BY WAYNE ROSENKRANS | FROM SEOUL

Converging Agendas

Completing existing work plans will be essential to future aviation risk management.

Speakers from left, Voss and Huntzinger

Photos: Alan Bond

Accelerating the reduction of accident risks in airline flight operations requires implementing widely endorsed safety measures without being overwhelmed by industry growth, several presenters told the joint meeting of the 60th annual International Air Safety Seminar (IASS), International Federation of Airworthiness 37th International Conference and International Air Transport Association (IATA). Finishing tasks already planned will be the key element differentiating future aviation risk management from some past efforts, William R. Voss, FSF president and CEO, told the October meeting. "There does not seem to be a problem knowing how to do safety; there is a problem of implementation — of getting it done," Voss said.

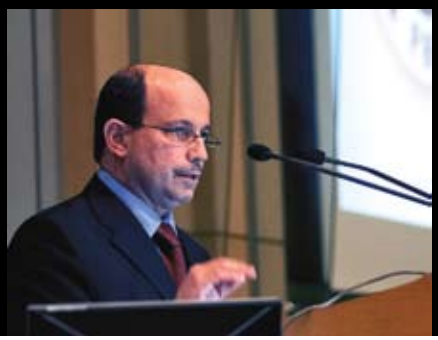
This imperative already is shifting Flight Safety Foundation's priorities to implementation of the *Global Aviation Safety Roadmap;* promoting safety management systems (SMSs); expanding threat and error management within business aviation; modernizing air traffic control; integrating runway safety efforts; and addressing the systemic threats induced by projected industry growth, insufficient qualified personnel, weak political will and criminalization of aircraft accidents. Legacy FSF initiatives, such as approach and landing accident reduction, will remain important priorities, Voss said.

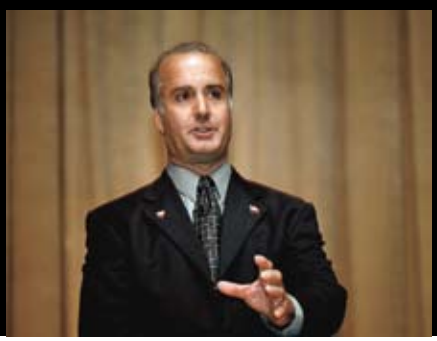
Although many aviation safety specialists have decried the practice of some governments of arresting aviation personnel involved in aircraft accidents and charging them with criminal offenses, the arguments must be articulated carefully, he said. "We are not going to change all the laws, we are not going to amend all the constitutions around the world, and we are not going to change all the hearts and minds of the public," Voss said. "But at the very least, we need to make sure that the prosecutors and the jurists/judges understand that there is a balance to be made — a tradeoff to be considered — between the need for justice and the need to support reporting systems that will save lives."

The worldwide airline industry is forecast to double in size within 20 to 25 years, with some of the most rapid growth projected in Asia and the Middle East. Yet, market forces also have decimated some airlines' ability to retain people. "The lack of qualified personnel has become acute in Asia and Africa and is emerging in Russia, Eastern Europe and the Middle East," Voss said. In some developing states, inadequate political will of civil aviation officials to override powerful economic interests in favor of safety also has become a major challenge, he said.

SMSs have begun to permeate civil aviation authorities, airlines, air traffic service providers and airports, among other elements of the industry, and in many cases they have been mandated. But enthusiasm can conceal the inertia of conventional systems. "SMSs clearly must be done by the aircraft operators and others and done well, but the trouble is that this involves, really, a fundamental overhaul of the regulatory system in the world," Voss said.

SMSs soon will have profoundly positive effects on organizations and individuals, said David Huntzinger, vice





president of safety, security and compliance for Korean Air. For example, as Korean Air has developed its SMS, risk-based predictive tools — such as a new predeparture threat and error management checklist — have been especially challenging. "Our checklist formalizes the flight crew's review of the flight, and it forces them to come up with corrective measures ahead of time," Huntzinger said. "Once you get an SMS done — looking at the things in front of you before they happen — you change the way you work forever."

Signs of Advances

Michael Comber of IATA reviewed follow-up activities of the Industry Safety Strategy Group (ISSG), which produced the *Roadmap,* and the International Civil Aviation Organization (ICAO). ICAO has absorbed the *Roadmap* into its processes and has begun working with states in Africa, the Middle East, Latin America and Southeast Asia under this framework. "ICAO's presence gives confidence to each state participating; the concept of the *Roadmap* is not to start with a blank sheet but to use what is already in a state or region in the best way possible," said Comber, director of ICAO relations and co-chairman of the ISSG. "What makes the *Roadmap* unique … is that it helps all the players involved to focus on important things and agree on where to put the investment first."

