

Evolution of System Safety Oversight

Oversight of 14 CFR 121 air carriers is complex and dynamic. Furthermore, architects of change in the oversight environment are faced with the same problem as traffic engineers – the system must continue to handle the traffic while new roads are being built. FAA Flight Standards has the responsibility to build new roads but must still accommodate the industry's traffic in the meantime.

We are committed to implementing a systems safety approach to oversight, the Air Transportation Oversight System (ATOS), but we are equally committed to doing so in an intelligent, orderly fashion. To do this, it is continually important to evaluate current capabilities and limitations, to design a set of steps to resolve those limitations and increase capabilities, and continue to learn at each step.

The following outline begins in the past and moves into the future. It outlines how we have, are, and will evolve the systems approach to oversight.

Standardizing and Modernizing Oversight

In the 1980s, Flight Standards entered into the information age and also sought to bring more standardization to surveillance work programs. Before this, surveillance records were stored on paper at local offices. Work programs were largely defined locally. A series of efforts to provide computerized planning and record-keeping facilities resulted in the Program Tracking and Reporting Subsystem (PTRS). Standardized minimum surveillance planning requirements covering critical areas of certificate holders' operations were embodied in the National work Program Guidelines (NPG). Together, these tools provided a minimum baseline of surveillance activities and a means of planning, tracking and managing these surveillance activities and recording inspectors' observations in a common database.

Beginning to Think Systematically

In the mid-1990s, the Safety Performance Analysis System (SPAS) allowed the data to be consolidated and displayed, to allow Principal Inspectors to analyze the combined results of surveillance data and other information.

These NPG, PTRS, and SPAS are the primary tools that are used for most all certificate holders at present. However, review activities such as the 90-Day Safety Review pointed out important limitations to the capabilities provided by them. The surveillance program was not as systematic as possible and had no structured tools with which to identify risk and manage the oversight program accordingly. Furthermore, the NPG's required items often do not reflect the differences between certificate holders' situations or the complexity of large certificate holders. More was needed.

ATOS 1.0 and System Safety-Based Certification

In the late 1990s, Flight Standards began to develop a systems approach to oversight of 14 CFR 121 carriers. Regulatory requirements were grouped into a set of system, subsystem, and elements. A set of process quality characteristics were developed which became known as the safety attributes. These attributes are used to judge the design and performance of the carrier's systems. A set of structured tools was developed for evaluating design and performance of each system element. The developed system is referred to as ATOS version 1.0.

At the same time, the Certification Standardization Evaluation Team (CSET) was formed. Among other duties, CSET was tasked with coordinating and standardizing new entrant certification using system safety methods and tools.

At this time, however, only the "top ten" airlines, which accounted for 90% of the industry's annual passenger enplanements as involved in the ATOS program. This implementation is called "phase I" of ATOS. Also, after certification, new entrants were returned to traditional methods of surveillance planning, implementation, and analysis for continuing oversight. Flight Standards sought to expand the use of system safety methods with the eventual goal of implementing ATOS across the Part 121 industry.

Expanding System Safety

The Surveillance and Evaluation Program (SEP) introduced the system elements and risk indicators to Certificate Holding Offices for all carriers, beginning with "new entrants," those carriers that had been conducting Part 121 service less than five years, and later covering all Part 121 carriers. Tools were developed for Principal Inspectors to assess the overall risk situation of the carrier, document and analyze their observations, and to re-focus the surveillance program toward those areas where the highest risks were perceived. The dotted line on the graphic indicates that, while the ATOS program was not fully implemented, many important system safety features of the system were provided to all Part 121 Certificate Management teams.

The original SEP program was, however, an "overlay" on the traditional surveillance program. The program was still developed in a conventional fashion and "retargeted" at a later time. This resulted in considerable workload and additional complexity for managing the program.

Including Risk Management

Efforts to complete the modules of the ATOS program in the top ten CMTs were also underway. ATOS module 7 (Analysis) and module 8 (Implementation) were developed using the System Safety Process Model (SSPM), as recommended by the FAA Office of System Safety. At the same time, another working group applied the model to the SEP program. Using the SSPM in SEP not only allowed a clearer risk analysis and targeting approach, other enhancements placed these activities in the initial planning phase. This is referred to as SEP module III. The use of a common system safety model in both ATOS and pre-ATOS CMTs brought the programs closer together and gave new capabilities to all CMTs.

