

Process for Tracking Runway Safety Performance



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1. Executive Summary

Congressional Runway Safety Report Requirement

Safety is the top priority of the Federal Aviation Administration (FAA). Runway safety is a cornerstone of the aviation safety system. Evaluating runway safety performance is critical in establishing confidence in the control measures undertaken to ensure safety on the nation's runways. Accurate performance evaluations are also vital for the development of procedures, technology, and training designed to ensure future runway safety.

This report is in response to Section 314 of the FAA Modernization and Reform Act of 2012 (Public Law 112-95) that directs the FAA Administrator to develop processes to investigate and track safety incidents on the surface and communicate key information to operational personnel.

The key safety improvement metric will be the number of safety issues identified through multiple safety management mechanisms and addressed by the operational FAA Lines of Business.

This report also includes the processes for tracking runway safety performance, auditing the oversight process, and ensuring proper accountability. These processes are designed to function with the FAA's Strategic Runway Safety Plan.

Evaluating runway safety performance, given the increased volume of surface and air traffic and the accommodation of new aerospace vehicles envisioned by the Next

Generation Air Transportation System (NextGen), requires moving beyond just tracking and determining responsibility for runway incursions and other incidents. This broader evaluative process builds on successful past efforts and can serve as a guide for how to best incorporate other aspects of surface safety, such as runway excursions¹ and other occurrences. This can be accomplished through continuing efforts to understand and prioritize the risks posed by high consequence and technically complex surface operations.

¹ A veer off or overrun off the runway surface Source: International Civil Aviation Organization

2. Elements of the Process

The elements described here are also referred to in the Strategic Runway Safety Plan. As FAA's "Evaluative Process", it is a critical part of the runway safety feedback. Congress requested that FAA submit:

A process for tracking and investigating operational incidents, losses of standard separation, and runway incursions that includes procedures for:

- 1. Identifying who is responsible, reporting mechanisms for lower level employees to higher supervisory levels, and for frontline managers to receive the information in a timely manner;*
- 2. Conducting periodic random audits of the oversight process; and*
- 3. Ensuring proper accountability.*

The Evaluative Process addresses the elements requested by Congress and describes the Agency's risk-based, proactive approach to system safety. Recently, the FAA implemented new Orders that establish and clarify Quality Assurance (QA) and Quality Control (QC) duties and responsibilities. QA is responsible for ensuring all policies and procedures are being followed correctly. QC is responsible for ensuring the quality of air traffic services provided at the service delivery point. This is especially true of the runway environment. The combination of these services increases transparency and accountability when evaluating runway safety.

3. Evaluative Process to Track Runway Safety Performance Goals

3.1 Past Efforts to Track Runway Safety Performance

Since its inception, the Runway Safety Program² has utilized agency and industry resources to analyze and identify causal and contributory factors surrounding runway incursions categorized as A or B.³ The proposed actions to address hazards associated with A and B incursions are tracked inside the Runway Safety Tracking System (RSTS). The causal and contributory factors of runway incursions and their frequency and severity are determined and rated by the Runway Incursion Assessment Team (RIAT). These results are then compiled within the annual Runway Safety Report. In 2008, the FAA established the Runway Safety Council (RSC) and the Root Cause Analysis Team (RCAT) to utilize a government/industry approach, similar to that used by the Commercial Aviation Safety Team⁴ (CAST), to reduce the number and severity of runway incursions. The RCAT provides additional depth of understanding on why events occur and recommends mitigating actions.

3.2 Current Evaluative Processes

In 2008, the FAA began the implementation of an Agency-wide Safety Management System (SMS). SMS is moving the FAA from an events-based, reactive approach to a risk-based, proactive approach that uses the analysis of data to evaluate ongoing performance and predict future risk. In January, 2012, the Air Traffic Organization (ATO) implemented four new Orders⁵ that transform the process of collecting safety data, tracking the trends, and evaluating risks. Combined, the Orders provide the FAA with processes to differentiate between increases in the number of events due to better reporting and increases due to the actual deterioration of safety. The Orders also

² The Runway Safety Program was established by FAAO 7050.1 in 2002. The Order created an office within the Air Traffic Organization's Office of Safety (now ATO Safety and Technical Training) to coordinate the FAA's efforts to reduce runway incursions and surface incidents.

