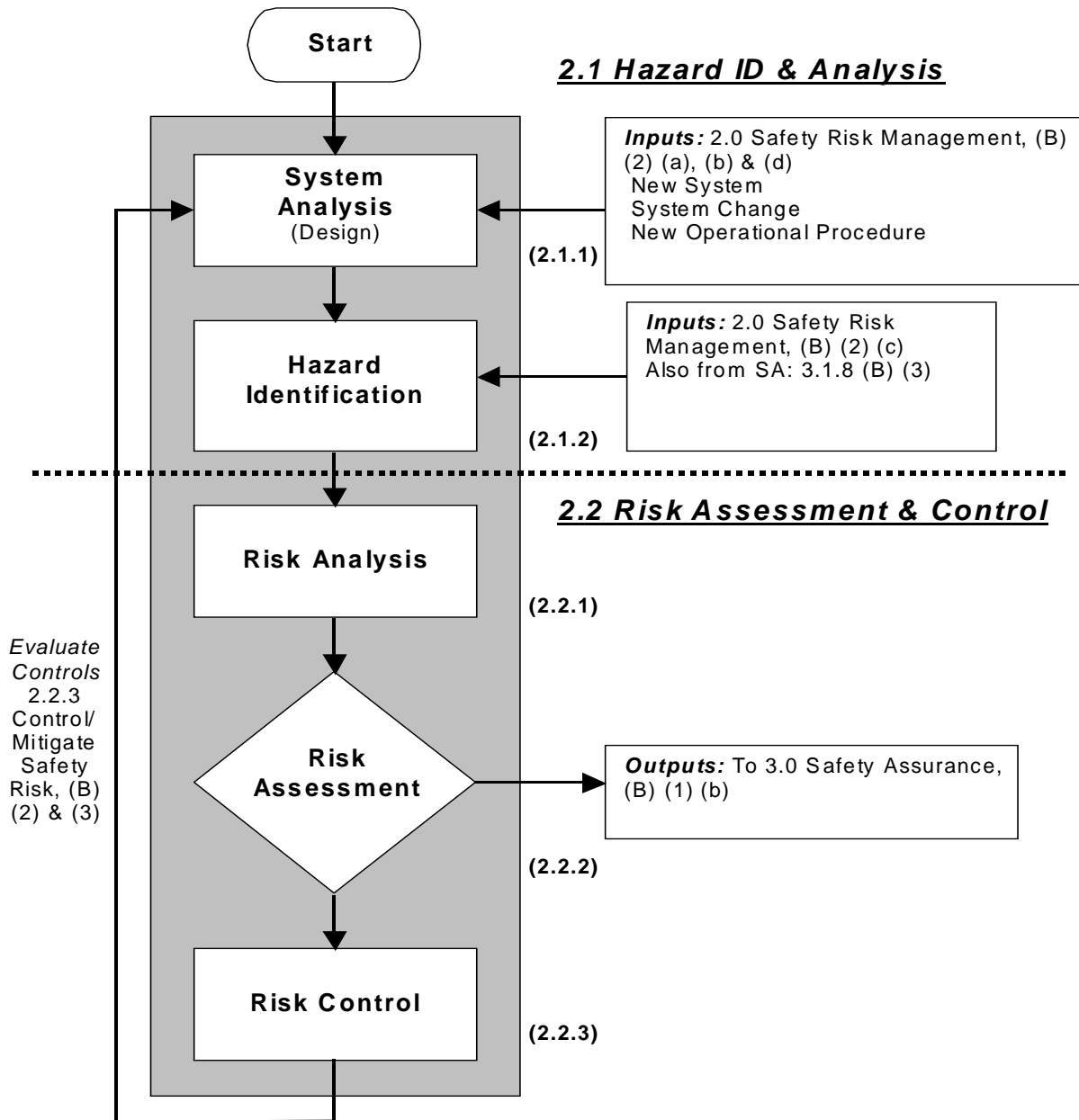


Figure 1. Safety Risk Management Process Flow Diagram

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## 5.4 Safety Assurance Process Flow

The Safety Assurance flow diagram (Figure 2, below) includes the Framework element/process numbers and other notes to help the reader visualize the Framework in terms of a process flow (with interfaces, i.e., inputs and outputs), and understand the component/element/process expectations.

