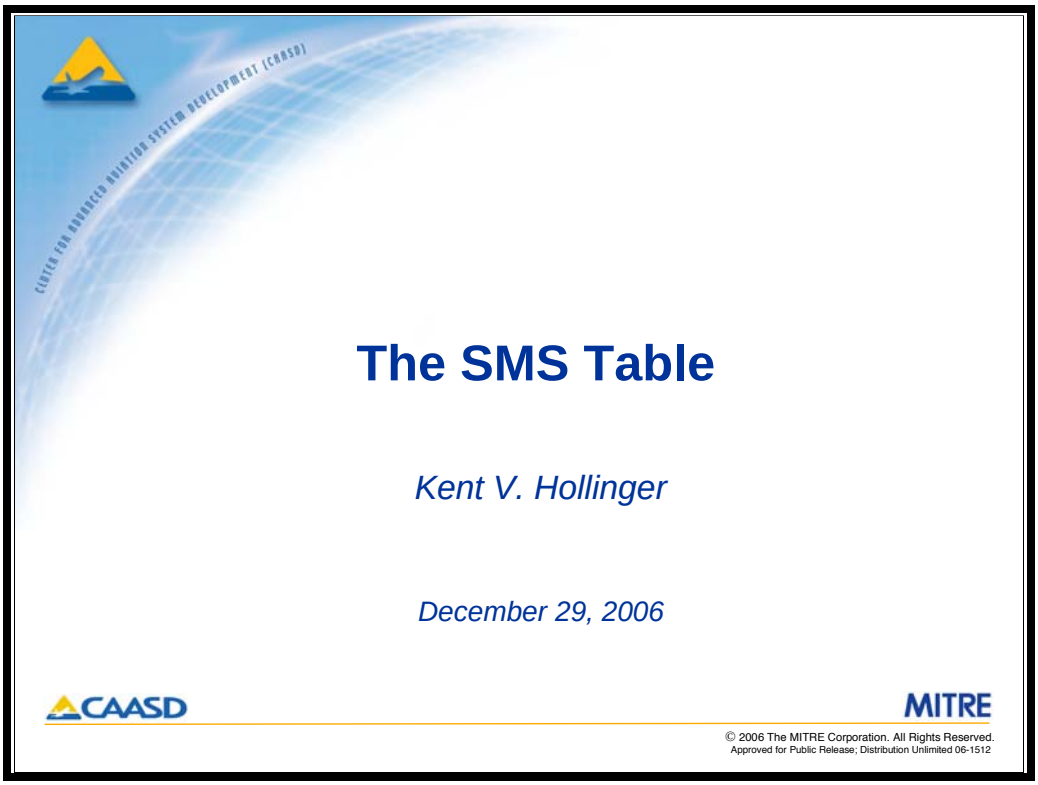

This presentation introduces the concepts contained in a Safety Management System (SMS) by using the analogy of an SMS being a four-legged glass-top table, to illustrate how the various components interact and fit together. This is a high-level presentation that briefly explains the SMS concepts, but does not go into detail regarding their implementation or practice.

NOTE: A more detailed discussion of SMS concepts can be found in the following documents from which much of this presentation is derived:

FAA AC 120-92, *Introduction to Safety Management Systems for Air Operators*

ICAO Document 9859, *Safety Management Manual (SMM)*

This presentation is best viewed in Slide Show mode. The annotated notes with each slide will explain the new information presented with each “click” of the presentation. It is recommend that the reader print these Notes Pages to be able to read the notes during the slide show.

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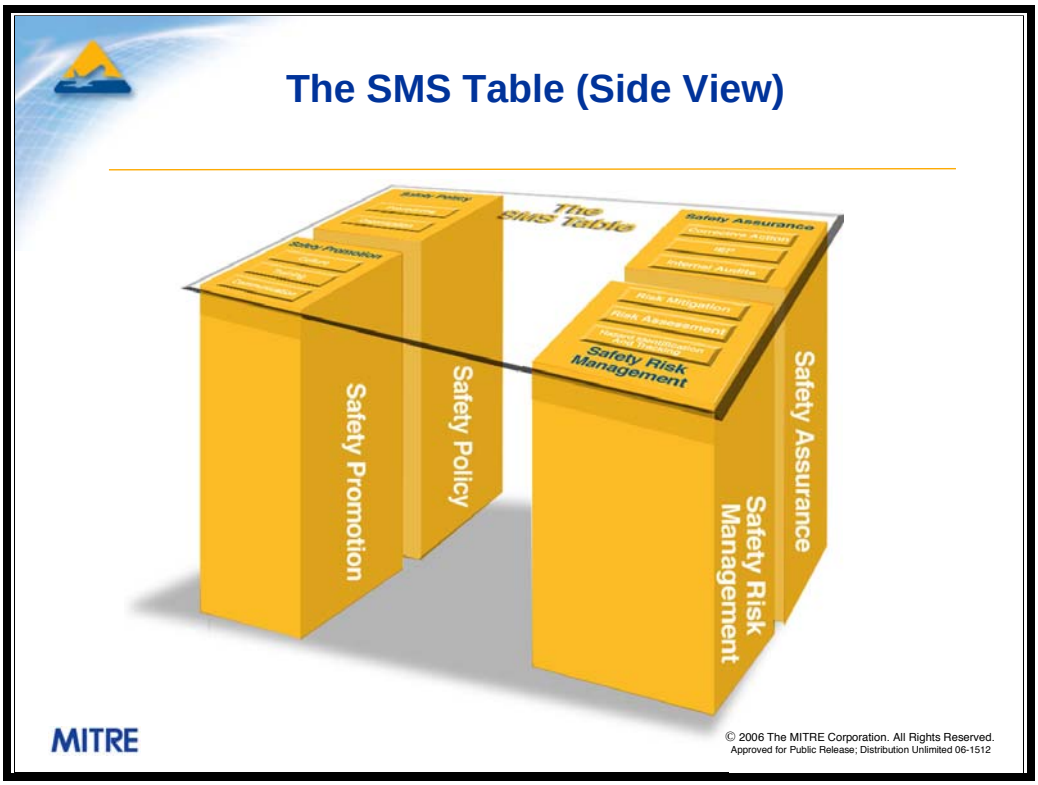

This four-legged glass-top table represents a Safety Management System (SMS) and its basic components, which are grouped into the 4 pillars (represented as table legs) of:

-Safety Policy

-Safety Promotion

-Safety Risk Management

-Safety Assurance

Next we will more closely examine the top of the table for a discussion of the components of each pillar and associated programs that comprise the SMS.

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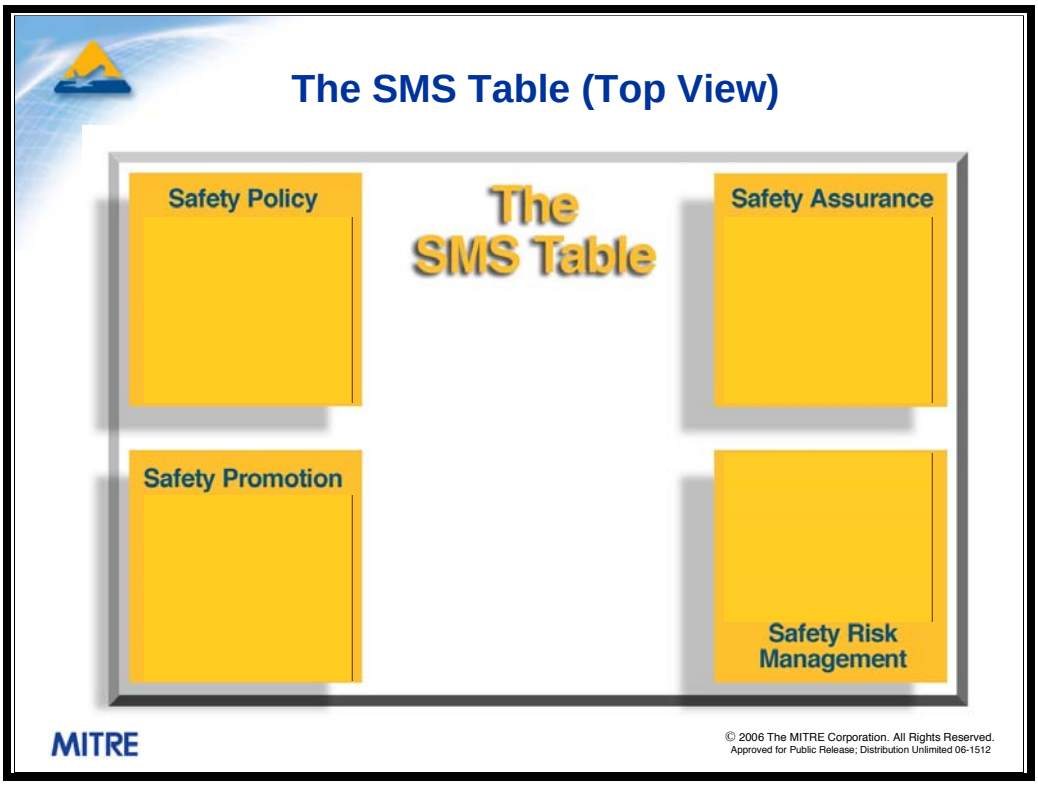

In this top view of the table, the 4 pillars of SMS can be viewed through the glass top that joins them together. This top view will be used throughout the remainder of the presentation.

