

GLOBAL SAFETY INFORMATION PROJECT

# Information Sharing Toolkit

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## Welcome

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Thanks for your interest in enhancing aviation safety data collection and processing systems (SD-CPS). Information sharing for risk management is now necessary and inevitable. Sharing amplifies what your safety management system (SMS) processes alone can achieve in the real-time risk mitigations of daily operations, and reaches far beyond SMS to longer-term, collaborative initiatives that increase your awareness of risks everywhere.

This toolkit — a product of the Global Safety Information Project (GSIP) — concentrates on best practices of civil aviation authorities and aviation service providers — such as airlines, airports, air navigation service providers (ANSPs) and aviation maintenance and repair organizations — in information sharing. Flight Safety Foundation studied these best practices in 2015–2016 within the Asia and Pacific and Pan America regions. We urge all aviation safety professionals to consider the leading methods of data-derived information sharing to accomplish your own goals and the world’s common interest in risk management.

The Foundation first encourages strong SMS processes, then sees information sharing as a critical complementary process in an effective SDCPS. We expect that organizations like yours will continue to set annual objectives, such as specific measurable progress steps on safety performance indicators (SPIs), while collaborating with external counterparts to build robust information-sharing and comparative/benchmarking agreements, policies, procedures and technical platforms for analyzing risk data that will lead to effective mitigations of high-priority risks.

This toolkit also is part of the Foundation’s effort to help the aviation industry make the most of SDCPS in the near future, bolstered by the strong safety information protection measures covered in GSIP’s companion *Information Protection Toolkit*.

We also believe that beyond commercial air transport, certain underserved aviation industry sectors — for example, business aviation, charter/on-demand air carriers and helicopter operators — will benefit from information sharing and that existing practices likely will be translatable/adaptable by the other sectors without reinventing methods or safeguards.

Information sharing by aviation service providers has been increasing steadily within the two regions visited. Globally, subject matter experts say, the commercial aviation sector of the aviation industry could make significant strides by enhancing practical applications of the information sharing component of SDCPS. Aviation service providers already influence, and are influenced by, civil

aviation authorities, regional aviation safety groups, trade associations, manufacturers and other stakeholder organizations and sectors.

Updates of this toolkit will cover fundamental issues, challenges and solutions in information sharing to help you to identify high-value opportunities and to join initiatives well matched to your risk management priorities.

## Toolkit Introduction

Information sharing is intended to give you a broader perspective on risk, especially to detect hazards that may not be visible through your normal data streams. This practice triggers questions such as: What information should be shared between our airports and our airline? What information should be shared between airlines? What information should be shared among air navigation service providers? What information or data should be contributed by aviation service providers and by regulators to an objective third party for purposes of wider influence and joint analysis efforts?

The International Civil Aviation Organization (ICAO) expects these stakeholders' risk-management opportunities to thrive using standards and recommended practices for information sharing. One relevant recommendation says, "If a State, in the analysis of the information contained in its database, identifies safety matters considered to be of interest to other States, that State should forward such safety information to them as soon as possible." ICAO also says, as part of another recommendation, "Each State should promote the establishment of safety information sharing networks." Similarly, ICAO's Global Aviation Safety Plan positions safety information sharing as a practice meant to expand progressively among states as SPIs evolve, terminology and taxonomies become harmonized and state safety programs meet SDCPS objectives.

The *Information Sharing Toolkit*, partly based on input from focus group participants and subsequent feedback to our proposals from workshop participants, is a response to the participants' strong interest in forming relationships in which peers can benefit from the experiences of others. Like the participants, you may be open to creating/joining processes and venues to boost awareness of real-world examples of aspects such as choosing and analyzing SPIs, setting safety performance targets, using bow-tie diagram-based analyses, and other best practices.

As summarized in the companion *GSIP Toolkits Introduction*, *Data Collection Toolkit* and *Data Analysis Toolkit*, whether and how you agree to provide and to receive data-derived information may depend on what GSIP proposals call the *intensity level* of your SDCPS at a particular time in relation to peers and to other like-minded stakeholders (see the matrix on page 6).

- As in all GSIP toolkits, this one describes evolution of the aviation industry through the intensity levels. We envision stakeholders self-ranking their GSIP intensity level beginning with the most basic capabilities of an SDCPS. At this first level, information is generally handled and shared by one department or a work group within the organization, and people are assigned to develop the risk mitigations/solutions made within that organization. An SMS will lack effectiveness if the SPIs and the analysis of metrics are not shared with the people who have the ability to directly influence performance.
- At the second (higher) intensity level, your organization may be sharing information for risk management/familiarization across multiple work groups within one organization, or between peer stakeholders. This sharing of both the performance and the improvement actions increases the influence those mitigations exert on other divisions and other organizations.

If you can make a clear case for how your data analysis led to a specific mitigation that proved effective, other stakeholders are likely to adopt that practice or conduct a similar analysis of their operations. Sharing of such results often occurs at aviation safety conferences. Some safety professionals say these are the predominant venues where SMS risk-management interfaces occur. For example, one airline shares information on aircraft damage SPIs. That information also may be tracked by

several airports. At some point, these two aviation service providers also may exchange details of their results and actions related to their data analyses.

