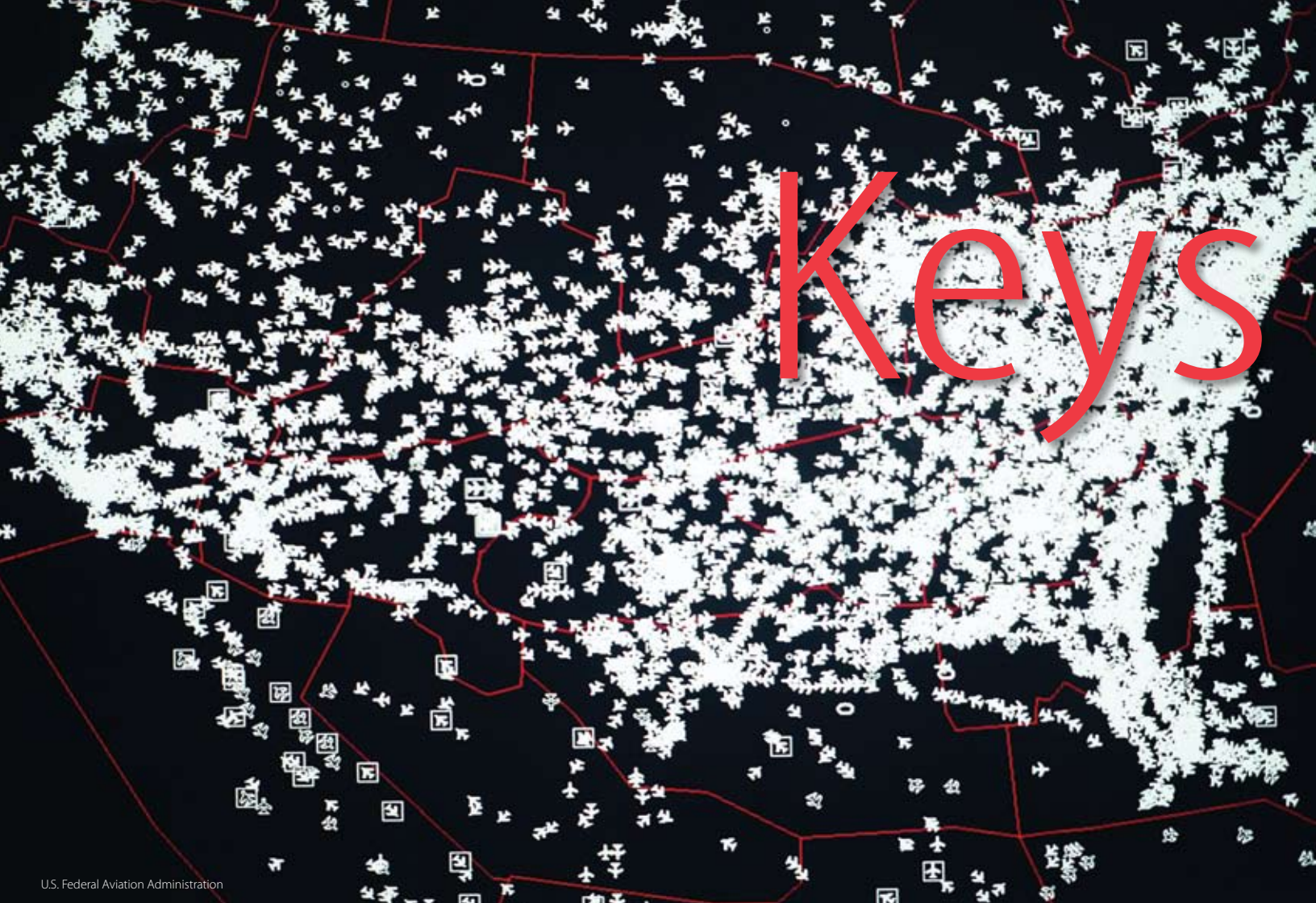


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# Keys

U.S. Federal Aviation Administration

## The FAA cites its safety record as proof a positive safety culture exists within its Air Traffic Organization. Others don't necessarily agree.

