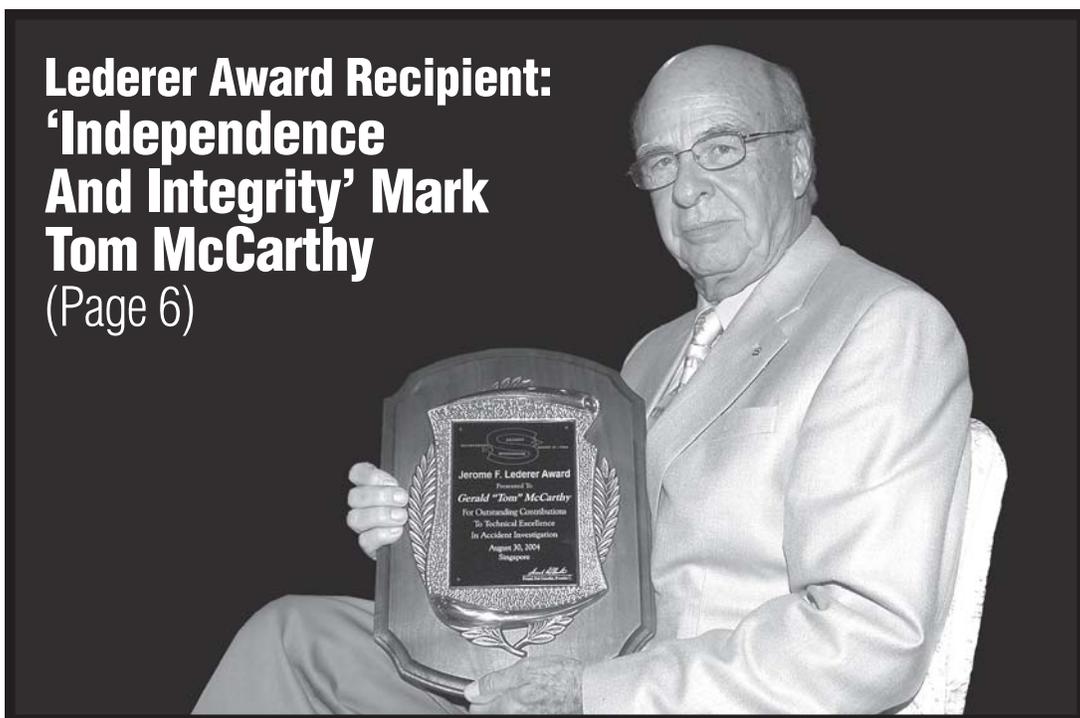


# ISASI FORUM

“Air Safety Through Investigation”

**Lederer Award Recipient:  
‘Independence  
And Integrity’ Mark  
Tom McCarthy**  
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Gerald "Tom" McCarthy displays his pride and the plaque that denotes his selection as the recipient of the ISASI 2007 Jerome F. Lederer Award, given for outstanding lifetime contribution in the field of aircraft accident investigation and prevention. (Photo by Kelly Chong, senior photographer, AAIB Singapore)



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## Welcome to Singapore!

By Frank Del Gandio, President



*(President Del Gandio's August 28 opening remarks to the delegates of ISASI 2007 have been abbreviated.—Editor)*

ISASI thanks our seminar hosts, Chan Wing Keong, director of the Air Accident Investigation Bureau of Singapore, and Barbara Dunn, who, as always, worked hard to ensure the success of this seminar. Also, our thanks to all the members of the seminar committee for their work and to everyone who helped to organize last week's tutorial programs at the Singapore Aviation Academy.

Five years ago, ISASI met in Taipei. That was the first time we had met in Asia, and I made the point then that Taipei was a powerful indication that the International Society of Air Safety Investigators was indeed an international organization. This week's meeting in Singapore introduces ISASI to South Asia. Much like Taipei, this is a powerful confirmation that ISASI is truly an international professional society.

Our theme is "International Cooperation: From Investigation Site to ICAO." The point of the theme is this: whatever we learn by investigating accidents will be of little practical use unless that learning is effectively shared with everyone in aviation.

The theme also suggests that all of us in this room today are really in the business of accident prevention as well as accident investigation. At a minimum, all the accident investigation authorities and civil aviation authorities represented here today seek to prevent accidents in their respective countries, but we also seek to prevent accidents elsewhere in the world. We do this for basic moral reasons, but we also do it because we understand that a major accident anywhere in the world reflects on all of us. We also do it because we understand that aviation was a truly global industry long before the term became popular, and we recognize that everyone's citizens fly in aircraft operated under foreign flags.

Today, the process of accident *prevention* employs a wide range of new tools or at least older tools that have been made much more capable by still relatively new data processing capacities, communication technology, data mining tools, etc. These new analytical tools hold real promise for the entire aviation safety community. One result is that, for the first time, we really have begun to analyze incidents and routine operations to identify new risks before they lead to accidents.

Yet, acquiring a fundamental understanding of accidents and serious incidents still begins at the accident site. In fact, the knowledge we have amassed from accident investigation has

been the foundation for defining risk in the first generations of FOQA programs and voluntary reporting programs. What we learn in accident investigations will continue to be the first step in accident prevention and mitigation. Investigations often confirm well-understood issues, but they also produce new knowledge and new recommendations for corrective action.

However, to be useful, any understanding we achieve must be shared with the entire aviation community, based on detached, professional investigation of all accidents and serious incidents. It also requires that such investigations are not complicated by the still far-too-common practice of criminalizing accidents.

"From Investigation Site to ICAO" also requires that the ICAO member states make their data and investigative findings available to the rest of the world. The vehicle for that data sharing is ICAO. The aviation community has come impressively close to eliminating those accident scenarios that, not many years ago, explained most major accidents. The task now is to drive risk even lower. The only way we can do that is by sharing

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**A**t a minimum, all the accident investigation authorities and civil aviation authorities represented here today seek to prevent accidents in their respective countries, but we also seek to prevent accidents elsewhere in the world.

information in a manner that makes it useful to everyone in our community.

Since we met last year, we have had nine major accidents, resulting in 857 fatalities.

This does not mean that aviation safety is on the verge of crisis; it is not. In fact, as IATA recently reported, 2006 was the safest year on record. By IATA's count, air carrier accidents decreased worldwide from 110 in 2005 to 77 in 2006, despite an increase in operations.

As all of us recognize, accidents can occur anywhere. That is why we seek new approaches and new tools for accident prevention in those countries where major accidents really are rare events. Yet, we also understand that many countries can still benefit greatly from more basic approaches. For either group of countries, sharing *and using* information from the accident site and from operational experience will make the system safer everywhere. ICAO remains the best vehicle by which sovereign countries can share data, safety knowledge, and good safety practice.

With that, I will close, but allow me to remind you that ISASI is proud to be in Singapore and we sincerely thank our hosts. ♦

# Sharing Experience and Knowledge

By Mark V. Rosenker, Chairman, U.S. National Transportation Safety Board

*(Remarks presented by Chairman Rosenker in his keynote address to the ISASI 2007 air accident investigation seminar delegates on Aug. 28, 2007, in Singapore.—Editor)*

**M**inister for Transport and Second Minister for Foreign Affairs, Raymond Lim, distinguished visitors, ladies and gentlemen, members of ISASI, and guests—on behalf of the organizers of ISASI 2007, Wing Keong Chong (who also goes by Chan Wing Keong) and the staff at the Singapore Air Accident Investigation Bureau, please allow me to welcome you to our venue here in Singapore and to the lovely Stamford hotel.

It is always a pleasure to return to Singapore; and since my first visit more than 20 years ago, each time I return, I am amazed at the continued growth and technical advancements that are taking place. Yesterday, I visited with corporate officials at Singapore Airlines to view some of that new technology. I was briefed on the challenges of integrating the A380 into the airline route structure. We are all aware of how big the airplane is, and it is equally interesting to observe the maintenance and crew training issues as they present themselves in the airline environment.

I'm also interested in viewing another transportation mode here in Singapore, the maritime sector. Of course, we are all interested in the surface movement of aircraft—and there is a similar challenge at the Singapore Port Facility. Singapore is No. 1 in the world for handling the movement of container ship traffic. The seaport traffic issues are very similar to those in aviation, where aviation is faced with ever-increasing air traffic volume and limited airport arrival and departure rates, with runway incursion and excursion risks; the marine sector has similar challenges with narrow ship channels and limited dock side berths. Singapore leads the industry with a tracking system equal to our aviation methods. In fact, it is already using technology similar to the automatic surveillance broadcast of the ship's GPS position for marine ship movement. So congratulations to you, Singapore, for showing such leadership in integrating a variety of new technology into our everyday lives.

Now it is time to talk about ISASI 2007. Let's start with the seminar title: "International Cooperation: From Investigation Site to ICAO." I believe we can take that title to mean working within the cooperative framework of international standards



PHOTOS: E. MARTINEZ

**Chairman Rosenker addresses the assembly.**

and recommended practices, and, further, to transfer vital information from an accident site anywhere in the world, with careful analysis along the way, to the offices and the staff of the International Civil Aviation Organization (ICAO) in Montreal. I've looked at the delegate list and note that we have representation from all continents of the globe. We know right away that our friends from South Asia and North Asia are well represented. And we see representation from all of Europe, the Mid East, and Russia. Looking further, Africa and Australia are here, and for the Americas, from Chile to Canada we have representation. This representation is truly the global approach desired by ICAO to permit the greatest exchange of ideas and international cooperation.

Now what do we do with these ideas? There are ample opportunities to apply multiple aviation safety initiatives through various avenues. There are local nation state opportunities, as well as action by regional organizations, and within the global framework. My agency, the U.S. NTSB, maintains an Internet website posting our "Most Wanted" list of safety recommendations. We try and keep the focus on those issues that offer the greatest potential for saving lives and avoiding a major disaster. As one example, we give the highest priority to reducing the risk of a runway collision. And we are certainly not alone. Just last month, the president of the ICAO Council, Roberto Kobeh Gonzalez, during an address to the Strategic Aviation Safety Summit in Bali, Indonesia, declared, "There is an urgent need to implement a concrete, realistic, and achievable plan of action." I fully endorse the words of President Kobeh. His personal attention to such issues will have lasting impact. And I believe we all can fully endorse ICAO's Global Aviation Safety Plan, and the industry developed the Global Aviation Safety Road Map to support the plan.

But I have to add something about the ICAO Road Map. As aviators, I believe you will be quick to recognize my point. When we discuss the roadmap, or any map, we know it will show you the direction to take—but it requires a commitment to reach your destination. In the case of the Global Aviation Safety Plan, we have to

address the commitment of states and operators to reach the intended safety objectives. That is where the ICAO Universal Safety Oversight Audit Program (USOAP) plays a very important part. The ICAO USOAP audit results provide identification of a state's capabilities to provide adequate safety oversight. As the audit cycle becomes complete in 2008, and with the agreement among states to release ICAO audit information to the public in 2009, the states not meeting their safety oversight responsibilities, those requiring assistance to improve their infrastructure and technical competence, will be well known. Thereafter, we should be looking toward each and every state's high-level commitment to its long-term sustainable safety responsibilities ... and to meet the milestones along the safety roadmap.

Let's take a moment to view the record of the aviation industry—and the ongoing safety efforts around the world. Consider for a moment the number of travelers—or the number of departures—that take place around the world every day. More than 2 billion passengers traveled by commercial air transportation in 2006. Certainly, we recognize the accidents that took place—and you will hear more about some of them during the seminar; however, we should also recognize that many of the safety improvements that aviation safety professionals and groups such as ISASI have promoted over the years are now providing the benefits we predicted. I'm referring to the professional crew training and the elevated standards of SOPs, adherence to the stabilized approach criteria, improved reliability of aircraft powerplants, and the very specific enhancements such as satellite navigation systems, moving map airport displays, and Enhanced Ground Proximity Warning and Traffic Collision Avoidance Systems. What we have to do now, ...today's challenge, is to maintain that momentum for an ever-increasing level of aviation safety.

As the industry moves to adopt the Safety Management Systems (SMS) approach, we have a unique opportunity to increase the level of safety—and to involve all the stakeholders in the solu-

tion. The industry has readily endorsed SMS objectives to find more efficient methods of safety data collection and to analyze that incident data in a proactive way to reduce the accident potential in our operations. With the SMS approach, the objective is to identify multiple risk factors and reduce or eliminate those risks, thereby providing intervention in the causal chain of events, with the end result to prevent major accidents before they occur.

However, we must be realistic—aviation is a human endeavor; unfortunately, air accidents and serious incidents will continue to occur. And related safety recommendations originating from those unfortunate events will be necessary. At every level of government and industry, we must be prepared for major accidents. We can see from the most recent occurrences that a major accident can quickly become a national crisis—with international consequences far beyond aviation interests.

So, we are gathered here today to share our experiences and knowledge in order to produce the best possible air safety investigations. We have a unique opportunity at ISASI 2007 to gain further insight into aviation safety initiatives from an outstanding group of presenters. And the topic list holds some very valuable subjects for each of us. We will hear about some recent investigations from a variety of locations, from Africa, from Indonesia, from Brazil, and from the oceanic area, to name a few. The airframes discussed will range from the general aviation Cessna and Cirrus to include the very light jets (VLJs) and extend to the most modern commercial transport airplanes—the complete spectrum of our industry.

As members of this unique professional Society, ISASI, I'm certain you are interested in the advancing investigative techniques. You won't be disappointed. Of course, flight recorders will be addressed, with views from several different perspectives. Also, there are several papers on the techniques and protocols of investigation with particular emphasis on the aspect of international cooperation. The cultural challenges of our variety of social systems that combine during an investigation are present in almost every investigation. National borders have become transparent in many ways—in the manufacture of the airframe and the various components, in the crew makeup and training of our personnel, in maintenance facilities, and with air traffic service providers. We are truly a multinational and fully global industry. Several speakers will discuss these cross-cultural challenges as they affect the workings of an air safety investigation.

Before closing, I'd like to make added mention of the importance of international cooperation and the need for harmonized best practices in investigation. This is especially true for those of us representing airplane-manufacturing states. Our industries desire to provide the most airworthy aircraft possible for the market place. To do this, we need to know how the aircraft perform in the market place, and when deficiencies occur. (continued on page 30)



**Chairman Rosenker speaks informally with Minister Raymond Lim (left). Looking on are ISASI 2007 host Chan Wing Keong and ISASI President Del Gandio.**

# Lederer Award Recipient: 'Independence And Integrity' Mark Tom McCarthy

**"...two things an investigator must have: independence and integrity. Independence to do the work without outside influence or pressure.... Integrity, without it true progress in accident investigation and prevention is not possible."**

**—Gerald "Tom" McCarthy**

By Esperison Martinez, Editor

**T**he many ASIs who know or have worked with Tom McCarthy are familiar with his warm, bright smile and deportment, which signal the nature of the man: friendly, soft-spoken, patient, disciplined, deliberate, confident, and staunch integrity. Those who never heard of Tom before, but sat in the audience at the ISASI 2007 Awards Banquet when he accepted the ISASI 2007 Jerome F. Lederer Award, were able to quickly discern for themselves his nature, including his exuberance.

