RUNWAY SAFETY

PROMOTING BEST PRACTICES

Invasive Alien Species
MITIGATING CIVIL AVIATION'S ROLE

Statistical Databases
NOT ALL CODES ARE CREATED EQUAL

Trinidad and Tobago
First ACI
Global Training Centre

Airports Authority
OF TRINIDAD AND TOBAGO

Linus Rogers, Chairman - AATT
Robert J. Aaronson, Director General - ACI

ACI Director General, Robert J. Aaronson, explained that in selecting Trinidad and Tobago, the ACI considered: "The excellent infrastructure available at the airport as well as the central location of Trinidad and Tobago within the Caribbean, easy air access for ACI members and the English language facilities made this a natural choice."

Trinidad and Tobago has been firmly established as a Global Training Centre (GTC) for aviation with the signing of an agreement on September 28th 2006 between the Airports Authority of Trinidad and Tobago and the Airports Council International. This development is being viewed positively by industry professionals in the Caribbean and internationally as it provides easier and more convenient access to training; and points to the broadening of the ACI's training operations outside of the traditional bases, beginning with Trinidad and Tobago.

Since February 27th 1996 under a similar type agreement with the International Civil Aviation Organisation, Trinidad and Tobago has served as the ICAO's regional centre for aviation security training. The ACI programmes will be conducted at the ultra modern Aviation Security Training Centre at Piarco International Airport.

This agreement follows a string of positive achievements for the Airports Authority including being recognised by the World Travel Awards for operating the Caribbean's Leading Airport. Piarco International Airport was voted the Caribbean's Leading Airport on the basis of excellence in customer service, technology, operational efficiency, product offering and style following an industry wide travel and tourism poll, carried out over a five month period, in 2006.

The locating of the ACI's first Global Training Centre at Piarco International Airport is considered reflective of the regard held for Trinidad and Tobago in aviation; and a direct consequence of the Airports Authority's successful hosting of the ACI-LAC XIII Regional Assembly in November 2004 and subsequent election to the Regional Board. The position on the Regional Board enables the Airports Authority to better champion the interests of the region. Interestingly, the Airports Authority was re-electedto the Regional Board of the ACI-LAC at its XIV Regional Assembly in Santo Domingo in October 2006.

According to Mr. Aaronson: "By establishing the GTC in Trinidad and Tobago, the ACI is able to meet its principal objective of providing high quality training in the most accessible way. The agreement demonstrates the ACI's commitment to providing excellence to its members on a global level within local reach. This is ACI's investment in the human capital of its members."

The AATT-ACI agreement furthers Trinidad and Tobago's developed nation status agenda with respect to the training and development of its people whilst simultaneously propelling the Airports Authority closer towards its goal of a learning and growth environment and its vision to become the premier provider of aviation driven business.

The GTC at Piarco International Airport is currently being used by the ACI as a model in the setting up of its five other training centres in other parts of the world.

The AATT-ACI Global Training Centre will provide training and support for airport personnel in a wide range of areas such as benchmarking, certification, crisis management, non-aeronautical revenues, operational safety and natural disaster management.

The Chairman of the Board of the Airports Authority, Linus Rogers, notes that: "The agreement makes a hemispheric connection with our most urgent and more immediate quest to provide a safe gateway to Trinidad and Tobago. It furthers for the long term, the link the Airports Authority has developed with the ACI, an organisation that represents close to 600 airport members over more than 1,600 airports in 176 countries."

Mr. Rogers emphasised the importance of ensuring that we grow our human capital in a working environment that facilitates the optimum application of skills and values to attain our vision to be the *premier provider of aviation driven business.*

ICAO Journal

The magazine of the International Civil Aviation Organization

VOL. 62, NO. 1　　　　　　**JANUARY/FEBRUARY 2007**

FEATURES

Cover photo by Steve Craft/Masterfile

WWW.ICAO.INT

Promoting the Development of International Civil Aviation

The International Civil Aviation Organization, created in 1944 to promote the safe and orderly development of civil aviation worldwide, is a specialized agency of the United Nations. Headquartered in Montreal, ICAO develops international air transport standards and regulations and serves as the medium for cooperation in all fields of civil aviation among its 189 Contracting States.

ICAO CONTRACTING STATES

Afghanistan	Denmark	Lithuania	Senegal
Albania	Djibouti	Luxembourg	Serbia
Algeria	Dominican Republic	Madagascar	Seychelles
Andorra	Ecuador	Malawi	Sierra Leone
Angola	Egypt	Malaysia	Singapore
Antigua and Barbuda	El Salvador	Maldives	Slovakia
Argentina	Equatorial Guinea	Mali	Slovenia
Armenia	Eritrea	Malta	Solomon Islands
Australia	Estonia	Marshall Islands	Somalia
Austria	Ethiopia	Mauritania	South Africa
Azerbaijan	Fiji	Mauritius	Spain
Bahamas	Finland	Mexico	Sri Lanka
Bahrain	France	Micronesia	Sudan
Bangladesh	Gabon	(Federated States of)	Suriname
Barbados	Gambia	Monaco	Swaziland
Belarus	Georgia	Mongolia	Sweden
Belgium	Germany	Morocco	Switzerland
Belize	Ghana	Mozambique	Syrian Arab Republic
Benin	Greece	Myanmar	Tajikistan
Bhutan	Grenada	Namibia	Thailand
Bolivia	Guatemala	Nauru	The former Yugoslav
Bosnia and	Guinea	Nepal	Republic of
Herzegovina	Guinea-Bissau	Netherlands	Macedonia
Botswana	Guyana	New Zealand	Timor-Leste
Brazil	Haiti	Nicaragua	Togo
Brunei Darussalam	Honduras	Niger	Tonga
Bulgaria	Hungary	Nigeria	Trinidad and Tobago
Burkina Faso	Iceland	Norway	Tunisia
Burundi	India	Oman	Turkey
Cambodia	Indonesia	Pakistan	Turkmenistan
Cameroon	Iran (Islamic	Palau	Uganda
Canada	Republic of)	Panama	Ukraine
Cape Verde	Iraq	Papua New Guinea	United Arab Emirates
Central African	Ireland	Paraguay	United Kingdom
Republic	Israel	Peru	United Republic
Chad	Italy	Philippines	of Tanzania
Chile	Jamaica	Poland	United States
China	Japan	Portugal	Uruguay
Colombia	Jordan	Qatar	Uzbekistan
Comoros	Kazakhstan	Republic of Korea	Vanuatu
Congo	Kenya	Republic of Moldova	Venezuela
Cook Islands	Kiribati	Romania	Viet Nam
Costa Rica	Kuwait	Russian Federation	Yemen
Côte d'Ivoire	Kyrgyzstan	Rwanda	Zambia
Croatia	Lao People's	Saint Kitts and Nevis	Zimbabwe
Cuba	Democratic Republic	Saint Lucia	
Cyprus	Latvia	Saint Vincent and	
Czech Republic	Lebanon	the Grenadines	
Democratic People's	Lesotho	Samoa	
Republic of Korea	Liberia	San Marino	
Democratic Republic	Libyan Arab	Sao Tome and Principe	
of the Congo	Jamahiriya	Saudi Arabia	

ICAO Journal

THE OBJECTIVES of the Journal are to provide a concise account of the activities of the International Civil Aviation Organization and to feature additional information of interest to ICAO Contracting States and the international aeronautical world. Copyright ©2007 International Civil Aviation Organization. Unsigned and Secretariat material may be reproduced in full or in part provided that it is attributed to ICAO; for rights to reproduce other signed articles, please write to the editor.

OPINIONS EXPRESSED in signed articles or in advertisements appearing in the ICAO Journal represent the author's or advertiser's opinion and do not necessarily reflect the views of ICAO. The mention of specific companies or products in articles or advertisements does not imply that they are endorsed or recommended by ICAO in preference to others of a similar nature which are not mentioned or advertised.

PERFORMANCE INDICATORS

BEGINNING WITH THIS ISSUE, statistics reflecting developments and trends in the air transport sector, including safety, will be highlighted in *ICAO Journal* on a regular basis. The figures that appear in this new department are submitted by ICAO's member States and are entered into ICAO's integrated statistical database (ISDB) for use in various analyses where, if necessary, they are supplemented with data from other sources.

Interestingly, ICAO has been collecting aviation statistics from its member States since the late 1940s. The earliest data available in electronic form (air carrier traffic) covers the year 1968. At present, the ICAO aviation statistics programme covers 10 data series, including commercial air carrier traffic, flight origin and destination, commercial air carrier financial data, and civil aircraft on register. Specific data are available online for a fee, while Contracting States have access to the information at no charge. For more information on obtaining ICAO data, contact the Economic Analyses and Databases Section via e-mail (sta@icao.int) or by telephone (+1-514-954-8219, ext. 8398).

In this issue, tables and figures illustrate the growth of the air transport industry since 1997, and more recently, compare preliminary 2006 scheduled traffic results with those of 2005. The detailed year-on-year comparison (*Table 1*) shows worldwide traffic results in terms of the volume of passengers carried as well as the passenger-kilometres (PKM) flown, available seat-kilometres (ASKM), revenue tonne-kilometres (RTKM), freight tonne-kilometres (FTKM) and available tonne-kilometres (ATKM). *Table 2* highlights changes in traffic volumes in three specific regions: Asia/Pacific, Europe and North America.

Figure 1 illustrates the growth in the number of passengers carried over a 10-year period, to a total of some 2.1 billion passengers in 2006. Also depicted are the international and domestic components. Similarly, *Figure 2* shows the growth in freight tonnes transported during the same period, with a record 38.9 million tonnes transported last year. For more information on 2006 scheduled traffic results, see ICAO Update (page 29).

Figure 3 illustrates revenue tonne-kilometres, and available tonne-kilometres over a 10-year period (a tonne-kilometre is a combined measure of passengers, freight and mail traffic that takes into account the distance flown).

Also featured is a 10-year comparison of worldwide passenger and cargo load factors (*Figure 4*). The passenger load factor has grown significantly, from 69 percent in 1997 to 76 percent in 2006, its highest level in the past decade. The trend is explained by a combination of traffic stimulation by the low-cost carriers and better capacity management by airlines generally.