BY LINDA WERFELMAN

Safety culture, as defined by the U.S. Federal Aviation Administration (FAA), is the “product of individual and group values, attitudes, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, the organization’s management of safety.” Among the primary characteristics of a positive safety culture is “communications founded on mutual trust,” the FAA says.<sup>1</sup>

How does the FAA itself measure up in terms of the quality of the safety culture in place at the more than 300 FAA air traffic control facilities nationwide? Those most closely involved with the FAA Air Traffic Organization (ATO) differ in their assessments.

“Safety is our passion,” said Robert A. Sturgell, FAA deputy administrator and acting chief operating officer of the ATO. “The ATO, and the FAA as a whole, have a very strong safety culture. ... Pretty much everything this organization does is about safety.”

On the other hand, Darren T. Gaines, chairman of the National Air Traffic Controllers Association (NATCA) Air Safety Investigations Committee, said that the ATO “actually practices a blame and punishment culture” that has deteriorated over time. The organization is “a long way from emulating a just culture,” he said.<sup>2</sup>

*Continued on page 14.*



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# to Safety

**Non-punitive incident reporting is a cornerstone of air traffic control's multi-layer safety management in the United Kingdom.**

BY ANNE PAYLOR | FROM LONDON

In the United Kingdom, the regulator, service providers — including NATS, originally National Air Traffic Services — and industry have, over time, put in place a unique multi-layer system that fosters the optimum collection and dissemination of data to track and address potential or actual safety issues. It is a system that, for the most part, players agree works well.

The top layer of the U.K. system is mandatory incident reporting at the regulatory level. The Civil Aviation Authority (CAA) Mandatory Occurrence Reporting Scheme (MORS) has developed over the past 30 years and made, the CAA believes, “a real contribution to flight safety in U.K. civil aviation.” The CAA describes MORS as “one of the most important safety data resources for the CAA and industry.”

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### 'Emphasis on Safety'

The ATO — the largest provider of air traffic services in the world — was established by the FAA in 2004, in response to a directive from the president and Congress calling for development of a more effective, performance-based air navigation services organization. Data compiled for the organization's 2006 annual report show that air traffic controllers working for the ATO guide about 50,000 aircraft through the National Airspace System (NAS) every day. In the fiscal year that ended Oct. 1, 2006, the ATO met safety targets for reduced operational errors — errors involving aircraft separation requirements — and runway incursions. The annual report characterizes the U.S. air traffic system as the safest in the world.

"Our employees develop, test and deploy a variety of programs, systems and procedures to continually enhance

aviation safety," the report said. "The emphasis on safety permeates the organization at every level, from the technician in the field to the vice president on the executive council."

Sturgell said that in recent years, work has been done on various concepts that "can help move the safety ball forward," including development of a just culture and of safety management systems (SMSs) — a structure of systems to identify, describe, communicate, control, eliminate and track risks.

He signed an order in March 2007 for implementation of an ATO SMS; plans call for the SMS to be fully implemented by 2010.

Tony Mello, acting ATO vice president for safety services, said that guidelines were established in 2005 for applying the SMS process to any changes being made in the NAS.

"Any new procedure, any change to the NAS, we will run through the SMS process and do a safety risk-management document on it," Mello said. "I think we're maturing very well through it"

It is widely accepted that primary elements of an SMS are confidential, nonpunitive incident reporting systems, which the International Civil Aviation Organization (ICAO) characterizes as excellent tools for hazard identification. For the most part, these reporting systems are not yet in place within the ATO, although top FAA officials are "big believers in those kinds of systems," Sturgell said, adding that the ATO has plans to implement them.

"Being a former pilot, programs like ASAP [aviation safety action program, a voluntary safety reporting program that exists at many airlines] have proven to be very successful in helping the industry proactively address safety



issues,” Sturgell said. “It’s our full intention to move down that road in the air traffic organization.”

ASAPs are designed to encourage employees to voluntarily report safety information that “may be critical to identifying potential precursors to accidents,” the FAA said in an advisory circular describing the programs.<sup>3</sup> “The ... FAA has determined that identifying these precursors is essential to further reducing the already low accident rate.”