ISASI President Frank Del Gandio declared it an "honor and a privilege" to present the Lederer Award to the man who has served at ISASI's treasurer for the past 12 years. In truth, that is probably the lesser of his service to the Society. As President Del Gandio told it, Tom joined ISASI in 1981 and his achievements "are nothing short of phenomenal." He has chaired the Membership and Nominating Committees for more than two decades; serves with the Ballot Certification Committee; was the ISASI 2003 seminar technical chairman; and is "Mr. Ready" at the headquarters office, doing jobs such as plumber, window washer, box mover, maintenance man, etc. All because "It has to get done."

Add to all of this the acumen Tom has demonstrated in reducing by thousands of dollars the operational costs the Society incurs for office space and taxes and in his development of a highly effective financial and budget reporting system and a



**President Del Gandio (right) presents the Lederer Award to Tom McCarthy. With the formalities over, Tom exhibits the exuberant side of his nature.**

person can understand why President Del Gandio told the assembled audience, "I really can't exist in ISASI without him, and he knows I mean that from the bottom of my heart."

But the Lederer Award isn't about serving ISASI—the Award is conferred for outstanding lifetime contribution in the field of aircraft accident investigation and prevention. It was created by the Society to honor its namesake for his leadership role in the world of aviation safety since its infancy. Tom McCarthy also fills that requirement.

President Del Gandio tells why: "For the past 54 years, Tom has dedicated his talents, endless energy, in-depth technical expertise, and 'can do' spirit to improve aviation safety, through accident investigation and in support of investigator mentoring programs. He was a command fighter pilot in the U.S. Air Force who served for 22 years and retired as a lieutenant colonel. For more than a decade of that time, he was an aviation safety officer who performed in-depth accident investigations, which resulted in numerous safety regulations effecting technical refinements, operational policies, and procedures that are still current to this day in the Air Force.

"Following his retirement, he joined the National Transportation Safety Board, eventually moving to senior investigator in charge of major 'go team' investigations. During his NTSB tenure, he investigated approximately 100 aircraft accidents, resulting in numerous safety recommendations and noteworthy improvements to the National Airspace System, which caused procedural changes to flight operations, dispatch, air traffic, airport operations, CFR response, as well as highlighting issues concerning aircraft engineering, maintenance processes, and policies. Later, he joined NASA, becoming the director of the Aircraft Management

Office. Again, analytical skills and lifelong experiences helped bring numerous changes to the operation and maintenance of the NASA fleet. Many of Tom's safety recommendations were adopted by the Interagency Committee for Aviation Policy and applied to all federally operated aircraft."

President Del Gandio closed his talk this way: "Tom's actions have shown him to be deeply dedicated to aviation safety, to accident investigation, and to safety mentoring programs to help prevent aircraft accidents. His contributions to the National Airspace System and our Society are monumental and make him truly worthy of being selected as the recipient of the coveted 2007 Jerome F. Lederer Award presented annually by ISASI.

A thunderous applause filled the banquet hall as the Award presentation ceremony took center stage. Then Tom took his place at the lectern. Following is his acceptance address, abbreviated:

"Thank you very much! To say that I am honored would be an understatement. I am a bit overwhelmed. It is truly a privilege to be in the estimable company of past selectees such as John Purvis, Ron Schleede, Ron Chippindale, and Caj Frostell who are all present here tonight. "The very first Society of Air Safety Investigators (SASI) international seminar was held in November 1970 at the Sheraton-Park Hotel in Washington, D.C., with 159 delegates in attendance. Jerry Lederer, SASI's second president, opened the seminar. These are his words:

"I want to welcome you to the first international seminar on air accident investigation. It's an experiment, which we hope will go far. It is an idea that meetings such as this would have positive effect by getting people to know one another before accidents happen in foreign lands. You'll have an opportunity to meet with people and discuss mutual problem areas. In addition, we will be able to exchange ideas on new techniques as well as old proven techniques on aircraft accident investigations.

"Much of the progress in the development of aviation safety has come from lessons learned from accident investigation. There is reason to believe that this will continue and that new techniques will be developed to aid the investigator to determine probable causes in less time with greater accuracy than in the past in spite of the incredible growth and complexity of aviation. The use of recorders, X-ray, improved photography, improved search and rescue, better training, formalized safety engineering, and the system approach to investigation are some techniques developed in the past decade or two that are transforming accident investigation from an art to a science. But it still remains a considerable art. We are here to help each other uncover and disseminate new ideas on developments in both the art and science of aircraft accident investigation."

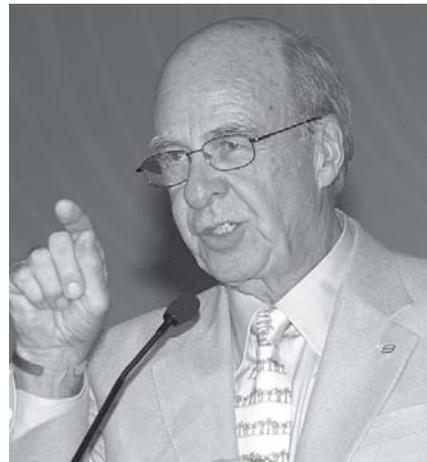
"As I sat at the opening of this 2007 seminar, I marveled at the intuition of Jerry Lederer and the growth of the seeds that he planted. Here we are, gathered in one of the premier cities of the world with hundreds of international delegates refining the art and science of aircraft accident investigation and prevention. The progress I've seen is astounding.

"Over the years' seminars, the demonstrated improvements in accident investigation and prevention are gratifying. I'm proud to be a part of all this. Let me give you a feel for Jerry Lederer. Did you know, for instance, that he inspected Lindbergh's aircraft before the history-making flight? That Jerry was a founder of the Flight Safety Foundation? That he became NASA's safety director as a result of the Apollo module fire and helped save the to-the-moon program? And that he was designated by the U.S. Congress as the Father of Aviation Safety?"

"My own career in the business started in the early 1960s. I was stationed in Minot, N.D., flying a wonderful new fighter, the F-106 Delta Dart. We got a new squadron commander, Col. Jack Broughton. He observed for a short while, had a meeting, and laid out his plan for the squadron's future. I agreed with his ideas except for one that Capt. McCarthy was to be the flight safety officer. I approached him after the meeting and asked to be relieved of that job since I was about to become a flight commander. He looked me in the eye and said, "You work for me, and I want

you to be the FSO." I answered, "Yes sir," and have been eternally grateful ever since. I joined a group of truly bright folks who are dedicated to saving lives.

"George van Epps, New York office, hired me at the NTSB. He was a great and humble man. He said, "This job is easy—all you have to do is work hard and tell the truth." I



**"Independence and integrity are all important," says the Award winner.**

have never forgotten that. There are two things an investigator must have: independence and integrity. Independence to do the work without outside influence or pressure and the independence that comes when the investigator has the knowledge and wherewithal to accomplish the required task. Integrity speaks for itself. Without it, true progress in accident investigation and prevention is not possible.

"I want to thank Frank; my fellow Council members, past and present; Ann; and the Awards Committee for their help in making this possible.

"There is truly no way to express my feelings. I'm humbled, I'm honored, I'm extremely grateful. But most of all, I'm pleased that you are all here to share this wonderful moment with me. Thanks!" ♦



## ISASI 2007 Trumpets Cooperation in 'Lion City'

**The ISASI 2007 theme “International Cooperation: From Investigation Site to ICAO” received a thorough airing during the 3-day assembly held in Singapore, which—according to legend—was once known as Singapura (Lion City).**

By Esperison Martinez, Editor

**T**he Society’s 38th annual international conference on air accident investigation attracted a well-mixed international group of accident investigators and related professionals. Final tally by the Air Accident Investigation Bureau of Singapore (AAIB Singapore), host for the near-week-long event, shows attendance of 303 delegates and 34 companions. Of those totals, 114 persons were from 19 Asian countries. During the 3 days of technical-paper presentations, the nagging issue of “cooperation,” which when withheld or grudgingly given can acutely affect aircraft accident investigations, was quieted by high-level regulators and field “tinkickers.”

In his opening address, Raymond Lim, Singapore Minister for Transport and Second Minister for Foreign Affairs, told the group, “I am heartened to see so many of you here, as it underscores the importance of international cooperation in aircraft accident investigation and your endless pursuit in honing the skills required in this area.” Commenting on the expected Asia passenger growth of 7.9 percent annually over the next 5 years and a doubling of the current 4.2 billion global passengers in the next 20 years, he said, “We must not allow ourselves to be lulled by the euphoria of a buoyant air travel industry and lose our focus on air safety...” He continued, “it is imperative that we strengthen our safety and accident investigation frameworks...In addition, the willingness to openly and professionally share ideas, experiences, and lessons learned from accident investigations is an important element in upgrading the safety standards in the aviation industry....”

He then spoke of the complexity of aviation-related accident investigations and the need for “governments and industry players to collaborate closely.” Doing so, he noted, “will help smooth

problems that an individual country’s investigation bodies may encounter as a result of the complexity of aircraft and air transport systems...It is also worthwhile for those which lack resources of their own to tap into an international network of investigators and safety professionals who can support them in their investigations, as well as share and exchange views on experiences, techniques, best practices, and relevant issues.” He closed by noting that Singapore is “continually striving to contribute to such cooperation initiatives.”

Globally, the need for, and manner of, collaborations and cooperation is outlined by ICAO’s Annex 13 to which all signatory states pledge adherence. That Annex was no doubt in the mind of keynote speaker Mark V. Rosenker, U.S. NTSB chairman, who said of the seminar’s theme “International Cooperation: From Investigation Site to ICAO,” “I believe we can take that title to mean working within the cooperative framework of international standards and recommended practices, and, further, to transfer vital information from an accident site anywhere in the world, with careful analysis along the way, to the offices and the staff of the International Civil Aviation Organization (ICAO) in Montreal.”

He proceeded to speak to industry actions that effect cooperation and in closing noted the “importance of international cooperation and the need for harmonized best practices in investigation... especially... for those of us representing airplane-manufacturing states. Our industry’s desire is to provide the most airworthy aircraft possible for the market place. To do this, we need to know how the aircraft perform in the market place, and when deficiencies do become apparent, to move swiftly to correct them—and avoid recurrence.”

In closing, he urged all to attend the ICAO Accident Investiga-

### Legend of the city



According to legend, Singapore was named by the visiting 14th century Sumatran Malay prince, Sang Nila Utama, who called the island Singapura (*singa*—lion, *pura*—city) when he thought he spotted a lion. But since lions have never lived there, he probably saw one of the many tigers that used to roam the island.

The ISASI 2007 logo is known as the Merlion Statue. It is a symbol of Singapore and guards the entrance to the Singapore River. First designed as an emblem for the Singapore Tourism Board in 1964, the lion head with a fish body (i.e., mermaid body) resting on a crest of waves quickly became Singapore’s icon to the rest of the world. The lion head symbolizes the legend of the rediscovery of Singapura; the fish tail symbolizes Singapore’s humble beginnings as a fishing village. ♦

**Photos of ISASI 2007 seminar activities are available for viewing online at [isasi.org](http://isasi.org) (follow screen instructions).**



**T. Wang holds the audience's attention with his Geographical Information System (GIS) browsing program on Internet platform presentation.**

tion and Prevention Divisional meeting (AIG 2008) in the fall of 2008. (See page 4 for his full text).

### Behind the scene

Standing at an elevated platform flanked by two giant video screens and looking out upon the more than 300 assembled delegates seated in a cavernous but comfortable conference hall in a 70-story ultra-luxury hotel, it is easy for both speakers and listeners to not give thought to the many challenges overcome by those who make the Society's annual international conference happen—and there are many. Among them are the

- Executive Council—evaluating and accepting host/venue bids that stretch 3 to 5 years ahead.
- Executive Council Seminar Chairperson—inviting, securing bids, investigating venue locations, and overseeing progress.
- Host—determining that it can accomplish the myriad tasks to make a successful seminar and related work to develop the committee, secure venue, sponsors, and venue support.
- Authors—developing and presenting technical papers.

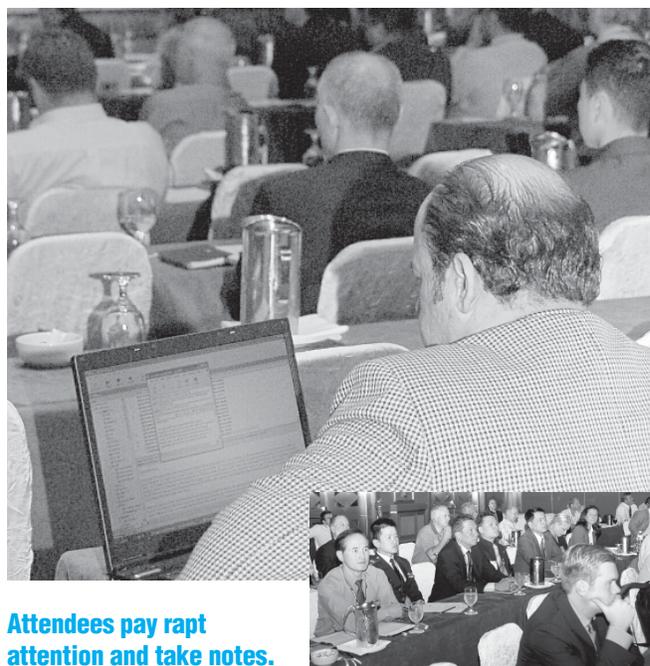


**Sharon Morphew (not shown) takes a last-minute registration, while volunteers help hand out welcome and program material to attendees.**

- Committee—evaluating and accepting papers.
- Delegates/companions—committing to a costly attendance.

This list is greatly abbreviated and diminishes the number of persons involved and the actual work that requires almost two years to complete to achieve the success delivered by ISASI 2007 and all past annual international conferences.

And a success it truly was, particularly from the perspective of Jerry Lederer who uttered his vision upon the opening of the Society's very first conference in 1970: *"It is an idea that meetings such as this would have positive effect by getting people to know one another before accidents happen in foreign lands. You'll have an opportunity to meet with people and discuss mutual problem areas. In addition, we will be able to exchange*



**Attendees pay rapt attention and take notes.**

*ideas on new techniques as well as old proven techniques on aircraft accident investigations."*

All his hopes were experienced: In the assembly room, whispered conversation was restricted to near seat mates, questions were jotted on paper to pose to panel members, presentations were followed and mentally filed for later discussions with "friends" yet to be met, and others tapped notes into laptop computers for future use. But the meaningful conversation occurred at those times designed for networking: coffee/tea breaks, group breakfasts and lunches, bus trips, social hours, and banquet night.