An SMS will not be effective unless there is a strong Safety Policy that reflects top management's commitment to safety, including a commitment to implement an SMS. The Safety Policy should be a written document from top management that is communicated to all employees and other affected parties. The policy should also include:

- The overall safety objective of the organization
- A commitment to the continual improvement of the level of safety
- Top management's commitment to establish and measure safety performance against realistic objectives and/or targets for all aspects of the operation
- Encouragement for all employees to report previous or potential safety issues without fear of reprisal
- Establishment of clear standards for acceptable behavior related to safety

A sample Safety Policy Statement is presented in 12-Appendix 1-1 of ICAO document 9859.

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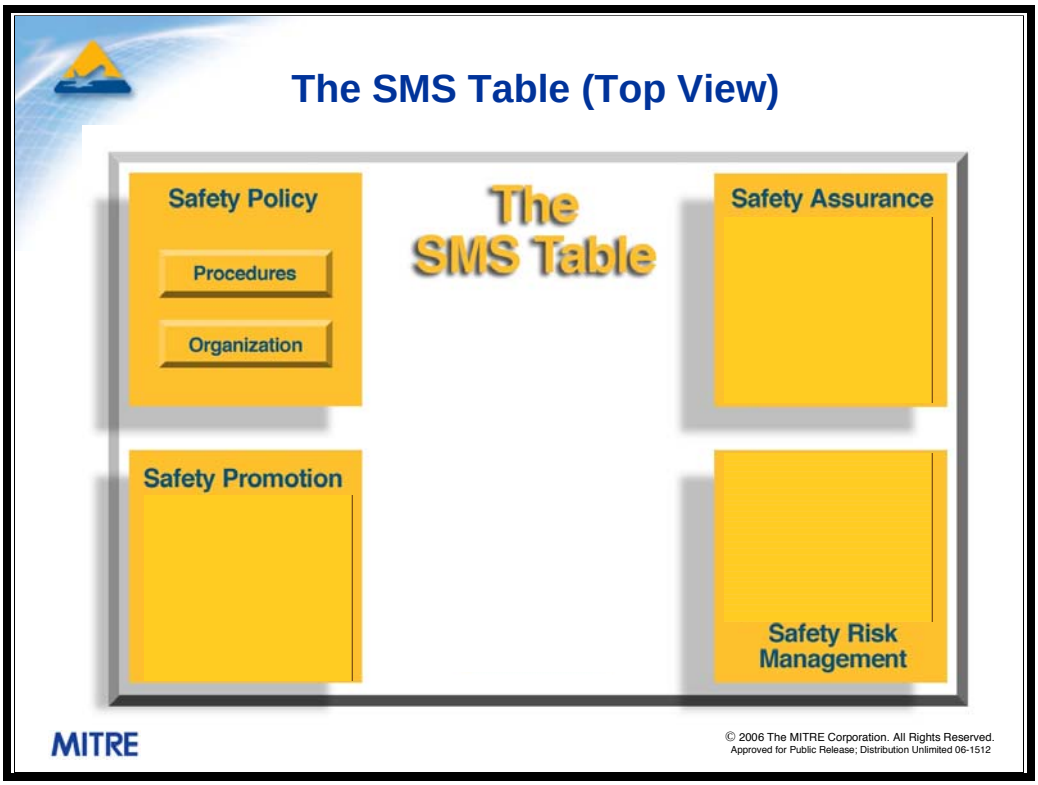

Safety Policy also includes the organizational structure and procedures that will be followed to reach and maintain the organization's safety objectives.

The organizational structure and safety procedures should be appropriate to the size, complexity, type of operation and operating environment of the organization. Large organizations may be best served by a formal SMS that utilizes a cross-functional Safety Committee, while it may better suit smaller organizations to discuss and resolve safety matters in an informal way.

Regardless of organizational size, a Safety Manager (SM) should be appointed as the focal point for implementation and maintenance of the SMS. While it is preferable for the SM to have no responsibilities other than safety, this may not be possible in smaller organizations. In that case, the SM's other responsibilities should not be in the operational areas. The SM should be at a high enough position in the organization to be able to communicate directly with top management.

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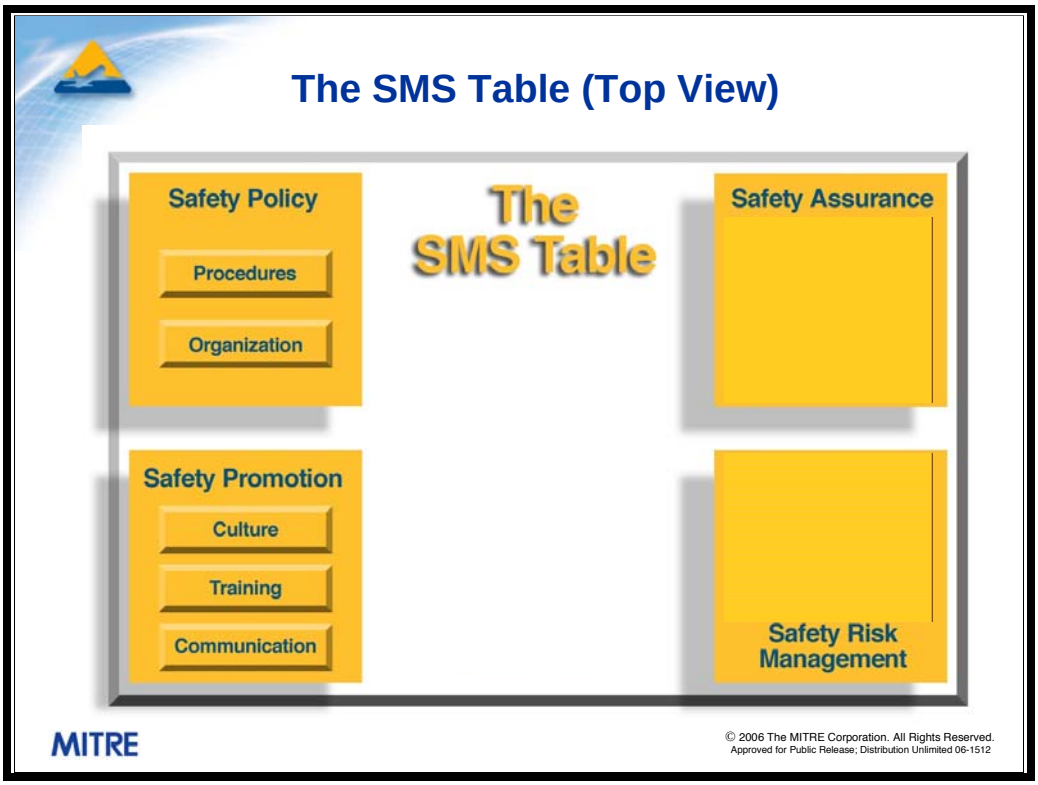

Safety Promotion is necessary to ensure that the entire organization fully understands and trusts the policies, procedures and organization put in place to implement and maintain the SMS. The main goal of Safety Promotion is to create and continually reinforce a safety culture in the organization that allows the SMS to function at a high level. Having a safety culture means that all employees are responsible for, and consider the impact of, safety in everything they do. Such a culture is lead by top management example, especially in the manner with which they deal with day-to-day activities. Employees should fully trust that they will be supported by top management in decisions made in the interest of safety, while also recognizing that intentional breaches of safety will not be tolerated. The result is a non-punitive environment that encourages the identification, reporting and correction of safety issues.

In order to fulfill their responsibilities in an organization with a safety culture, each employee requires training in safety principles. All personnel must understand the organization's safety philosophy, policies, procedures and practices, and they must understand their roles and responsibilities within the safety management framework. The depth of the training should be appropriate to each individual's position and vary from general safety familiarization to expert level training for safety specialists.

Individual safety training is supplemented by an ongoing two-way communication process that ensures employees benefit from safety lessons learned, see the results of their actions, and continue to grow their understanding of the organization's SMS. When new procedures are introduced, the associated underlying safety analysis should also be communicated to all employees. In addition to written communications, it is important for employees to witness evidence of the commitment of top management to safety.