ASAPs are intended to help resolve safety issues through corrective action, not punishment. The safety data that are collected through ASAP reports are analyzed, and the information is “used to develop corrective actions for identified safety concerns and to educate the appropriate parties to prevent a reoccurrence of the same type of safety event,” the FAA said. A key provision of most ASAPs is that employees report safety-

critical information without fear that it will result in legal enforcement action or disciplinary action against them.

The FAA began an experimental ASAP program in spring 2007, but only for technicians working in a couple of ATO locations, Sturgell said; that program is likely to be expanded within 12 to 18 months to include all ATO technicians. ATO management already has discussed with NATCA the “long-term goal” of establishing a similar ASAP program for air traffic controllers, he said. In addition, a program established in 2002 to reduce runway incursions has a nonpunitive voluntary-reporting component.

Russell Gold, a staff engineer in the engineering and air safety division at the Air Line Pilots Association, International, said use of an ASAP would mark “a very interesting transition” for the ATO. “A nonpunitive type of environment

... that’s an environment they’ve never worked in before,” he said.

Gaines and other NATCA officials said that an ASAP program specifically for controllers would be one of the most important elements of a strong ATO safety culture.

“An ASAP program for controllers would go a long way toward fostering a safety culture within the ATO,” Gaines said.

Nevertheless, he added, “An ASAP program requires strict oversight and an element of mutual respect and trust with the employer. ATO is a long way from achieving this. ...

“There are individual managers at some facilities that try to do the right thing. However, they are severely restricted as to how they are allowed to manage their facilities. ... The ‘culture change’ must begin at the top of the organization.”

U.S. Federal Aviation Administration





The recent relationship between the ATO and its controllers has been strained — so strained that, in an August–September 2006 survey of ATO employees, only 9.3 percent said that they trust FAA management, and 8 percent said that they considered managers honest in sharing information with their workers.<sup>4</sup> The survey was taken about the same time that the FAA, responding to unsuccessful contract negotiations, authorized what it calls a contract — and what NATCA refers to as “imposed work rules.”

Sturgell recognized the lingering tension but said that it does not affect the ATO’s safety culture.

“The one area that the FAA and NATCA completely agree on is that safety is the foundation of this organization, and we would not compromise that,” Sturgell said. “Granted, labor discussions are tough, but you have to separate the institutional labor-management issues from the safety issues. I think both sides keep that, first and foremost, in mind.”

Gaines, however, said that the safety culture has suffered because controllers have no satisfactory forum for raising safety issues.

“Controllers are worried about possible discipline if they bring up any adverse policy, procedure or event dealing with safety implications,” Gaines said. “We are the largest air traffic service provider in the world and one of the few without the ability for controllers to adequately report safety deficiencies.”

This has not always been true, he said, citing a program no longer in effect that had allowed controllers to provide formal input into the technology and programs that affected their jobs, including radar and communications systems; the airport movement area safety system (AMASS), which alerts controllers to potential ground collisions at airports; and airport surface detection equipment (ASDE), which provides controllers with information on aircraft and other vehicles on runways and taxiways.

Gaines also cited a program that included a NATCA liaison to the FAA Office of Runway Safety; the liaison was responsible for raising safety issues and helping to develop methods of addressing them.

“Controller liaisons and project representatives ... helped engineer a workable product for controllers in the field ... and assist in designing appropriate training for controllers,” he said. “This was a great concept, as controllers designed equipment and procedures for controllers.”

This program also is no longer in place, Gaines said.

### Confidential Hotline

When an ASAP is implemented within the ATO, it will be in addition to an existing confidential telephone hotline reporting program that allows ATO employees to report “anything they consider unsafe, potentially unsafe or hazardous,” Sturgell said. “They’re the people on the front line who see and hear and know what affects the NAS, so we encourage honest and open reporting of anything, directly to us or through means ... such as the hotline.”

Up to three reports a week are submitted using the hotline, Sturgell said. Each report is forwarded to people within the ATO who are responsible for the specific area involved, and ATO officials subsequently follow up to ensure that the problem has been resolved, he said.