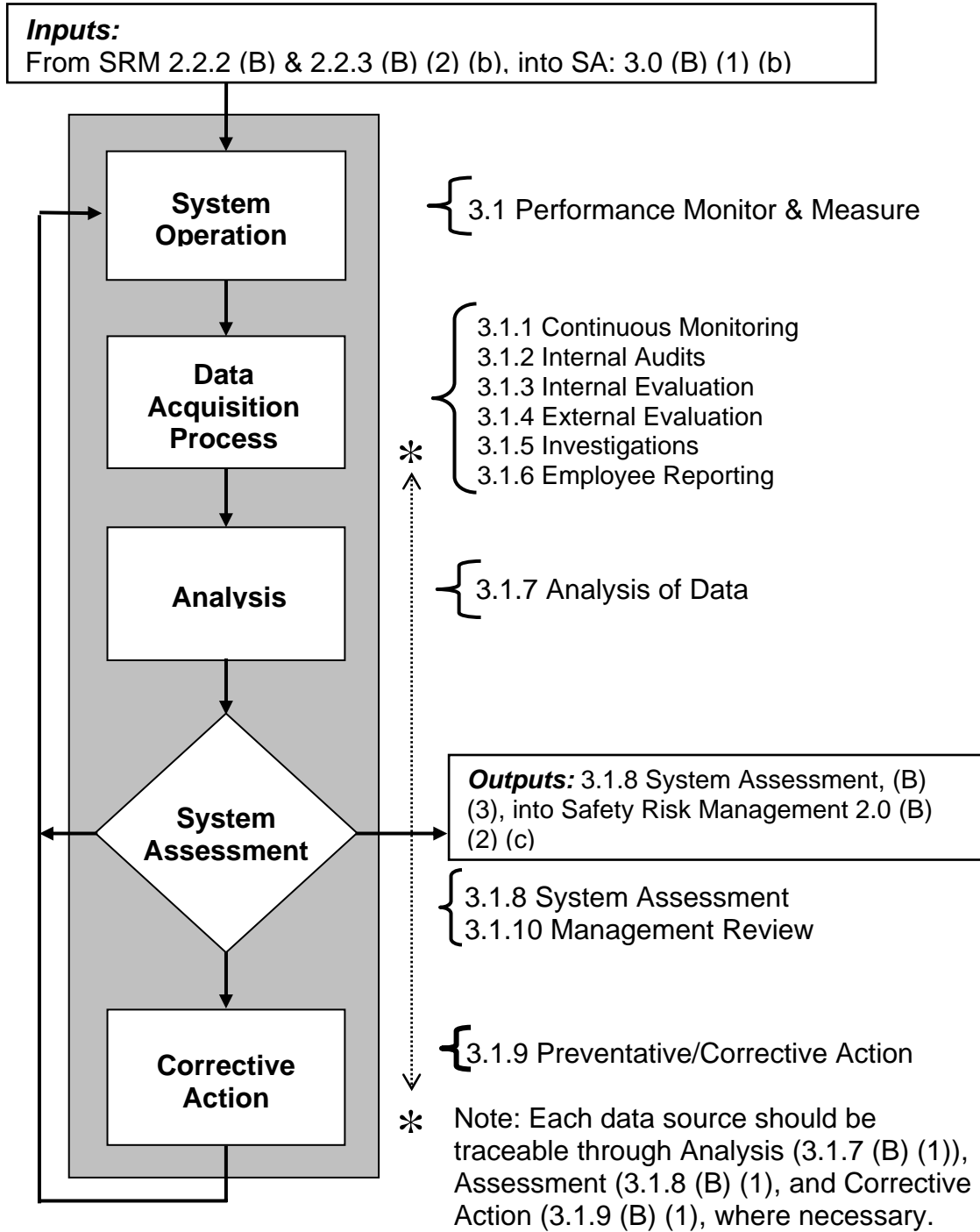


Figure 2. Safety Assurance Flow Diagram

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## 6. Functional Expectations

### 6.1 SMS Framework Structure

The SMS Framework is broken down into components, elements and processes. The components and elements are based on the ICAO SMS Framework. Elements in the Safety Risk Management and Safety Assurance and Safety Promotion components are further broken down into processes.