A novel technique for investigating "clusters of events" — based on greater awareness of seemingly unrelated accidents/incidents that reveal common patterns — has produced promising results, said Pierre Jouniaux, head of the Incident Investigation Division of the Bureau d'Enquêtes et d'Analyses (BEA) of France. Since 2003, the BEA has incorporated these findings into reports on icing, runway incursions, winter operations and midair collisions. The BEA also has applied this method to the Air France Airbus A340 runway overrun at Toronto in August 2005, comparing the accident with other occurrences involving convective weather. "Data for the past 10 years … show that runway excursions and abnormal contact with the runway happen all over the world and on a regular basis," Jouniaux said, citing an example in which the flight crew of an A340 landed 30 m (98 ft) short of the runway threshold at a French airport while unaware that their approach had become unstabilized at 150 ft. Causal factors included the autothrust response to wind shear, in which a headwind decreased from 23 kt to zero kt in four seconds, and suddenly reduced visibility in a rain shower. "The crew was aware of the wind shear, but they did not take any protective action," he said. "They did not brief for a go-around, and there were no criteria to tell them when an approach should be aborted in the presence of convective weather with cumulonimbus near the runway."

Following up the March 2005 publication of a consensus-based smoke/fire/fumes checklist template, the Air Line Pilots Association, International (ALPA) has called for adding equipment to aircraft to improve the flight crew's ability to detect and suppress in-flight fires, and to make appropriate decisions. Capt. H.G. "Boomer" Bombardi, ALPA's in-flight fire project team leader, said that Airbus and Boeing Commercial Airplanes — both participants in the checklist initiative — have factored the template into new aircraft-specific smoke/fire/fumes checklists. "Current aircraft systems do not provide adequate protection, detection or feedback, so it is tough to know whether you have the event under control," Bombardi said. ALPA wants the U.S. Federal Aviation Administration to mandate use of the standardized checklist and "to require all passenger and cargo transport category aircraft to be equipped with detection systems throughout the entire aircraft, extinguishing devices and a system of feedback monitoring."

Airbus and Boeing discussed technologies and training, respectively, to improve flight crew situational awareness and performance in uncommon scenarios. An Airbus specialist reviewed a new high-energy approach monitoring system and a new traffic-alert and collision avoidance system (TCAS) mode of the autopilot and flight director, which were in the

Speakers from left, Comber and Bombardi
Photos: Alan Bond and Wayne Rosenkrans

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process of certification on the Airbus A380 and expected to be on other Airbus types in 2008.

Airline pilots typically have ample instrument indications of a low-energy aircraft state during an approach, said Capt. Etienne Tarnowski, an Airbus experimental test pilot. "When an airplane is in a high-energy situation — for example, too high and too fast — pilots [may misperceive] the severity because the information presented to them is in the green zone [indicating normal operation]," Tarnowski said. "Many of us have the temptation to try to continue. … This is what leads to possible runway overruns, lateral excursions, short or hard landings, tire bursts and very hot brakes." The monitoring system provides on the navigation display a color-coded arc around the flight path, called the *standard energy circle arc,* "with an airplane symbol representing the present position and the circle arc [representing] the computed distance required for the airplane to descend and decelerate from the present altitude and speed down to the landing elevation at approach speed, assuming a given descent profile speed and flying technique." This arc assumes standard descent procedures while a *limit energy circle arc* shows the aircraft performance possible using speed brakes and configuration changes.

TCAS mode helps a flight crew to respond safely and consistently to TCAS resolution advisories (RAs). "[Relying on the pitch cue of the primary flight display] does not provide unambiguous information or prevent overreactions or opposite reactions," Tarnowski said. "During an RA [with autopilot on], the autopilot mode automatically reverts to the TCAS mode and the autopilot guides the [aircraft] with the required pitch authority [for a vertical rate of 1,600 fpm]. If the pilot is flying the aircraft with the flight director on when the RA occurs, the flight director vertical mode automatically reverts to TCAS mode so that if the pilot follows the flight director pitch bar … guidance provided by TCAS mode ensures the proper pitch authority required by the maneuver [and] the minimum deviation from the latest air traffic control clearance is actually achieved with no overreaction." When clear of the traffic conflict, TCAS mode assists the flight crew to return to the target altitude at a 1,000 fpm vertical rate.

Pilot education and simulator training remain essential elements in mitigating the threat of high altitude loss of control in large commercial jets, said Capt. Dave Carbaugh, chief pilot, flight operations safety, of Boeing. In the second quarter of 2007, an international industry team that developed the 1998 *Airplane Upset Recovery Training Aid* assigned a subteam to update guidance on upset threats in high-altitude operations via a supplement scheduled for release in January 2008. "The airplane is in a performance-limited condition [at high altitude, but] it does not have to be at the maximum limit — just initially near the limited condition — for other [factors] to have an impact and cause an incident," Carbaugh said. "Thunderstorm conditions associated with winds, turbulence and icing effects are a factor."

In normal operations, selection of an automation mode that provides an adequate margin of safety helps to prevent high-altitude upsets. "When selected, lateral navigation mode — provided the flight management computer is programmed correctly — should protect the airplane against too much bank and a possible stall situation," Carbaugh said. In events studied by the subteam, loss of control often has involved flight crews failing to maintain sufficient distance from convective weather, causing an inadvertent encounter with turbulence or icing associated with thunderstorms. The maneuvering to avoid thunderstorms itself could induce an upset if at high altitude the flight crew inadvertently keeps a bank-angle setting selected during low-altitude operation. If an upset occurs, flight crews cannot be reluctant to use the maximum thrust available during their recovery, and they must understand the consequences of improper rudder use, including the risk of structural failure, he said.

The 2007 IASS drew about 350 attendees. The next IASS will be Oct. 27–30, 2008, at the Sheraton Hotel and Resort Waikiki in Honolulu. ●