³ Runway Incursion statistics are reported as Category A through D incidents, with Category A & B being the most serious.

⁴ Commercial Aviation Safety Team (CAST) -- Formed in 1998, CAST is a partnership between government and industry including the DOT, FAA, National Air & Space Administration (NASA), Transport Canada, European Aviation Safety Agency (EASA), Department of Defense (DOD), Flight Safety Foundation, National Air Traffic Controllers Association (NATCA), Airline Pilots Association (ALPA), regional, national and international airline associations, and manufacturers. CAST utilizes a data-driven, risk-centric, consensus approach to identifying and resolving significant commercial aviation safety issues. CAST achieved its goal of reducing commercial aviation fatality rate by over 80% (83%) in 2008. CAST was awarded the prestigious National Aeronautical Association's Collier Trophy in 2008 for "achieving an unprecedented level of safety in U.S. commercial airline operations."

⁵ FAAJO 7210.632 Air Traffic Organization Occurrence Reporting; FAAJO 7210.633, Air Traffic Organization Quality Assurance Program; FAAJO 7210.634, Air Traffic Organization Quality Control; FAAJO 7200.20, Voluntary Safety Reporting Program.

provide processes to perform standardized and repeatable analyses to track and trend performance.

Two of these Orders, the Voluntary Safety Reporting Program Order (FAAJO 7200.20) and the Quality Assurance Order (FAAJO 7210.633), outline procedures for voluntary and mandatory occurrence reporting systems. Following the guidance in the Orders, the FAA is moving beyond classifying runway incursions based only on who is at fault. Instead, it is creating the ability to evaluate, correct, and track system deficiencies and the actions taken to address the risks.

The framework for the Air Traffic Organization (ATO) SMS creates the ability to compile multiple data streams from a variety of sources. Data derived from operational, engineering, procedural, and risk assessment perspectives provide additional insight into current system vulnerabilities and suggest future mitigation requirements.

Comprehensive Electronic Data Analysis and Reporting

A critical data source is the newly implemented Comprehensive Electronic Data Analysis and Reporting system (CEDAR). CEDAR recently replaced the manual safety event reporting system used for record keeping, documenting, collecting and processing safety event reporting in air traffic facilities and will streamline many functions for Air Traffic Managers. CEDAR will provide for major collection and storage of safety data including manually reported data and runway safety issues. Supporting data, such as radar replays or voice data, are stored in CEDAR and are then available for analysis and review. Subsequent CEDAR development will provide runway safety analysts with a customized risk form for reporting runway incursion, excursion, and confusion events. CEDAR is automating the creation, management, and storage of facility activities and events, briefing items, Quality Assurance Reviews (QAR), technical training discussions, and FAA forms.

ATO Safety and Technical Training Safety Dashboard

Data management within ATO Safety and Technical Training has led to the development of Safety Dashboard. A tool of the SMS, the Safety Dashboard displays information extracted from several FAA databases in real time, including statistical information for runway safety. Outputs from the RIAT and Runway Safety CEDAR are displayed in the dashboard. This information is available to relevant FAA organizations and personnel to facilitate reporting, incident review and analysis.



Figure 3-1. ATO Safety and Technical Training Dashboard

3.3 Communication

Safety Promotion is one of four core elements of the FAA's SMS. One of the key functions of Safety Promotion is to provide communication channels between personnel on the operational front line and the appropriate safety organization. The Voluntary Safety Programs Branch of the Flight Standards Services has been the FAA's leader in the development of safety programs designed to provide the FAA with safety information and instances of non-compliance that would otherwise not be known. The information provided through these dashboards, bulletins and corrective action requests, facilitates the identification of weaknesses in safety programs or procedures at individual, organizational, and systemic levels. The ability of the FAA to promote safe air transportation is greatly enhanced by the information gained through voluntary safety reporting programs.