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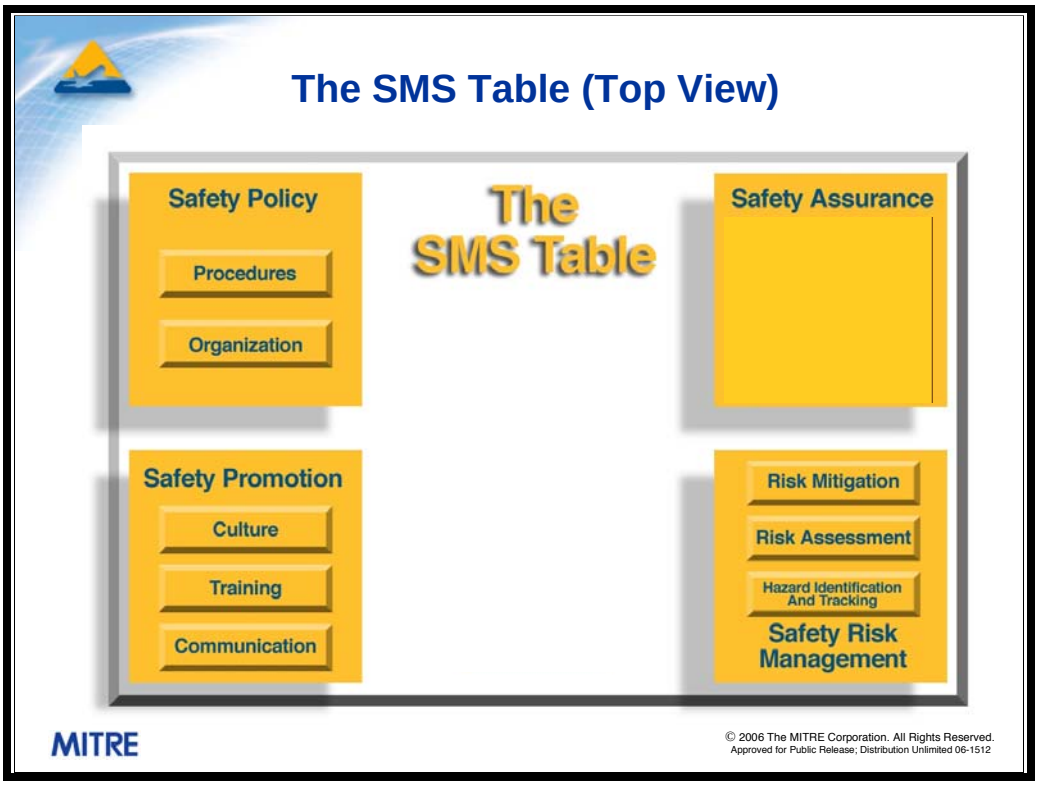

Aviation is an activity that faces numerous risks on a daily basis. It is impossible to completely eliminate all risks, but through Safety Risk Management (SRM), risks can be controlled to acceptable levels.

The first step in Safety Risk Management is to identify hazards that the organization faces in its operational environment. A hazard is any existing or potential condition that can lead to an accident or incident. In an SMS, all identified hazards are documented, tracked and analyzed to determine what, if any, action is required to eliminate or reduce the safety risk associated with the hazard.

Each identified hazard undergoes a risk assessment that determines its potential for harm or damage. An assigned risk value considers the severity of potential adverse consequences resulting from the hazard, along with the probability of such an event occurring. A risk assessment matrix is typically utilized in such an analysis. The assessment may show that some certain risks are acceptable at their current level, while other risks will require mitigating actions to reduce the risk to an acceptable level

Mitigating actions should be fully analyzed to ensure that they address the root cause of the issue, and it may be beneficial to explore a range of mitigating strategies before choosing the preferred option based upon factors such as effectiveness, cost, practicality, etc.

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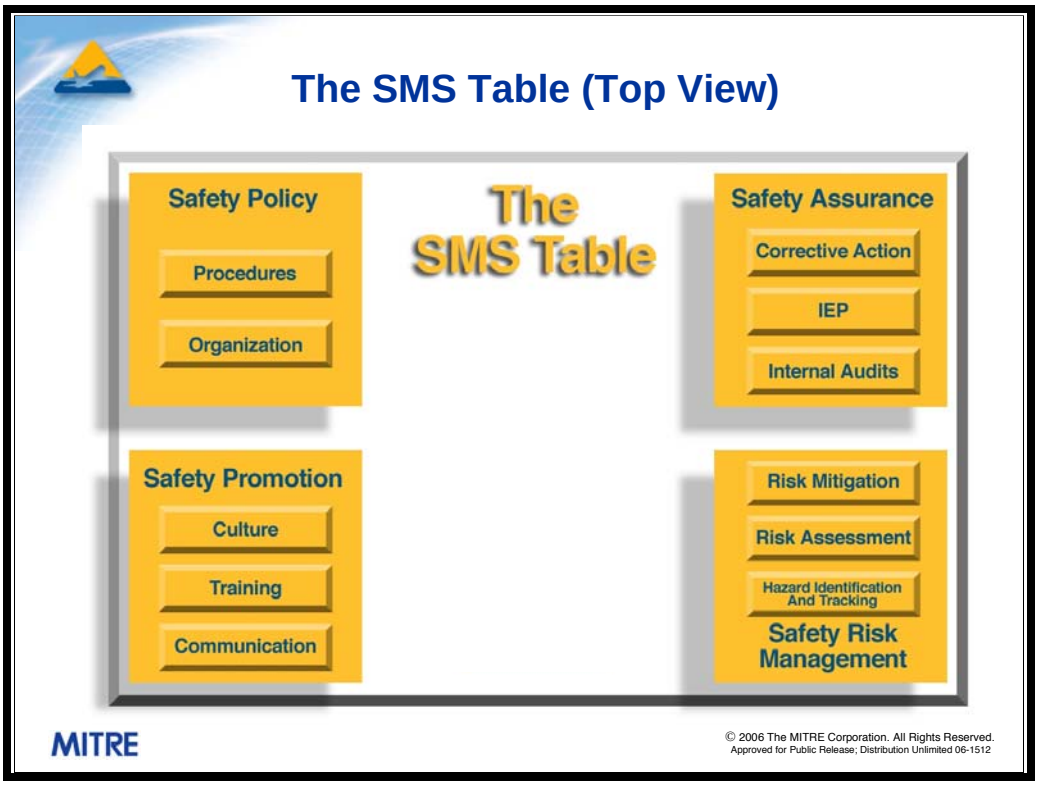

Safety Assurance functions provide confidence that the organization is meeting or exceeding its safety objectives. The functions provide feedback on the performance of the organization, as well as the effectiveness of implemented risk mitigation strategies.

Internal audits are performed by each line of business within the organization to confirm that they are following the proper procedures and are achieving their safety objectives. These internal audits should be performed on a daily basis and may include surveys of employees and formal or informal inspections performed by departmental personnel.

An Internal Evaluation Program (IEP) is an independent series of evaluations that assess the effectiveness of managerial controls in key programs and systems. IEP evaluators are independent of the line of business being evaluated, and typically report to top management.

If an internal audit or IEP evaluation finds that prescribed procedures are not being followed, then corrective actions should be developed by that line of business within the framework of Safety Assurance.

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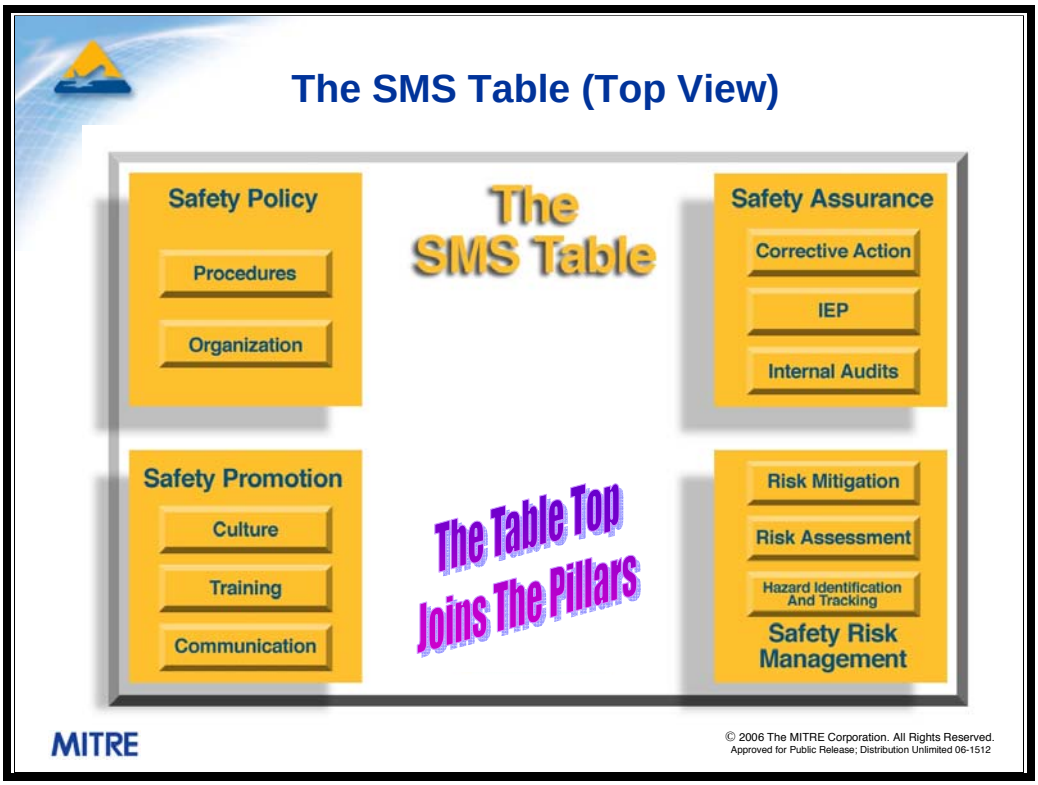

Remember, these pillars are all linked, as represented by the glass table top joining them all.

Strong safety policies are needed to create a safety culture, ensure that all hazards are identified, analyzed and mitigated, and monitored on an ongoing basis.