- At the third intensity level, stakeholders conduct data-derived information sharing across an entire organization, a geographic region or several sectors of the aviation industry to assure wide understanding of their methods and the implementation of related risk mitigations (e.g., peer to peer among stakeholders). This could be through structured or unstructured means. *Structured* refers to common definitions of performance calculations while *unstructured* means simply speaking to a specific risk study and explaining the results. At this level, any number of aviation service providers may share their SPI results and their stories of mitigation successes and remaining challenges.

The SPIs can be from a defined, standardized formula that all stakeholders adhere to separately under their own analysis programs. This offers at least a preliminary baseline view of performance for many service providers. Most often, this kind of information sharing is done with specific arrangements and is strictly confidential under agreements between the parties.

- At the fourth intensity level, your organization shares data-derived information within a category of aviation service providers and with civil aviation authorities to understand more about priority risks in the industry using the most sophisticated methodology, datasets/samples and risk mitigations.
- Quite often, parties under these agreements contract with a specialized information technology service to take raw data from many stakeholder organizations and to assemble key performance metrics throughout the industry. This enables the greatest degree of consistency for safety performance calculations. The approach also provides the most sophisticated capability for service providers to examine performance against a standardized — so-called “blind” (unbiased) — benchmark.

As a rule, this intensity level is possible only under strictest safety information protection agreements with equally strict governance and operating policies for its participants. At this level, key performance metrics — often those very close to inducing undesired aircraft states — can be fully examined. For example, data-derived information about loss of control-in flight precursors — such as aircraft overbank SPIs and approach-to-stall SPIs — can be understood by the industry across specific equipment and sectors of operation.

## Key Insights and Considerations

As safety information sharing expands throughout the world, the analytical power of bow-tie diagram-based analyses likely will reveal trends and patterns that show up in nearly every accident category. By applying appropriate techniques summarized in our *Data Analysis Toolkit*, you can determine where additional collaborative work and information sharing are indicated. The bow-tie techniques encourage stakeholders to come together to contribute de-identified operational data relevant to the specific bow-tie diagram and accident paths. They also make clear how the involvement of multiple stakeholders makes it possible to collectively assume responsibility for all threats, barriers and recovery actions.

Watch for new examples of stakeholders’ other best practices for information sharing as this website is updated.

Beliefs about safety information sharing can key off an assumption that if even more safety data were available for the stakeholder to analyze, the stakeholder automatically would be able to learn more. But we cannot count on scenarios in which such an increase in analytical power occurs immediately, or at all.

Information sharing so far has enabled stakeholders to accomplish or enhance SPIs and to review the following: SPI status against performance targets, actions for improved performance (to meet a target for an SPI), SPI status compared with other similar organizations and operations, pooling data

with others for structured analysis, structured information exchange of risk data with other organizations, sharing data via components of a bow-tie diagram-based analysis, publishing lessons learned from outcomes of mitigation efforts, sharing from regulator to aviation service provider, sharing among peer aviation service providers, and sharing among business partners or industry sectors.

Looking toward the near future, stakeholders participating in GSIP express the following needs and expectations: guidelines on who should manage data sharing and aggregated data analysis; guidelines on what data should be shared and in what formats; and industry-wide education on the purpose of data sharing, what resultant information is currently shared, and how the data and information are being analyzed. They also seek advanced techniques for aggregate-data analyses — including how to set safety baselines (benchmarks) and how to extend compatible data sharing technologies and processes across state boundaries.

In the Pan America region, for example, the Foundation learned that de-identified data and analytical results (safety information) are being shared within aviation service providers, operator-to-operator, ANSP-to-ANSP and operator-to-regulator. Information sharing occurs through meetings, forums, exchange programs, airline alliances and programs of civil aviation authorities.

Standards exist for information sharing that outlines the data types, trends and statistics required from stakeholder groups. Some regulators are collecting and analyzing shared data and holding conferences in which their expert feedback is provided regarding the results of various analyses. Feedback is also provided to organizations about current legislation, associated benefits and recommendations for risk mitigation in this context. Nevertheless, the civil aviation regulators tend to have limited access to the data being collected by operators because SMS is not fully implemented throughout Pan America, they said, and regulators have difficulty validating the data and information they receive during information sharing.

The degree to which civil aviation authorities support or conduct data sharing varies greatly within world regions, GSIP focus group participants said in 2015. Some regulators support data sharing via their own audits or inspections of aviation service providers and via ICAO assessments of state safety oversight, while other regulators either cannot or will not promote data sharing. The latter may involve safety culture issues or stakeholder concerns about punitive uses during regulatory oversight. Such local limitations often affect openness to information sharing beyond national or regional borders, they said.

Over time, plans call for our *Information Sharing Toolkit* to add links (under this subtitle) to include detailed examples of international best practices in data-driven collaboration, including references to critically important factors in safety information protection.