Improvement of Tools

Also during the 2001-2003 time frames, a project commenced to upgrade the job aids used for design and performance evaluation of the carrier's systems. Growing experience with the system and increasing knowledge of the safety attributes' contexts allowed a several groups of field inspectors to identify Job Task Items (JTI's) associated with each element. These JTI's are being included in a new version of the job aids, now referred to as "Data Collection Tools" or DCTs. Since they are an upgrade but still associated with the original ATOS version, they are being referred to as "1.x DCTs."

Another program that is being added to the system safety suite of tools is the Air Carrier Evaluation Program (ACEP). The ACEP, a replacement for the National Aviation Safety Inspection Program (NASIP), not only applies system safety principles to comprehensive or focused inspections of air carriers, it also allows for air carrier participation in the evaluation. In this case, findings of the joint evaluation result in a corrective action plan that handles compliance issues under a non-punitive self-disclosure agreement. However, FAA still retains the capability to conduct inspections independently, with normal enforcement procedures applying.

Providing Better Tools to More People

In spite of the system safety enhancements provided by the SEP program and continuing improvement efforts in ATOS, pre-ATOS carriers (non-top-ten) still must use traditional tools to conduct surveillance. Risk analysis is conducted using the ATOS elements but the resulting action plan must still be planned and assigned using PTRS activity codes, necessitating a translation. Once collected, another translation of the data must be made to conduct subsequent analyses. Furthermore, while new entrant carriers can be certificated using the ATOS design tool, the Safety Attribute Inspection (SAI), performance assessments of these elements must also be conducted largely with PTRS activities, even it the ATOS performance tool, the Element Performance Inspection (EPI) is used as a checklist. It is highly desirable to use a consistent set of tools throughout a carrier's oversight program. Likewise, it is also desirable to use a standardized set of tools across the Part 121 industry.

Based upon these limitations and the objective of further expanding the ATOS program, Flight Standards is considering moving the SEP program forward to SEP IV, where ATOS SAI's and EPI's will be used directly. The third dotted line on the graphic, as well as the earlier two, show how the ATOS and pre-ATOS programs are being tracked to bring increasing commonality of methods and tools.

During the FY01-03 timeframe, deployment of the 1.x DCT's and mod 7/8 at the top tem CMT's should also be completed.

Completing the Transition

ATOS is in use by 42 Certificate Management Teams. By the end of FY 07and ATOS Phase II, all Part 121 CMTs will be using ATOS, resulting in a single Part 121 air carrier oversight system.

ATOS is currently in use at:

- American Airlines
- United Airlines
- Delta Airlines
- US Airways
- America West
- Alaska Airlines
- Continental Airlines
- Northwest
- Southwest
- American Eagle
- Skywest
- Champion Airlines
- ExpressJet
- FEDEX
- UPS
- GoJet
- Trans States
- Ryan International
- Air Midwest
- Hawaiian Air
- Horizon Airlines
- AirTran
- ASA
- Comair
- Champlain Enterprises DBA Commutair
- Frontier Airlines
- Frontier Flying Service
- Everts Air
- Cargo 360
- Continental Micronesia
- Aloha
- Aviation Services
- Hawaii Island Air, dba Island Air
- Midwest Airlines
- SkyWay
- MESA
- Freedom Airlines
- Pinnacle Airlines
- ASTAR Airlines
- Tradewinds
- PACE Airlines
- Mountain Air Cargo

And Into the Future

Beginning in FY 04, the Systems Approach for Safety Oversight (SASO) program will begin. This program is designed to provide a common umbrella for safety oversight, using system safety methods, across all of FAA's oversight responsibilities.

Up to this point, all implementation of ATOS will have used progressively improved versions of ATOS version 1.0. Knowledge of better ways to collect and analyze data, evaluate the air carrier's systems, and utilize partnership safety efforts with the air carriers continues to accumulate. Furthermore, Flight Standards is also seeking to increase the effectiveness and efficiency of the ATOS system as a management tool. Expanding commitments, constrained resources, and high expectations for attainment of safety goals demand that we "work smarter."

The original version of ATOS, with its roots in the Surveillance Improvement Program (SIP), covers the gamut of the oversight program but still has a high surveillance orientation or "flavor." Current knowledge indicates that the orientation should be more oriented toward certification and continuous validation of that status. ATOS version 2.0 is, therefore, already in the planning stages. This version will take a completely new look at how we view the air carrier, plan, collect, and use data, and prioritize oversight activities for maximum safety benefit. ATOS 2.0 will also further apply modern quality management techniques as an integral "designed in" feature.

Lastly, in the years beyond, we must continue to evolve and adapt. It would be naïve to think that the program will ever be finished or that there can be a "final" version of ATOS. We must continue to learn, to recognize limitations of our programs and changes in the environment, and to apply this knowledge to continuous improvement. ATOS, therefore, will never be "done."