The Four SMS Components

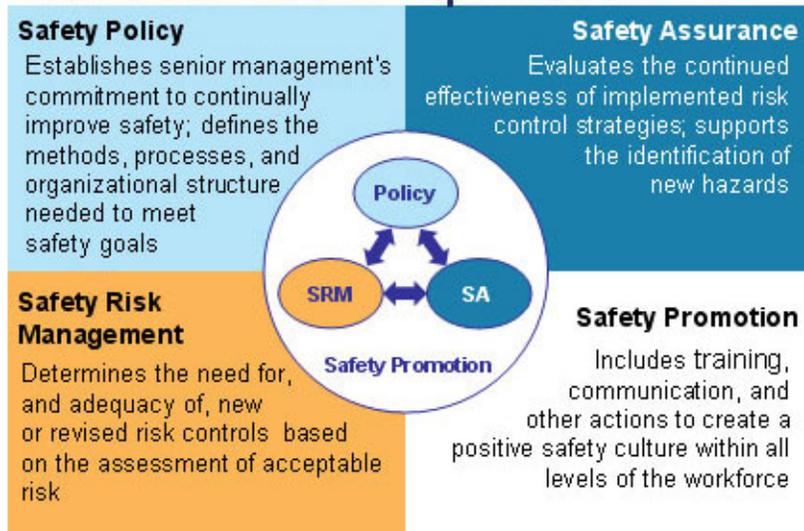


Figure 3-2 Four Components of FAA SMS

FAA's strategy to continuously improve runway safety uses the information provided by front line employees to address safety concerns proactively. A near-term action item from the FAA Administrator's Runway Safety Call to Action⁶ was the creation of a voluntary safety reporting program for ATO operational employees. The Air Traffic Safety Action Program (ATSAP) and the Technical Operations Safety Action Program (T-SAP) enables the reporting of safety issues by lower level employees to management and the safety organizations within the FAA.

3.3.1 Front Line Employee Communications -- Bottom Up

The FAA has established two key front line communication channels that provide critical air traffic safety information to the operational and oversight authorities within the FAA. These two programs are modeled on the Aviation Safety Action Programs⁷ (ASAP). The ATSAP and T-SAP provide air traffic controllers and Technical Operations employees with a web-based electronic system for the confidential reporting of safety related events or issues. The reports are evaluated by an Event Review Committee (ERC) comprised of experienced personnel who represent the interest of the three key stakeholders: management, labor, and the internal FAA safety oversight authority. The ERC is charged with ensuring each safety report is addressed appropriately. ATSAP achieved

⁶In August, 2007, FAA Administrator Marion Blakey issued a "Call to Action" to the U.S. aviation industry. Hosted at FAA Headquarters in Washington D.C., the Call to Action resulted in several short and longer term actions to improve the safety of nation's airports. The actions focused on solutions in cockpit procedures, airport signage and markings, air traffic procedures and implementation of technology.

⁷Aviation Safety Action Programs (ASAP) are one of the voluntary reporting systems designed to encourage reporting of safety issues and events that come to the attention of operational employees. Enforcement-related incentives are designed into the program to encourage an employee to voluntarily report safety issues even though they may involve an alleged violation of Title 14 of the Code of Federal Regulations (14 CFR). An airline ASAP is based on a safety partnership that includes the FAA and the certificate holder, and may include any third party such as the employee's labor organization.

nationwide implementation in October 2010 and has received over 57,000 safety-related reports to date. T-SAP is currently in the demonstration phase within specific regional areas. Both ATSAP and T-SAP are providing critical qualitative information to the SMS while maintaining the confidentiality required by the programs.

Similar to airlines' safety action programs, ATSAP and T-SAP are voluntary reporting programs. The electronically-filed reports are collected and processed by ERCs. These committees are staffed by representatives from management, the oversight organization and the National Air Traffic Controllers Association (NATCA). Collated data provides the ERC with actionable information which is transmitted to the responsible FAA division through the use of tracked ATSAP Information Requests (AIR) and Corrective Action Requests (CARs).