As *Figure 5* illustrates, the spread between the overall load factor and the break-even point has progressively narrowed over the past decade, with the break-even point exceeding the overall load factor in 2001 and 2002, resulting in operating losses. The trend was reversed around 2004, and it is anticipated that the world's scheduled airlines will continue to post an operating profit for the near future.
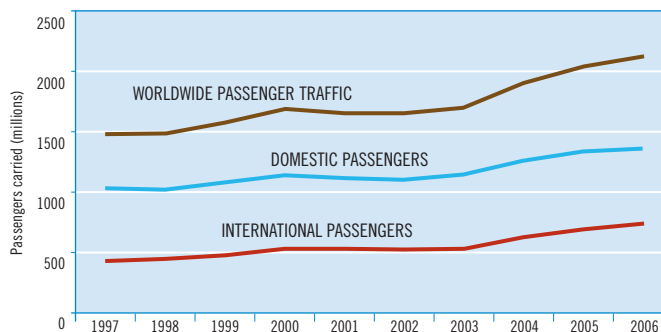
Figure 1. Passengers carried on scheduled air services, 1997-2006
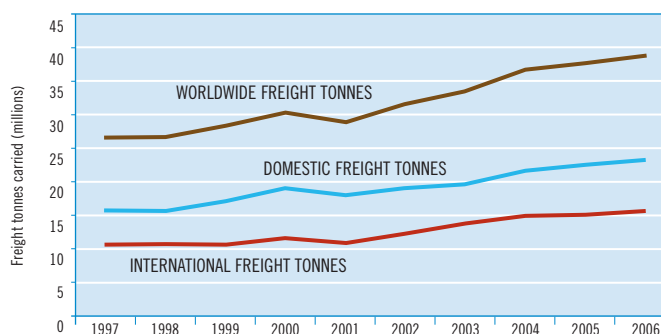
Figure 2. Freight tonnes carried by the world's scheduled airlines, 1997-2006

Air carrier traffic	International			Domestic			Total		
	2006	2005	%Var	2006	2005	%Var	2006	2005	%Var
Passengers (millions)	752	705	6.7	1 353	1 317	2.7	2 105	2 022	4.1
Passenger-km (billions)	2 335	2 198	6.2	1 579	1 522	3.7	3 914	3 720	5.2
Available seat-km (billions)	3 072	2 932	4.8	2 061	2 041	1.0	5 133	4 973	3.2
Revenue tonne-km (billions)	341.9	325.3	5.1	168.6	162.4	3.8	510.5	487.7	4.7
Freight tonne-km (billions)	122.1	118.5	3.0	25.4	24.1	5.4	147.5	142.6	3.4
Available tonne-km (millions)	527.6	506.9	4.1	277.5	273.4	1.5	805.1	780.3	3.2

Table 1. Worldwide scheduled airline traffic, 2006 versus 2005
(2006 figures preliminary)

Air carrier traffic	North America			Europe			Asia/Pacific		
	Intl.	Dom.	Total	Intl.	Dom.	Total	Intl.	Dom.	Total
Passenger-km	8.5	2.1	4.0	6.0	0.9	5.3	4.3	9.0	6.0
Available seat-km	6.2	-1.9	0.4	4.9	-1.1	4.0	2.4	7.8	4.4
Revenue tonne-km	6.5	2.3	3.8	3.8	-0.3	3.4	5.1	9.7	6.2
Freight tonne-km	3.5	4.4	3.9	1.9	-3.8	1.8	2.4	12.4	3.4
Available tonne-km	4.3	-0.9	0.9	3.4	-1.1	2.9	2.8	8.3	4.3

Table 2. Scheduled airline traffic and capacity by region, percentage change vs 2005 *(based on preliminary 2006 figures, ICAO statistical regions)*

PERFORMANCE INDICATORS

Figure 6 reveals the fatal accident rate since 1990, including pre-liminary 2006 data. (ICAO safety data reflect only accidents that involve passenger fatalities on scheduled commercial services by aircraft having a certificated maximum take-off mass of 2,250 kilo-grams or more.) The trend is generally downward, with the rate for 2007 expected to be significantly lower than that experienced in 2005.
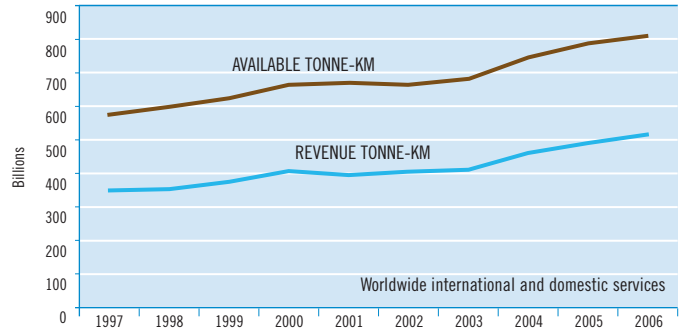
Figure 3. Scheduled airline revenue tonne-km and available tonne-km, 1997-2006
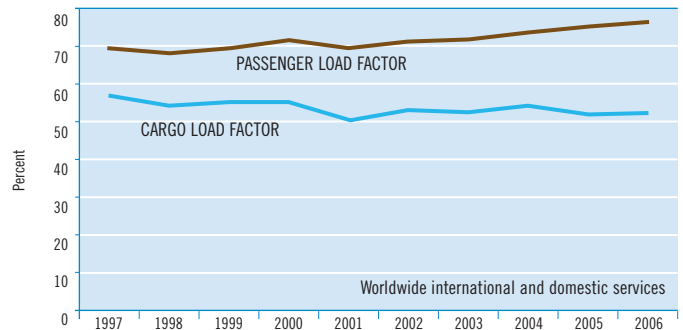
Figure 4. Growth in scheduled airline passenger and cargo load factors, 1997-2006
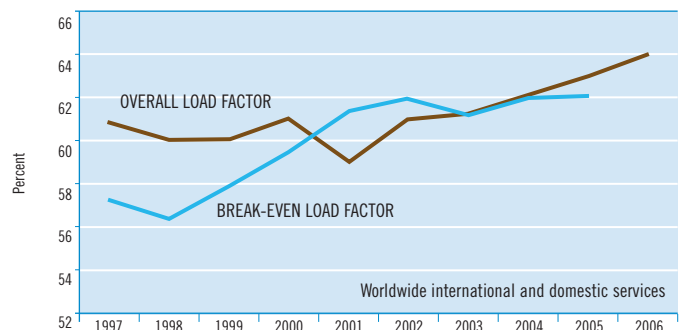
Figure 5. Spread between scheduled airline overall load factor and operating break-even load factor, 1997-2006
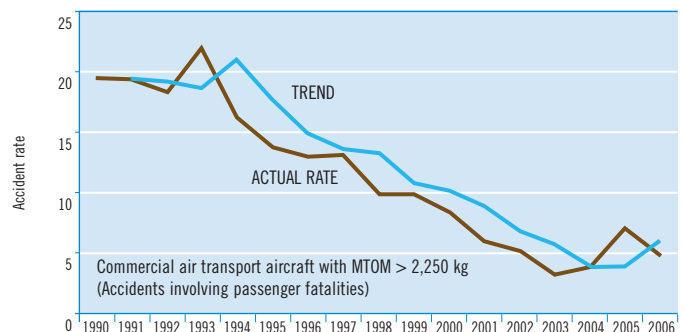
Figure 6. Fatal accidents per 10 million departures, scheduled passenger services

YOU'D BE SURPRISED WHERE YOU FIND US

As airspace gets more crowded, you'll find Thales taking control.

ATM systems face the same challenge worldwide: economic growth means more air traffic, putting dangerous pressure on existing systems. Thales is the safe choice for future development. We can take on prime contractorship and deliver complete turnkey solutions, gate to gate. We already control the airspace in 170 countries: our EUROCAT ATM system is the industry standard. In technology, we lead the way with Mode S radars and Automatic Dependant Surveillance-Broadcast (ADS-B). In European initiatives we're partners in the Single European Sky (Sesar) and Galileo satellite programmes.

Fully equipped for the present; already planning for the future. If you're looking for the safest route forwards, call Thales.

European action plan promotes best practices for preventing runway incursions

Based on insight into why runway incursions occur, European States are implementing an action-oriented plan that addresses safety concerns by disseminating best practices while placing new emphasis on harnessing technology and understanding human factors

PAUL WILSON
EUROCONTROL

THE ISSUE of runway incursions has been identified as a serious threat to aviation safety that European States, among others, are working hard to resolve. Recent initiatives to enhance runway safety include the implementation of the *European Action Plan for the Prevention of Runway Incursions*, which contains a number of recommendations designed to reduce runway accidents and incidents and improve safety. First distributed in 2003, the plan — the result of the combined efforts of organizations representing all areas of aerodrome operations — is updated periodically and remains in effect.

As the action plan points out, runway safety is a vital component of aviation safety as a whole. Moreover, runway safety calls for a continuous effort because growth in air traffic is likely to lead to more incidents unless this can be held in check by preventive actions.

Efforts to tackle the problem of runway incursions have been facilitated in recent years by the adoption of a standard definition for a runway incursion. As defined by ICAO, a runway incursion is "any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft."

The ICAO definition, applicable to all data collection and analysis since November 2004, made it practical for Eurocontrol to collect and share data on a global basis, and subsequently analyse and understand why these incidents are taking place.

As shown by incident data analysed by Eurocontrol, circumstances surrounding a runway incursion differ considerably, but are frequently caused by a complex mixture of contributing factors. Of the most common contributory and causal factors,

The circumstances surrounding a runway incursion differ considerably, but of the most common contributory factors, flawed communications is the most prevalent

those relating to communications form the biggest group. Non-ICAO phraseology, overlong and complex instructions, ambiguity and failure to provide or check readbacks, were frequently noted in incident reports that led to confusion and resulted in a runway incursion.

One very surprising result from the data analysis concerns those incidents where pilots or vehicle drivers inadvertently stray onto a runway. Prior to the survey, it had been assumed that pilots or vehicle drivers inadvertently entered a runway because they had lost awareness of where they were. However, the analysis showed that the prime contributing factor was, in fact, a breakdown in communication between Air Traffic Control (ATC) and the pilot or vehicle driver. Simply explained, the pilot or vehicle driver entered the runway believing that a valid ATC clearance had been received in well over 50 percent of the cases.

Improving communications is therefore a matter of priority, but difficult to accomplish. It is not simply a case of issuing an instruction telling people to communicate more efficiently. Aerodrome operations are conducted in dynamic and volatile environments. There are times of very high workload, with multiple crossed transmissions, and indistinct or clipped messages as air traffic controllers constantly scan the manoeuvring area and plan their next four or five actions.

Action plan vs manual. The European action plan cited above was developed by a still active group of experts known as the European Working Group for the Prevention of Runway Incursions. Formed in 2002, the dynamic group is made up of representatives of all organizations involved in runway operations. Working as a team, it operates on the premise that no single group — whether

ATC, aerodrome operators or aircrew — can solve this very complex problem in isolation. The group members are operational personnel who understand the day-to-day problems experienced on the job.

