

## Station #4: Safety Risk Management

Managing safety is about controlling the risk from hazards, which means trying to prevent bad things from happening, or if something does go wrong, trying to minimize the consequences of the hazard event. Every SYSTEM has hazards and some level of risk associated with it. What do we do about it?

The SMS component “Safety Risk Management” (SRM) plays a key part within an SMS through proactive methods. Robust risk management is a strong indicator of safer operations.

### Key Definitions:

- **Hazard** - a condition or an object that could foreseeably cause or contribute to an incident or aircraft accident, as defined in 49 CFR 830.2.
- **Consequence** – the effect or result of a particular action or situation, often one that is bad or not convenient.
- **Risk** – the predicted likelihood (probability) AND severity of the consequences or outcomes of a hazard.
- **Mitigation or Control** – a means to reduce or eliminate the effects of hazards (also a barrier).
- **Threats** – events or errors that occur beyond the influence of the personnel, increase operational complexity, and which must be managed to maintain the margins of safety.
- **Error** – an action or inaction by personnel that leads to deviations from organizational or the operational person’s intentions or expectations.
- **Violation** – a deliberate act of willful misconduct or omission resulting in a deviation from established regulations, procedures, norms or practices.

### Integral elements to SRM:

- Understand the environment/system in which you operate or perform a task.
- Know the processes/procedures you use to complete the operation or task. “What do you do to get it done?” (a step-by-step flowchart can be useful for this)
- Identify the hazards that may or have been encountered during the operation or task.
- Understand the potential impact/consequence of an identified hazard through a process of analysis and assessment.
- Determine risk acceptability of the hazard occurring.
- If the risk is deemed unacceptable, implement appropriate mitigations/controls to eliminate the risk or reduce it to an acceptable level.

There are certain conditions in which the SRM process is required to be applied:

[14 CFR Part 5 §5.51 – Applicability]

- Implementation of new systems.
- Revision of existing systems.
- Development of operational procedures.
- Identification of hazards or ineffective risk controls through the safety assurance processes.

In conducting the system analysis, the following information must be considered:

- (1) Function and purpose of the system.
- (2) The system's operating environment.

- (3) An outline of the system's processes and procedures.
- (4) The personnel, equipment, and facilities necessary for operation of the system.
- (5) The interfaces of the system.

When a hazard has been identified, an organization must analyze and assess the risk associated with it by looking at the severity and likelihood. The purpose is to facilitate the determination of a risk level and assign a value to it, thereby providing the organization a better understanding of the hazard's potential impact and acceptability. A risk matrix is an effective tool that provides aviation organizations with a way to integrate the effect of severity of the outcome and the probability of occurrence. Aviation organizations are then able to assess risks, compare potential effectiveness of proposed risk controls, and prioritize risks where multiple risks are present. This enables you to assess risks using quantitative or qualitative estimates.

Risk Probability	Risk Severity				
	Catastrophic (A)	Hazardous (B)	Major (C)	Minor (D)	Negligible (E)
Frequent (5)	5A	5B	5C	5D	5E
Occasional (4)	4A	4B	4C	4D	4E
Remote (3)	3A	3B	3C	3D	3E
Improbable (2)	2A	2B	2C	2D	2E
Extremely Improbable (1)	1A	1B	1C	1D	1E

Figure 3: Example Risk Matrix

Our strategic objective is to manage the safety risks to a level As Low As Reasonably Practicable (ALARP) or Acceptable Level of Safety (ALoS)

- A point at which a risk is reduced so low that further risk reduction measures are not required.
- Any further risk reduction is either impractical or is grossly outweighed by the costs.
- Simply a balancing of risk reduction feasibility and the cost of achieving it.

**Risk mitigation/control methods are often grouped into the following categories:**

- Elimination
- Substitution
- Engineering Controls
- Administrative Controls
- Personal Protective Equipment

**Risk mitigation/control considerations:**

- Residual Safety Risks – The degree of safety risk that remains after the implementation of the initial mitigation and which may necessitate additional risk control measures.
- Unintended Consequences (Substitute Risk) – The introduction of new or different risks associated with the implementation of any mitigation alternative.
  - Unexpected drawback – unexpected detriments that occur in addition to the desired effect of the solution.
  - Perverse results – the intended solution makes the problem worse.
  - Unexpected benefits – a positive, yet unexpected or unpredictable outcome from an action.