### 6.2 SMS Framework Expectations

This section describes expected characteristics of a robust SMS. They are called “functional” expectations because they describe the “what”, not the “how” of each process. For example, the “what” of a de-icing process is to prevent any aircraft from taking off with ice adhering to any critical control surface. The “how” of the de-icing process would include de-icing equipment procedures, flight crew de-icing procedures, hold-over table activities, etc., and may be different between individual organizations. Organizations are expected to meet SMS Framework expectations by developing processes to fit their unique business and management models.

SMS Framework expectations are further defined in terms of performance objectives and design expectations:

- **Performance Objectives** are the desired outcomes of the particular element or process under evaluation.
- **Design Expectations** are the characteristics of the element or process that, if properly implemented, should provide the outcomes identified in the performance objectives.

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## **Component 1.0 Safety Policy and Objectives**

### **A) Performance Objectives:** The organization will:

Develop and implement an integrated, comprehensive SMS for its entire organization and will incorporate a procedure to identify and maintain compliance with current safety-related legal, regulatory, and statutory requirements.

### **B) General Design Expectations:**

1) Safety management will be included in the complete scope and life cycle of the organization's systems including:

a) For air operators:

- (1) Flight operations,
- (2) Operational control (dispatch/flight following),
- (3) Maintenance and inspection,
- (4) Cabin safety,
- (5) Ground handling and servicing,
- (6) Cargo handling, and
- (7) Training.

b) For separate aviation maintenance organizations:

- (1) Parts/materials,
- (2) Resource management (tools and equipment, personnel, and facilities),
- (3) Technical data,
- (4) Maintenance and inspection,
- (5) Quality control,
- (6) Records management,
- (7) Contract maintenance, and
- (8) Training.

2) SMS processes will be:

- a) Documented,
- b) Monitored,
- c) Measured, and
- d) Analyzed.

3) SMS outputs will be:

- a) Recorded,

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- b) Monitored,
  - c) Measured, and
  - d) Analyzed.
- 4) It is expected that:
- a) The organization will promote the growth of a positive safety culture (described under Component 4, B);
  - b) If the organization has a quality policy, top management will ensure that the quality policy is consistent with the SMS;
  - c) The SMS will include a means to comply with FAA policy, legal, regulatory and statutory requirements applicable to the SMS;
  - d) The organization will establish and maintain a procedure to identify current FAA policy, legal, regulatory and statutory requirements applicable to the SMS;
  - e) The organization will establish and maintain procedures with measurable criteria to accomplish the objectives of the safety policy<sup>3</sup>;
  - f) The organization will establish and maintain supervisory and operational controls to ensure procedures are followed for safety-related operations and activities; and
  - g) The organization will establish and maintain a safety management plan to describe how it will achieve its safety objectives.

### ***Element 1.1 Safety Policy***

**A) Performance Objective:** Top management will define the organization's safety policy and convey its expectations and objectives to its employees.

**B) Design Expectations:**

- 1) Top management will define the organization's safety policy.
- 2) The safety policy will:
  - a) Include a commitment to implement an SMS;
  - b) Include a commitment to continual improvement in the level of safety;
  - c) Include a commitment to the management of safety risk;
  - d) Include a commitment to comply with applicable regulatory requirements;
  - e) Include a commitment to encourage employees to report safety issues without reprisal (as per Process 3.1.6);
  - f) Establish clear standards for acceptable behavior;

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<sup>3</sup> Measures are not expected for each procedural step. However, measures and criteria should be of sufficient depth and level of detail to ascertain and track accomplishment of objectives. Criteria and measures can be expressed in either quantitative or qualitative terms.

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- g) Provide management guidance for setting safety objectives;
- h) Provide management guidance for reviewing safety objectives;
- i) Be documented;
- j) Be communicated with visible management endorsement to all employees and responsible parties;
- k) Be reviewed periodically to ensure it remains relevant and appropriate to the organization; and
- l) Identify responsibility and accountability of management and employees with respect to safety performance.