A safety culture encourages the communication of safety issues, promotes the reporting of incidents and hazards by employees, and continually monitors itself with the aim of continuous improvement.

Mitigating actions resulting from safety risk assessments should be thoroughly communicated to the organization so that employees can see the result of their inputs, thus reinforcing the safety culture.

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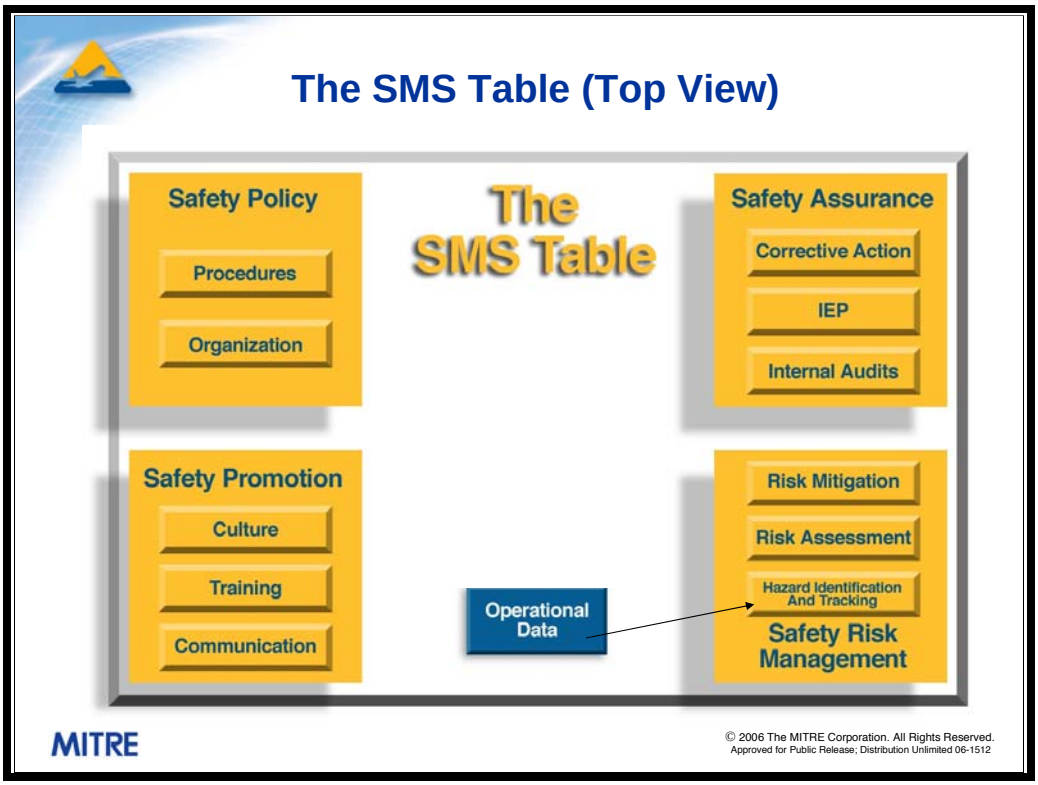

Even though we have examined the 4 pillars of an SMS, there are other very important components that merit discussion. Hazard identification was previously discussed, but the actual methods of identifying the hazards were not covered. Hazards may be recognized as a result of safety events such as accidents and incidents. This is known as reactive hazard identification. Hazards may also be identified by studying operational data.

There are many sources of ongoing operational data available to each organization. For example, airlines may collect FOQA and mechanical reliability data, airports may monitor surface incidents, and ATC providers may track operational errors. The information from these operational data sources and any others should be analyzed by experts in that field to determine if any new potential hazards are present.

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These potential hazards are documented and entered into the Safety Risk Management process in the same manner as any other identified hazard.

Each hazard is assigned an unique tracking number so that it can be identified and documented for future reference.

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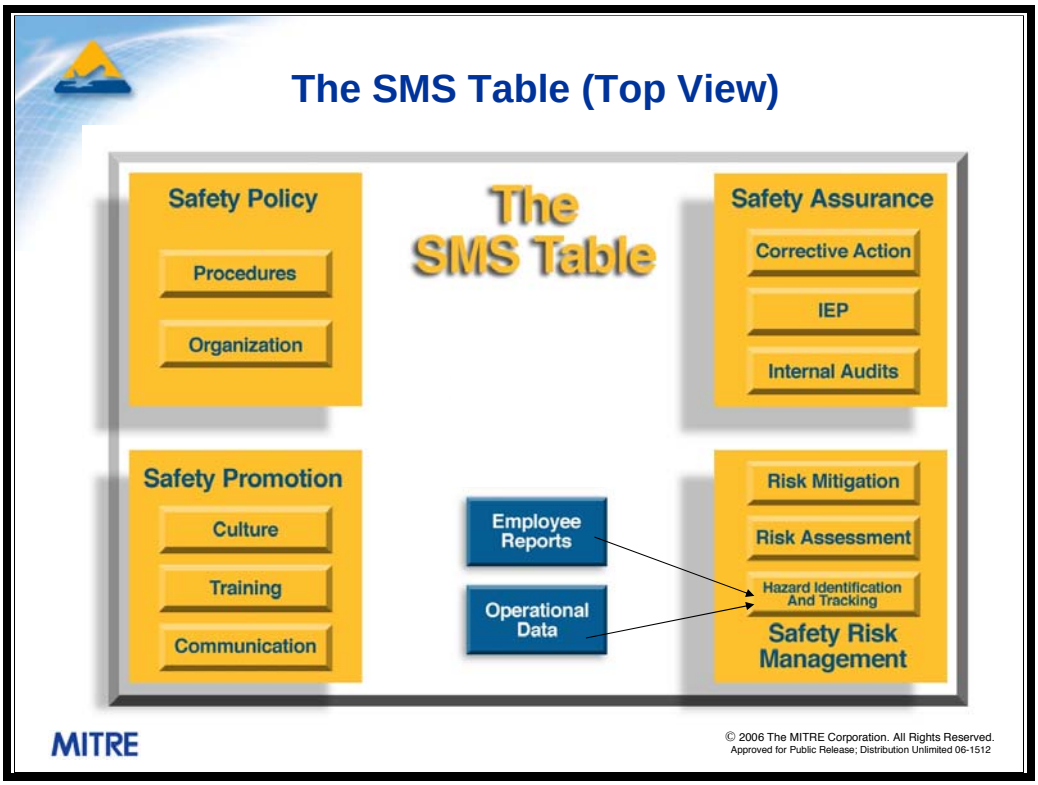

Even though a team of experts has analyzed all available operational data, it is usually impossible for such a team, or top management, to know everything that goes on in an organization on a daily basis. Therefore, it is crucial to have a voluntary employee reporting system that allows any employee to input a real or potential hazard into the Safety Risk Management process.

Such a reporting system should be non-punitive and protect the identity of the reporter. The focus should be on determining why the organization's procedures allowed a mistake to be made and then improving the procedures, not on punishment of the violator. If employees are to be expected to freely report all incidents, they must fully believe that such information will not be used punitively against them. Of course, intentional violations or criminal acts would not be protected under this program.

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These potential hazards are documented and entered into the Safety Risk Management process in the same manner as any other identified hazard.

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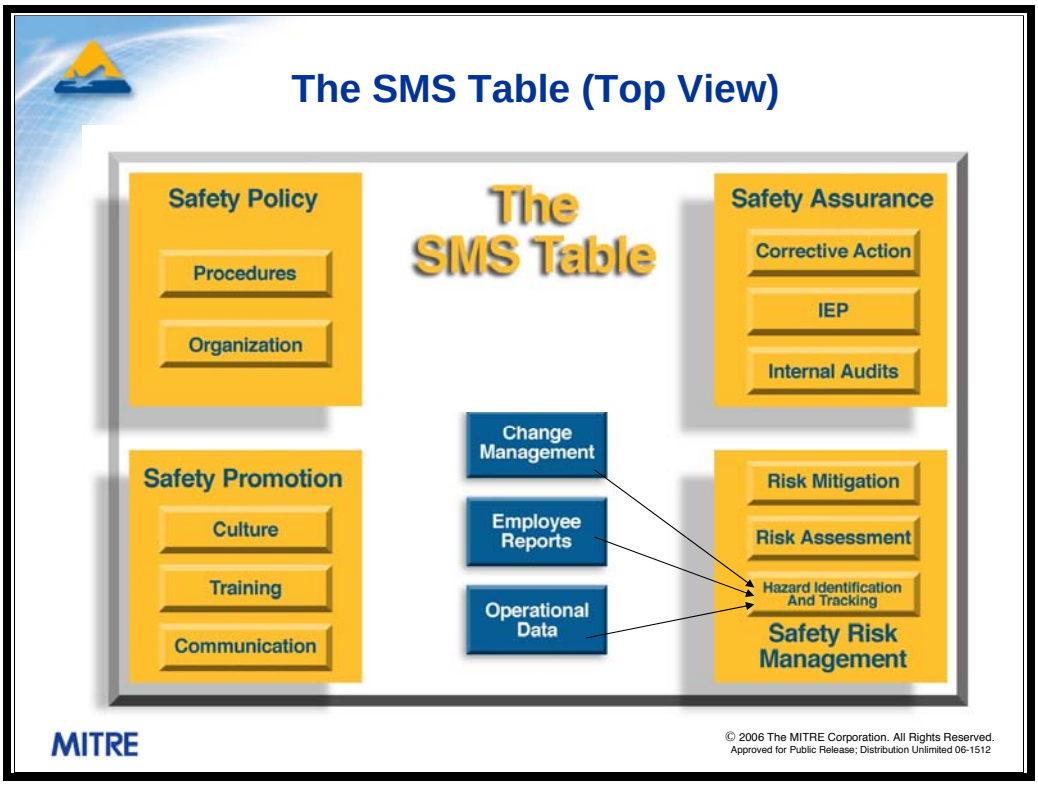

When new operational procedures (or equipment or locations, etc.) are proposed for introduction into the organization, they must first be analyzed to determine the potential hazards that may also be introduced. It is not good safety practice to introduce changes that will subsequently submit the organization to hazardous situations. As part of Change Management, a review is performed on the proposed procedures and all identified hazards are assessed and mitigated before introducing the new procedures.