In addition, controllers can report safety concerns to their immediate supervisors or to the facility manager, Sturgell said.

“It’s really the first line they can go to,” Sturgell said. Controllers are most likely to raise safety concerns at the local level. These concerns typically involve a procedural issue that relates to one airport’s particular method of doing things.

For example, he said, one recent concern dealt with a separation issue involving the movement of aircraft on converging runways in Memphis, Tennessee. A controller took the issue to the local manager, who raised it with superiors; the same issue was the subject of a hotline report. Eventually, the controller’s concern was reported to officials at ATO headquarters, where a proposed procedural change was being developed in compliance with the SMS process, Sturgell said.

### ASRS Option

In addition to ATO reporting programs, controllers have the option of filing confidential reports of safety problems with the U.S. National Aeronautics and Space Administration Aviation Safety Reporting System (ASRS).

They may exercise this option relatively infrequently, however. Of 20,805 reports submitted to ASRS from September 2006 through February 2007, 1,278 — 6 percent — were filed by controllers. The vast majority of reports (88 percent) were filed by pilots.

A sampling of controller reports compiled by ASRS in January 2007 discussed a variety of concerns, including a faulty radio frequency; observations of aircraft in an instrument landing system (ILS) “critical zone,” where they interfered with the glideslope signal for aircraft being flown on ILS approaches; and controller errors in assessing required separation between en route aircraft.<sup>5</sup>

The ATO’s evaluation of the reports submitted by controllers to ASRS indicates that the majority discuss unsafe conditions related to pilot actions rather than procedural problems or safety concerns that directly affect controllers, Mello said.

### Lingering Issues

As of October 2006, more than 14,600 controllers were employed in ATO facilities. FAA plans call for the hiring of nearly 1,400 new controllers in 2007 and more than 15,000 controllers during the next decade, as many of those now on the job become eligible for retirement. Hiring plans include a range of authorized staffing numbers for all ATO facilities, “giving the agency greater flexibility to match the number of controllers with traffic volume and workload,” the FAA said.<sup>6</sup>

NATCA repeatedly cited understaffing at ATO facilities as one of several factors — along with the

resulting fatigue and low morale — that it says are damaging the ATO safety culture.

NATCA officials say that the FAA’s hiring plans are inadequate because the number of retirements will far exceed the agency’s projections.

“Without a concerted effort to attract experienced controllers and retain our current work force, the [air traffic control] system will continue to lose controllers, and that will mean flight delays, runway incursions and increased chance of aviation disasters,” NATCA President Patrick Forrey said in testimony in March 2007 before a congressional subcommittee.

“NATCA has found a direct relationship between staffing and safety, one that becomes even clearer over time, as the cumulative effect of long shifts, forced overtime, increased time on position and decreased personal time for family, rest and relaxation take a brutal toll on the mind and the body.



This, in turn, affects reaction times, judgment, focus and alertness. Fewer controllers in a facility means a rise in operational errors and runway incursions and a higher risk of safety problems due to the decreased margin of safety and lack of any room for error.”

Forrey also complained of “jail-house-like work rules,” that he said have forced sick controllers to report to work and to remain on the job, required one controller to use vacation or personal leave time to retrieve a pair of eyeglasses from his car in the parking lot, and banned all radios — including weather radios used to monitor local weather bulletins, especially tornado warnings.

“Just days after the radio ban took effect, a severe weather system spawned tornadoes near both DuPage Tower in Illinois and Lincoln Tower in Nebraska,” Forrey said. “With FAA management having removed radios from all towers under the imposed work rules, neither facility’s controllers knew of the impending danger nearby.

“At [Lincoln] ... tornado sirens sounded, an event that, according to controllers’ own orders, mandates the use of weather radios, radios and televisions to monitor the weather. But there was nothing in the tower to use. At DuPage, a tornado came within two miles [three kilometers] of the tower. But controllers had no way of seeing it because heavy rains reduced visibility to a quarter of a mile [403 meters]. ... The next day, the controllers notified the supervisor and stated that the radio that was in the tower, which management took away, would have alerted the staff sooner. The supervisor replied, ‘You should have looked out the window.’”