We hope that your stories, presented anonymously, along with lessons learned and testimonials on this website, will convey the success-factor details involved in information sharing. Examples of the data-visualization aspects of information sharing also are being curated to show the latest ways that aggregated event data, event rates and correlations of findings across data streams increase everyone's understanding and inspire replication.

## Guidance Resources

Regarding international expectations for safety data sharing in civil aviation, first check ICAO's standards and recommended practices, starting with Annex 19, *Safety Management*.

Some of ICAO's most relevant requirements and guidance to states regarding safety information sharing also provide valuable background for aviation service providers. These are in Annex 13, *Aircraft Accident and Incident Investigation*, in Annex 19 and in the *Code of Conduct on the Sharing and Use of Safety Information* (see Appendix E). Sources of data encompass public safety data (such as official reports of accident investigations and annual compilations of accident types, numbers, rates and trends), reportable occurrences, and safety program information (such as employee voluntary safety reports).

Other sources of information about current and future information sharing practices are publications by the U.S. Federal Aviation Administration's (FAA's) Aviation Safety Information Analysis and Sharing (ASIAS) program. This is a prime example of a collaborative and confidential government-industry process designed to detect event probabilities that individual service providers could not detect by themselves. ASIAS has been designed to help stakeholders to think objectively about whether a risk discovered is acceptable or unacceptable (i.e., whether it requires new or enhanced mitigations). The process currently is being used, for example, to study events involving flight crews' flap misconfigurations for takeoff.

As one of the aviation industry's most-watched international programs, ASIAS has proved that it is possible to incentivize airlines to join very large and secure information exchanges that allow for continuous analysis, special studies and querying of data in a shared data pool (a massive network of networks). One benefit, as noted, has been that participants are exposed to new forms of data collection and analysis that otherwise would be invisible to individual organizations.

### **Opportunities to Share**

From the outset of GSIP, Flight Safety Foundation has requested permission to curate and publish de-identified narratives about information sharing, drawing from experiences of other aviation safety organizations and professionals. We welcome you and fellow *Information Sharing Toolkit* website visitors to take advantage of this chance to advance and enrich the knowledge of your counterparts worldwide.

Others want to learn, for example, how you share/contribute de-identified, aggregated and other forms of information from flight data monitoring of routine operations, air traffic management safety data, aircraft maintenance and repair irregularities, internal accident/incident studies, audits/assessments, employee voluntary safety reporting systems and other confidential sources. Hundreds of GSIP participants and other individual stakeholders will appreciate the chance to learn from you and to share with you in return. GSIP will follow FAA-FSF confidentiality standards on vetting information if needed and protecting your privacy.

## Global Safety Information Project (GSIP) Overview Matrix Of Intensity Levels

Risk management is a tool for decision making and improving safety performance. As it is executed, additional learning continues to take place, which expands our knowledge on hazards and our horizons of influence. GSIP recognizes this ever-expanding growth of risk management and therefore incorporates a level of intensity across our toolkits. The following chart includes a simplified version of the different levels of intensity across all risk management safety activities.

	SMS Core Level	Expanded Level	Advanced Level	Industry Level
Data Collection	Data are collected to adequately monitor the normal hazards an organization may encounter and to support a functioning SMS.	Data are collected to understand both the hazards and exposure to operations with those hazards (e.g., <i>flight data acquisition systems</i> ).	Data are collected to advance understanding of primary causes and contributing factors (e.g., <i>monitored data through LOSA</i> ).	Data are collected to utilize and contribute to a larger industry understanding through bow tie organization of events (e.g., <i>data collection with industry partners</i> ).
Data Analysis	Data are analyzed to determine acceptable risks. Safety performance indicators with current status against objectives.	Data are analyzed to understand all direct hazards and their impact on undesired outcomes. Multiple hazards are each examined for their influence on risk.	Data are analyzed to understand all potential direct and indirect hazards and their impact on undesired outcomes.	Data are analyzed to understand all industry impacts on safety. The math behind paths leading to and from an undesired state are well understood.
Information Sharing	Information sharing of performance results is comprehensive within an organization (e.g., within one organization).	Information sharing of performance and key areas of linked performance is performed among divisions or industry peers at detailed levels (e.g., ANSP to ANSP).	Information sharing is across the industry for key risks and mitigations. Generally this is through presenting detailed independent investigative work in the data (e.g., ANSP to airline).	Information is shared and managed across the industry for benchmarking capabilities and emerging conditions. Cooperative analysis is conducted (e.g., pooled data).
Information Protection	Individuals and organizations are protected against disciplinary, civil, administrative and criminal proceedings, except in case of gross negligence, willful misconduct or criminal intent.	The protection extends to certain mandatory safety reporting systems. In Annex 13, the protection extends to final reports and investigation personnel.	Further protection mechanisms may be in place to implement just culture principles and cross-industry support for strong safety reporting cultures.	Protection is formalized at the highest level between countries through memorandums of understanding or similar agreements.

ANSP = air navigation service provider; LOSA = line operations quality assurance; SMS = safety management system