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These potential hazards are documented and entered into the Safety Risk Management process in the same manner as any other identified hazard.

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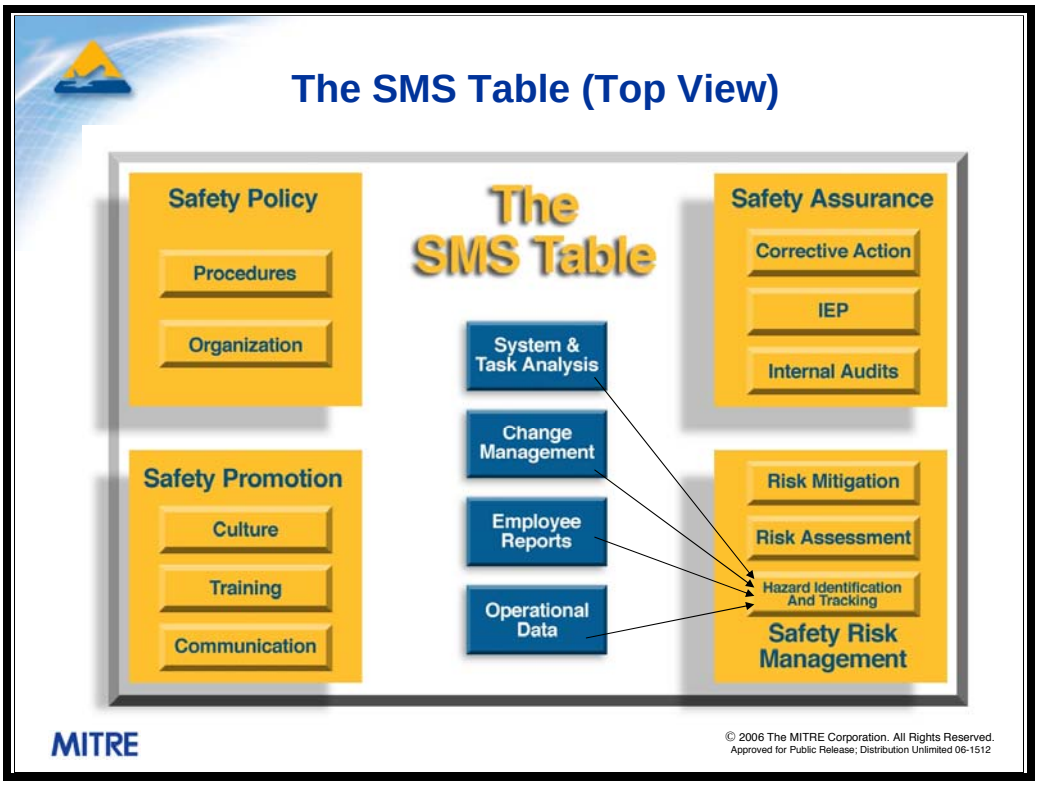

Hazards may also be identified through proactive processes aimed at identifying hazards before they cause a safety event. In addition to Change Management, one of the proactive processes is a System & Task Analysis, which is the process of studying all of the existing processes and procedures used by the organization, and identifying the potential hazards associated with each. This is usually accomplished by a team of experienced operational and technical personnel from all lines of business in the organization. Brainstorming is often a useful tool to identify potential hazards.

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These potential hazards are documented and entered into the Safety Risk Management process in the same manner as any other identified hazard.

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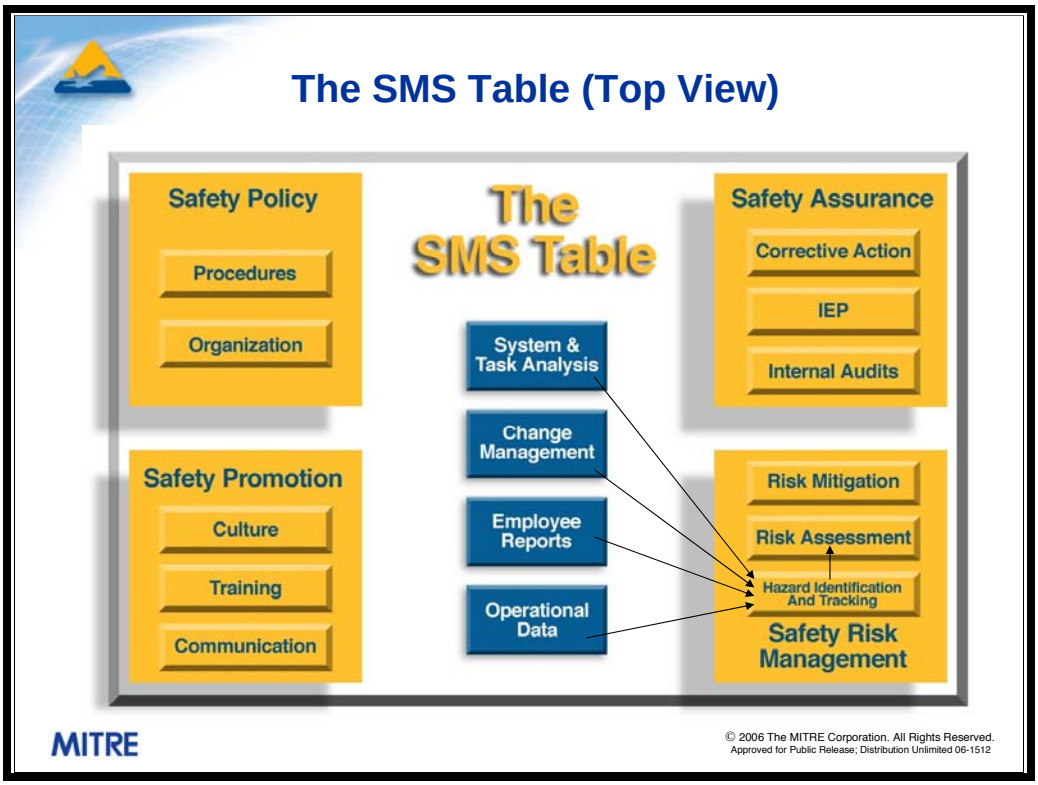

Each identified hazard undergoes a risk assessment to determine its potential for harm or damage, known as risk. Risk is defined by two components; the probability or likelihood of occurrence of a resulting event, and the severity of the event, should it occur. A commonly used tool is a Risk Assessment Matrix that can be used to define a risk by its two aforementioned components.

Depending on the desired levels of safety (above those prescribed by regulations), each organization can define its own levels of acceptable and unacceptable risk. Even though acceptable risks can be accepted without further actions, the objective should always be to reduce risk to as low a level as practical, as long as that is not cost-prohibitive.

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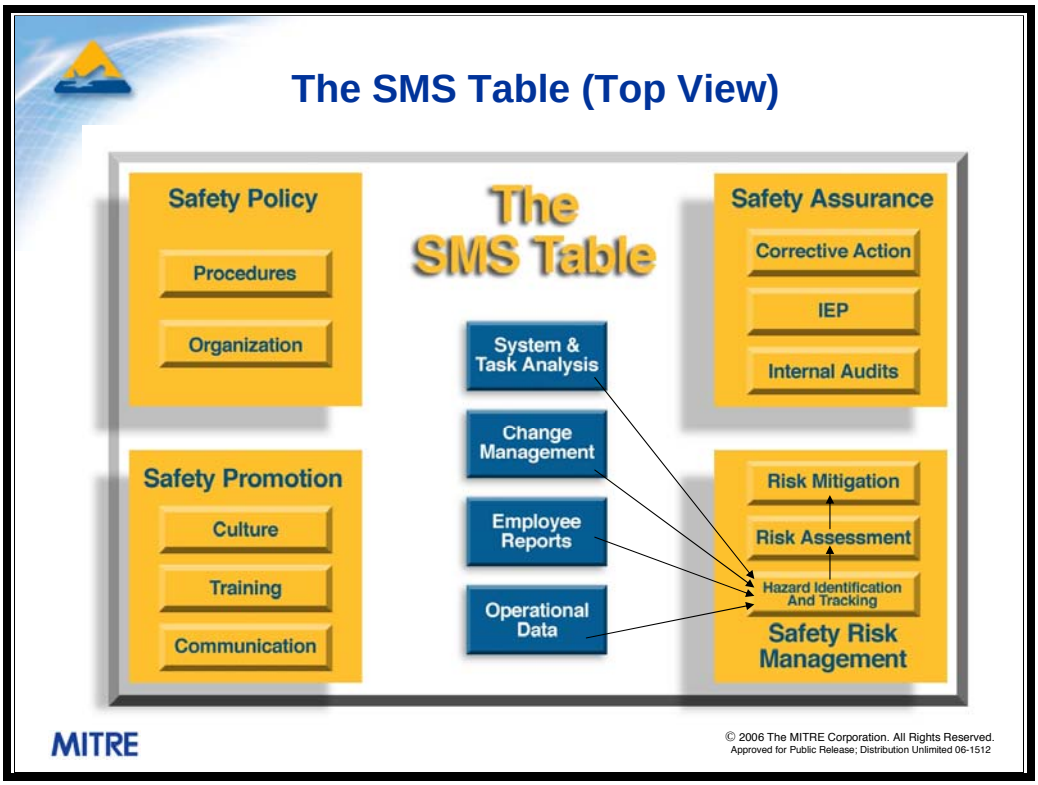