On May 30, Sturgell said in a message to ATO employees that, in addi-

tion to the array of weather data already available to controllers, weather radios would be provided in air traffic control towers to “provide an additional level of assurance for our controllers that they are receiving as much weather information as required to meet their personal needs.”

### ‘State of Fatigue’

The U.S. National Transportation Safety Board (NTSB) also has expressed concern about the effects of fatigue on job performance by air traffic controllers. In safety recommendations issued in April to the FAA and NATCA, the NTSB said that it had investigated several incidents between 2001 and 2006 that “provide clear and compelling evidence that controllers are sometimes operating in a state of fatigue because of their work schedules and poorly managed utilization of rest periods between shifts, and that fatigue has contributed to controller errors.”

The NTSB also cited its ongoing investigation of the Aug. 27, 2006, crash of a Comair Bombardier CRJ-100 during takeoff from the wrong runway at Blue Grass Airport in Lexington, Kentucky. The flight crew had been cleared for takeoff on the 7,000-ft (2,135-m) Runway 22, but mistakenly taxied onto Runway 26, which was only half as long. Forty-nine of the 50 people in the airplane were killed, and the airplane was destroyed.

The air traffic controller who issued the clearance — the only controller in the tower at the time of the accident — told investigators that after providing the clearance, he had turned away from the tower’s windows to perform an administrative task; he did not see the airplane move onto Runway 26 and did not witness the crash.<sup>7</sup>

The controller had worked from 0630 until 1430 local time the day before the accident, napped for about two hours and returned to work from 2330 until the accident at 0607 the following morning. At press time, investigators had not determined whether controller fatigue might have influenced the controller’s actions related to the accident.

“Such limited sleep can degrade alertness, vigilance and judgment,” the NTSB said in issuing safety recommendations that called on the FAA and NATCA to work together to “reduce the potential for controller fatigue” by revising work-scheduling policies to ensure adequate rest periods and minimal shift rotations. ●

### Notes

1. U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) 120-92, *Introduction to Safety Management Systems for Air Operators*. June 22, 2006.
2. A “just culture,” in which everyone is treated fairly, is considered one of the primary elements of safety culture. Safety specialists agree that in a just culture, people usually are not punished for unintentional errors.
3. FAA. AC 120-66B, *Aviation Safety Action Program (ASAP)*. Nov. 15, 2002.
4. Barr, Stephen. “Federal Diary: FAA Has Some Unhappy Controllers.” *The Washington Post*, April 23, 2007.
5. U.S. National Aeronautics and Space Administration Aviation Safety Reporting System (ASRS). *ASRS Database Report Set: Controller Reports*. Jan. 23, 2007.
6. FAA. *FAA’s Updated Hiring Plan Matches Controller Staffing to Air Traffic*. March 7, 2007.
7. U.S. National Transportation Safety Board (NTSB). *Update on NTSB Investigation Into the Crash of Comair Flight 5191*. Sept. 25, 2006.



Continued from page 13.

**M**ORS specifically relates to “any incident which endangers or which, if not corrected, would endanger an aircraft, its occupants or any other person,” as defined by the U.K. Air Navigation Order (ANO). Such incidents are detailed in Civil Aviation Publication (CAP) 382, but it is up to those involved to determine whether “endangerment is a factor” and thus whether the incident should be reported.

The CAA receives approximately 10,000 reports every year. Each is recorded and analyzed to ensure that the authority is aware of hazardous incidents and defects. The information is then disseminated as widely as possible to ensure that individuals and/or organizations can learn from them. In addition, the safety implications of each occurrence are assessed so that necessary remedial action can be taken.

The scheme has been operating since 1976, and the database now contains more than 150,000 records.

Significantly, the ANO says that “the sole objective of occurrence reporting is the prevention of accidents and incidents and not to attribute blame or liability.”

However, NATS, the primary service provider, found that MORS was failing to capture some occurrences “that we knew were happening, but which were not being reported because they did not meet the reporting criteria specified by MORS,” Steve McKie, head of safety performance and communication with the NATS Division of Safety, told *AeroSafety World*. “We recognized that MORS was the visible tip of the iceberg; we wanted to see what was going on beneath the surface.”