Chan Wing Keong, chairman of the seminar committee, said, "The AAIB would like to express its gratitude to the speakers for the high quality of the papers they produced and to the moderators for their able steering of the session. Credit must also be given to the support of the seminar participants without



**Breaks between sessions offer the perfect networking and interaction opportunities.**

whom the seminar would not have been such a success. We are most heartened by the kind words of encouragement that the participants have unstintingly heaped on the AAIB team.”

## Program

ISASI 2007’s program schedule kept to the traditional format: tutorials on Monday, technical programs the following 3 days, and a post-seminar social day on the fifth day. In all, a full week is devoted to the program. For many of the attendees, the time stretches to 7-plus days with travel included.

Seminar registration opened Sunday afternoon to accommodate the 137 persons who would attend the Monday tutorials. They departed the hotel at 7:30 a.m. for travel to the Singapore Aviation Academy (SAA), where the two day-long tutorials were conducted. For those persons who had not visited Singapore before, the 1-hour bus trip was a good opportunity to get a “commuter’s” view of the city’s green landscape, its modernistic architecture, the Western-dress pedestrian scene, and the late-model auto and truck traffic along its highways and byways. Conspicuous by absence was bicycle and motor-scooter traffic. The city’s skyline shows a significant number of high-rise housing and towering office buildings. The conference hotel, Swissotel The Stamford, soared up 70 floors.

Twenty-six presentations filled the technical program schedule. For this conference, the planners divided the available time into six sessions, two per day, four to five talks per session. Presentations included actual investigation discussions, use of innovative processes to aid investigations, and findings of studies related to investigation tools and processes. Most talks, in one way or another, delved into the international cooperation theme. Some spoke directly to the subject, such as the paper selected as “Best in Seminar” (see page 15.) Also, speaking directly to the theme were Russia’s Alexey N. Morozov, Interstate Aviation Committee, and Sylvain Ladiesse, BEA France, who spoke

of the cultural challenges in international investigation. All speakers, as a panel, took questions at the end of their given session. A listing of speakers and paper topics is located on page 11.

Marcus Costa, chief of the Accident Investigation and Prevention Section, ICAO, gave the program’s concluding remarks. He echoed and agreed with Lim’s and Rosenker’s (see page 4) comments regarding the need for vigilance of investigators and continued need for safety recommendations. He said, “Investigators are truly one of the main pillars to the advancement of the industry, as ... accidents are, in fact, catalysts to progress!”

He added, “Investigators sometimes do the unthinkable to properly and thoroughly identify the root causes and contributing factors of mishaps, no matter the potential pressures they might be forced to face. In the ‘hierarchy of needs’ of mankind, investigators are at the very peak of the triangle, where one pursues the truth: this is what we do when we investigate mishaps; we look for the truth no matter the consequences that might ensue. I would say that the aviation industry should never be allowed to overlook or underestimate our efforts, as the importance of investigations is timeless.”

He also commented on the October 2008 AIG Divisional meeting, saying that “Annex 13, Aircraft Accident and Incident Investigation, actually belongs to states and it is up to states to improve its provisions, and ICAO should be seen as the custodian of the Annex.” He reminded the audience of President Del Gandio’s opening remarks (see page 3) that “the vehicle for data sharing is ICAO.”



**ABOVE: T. Jen as she presents her “Aftermath of a Sea Crash” to the tutorial audience. BELOW: A tutorial group is shown a model of the Aviation Academy of Singapore and its grounds.**



## Speakers and Technical Papers Presented at ISASI 2007

**Welcome Remarks:** Frank Del Gandio, President, ISASI

**Opening Address:** Raymond Lim, Minister for Transport and Second Minister for Foreign Affairs

**Keynote Address:** Mark V. Rosenker, Chairman, U.S. National Transportation Safety Board

### SESSION 1—Moderator David McNair

Royal Australian Navy Sea King Accident Investigation Indonesia April 2, 2005—*Nicholas Athiniotis and Domenico Lombardo, Defence Science and Technology Organisation, Australia*

Russia/France: Safety an Cultural Challenges in International Investigations—*Alexey N. Morozov, Interstate Aviation Committee, Sylvain Ladiesse, and Martine Del Bono, BEA*

International Cooperation Paves the Runway for a Safer Sky—*Guo Fu, East China Administration, CAAC*

### SESSION 2—Moderator Sue Burdekin

Winter Operations and Friction Measurements—*Knut Londe, Accident Investigation Board Norway*

Utilisation of the Web-Based GIS to Assist Aviation Occurrences Investigation—*Dr. Michael Guan, Tian-Fu Yeh, and Dr. Hong T. Young, ASC*

Use of Reverse Engineering Techniques to Generate Data for Investigators—*Peter Coombs, AAIB U.K.*

Using Checklists as an Investigation Tool—*Al Weaver*

### SESSION 3—Moderator Alan Stray

Finding Nuggets: Cooperation Vital in Efforts to Recover Buried Data—*Christophe Menez, Jerome Progetti, and Martine Del Bono, BEA*

International Investigation: General Aviation Accident in Atlantic Waters—*Joseph Galliker, ASC International, Inc.*

Standardizing International Taxonomies for Data-Driven Prevention—*Corey Stephens, Air Line Pilots Association; Kyle Olsen, FAA; Oliver Ferrante, BEA; and Vivek Sood, FAA*

Mid-air Collision Over Brazilian Skies—A Lesson To Be Learned—*Col. Rufino Ferreira, Col. Carlos Pellegrino, and Col. Jose Mounir; Aeronautical Accident Investigation Commission (CENIPA); and William English, NTSB; and Nick Stoss, TSB Canada*

### SESSION 4—Moderator Richard Breuhaus

Convair 580 Accident Investigation: A Study in Synergy—*Ian McClelland, TAIC, New Zealand*

Tenerife to Today: What Have We Done in 30 Years to Prevent Recurrence?—*Ladislav Mika, Ministry of Transport, Czech Republic, and John Guselli, JCG Aviation Services*

Flight Data: What Every Investigator Should Know—*Michael Poole, Flightscape, Inc.; and Simon Lie, Boeing*

Sound Identification and Speaker Recognition for Aircraft CVR—*Yang Lin, Centre of Aviation Safety Technology, CAAC; Liu Enxiang; and Wu Anshan, Office of Aviation Safety, CAAC*

### SESSION 5—Moderator Danny Ho

International Cooperation and Challenges: Understanding Cross-Cultural Issues—*Dr. Don Harris, Cranfield University; Dr. Wen-Chin Li, National Defence University, and Thomas Wang and Dr. Hong T. Young, Taiwan ASC*

Very Light Jets: Implications for Safety and Accident Investigation—*Dr. Robert Matthews, FAA*

Enhanced Airborne Flight Recorder (EAFR): The New Black Box—*Jim Elliot, Smiths Aerospace*

RSAF: Analysis and Investigation—Tools and Techniques—*Lt. Col. Suresh Navaratnam, Republic of Singapore Air Force (RSAF)*

Wet Runway Accidents: The Role of Fatigue and Coercive Habits—*Capt. Mohan Ranganathan*

### SESSION 6—Moderator David King

ISASI International Working Group on Human Factors: A Progress Report—*Capt. Richard Stone, ISASI, and Dr. Randy Mumau, Boeing*

Three Nigerian Investigations—*Dennis Jones, NTSB*

Critical Aspects of International Incident Investigations—*Robert van Gelder, Deborah Lawrie, and Jan Smeitink, Independent Safety Investigation & Consultation Services*

Remarks on International Cooperation: An Indonesian Perspective—*Tatang Kurniadi, Chairman, National Transportation Safety Committee, Indonesia (scheduled speaker)* ♦

Noting the need for states to have a more comprehensive exchange of safety data among themselves, he encouraged all to use a data system comparable to the ECCAIRS/ADREP system of ICAO.

## Tutorials

Singapore Aviation Academy is looked upon as an oasis for learning. Its setting puts one at ease and relaxes the mind. ISASI delegates marveled at the courtyard that separated the pavilion in which the tutorials were conducted. The meeting rooms were in different wings, separated by a shimmering, deep blue-water-filled pool in which instruction is given. Nearby is a water/stone garden that creates a serene atmosphere. Good use was made of the area during the breaks of the two tutorials, which whetted the wits of the attendees. Each of the two tutorials was in a panel format of four and six members.

Tan Siew Huay, CAA Singapore, led the tutorial titled "ICAO Annex 13 Investigation in a Litigious Environment," which permitted speakers to describe how their agency's procedures met and interfaced with Annex 13 provisions. Speakers and topics discussed were Alan Stray, Australian Transport Safety Bureau, "In-

vestigation Reports." He also spoke on the conduct of the coroner's investigation in concert with the state investigation. Gary L. Halbert, general counsel, U.S. NTSB, addressed litigation and the trial, centering on use and misuse of investigation reports, admissibility of reports and records, discovery and the subpoena, and testimony by agency employee/agent.

Y.P. Tsang, deputy chief inspector of accidents, Hong Kong Civil Aviation Authority, described the state's Board of Review process, which is triggered by any interested party reading findings and conclusions of the report "from which it appears that his reputation is likely to be adversely affected." Tsang used an actual accident with fatalities to trace the Board's actions as required under regulations.

Remi Jouty, head of the Investigations Department, BEA France, discussed the "Relationship Between Safety Investigation and Judicial Inquiry in France." Lok Vi Ming, a partner in Rodyk and Davidson LLP, Singapore, received riveted audience attention when he discussed "Air Accident Investigators as Witnesses in Court Proceedings," relating the differences between the categories of "expert" witness and "factual" wit-



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SIA Engineering Company

Tiger Airways

### WRIGHT BROTHERS

Pratt & Whitney Canada

Singapore Air Show ♦

Rooij's presentation covered the lot, but the audience seemed most attentive to the company's involvement with TWA 800 recovery operations in July 1996. Rooij provided extensive details of SMIT's victim and debris search as well as its victim and wreckage recovery work all done at depths of 125 feet.

As if to demonstrate the evolution of ISASI'S 2007 theme, Jurgen Whyte, chief inspector of air accidents, Air Accident Investigation Unit (AAIU) Ireland, took the tutorial audience back to a 1985 crash. He titled his presentation "A Truly International Effort." He recapped the totality of the event and its investigation, from the time of the Air India's B-747 (Flight AI182) plunge into the international waters of the Atlantic 100 miles southwest of Ireland on June 23, 1985, at 07:14 GMT with a crew of 23 and 307 passengers. All perished. India

ness. He traced the roles of each, demonstrating what can be asked of each and what cannot, in court.

The second tutorial was of a totally different nature, dealing with matters pertaining to the "Aftermath of a Sea Crash." Chaired by David McNair, TSB Canada, Tracy Jen, of the Aviation Safety Council, Taiwan, used two underwater crash examples to relate the experiences of the ASC: a B-747-200 that crashed on May 25, 2002, killing 225 off Penghu Islands and an ATR 72-200 that crashed on Dec 21, 2002, killing two pilots in the Taiwan Strait. It was a lengthy PowerPoint presentation in which she used the two crashes as case studies to underwater recovery operations to provide the group the lessons learned in the areas of emergency response; intragovernment coordination; technical, logistic, and cost issues; and working with the news media and crash victim family issues.

Michael Kutzleb, CEO of Phoenix International, a company that provides underwater solutions worldwide, provided his company's impressive history relative to underwater recovery. He gave an overview of the equipment it used and its capability and provided operational examples of the company's methods in successful recoveries. He noted the 59 overwater mishaps that have occurred between 1970 and 2007. Phoenix has been involved in 23 aircraft and 1 spacecraft recovery effort. Among the roles Phoenix filled in investigations during the search phase were loss analysis, target location, and mapping, and in wreckage recovery the company is active in rigging, heavy lift, and human remains recovery, among other areas.

Hans van Rooij, of SMIT Salvage, also presented a company profile of its worldwide services with 25 strategically located offices and 3,000 employees that permit 1-day emergency response, salvage, and wreckage removal in which it has been most involved.

assumed responsibility of the investigation under the provisions of ICAO Annex 13 and coordinated and ran the entire investigation with international assistance. The success and magnitude of that assistance can best be assessed from the words of the then India Prime Minister Rajiv Gandhi to Ireland's Prime Minister. He conveyed his government's and people's "deep gratitude" to Ireland "for coming so readily to our assistance." He made special mention of thanks to the Cork Regional Hospital, the police, and the airport.

Dennis Jones, U.S. NTSB, brought some low-tech reality to the tutorial when he noted that not all water recovery work is in the oceans. He held everyone's close attention with his talk regarding the recovery work involving an aircraft that crashed into a Kenya swamp on May 5, 2007. Because the investigation is still ongoing, his presentation centered on the recovery of the aircraft and victims in a "swamp during the rainy season from a water hole the size of a 737." His photos of the "local low-cost recovery equipment" at work amazed all.

## Getting acquainted

The positive effect of getting people to know one another before meeting at an accident site is an intangible until it happens, but few can argue against the merits of making it possible. That is why ISASI conference hosts work so diligently at creating such opportunities. And the AAIB Singapore team did an exceptionally fine job, if the nods, handshakes, cluster conversations, and relaxed mood of the networking activities were any indication.

While the timing of a seminar event is dictated by the schedule, the nature of the event, before it happens, is always a question mark. ISASI 2007 dispelled any doubts of "nature" with its first social event held in the 70<sup>th</sup> floor "sky room" of the Stamford ho-



**Panel members respond to questions. ABOVE: Session panel, left to right, L. Anthinotas, D. Lombardo, S. Ladiesse, A. Morozov, G. Fu, and D. McNair (moderator); BELOW: Left to right, S. Burdkin, K. Londe, T. Wang, P. Coombs, and A. Weaver.**



tel. The panoramic view of Singapore afforded to the guests was merely a prelude to the culinary Asian and Western delicacies that adorned the serving tables around which greetings and talk abounded. The evening social lasted only several hours, but long enough to make attendees feel bonded at the opening of the ISASI 2007 program the next day.

A presidential prerogative during opening remarks is to announce the year's Jerome Lederer Award selectee (see page 6) and introduce winners of the ISASI Rudolph Kapustin Memorial Scholarship (see page 3, *Forum* July/September 2007). Both announcements received rousing audience response. The crowd's enthusiasm was no surprise to ISASI Vice-President Ron Schleede, who believes that "the ISASI Rudy Kapustin Memorial Scholarship program is one of the Society's best efforts in years and may be expanded." He intends to work closely with the International Council, the individual and corporate members, and other aviation industry officials to promote and expand the program to bring more youth to ISASI. "It just takes funding, which must come from donations of cash or in kind (airline tickets, etc.), and more excellent student applicants."