Figure 3-3 ATSAP Reporting Process

ATSAP and T-SAP creates the ability to generate front line communication from over 25,000 operational personnel and direct it towards the appropriate organizational level within every FAA Line of Business (LOB), such as:

- Data on a wide range of subjects may be requested from the ATSAP database. Recent queries for runway safety related data include
 - Support of 2012 Recurrent Training for air traffic controllers
- On the Job Training Instruction (OJTI)
- Aviation Safety Information Analysis and Sharing (ASIAS) directed studies concerning
 - Pilot/Controller communications
- Human factors issues in Air Traffic Control (ATC) handoffs
- Separation standards
- Notices to Airman (NOTAMs)

- Airport Surface Detection Equipment - Model X (ASDE-X) studies

FAAJO 7200.20 established ATSAP as a Voluntary Safety Reporting Program (VSRP). The Order outlines the responsibilities of individuals and organizations. This includes requirements, expectations, and policy under which the identified programs operate. The ATO voluntary safety reporting systems are foundational programs of the SMS and serve as a means to facilitate communication of a broad range of safety concerns from lower level employees to service unit executives in the ATO.

3.3.2 Frontline Manager Communication Information – Top Down

Through the development of the SMS, VSRPs, and enhanced QA measures, frontline managers are gaining insights into day-to-day operations that were previously unknown to them. This information provides front line employees with real-time aviation safety data, including granular runway safety data, available through the ATO Safety and Technical Training Dashboard.

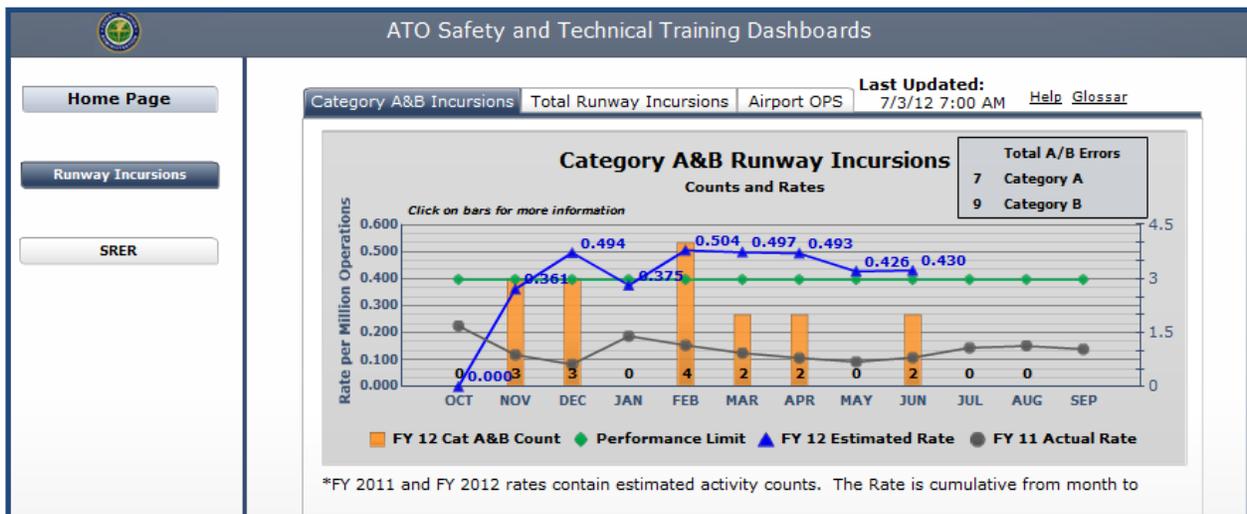


Figure 3-4 Runway Incursion Section of the Dashboard

Partnership For Safety (PFS)

PFS consists of collaborative, integrated safety teams, including frontline managers and facility personnel, who are focusing on the identification of local issues and the development of local solutions. PFS 'Lessons Learned' are communicated at the facility level and are collated at the Service Center level for nationwide distribution so that other facilities can benefit from those lessons.