### ***Element 1.2 Management Commitment and Safety Accountabilities***

**A) Performance Objective:** The organization will define, document, and communicate the safety roles, responsibilities, and authorities throughout its organization.

**B) Design Expectations:**

- 1) Top management will have the ultimate responsibility for the SMS.
- 2) Top management will provide resources essential to implement and maintain the SMS.
- 3) Aviation safety-related positions, responsibilities, and authorities will be:
  - a) Defined,
  - b) Documented, and
  - c) Communicated throughout the organization.
- 4) The organization will define levels of management that can make safety risk acceptance decisions.

### ***Element 1.3 Key Safety Personnel***

**A) Performance Objective:** The organization will appoint a management representative to manage, monitor and coordinate the SMS processes.

**B) Design Expectations:**

- 1) Top management will appoint a member of management who, irrespective of other responsibilities, will have responsibilities and authority that includes:
  - a) Ensuring that processes needed for the SMS are established, implemented and maintained;
  - b) Report to top management on the performance of the SMS and the need for improvement; and

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- c) Ensure the promotion of awareness of safety expectations throughout the organization.

### ***Element 1.4 Emergency Preparedness and Response***

- A) Performance Objective:** The organization will develop and implement procedures that it will follow in the event of an accident or incident to mitigate the effects of these events.
- B) Design Expectations:** The organization will establish procedures to:
  - 1) Identify hazards that have potential for accidents and incidents,
  - 2) Coordinate and plan the organization's response to accidents and incidents, and
  - 3) Execute periodic exercises of the organization's response.

### ***Element 1.5 SMS Documentation and Records***

- A) Performance Objectives:** The organization will have documented safety policies; objectives, procedures, a document/record management process and a safety management plan that meet organizational safety expectations and objectives.
- B) Design Expectations:**
  - 1) The organization will establish and maintain information, in paper or electronic form, to describe:
    - a) Safety policies;
    - b) Safety objectives;
    - c) SMS expectations;
    - d) Safety procedures and processes;
    - e) Responsibilities and authorities for safety-related procedures and processes;
    - f) Interactions/interfaces between the safety-related procedures and processes; and
    - g) SMS outputs.
  - 2) The organization will maintain their safety management plan in accordance with the objectives and expectations contained within this element (1.5).
  - 3) Documentation Management
    - a) Documentation will be:
      - (1) Legible,
      - (2) Dated (with dates of revisions),
      - (3) Readily identifiable,
      - (4) Maintained in an orderly manner, and
      - (5) Retained for a specified period of time as determined by the organization.

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- b) The organization will establish and maintain procedures for controlling all documents required by this Framework to ensure that:
  - (1) They can be located; and
  - (2) They are periodically:
    - (a) Reviewed,
    - (b) Revised as needed, and
    - (c) Approved for adequacy by authorized personnel.
  - c) The current versions of relevant documents are available at all locations where essential SMS operations are performed; and
  - d) Obsolete documents are promptly removed from all points of use or otherwise assured against unintended use.
- 4) Records Management
  - a) The organization will establish and maintain procedures to:
    - (1) Identify,
    - (2) Maintain, and
    - (3) Dispose of  
Their SMS records.
  - b) SMS records will be:
    - (1) Legible,
    - (2) Identifiable and
    - (3) Traceable to the activity involved.
  - c) SMS records will be maintained in such a way that they are:
    - (1) Readily retrievable; and
    - (2) Protected against:
      - (a) Damage,
      - (b) Deterioration, or
      - (c) Loss.
  - d) Records retention times will be documented.

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### **Component 2.0 Safety Risk Management (SRM)**

**A) Performance Objective:** The organization will develop processes to understand the critical characteristics of its systems and operational environment and apply this knowledge to identify hazards, analyze and assess risk and design risk controls.