After a full day of sitting, relieved only by the much-appreciated extended coffee/tea breaks that more resembled a continental breakfast, attendees wonderingly looked forward to the evening's planned activity of a "night safari." With little time to change from conference dress to loose clothes, the group boarded busses for an evening of unexpected sights. First stop was the renowned Singapore zoo, where all walked along lighted paths past an array of wildlife. Many stopped to pose with a "petting" Asian elephant or watch the placid-looking, very large Orang Utans clinging to a tree perch. The walk led to a buffet-style meal under tarp

cover to ward of threatening rain. Many were still wondering what the "safari" would bring. At nightfall, the answer came. All boarded open trams that wheeled along a 3.2 km trail covering terrain resembling the rocky Himalayan foothills to the grassy plains of Equatorial Africa. The entire setting was bathed in shadowy half-light so that the uncaged rhinos, elephants, giraffes, tapirs, tigers, and lions were largely oblivious to those riding in the trams and gasping at the sights a stone's throw away from them.

The enchantment of the evening was repeated in all the social events planned by the seminar hosts—the climax of which was the highly entertaining dancing exhibitions in traditional costume dress displayed during the Awards Banquet. The post-seminar daytrip was also a marvel, filled with the wonders of Singapore's island resort, Sentosa. Just getting there in the cable car system that moved 90 meters above the water and gave breathtaking sights of tropical forests, city skyscrapers, and a ship-filled harbor dotted with small islands was an unforgettable experience. The island resort offered many other equally absorbing sights and events.

But it is the companions who really get to see the city and its attractions. In addition to the all-group events, companions were treated to a 2-day program filled with excursions through museums and botanic gardens offering a massive array of blooms and colors, such as 20,000 orchid plants of more than 1,000 different species. Also on the schedule was a river boat trip, which gave a different perspective than one gets from a bus window or walking. Still, walking through Chinatown, with its endless stalls of merchandise, makes for an forgettable experience as did the tour through Singapore's Indian community with its spice-scented streets. Also making an impression was the unpredictable weather that more often than not brought showers. Other not-to-be-forgotten experiences were the delicate tastes of the local lunch dishes and, for some, the manipulation of chop sticks in lieu of Western dinnerware.

### Seminar finale

It is the evening before the post-seminar experience that is *the* "social" event of the seminar: Awards Banquet night. The more than 300 attendees and companions were ready to relax and honor peers.

Relaxation came with the considerable milling about and en-



**President Del Gandio offers congratulations to scholarship winners Philip Gregory and Ruth Martin (left).**



**AAIB seminar committee, left to right, Michael Toft, Arik Tan, Chee Ping Swee, Tan Hak Soon, Ho See Hai, Chan Wing Keong (chairman), Chong Chow Wah, David Lim, and Goh Kay Boon.**

thrilling dance exhibitions in native costume that preceded the 9-course dinner prepared and served Chinese style.

Later in the evening, President Del Gandio recognized the three recipients of the ISASI Rudolf Kapustin Memorial Scholarship Fund. They were Ruth Sylvia Martin, University of Surray, Farnborough College of Technology, U.K.; Marissa LaCoursiere, Clarkson University, Potsdam, New York, U.S.A.; and Philip Gregory, Embry-Riddle Aeronautical University, Daytona Beach, Florida, U.S.A. LaCoursiere was unable to attend the conference, and Gregory was necessarily absent from the awards presentation, but the recognition included all three. President Del Gandio also announced contributions made to the Fund during the week: Capt. Sameer S. Gabsair \$80; ISASI's Fort Worth Regional Chapter, \$1,000; and the winners of the Best Seminar paper contributed the \$500 prize to the Fund. The Fund was established in memory of all ISASI members who have died, and was named in honor of the former ISASI MidAtlantic Regional Chapter president.

Kevin Humphreys, director safety regulations, Irish Aviation Authority, was inducted into the honored Fellow membership, marking him ISASI's 22nd member to reach that plateau. Another special recognition was the "Best in Seminar Award" for the best technical paper of the seminar. This year the winning paper, "International Cooperation and Challenges: Understanding Cross-cultural Issues" was prepared by four persons: Dr. Wen-Chen Li, Thomas Wang, Dr. Hong T. Young, and Dr. Don Harris. (See page 16.)

President Del Gandio then welcomed ISASI's new corporate members and awarded plaques to David Longstaff, Jones Day, LLP; Christine Negroni, Kreindler & Kreindler, LLP; Kevin Humphreys, Irish Aviation Authority; John Gadzinski, Southwest Airlines Pilots' Association; Atanas Kostov, AAIU Ministry of Transport Republic of Bulgaria; Joe Gillespie, Gulf Flight Safety Committee; Richard Breuhaus, Jeppesen; Won Yung, Korea Aviation & Railway Accident Investigation Board; Mark Scott, Charles Taylor Aviation; Tracy Dillinger, Reytheon Company; and Eric Mayett, Aerovias De Mexico S.A.De C.V.



PHOTOS: K. CHONG/AAIB SINGAPORE

**Chan Wing Keong, seminar chair, (left) accepts on behalf of the committee a "well done" gift from President Del Gandio.**

The crowning finale to the evening of peer recognition was the presentation of the prestigious Jerome F. Lederer Award. President Del Gandio called Tom McCarthy to the stage and the room quieted. In describing the Award selectee, the president said: "Tom, a patriarch of aviation safety and accident investigation, has dedicated his life to government service, ISASI aviation safety, to accident investigation, and to safety mentoring programs to help prevent aircraft accidents. His contributions to the National Airspace System and our Society are monumental and make him truly worthy of the coveted Jerome Lederer Award." Filled with pride, Tom accepted and spoke to the audience about the stupendous growth experienced by ISASI and what it means to aviation safety (see page 6 for presentation ceremony).

In closing the evening, President Del Gandio paid special thanks to the industry sponsors of ISASI 2007 and to the attendees who traveled from 52 nations to attend a truly "international" event. As always, the closing seminar action was the transfer of the "Cowbell" from Chan Wing Keong to Barbara Dunn and the Canadian Society, host of ISASI 2008. ♦



**Traditional handoff of the "seminar cowbell" is made from Chairman Chan to Barbara Dunn, chair of ISASI 2008, to be held in Halifax, Canada.**



## 'Best in Seminar'

By Espersion Martinez, Editor

**I**nternational Cooperation and Challenges: Understanding Cross-cultural Issues is the technical paper judged to be "Best Seminar Paper" of those papers presented at the annual ISASI 2007 Singapore seminar on aviation accident investigation held in Singapore, August 27-31. Of the paper's four co-authors, two made the verbal presentation to the assembly. Presenters were Dr. Wen-Chen Li and Thomas Wang, who accepted the Award of Ex-

cellence plaque during the Awards Banquet on the last evening of the seminar. The other two co-authors are Dr. Hong T. Young and Dr. Don Harris

The award was established through an anonymous donation by an ISASI member who wished to acknowledge a paper at the annual seminar that made an outstanding contribution to the advancement of technical methodologies in aircraft accident investigation. For the first time since its inception, the "Best Paper" selection carried with it a monetary award of \$500. At the award presentation, the winners announced that the \$500 was being contributed to the ISASI Rudolph Kapustin Memorial Scholarship Fund, established in the memory of all deceased ISASI members.

For the ISASI 2007 selection, a judging panel was made up of four ISASI members. ISASI co-chairs of the selection panel were

Dr. Graham Braithwaite and Capt. Richard Stone (Ret.). Other members were 20007 ISASI Memorial Scholarship winners Ruth Martin and Philip Gregory. The young scholars were selected in the belief that they would provide a fresh perspective to the process of evaluating technical papers based on the cited criteria and on reflecting the overall theme of the seminar "International Cooperation: From Investigation Site to ICAO."

Dick Stone commented that the criteria used for the selection were that it had to provide new methodology for accident investigation, it had to be useful for a field investigator, and the paper and graphics had to be professional. He noted that the selected paper reflects outstanding work and will add a new dimension to international accident investigation. ♦



Dr. Hong T. Young



Dr. Don Harris

**ABOVE:** Thomas Wang (left) accepts congratulations and the award plaque from ISASI President Frank Del Gandio. Dr. Wen-Chen Li (center) beams his delight with the selection of the authors' work. **RIGHT:** Award of Excellence plaque presented to "Best Seminar Paper" authors.



K. CHONG/AMIB SINGAPORE

K. CHONG/AMIB SINGAPORE



## International Cooperation and Challenges:

# Understanding Cross-cultural Issues

By Wen-Chin Li, Hong-Tsu Young, Thomas Wang, and Don Harris

*(In the publication of this award-winning technical paper, Forum is departing from its usual style format and is publishing the following as a "technical paper" as accepted by the ISASI 2007 seminar technical committee.—Editor)*

### Abstract

The idea that national cultural characteristics play a part in aviation safety had been suggested by Helmreich and Merritt (1998). This research involved around 45 aviation accident investigators from different cultural backgrounds and investigated attribution of causal factors in the Ueberlingen accident report through the application of the Human Factors Analysis and Classification System (Wiegmann and Shappell, 2003). Hofstede's (1991 and 2001) cultural dimensions draw a clear picture of the attributable patterns of human errors based on cultural differences. As a result, it is necessary to develop a better understanding of the differences in attribution of accident causes and contributory factors across cultures to promote both aviation safety and international cooperation for accident investigation to be achieved. Furthermore, when suggesting safety enhancements resulting from accident investigations it needs to be noted that the same remedy may not work in different cultures. Remedial actions must be "culturally congruent." This process starts with understanding the cultural factors at work in the accident investigation process itself.

### Introduction

There has been a great deal of research regarding the relationship between national culture and aviation safety (e.g., Braithwaite, 2001; Helmreich and Merritt, 1998; Jing, Lu, and Peng, 2001; Lund and Aaro, 2004; Merritt and Maurino, 2004; Patankar, 2003; Rose, 2004). Culture is at the root of action; it underlies the manner by which people communicate and develop attitudes toward life. Accident investigation is supposed to be an objective exercise, but different cultures may produce different interpretations for human factors issues based upon different

cultural preconceptions. In the aviation industry, pilots not only fly in foreign airspace transporting passengers around the world, but also in multicultural crews. Furthermore, according to ICAO Annex 13, the accident investigation team should include representatives from the state of the aircraft's design and manufacture, the state of the occurrence, the state of the operator, and the state in which the aircraft was registered. As a result, by its very nature, accident investigation is a multicountry, multicultural undertaking. International cooperation has always been a great challenge for accident investigation as a result of the many cultures often involved in an accident. It only requires a little imagination to demonstrate how culture may impact upon the accident investigation process. Take a hypothetical example, where an Airbus aircraft, operated by a Chinese airline, equipped with General Electric's engines crashes in Japan.

There are many definitions of culture. Kluckhohn (1951) proposed one well-known definition for culture—"culture consists

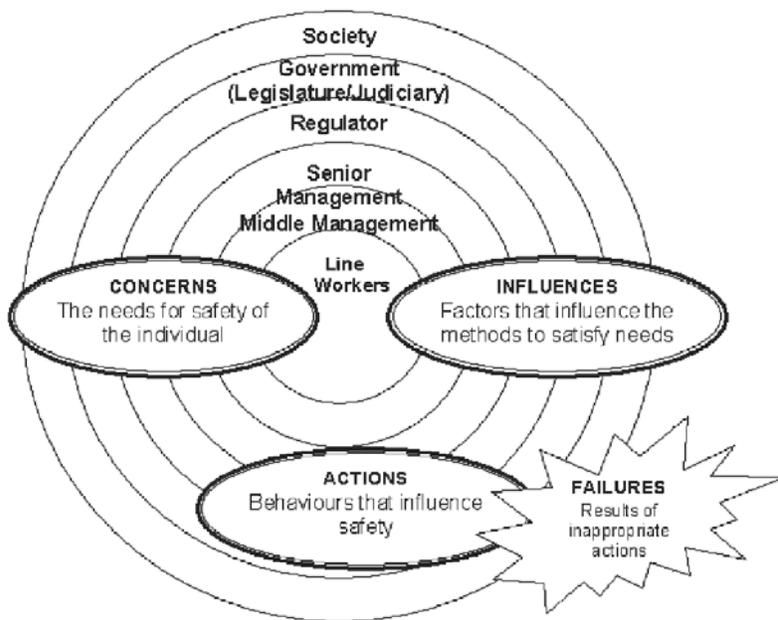
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***Professor Hong-Tsu Young** is the managing director of the Executive Yuan, Aviation Safety Council, Republic of China. He was the coordinator of the National Taiwan University Commercial Pilot Training Program by the Civil Aviation Authority (CAA) and deputy chairman of the Department of Mechanical Engineering, National Taiwan University.*

***Thomas Wang** is currently the director of the Flight Safety Division, Aviation Safety Council. He is a former China Airlines Airbus A300 pilot. He joined ASC as an aviation safety investigator in 2000. He was the investigator-in-charge of the China Airlines CI611 accident investigation and was the Singapore Airline SQ006 accident investigation Human Factors Group chairman.*

***Dr. Don Harris** is the director of the Flight Deck Design and Aviation Safety Group in the Human Factors Department, Cranfield University. He was an aircraft accident investigator (specializing in human factors) on call to the British Army Division of Army Aviation. He sits on the editorial boards of the International Journal of Applied Aviation Studies (FAA) and Cognition, Technology, and Work (Springer-Verlag). He is also co-editor in chief (with Helen Muir) of the journal Human Factors and Aerospace Safety (published by Ashgate).*



**Figure 1. Layers of influence and categories comprising the Ripple Model of safety culture (Morley and Harris, 2006).**

in patterned ways of thinking, feeling, and reacting, acquired and transmitted mainly by symbols constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core of culture consist of traditional ideas and especially their attached values.” If the majority of people in a society have the same way of doing things, it becomes a constituent component of that culture (Jing, Lu, and Peng, 2001). A culture is formed by its environment and evolves in response to changes in that environment; therefore, culture and context are really inseparable (Merritt and Maurino, 2004).

Cultures can be divided into different levels: families, organizations, professions, regions, and countries. The power of culture often goes unrecognized since it represents “the way we do things here.” It is the natural and unquestioned mode of viewing the world as national cultural characteristics play a significant part in aviation safety (Helmreich and Merritt, 1998). Johnston (1993) suggested that regional differences have a major impact on CRM implementation and crew performance. There is a marked difference in how crew resource management (CRM) training is perceived outside the United States. In the United States, CRM is normally seen as the primary vehicle through which to address human factors issues. Other countries, notably those in Europe, see human factors and CRM as overlapping, viewing them as close but distinct relatives. Orasanu and Connolly (1993) have suggested that a great deal of decision-making occurs within an organizational context, and that the organization influences decisions directly (e.g., by stipulating standard operating procedures) and indirectly through the organization’s norms and culture. Culture fashions a complex framework of national, organizational, and professional attitudes and values within which groups and individuals function.

To a certain degree, aviation human factors has been dominated by research into psychological and psycho-physiological attributes such as motor skills, visual perception, spatial abilities, and decision-making (Hawkins, 1993). This may crudely be classified as the “hardware” of human factors. However, for operating hardware, codes and instructions are required that may be referred to as the “software of the mind.” This software of the mind may be considered to be an indication of culture because culture provides “a toolkit” of habits, skills, and styles from which people construct “strategies of action” (Hofstede, 1984). National cultures provide a functional blueprint for a group member’s behavior, social roles, and cognitive process. Culture provides rules about safety, the basis for verbal and nonverbal communication, and guidelines for acceptable social behavior. Culture also provided cognitive tools for making sense out of the world. National culture was rooted in the physical and social ecology of the national groups (Klein, 2004).

