

The following information expands upon SAFO 10009.

Safety Alerts for Operators (SAFO) are posted at:

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/

Safety Management Systems (SMS)

To help ensure that air carriers maintain the highest degree of safety and meet the needs of challenging operational environments, the FAA recommends that carriers use SMS principles as they build their training programs and systems. Training programs are an essential element of integrating people into system operations. Training is therefore an integral part of a carrier's overall "system" and must be considered a part of safety management.

SMS consist of four components; policy, safety risk management (SRM), safety assurance (SA), and safety promotion (SP). The *policy* component sets up the management framework, *safety risk management* and *safety assurance* are the two highly interactive functional processes, and *safety promotion* both shapes the organization's culture and supports the operation of both safety management and operational functions.

Policy. The policy component establishes management's commitment to safety, acceptance of top level accountability and establishment of the accountabilities, responsibilities, and authority of other members of the organization, plans for safety management, and setting objectives. This is where a SMS differs from a traditional "safety program." An SMS is a manager's tool that provides a framework for management's decision making rather than a separate program. As such, top and line management decision makers must be personally and directly involved in managing safety in their organizations.

Safety Risk Management (SRM). SRM considers all aspects of the system to include, people, hardware (equipment and facilities), software (or "knowledgeware" – this may be electronic, print, or visual), and other factoring aspects of the operating environment.

SRM consists of five steps:

- Describe and analyze the systems and tasks
- Identify hazards
- Analyze the hazards to identify potential events and their consequences
- Assess the risk for acceptability
- Develop and implement risk controls

This last step in SRM (develop and implement risk controls) will likely result in changes of or additions to your organization's processes and procedures.

Safety Assurance (SA). SA is the collection of processes used to ensure that the processes an organization has designed and implemented continue to meet their design standards and safety objectives.

SA also consists of five steps:

- Monitoring operations

- Data acquisition (collection – e.g. audits, evaluations, employee reports, investigations)
- System performance analysis
- System performance assessment
- Preventive/corrective action

Safety Promotion (SP).

The SP component of an SMS has two major elements:

- Competencies and Training.
- Communication

Each organization must determine the critical job tasks in their operations (this is part of the SRM processes) and what competencies are needed to attain and maintain the knowledge, skills, and abilities needed to meet those competency requirements. They also need to communicate the elements of their policies, safety objectives, information on risk controls developed in the SRM process, and findings of safety the safety assurance process.

Instructional Systems Design

Sophisticated training programs such as the Advanced Qualification Program (AQP) use formal Instructional Systems Design (ISD) principles to develop, implement, and validate their training programs. Likewise, SRM discussed above may be applied to the ISD process to integrate risk management concepts into the training programs. Once designed, the SA process would be used to ensure that the quality of the training program is maintained and continues to meet the organization's needs in line operations.

These processes are particularly important for managing change, such as growth of operations, acquisition of new aircraft makes and models, operating in new environments, changes in demographics of new hires, changes in procedures, or corporate reorganization.

Ensuring that an employee's training is proper for their capabilities, the characteristics of the organization's equipment, and the way that the organization is run is crucial to safety.

A commonly used ISD process, the "ADDIE" model, also has five steps:

- **Analyze**: Use the safety critical job tasks, competencies and the target audience characteristics (education, certification, language, etc) to determine the training that will be necessary.
- **Design**: Consider training tasks, qualification standards, courseware, etc.
- **Develop**: Consider the Training Medium, Lessons, Exercises, Activities, Tests, Evaluations, etc.
- **Implement**: This is the Safety Assurance (SA) component of the SMS. It should monitor the effectiveness of the training program, through things like training delivery (performance assessments), records, testing, qualification demonstrations, etc
- **Evaluate**: This is also a Safety Assurance (SA) component of the SMS. It should assess the effectiveness of the training program, through things like Student

evaluations & critiques, instructor critiques, On-the-Job-Training (OJT), performance observations of trained personnel, etc.

The Training System

The training system is developed by matching ISD principles with the principles of SRM and SA, the two active components of safety management.

ISD Component	Related Safety Management Activities
Analyze	System/Task Design (SRM) <ul style="list-style-type: none"> • Identify characteristics of equipment and operational environment (SRM) • Identify and document needed employee competencies (SRM, SP) • Describe target audience characteristics (SP - e.g. existing knowledge, skill, experience level, language capability)
Design	Design training tasks <ul style="list-style-type: none"> • Match tasks to critical equipment, environment, and personnel characteristics (SRM – this may entail interaction or research with aircraft OEMs and/or experienced training agencies) • Develop qualification standards (SP – required level of competency)
Develop	Develop Courseware and Training Profiles (be sure to match training and evaluation events with criticality of tasks (SRM) and required competency levels (SP) as well as with expected existing employee knowledge, training, and experience levels.
Implement	Monitor the implementation of the program (SA). <ul style="list-style-type: none"> • Make sure that the program that’s being practiced is the one that was designed
Evaluate	Evaluate SA: <ul style="list-style-type: none"> • Trainee performance • Trainee acceptance of training events • Trainee on the job performance

Both ISD and safety management are continuous, closed loop processes. Organizations should use the tools of SA (e.g. audits, employee reports, data sharing with OEMs, other operators, and training agencies) to continuously evaluate and improve the training program. Use the SA and SRM processes, as well as the SA process to continuously improve the training program and assure that it continues to be relevant and contributes to control of identified hazards. Neither ISD nor safety management are ever “done” as aviation is a dynamic industry and healthy organizations should always strive for growth in the maturity of their safety management processes, as well as their businesses.

Advisory Circular 120-92, *Introduction to Safety Management Systems for Air Operators*, issued June 22, 2006, provides guidance for developing SMSs in the air carrier environment.