**B) General Design Expectations:**

- 1) Safety Risk Management (SRM) will, at a minimum, include the following processes:
  - a) System and task analysis,
  - b) Hazard identification,
  - c) Safety risk analysis,
  - d) Safety risk assessment, and
  - e) Safety risk control and mitigation.
- 2) The SRM process will be applied to:
  - a) Initial designs of systems, organizations, and/or products;
  - b) The development of operational procedures;
  - c) Hazards that are identified in the safety assurance functions (described in Component 3.0, B); and
  - d) Planned changes to operational processes.
- 3) The organization will establish feedback loops between assurance functions described in Process 3.1.1, B to evaluate the effectiveness of safety risk controls.
- 4) The organization will define a risk acceptance process that:
  - a) Defines acceptable and unacceptable levels of safety risk.
  - b) Describes:
    - (1) Severity levels, and
    - (2) Likelihood levels.
  - c) Defines specific levels of management that can make safety risk acceptance decisions.
  - d) Defines acceptable risk for hazards that will exist in the short-term while safety risk control/mitigation plans are developed and executed.

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## ***Element 2.1 Hazard Identification and Analysis***

### ***Process 2.1.1 System Description and Task Analysis***

**A) Performance Objective:** The organization will analyze its systems, operations, and operational environment to gain an understanding of critical design and performance factors, processes, and activities to identify hazards.

**B) Design Expectations:**

- 1) System descriptions and task analysis will be developed to the level of detail necessary to:
  - a) Identify hazards,
  - b) Develop operational procedures, and
  - c) Develop and implement risk controls.

### ***Process 2.1.2 Identify Hazards***

**A) Performance Objective:** The organization will identify and document the hazards in its operations that are likely to cause death, serious physical harm, or damage to equipment or property in sufficient detail to determine associated level of risk and risk acceptability.

**B) Design Expectations:**

- 1) Hazards will be:
  - a) Identified for the entire scope of the system, as defined in the system description<sup>4</sup>; and
  - b) Documented.
- 2) Hazard information will be:
  - a) Tracked, and
  - b) Managed through the entire SRM process.

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<sup>4</sup> While it is recognized that identification of every conceivable hazard is impractical, organizations are expected to exercise due diligence in identifying and controlling significant and reasonably foreseeable hazards related to their operations.

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## ***Element 2.2 Risk Assessment and Control***

### ***Process 2.2.1 Analyze Safety Risk***

**A) Performance Objective:** The organization will determine and analyze the severity and likelihood of potential events associated with identified hazards, and will identify factors associated with unacceptable levels of severity or likelihood.

**B) Design Expectations:**

- 1) The safety risk analysis process will include:
  - a) Existing safety risk controls,
  - b) Triggering mechanisms, and
  - c) Safety risk of reasonably likely outcomes from the existence of a hazard, to include estimation of the<sup>5</sup>:
    - (1) Likelihood, and
    - (2) Severity.

### ***Process 2.2.2 Assess Safety Risk***

**A) Performance Objective:** The organization will assess risk associated with each identified hazard and define risk acceptance procedures and levels of management that can make safety risk acceptance decisions.

**B) Design Expectations:** Each hazard will be assessed for its safety risk acceptability using the safety risk acceptance process described in Component 2.0 B) 4).

### ***Process 2.2.3 Control/Mitigate Safety Risk***

**A) Performance Objective:** The organization will design and implement a risk control for each identified hazard for which there is an unacceptable risk, to reduce to acceptable levels the potential for death, serious physical harm, or damage to equipment or property. The residual or substitute risk will be analyzed before implementing any risk control.

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<sup>5</sup> Risk likelihood and severity may be expressed in quantitative or qualitative terms.

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### **B) Design Expectations:**

- 1) Safety control/mitigation plans will be defined for each hazard with unacceptable risk.
- 2) Safety risk controls will be:
  - a) Clearly described,
  - b) Evaluated to ensure that the expectations have been met,
  - c) Ready to be used in their intended operational environment, and
  - d) Documented.
- 3) Substitute risk will be evaluated when creating safety risk controls/mitigations.

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## **Component 3.0 Safety Assurance**

**A) Performance Objective:** The organization will monitor, measure, and evaluate the performance and effectiveness of risk controls.