The working group has adopted a no-blame culture: if highly professional and very proficient people have done something that has resulted in a runway incursion,

Figure 1. Number of runway incursions within Eurocontrol statistical reference area (occurrence per million aircraft movements; severity of occurrence)
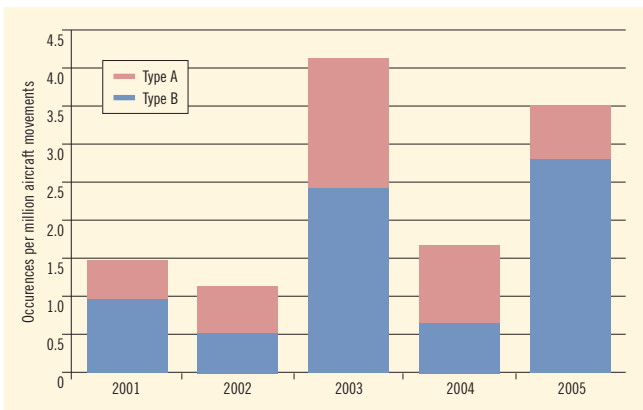
Figure 2. Runway incursion trend (occurrence per million aircraft movements; severity of occurrence: A or B)

then some fault in the system has led to the human mistake. It is these systemic faults that need to be identified and addressed.

At the outset, the group decided to produce an action plan with specific tasks and deadlines in preference to a manual, which tends to be placed on shelves with other manuals. The action plan, containing over 50 recommendations that recognize that airports vary from small regional operations to large multi-runway hubs, may be viewed at Eurocontrol's website (www.eurocontrol.int/runwaysafety/public/standard_page/EuropeanAction.html).

A number of principles underpin the action plan's 56 recommendations, which are directed at aerodrome operators, air navigation service providers, aircraft operators and regulators, among others. The underlying principles are:

• Existing ICAO provisions are adequate for all tasks associated with runway operations.

• Aviation is a global industry and variations in practice have, and will continue to cause, significant problems as aircraft fly from one region to another.

• Aircrew require the consistency and predictability that the harmonized application of ICAO provisions can provide.

• At the aerodrome level, runway safety can only truly be enhanced by local joint action because local differences in the layout of the infrastructure and the mixture of traffic, etc., must be taken into account.

Learning from experience. In the process of disseminating the action plan, good practices were identified and have been incorporated. Among these, one good practice is the decision by some airport operators to confirm in writing that all airline users have implemented the relevant recommendations in the action plan. Another desirable practice is to obtain pilot input on local runway safety teams; this is usually available from the International Federation of Air Line Pilots' Associations (IFALPA) aerodrome liaison representative.

Some air navigation service providers are making considerable effort to enhance the standard of ATC-pilot-vehicle driver communication. These include

regular analysis of radiotelephony recordings to ensure that all participants are using the correct phraseology and procedures. In addition, some airport operators are providing comprehensive radiotelephony training to vehicle drivers.

Another good practice adopted in some States is to have a policy preventing aircraft from crossing illuminated red stop bars.

In addition to outlining best practices for operating personnel, the action plan provides guidelines for local runway safety teams and furnishes details about inspection and audit guidelines, safety management systems and aeronautical information management.

Role of technology. In addition to numerous recommendations for systemic improvement, technology can be harnessed to reduce the risk of runway collisions. Current efforts are focused on two main areas, specifically devices that provide positional awareness to pilots, and systems that provide air traffic controllers with a warning whenever a runway incursion is under way.

Current positional awareness technologies that an aircrew can use to monitor their precise location on the surface of an aerodrome help with navigation. Even when a pilot is absolutely certain of his or her location, however, a runway incursion may still take place because of a misunderstanding between ATC and the pilot.

Runway incursion alerting technologies have already been instrumental in avoiding a number of serious incidents. The drawback to this technology, however, is the very limited time available for the alerting process.

A taxiing aircraft can cross the runway holding point marking and reach the runway in a matter of a few seconds. During that brief interval, the incident can be

Incident at Manchester Airport puts focus on runway safety

Non-adherence to established procedures by the flight crew, as well as by the airport operator and ATS provider in terms of planning and managing runway maintenance, lie behind a serious incident involving vehicles at work on the active runway

AIR ACCIDENTS INVESTIGATION BRANCH
(UNITED KINGDOM)

FOLLOWING its investigation of a serious incident at Manchester Airport on 16 July 2003 involving a Boeing 737-86N operated by Excel Airways, the U.K. Air Accidents Investigation Branch (AAIB) has published a formal report (No. 3/2006) that includes several safety recommendations related to runway safety.

The B737 (registration G-XLAG), with seven crew members and 190 passengers on board, was undertaking a flight from Manchester Airport to Kos, Greece. Runway 06L was in use, but the pilots were not aware that 06L was being operated at a reduced length because of work in progress to remove rubber deposits at the far end of the runway. The pilots could not see the maintenance vehicles from near the 06L threshold, as the runway is built over a slight rise in the ground.

Due to a difference in interpretation of information passed between Air Traffic Control (ATC) and the flight crew, the aircraft entered the runway from holding point AG (see accompanying chart) rather than the expected holding point A [at the 06L threshold end], and the take-off was

conducted using a reduced thrust setting calculated for the assumed normal runway length. As the aircraft passed the crest of the runway, the flight crew became aware of vehicles at its far end but, as they were now close to their rotation speed, they continued and carried out a normal take-off. The aircraft passed within 56 feet of a 14-foot high vehicle performing removal of rubber deposits on the runway (see photo).

The AAIB was notified of this serious incident on 23 July 2003, seven days after it had occurred. The subsequent investigation revealed further incidents had occurred during the course of the work, the most significant being on the night of 15 July 2003. On this occasion, ATC had instructed three commercial passenger aircraft to go-around after they had knowingly positioned them to land on the reduced length runway. The crews of all three aircraft were unaware of the reduced length available and, when informed, stated that it was insufficient for them to be able to land. The closest of the aircraft, a Lockheed Tristar, was at a range of 2.5 nautical miles (NM) when instructed to go-around.

The actions of Manchester Airport plc (MA plc) and National Air Traffic Services (NATS) Manchester, while not directly contributing to the event involving G-XLAG, raised additional concerns. In light of this, the scope of the investigation was extended to include the manner in which MA plc and NATS had planned and managed the rubber-removal operation.

The operator, MA plc and NATS have

now taken considerable steps to address most of the issues raised in the AAIB report, which contains six safety recommendations concerning runway safety,

After becoming airborne, the B737 came within 56 feet of a large maintenance vehicle removing rubber deposits from the runway's surface

including specific recommendations concerning operations at Manchester Airport.

Analysis

The AAIB report includes an analysis of several aspects of the incident, including flight crew planning and, in the wake of the incident, follow-up action by those concerned. Following is an extract of the comments on these two topics.

Flight Crew Planning. Prior to a flight, as part of the planning process, flight crews are required to check all relevant notices to airmen (NOTAMs). In addition, the aircraft operator requires that the departure automatic terminal information service (ATIS) message is recorded on the flight navigation log.

The flight crew reporting time used by the operator of one hour prior to departure, while complying with the regulations, provided little extra time to resolve

any problems which might arise in the planning phase of a flight. However, should more time be required by the flight crew owing to unforeseen complications, the operator would not hold the crew responsible for any delay in ensuring the safe dispatch of the aircraft. Despite this, in this instance the commander might well have felt under pressure not to delay the flight; the lack of time having, in part, been exacerbated by his own late arrival at the airport.

It is often the case that flight crews report earlier than required by the operator to ensure that planning is completed in good time, as was the case with G-XLAG's co-pilot on the day of the incident. On learning that the aircraft commander would be late, he attempted to avert any subsequent delay to the flight by completing sufficient planning to be able to pass the fuel uplift figure to the aircraft refuellers. As the co-pilot was solely interested in getting sufficient information to make this calculation, he looked only at those NOTAMs for the destination and diversion airfields.

When the commander arrived at the crew room, he checked the fuel figures at that time by reference to the flight plan and weather forecasts for the destination and alternate airports; however, he did not read the relevant NOTAMs, deciding instead to check them once he was on the aircraft. While the flight crew had the intention of reading all the relevant NOTAMs before departure, they missed the opportunity to thoroughly brief together in the crew room. Once on the aircraft, they were subject to the usual distractions involved in pre-flight preparation and the pressure of trying to make their allocated departure time. As a result, despite their stated intentions, the NOTAM of critical importance to their departure, detailing the work-in-progress on Runway 06L/24R, was never read.

Although unaware of the content of this NOTAM, the ATIS provided both pilots with another opportunity to learn of

While the pilots intended to read all NOTAMs before departure, they missed the opportunity to do so in the crew room

the work-in-progress. The ATIS broadcast gives a letter allocation at the start and finish of the information to ensure that those listening are aware that they have received the full transmission. The weather information was heard by the co-pilot, as he noted it in the appropriate place on the navigation log, but it was not possible to establish if either pilot had listened to the information about the work-in-progress.

The weather information from the ATIS was used by the pilots to calculate their performance for the take-off. This was done, however, using performance figures for Runway 06L at its normal length, and not the reduced length in force at the time of their planned departure. The performance figures calculated were correct for the normal runway length and allowed for the reduced thrust take-off which was subsequently performed. The pilots had no data available which would have allowed them to calculate their performance for the reduced runway length, and they were not in a position to obtain this data at such short notice.

Subsequent calculation revealed that the crew correctly calculated their take-off speeds based on their belief that they were using Runway 06L at its normal length. The aircraft was, however, more than nine tonnes overweight for a take-off on the reduced length Runway 06L when using the calculated reduced thrust.

On 9 July, a member of the operator's ground staff had attended a monthly meeting held by the airport operator for airlines using the airport. The minutes of this meeting recorded that the Airfield Policy and Planning Manager had advised that there would shortly be some runway restrictions in place on Runway 06L/24R, due to maintenance work involving the removal of rubber deposits, although precise details were not given. This information was not passed on to either the operator's pilot managers at

Manchester or the company operations department at Gatwick, as it was considered the meeting was designed to cover issues of importance only to the ground staff (i.e. the terminal and ramp areas). It was considered that, if it were of importance to flight operations, the airport operator would pass the relevant information to the various operators through a different channel.

Therefore, in the absence of any detailed notification of the restrictions planned for Runway 06L/24R, neither the pilot managers at Manchester nor their operations department at Gatwick were in a position to notify their flight crews of the work and its implications, or to produce and disseminate revised performance figures for operation from Runway 06L/24R at reduced length.