Risks that fall in the unacceptable area must be either eliminated though a design intervention, or reduced to an acceptable level via mitigating actions that reduce the severity of the potential consequences or reduce the likelihood of occurrence. Preference should be given to actions that completely eliminate the risk, but sometimes these solutions are too expensive, resulting in the need to mitigate the risk. The controls associated with risk mitigation have a range of effectiveness, as shown below from most to least effective:

- Design the hazard out of the system
- Physical guards or barriers
- Warnings, advisories or signals of the hazard
- Procedural changes to avoid the hazard
- Training about the hazard

These controls may be used in combination or in a phased approach.

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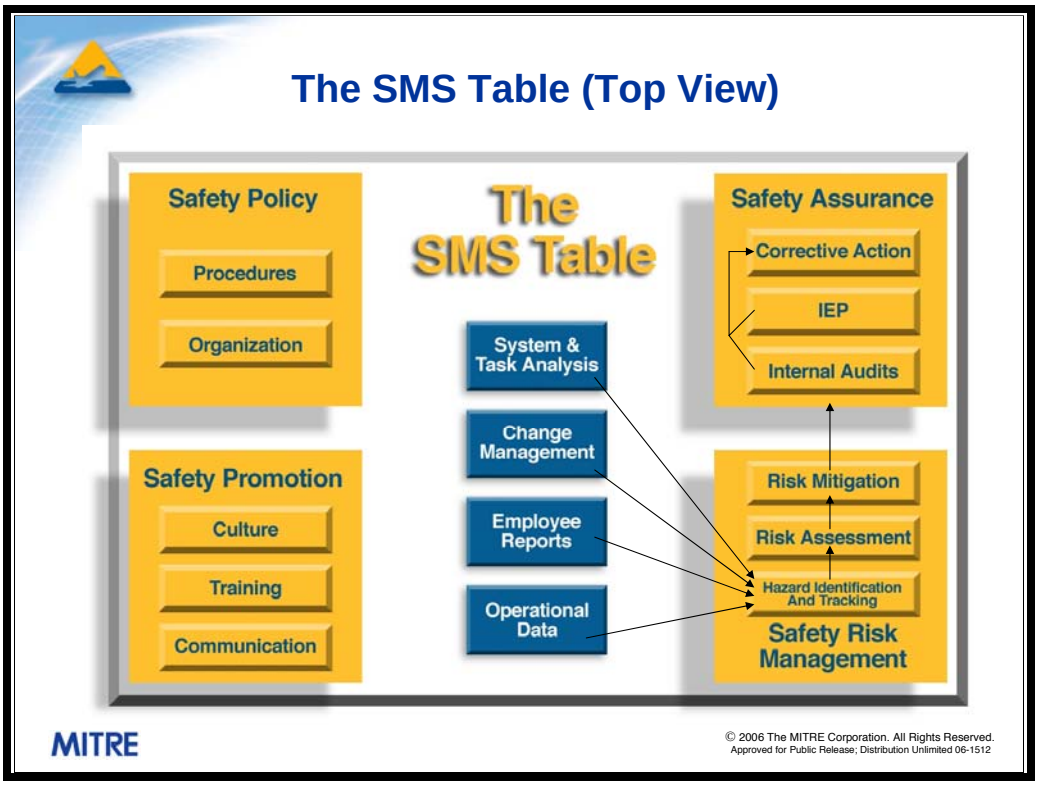

The Safety Assurance function monitors all operational procedures, including any newly developed risk mitigating strategies, to determine their effectiveness.

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If an internal audit or IEP evaluation finds that prescribed procedures are not being followed, then corrective actions should be developed by that line of business within the framework of Safety Assurance.

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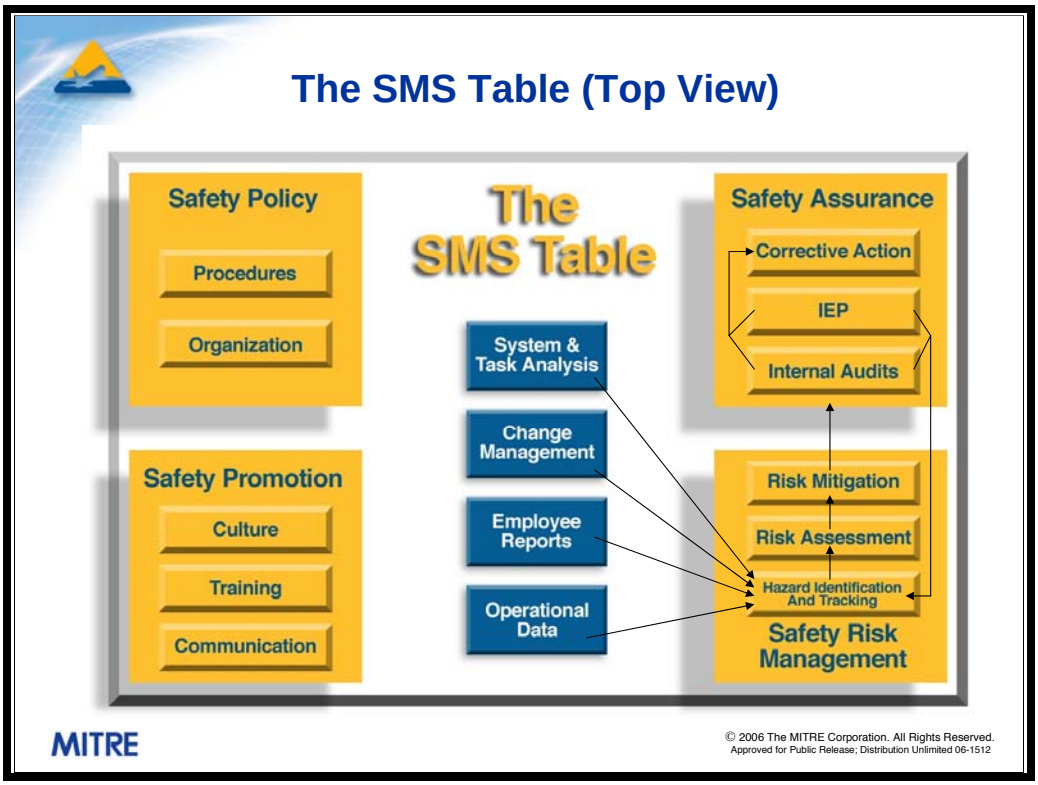

If an internal audit or IEP evaluation finds that prescribed procedures are not effective in controlling risk, the hazards associated with that risk should be re-entered into the Safety Risk Management process for development and implementation of more effective practices.

This completes the description of the SMS from the organization's internal point of view. However, the organization should not rely merely on the creation of an SMS to achieve its safety objectives. There should be an independent evaluation of the SMS by parties outside of the organization to determine the true effectiveness of the SMS. These outside parties (hired consultants, regulatory body, etc.) perform external audits of the SMS itself to determine if it is functioning as planned. When an organization has a fully functioning SMS, it may be possible for the regulator to transition from an oversight role that attempts to determine individual instances of regulatory non-compliance, to a role of overseeing the organization's SMS.

Next we will look at the types of questions that would be asked during an external audit of the SMS.