NATS believed that access to data outside the MORS criteria limits could help improve trend analysis, which in turn would enable the company to identify potential safety or operational problems before they could contribute to a reportable incident or accident.

With this objective in mind, the recently privatized NATS in 2003 implemented a second layer of purely voluntary reporting, which it describes



NATS

as a safety observation system. It uses the same electronic reporting form as MORS, but filters out non-mandatory reports for in-house analysis.

“About one-third of all reports processed through NATS come under the safety observation umbrella,” said McKie. The rest are channeled through to the CAA. Safety observation reports are then distributed to the appropriate department within NATS to be handled accordingly.

Like MORS, the NATS safety observation scheme is non-punitive, or as NATS prefers to describe it, “just.” McKie explained that the whole NATS safety management system is based on “just culture,” as defined in the company’s *Safety Management Manual*. The safety observations system, he said, “provides checks and balances to that.”

“We do of course reserve the right to act in cases involving gross negligence or willful operation outside the company’s safety rules,” said McKie. “So we prefer to define it as a ‘just’ rather than ‘no-blame’ culture. But the ultimate aim is to learn from the experience rather than punish the individual. Fear of punishment tends to discourage people from reporting. We want our people to talk to us; we want to know when there’s a

problem or potential problem that we can fix before it becomes a serious issue.”

Reporting rates are up, from just over 1,600 in 2005 to 1,700 last year, but McKie said that when compared with the number of aircraft handled, the reporting rate per 100,000 movements was actually up 10 percent. The number of serious incidents remained largely unchanged.

“We are very happy about the increase,” McKie said. “The more data we can get, the clearer the picture we get about the very real actions we can take to improve safety. Frankly, we would be happy to see the number of reports double. We derive very clear benefits from non-mandatory safety reporting; it helps us to detect the incidents we haven’t yet had.”

The system originally had a protracted manual feedback process, which meant that the person reporting an incident did not know for some time what action was taken in response to their report. This has now been streamlined, and all reports can be tracked on line.

“This gives people confidence that something positive is being done with their report and that submitting it is not a waste of time,” said McKie.

NATS is also improving investigator training for the 120 or so investigators it has at four en route centers and 16 airport units.

Controllers believe that the NATS system is a useful tool, and despite considerable skepticism at the outset, it is now highly regarded, according to John Levesley, president and CEO of the U.K. Guild of Air Traffic Control Officers (GATCO). “The just culture element of it is particularly important,” he said, “and controllers can see improvements made in direct response to reports.”

Because the safety observations system is restricted solely to NATS staff,

the company is starting to share de-identified incident data with a number of airlines with which it has established safety partnership agreements.

“Within a closed forum environment, the airlines and NATS share sensitive data from our respective in-house reporting systems in confidential surroundings,” McKie said. This allows for pilot input into the NATS system and, McKie said, NATS sees the benefits, especially in terms of early trend identification, in further expanding these safety partnership agreements.

In addition, NATS supports the Confidential Human Factors Incident Reporting Program (CHIRP), which is the third layer or safety net in the U.K. incident reporting chain.

CHIRP is an independent, confidential — though not anonymous — reporting system for all individuals employed in or associated with commercial and general aviation in the United Kingdom. It allows them to confidentially report incidents arising from human errors for analysis by the CHIRP Charitable Trust at Farnborough, England.

Set up in 1982, CHIRP specifically keeps the identity of each reporter confidential — anonymous reports are not normally acted upon because they cannot be validated. Personal details are not retained but are returned to the reporter on closure of the report. Only with the specific approval of the reporter is the information made available, in a de-identified form, to those who can take action to remedy the problem.

Important information, after being de-identified, is also disseminated through CHIRP publications and through quarterly reports mailed to every licensed commercial pilot and controller in the United Kingdom.



“CHIRP provides a means by which individuals are able to raise issues of concern without being identified to their peer group, management or the regulatory authority,” said Peter Tait, chief executive of CHIRP.