**B) General Design Expectations:**

- 1) The organization will monitor their systems and operations to:
  - a) Identify new hazards,
  - b) Measure the effectiveness of safety risk controls,
  - c) Ensure compliance with regulatory requirements applicable to the SMS, and
  - d) Ensure the safety assurance function is based upon a comprehensive system description as described in Section 2.1.1.
- 2) The organization will collect the data necessary to demonstrate the effectiveness of it's:
  - a) Operational processes, and
  - b) SMS.

## ***Element 3.1 Safety Performance Monitoring and Measurement***

### ***Process 3.1.1 Continuous Monitoring***

**A) Performance Objective:** The organization will monitor operational data, including products and services received from contractors, to identify hazards, measure the effectiveness of safety risk controls, and assess system performance.

**B) Design Expectations:**

- 1) The organization will monitor operational data (e.g., duty logs, crew reports, work cards, process sheets, and reports from the employee safety feedback system specified in Process 3.1.6) to:
  - a) Determine conformity to safety risk controls (described in Process 2.2.3);
  - b) Measure the effectiveness of safety risk controls (described in Process 2.2.3);
  - c) Assess SMS system performance; and
  - d) Identify hazards.
- 2) The organization will monitor products and services received from subcontractors.

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### ***Process 3.1.2 Internal Audits by Operational Departments***

**A) Performance Objective:** The organization will perform regularly scheduled internal audits of its operational processes, including those performed by contractors, to determine the performance and effectiveness of risk controls.

**B) Design Expectations:**

- 1) Line management of operational departments will conduct regular internal audits of safety-related functions of the organization's operational processes (production system). These audits will include any subcontractors who perform those functions. (Note: The internal audit is a primary means of output measurement under Component 1.0, B, 3) c) and 4) e)).
- 2) Line management will ensure that regular audits are conducted to:
  - a) Determine conformity with safety risk controls, and
  - b) Assess performance of safety risk controls.
- 3) Planning of the audits program will take into account:
  - a) Safety criticality of the processes to be audited, and
  - b) The results of previous audits.
- 4) The organization will define:
  - a) Audits, including:
    - (1) Criteria,
    - (2) Scope,
    - (3) Frequency, and
    - (4) Methods;
  - b) How they will select the auditors; and
  - c) The requirement that auditors will not audit their own work.
- 5) The organization will document audit procedures, to include:
  - a) The responsibilities and
  - b) Expectations for:
    - (1) Planning audits,
    - (2) Conducting audits,
    - (3) Reporting results,
    - (4) Maintaining records, and
    - (5) Auditing contractors and vendors.

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## ***Process 3.1.3 Internal Evaluation***

**A) Performance Objective:** The organization will conduct internal evaluations of the SMS and operational processes at planned intervals, to determine that the SMS conforms to its objectives and expectations.

**B) Design Expectations:**

- 1) The organization will conduct internal evaluations of the operational processes and the SMS at planned intervals to determine that the SMS conforms to objectives and expectations (Note: Sampling of SMS output measurement is a primary control under Component 1.0, B, 3) c) and 4) e)).
- 2) Planning of the evaluation program will take into account:
  - a) Safety criticality of the processes being evaluated, and
  - b) The results of previous evaluations.
- 3) The organization will define:
  - a) Evaluations, including:
    - (1) Criteria,
    - (2) Scope,
    - (3) Frequency, and
    - (4) Methods;
  - b) The processes used to select the evaluators; and
  - c) Documented procedures, which include:
    - (1) The responsibilities and
    - (2) Requirements for:
      - (a) Planning evaluations,
      - (b) Conducting evaluations,
      - (c) Reporting results,
      - (d) Maintaining records, and
      - (e) Evaluating contractors and vendors.
- 4) The program will include an evaluation of the programs described in Component 1.0, B), 1).
- 5) The person or organization performing evaluations of operational processes must be independent of the process being evaluated.

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### ***Process 3.1.4 External Auditing of the SMS***

**A) Performance Objective:** The organization will include the results of assessments performed by oversight organizations in its analysis of data.

**B) Design Expectations:** The organization will include the results of oversight organization assessments in the analyses conducted as described in Process 3.1.7.