The FAA continues to refine these paths of communication – including facility, regional, and national levels – to best implement its communication strategy and provide real-time information on day-to-day operations.

3.3.3 ATSAP Positives

An ATSAP Positive is a reported safety issue that may otherwise not have been identified and therefore not resolved. The *ATSAP Positives Bulletin* is published

quarterly and serves as a means to communicate the accomplishments of the program to all levels of the organization.

The following example is an ATSAP Positive excerpted from a past *ATSAP Positives Bulletin* that resulted in steps to reduce runway safety risk at an airport.

Issue:

Numerous ATSAP reports were received in regards to a runway hold short line that had been displaced approximately 800 feet from the runway. Pilots were missing the new hold short line and proceeding to the old hold short line on the taxiway. It was indicated that these incidents happen on a regular basis.

Potential Hazard:

Non-standard hold short lines cause a runway incursion.

Positive:

Following Event Review Committee (ERC) investigation via an ATSAP Information Request (AIR), the airport authority decided to modify the construction schedule.

Figure 3-5 Example of ATSAP Positive

3.3.4 Aviation Safety Information Analysis and Sharing (ASIAS)

Runway safety is a responsibility collaboratively shared by pilots, air traffic controllers, as well as those driving vehicles on runways. FAA is enhancing the means to analyze broader sets of data from those sources as possible through the Aviation Safety Information Analysis and Sharing (ASIAS) program. ASIAS connects multiple proprietary and publically available safety databases in order to enable unique analytical capabilities and information to all participating members. This multi-faceted collection of shared operational experiences, along with the efforts to coalesce diverse safety related data, is yielding an improved understanding of relevant surface safety risks and aiding the development of mitigating actions.

ASIAS creates the means for the FAA and industry to generate a composite understanding of systemic safety issues. In the ATSAP Positive example above, the air traffic reports of runway incursions (ATSAP), the flight crew perspective (ASAP), any involvement by ground personnel (T-SAP or Aviation Safety Reporting System reports), and applicable playback of surface and airborne radar tracks that result in an enhanced understanding of the factors which resulted in repeated incidents. Understanding where and how risk is generated helps leadership design future systems and prioritize resources.

4. Conducting Periodic Random Audits of the Oversight Process

The FAA is building additional oversight capability within the Agency's Safety Management System (SMS) to enhance the auditing functions required by an internally regulated entity. The SMS builds in capability to continually assess risk-based metrics and provides an auditing mechanism to assure adequacy of control measures, effective service delivery operation, and compliance with official guidance. The visibility created by the Quality Assurance (QA) and Quality Control (QC) mechanisms supports internal and external auditing activities.

The FAA's move towards a more systemic, risk-based view of safety creates the processes to differentiate between the QA and QC roles. QA is responsible for identifying safety trends, ensuring all policies and procedures are followed, as well as appropriate corrective actions. QC is responsible for ensuring that the quality of air traffic services is maintained at the point of service delivery. The combination of QA and QC provides a clear view of the quality of service delivery, as well as compliance with applicable regulatory guidance. QC also provides data for periodic and random audits for internal and external auditors.

Audits are dependent upon the availability and organization of data. Runway Safety Action Teams (RSATs) were initially tasked to survey and assess hazards and risks at specific airports. The evolution of risk-based safety systems increasingly utilizes the RSAT as an auditing and oversight mechanism. Hazards and action items for specific airports are identified by Local Runway Safety Action Teams (LRSATs), recorded in the Local Runway Safety Action Plan (LRSAP), and logged in the Runway Safety Tracking System (RSTS). As a function of the Regional Runway Safety Governance Council, members of the Regional Runway Safety Program Managers (RRSPMs) will actively audit the LRSAPs to ensure the identified deficiencies are corrected.

