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Case study

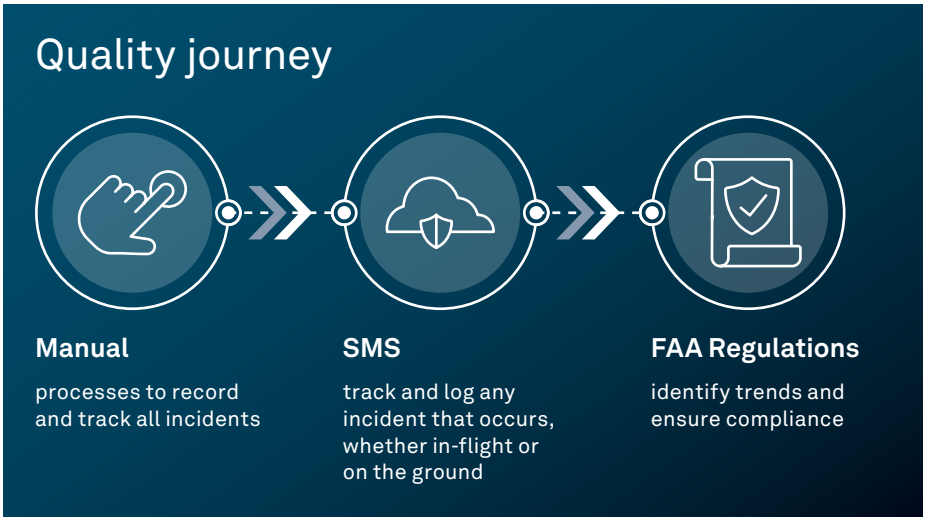
Commercial airline

Implementing a holistic airline safety management system

Now, more than ever, airline carriers are required to demonstrate their commitment to numerous regulations — navigating these protocols can be challenging.

These regulations are required by the International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO) as well as Government regulatory agencies such as Transport Canada, the European Aviation Safety Agency (EASA), the Federal Aviation Administration (FAA), and other National Aviation Authorities (NAA). Safety, for many of these agencies is a top priority. In fact, IATA members are required to be audited and prove compliance through operational safety audits (IOSA). In addition, the FAA's goal is to provide the world's safest air system; EASA strives to promote the highest possible safety standards and environmental protection standards; ICAO strives to achieve secure and safe aviation; and Transport Canada ensures efficient, environmentally responsible, as well as a secure and safe air transportation system.

During 2008, major safety incident rates within the US among commercial airline carriers dropped 57%. This shows an improvement in safety processes, and industry reports indicate, per the United States Department of Transportation, that we are experiencing one of the safest periods for both general and commercial aviation. This is due largely to the safety system that regulatory agencies such as the FAA and industry partners have developed. In order to continue to meet the goals set forth by these regulating agencies, the ability to demonstrate a Safety Management System (SMS) has become critical to ensure that safety processes are effective.



The business need

Within the airline industry, adverse events can occur in multiple operational areas — cabin, ground, in-flight, maintenance, and more — and an incident report must be completed in each case. This report provides insight into the tracking and trending of adverse incidents across the organization, allowing this carrier to pinpoint the exact source and causes of such incidents, correct them and reduce the risk associated with recurrence.

This study will look into the case of a global commercial airline carrier that chose to implement an SMS to identify trends within incidents across their enterprise through the use of safety reports and similar SMS functionality. The SMS is able to identify trends through separate reports that look for similarities in areas such as date, time, and flight number and consolidates this valuable information into a single report that helps systemic incidents that present a high risk become more easily identifiable.

Prior to implementing an SMS, this airline carrier used manual processes to record and track all incidents. This process is now automated and many of the forms where incident information is recorded include a link to a regulatory reporting form that can be printed and sent to regulatory agencies. The carrier's SMS focuses on an efficient and convenient user interface so that incident and event data can be entered as quickly as possible from anywhere in the world. This is necessary as this carrier has a wide global reach and a variety of users spanning the scope of their SMS.

In the area of reporting, collecting data can be difficult and time consuming. The SMS helps to ensure that an organization doesn't suffer "data paralysis." Data paralysis occurs when there is too much data being tracked within the system. The organization does not have the tools necessary to search and filter the data to determine the incidents that present the most risk. Data paralysis also leads to the inability to locate relevant data within the system and identify trends. The carrier's SMS eliminates data paralysis by automatically filtering data by common elements and categorizing the cause and effect as well as frequency of problems. The ability to organize data in this way enables them to determine trends, find similar events and the resulting action taken, and use the historical information to fix the incident at its source. Let's look into this carrier's background and how the SMS helps in meeting their safety goals.