Hofstede (1984, 1991, and 2001) proposed four dimensions of national culture:

- Power distance (PDI) focuses on the degree of equality, or inequality, between people in the country’s society. In countries with a large power distance, subordinates are subordinate to their superiors. A relatively small power distance between superior and subordinate results in informal relationships and a great deal of information and discussion. If necessary, the subordinate will contradict his superior.
- Uncertainty avoidance (UAI) is the extent to which the members of a society perceive a threat in uncertain or unfamiliar situations, and the extent to which they subsequently try to avoid these situations by means of regulations and bureaucratic sanctions, among others actions. Uncertainty avoidance concerns the situations of unclear events, preferred more predictable, and which risks are more clearly defined events.
- Individualism (IDV) focuses on the degree that society reinforces individual or collective achievement and interpersonal relationships. In a highly individualistic society, rights are paramount. Individuals in these societies may tend to form a larger number of moderately distant relationships. A society with low individualism is typical of a society of a collectivist nature with close ties between individuals.
- Masculinity (MAS) exemplifies the traditional masculine work role model of male achievement, control, and power. Expressions of this are an orientation toward competition and performance and the desire for recognition of one’s performance. A highly masculine social order is one in which males dominate a significant portion of the power structure, with females being controlled by male domination. A low masculinity ranking indicates the country has a low level of differentiation and discrimination between genders. Women are treated equally to men in all aspects.

More individualist cultures show a lower probability of total-loss accidents; collectivist cultures exhibit a greater chance of accidents. A high level of uncertainty avoidance in a national



culture has also been found to be associated with a greater chance of accidents (Soeters and Boer, 2000). As aircraft have become increasingly more reliable, human performance has played a proportionately increasing role in the causation of accidents. Recently, research comparing the underlying patterns of causal factors in accidents comparing Eastern and Western cultures has suggested underlying differences attributable to culture. Using the Human Factors Analysis and Classification System (HFACS), it was observed that issues concerning inadequate supervision at higher managerial levels and a suboptimal organizational process were more likely to be implicated in accidents involving aircraft from Eastern cultures (Li, Harris, and Chen, 2007). It was suggested that small-power-distance cultures with a high degree of individualism seemed to be supe-

**The effects of national culture have yet to be considered as part of the multinational, multicultural accident investigation process. It needs to be established if culture has an effect on the interpretation of the underlying causes of accidents as well as their causation.**

rior to collective, high-power-distance cultures for promoting aviation safety, especially in terms of the processes and procedures at the higher organizational levels. Such an analysis may provide additional explanatory power to elucidate why national differences in accident rates occur.

Morley and Harris (2006) developed an open system model of safety culture—the Ripple Model (see Figure 1). This Model has been used to interpret the wider influences underlying several major accidents (e.g., the China Airlines 747 accident—Li and Harris, 2005; Dyrden Fokker F28 accident at Dryden—Harris, 2006). This Model identified three threads running throughout the personnel within (and without) an organization, irrespective of their level and role. These were labelled “Concerns,” “Influences,” and “Actions” and were evident in line personnel, middle management, senior management, the industry regulator, government, and society as a whole.

- Concerns were associated with threats to the needs of the individual and worries about meeting the requirements placed on them by others.
- Influences were concerned with the factors that dictated the methods by which safety needs could be accomplished.
- Actions described the behaviors that directly impacted upon safety, in either a positive or negative manner.

In this Model, the authors argued that elements outside an organization have a profound effect on safety culture. The boundaries for the conceptualization of safety culture must be extended beyond the organization if a comprehensive model of the evolution of safety culture is to be developed. Authors such as Merritt

and Helmreich (1995) and Glendon and Stanton (2000) propose that safety culture is a subculture of organizational culture, which is itself a subculture of the industry culture, which in turn is a subculture of national culture. If attempts to separate safety culture from organizational culture are difficult enough, trying to fully separate these entities from national culture is almost impossible.

Culture has already been demonstrated to have a considerable impact upon aviation safety and accident causation; however, as alluded to earlier, the effects of national culture have yet to be considered as part of the multinational, multicultural accident investigation process. It needs to be established if culture has an effect on the interpretation of the underlying causes of accidents as well as their causation. To this end, the manner in which accident investigators from Eastern and Western (high power distance versus low power distance) cultures attributed the underlying causes of the Ueberlingen midair crash of a Boeing 757 and Tu-154 were investigated using the HFACS analytical framework.

The inter-rater reliability of HFACS has been demonstrated to be quite good both by using a simple percentage rate of agreement and Cohen’s Kappa (e.g., Wiegmann and Shappell, 2001; Gaur, 2005; Li and Harris, 2005 and 2006). However, in all these cases reliability was established between two raters coding multiple accidents. In this study, a different approach is undertaken to evaluate reliability. In this case, many raters (from two different cultures—a high-power-distance and a low-power-distance culture) code a single accident.

## Method

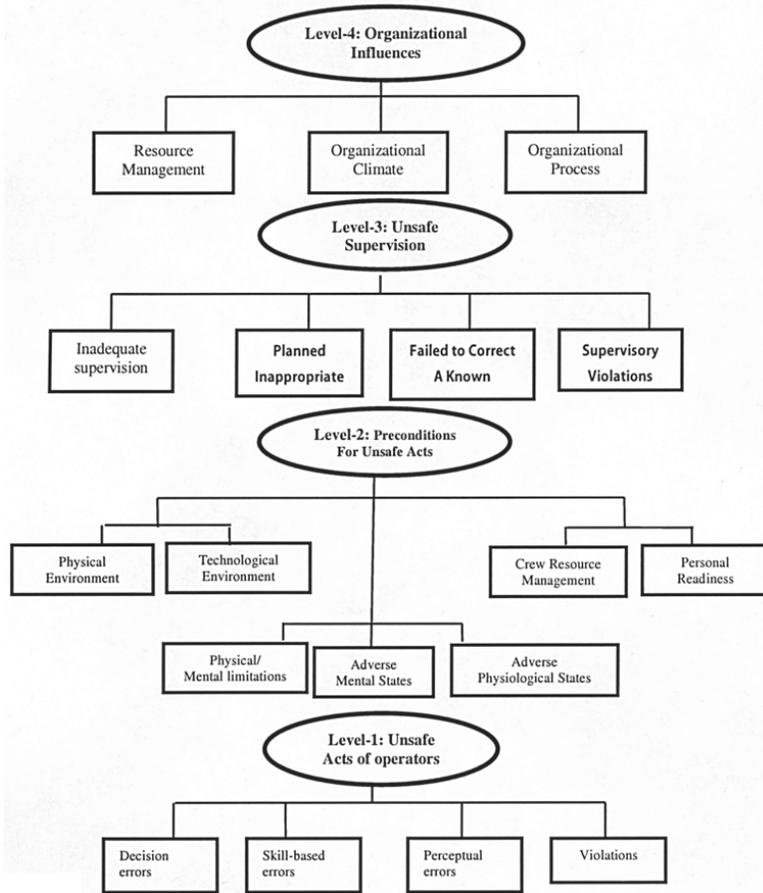
### Participants

There were 29 Chinese accident investigators including pilots, air traffic controllers, airlines safety managers, and maintenance staff and 16 British accident investigators consisting of pilots, air traffic controllers, airlines safety officers, and maintenance staff.

### Stimulus material

The data were derived from the narrative descriptions of accident reports occurring at Ueberlingen on July 1, 2002. The synopsis of the accident is as follows (BFU: AX001-1-2/02).

The investigation was carried out in accordance with the international standards and recommended practices contained in ICAO Annex 13 and the German investigation law under the responsibility of the BFU. The Kingdom of Bahrain, the Russian Federation, Switzerland, and the United States were involved in the investigation through their accredited representatives and advisers. In the first phase of the investigation, the investigation team worked simultaneously in a headquarter at the airport Friedrichshafen, at ACC Zurich, at the different accident sites in the area around the city of Ueberlingen, and at the BFU in Braunschweig. On July 1, 2002, at 21:35:32 hours, a collision between a Tupolev Tu-154M, which was on a flight from Moscow to Barcelona, and a Boeing B-757-200, on a flight from Bergamo to Brussels, occurred north of the city of Ueberlingen (Lake of Constance). Both aircraft flew according to IFR (instrument flight rules) and were under control



**Figure 2. The HFACS framework—each upper level would affect downward level, proposed by Wiegmann and Shappell (2003).**

of ACC Zurich. After the collision, both aircraft crashed into an area north of Ueberlingen. There were a total of 71 people on board the two airplanes, and none survived the crash.

The following immediate causes have been identified: (1) The imminent separation infringement was not noticed by ATC in time. The instruction for the Tu-154M to descend was given at a time when the prescribed separation to the B-757-200 could not be ensured anymore; (2) The Tu-154M crew followed the ATC instruction to descend and continued to do so even after TCAS advised them to climb. This maneuver was performed contrary to the generated TCAS RA.

The following systemic causes have been identified: (1) The integration of ACAS/TCAS II into the aviation system was insufficient and did not correspond in all points with the system philosophy. The regulations concerning ACAS/TCAS published by ICAO and as a result the regulations of national aviation authorities, operations, and procedural instructions of the TCAS manufacturer and the operators were not standardized, were incomplete, and were partially contradictory. (2) Management and quality assurance of the air navigation service company did not ensure that during the night all open workstations were continuously staffed by controllers. (3) Management

and quality assurance of the air navigation service company tolerated for years that during times of low traffic flow at night only one controller worked and the other one retired to rest.

#### *Classification framework*

The Human Factors Analysis and Classification System is based upon Reason's (1990) model of human error in which active failures are associated with the performance of front-line operators in complex systems and latent failures are characterized as inadequacies or mis-specifications that might lie dormant within a system for a long time and are only triggered when combined with other factors to breach the system's defenses. HFACS was developed as an analytical framework for the investigation of the role of human factors in aviation accidents. This study used the version of the HFACS framework described in Wiegmann and Shappell (2003). The presence (coded 1) or the absence (coded 0) of each HFACS category was assessed in each category of HFACS. To avoid over-representation from any single accident, each HFACS category was counted a maximum of only once per accident. The count acted simply as an indicator of presence or absence of each of the 18 categories in the Ueberlingen accident.

The first (operational) level of HFACS classifies events under the general heading of "unsafe acts of operators." The second level of HFACS concerns "preconditions for unsafe acts." The third level is "unsafe supervision," and the fourth (and highest) organizational level of HFACS is "organizational influences." This is described diagrammatically in Figure 2.

#### *Procedure*

All participants were trained for 2 hours by an aviation human factors specialist in the use of the Human Factors Analysis and Classification System. This was followed by a debriefing and a summary of the events in the Ueberlingen midair crash. Finally, all participants received a blank form for coding their HFACS data before watching the film of Ueberlingen midair crash accident investigation to code the contributing factors underlying this accident.

### **Results and discussions**

The frequency of participants indicating that a particular HFACS category was a factor in contributing to the Ueberlingen accident is given in table 1.

According to Wiegmann and Shappell (2001) and Li and Harris (2006), factors at the level of "unsafe acts of operators" were involved in 63.4% of accidents in U.S. sample and 41.1% in Taiwan; factors at the level of "preconditions for unsafe acts" were involved in 26.8% of accidents in United States and 31.3% in Taiwan; at the level of "unsafe supervision," 4.5% of causal factors were associated with accidents in United States and 12.5% in Taiwan; at the level of "organizational in-



fluences,” 5.3% of causal factors were associated with accidents in United States and 15% in Taiwan. However, it is difficult to suggest with any certainty if the true explanation for the differences in the data were attributable to the U.S. data being taken from civil aviation or if it was a national, cultural difference between the United States and Taiwan.

As Hofstede (1991) pointed out, the culture of the United States is characterized as small-power-distance and individualist. Subordinates acknowledge the authority of their superiors but do not bow to it, and emphasis is firmly placed on individual initiative (and reward). This supports the findings of Wiegmann and Shappell (2001) that individual operators have greater bearing on accidents in the United States. On the other hand, in Taiwan, a high-power-distance collectivist culture, it has been found in this research that supervisory and organizational influences have a greater influence in accidents. The U.K., from which the comparison data in this study were derived, is also a low-power-distance culture (according to Hofstede’s classification system).

The results in Table 1 show that at HFACS Levels 3 and 4 (the higher organizational levels) there were significant difference between the Taiwanese and U.K. sample in two categories: “Organizational Climate” and “Planned Inadequate Operations.” In both cases, participants in the U.K. sample were more likely to attribute shortcomings at the organizational level than were their Taiwanese counterparts. This may reflect the differences on Hofstede’s power-distance dimension, where, as a result of being a low-power distance culture, U.K. participants were more likely to be critical of higher level management than the Taiwanese participants who are more likely to defer to superiors.

According to Hofstede’s classification, the Taiwanese culture is predisposed toward organizations with tall, centralized decision structures and that have a large proportion of supervisory personnel. In these cultures, subordinates expect to be told what to do. However, members of these high-power-distance cultures frequently experience role ambiguity and overload. Group decisions are preferred, but information is constrained and controlled by the hierarchy and there is resistance to change. Members of society in high-power-distance countries are also unlikely to speak out when their opinions may contradict those of their superiors. Confrontation is generally avoided. Low power distance and high individualism promote greater autonomy of action at the lower levels of an organization. The Taiwanese culture, on the other hand, which is less reactive as a result of its preferred organizational structures that discourage autonomy, is also resistant to change.