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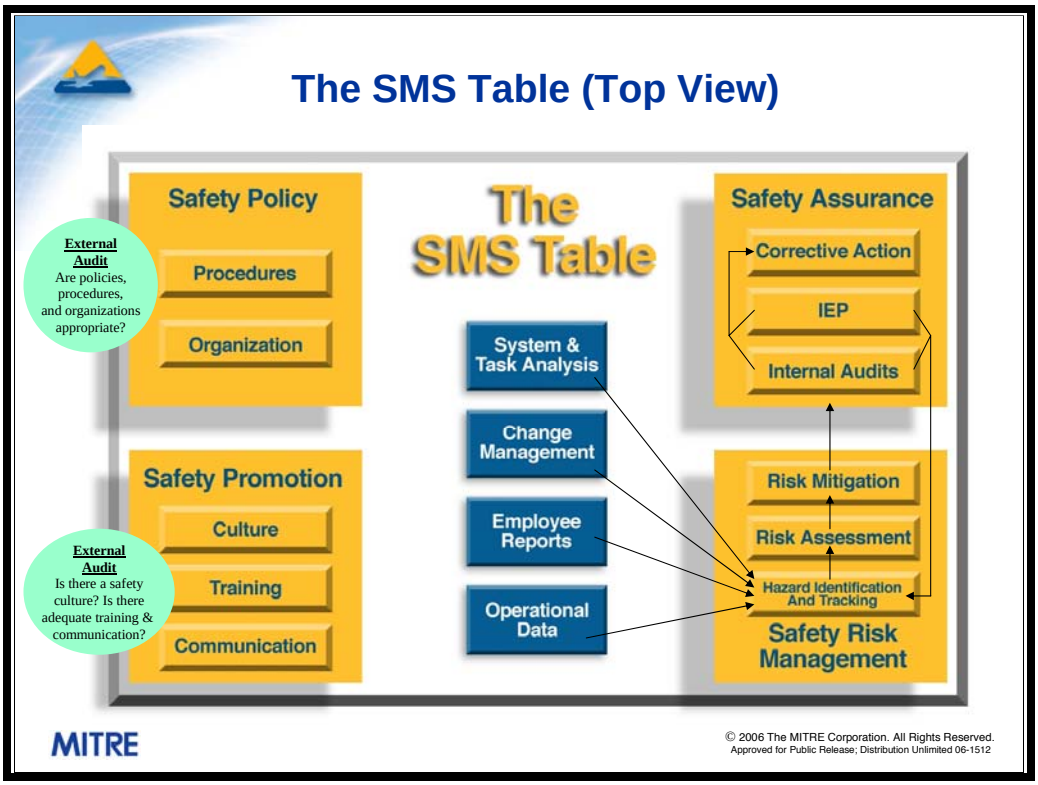

Are policies, procedures, and organizations appropriate? This question is aimed at determining whether the SMS is designed in a manner that will lead to success. If the policies are not strong and clearly stated, the organization may not fully believe in them. If resources appropriate to the size of the organization are not devoted to the SMS, then success will be unlikely.

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Is there a safety culture? Is there adequate training & communication? A safety culture will be evident when management actively solicits new ideas related to safety and all employees share the responsibility for safety, including reporting safety information in a non-punitive environment. Policies, safety objectives, performance levels, roles & responsibilities and other safety related information should be continuously communicated with all personnel.

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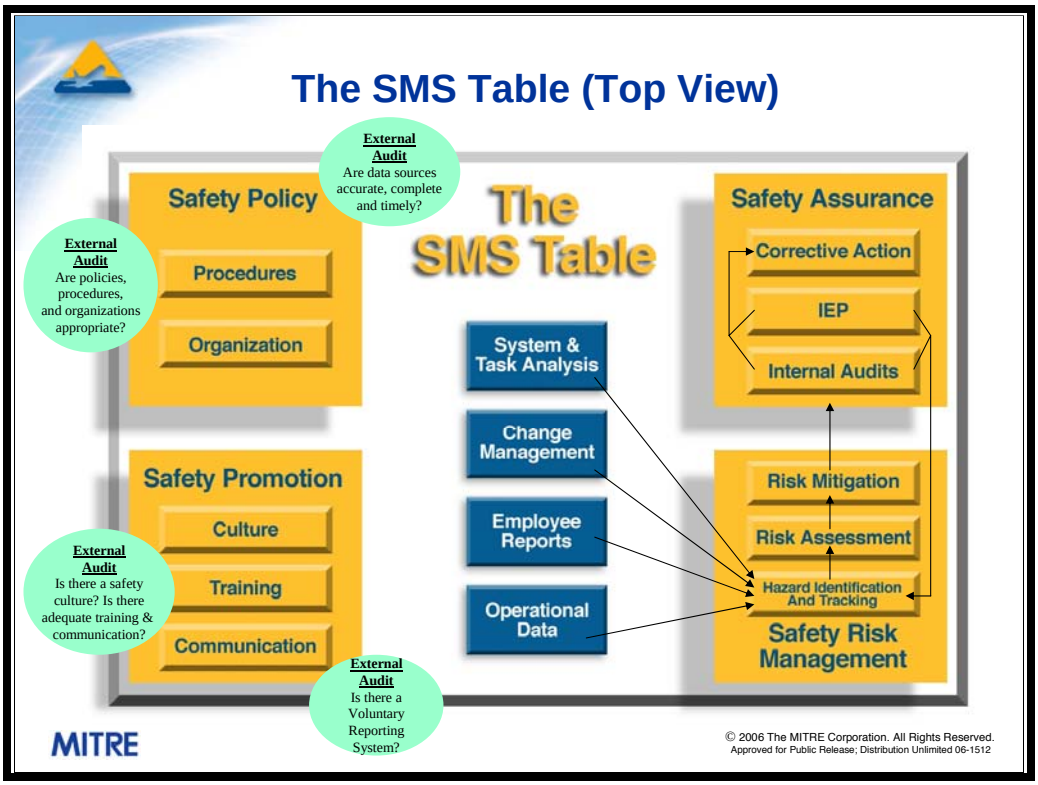

Are data sources accurate, complete and timely? If the SMS is not receiving information across the entire organization, or if the information is out-of-date, then the safety risk management process will be unable to evaluate and mitigate risks before incidents occur.

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Is there a Voluntary Reporting System? Certain events, such as accidents, may involve a mandatory reporting system. However, a large amount of information can be gathered form the reports of more minor events, such as incidents, that did not lead to an accident at that time but may in the future. Persons reporting such events must trust that the organization will not use the information against them. Without such confidence, people will be reluctant to report their mistakes, and important data will be lost to the SMS. Also, the employees performing the day-to-day operations of the organization are in the best position to observe the hazards related to their work. A reporting system should allow them to voluntarily report hazards that may affect their workplace and be assured that the report will receive the proper analysis.

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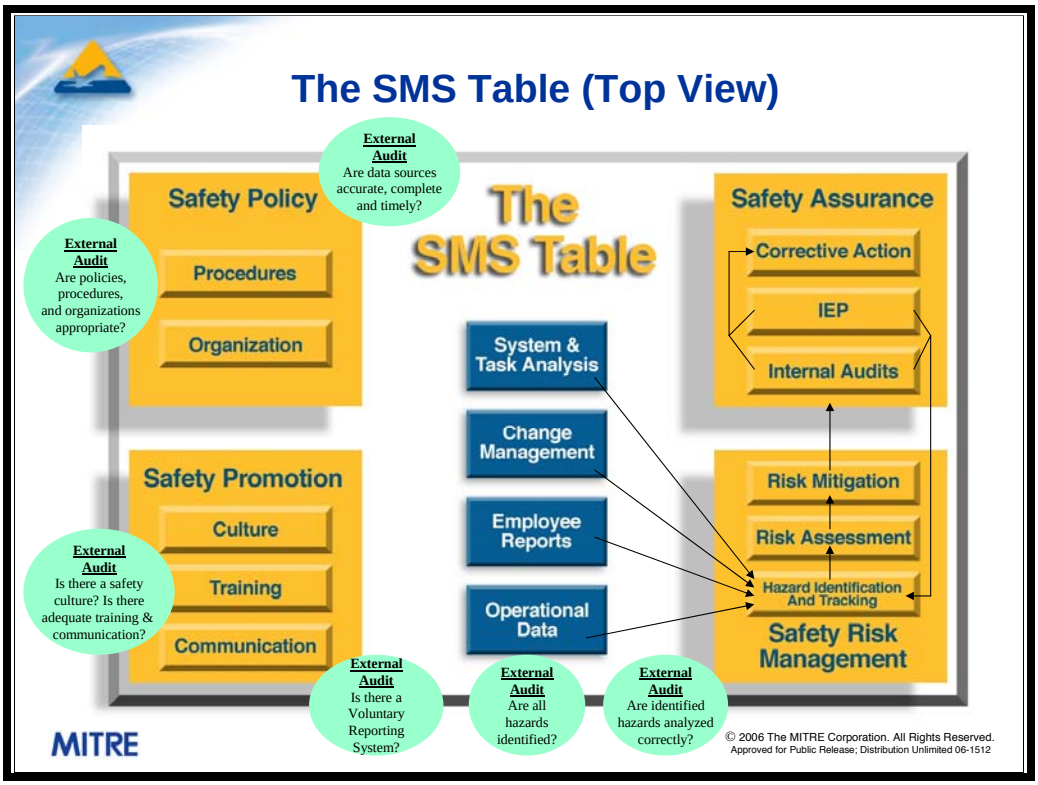

Are all hazards identified? Just gathering the operational data is not sufficient. There should be a thorough analysis of the data by experts to determine all associated hazards.

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Are identified hazards analyzed correctly? An organization with a poor safety culture might have a tendency to assign a low risk assessment value to more hazards than is appropriate, thus avoiding the need to take action.