In addition to Runway Safety QA/QC functions, certification inspectors from the FAA Office of Airports Safety and Standards (AAS) conduct annual inspections of each certificated airport. As part of that inspection, the condition of airport lighting, marking, and signs are noted to ensure they meet the requirements specified by the FAA's Advisory Circulars on airport lighting and pavement markings.⁸ Discrepancies are recorded in the AAS Certification and Compliance Information Management System. Resolution of findings and discrepancies are ensured by subsequent inspections.

The FAA is supporting the evolutionary development of these safety assurance mechanisms within the SMS, creating visibility and accountability for the users, auditors, and oversight authorities. Random and periodic audits are facilitated through the creation of common analysis codes, harmonization of risk management processes, and standardization of assessments. Merging audit processes inside the SMS will facilitate comprehensive understanding of the current status of airport infrastructure by ensuring that findings and open items are properly monitored.

⁸ AC 150/5340-1K, Standards for Airport Markings, September 03, 2010; AC 150/5345-53C, Airport Lighting and Certification Program and Addendum, June, 2012

5. Ensuring Proper Accountability

The FAA is accountable for the safety of the National Airspace System (NAS), including the airport surface areas. Effective September 16, 2010, the *Runway Safety Program Order* (FAA Order 7050.1A) updated policy, assigned roles and responsibilities, and delegated authority to offices in the three main FAA LOBs:

- Office of Airports - Airport Safety and Standards provides leadership and oversight to the aviation and airport community, including vehicular driver certification, compliance with airport surface markings, and lighting standards.
- Office of Aviation Safety - Flight Standards Service provides certification standards for pilots, mechanics, and others in safety-related positions and oversight of domestic and international air carriers with operations in the NAS.
- The ATO has two relevant Service Units:
 - ATO Safety and Technical Training is accountable for integrating safety standards into the provision of air traffic services, leading organizational efforts to manage risk, assuring quality standards, and is responsible for policy development and processes for improving operational safety within the ATO including the area of runway safety.
 - ATO Terminal Services provides safe and secure air traffic management across the NAS through FAA airport towers, FAA contract towers, and Terminal Radar Approach Control (TRACON) facilities.

Accountability is assured through compliance with the delegated roles and responsibilities outlined in the program order. Integrating information from the Runway Safety Tracking System, airport inspections, Local and Regional Runway Safety Action Plans, and Voluntary Safety Reporting Program CARs will ensure compliance with Order 7050.1A will be timely and accurately tracked.

6. Evolving Future Runway Safety Performance Evaluation

The FAA's Strategic Runway Safety Plan (the "Strategic Plan") includes a goal to:

Evolve runway safety event risk analysis through a surface Risk Analysis Process (RAP) and adopt target measures compatible with the System Risk Event Rate (SRER) process.

With the adoption of the FAA's System Risk Event Rate (SRER), the FAA is now able to assess the number of events as a result of better reporting and to use this additional information to more effectively assess risk.

The FAA has entered into a test phase for the development of a similar program to evaluate surface safety. The new surface Risk Analysis Process (RAP) uses a similar combination of air traffic control and flight crew subject matter experts, surface radar recording mechanisms, and voluntary reporting programs to aid in the determination of root cause and contributory factors.

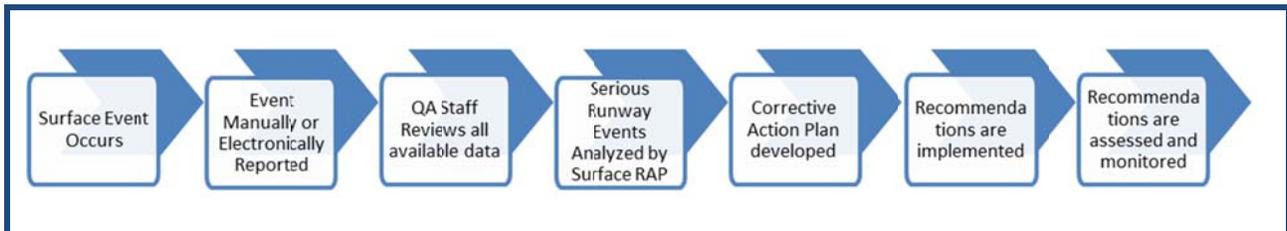


Figure 6-1 Surface Risk Analysis Process

The ability to merge airborne and surface risk analyses using common analysis codes, common risk identification and weighting methodologies, as well as standardized metrics will allow the FAA to proactively address today's runway safety conditions and meet the challenges of tomorrow. Current risk assessment processes such as the RIAT and RCAT will help inform the surface risk assessment program. Merging expertise creates a systemic approach to tracking runway safety performance. This Evaluative Process will provide critical understanding of risk and will serve to inform the FAA of measures to continually identify and reduce the risk of runway operations.