U.K. participants were also more likely to attribute “adverse mental state” as a psychological precursor to the accident, whereas the Taiwanese participants were predisposed to attributing the accident to a perceptual error (see Table 1). This may reflect some reluctance on the part of Eastern participants to utilize the category of “adverse mental state,”

	HFACS Categories	Taiwan (n=29)	U.K. (n=16)	Overall (n=45)	Chi-Square (df=1)
HFACS Level 1	Decision Error	29 (100%)	15 (93.8%)	44 (97.8%)	$\chi^2=0.093^*$ ; p=0.760
	Skill-Based Error	24 (82.8%)	14 (87.5%)	38 (84.4%)	$\chi^2=0.000^*$ ; p=1.000
	Perceptual Error	24 (82.8%)	5 (31.3%)	29 (64.4%)	$\chi^2=11.939$ ; p=0.001
	Violation	20 (62.1%)	13 (81.3%)	31 (68.9%)	$\chi^2=0.988$ ; p=0.320
HFACS Level 2	Adverse Mental State	15 (51.7%)	15 (98.3%)	30 (66.7%)	$\chi^2=8.195$ ; p=0.004
	Adverse Physiological State	9 (31.0%)	2 (18.2%)	11 (24.4%)	$\chi^2=1.046^*$ ; p=0.307
	Mental/Physical Limitation	17 (58.6%)	10 (62.5%)	27 (60.0%)	$\chi^2=0.000$ ; p=1.000
	Crew Resource Management	28 (96.6%)	15 (93.8%)	43 (95.6%)	$\chi^2=0.000^*$ ; p=1.000
	Personal Readiness	15 (51.7%)	5 (31.3%)	20 (44.4%)	$\chi^2=1.751$ ; p=0.186
	Physical Environment	11 (37.9%)	5 (31.3%)	16 (35.6%)	$\chi^2=0.201$ ; p=0.654
	Technological Environment	23 (79.3%)	11 (68.8%)	34 (75.6%)	$\chi^2=0.182^*$ ; p=0.670
HFACS Level 3	Inadequate Supervision	25 (86.2%)	12 (86.2%)	37 (82.2%)	$\chi^2=0.285^*$ ; p=0.593
	Planned Inadequate Operations	12 (41.4%)	12 (75.0%)	24 (53.3%)	$\chi^2=4.683$ ; p=0.030
	Failed to Correct a Known Problem	25 (86.2%)	10 (62.5%)	35 (77.8%)	$\chi^2=2.121^*$ ; p=0.145
	Supervisory Violation	18 (62.1%)	12 (75.0%)	30 (66.7%)	$\chi^2=0.776$ ; p=0.378
HFACS Level 4	Resource Management	22 (75.9%)	13 (81.3%)	35 (77.8%)	$\chi^2=0.002^*$ ; p=0.967
	Organizational Climate	12 (41.4%)	12 (75.0%)	24 (53.3%)	$\chi^2=4.683$ ; p=0.030
	Organizational Process	27 (93.1%)	15 (93.8%)	42 (93.3%)	$\chi^2=0.000^*$ ; p=1.000

**Table 1. Number (and percentage) of participants who indicated an HFACS category was a factor in contributing or causing the Ueberlingen accident, broken down by country and overall. In instances where the expected cell count for one (or more) cells was less than five, Yates’s correction was applied (designated by \*).**

which may have a certain degree of stigma attached to it. Instead, they opted to use the (perhaps) less blameworthy category of “perceptual error.”

In all previous studies, the reliability of HFACS has been demonstrated using just two raters coding multiple accidents. Interrater reliability, calculated either by simple percentage agreement or Cohen’s Kappa, has demonstrated the categorization system to be moderately highly reliable. The method for demonstrating reliability in this study, however, suggests that reliability estimated

using multiple raters and a single accident is somewhat lower. Looking at the third column in Table 1, it can be seen that the overall percentage use of each category differs across the categories. However, some care should be taken when interpreting this table.

For example, in instances where the overall count for a category was low (e.g., "Adverse Physiological States"), this was indicative of agreement across the raters that a particular category was not

**There seems to be some evidence that there are cultural differences in the manner in which participants from different cultures interpret the same factors in a sequence of events leading to an accident. This is something that investigators from different cultures need to be aware of as the same events will be interpreted quite differently by representatives from different cultures, especially when interpreting human actions.**

a factor (i.e., high rater reliability). Nevertheless, reliability calculated this way is significantly lower than that calculated the more conventional manner. However, this could be a product of either the degree of training received on the HFACS framework or the clarity of the factors in the stimulus material or HFACS itself. Further research is required to clarify this issue.

## Conclusion

There seems to be some evidence that there are cultural differences in the manner in which participants from different cultures interpret the same factors in a sequence of events leading to an accident. This is something that investigators from different cultures need to be aware of as the same events will be interpreted quite differently by representatives from different cultures, especially when interpreting human actions. This demonstrates that despite the best efforts of all concerned, there is sometimes no such thing as an objective truth when analyzing and interpreting the events leading to an accident. These cultural differences are evident in the interpretation of the influences and subsequent actions (as described in Figure 1) surrounding an accident. Investigators need to understand this when working in multicultural teams, not only when interpreting the events leading to an accident but also when suggesting remedial actions to ensure that they are congruent with the national culture of the operators. ♦

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In demonstrating that the Advanced Qualification Program (AQP) breaks the present tendencies related to aviation accidents, the author gives meaning to the age-old quote: “How many things, too, are looked upon as quite impossible until they have been actually effected?”—Pliny the Elder (A.D. c. 23–A.D. 79)

# TO BREAK THE CHAIN Use AQP

(This article was adapted, with permission, from the author’s presentation entitled The Advanced Qualification Program (AQP) as a Tool to Break the Chain of Accidents, presented at the ISASI 2006 seminar held in Cancun, Mexico, Sept. 14-17, 2006, which carried the theme “Incidents to Accidents: Breaking the Chain.” The full presentation including cited references index is on the ISASI website at [www.isasi.org](http://www.isasi.org).—Editor)

**D**r. Thomas Longridge (1998) defines the basic concept of Advanced Qualification Program (AQP) as “The systemic methodology in the development of instruction, training, and evaluation programs for crews and air dispatchers, including skills in CRM [crew resource management].”

But in reality, what is the AQP program and what is it for? Will AQP break the cur-

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rent accident barriers? Is this model a vanguard system? The answer to these questions is undoubtedly YES, as a systemic way to face the instruction, based on the technology available in the 21st century, and using CRM skills and tools. Another open question would be: Is the AQP model based on human factors? Here, too, the answer is positive; in order to apply and develop this program, it is essential that companies apply the systemization of the different human factors concepts that are based on the models published by Shell (Hawkins, 1975) and TEM (Helmreich and the International Civil Aviation Organization).

This AQP program has been applied since the early nineties and reveals itself as a proposal for the U.S. air industry, under the supervision of the Federal Aviation Administration (FAA). Its main lines have been led by T. Longridge and D. Farrow from the FAA, which certainly allowed to be created the most efficient way of operational training at a global level, and in my opinion, has permitted the breaking of barriers and trends in accident rates, thus generating a more efficient and secure system.

What is AQP? What makes it distinct from the traditional programs? When we analyze and check the distinct models applied at a global level, be it by Europe or the United States, we can acknowledge important differences through which the AQP system demonstrates a more systemic and

efficient application to the real world of operations. A comparison shows that the JAR 1978 regulations only include tendencies and general application requirements of an AQP style model, while a detailed analysis of the standards defined by the FAA’s AC 120-54 shows a complete and systemic application of this model to commercial air operations.

## Origins and genesis

First, an analysis of AQP shows its genesis to be a need by the companies in North America for a deep and auto-critical study of the various failures and accident trends labelled “operator error.”

Moreover, this study was oriented to the research of operational trends that might bring systemic improvements into the air industry. The origin of AQP followed with the constitution of several multitask work groups under the leadership of the aeronautical industry, the FAA, NASA, and commercial companies in order to optimize air safety factors and achieve scale economies that allowed the latter to be the safest and most efficient transport means in the eyes of the public.

It is this voluntary work, around 1988, that generated an advanced knowledge that grew in 1989 to what many consider the first training profiles in environments that are typical or adapted to the real world of operations, or typical evaluations (LOFT/LOS) for the air business.

The instruction theory was defined by Bloom’s taxonomy, the latter being the basis of this descriptive study, which described



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# The AQP program's major goal is to achieve *quality training* based on the continuous improvement concept in which the instruction is assessed and checked at every stage, thanks to a permanent analysis that generates a real knowledge of the instruction level status in the company.

in detail every move to be performed or expected to be used in operational training.

In 1990, under FAA supervision, the program begins and AC 120/54 is created, as is SFAR 58 special regulation (now obsolete). The new program is based upon a voluntary application by different companies. It aims to obtain validated and free access data from the FAA, under a defined chronogram of events that considers five stages in order to achieve the final qualification of the complete application and chosen AQP program.

After analyzing the statistics at a worldwide level, ICAO signals in its C-302-AN/175 that the United States and Canada maintain at global level a rate of 0.5 accidents per million flights, taking into account that over half the world's air traffic takes place in the area included between Mexico, Canada, and the United States. Under this perspective, flight operations in this area undoubtedly show a definite leadership, as this region is the only one that uses this innovative program, and is based on the systemic application of human factors as an essential component of the theoretical and practical training.

The AQP program plays a vital role in air business, as this program allows an indirect control and it compels the operators to apply the human factors tools together with an objective assessment of the behaviors and skills of the CRM, which are an integral part of the instruction and continuous evaluation programs for air crews.

During the IATA meeting held in Santiago, Chile, at the FIDAE 2006 aerospace fair, the phenomenon generated by low-cost companies was pointed out, as the latter have to respect two variables that the public is not ready to give up: the cost of the ticket and air safety factors. "Who does not understand this will fail." With this statement, the ICAO President Bisignani clearly expressed the new model that the air business has to face.

## AQP program goals

The operational purpose of this innovative program seeks excellence in the instruction

processes, which have to be clearly defined at all stages and clearly describe each one of the events to be assessed by using the technology currently available. In the initial stage of the process, it is compulsory to define the formula and the way to use the technological level at hand, where basic training computers (CBTs) are the perfect tools when used in conjunction with the syllabus concept or e-learning.

A second stage is defined by the use of more advanced programs in flight training machines (FTDs), which allow the performance of hundreds of maneuvers, and activation of systems such as hydraulics, FMS, or typical failures. The third stage is reserved for the application of theoretical as well as practical knowledge in full level, or Category D simulators; these are called full-flying simulators (FFS) and allow integrally qualifying the pupil and operating an aircraft without actually having to fly it.

During this essential third stage, a pupil is able to achieve an efficiency that translates to actually being able to operate an aircraft without having previously flown it physically, though this generates doubts among some flight instructors. This constitutes a new paradox in advanced simulation. In this case, the AQP program permits one to objectively assess every stage of CRM behaviors and skills because of the high level of realism in the simulation of real situations under specific characteristics. Not only does AQP lead us to apply theoretical and practical concepts, but also their interaction among all the crew members, such as language, communication factors, situational awareness, and decision-making among others.

The latter is used in Europe and allows us to analyze the strategies applied under an operational context. The AQP program also shows the importance of training regarding the dilemma of shared situational loss of awareness, which under high stress provokes the appearance of typical cultural problems that are not fully instructed, such as the typical "macho pilot" concept, so char-

acteristic of our Latin American operational environment, and which requires special attention.

The AQP program's major goal is to achieve *quality training* based on the continuous improvement concept in which the instruction is assessed and checked at every stage, thanks to a permanent analysis that generates a real knowledge of the instruction level status in the company. The application of this type of program is totally based on free will of the companies, so its development will exclusively depend on the company will to choose this excellence qualification.

In regard to the Chilean aeronautical authority, this kind of supervision is carried out by a unique bureau, Office 230, in a similar way to what the FAA does. This department centralizes the information and allows a permanent supervision of the different stages involved by the companies in the implementation of the AQP program.

This program aims at theoretical and practical training levels to be actually applied at the various stages determined by a company, and at being an integral form within the latter's instruction and training programs. It also allows the development of its operational culture and leads to a quality standard that is its main target, together with the creation of a system that can tolerate operational error, as stated by the ICAO, as well as Helmreich (1998) in his Threats and Errors Management Model (TEM), and Reason (1996) through his concept of the human error in his famous Swiss cheese.

## AQP program integral concept

The AQP program's integral concept is based on the SHELL Model (Hawkins, 1975) describing the interaction among man, machine, and environment, and how under certain operational circumstances human beings make stupid mistakes. Moreover, when we carry out a reactive exam according to the ICAO's Annex 13 regarding the investigation of an accident, this Model allows us to visualize a part of the equation regarding this

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## **We insist in stating that the AQP program is a valuable tool that permits us to “break the accident chain and change our traditional paradigms in the air business environment.”**

problem. Nevertheless, and in spite of ergonomic improvements to come, operational errors *are and will be* a part of the operational world. It is not enough to use and apply all the operational resources allowed by our organizations (CRM) as these ensure only a certain air safety level. But through the implementation of the AQP program, it will be possible to reach better operational levels, which will match the technological level that we operate in this century of communications.

In this 21st century, the old saying: “There are two kinds of pilots, the ones who land with the undercarriage up, and the ones who will” remains valid. It is not enough to have a standard operational procedure (SOP) and isolated programs that do not interact and are copied from different operational cultures.

From the application of Helmreich’s TEM Model, we may state that as long as we maintain a real training level by applying and assessing behaviors, or CRM skills, the latter will avoid opening opportunity windows, and let us focus on the operational error itself. The AQP is precisely that, a tool that allows us to break traditional paradigms in conventional instruction and supplies us with a friendlier system, with a major error tolerance for the operator; and thus reduces our present operational trends, at a regional or global level.

The first-generation CRM focused on the crews or the cockpit; the present evolution naturally integrates the Threats and Errors Management Model, which seeks to manage the undesirable situations known as TEM, thus allowing a more holistic vision of this problem.

Man can now manage his own errors and escape from an event that carries possible catastrophic effects by being able to avoid the event or “successfully manage a determined event,” thanks to his capacity to control undesired situations. This is known as 3M, the management of threats or lapses, and thus the ability to avoid an undesired situation and its catastrophic effects.

The new paradigm should now consist of learning from successful operations, which represent more than 98% of the events worldwide, instead of focusing as we currently do on the accidents and having a more reactive than proactive vision. Our great challenge? Stop being reactive, as reflected by the Heinrich pyramid (1930) and be able to invert or at least modify its base so that our actions are more proactive.

Through our present knowledge, we define as an expert level that of a crew that still makes operational errors of any kind, but is able to manage them and return to a normal or low-risk level. This is what AQP is giving to our crews who are training in an operational environment that is completely similar to the real operational world (LOS/LOE) and generates an environment of efficiency and safety, which leads to a change in our current trends, avoids losses to the air business, and consequently makes the world air system more efficient and eventually safer and more cost efficient.

The tools provided by the AQP program allow training that is based on what actually happens in the real operational world and feeds with action a reliable report system (SARSEV, BASIS), an operational quality verification program (FOQA), and a line operational audit system (LOSA) that all permit, thanks to a common language, their interaction in an air Safety Management System (SMS). This global frame feeds the instruction processes by accessing a standard based on a continuous improvement, with an empirically validated model that allows applying coherent strategies to the distinct instruction processes destined for our air crews.

### **AQP model certification stages**

Among AQP’s qualities is that it describes in full detail the distinct characteristics, skills, and achievements expected to be applied in the instruction process based on Bloom’s taxonomy (1948), which allows multitasking. This stage forms the basis of the AQP program. It requires the longest

time to develop in the company, as it calls for the application of the distinct agreements that tend to define the résumés and the standards the company will use for its operational system.

Experts are needed in all the areas involved, such as instructors, pilots, systems engineers, programmers, technicians, psychologists, and teachers. This working team will have to define the typical résumé to be implemented in this phase, as well as the feedback method. This stage will also have to explain how to instruct the personnel involved, as well as the chronogram of defined events, for operational reality. Airbus is implementing this procedure in its A340 fleet as an initial stage.