The SMS is Web-based and allows pilots, maintenance, ground crew, and others to log incidents from virtually anywhere in the world and have that data immediately available in the SMS system.

Case in point

This particular airline carrier's activities consist of the provision of international and domestic airline services; aircraft production, including military aircraft; aircraft maintenance; and engineering services. It also provides in-flight meals for third parties. In addition to passenger transportation services, this airline serves as a cargo carrier that operates air freighters worldwide. Its operations span over 100 cities in more than 30 countries with a fleet of over 100 aircrafts and it carries more than 20,000,000 passengers and 2,000,000 tons of freight.

This airline carrier chose to implement an SMS to help them in meeting their corporate goal of becoming a leader in safety among airline carriers in the world. The SMS's capability to identify trends and ensure compliance to regulatory agencies was paramount to this carrier meeting this goal and was the driving force behind the decision to implement an automated SMS.

This carrier's SMS is designed to track and log any incident that occurs, whether in-flight or on the ground, geographically. The SMS is Web-based and allows pilots, maintenance, ground crew, and others to log incidents from virtually anywhere in the world and have that data immediately available in the SMS system. Data that can be entered includes air speed, flight numbers, date, time, flight information, weather conditions, categorization of the incident, employee data, equipment information, aircraft information, nature and cost of damages, as well as number of passengers and crew members. This information is then sent through a workflow process to the airline's corporate office for analysis and trending.

Through the implementation of an SMS, this carrier can create safety reports, in real time, on incidents that occur within their organization, provide a report on every safety-related process, and utilize quantitative Risk Assessment tools within each safety report form to prioritize and categorize each incident. The SMS's ability to track all incidents and identify trends in order to recognize related occurrences is key to uncovering areas in the organization that present a risk and need to be improved. This SMS provides three different types of risk-based processes — Safety Reports, Job Safety Analysis (JSA), and Audits.

Safety Reports

These reports provide an automatic calculation of risk probability and severity based on 3 years of historic safety data. In addition, a Risk Assessment can be created from every safety report and relates this data to the occurrence type. For example, if the carrier experiences an oil leak, the Risk Assessment tool will be able to look into all reports for that type of incident as well as all of the similar occurrences over the past 3 years and will apply a statistical formula to calculate the probability of reoccurrence. This enhances convenience for this airline carrier by automating the process of looking into all data in the system, leaving no room for user-related subjectivity. Furthermore, the carrier can set automatic notifications that are linked to their Safety Upper Control Limits (UCL) and Lower Control Limits (LCL), providing visibility into whether their safety limits are being encroached.

Job Safety Analysis (JSA)

This airline carrier recognized that safety is necessary in every aspect of their organization, including each individual job function. The JSA function breaks down a job position into its various operational steps in order to analyze each step for potential safety hazards, identify each step's associated hazards, analyze the risk of the hazard occurring, and determine preventive and counter measures that should be put in place. This carrier's SMS Risk Assessment tool provides the core technology necessary to determine the risk of a hazard occurring and measures the residual risk of the hazard. Using Quantitative Risk Assessment, the carrier is able to assess the risk of each job within their organization, discover ways to mitigate risk of incidents by making each job safer, and provide visibility into potential areas of high risk within the various operational areas within the organization. Once the SMS's JSA report has broken down a job function into different steps and evaluated the hazards at each step, it then determines what Personal Protective Equipment (PPE) needs to be used, as well as what preventive measures need to be taken in order to mitigate the risk. This ability allows this airline carrier to conduct a residual risk rating to determine what the risk is with the PPE and other controls in place. They then take the highest risk step within the job in order to measure the overall risk. This concept of proactive risk mitigation is a leading edge concept in Environmental Health and Safety (EHS) Management and is becoming a growing trend within EHS practices in many industries. This airline carrier now has the ability to access risk in jobs and processes enabling them to proactively mitigate risk and put measures in place that will mitigate job risks to within acceptable parameters.

Audits

The SMS is able to incorporate quantitative risk assessment into audits, providing a risk template for questions and checklists within the audit record. This risk assessment allows the SMS to measure the overall risk of an answer to a question, the overall risk of a checklist area within the audit, and the overall risk of the operational area being audited. This relational risk ranking enables the carrier to identify operational areas that have the highest risk and take Corrective Action to mitigate such risks based on audit findings and results.

Usability features for improved user performance

Searching

In any Safety Management System, the ability to effectively search and report on data quickly is key to timely response to incidents. Searching is enhanced through the SMS's advanced searching features, which include the ability to create personalized report views; enabling users to create real-time reports on data they regularly search on. The carrier also needed to have a tool to allow them to search across the entire SMS, without having to search each individual application that contributes to the SMS. Global Searching enables users to search for a topic across all SMS applications and retrieve all information relevant to that topic that exists within their global SMS. This concept speeds the efficiency of finding important information within the system, further eliminating data paralysis.