It might have been expected that, once it became apparent that runway work had commenced, such actions would have been taken by the operator. It is also possible to argue, however, that there would be no benefit in doing so as all the necessary information concerning the work was already available to flight crews in the relevant NOTAM. In addition, the operator stated that it would not have provided revised performance tables in this case for such temporary work, as the full length of Runway 06R/24L was available as an alternative. Their pilots would, therefore, have had no choice but to use Runway 06R/24L, for which revised performance figures were not required.

Follow-up Actions. Following this incident, the pilots involved received appropriate retraining before returning to flying duties. The operator's own investigation, and that of its CAA Flight Operations Inspector, revealed no other issues requiring action.

Steps were taken to improve the safety culture within NATS at Manchester by, among other measures, introducing a more open and robust reporting regime. Assets have also been made available to create a new safety and development management post. At the national level, NATS has taken on several new initiatives to increase the level of information
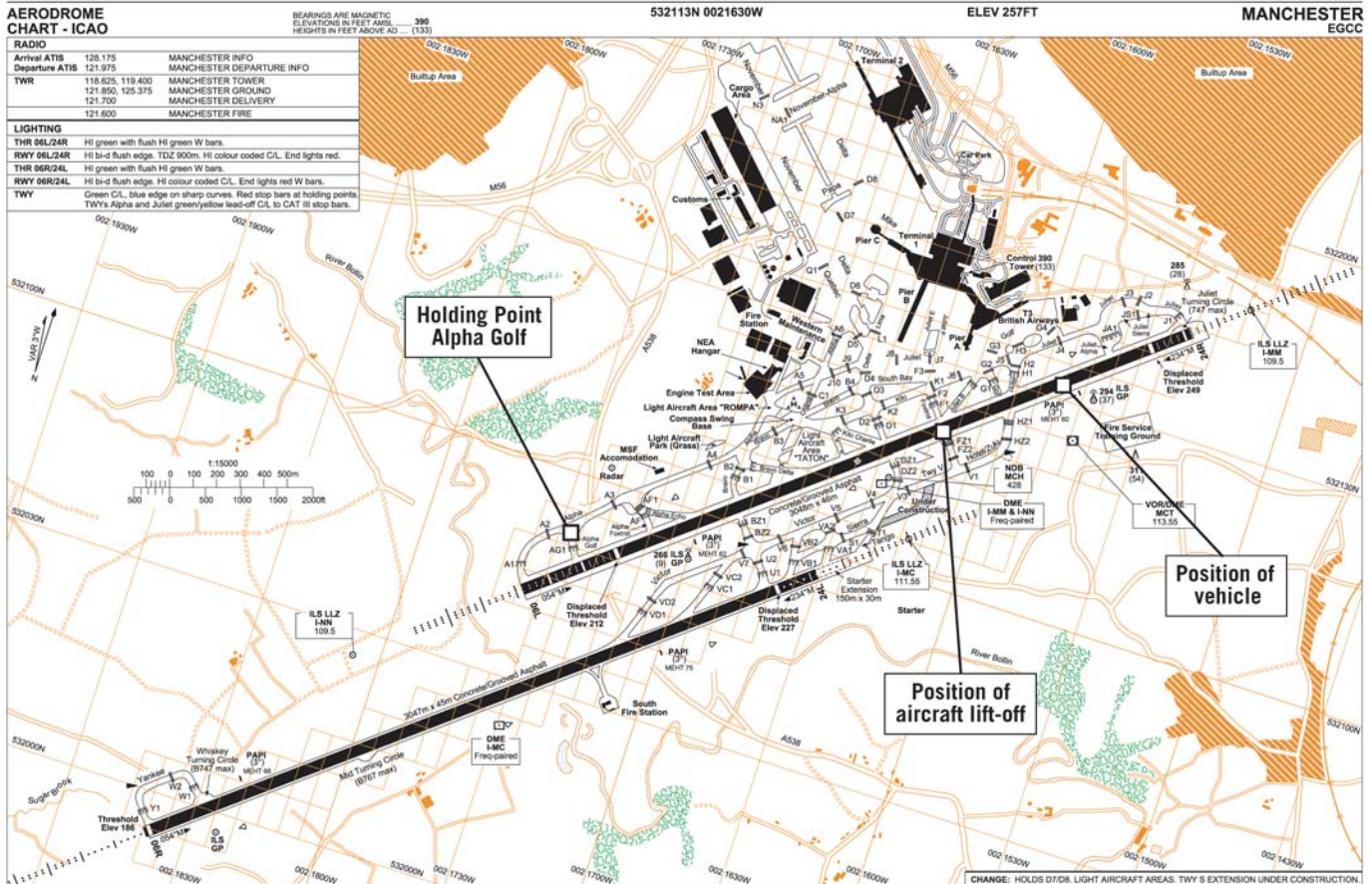
Aerodrome chart for Manchester International Airport showing the point at which the aircraft entered the runway and its position at lift-off in relation to the ground vehicle performing maintenance on the runway

dissemination between their various ATC units and to provide safety staff with better training. NATS is also carrying out a study to assess the level of safety culture within its various units and to provide a means of tracking any changes.

The working relationship between NATS and MA plc has come under close scrutiny from both sides and as a result of changes has now improved considerably. In particular, both sides have worked jointly to provide better agreement on the process leading up to similar projects being undertaken in the future. This includes a joint hazard analysis process and better internal dissemination of information.

The CAA published two documents in 2003 relating to combined hazard procedures: *The Management of Safety* (CAP 726) and *Guidance on Aerodrome Development Procedures* (CAP 729). In addition, the CAA had published further and more up-to-date guidance on this subject in a document titled *Guidance on the Conduct of Hazard Identification, Risk Assessment and the*

Production of Safety Cases for Aerodrome Operators and ATS Providers (CAP 760).

The airport operator has taken the decision not to conduct take-offs or landings towards planned work-in-progress. The operator has stated that it has also improved the sharing of safety and operational lessons learned amongst the airport group of which it is a member.

Investigation findings

The AAIB report contains 43 findings in all. Among the conclusions are the following:

• The request for NOTAM action was applied for by the airport operator approximately three hours prior to the commencement of the rubber-removal operation on 14 July 2003.

• The Civil Aviation Authority (CAA) confirmed that the correct reduced runway distances had been calculated when contacted by the airport operator on the morning of 14 July 2003.

• Rubber-removal operations com-

menced at 1430 hours local time on 14 July 2003 and were completed by 2053 hours local time on 17 July 2003.

• No evidence was found that the NOTAM detailing the work had been cancelled by the airport operator when the work had been completed ahead of schedule.

• Work was in progress at the time of the incident at the end of Runway 06L.

• The work-in-progress was promulgated by NOTAM and transmitted on the ATIS to which the two pilots had access.

• The co-pilot listened to the ATIS broadcast, which contained details about the weather, bird activity and the work-in-progress, but only copied down details about the weather.

• Manchester ATC advised the pilots of the reduced runway distance available for take-off.

• The pilots did not read the NOTAMs relating to Manchester Airport prior to the aircraft's departure.

Integrated information system facilitates effective decision making

By incorporating data on aviation activities from various sources in a single information system, as Colombia has recently done, decision makers benefit from having sufficient and timely information readily at hand

JORGE A. QUINTANA CRISTANCHO
CIVIL AVIATION AUTHORITY (COLOMBIA)

IT IS IMPORTANT to make the most of information resources, if only because the lack of sufficient data often leads decision makers to flawed conclusions. Planners, it is commonly said — only half in jest — spend half their year trying to explain future behaviour, and the rest of the year explaining why their projections did not come to pass. At every level, planning organizations end up classifying actual results as "atypical" behaviour that stems from variables not taken into account in the projection model used. The omission is usually explained by the fact that the model already had independent variables which satisfactorily explained past behaviour. In reality, during the formulation of the model, certain variables were excluded because they were probably not considered representative owing to their low probability.

Even today, many countries still do not give the aviation industry the importance it is due and the attention that is necessary for its continued success. The development of a statistical system is often prevented by lack of resources, but its absence compels countries to make decisions about air transport based on studies focused on other markets. It is also common, where statistical systems are in place, for countries to have information which is insufficient or which has not been properly consolidated or made available.

In bilateral and multilateral air transport agreements, negotiators who lack suffi-cient information often have difficulty in setting their objectives and articulating their case. Often they do not understand market dimensions or fail to see what added value certain bilateral or multilater-al arrangements can generate for their country's economy. Yet air transport nego-tiations today may be more difficult than ever, in part because resources can no longer be squandered in a globalized world that demands that governments run their affairs more efficiently and soundly.

From a historical perspective, all goods and services have a life cycle that is sus-ceptible to change because of variables. Many of these are external to the system of production, and have to do with the quality of information available to the decision maker. In order to define a prod-uct that will meet today's needs, compre-hensive and timely background informa-tion is needed on the product itself. This includes its various characteristics and quality, as well as any improvements made; the supplier, including the status of competition and availability of alterna-tives; and the consumer, especially in terms of buying power and consumer sat-isfaction. Background is also required on the environment (this last element con-cerns such variables as economic growth and the political situation).

ICAO has developed a valuable system

Cesar Bejarano

Governments, aircraft manufacturers and air carriers all need precise information on the actual origin and destination of air travellers and cargo shipments

of statistical information that allows ana-lysts to visualize the worldwide develop-ment of the aviation industry, mainly the air transport sector. With the support and collaboration of member States, ICAO periodically compiles air carrier operating figures, complementing these with infor-mation from other international organiza-tions. Individual national and regional sta-tistics systems should be devised using the ICAO system as a model.

In creating an aviation information sys-tem, consensus must first be reached by the economic players involved in the pro-duction, marketing, consumption and regu-lation of aviation goods and services, as they are the stakeholders that stand to ben-

efit from determining the type of information needed, the sort of system required for its collection, and the way in which data will be communicated. Just as information is not exclusively the responsibility of the producer or the consumer, neither is it exclusively the responsibility of any single part of the chain. Information gathering must involve all airline suppliers, among them fuel providers, aircraft manufacturers, maintenance contractors, computer reservations system operators and providers of financial management services.

Establishing an information system is a process that occurs over several years. System modules need to be defined, and of course the sort of information that will constitute the backbone of the system has to be determined, taking into consideration the relative importance of various aspects. The system's developer, for example, needs to ensure the validity of information, which must be organized in a highly productive way, thus guaranteeing consistent information over a long period of time. Reliability is also crucial, requiring unambiguous and timely data. And information should be available in a format that is easily handled over the long term, and addresses actual needs for measuring growth.

An aviation statistics information system supports the development of a country's aviation sector. In addition to measuring the quantity of products and services available, it takes into account consumer opinion on the quality of the services offered, and identifies how their providers of aeronautical services are compensated. It is also crucial to establish good cooperation between the administrator of the system and the sources of information. To some extent, this calls for clear instructions to reporters on how and when information must be communicated to the system administrator.