The second stage checks and corrects the system with its basis being the recollection of objective evidence, applying the Deming purpose together with the distinct observations found. From there, the curricular models will be corrected and the changes performed, completely or partially. As an example of the latter is a typical maneuver in which the council or instructors committee objectively determines that the required action has been badly assessed and does not match the program’s specific goal, after which the latter is corrected and a new standard is redacted. Maneuvers that result from the daily operational experience will also be added or modified, based on the information recollected by other parallel programs under SMS. These parallel programs include the flight safety anonymous report system (SARSEV), the flight operations quality system (FOQA), and in-line safety audits (LOSA), together with the integration of a flight safety voluntary anonymous reporting system, which is at the official publication stage by our national aeronautical authority.

A third stage will seek the updating of all the programs. These systems are working and integrated in reality and based on a common language of an SMS-type system. The creators and the council of instructors

will analyze the global information together with their respective aeronautical authority (DGAC inspectors) and define the changes that will bring a real continuous improvement. This information will help provide feedback to the company and update the latter's databank, mostly through the coordinated work that will tend to overcome the deficiencies of the previous stages and establish a continuous improvement as a quality standard.

To pass the fourth stage of this program, an empirical experience and minimum operations times will be required, which is fundamental to be able to compare the distinct observations from the previous events. These events may include, for example, a deficiency in FMA operation or ACARS, the configuration of unexpected approximations, or the non-respect of standards during the stabilized approximations of the Flight Safety Foundation's ALAR program, or the deficient use of language at critical moments, among others.

Eventually, once all the previous stages are concluded, the fifth stage is reached, after which the AQP program certification is obtained. We have assessed that it will take 24 to 36 months to achieve certification, so the process will always remain under the constant supervision of the respective authority. In the case of Chile, an initial program has been launched and is now at the closing stage for the A340 fleet, after which the corrections will be applied to instruction courses and the distinct deviations corrected by applying the Deming cycle—aiming for a continuous improvement before directing the efforts to the Boeing B-767 fleet, and then to other models.

## Operational cases and challenges

In our experiences, we have known cases that after takeoff and during the climbing phase, the crew has seen all the screens of the glass cockpit remain dark and display only the mention "Please Wait." After having tried to solve this problem without any practical results, the captain has made the

right decision to turn back and land manually, achieving a successful landing. But the analysis showed that the system initialization (INS) had not been performed correctly on the ground—a clear case of human factors and CRM skills; so it has been decided to give a higher emphasis to the FTS and FFS phases, through more theoretical as well as practical instruction hours.

It is important to point out the situation experienced by our crews when operating in extreme or high-latitude areas, which is the case in the most southern sector of Chile, specifically in the Magellan Straits, where spring and summer are seasons of strong winds of hurricane strength averaging 28 to 35 knots with evening peaks up to 55 knots, generating tempest conditions.

There exists the case of a high-technology aircraft that could not land normally three times in a row because its automatic system caused it to abort at low altitude due to an excess of crosswind. The situation generated some uncertainty among the crew, which eventually decided to land manually, with all the limits involved. Once the data of this case were analyzed, it resulted that the man/machine interaction (Shell), made of human factors and CRM skill, had not been correct, which generated a reinforcement of theoretical and practical training, including typical applications in FTD and FFS simulators.

The distinct challenges involved in the implementation of the AQP program in our operational system have generated new requirements and operational standards in the use of such systems as ILS Cat III-B, EGPWS, TWAS, TCAS II, WAAS/LAAS, RNP, ATM, and ADS-B. The instruction processes are fundamental in achieving a real man-machine-environment integration and to use it in a safe and friendly way. As long as our practical formation and qualification processes lead to a systemic implementation of AQP, as close as possible from the operational reality, we will eventually avoid the classic operator or human error

and break the present trends that cause accidents with catastrophic effects at regional level.

## Conclusions

We have pointed out the importance of implementing skills in the CRM behaviors, and human factors checking in the distinct instruction processes, based on the SHELL and TEM Models and the application of different levels of basic or advanced simulation through the AQP prism. This will allow us to obtain quality training with a degree of objectivity in the different theoretical and practical training processes, leading to apply a systemic application to these processes and to the friendly use of the technology available in our century.

- **From the above, we may state that the AQP program is a new standard that allows a quality training to be dispensed, using the technological discoveries of the 21st century.**
- **The kind of assessment, the methods, the innovation, and the instruction techniques constitute a process that generates valuable synergies leading to the production of a safer and more efficient air business system.**
- **The evolution of the behaviors and skills in CRM and human factors are essential to achieve success in this kind of AQP.**
- **In AQP, the programs and distinct stages are clearly defined and adapted to the company, allowing us to have clear and achievable goals.**
- **In its implementation, the aeronautical authority as well as the company form a team that, thanks to a proactive work, will jointly generate a safer and more efficient system to be acknowledged as a leader system, at the regional level as well as worldwide.**

Finally, we insist in stating that the AQP program is a valuable tool that permits us to **"break the accident chain and change our traditional paradigms in the air business environment."** ♦

## ISASI Accorded 'Observer' Status at ICAO AIG Divisional Meeting

ISASI has been accorded observer status at ICAO's 2008 AIG Divisional meeting. AIG is presently establishing priorities for discussion. ISASI will plan on sending one to two representatives to the AIG meeting. The AIG08 is planned only as a 1-week meeting, and the consensus of the International Council members is that is insufficient time to effectively address all the issues that need to be discussed. The AIG99 meeting was 2-week's long and that proved to be just barely enough time, according to ISASI representatives who attended.

Among the subjects that ISASI has proposed to ICAO for discussion in the AIG meeting is the need for a worldwide safety recommendation repository—that is, a single centralized source for cataloguing recommendations from investigative agencies around the world. To that end, ISASI would like to see states forward safety recommendations and safety actions taken to ICAO for posting on an ICAO website. Also, ISASI says there is a need for ICAO to establish an Internet-based means for the collection and distribution of all safety recommendations and safety actions taken by member states. ♦

## Great Lakes Chapter Gains Acting President

Matthew Kenner has been named as acting president of the Great Lakes Regional Chapter due to the retirement of Rodney Schaeffer, former president.

While the regional activity has been dormant for a number of years, Kenner says that resurrection efforts include

- identifying members who might like to become active again.
- scheduling a meeting in the Chicago area to present information on the Cirrus airframe parachute system and AmSafe aircraft inflatable restraints.
- continuing a regular meeting schedule for the Chapter.

Regional members wishing to become

reengaged with the Chapter's activities are asked to contact Matthew at e-mail [mtkenner@esi-il.com](mailto:mtkenner@esi-il.com), work phone 630-851-4566. ♦

## By-Laws Amendment Voting Deadline Closes

At press time, the by-laws amendment voting period was preparing to close (October 27). In early August, President Frank Del Gandio mailed to each member in good standing information regarding the voting process.

He noted that the International Council (IC) had directed By-Laws Committee Chairman Darren Gaines "to revise our by-laws that have been in effect since our founding in 1964. The revisions will allow us to use modern-day tools and programs for everyday Society administration at significant monetary savings and will provide guidelines for responsible fiduciary and business practices."

The IC has approved the revisions after extensive review and had them posted on the ISASI website, [www.isasi.org](http://www.isasi.org), for members' perusal. The member-

ship voting process to approve the revised by-laws was accomplished confidentially by electronic e-vote. The open voting period for all eligible members was August 25 through October 25. ♦

## Election Nominations Due April 1

The ISASI Nominating Committee has issued an early call for nominations for the Executive officer and councillor positions that will be open to election for the years 2009-2010. The nomination deadline is April 1, 2008. The positions to be filled are president, vice-president, secretary, treasurer, U.S. councillor, and international councillor. Nominations in the past several years have been very low.

Each potential candidate whose name is submitted to the Nominating Committee must have consented to the submission. The nominator must submit a short biographical sketch of the nominee. Nominees must be at least a full member to be eligible for office within ISASI. Nominations should be sent to the ISASI office, attention Nominating Committee. ♦



**Tom McCarthy provides the treasurer's report to Society members during the ISASI general business meeting conducted at the ISASI annual seminar. Looking on are, left to right, President Del Gandio, Vice-President Schleede, and Secretary Baum.**

## New Members

### CORPORATE

Aerovias De Mexico, S.A.De C.V.  
Andres Conesa,  
Eric Mayett  
Raytheon Company  
Greg Alston  
Jason Elwood  
Defence Science and Technology  
Organisation (DSTO)  
Nicholas Athinotis

### INDIVIDUAL

Almaskari, Saif, N., Seeb, Oman  
Alrashid, Abdullah, A., Riyadh, Saudi Arabia  
Baldursson, Bragi, Reykjavik, Iceland  
Baldwin, Robert, M., Guildford, Surrey,  
United Kingdom  
Chikosi, Forbes, F., Harare, Zimbabwe  
Collins, Anthony, W., Auckland, New Zealand  
D'Oliveira, Lisa, J., Wellington, New Zealand  
Digance, Jason, Asington, West Sussex,  
United Kingdom  
Farrell, Paul, J., Dublin, Ireland  
Flanagan, Viti, M., Auckland, New Zealand  
Gregory, Philip, Ringoes, NJ, USA  
Harris, Benjamin, H., Alexandria, VA, USA  
Ho, Lye, H., Singapore, Republic of  
Singapore  
Iskandar, Peter, Rome, Italy  
Junckerstorff, Reimar, C., Karrinyup, WA,  
Australia  
Ko, Samuel, Singapore, Republic of  
Singapore  
Laine, Sami, P., Helsinki, Finland

Letchman, Hunter, S., Columbus, MS, USA  
Lewis, Kent, B., Watauga, TX, USA  
Lusch, Patrick, D., Pompano Beach, FL, USA  
Mackrell, Stuart, J., Farnham, Surrey,  
England  
MacPherson, Ian, J., Palmerston North, New  
Zealand  
McGraw, Nathan, L.V., Christchurch, New  
Zealand  
Parata, Gary, R., Auckland, New Zealand  
Pavlovic, Gabriel, T., Castelar (N), Argentina  
Puntillo, Ronald, U., Palm Coast, FL, USA  
Randell, Edward, J., Wellington, New  
Zealand  
Ranganathan, Ananthakrishnan, Chennai,  
India  
Rebbapragada, Dhruv, Uttar Pradesh, India  
Richardson, Don, S., Auckland, New Zealand  
Ritter, Thomas, J., Neuried, Germany  
Sanitioso, A. Toos, Cimahi, West Java,  
Indonesia  
Saunders, David, Wellington, New Zealand  
Siswosuwarno, Mardjono, Bandung,  
Indonesia  
Thacker, Ron, M.R., Palmerston North, New  
Zealand  
Torres, Roberto, H., Ormond Beach, FL,  
USA  
Usman, Muhtar, S., Kaduna, North, Kaduna,  
Nigeria  
Walsh, Mary, T., Republic of Singapore  
Wiener, Morris, J., Cherry Hill, NJ, USA  
Wong, P. F., Hong Kong, China  
Yasin, Rayhana, Cape Town, South Africa ♦

## In Memoriam

**Dr. Walter Tye** (HO0005), Cobham, Surrey, U.K. Dr. Tye was one of a few Honorary members.

**Howard C. Craft** (LM0373), Claremont, Calif., U.S.A., Jan. 13, 2007

**Theodore A. Faber** (LM2452), Alpharetta, Ga., U.S.A., May 26, 2007

**Preston K. Higgins** (LM0485), Burbank, Calif., U.S.A. ♦

Years to Prevent Recurrence?" during ISASI 2007. As the only ATS-specific paper accepted for presentation by the Singapore organizing committee, it contained varied global contributions from the Group relating to the status of contemporary runway safety. The Working Group co-chair John Guselli's late withdrawal from the seminar led to Darren Gaines stepping in at short notice to successfully present the paper.

On the personal side, John said, "The Working Group is delighted to report that Vice-Chairman Ladislav Mika is recovering well from major surgery conducted in late August. He is convalescing at home in Prague and expects to be back at work very soon. We wish him well in his recovery." Projected ATSWG initiatives relate to supporting the ISASI Reachout program around the world on request. ♦

## ASASI Posts New Officers; Issues Call for Papers

The Australian Society announces the posting of two new officers and a call for papers for the 2008 Australasian Safety Seminar.

Following the resignation of Ken Lewis, Lindsay Naylor, former vice-president, was appointed president. A subsequent election places Lieutenant Commander Richard (Rick) Sellers (RAN) in the office

## International Councilor Maintains Heavy Contact Schedule

Caj Frostell, ISASI international councilor, is maintaining a frequent contact schedule both in conjunction with Reachout seminars and stand-alone meetings with various groups of prospective members. From October 2006 through April 2007, he has traveled to seven countries and delivered ISASI promotional material as well as Reachout training information to audiences with attendees from more than 60 countries.

He has found that ISASI's website is now a valuable source of information for new and potential members. In reporting this information to the International Council last May, discussion was generated about what motivates people to join

ISASI, remain in ISASI, and/or leave ISASI. Frostell said, "There is typically a membership 'spike' after a Reachout or seminar. Some of those people join on impulse, and so some degree of attrition among those members is to be expected." Further discussion showed what the Council believes to be ISASI's top five products. These are

- annual seminar,
- *Forum* magazine,
- Reachout,
- ISASI website, and
- networking among safety professionals. ♦

## ATS Working Group Provides Update

The Air Traffic Services Working Group delivered its paper titled "Tenerife to Today—What Have We Done in Thirty

Continued . . .

of vice-president. The secretary/treasurer is Paul Mayes.

Sellers has had a flying career spanning 27 years. He started his flying career in light GA aircraft after leaving school. He has operated a wide variety of civil and military aircraft from multiengine jet transport aircraft through turboprops to piston- and single-engine jet trainers. He has also operated a mix of military rotary wing types from the Bell UH1B Iroquois to the Sea King. He has approximately 6,500 hours of flying experience and has held a number of squadron executive and instructional positions.

He has enjoyed postings with RAN, RAAF, RAF, USN, and USAAC. He holds an ATPLA and CPLH and has qualifications in Safety Systems Management and air accident investigation from the U.S. Navy postgraduate school in Monterey, Calif., and from Cranfield University (U.K.). He is also a graduate of the RAAF Aviation Safety Officers Course and the ADF Aircraft Accident Inquiry Management Course. He is trained in human factors, CRM, and AVRMS and holds a master's degree in aviation management from the University of Newcastle.