7. Appendix A – Available Databases

Database	Responsible Entity	Description	Safety-Related Data Collected	Format
Aviation Safety Information Analysis and Sharing	FAA	Integrates aviation safety data from 46 safety databases and 40 participating airlines	Accidents, incidents, advisory information, aircraft information, statistical data	Narrative and quantitative
Aviation Safety Reporting System (ASRS)	National Aeronautical and Space Administration (NASA)	Contains voluntarily submitted aviation safety incident reports from industry personnel in the air and on the ground (e.g., flight attendants, air traffic controllers, ground crews and mechanics)	All types of safety events	Narrative and quantitative
Air Traffic Quality Assurance (ATQA)	FAA	Contains information recorded by air traffic controller supervisors, support specialists, and managers	Surface and airborne incidents	Quantitative
Air Traffic Safety Action Program (ATSAP)	FAA	Non-punitive, voluntary safety reporting program for air traffic controllers	Air-traffic controller safety issues including loss of separation	Narrative and quantitative information
Comprehensive Electronic Data Analysis and Reporting (CEDAR)	FAA	New web-based application to capture safety-related information, air traffic employee performance, and training data, manager resources.	Surface and airborne incidents	Narrative and quantitative
Performance Data and Analysis Reporting System (PDARS)	FAA	Digitally recorded flight plan and radar track data utilizing airborne and surface radar information	Surface and airborne	Quantitative
Traffic Analysis and Review Program (TARP)	FAA	Error detection system that automatically captures data on airborne losses of separation	Airborne losses of separation that occur while the aircraft is under the control of ATC control towers and terminal radar approach controls	Quantitative
Technical Operations Safety Action Program (T-SAP)	FAA	Non-punitive, voluntary safety reporting system for Technical Operations personnel	Technical Operations safety issues	Narrative and some quantitative information

Source: GAO, FAA, NASA

8. Appendix B – Acronym List

AIR	ATSAP Information Request
ASAP	Aviation Safety Action Program
ASDE-X	Airport Surface Detection System – Model X
ASIAS	Aviation Safety Information Analysis and Sharing
ASRS	Aviation Safety Reporting System
ATC	Air Traffic Control
ATO	Air Traffic Organization
ATQA	Air Traffic Quality Assurance
ATSAP	Air Traffic Safety Action Program
CAR	Corrective Action Request
CAST	Commercial Aviation Safety Team
CCMIS	Certification and Compliance Management Information System
CEDAR	Comprehensive Electronic Data Analysis and Reporting
ENR	Enrolled Bill (Final has passed both the House and Senate)
ERC	Event Review Committee
GAO	General Accounting Office
FAAJO	FAA Joint Order
LRSAP	Local Runway Safety Action Plan
LRSAT	Local Runway Safety Action Team
NASA	National Aeronautics and Space Administration
PFS	Partnerships For Safety
QA	Quality Assurance
QC	Quality Control
RAP	Risk Assessment Program
RCAT	Root Cause Analysis Team
RIAT	Runway Incursion Assessment Team
RRSPM	Regional Runway Safety Program Manager
RSAT	Runway Safety Action Team
RSC	Runway Safety Council
RSTS	Runway Safety Tracking System
SMS	Safety Management System
SRER	System Risk Event Rate
TARP	Traffic Analysis Review Program
TRACON	Terminal Radar Approach Control
T-SAP	Technical Operations Safety Action Program
VSRP	Voluntary Safety Reporting Program