The aviation statistics information system set up by Colombia features an operational information subsystem that categorizes aviation industry activities by employing different modules for the air transport sector, special aerial work and related activities, as well as several other modules.

Air transport module. The air transport module is comprised of different databases dedicated to passenger and cargo movements. These databases are used to display the origin and destination of air passengers and cargo shipments. They also provide information about the type of services offered.

Governments, manufacturers and air carriers all have an interest in knowing about the size of air transport markets and the changes these markets undergo. In other words, they need precise information on the actual origin and destination of travellers and goods.

This is a complex measurement in practice, especially when factoring in flight connections involving inter-carrier agreements. For this reason, it is important to identify all such agreements in advance and confirm which party is responsible for providing the service. Connections can be associated with one or more contracts of carriage and with one or more airlines, but whenever a number of carriers are involved, it can be very difficult for a system administrator to obtain the necessary information.

Once the content of the desired information has been defined, it is then necessary to determine who will provide such information as well as examine the different elements affecting the information-gathering process.

Operators of reservations systems and others involved in marketing services can be asked to periodically report their sales or reservation figures for a given flight or market. Information obtained in this way needs to be complemented by travel data, such as details about the advance purchase of tickets or the overbooking of specific flights. The additional information is important because while these data demonstrate the intention to travel, no certainty as to the date of travel is available, and there even exists the possibility that travel will not occur at all.

Information from airports is readily available because of the operator's clear interest in reporting data. Such information is usually highly reliable in terms of departures, but not for ascertaining details about inbound and outbound passengers and cargo shipments. What the airport operator is most interested in is knowing the destination of departing aircraft, as this information is most pertinent to generating revenue through departure fees.

Information obtained from immigration and customs authorities is extremely detailed. However, these data are rather limited because they account only for

SOURCES	SUBSYSTEMS	MODULES	REPORTS	ECONOMIC IMPACT
Aviation companies	Operational	Air transport	On-line reports	Quality of life
Users	Production factor compensation and the State	Special aerial work	Specialized journals	Economic growth
Environment	Quality of service	Related activities	Indicators	National and international connectivity
		Training and licences		Productivity and competitiveness
		Infrastructure and flight protection services		
		Costs		
		Financial statements		
		Fulfilment of commitments		
		Complaints		
	Environment information			

Colombia has developed an integrated aviation statistics information system that is comprised of a number of modules

international traffic, a characteristic reinforced by international agreements on free trade and air transportation.

Airline information reflects the services rendered in accordance with contracts of carriage. As stated above, however, it is important to establish at the outset whether the information provided pertains to the services actually rendered by the reporting entity, and how codesharing services and other inter-carrier arrangements are to be handled. All information on 5th and 6th freedom traffic rights under the same contract of carriage and airline must also be included.

There is no such thing as perfect information. The best scenario is to obtain the information that most closely meets the needs of stakeholders. There may be significant overlap in the information needed by airlines and that required by the State, yet when it comes to making certain decisions, other information can be quite valuable and therefore should not be discarded. For example, information from immigration authorities gives a clearer picture of a potential market not yet directly served by any airline; sale systems information enables the prediction of market fluctuations during peak season; and airport data corroborates the quantity of arriving passengers and goods, as well as traffic in transit or making connections.

Service characteristics. Air transport services are characterized by the alternatives offered to the user, as reflected in pricing systems that include conditions of travel and itineraries. What is needed is a pricing and itinerary registry system, preferably automated, that shows changes and maintains a historical record.

Complementary stage-by-stage traffic information, which is the data gathered from the breakdown of flights into their individual stages, provides details about each segment of the air transport market, each air carrier and changes in air carriers serving the route, and the types of aircraft used. This information can be obtained from airport and/or airline statistics. It

A good information system can support the development of a country's aviation sector

measures occupancy (i.e. the percentage of seats filled or cargo capacity sold), the actual size of the market in terms of passenger-kilometres or cargo-kilometres, the quantity of flight hours, the type of aircraft equipment used, and the routes flown. It also indicates which airlines are making the best use of resources.

Special aerial work. Special aerial work refers to all aviation activities other than commercial air transport operations. This includes crop spraying, ambulance services, firefighting, aerial surveying, and the like. Statistics focus on the data provided by the operator on the type of aircraft, number of operations, hours flown and, in the case of fumigation, the areas and crops affected and the chemical products applied.

Related activities. This heading covers all aircraft manufacturing and maintenance activities and specialized airport services. Gauging these various activities is somewhat complicated, and for this reason it is necessary to first classify services in accordance with the complexity of the tasks involved.

Alongside related activities, it is beneficial to have a module dedicated to training and licensing. In order to recognize a country's capacity for technical training, information is needed about the personnel licensed for each activity, as well as the existing training centres and their resources.

Information about a country's aviation sector cannot be complete if the particularities of its infrastructure are unknown. ICAO has recommended enhancement of worldwide infrastructure because the current global transport system is not capable of accommodating anticipated traffic growth. However, there still exist infrastructures that have the capacity to sustain operational growth. Unlike many countries where congestion is an obstacle to further growth, countries like Colombia have underused infrastructure, a situation that is highlighted by Colombia's aviation statistics system.

In addition to an inventory of airports, runways and equipment for air traffic

control, aviation telecommunications, meteorology and aeronautical information, one must also include changes that affect their capacity and their use (e.g. number of operations per type of aircraft, air carrier and activity).

The ability to meet the demand for air services adequately, which is fundamental to guaranteeing the competitiveness of an airline, can be seen in the degree of satisfaction expressed by consumers. This can be measured through passenger complaints filed with a regulatory entity, the fulfilment of service-related promises made by the air carrier, and periodical surveys on satisfaction and service standards.

To be used effectively, information about service quality should be integrated into the aviation statistics database. In the case of Colombia, this information is maintained as a subsystem.

Another subsystem of the Colombian system concerns the viability of producing goods or services and the contribution of certain aviation activities to the wealth of a company, region or country as a whole. Such data are obtained from the financial information released by companies and operators involved in the aviation sphere, and from the operating costs of different types of aircraft equipment. Some items indicate the added value generated for the economy, as well as the distribution of this value between the resources involved in the production of goods and services, and the State. Even import and export volumes can be identified in the breakdown of revenue and external payments (balance of payments). Knowing the origin of imports is beneficial because the ability to trace the origin of new equipment and replacement parts is improved, thereby assuring better quality control and, ultimately, safety.

Yet another subsystem of an effective aviation statistical system concerns the linkage with other statistical systems. In Colombia, this is known as the environment information subsystem. This subsystem is

Jorge A. Quintana Cristancho is the Chief of the Sectorial Study Group, Special Administrative Unit of Civil Aeronautics, Colombia.

Statisticians should be wary of using operational codes in databases

When existing operational codes are adapted for aviation statistics databases, problems arise. That is why ICAO's new integrated statistical database automatically augments any operational codes submitted by States with unique and permanent codes for unmistakeable record identification.

ATTILIO COSTAGUTA
ICAO SECRETARIAT

AS EVEN the first-time airline passenger would know from a glance at his baggage tag, the air transport industry favours the use of codes to identify aerodromes. Indeed, the industry has generated a whole series of codes as a short-hand notation to identify aircraft operators and types as well as airports. These codes are used to meet various operational requirements.

The existence of operational codes has created a temptation to extend their application to areas for which they were never intended, such as statistical databases, but with poor results. This is because the most important criterion for any statistical database is that the codes employed have to be permanent and unique over time. In practice, this is not the case for existing operational codes. In such systems codes need only be correct and typically distinct on the day they are used, and they do not always represent a unique entity over an extended period of time, a characteristic that must raise the concern of any statistician.

Perhaps the best way to illustrate the situation is to examine the operational codes issued by ICAO and the International Air Transport Association (IATA), or by States in cooperation with ICAO, and the issues that may arise when these are adopted as the sole identifier for a data record in a statistical database.

Location indicators

The purpose of ICAO Document 7910, *Location Indicators*, is to identify all of the stations which form part of the worldwide aeronautical fixed telecommunication network (AFTN) used to exchange messages and/or digital data between these stations. In other words, the location indicators are the equivalent to phone numbers or e-mail addresses. It happens that most of these AFTN stations are located at airports, therefore these codes are also used to identify aerodromes, in particular those used for international operations.

ICAO location indicators are composed of four letters (e.g. CYUL for Montreal's international airport). The first letter indicates the area in which the communications centre is located; the second designates the State or territory in which the centre is situated (larger States may use more than one letter to identify different areas in their territory); and the last two letters are assigned to assist in the process of routing the message to the communications centre.

The primary purpose of the ICAO location indicator, as noted above, is to identify a communications facility. This could be situated at a civil airport or a military base, in an air traffic control centre or in a civil aviation administration office. In some major centres there may be "location indicators" for communications centres associated with particular services, such as meteorological services, in the same physical location. Similarly, in the case of airports that combine military and civil operations, often the location indicator identifies the communications facility associated only with the military installation.

The information presented in Document 7910 is not always very clear as to which entity the code belongs to. Cross-checking this information with other sources is sometimes rendered more complex for location indicators from States with non-Latin based languages. In these cases, names are often converted on the basis of their phonetic sound, and the spelling used by ICAO may differ from that used by others.
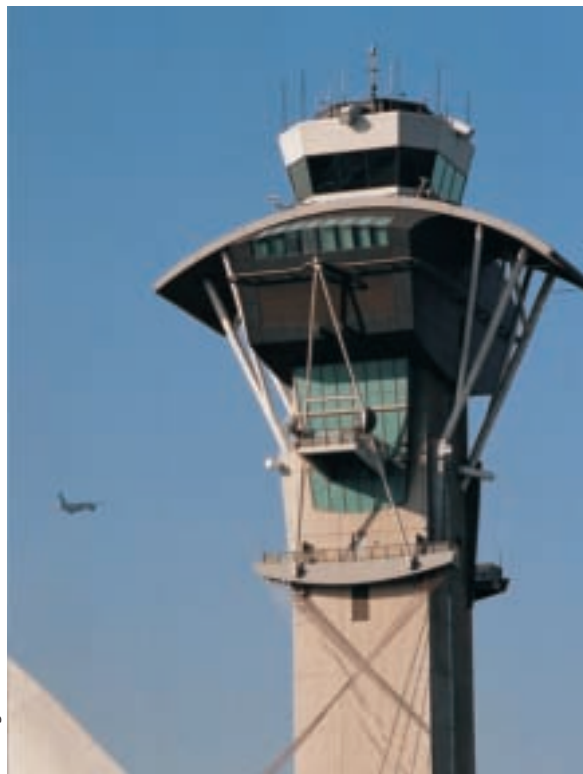
Jim Jorgenson

ICAO's location indicators identify stations of the aeronautical fixed telecommunication network, and international airports. Nevertheless, the codes are often pressed into service to identify all airports found in statistical databases.