In addition, a "call for papers" has been posted for the joint Australian and New Zealand Societies 2008 Australasian Safety Seminar to be held in Adelaide, May 30 to June 1. The seminar theme is "Transport Safety--Past, Present, Future." Papers are being sought on contemporary transport safety including recent investigation (road, rail, marine, aviation) and on the issues facing the safety investigators in the future. An abstract and a short author's biography should be sent to Paul Mayes at e-mail address Paul.Mayes@Cobham.com.au. ♦

## Failure Analysis of Composites Gets Airing

At ISASI 2006, Dr. Joseph Rakow presented a technical paper entitled

## ISASI Annual Report 2006—Profit & Loss Budget

	Jan.-Dec. 06	Budget	\$ Over Budget	% of Budget
<b>Ordinary Income/Expense</b>				
<b>Income</b>				
601 Dues-New Individual Member	11,770.00	11,000.00	770.00	107.0%
603 Dues-New Corporate Member	4,180.00	5,000.00	-820.00	83.6%
611 Dues-Renewal Individual Member	56,790.00	68,000.00	-11,210.00	83.52%
613 Dues-Renewal Corporate Member	40,305.00	54,000.00	-13,695.00	74.64%
614 Dues-Late Fees	900.00	1,000.00	-100.00	90.0%
615 Dues-Upgrade Fees	510.00	300.00	210.00	170.0%
616 Dues-Reinstatement Fees	160.00	200.00	-40.00	80.0%
621 Contrib-Unres Membership	1,338.00	2,000.00	-662.00	66.9%
631 Publication Subscriptions	776.00	700.00	76.00	110.86%
632 Publication Income	650.00	1,500.00	-850.00	43.33%
634 Library Services	70.60	100.00	-29.40	70.6%
642 Membership Services	262.39	300.00	-37.61	87.46%
643 Membership Regalia Sales	354.49	300.00	54.49	118.16%
650 Seminar-Proceedings	6,310.55	6,000.00	310.55	105.18%
651 Seminar-Net Proceeds	43,918.43	10,000.00	33,918.43	439.18%
652 Seminar-Reimbursed Advance	0.00	3,000.00	-3,000.00	0.0%
Total Income	168,295.46	163,400.00	4,895.46	103.0%
<b>Expense</b>				
700 Condo Fees	3,241.46	4,800.00	-1,558.54	67.53%
705 Mortgage Interest	5,012.35	8,500.00	-3,487.65	58.97%
711 Repairs and Maint	0.00	1,000.00	-1,000.00	0.0%
712 Storage Rental	1,620.00	1,620.00	0.00	100.0%
801 P/R Exp-Office Mgr Salary	41,767.43	41,000.00	767.43	101.87%
802 P/R Exp-Health Insurance	12,250.00	10,000.00	2,250.00	122.5%
803 P/R Exp-SEPP	1,989.75	1,800.00	189.75	110.54%
805 P/R Expense Employers FICA	3,195.38	3,000.00	195.38	106.51%
807 P/R Expense-VA UIC Tax	23.20	40.00	-16.80	58.0%
811 Accounting-Payroll	1,026.48	850.00	176.48	120.76%
812 Accounting-Tax Prep	430.00	450.00	-20.00	95.56%
813 Audit Expense	0.00	150.00	-150.00	0.0%
814 Insurance	1,935.00	3,000.00	-1,065.00	64.5%
816 Legal Fees	0.00	140.00	-140.00	0.0%
817 Licenses and Permits	125.00	3,000.00	-2,875.00	4.17%
822 OPS-Telephone & Telex	2,785.01			
824 OPS- Equip Maint & Repair	104.95	2,000.00	-1,895.05	5.25%
825 OPS-Other Utilities	2,162.31	3,000.00	-837.69	72.08%
826 OPS-Postage and Shipping	8,759.90	6,500.00	2,259.90	134.77%
827 OPS-Printing and Reproduction	2,019.81	2,200.00	-180.19	91.81%
828 OPS-Office Supplies	2,809.83	4,000.00	-1,190.17	70.25%
829 Website		1,785.00		
830 OPS-Computer Tech Support	2,458.50	1,000.00	1,458.50	245.85%
831 OPS-Equipment Purchase	0.00	3,500.00	-3,500.00	0.0%
832 OPS-Equipment Lease	4,588.67			
833 OPS-Petty Cash	0.00	200.00	-200.00	0.0%
840 OPS-Temp Help	435.75	1,000.00	-564.25	43.58%
844 Publications-Forum Expense	36,868.50	37,000.00	-131.50	99.65%

"Failure Analysis of Composite Structures in Aircraft Accidents." The paper, one of 20 presented, was selected for "special consideration" honors by the seven-member panel that reviewed papers for the "Best in Seminar" award. *Forum* published the paper in its January-March 2007 issue and received the greatest number of "reprint" requests for

it than for any other paper published in the past 9 years.

Since then, Dr. Rakow, teamed up with Dr. Alfred M. Pettinger, has produced a manual designed especially for aircraft accident investigators titled *Failure Analysis of Composites*.

The authors prepared this manual to summarize some of the fundamental

# vs. Actual

	Jan.-Dec. 06	Budget	\$ Over Budget	% of Budget
845 Publications-Proceedings	6,310.55	5,000.00	1,310.55	126.21%
848 Publications-Handbook Expense	210.00	100.00	110.00	210.0%
856 Membership-Regalia Items	0.00	500.00	-500.00	0.0%
861 Membership-Service Expense	5,873.80	1,500.00	4,373.80	391.59%
871 Library Expenses	0.00	1,000.00	-1,000.00	0.0%
881 Management Council-Travel	23,034.58	15,000.00	8,034.58	153.56%
882 Management Council-Admin Exp	1,850.17	1,000.00	850.17	185.02%
883 Management Council-Other	123.85	3,000.00	-2,876.15	4.13%
886 Management Council-Rep Travel	656.51	300.00	356.51	218.84%
887 Management Council-Rep Admin	0.00	200.00	-200.00	0.0%
891 Rebate-Natl/Reg/Corp	0.00	2,000.00	-2,000.00	0.0%
901 Seminar-Advances	0.00	3,000.00	-3,000.00	0.0%
* 902 Seminar-Reimbursable Cur Exp	158,905.33			
903 Seminar-Lederer Award	0.00	500.00	-500.00	0.0%
905 Seminar/Reachout	590.26	1,000.00	-409.74	59.03%
906 Scholarship Fund	2,813.64			
911 Bank Fees	264.00	200.00	64.00	132.0%
912 Credit Card Charges	8,475.99	2,500.00	5,975.99	339.04%
<b>Total Expense</b>	<b>346,502.96</b>	<b>176,550.00</b>	<b>169,952.96</b>	<b>196.26%</b>
<b>Net Ordinary Income</b>	<b>-178,207.50</b>	<b>-13,150.00</b>	<b>-165,057.50</b>	<b>1,355.19%</b>
<b>Other Income/Expense</b>				
<b>Other Income</b>				
661 Rent-Tenant Rental Income	8,030.00	8,780.00	-750.00	91.46%
671 Interest-Checking Acct	3,398.20	400.00	2,998.20	849.55%
672 Interest-Other	228.28	500.00	-271.72	45.66%
681 Other Income-Miscellaneous	56.82			
682 Other Income-Refunds	734.96			
**683 Other Income-Reimbursements	169,646.45			
***685 Memorial Scholarship Fund	2,670.00			
<b>Total Other Income</b>	<b>184,764.71</b>	<b>9,680.00</b>	<b>175,084.71</b>	<b>1,908.73%</b>
<b>Other Expense</b>				
922 Misc-Other Reimb Exp	0.00			
924 Misc-Death/Illness Exp	173.10			
925 Misc-Refunds	0.00			
930 Depreciation	5,361.00			
<b>Total Other Expense</b>	<b>5,534.10</b>			
<b>Net Other Income</b>	<b>179,230.61</b>	<b>9,680.00</b>	<b>169,550.61</b>	<b>1,851.56%</b>
<b>Net Income</b>	<b>1,023.11</b>	<b>-3,470.00</b>	<b>4,493.11</b>	<b>-29.48%</b>

\* Vehicle to reimburse seminar registrations.

\*\* Vehicle to receive seminar registrations and members dues.

\*\*\* Deposits to Rudy Kapustin Scholarship Memorial Fund. Funds kept in a separate account.

concepts related to the failure analysis of fiber-reinforced composites, as applicable to the investigation of aircraft accidents. The manual is based upon existing literature and the experience and training of the parties.

The purpose of the manual, which was made available at no charge to attendees of ISASI 2007 in Singapore, is "to provide

aircraft accident investigators, who may not be engineers, with an introduction to failures in basic composite aircraft structures." The basic composite structural components addressed in the manual are laminates, sandwich structures, joints, and repairs.

Discussions contained in the manual are "intended to help investigators to,

first identify these structural components with an understanding of their purpose and, second, to recognize their basic failure modes.

The authors expressly note that "the scope and level of detail may not adequately address the needs of all interested parties, and any use of this manual is at the sole risk of the user." The manual is considered a "work in progress" with updates and revisions being published as appropriate. A cautionary note is added, "While great care was taken in the compilation of this manual, no warranties express or

## MOVING? Please Let Us Know

Member Number \_\_\_\_\_

Fax this form to 703-430-4970 or mail to  
ISASI, Park Center  
107 E. Holly Avenue, Suite 11  
Sterling, VA 20164-5405

**Old Address** (or attach label)

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State/Prov. \_\_\_\_\_

Zip \_\_\_\_\_

Country \_\_\_\_\_

**New Address\***

Name \_\_\_\_\_

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City \_\_\_\_\_

State/Prov. \_\_\_\_\_

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Country \_\_\_\_\_

E-mail \_\_\_\_\_

\*Do not forget to change employment and e-mail address.

Continued . . .

implied, are given in connection with the accuracy or completeness of this document.” Copies of the manual may be obtained by contacting Dr. Rakow at e-mail address [jrakow@exponent.com](mailto:jrakow@exponent.com).

In a related and more recent occurrence, Dr. Rakow recently appeared in a televised “Dan Rather Reports” program. The episode, entitled Plastic Planes, centered on the risks and benefits of using composite materials in the next generation of aircraft. ♦

## Curt Lewis & Associates Delivers On-site Safety Training Courses

Curt Lewis & Associates, a multi-discipline technical and scientific consulting firm, has announced the addition of safety training courses to its service offerings. The courses will be delivered on site by instructors who have extensive field experience and safety training.

As companies continue to expand their safety culture, they should be proactive in offering employee safety training and orientation, according to Curt Lewis, principal of Curt Lewis & Associates. Education is a necessary step in creating

awareness of safety risks. “We’ve developed a series of safety training courses that provide a solid overview of workplace risks and a systematic approach to controlling those risks,” says Lewis. “Our courses are beneficial for both managers and employees, new hires, and company veterans. Regardless of the development of a company’s safety culture, it’s important to review best practices and provide ongoing safety training.”

Course titles include Safety Management Systems, Safety and Investigation Training, Managing Workers’ Compensation, and Occupational Safety and Health Administration (OSHA) 10-Hour and 30-Hour Certificates of Training. Coursework is designed to assist a company in either implementing or supplementing safety processes that identify potential workplace risks. The OSHA coursework provides a broad overview of OSHA’s role in the workplace along with personal responsibilities that employees should assume. The investigation coursework includes training on root cause analysis and specific accident analysis techniques. For more information, companies can contact the firm at 817-303-9096 or by e-mailing Curt Lewis at [curt@curt-lewis.com](mailto:curt@curt-lewis.com). ♦

## Sharing Experience and Knowledge (from page 5)

cies do become apparent, to move swiftly to correct them—and avoid recurrence. As an effort to harmonize and promote efficiency in air safety investigation, in the fall of 2008, ICAO will convene an Accident Investigation and Prevention Divisional meeting (AIG 2008) for all ICAO state and interested organizations. The chief of the AIG Division, Marcus Costa, is with us for this seminar. He will make an address to us during the seminar. I would ask all attendees to pay particular attention to the message from Mr. Costa. AIG 2008 will be an opportunity for all of us to refine and modernize ICAO Annex 13 and our accident

investigation process to be as efficient as possible.

And now, as delegates to ISASI 2007, I hope I have addressed some of your objectives in attending the seminar—and that I have addressed some of the safety challenges facing our aviation industry. I encourage everyone to take advantage of the multiple opportunities throughout the seminar to exchange and gather information, and equally important, to meet your colleagues in this productive environment.

I thank you for your attention, and I wish you the most stimulating and fruitful seminar. ♦

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## Jones Day Serves Clients Globally

*(Who's Who is a brief profile of and prepared by, the represented ISASI corporate member organization to enable a more thorough understanding of the organization's role and functions.—Editor)*

**W**ith more than 2,200 attorneys in 30 offices around the globe, Jones Day has broad capabilities to provide legal services to the aviation industry in every major legal discipline. Jones Day acts as a single entity on behalf of its clients, and its global reach and integrated technologies permit the firm to assemble the team, strategy, and interdisciplinary experience to serve its clients best. Jones Day has a tradition of representing aviation industry clients across myriad legal disciplines, including litigation, business combinations and mergers, banking and finance, government regulation, environmental, tax, and labor and employment. Whether it's providing counsel on ever-changing international or domestic competition, advising on environmental or tax laws, negotiating a labor contract, bidding on airport construction contracts, or defending product liability claims involving commercial airline or general aviation accidents, Jones Day has substantial experience in every major practice area touching the aviation industry, in virtually every corner of the world.

Aviation litigation has become increasingly high-profile, factually complex, and legally complicated. Jones Day has considerable experience representing clients in claims involving commercial airline and general aviation aircraft. The firm has defended clients in litigation arising from the crashes of USAir Flight 427, SilkAir Flight 185, Swissair Flight 111, Flash Air Flight 604, and EgyptAir Flight 990. Jones Day also has represented clients in a variety of general aviation litigation cases in state and federal court across the United States involving various aircraft types. Our

aviation lawyers have firsthand experience with aircraft piloting, operations, and engineering.

Jones Day's aviation litigation experience ranges from crash site investigation to accident reconstruction, arbitration and mediation of disputes, litigation defense, and trial and appeal. Many of the firm's cases involve close work with accident investigators to identify, preserve, and



assess the physical evidence from a mishap to determine the possible cause(s) and provide advice to clients. Jones Day lawyers have worked with a variety of accident investigators from the private sector to marshal evidence in support of its clients, defend cases, appear in court, and interface with NTSB or FAA officials. The firm has developed relationships with former NTSB and other government officials who act as aviation consultants on accident investigation protocol or to provide expert testimony in court.

John D. Goetz and Dana Baiocco are Jones Day's contacts for its corporate membership in ISASI. John and Dana are partners resident in the Pittsburgh, Pa., office of Jones Day, and their practice is concentrated in the area of complex product liability and aviation litigation. John and Dana have appeared in state and federal trial and appellate courts across the United States. They have appeared in multidistrict and multijurisdiction litigation and have special expertise defending general aviation cases. They were part of the defense trial teams in the USAir Flight 427 litigation and the case involving the air crash death of a former Missouri governor. They also have counseled clients in crash site investigations, FAA administrative matters, corporate flight department procedures, and airport-related construction.

John and Dana have published articles on aviation litigation, litigation strategy, and product liability issues. They have spoken on a variety of legal topics, including legal issues relating to the use and operation of business jets. They are active members of the ABA Aviation Section and the Pennsylvania Bar Association Aeronautical and Space Law Section. They are pilots and members of the Aircraft Owners and Pilots Association. ♦



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