Type-ahead Text

Efficiency and speed are important to the carrier, especially in Safety Management. The SMS needed to provide a user-friendly environment that would enable users to limit their time entering data. Type-ahead text is a feature that helps to speed the process of entering data by providing a list of possible keyword upon typing the first few letters. Studies have shown that this type-ahead concept makes users more productive and efficient in their use of software systems, and helps to create a better user experience.

Corporate Branding

As with any major organization, the ability to align their business systems with the corporate brand is of paramount importance. Branding is the ability for the carrier to adopt their corporate identity, look, feel, and shared nomenclature to the software, providing a user-friendly interface for ease of use across the enterprise. Through use of configurable layouts, color schemes, naming conventions, and similar features, the software is able to match the corporate look and feel. Creating a consistent look and feel has a tremendous impact on the end-user experience and makes the software familiar and easy to use.

The SMS Reporting function searches for commonality among similar safety incidents, based on flight numbers, departures, and dates. This could cover any incident types such as hyperventilation, death, delay, voluntary offload, unruly passengers, and more. As incident data is entered in the field, the SMS compiles this data into reports such as Aircraft Defects, Air Safety, Cabin Safety, Ground Safety, Human Factor, Occupational Injury, Ramp Safety, and Confidential and Occurrence reports. The carrier's SMS is then able to roll-up this data from all related incident reports into a Central Report, which contains the common conditions and trends from all these related safety incidents. This function allows the carrier to consolidate the various reports from the incident, and create a robust, multi-operational view of the incident, allowing the carrier to make better-informed decisions through use of the data.

All reports include the ability to generate graphical charts, including a Radar chart that informs an organization of which quadrants are most problematic, and a Pareto chart that tracks the count of occurrence and also tracks the cumulative data over time. All charts within this SMS have the ability to allow the user to drill down into the data to multiple levels, down to specific incidents. This allows for the user to see multiple dimensions on each chart, from a high-level view down to a specific record. All charts include the ability to display objectives and targets — e.g. Key Performance Indicators (KPI) — calculated based on historical data. The SMS Reporting function also includes an Overview Report that allows this carrier to see how well they are meeting their metrics, and an Operational Report that shows frequency of events by occurrence type and effectively records ultimate results and effects. In addition, all reports and graphs can be exported to an Excel spreadsheet for further analysis.

The use of a system that can gather all data in real-time and provide insight into all incidents across an organization is crucial for identifying and relating incidents to uncover trends and take action to mitigate risk. This carriers' SMS focuses on creating a user-friendly environment that allows data to easily be entered in the field and relay this information to the corporate office in real-time, enabling them to focus on the issues quickly and efficiently.

Reaping the benefits

Through implementation of an SMS, this carrier is able to save time and resources with the SMS's automated processes. The SMS increases the efficiency and accuracy of data entered into the system, mitigates risk across the carrier's enterprise, identifies common trends across multiple incident types, and provides an environment to proactively solve potential safety challenges. Ultimately, the carrier is able to use their automated SMS to demonstrate their ability to comply with regulatory standards, and provide a tool in helping them achieve their goal of being the leader in safety among airline carriers in the world.

Conclusion

This study took the case of a large airline carrier that implemented an automated SMS in order to proactively mitigate risks and ensure safety across their organization. This carrier had the challenge of demonstrating compliance with air safety regulations, and meeting their goal of becoming the safest airline carrier in the world. To help meet this goal, the carrier implemented an automated SMS, resulting in the ability to create safety reports in real-time on incidents that occur in the field, and can automatically provide a report on related safety incidents. Multiple reports help the carrier to identify trends within the organization and use commonality in the data to proactive mitigate risk of reoccurrence. This study also looked into the additional features of an automated SMS that increases functionality for this carrier. With quantitative Risk Assessment, the carrier can determine risk of incidents, job functions, audit findings, and take actions to effectively mitigate these risks. The carrier also utilizes advanced searching and reporting features to increase efficiency in finding data and reporting on common trends. By using an automated SMS to record incidents in real-time, assess the risk of each incident using risk tools and historical data and taking actions to mitigate these risks, the carrier has been able to create complete transparency within the safety of their organization, eliminating "data paralysis" and increasing efficiency. This initiative has enabled the carrier to meet their goals of regulatory compliance and brought them closer to their goal of becoming the leader in safety among airline carriers in the world.

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