The structure of the example code cited above does not assure uniqueness over time. In a few cases, States have changed not only the last two letters of the code, but also the first two, thus rendering the code useless for identifying records in a statistical database.

Jim Jorgenson

Any organization creating a new statistics database that includes aircraft types would do well to acquaint itself with the naming standard adopted by CAST/ICAO

States also make use of the location indicators in the national *Aeronautical Information Publication* (AIP) to identify designated international aerodromes and heliports as required by ICAO Annex 15. The convenience of using these codes to identify aerodromes has prompted many States to extend this system to most of the aerodromes in their territory, including some that are not part of the AFTN system. In Document 7910, the codes of these aerodromes are identified with an asterisk.

IATA, too, has location indicators to identify aerodromes. These are used to identify international and domestic aerodromes with commercial operations. Again, while these are fairly stable, there is no guarantee that they will remain unique. Published by IATA in the *Airline Coding Directory*, at one time these location indicators were much more numerous than those shown by ICAO. Today, most of the IATA indicators have an ICAO equivalent, but despite this development, the two systems are not interchangeable.

Operator codes

The ICAO three-letter system of desig-

nators for aircraft operators, authorities and services became effective in 1987. Prior to that time ICAO, in coordination with IATA, had been issuing the more familiar two-letter designator still in use by IATA.

As long ago as the late 1970s, it was clear that there were not enough two-letter designators to meet the needs of an expanding air transport industry. And although ICAO and IATA initially agreed to move to a three-letter system for this reason, IATA member airlines twice requested postponement of the implementation. ICAO eventually decided to unilaterally proceed with the new system for international aeronautical communications; the assigned three-letter codes are listed in ICAO Document 8585.

In the meantime, IATA had to stretch its system to accommodate the higher number of codes required. Codes were changed from two letters to two alphanumerical characters. Subsequently, IATA allowed the use of the numbers 1 and 0, characters which had been proscribed from the character set as they could be easily confused with I and O respectively. Finally, it introduced the use of "controlled duplicates," whereby two air carriers — usually operating in different geographical regions — share the same code. In addition, the codes which become available as carriers cease operations are reassigned very quickly to new operators. Despite these complications, airlines so far prefer to retain the current automated system and avoid the cost of converting to three-character codes.

As with location indicators, from a statistical standpoint the main problem with the existing coding systems for aircraft operators is that neither assures uniqueness. As in the case of IATA, ICAO three-

letter air carrier designators of operators which cease to exist are reassigned to new air carriers. What's more, the use of these codes extends beyond commercial air carriers to cover other types of aircraft operators as well as civil aviation authorities and ground services.

ICAO codes are created or deleted at the request of States. States do not, however, always keep ICAO informed in a timely manner, and consequently not all international operators have a three-letter code prior to commencing operations. Similarly, in a few cases, ICAO may still show codes for operators long after they have ceased to exist.

Any attempt to use the IATA codes to identify air carriers in a statistical database usually proves problematic. These codes are not sufficiently stable to allow for even a 12-month data series, never mind one of several years' duration. Any entity that has tried to use the airline schedules available from some vendors to analyse air carrier data over a period of time would soon realize what a mistake it made in tying its system to the IATA codes. For example, if the same code were used by more than one air carrier during the period studied, spurious data from the previous owner of the code would creep into the data set being analysed, and this misinformation could colour the results without the analyst necessarily being aware of the fact.

Type designators

ICAO publishes aircraft type designators to be used for air traffic services (ATS). These codes, listed in Document 8643, are primarily intended for use in flight plans and associated ATS messages. A different designator for an aircraft variant or subtype will only be allocated when there is a significant difference in performance that has an impact on air traffic services. The latter fact is the real key to why these designators are not very useful for statistical databases.

Attilio Costaguta is the Chief of the Economic Analyses and Databases Section of the Air Transport Bureau at ICAO headquarters, Montreal.

Variance analysis can help airlines improve their competitive edge

An analytical process known as variance analysis is valuable in understanding why an airline's actual and projected revenues and costs are different, thereby highlighting ways to improve the bottom line

A. Sainarayan
ICAO Secretariat

SINCE the dawn of air transportation, there has been an exponential increase in the number of passengers and routes flown, currencies used in transactions, fare types and discount levels, to name just a few areas that generate complex data. Such an overload of information can make it difficult for a manager to identify ways to improve airline competitiveness. This is why a systematic data collection process is required to highlight information of value, with support from a management tool known as variance analysis.

Variance analysis has myriad forms that range from simple to complex, but its basic principle is simple: compare the actual revenue or costs with budgeted or same-period figures to ascertain variances. Once known, the reasons for these discrepancies are determined in such a way that managers are empowered with the right information to address deficiencies, if any, and to make decisions that enhance the airline's competitiveness and improve its profitability. Variance analysis is thus the set of procedures adopted by managers to help them understand the sources of variances between sets of comparable data.

The reasons for variances between actual and targeted capacity may be found in one or more factors, among them flight cancellations and rescheduling, unscheduled aircraft maintenance, unanticipated changes in equipment, unexpected block speeds, en-route and airport congestion, unforeseen payload restrictions and unplanned changes in payload configurations.

Understanding what underlies variances in capacity makes it possible to track traffic changes related to each route group and the impact of such changes on revenues, costs and profitability. Analysing the effects of traffic growth facilitates decisions on the optimal deployment of capacity. Addressing variances in block speeds will also help in minimizing fuel burn and operating costs wherever practicable.

An example of variance analysis at the macro level, which in this case focused on the world's scheduled airlines in 2005 and 2004, is illustrated in the accompanying table. The adjacent figure shows some individual costs, expressed as a percentage of total operating expenses, related to this global analysis. As shown, the share of fuel costs increased from 11 percent of total operating expenses in 1999 to around 19.5 percent in 2005. Airlines responded to this challenge by using technology and improving processes to reduce some controllable costs, notably that of distribution and, to a lesser extent, passenger service costs. (See *ICAO Journal* Issue 5/2006, pages 10-11 for more details concerning the variance analysis presented in the accompanying table and figure.)

Revenue variance analysis

Managers are often presented with revenue figures spanning comparable periods. It is crucial for the manager to discern why the variances in revenues occur so that steps can be taken to enhance revenue generation.

The basic document from which revenue data is collected is the passenger ticket, with revenue being generated at the time of travel. The calculation must account for commissions, adjustments for interline claims, special discounts, and so forth. It also takes into account sales in foreign currency.

Many airlines use specific software to account for their revenues. The end product of the process is statements of passenger revenues covering different route groups for comparable time periods. These statements simply show whether there has been a positive or negative change in revenues on different routes, and of course overall passenger revenues for comparable time periods. They do not account for variances, and the informa-

2005 versus 2004	Operating revenues ($ billion)	Operating expenses ($ billion)	Operating result ($ billion)
2005	413.3	409.0	4.3
2004	378.8	375.5	3.3
Variance in $ billion	+34.5	+33.5	+1.0
Due to change in:			
Traffic (revenues) and capacity (expenses)	+18.6	+17.4	+1.2
Unit revenues and unit costs	+15.2	+15.6	-0.4
Differences in exchange rate	+0.7	+0.5	+0.2
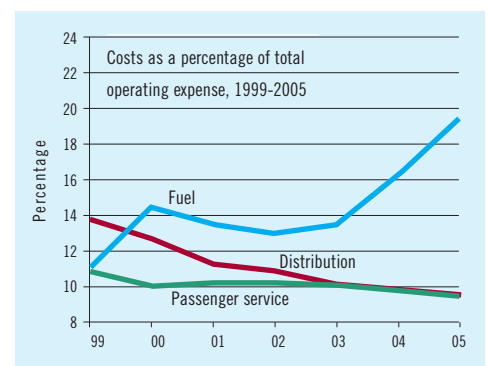
Example of variance analysis: changes in operating revenues and expenses, 2005 vs 2004 (scheduled air carriers of ICAO member States). The figure illustrates specific costs expressed as a percentage of total operating expenses.

tion they contain is not helpful in deciding how to boost revenues. To understand the reasons for revenue variances, it is necessary first to determine the variances that stem from currency exchange transactions, yield and traffic developments.

To some extent, variances in revenues can be traced to transactions involving currency exchanges, moreso for airlines that operate internationally. Sales transactions are performed in multiple currencies, but are converted on a regular basis to the home currency, according to the periodic rate of exchange adopted by the airline.

Variances in the level of bookings between comparable periods, when considered in light of different currencies representing a portion of total sales on a route, indicate to what extent the revenue growth or decline was caused by fluctuations in the currency exchange rate. When major foreign currencies are a critical component of revenues in a route group, the airline must decide whether the impact of currency exchange fluctuations warrants currency risk management. If so, several alternative approaches to managing currency risk are available.

When an airline's revenues are denominated in a foreign currency, in effect it holds assets valued in that currency. One way to manage the economic risk inherent in this situation is to establish a natural hedge by arranging long-term financing in the currency concerned, and undertaking currency trades, especially if the airline foresees that revenues in foreign currency will form an integral part of its long-term strategy. If financing is not deemed appropriate, "forward" contracts or currency put or call options may be considered. What's important is that the airline weigh the benefits of hedging. Simply put, the goal is to reduce variances in future cash flows and improve the airline's ability to plan. But hedging is

not a win-win situation; to apply this strategy, the airline must project the currency exchange rate for a specific period and must be prepared to accept a negative impact if this prediction turns out to be grossly inaccurate.

Even without the use of hedging, an airline will still find it necessary to pin-

Jim Jorgenson

Using variance analysis, an airline can exercise cost control and obtain a true picture of the cost of its efforts to increase revenues and profitability

point how much of the variance in revenues for a particular route group is caused by currency exchange rate fluctuations, as such information can provide the air carrier with a competitive advantage. If an airline finds, for example, that its home currency on a specific route is depreciating against an important foreign currency component on the same route (usually bookings made for the return leg), it can increase profitability by adopting a short-term strategy focused on the appreciating foreign currency. If, however, the long-term trend points to a depressed home currency, with the cost of the home currency not rising commensurately with the level of depreciation, the airline might decide to benefit from this. It could decide to lower fares in the appreciating foreign currency, thus increasing market share on the route concerned. Such an action would put pressure on the competitor to match the price in order to retain market share.

For a number of reasons, it is clear that an airline needs a currency reporting system and analyses of variances as they

develop for each route group, since there is an impact on its competitiveness, profitability and planning process.