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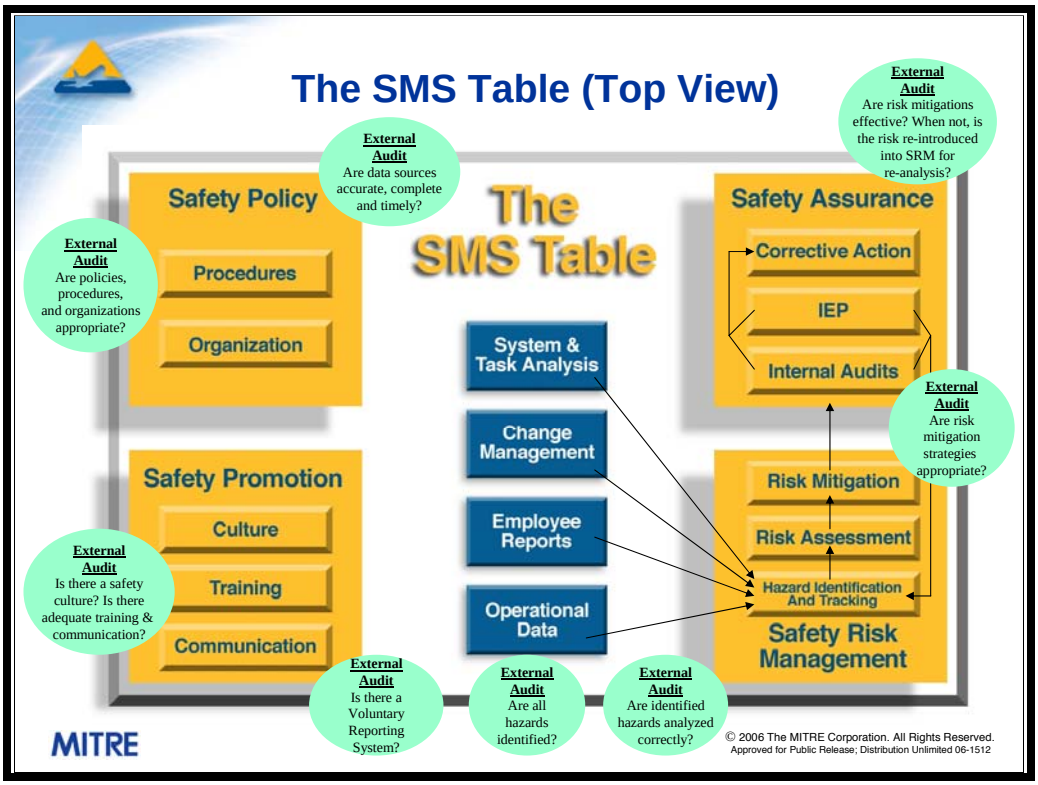

Are risk mitigation strategies appropriate? Risk mitigations should address the root cause of the problem and include appropriate controls to prevent reoccurrence, recognizing the order of effectiveness of different controls. Simply suspending or re-training a specific employee is normally not an effective control since that will probably not prevent other personnel from encountering the same hazard.

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Are risk mitigations effective? When not, is the risk re-introduced into SRM for re-analysis? Even well thought-out mitigations may not have the desired effect after introduction into the workplace. Safety Assurance determines if the risk has indeed been mitigated to an acceptable level. If so, then monitoring continues so that notification can be given if the risk level changes. Sometimes risks can reoccur because the organization has not properly implemented the mitigating strategy. In this case, the Safety Assurance function is responsible to assure that the line of business initiates corrective actions to implement the desired mitigation. When the mitigating strategy was properly implemented, but is found to be inadequate, Safety Assurance should re-introduce the hazard into the Safety Risk Management process for re-analysis and implementation of more effective risk mitigation strategies.

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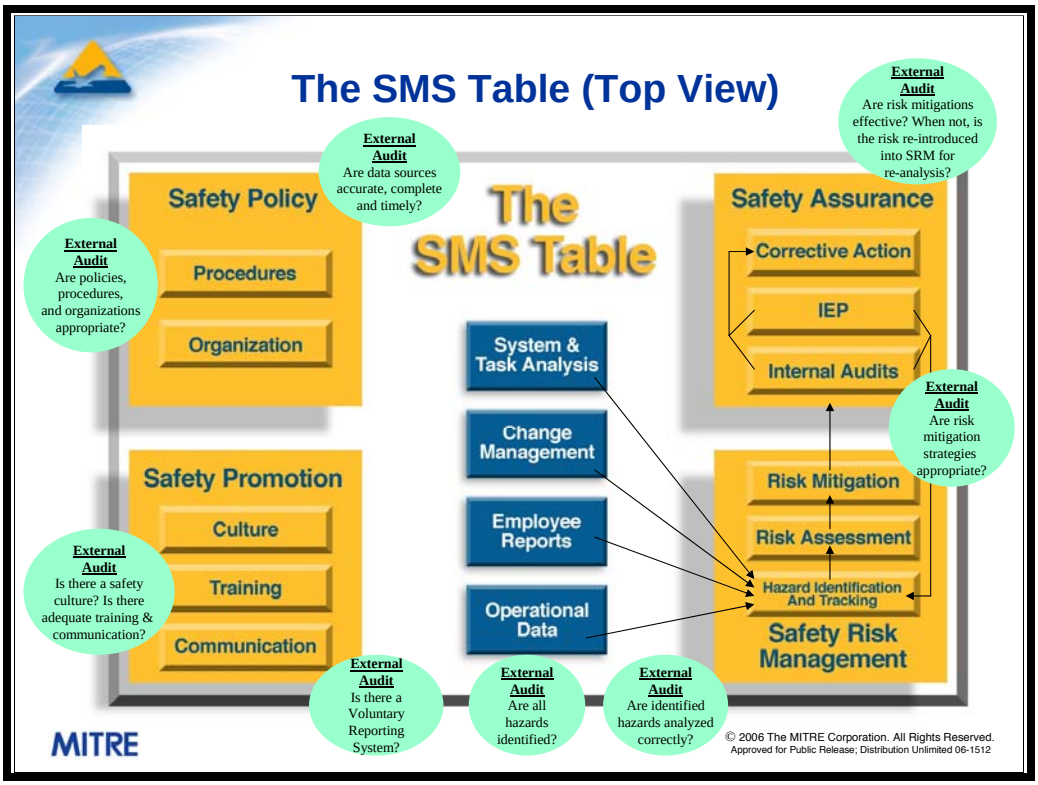
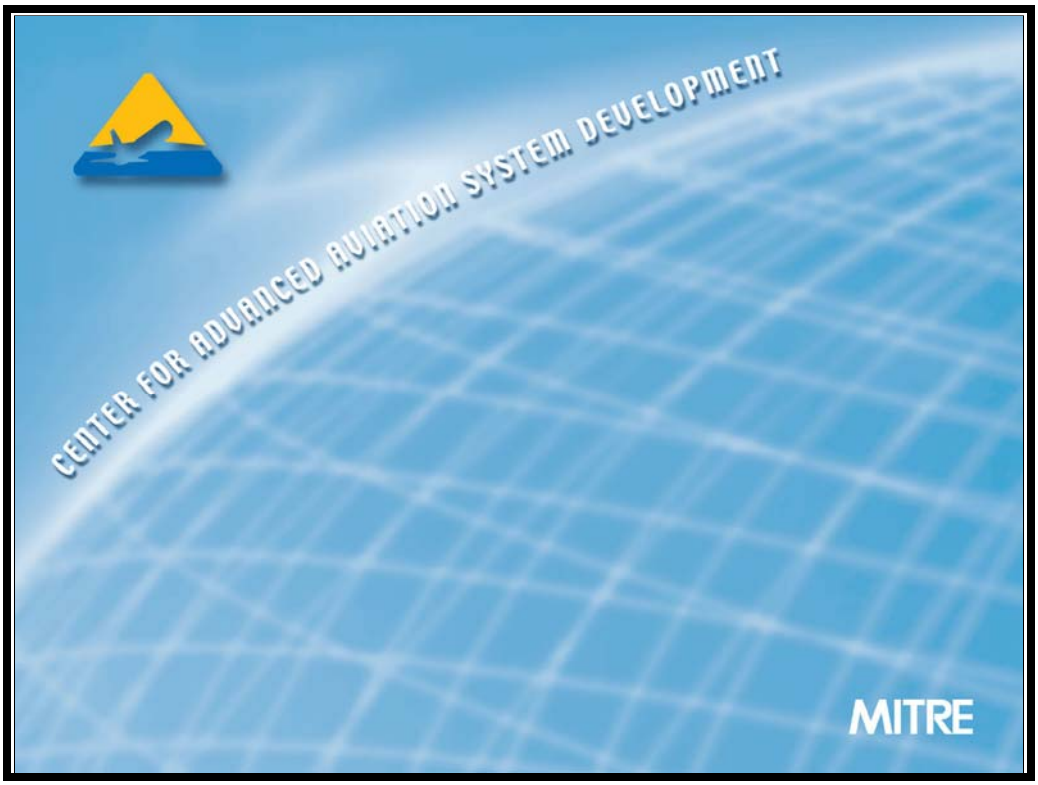


This slide shows the entire scope of the SMS, without the effects of the animation. This slide is suitable for printing and for use as an SMS poster in an organization's Safety Promotion efforts.



The End.

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