

A Data-Driven Approach to Safety:

SMS Databases

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The aviation law enforcement community and members of the aviation industry in general continue to talk about safety management systems (SMS) and their implementation. A number of aviation organizations now have safety management systems in place, but they vary considerably in terms of employee acceptance, effectiveness and ease of use. This is due in part to the fact that guidance is still forthcoming and each organization's SMS is typically developed from within based on the existing safety climate, culture and accident prevention programs that have evolved over time. Sadly, many organizations that have "implemented" SMS find themselves with little more than another manual sitting on the shelf.

Most people are in agreement that SMS is a "data-driven approach to safety." In essence, this means we collect and analyze data, identify hazards and latent conditions, assess risk and implement risk controls in order to prevent accidents. Some organizations are collecting data from inexpensive employee reporting programs and system/task analyses. Others are investing relatively large sums of money in flight data monitoring (FDM) systems to collect data on flight profiles and deviations from standard operating procedures. And while employee reporting and FDM can both contribute to overall safety efforts as part of a comprehensive SMS, the data must still be processed into meaningful risk controls and corrective actions.

SMS uses a quality management approach to managing safety. It requires, among other things, the monitoring of daily activities, identification of hazards through system/task analysis, management of change, training, auditing, a method for employees to report hazards, errors and events, and procedures for managing risk and following up to ensure that implemented risk controls remain effective. Clearly, this is no easy task and requires more than an SMS manual and some paper forms to do the job right.

So what do we do with our data? How do we address the many latent conditions that we know exist within our organizations in a manner that is both proactive and predictive, as SMS doctrine teaches us? And how can we make the whole safety risk management process efficient and effective? Fortunately, modern technology provides us with the SMS database. The spreadsheet is but one example of a tool that is great for recording and organizing data, but it falls short of addressing many safety risk management process elements.

Developing a Better Database

When planning and developing an SMS database (or if selecting a customized or off-the-shelf commercial program), consider first whether it is compatible with your existing office tools (such as commercially-available spreadsheet software). Consider also whether your database will be hosted by a third party or reside on your agency-owned servers, either in-house or co-located. Costs of hardware, space and IT resources must also be considered, in addition to the software itself. In any case, much of your safety risk data will be sensitive and confidential. Physical security, access devices, firewalls, intrusion protection/detection, secure transmission, backup and storage all should be planned for.

Regarding employee reporting, will your reporting system be paper or web-based? If web-based, how will employees connect? Effective reporting should be accessible and easy. Will you offer anonymous reporting options? And how will data from employee reports be entered into the database?

Next, consider the following database attributes:

- Levels of authority should be established for database administration, password assignment and access.
- Will the database provide for user-defined values and data entry choices that will permit use of the database for management of other issues, such as quality management, security, occupational health and environmental protection?
- How will interfaces between managers be handled regarding investigation, risk acceptance and corrective actions?
- Will your database provide for the assignment of responsibilities for investigation, risk acceptance, corrective actions and communication of lessons learned?
- Your SMS database should also contain controls to ensure the integrity of data and the proper completion of all assigned risk management responsibilities, including follow-up audits.

Using the Data

SMS is all about continuous improvement. And because SMS uses a quality management approach, there's no reason why your database shouldn't work to improve quality throughout your organization. In addition to managing incidents, accidents, near-accidents and identified hazards, your database should be able to help you track and manage a variety of other user-defined issues, such as scheduling problems, reliability of equipment, errors and quality escapes in maintenance, communications difficulties, security breaches, EPA violations, quality or supply problems with vendors, OSHA reportable injuries and other processes for which improvement is desired.

An effective SMS database should also support trend analysis. Trend reports allow managers to target specific types of events, equipment and mission types over time and look for contributing factors that may be a recurring theme. By accurately determining the root causes of these associated events, risk controls and corrective actions that make effective use of our limited safety management resources can be implemented.

We've come a long way with cell phones, computers and the internet to help us communicate and manage information, and the complexity of SMS processes demands we use these tools to our advantage. An effective SMS database should go beyond the collecting and sharing of data to address the many elements of safety risk management and improve the quality of other processes throughout our organizations.