Although initially targeted at pilot groups, CHIRP in 1986 was expanded to include air traffic control (ATC) in a bid to stop disaffected controllers airing in the media grievances about the lack of infrastructure to accommodate the then-booming charter business. Today, an average of 25 to 30 of the 500 or so air transport reports each year are from controllers.

“Approximately half are related to phraseology issues between controllers and pilots,” said Tait. “Other key issues include inaccurate readback, handling/operations issues such as third party reports of pilots displaying poor airmanship, and human factors problems with equipment resulting from technological innovations.”

Tait said that controllers tend to use CHIRP as a second line of reporting if they believe, for example, that not enough is being done in response to a report into the NATS safety observation system. It is also open to



controllers who work for providers other than NATS, some of whom may not have access to an in-house reporting system.

“We are a conduit for information from the reporter to a ... review by people who are in a position to take action,” Tait said.

The fact that there are not more reports from controllers could reflect an improved safety management culture within NATS, said Tait, who pointed out that effective voluntary reporting systems inevitably have a positive impact on labor relations.

“The availability of an open or just company scheme with a non-punitive regulatory approach and the safety net of a CHIRP system removes many of the frustrations that tend to dominate the staff-management relationship,” said Tait. “That relationship can then focus on terms and conditions of employment rather than safety-related issues.”

Tait said he believes the U.K. multi-layer system is unique and works because of the implicit trust that exists between professional groups, shored up by a professional culture that differs from those in many other countries.

In Europe, poor incident reporting has been a consistent challenge to Eurocontrol’s efforts to assess the region’s safety situation. For example, a recent runway incursion study showed the United Kingdom to have a high rate of incidents compared with most of its European neighbors. This was subsequently attributed to the fact that many European states were unable to accurately report the level of runway incursions and had few data on the situation in their country, good or bad. As data collection has begun to improve, the number of runway incursions coming to light has also increased.

Year after year, the Eurocontrol Performance Review Commission (PRC) has reported lack of data as being an obstacle to safety improvement efforts. It argued that, as long as the region had only limited information on the safety situation, it was difficult to identify where improvements needed to be made.

In its recently published 2006 report, the PRC finally reported progress.

The report says, “Incident reporting has improved significantly since 2001, which gives better visibility on ATM [air traffic management] safety issues, and more opportunities to prevent accidents. ... This is encouraging.”

However, it points out that incident reporting “remains inadequate in a number of states.”

The report says this is primarily a result of significant legal impediments in many states and an immature safety reporting culture “in a significant number of ANSPs [air navigation service providers].”

The PRC says the legislative framework underpinning the aviation safety reporting systems in a number of states is inadequate, hindering these states from implementing systems that

protect the identity of the reporter and contain the elements for a just culture. It says that effective legislation “is crucial to the development of aviation safety in general and of ‘just culture’ in particular.”

It recommends that Eurocontrol, states and possibly the European Commission should tackle legal issues “with the relevant priority,” and it says an improvement to the safety reporting culture is “equally important, even if it may be more difficult to achieve.”

The PRC says that “in the absence of other indicators on which quantified targets could be set concerning ATM safety,” it supports the target that all European ANSPs and national ATM regulators “should reach the agreed minimum level of safety management and regulation maturity (70 percent) by the end of 2008.” ATM safety maturity scores reflect the presence of the relevant safety processes and documentation. Maturity levels above 70 percent are considered as acceptable at this stage.

The PRC 2006 report says the assessed safety maturity of ANSPs in Eurocontrol member states “has improved from an average of 55 percent in 2002 to 70 percent in 2006,” but it warns that 19 ANSPs remained below acceptable levels.

Concerning the maturity of national ATM regulators, the PRC says the situation is “less satisfactory.” The average level rose from 52 percent in 2002 to 65 percent in 2006, with one state not responding and three others still below the 40 percent maturity level. “Only 14 regulators were at or above the acceptable maturity level (70 percent) in 2006,” the report says.

“Safety maturity needs to reach a sufficient level in all states,” the report concludes. “This, *inter alia*, is a prerequisite for safety performance review.” ●