### ***Process 3.1.5 Investigation***

**A) Performance Objective:** The organization will establish procedures to collect data and investigate incidents, accidents, and instances of potential regulatory non-compliance to identify potential new hazards or risk control failures.

**B) Design Expectations:**

- 1) The organization will collect data on:
  - a) Incidents,
  - b) Accidents, and
  - c) Potential regulatory non-compliance.
- 2) The organization will establish procedures to:
  - a) Investigate accidents,
  - b) Investigate incidents, and
  - c) Investigate instances of potential regulatory non-compliance.

### ***Process 3.1.6 Employee Reporting and Feedback System***

**A) Performance Objective:** The organization will establish and maintain a confidential employee safety reporting and feedback system. Data obtained from this system will be monitored to identify emerging hazards and to assess performance of risk controls in the operational systems.

**B) Design Expectations:**

- 1) The organization will establish and maintain a confidential employee safety reporting and feedback system as in Component 4.0 B) 1) e).
- 2) Employees will be encouraged to use the safety reporting and feedback system without fear of reprisal and to submit solutions/safety improvements where possible.
- 3) Data from the safety reporting and feedback system will be monitored to identify emerging hazards.

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- 4) Data collected in the safety reporting and feedback system will be included in analyses described in Process 3.1.7.

### ***Process 3.1.7 Analysis of Data***

**A) Performance Objective:** The organization will analyze the data described in Processes 3.1.1 through 3.1.6 to assess the performance and effectiveness of risk controls in the organization's operational processes and the SMS, and to identify root causes of deficiencies and potential new hazards.

**B) Design Expectations:**

- 1) The organization will analyze the data described in Processes 3.1.1 through 3.1.6 to demonstrate the effectiveness of:
  - a) Risk controls in the organization's operational processes and
  - b) The SMS.
- 2) Through data analysis, the organization will evaluate where improvements can be made to the organization's:
  - a) Operational processes and
  - b) SMS.

### ***Process 3.1.8 System Assessment***

**A) Performance Objective:** The organization will perform an assessment of the performance and effectiveness of risk controls, conformance to SMS expectations as stated herein, and the objectives of the safety policy.

**B) Design Expectations:**

- 1) The organization will assess the performance of:
  - a) Safety-related functions of operational processes against their objectives and expectations, and
  - b) The SMS against its objective and expectations.
- 2) System assessments will document results that indicate a finding of:
  - a) Conformity with existing safety risk control(s)/SMS expectations(s) (including regulatory requirements applicable to the SMS);
  - b) Nonconformity with existing safety risk control(s)/SMS expectations(s) (including regulatory requirements applicable to the SMS); and
  - c) New hazard(s) found.
- 3) The SRM process will be utilized if the assessment indicates:
  - a) The identification of new or potential hazards or

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- b) The need for system changes.
- 4) The organization will maintain records of assessments in accordance with the expectations of Element 1.5.

### ***Process 3.1.9 Preventive/Corrective Action***

**A) Performance Objective:** The organization will take corrective and preventive action to eliminate the causes of nonconformance identified during analysis, to prevent recurrence.

**B) Design Expectations:**

- 1) The organization will develop:
  - a) Corrective actions for identified nonconformities with risk controls, and
  - b) Preventive actions for identified potential nonconformities with risk controls.
- 2) Safety lessons learned will be considered in the development of:
  - a) Corrective actions and
  - b) Preventive actions.
- 3) The organization will take necessary corrective and preventive action based on the findings of investigations.
- 4) The organization will prioritize and implement corrective and preventative action(s) in a timely manner.
- 5) Records will be kept and maintained of the disposition and status of corrective and preventive actions.

### ***Process 3.1.10 Management Review***

**A) Performance Objective:** Top management will conduct regular reviews of the SMS, including outputs of safety risk management, safety assurance, and lessons learned. Management reviews will include assessing the performance and effectiveness of an organization's operational processes and the need for improvements.

**B) Design Expectations:**

- 1) Top management will conduct regular reviews of the SMS, including:
  - a) The outputs of safety risk management (Component 2.0),
  - b) The outputs of safety assurance (Component 3.0), and
  - c) Lessons learned (Element 3.3, B, 2).