After accounting for the impact of exchange fluctuations, variance in revenues can be broken down further for each fare class and type, based on changes in commissions and special discount rates, and the real increase or decrease in air fares. Such an analysis will help determine whether steps taken to increase yields or traffic are bearing results, or need to be reviewed.

Traffic variances can be further analysed to account for the increase or decline in capacity offered, and the real growth in traffic related to changing load factors.

A variance in traffic figures may be misleading since this could occur as a result of an adjustment in capacity offered vis-à-vis the comparable periods. Usually an increase in flight frequency will boost market share, provided there is no corresponding growth in capacity offered by competitors on the same route. Similarly, flight cancellations and service withdrawal will lead to a traffic decline. It is therefore necessary to isolate the traffic variance related to changes in capacity and arrive at true traffic variance attributable to load factor changes, while comparing equivalent capacities for comparable periods. The real variance in traffic, after excluding the impact of capacity adjustments, needs to be determined for different fare classes and types for the route group concerned.

Variances cannot be traced simply to yields or traffic developments. To achieve effective revenue management and optimize revenues through better inventory management, variances should be looked at in a holistic manner, considering all

A. Sainarayan is a Statistical Officer employed in the Economic Analyses and Databases Section of the Air Transport Bureau at ICAO headquarters, Montreal.

Air transport remains a major pathway for invasive alien species

Although many governments recognize that invasive alien species is a serious issue, there is still little international guidance available for assisting States in developing effective national policies and measures to combat the problem

DR. AHMED DJOGHLAF
UNEP SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY

INCREASING travel, trade, and tourism associated with globalization and expansion of the human population have facilitated intentional and unintentional movement of species beyond natural biogeographical barriers, and many of these alien species have become harmful to native ecosystems. Those species whose introduction or spread outside their natural past or present distribution threaten biological diversity are known as "invasive alien species." Invasive alien species have invaded and affected native biota in almost every ecosystem type on Earth, and have affected all major biological and botanical groups.

Many governments have taken the problem of invasive alien species very seriously and have developed guidelines and procedures specific to civil aviation

Civil air transport is one important pathway by which species are moved intentionally or unintentionally beyond natural barriers. Movement of both passengers and freight by civil aircraft is expected to increase by more than 5 percent annually through 2009, according to the International Air Transport Association (IATA); ICAO, meanwhile, foresees a worldwide increase in aircraft movements of 3.2 percent per year through 2015. Given such forecasts, the role of this pathway cannot be expected to diminish any time soon.

A meeting of experts held under the Convention on Biological Diversity (CBD) in 2005 identified civil air transport as one of the pathways where further efforts are needed to minimize risks associated with invasive alien species. Subsequently, at the 8th Conference of the Parties (COP) to the Convention on Biological Diversity held in Brazil in March 2006, governments addressed the issue in relation to civil air transport specifically. Similarly, the ICAO Assembly has adopted resolutions on the matter, with the intention of combating the movement of invasive alien species through civil air transport.

According to the Millennium Ecosystem Assessment, carried out under the auspices of the United Nations from 2001 to 2005 and involving more than 1,300 authors from 95 countries, invasive alien species are one of the most important drivers of biodiversity loss at the global level, and one of the most significant issues in terms of consequences for human well-being. These findings were reiterated in the CBD report, *Global Biodiversity Outlook 2*, which was published in 2006.

In addition, the economic costs associated with the impacts of invasive alien species on crops, pastures and forests, as well as control costs, have been estimated to be hundreds of billions of dollars. The relative impacts have varied among regions and biomes, but in almost all cases the impact is either steady or increasing. One study for the United States estimates costs of U.S. $137 billion per year from an array of invasive species; among the worst examples, water hyacinth and other alien aquatic weeds affecting water use currently cost developing countries over U.S. $100 million annually. (For more information on how invasive alien species affect ecology, visit www.gisp.org/ecology/).

There are many different pathways for the introduction and spread of invasive alien species. They include ship's ballast water, hull fouling, the pet and aquarium trade, aquaculture, scientific research, and military activities, to name just a few. Civil air transport is of particular importance

because of the ability of aircraft to cover long distances in a short time, and because of the large volume of passenger and cargo movements at the global level. Species may be moved in several ways including inside the aircraft cabin, where they may be present on passengers' clothing; inside checked or carry-on luggage, either intentionally or not; as stowaways in cargo holds, wheel wells and other aircraft parts; and in association with particular types of cargo, including packing material.

Many governments have taken this issue very seriously and have developed

Mauritius, such as in the vicinity of the airport, and regular spraying in the region surrounding the airport. More information on Mauritius' campaign to keep the beetle at bay is available online at www.cabi-bioscience.ch/wwwgisp/gtc2cs15.htm.

Although efforts similar to this have

Vladimir Ivanov/istockphoto

R.J. Toft/Landcare Research NZ Ltd.

Lee Pettet/istockphoto

International trade has resulted in the movement of species beyond natural biogeographic barriers. These alien species have in many cases become harmful to native ecosystems. Among examples are (clockwise from left): the red fire ant, a native of South America that invaded Australia, New Zealand and the United States; the house sparrow, brought to the Americas, South Africa, New Zealand, Australia and many islands from its native Eurasia; and the European bumblebee, introduced to Tasmania by ships and aircraft.

guidelines and procedures specific to civil aviation. In other cases, specific measures have been taken to address particular species. As one example, Mauritius has adopted stringent measures to prevent the introduction of a sugar cane pest — a beetle known as the white grub or ver blanc — that is indigenous to Madagascar. This particular pest has successfully invaded La Réunion, which lies 150 kilometres west of Mauritius. The measures taken to prevent introduction of the beetle from La Réunion include changes in flight departure times, with no aircraft allowed to depart La Réunion for Mauritius between 1830 local time and dawn; the restriction is necessary because the beetle actively flies around at dusk and is attracted to light. Among other precautions are regular inspections around the high-risk areas of

been initiated in a number of countries, there is little guidance at the international level that can assist governments in developing national policies and measures to address invasive alien species in civil air transport. In 2005, an expert group under the CBD concluded that a major gap in the international regulatory framework for invasive alien species relates to the pathway of civil air transport. The Conference of the Parties to the CBD subsequently decided that it was necessary to address the fact that civil aviation and other key pathways contribute to the problem.

Governments have recognized, through resolutions and decisions of the governing bodies of both ICAO and the CBD, that civil air transport is an important pathway for invasive alien species. The issue has been taken seriously in both organizations.

ICAO Assembly Resolution A35-19, adopted in 2004, reflects a commitment by ICAO member States to support one another's efforts to reduce the risks of introducing potentially invasive alien species through civil air transport. The same resolution also requested the ICAO Council to develop guidance material and, if appropriate, standards and recommended practices (SARPs) to assist Contracting States in reducing the risks of introducing potentially invasive alien species, and to continue working with appropriate organizations on this issue.

In early 2005 ICAO urged its member States to forward the "best practices" followed by the various national agencies involved in agriculture, horticulture, customs, quarantine and health matters for preventing the introduction of invasive alien species by air. About 35 States responded to the request, a clear indication that many governments take the issue seriously. Faced with other priorities, however, ICAO has not been able to complete the survey by analysing the results. The Global Invasive Species Programme (GISP), set up in 1997 to conserve biodiversity by promoting global cooperation in invasive species prevention and management, is attempting to raise a small amount of funds to carry out this analysis and subsequently develop guidelines for invasive species prevention in civil aviation. Airport authorities, airlines or other donors interested in supporting this effort should contact GISP directly (e-mail Philip Ivey at ivey@sanbi.org).

Given the well-known impacts of invasive alien species, it is no surprise that this issue has become one of the important elements addressed by the CBD. The mandate for this work is a Convention article calling for States to prevent the introduction of, or to control or eradicate, those alien species that threaten ecosystems, habitats or species. The COP has adopted several decisions related to invasive alien

Dr. Ahmed Djoghlaf is the Executive Secretary of the United Nations Environment Programme (UNEP) Secretariat of the Convention on Biological Diversity, which is located in Montreal. For more information on the CBD, visit (www.biodiv.org).

Security is strengthened at most important airport in Russia in wake of terrorist attacks

Following the destruction of two airliners in 2004 by suicide bombers who enplaned at Moscow's Domodedovo Airport, a major enhancement of security has been undertaken at the airport, which now has the most modern equipment and employs the most advanced security procedures

VALENTIN ANISIMOV
FEDERAL AUTHORITY FOR TRANSPORT OVERSIGHT (RUSSIAN FEDERATION)

DOMODEDOVO International Airport is the largest airport in the Russian Federation, and a leader in domestic and international passenger and cargo air services. It has attained this position through an active investment policy aimed at reconstructing and re-equipping the airport with the most advanced level of technology. Given its importance to the air transport system, aviation security at the airport has been significantly enhanced to address concerns raised a few years ago when terrorists were able to board aircraft at Domodedovo.

Recent measures to strengthen security commenced after the tragic events of 24 August 2004, when, for the first time ever, the airport was used by suicide bombers who caused the destruction of two airliners shortly after their departure from Domodedovo. A Tupolev Tu-134A aircraft, operated by Volga-AviaExpress, and a Tu-154, operated by Siberia Airlines, took off from the airport 41 minutes apart only to be destroyed in the air with the loss of 90 passengers and crew members.

Immediately after these events, a specially established security team began to study ways to strengthen security at Domodedovo. It reviewed the airport's security system and made decisions on a wide range of measures. These included a revision of the security procedures, changes in personnel, acquisition of new generation security equipment and implementation of new training programmes for security officers.

A newly created company, Domodedovo Airport Aviation Security, now provides a wide range of services intended to impose a higher level of security at the airport, a goal largely achieved by implementing a more technologically advanced security system. The system provides positive control over passengers from the time they enter the airport terminal until their boarding. It also covers the screening of passengers and crew members, their cabin and hold baggage, airport personnel, cargo shipments, catering supplies, stores and airmail.

To provide additional security, other measures include the screening of each passenger's shoes and garments, passenger profiling, and video recording of the movement of passengers throughout the

Security measures at Moscow's Domodedovo Airport have been stepped up following the in-flight destruction of two airliners by suicide bombers who boarded the aircraft at Domodedovo in August 2004

security-restricted areas and at check-in points using more than 500 digital video channels. There is also a system for detecting unacceptable or wanted persons.

A three-layer baggage screening system has been integrated into the automated baggage sorting line with a handling capacity of up to 7,000 bags per hour, and an electronic known shipper verification system has also been implemented. There is also video monitoring of the terminal building and the adjacent areas, and automated control over car parking spaces, including the verification of licence plates with integrated state licence plate system data.

The airport's security system has been implemented with the intention of improving the application of security measures and the quality of security assessment at all levels of the multilayer system.