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- 2) Management reviews will include assessing the need for improvements to the organization's:
  - a) Operational processes and
  - b) SMS.

### ***Element 3.2 Management of Change***

**A) Performance Objective:** The organization's management will identify and determine acceptable safety risk for changes within the organization that may affect established processes and services by new system design, changes to existing system designs, new operations/procedures or modified operations/procedures.

**B) Design Expectations:**

- 1) The following will not be implemented until the safety risk of each identified hazard is determined to be acceptable in:
  - a) New system designs,
  - b) Changes to existing system designs,
  - c) New operations/procedures, and
  - d) Modified operations/procedures.
- 2) The SRM process may allow an organization to take interim immediate action to mitigate existing safety risk.

### ***Element 3.3 Continual Improvement***

**A) Performance Objective:** The organization will promote continual improvement of its SMS through recurring application of Safety Risk Management (Component 2.0), Safety Assurance (Component 3.0), and by using safety lessons learned and communicating them to all personnel.

**B) Design Expectations:**

- 1) The organization will continuously improve SMS and safety risk control effectiveness through the use of the safety and quality policies, objectives, audit and evaluation results, analysis of data, corrective and preventive actions, and management reviews.
- 2) The organization will develop safety lessons learned.
  - a) Lessons learned information will be used to promote continuous improvement of safety.
  - b) The organization will communicate information on safety lessons learned to all personnel.

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## **Component 4.0 Safety Promotion**

**A) Performance Objective:** Top Management will promote the growth of a positive safety culture and communicate it throughout the organization.

**B) General Design Expectations:**

- 1) Top management will promote the growth of a positive safety culture by:
  - a) Publication of senior management’s stated commitment to safety to all employees;
  - b) Visibly demonstrating their commitment to the SMS;
  - c) Communicating the safety responsibilities for the organization’s personnel;
  - d) Clearly and regularly communicating safety policy, goals, objectives, standards, and performance to all organizational employees;
  - e) Creating an effective employee reporting and feedback system that provides confidentiality, as needed;
  - f) Using a safety information system that provides an accessible, efficient means to retrieve safety information; and
  - g) Making essential resources available to implement and maintain the SMS.

## ***Element 4.1 Competencies and Training***

### ***Process 4.1.1 Personnel Expectations (Competence)***

**A) Performance Objective:** The organization will document competency requirements for those positions identified in Element 1.2 B) 3) and 1.3 and ensure those requirements are met.

**B) Design Expectations:**

- 1) The organization will determine and document competency requirements for those positions identified in Element 1.2 B) 3) and 1.3.
- 2) The organization will ensure that those individuals in the positions identified in Element 1.2 B) 3) and 1.3, meet the Process 4.1.1 B) 1) competency requirements.

### ***Process 4.1.2 Training***

**A) Performance Objective:** The organization will develop, document, deliver and regularly evaluate training necessary to meet competency requirements of 4.1.1 B) 1).

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### **B) Design Expectations:**

- 1) Training needed to meet competency requirements of 4.1.1 B) 1) will be developed for those individuals in the positions identified in Element 1.2 B) 3) and 1.3.
- 2) Training development will consider scope, content, and frequency of training required to maintain competency for those individuals in the positions identified in Element 1.2 B) 3) and 1.3.
- 3) Employees will receive training commensurate with their:
  - a) Position level within the organization, and
  - b) Impact on the safety of the organization's products or services.
- 4) To ensure training currency, it will be periodically:
  - a) Reviewed and
  - b) Updated.

### ***Element 4.2 Communication and Awareness***

**A) Performance Objective:** Top Management will communicate the outputs of its SMS to its employees, and will provide its oversight organization access to SMS outputs in accordance with established agreements and disclosure programs.

### **B) Design Expectations:**

- 1) The organization will communicate outputs of the SMS to its employees.
- 2) The organization will provide its oversight organization access to the outputs of the SMS.
- 3) The organization's SMS will be able to inter-operate with other organization's SMSs to cooperatively manage issues of mutual concern.