Requirements for pre-flight screening of crew members and their cabin and hold baggage are the same as those applied to passengers. Plans for using biometrical data during screening of airport personnel and vehicle drivers entering the security-restricted areas are now being implemented. Security of catering supplies, stores and airmail is assured by 100 percent screening. Catering and kitchen equipment and loading devices are checked for compliance with the security requirements and then positioned in the security-restricted area under surveillance.

Aircraft checks and searches are carried out by specially trained security officers or, if appropriate, by bomb-disposal experts and law-enforcement officers. Aircraft cabins, cargo compartments and all hatches are inspected. The airport territory and perime-

The new aviation security system implemented at the busiest airport in the Russian Federation provides positive control over the flow of passengers from the time they enter the terminal until they board the aircraft

ter are patrolled on an around-the-clock basis and are protected by modern means. For example, a "smart fence" concept will soon be implemented.

Along with standard passenger screening systems (i.e. Heimann Hi-Scan 6040, Hi-scan-100100, Rapiscan-524 and Rapiscan-528), the airport uses state-of-the-art L3 SafeScout-100 portal scanner based on millimetre-wave technology and explosives trace detection systems such as Heimann Ionoscan-400B, General Electric Itemizer-3 and portable vapour tracers. It has also successfully tested a restricted area access control system developed by the Israeli company, Nemesysco, which is based on a multilevel voice analysis technology. The system analyses the voice characteristics of a passenger, probing for emotional indicators such as nervousness, and based on the results, directs him or her through the "green" or "red" corridor. This system is now being installed at the airport.

Perhaps one of the most remarkable means of security enhancement is a body X-ray-based scanner developed in Russia, which has now been installed at each passenger security checkpoint. This device allows screening to be performed without removal of shoes and garments such as jackets. The equipment is harmless to

human health, since the amount of radiation received by a passenger during the screening is equivalent to that obtained naturally during 10-15 minutes at an airliner's typical cruising altitude.

In 2006, U.S. $150 million was allocated for further development at the airport, of which $20 million has been earmarked for security system enhancements. Similar amounts will be spent in 2007.

With these funds, the airport plans to acquire new equipment for analysing travel documents as well as new portable X-ray systems, tomographs for baggage scanning, scanners for passenger screening, and a multilevel baggage scanning system. The money will also be used to acquire airport personnel access control and passenger check-in biometrical systems, as well as additional digital video monitoring and discreet observation video systems, and other special control equipment.

In March 2006, aviation security specialists from the Russian Federation's Federal Authority for Transport Oversight and the U.S. Transportation Security Administration conducted a joint assessment of the airport's security level and confirmed that the operational security measures at the airport were at an acceptable level, and were in compliance with the requirements

of ICAO Annex 17.

In summary, as a result of the investigation into the events of August 2004, Russia has developed and implemented a complex set of security measures. These include changes to the legislation and regulations of the Russian Federation to require more stringent measures for safeguarding the transport system and strengthening administrative and criminal penalties for violation of transport security measures. At major airports across Russia, there are now requirements for mandatory screening of shoes and outer garments of each passenger, and for passenger profiling. Personal search of passengers by an explosives trace detector is also required. Major airports such as Domodedovo have been equipped with advanced screening facilities including explosives detection systems, and there is positive control over the entire passenger flow up to the time they board an aircraft.

Major airports are also required to employ three-level baggage screening systems. At the first stage, 100 percent baggage

Valentin Anisimov is an Assistant to the Director, Federal Authority for Transport Oversight, in the Ministry of Transport of the Russian Federation. A member of the ICAO Aviation Security Panel, Mr. Anisimov is a former ICAO Secretariat staff member and, more recently, a former Alternate Representative of the Russian Federation on the Council of ICAO.

ICAO UPDATE

Industry presents final part of Safety Roadmap

ICAO was presented on 4 December 2006 with the second and final part of the *Global Aviation Safety Roadmap* developed by members of the air transport industry, in consultation with ICAO safety specialists, and designed to establish one level of safety worldwide.

The creation of the Roadmap represents the first time that governments and industry have jointly developed a unified and coordinated approach to reducing accident rates, particularly in the developing regions of the world, in accordance with the ICAO Global Aviation Safety Plan.

The Roadmap was produced by a team formed specifically for the purpose, and known as the Industry Safety Strategy Group (ISSG). The ISSG is composed of representatives of the International Air Transport Association (IATA), Airbus, Boeing, Airports Council International (ACI), the Civil Air Navigation Services Organisation (CANSO), Flight Safety Foundation (FSF), and the International Federation of Air Line Pilots' Associations (IFALPA). All ISSG members are committed to assisting in the implementation of the Roadmap, and in updating the document as required.

Part 1 of the Roadmap — a strategic action plan for future aviation safety — was presented to ICAO in December 2005. It provides the framework for action by the Contracting States of ICAO, regions and the industry to correct inconsistencies and weaknesses in 12 main areas, among them the implementation of international standards, regulatory oversight, incident and accident investigation, safety management systems, and deployment of sufficient qualified personnel. The document sets one or more short- and medium-term objectives for each focal area over the next 10 years.

Part 2, concerned with implementation of the action plan, describes and sets priorities for specific coordinated actions by industry to reduce risk and improve safety worldwide. For each objective identified in the strategic action plan, Part 2 proposes best practices along with related industry references and compliance metrics. Part 2 also includes annexes containing recommendations on existing and proven technologies (and associated training programmes) to further enhance safety in flight operations, airport operations and air traffic control (ATC) domains, as well as regional implementation through a knowledge-based regional assessment and deployment strategy.

The Roadmap stems from a meeting between ICAO's Air Navigation Commission and industry representatives in May 2005, at which time it was acknowledged that further enhancements to aviation safety worldwide required a better alignment of strategies and coordination of efforts by all stakeholders including States, regulators, airline operators, airports, aircraft manufacturers, pilot associations, safety organizations and providers of air traffic and air navigation services. It was agreed that a global safety roadmap would

ICAO was presented with the final part of the Global Aviation Safety Roadmap on 4 December 2006. Shown on the occasion are (l-r): ICAO Council President Roberto Kobeh González; Günther Matschnigg, Senior Vice-President, Safety, Operations and Infrastructure, International Air Transport Association (IATA); then-ANC President Adrian Sayce; and ICAO Secretary General Dr. Taïeb Chérif.

provide the necessary framework for such action, and IATA offered to coordinate the effort.

Part 1 of the Roadmap — the action plan — was endorsed by aviation leaders at a global ICAO conference in March 2006, with a recommendation that ICAO collaborate with all States and other stakeholders to continue developing an integrated approach to safety initiatives based on the *Global Aviation Safety Roadmap.* ☐

New approach recommended for enhancing safety in Africa

A recent field mission by an ICAO Air Navigation Commission (ANC) team has highlighted the need for increased ICAO involvement in coordinating and managing safety efforts throughout the African region.

Despite a mandate to resolve safety-related deficiencies that threaten the viability of civil aviation, "ICAO and Contracting States have struggled to meet the challenges posed by the aviation difficulties in the African region," the Commission noted in a report presented to the ICAO Council in late November.

The ANC report on safety and efficiency in the African region was based in part on previous findings as well as the team's 18-day visit to organizations and institutions in Kenya, Senegal, South Africa and the United Republic of Tanzania last August. The team concluded that the problems facing the region demand "a new approach" if ICAO is to fulfil its mandate.

The new approach requires strong political leadership from ICAO, supported by strong programme management and coordination, and must involve the regional offices "in a leading role in the development and implementation of response plans aris-

ing from the various audit tools in use throughout the region." Also in need are adequate capital investment, improved sharing of safety-related information, and training for aviation personnel in technical, management and leadership skills.

The Commission offered two specific recommendations for ICAO action that could bolster high-level political support from governments in the region for tackling safety and efficiency issues. It called for development of an implementation plan that integrates various current safety-related activities by mid-2007, noting that such a plan would have to be endorsed by all stakeholders and supported with adequate funding and staffing. One outcome would be the integration of ICAO's regional office activities with its global business plan, thus positioning the organization's regional offices as the primary focal point for ICAO activities.

In the other recommendation, the Commission called for the convening of a high-level meeting to identify solutions to safety-related operational oversight and airworthiness issues. While acknowledging that resources for meetings remain scarce, the Commission recommended that ICAO conduct such a meeting, with the goal of obtaining an endorsement for a comprehensive regional implementation plan, no later than March 2008.

Sustained improvement in the level of flight safety in the African region requires that ICAO play a greater role in addressing civil aviation issues in Africa, the Commission concluded. However, it also noted that enhancement of this role would require "a substantial investment of energy and capital by the organization and both political and financial support by Contracting States and other interested organizations over a period of several years." □

Revised strategic document helps assure global ATM harmonization

A revised global plan for achieving a seamless air traffic management (ATM) system around the world has been accepted by the ICAO Council. The renamed document, the *Global Air Navigation Plan* (Document 9750), describes a strategy aimed at achieving near- and medium-term benefits on the basis of available and foreseen aircraft capabilities and air navigation infrastructure. Developed in accordance with ICAO's strategic objectives, it contains guidance on how to support a uniform transition to the ATM system envisioned in the operational concept endorsed by the 11th Air Navigation Conference in 2003. The operational concept, simply put, describes how the emerging and future air navigation system should operate.

One important change reflected in the revised Global Plan is the incorporation of relevant material from an industry roadmap that provides a common frame of reference for all partners involved in enhancing aviation safety and efficiency (for more on the industry developed Safety Roadmap, see the article on page 26).

Among significant changes in the revised Global Plan, which first appeared in 1993 and remains a "living" document, is the introduction of a set of 23 Global Plan initiatives that stem from the industry roadmap. The initiatives are options for air navigation system improvements that, once implemented, result in direct performance enhancements. States and regions will adopt initiatives that meet perform-

ance objectives specific to the particular needs of a State, region, homogeneous ATM area or major traffic flow. A set of interactive planning tools, such as software applications and web-based reporting forms, will assist with the analytical process. Furthermore, the planning framework will serve to ensure the integration of the Global Plan and regional plans and associated work programmes.

Currently under development by ICAO is a performance manual, which will offer guidance on establishing regional performance targets associated with 11 key performance areas or expectations identified in the operational concept. □

Software tool and website facilitate CNS/ATM planning

An interactive software application that enables air navigation service providers and airspace users to build, evaluate and compare the economics of alternative options or scenarios for the implementation of CNS/ATM systems has been placed at ICAO's secure website (http://icaosec.icao.int). The tool, known as the database and financial analysis computer system (DFACS), is supported by a user's manual and an illustrative example. (For more details about the software application, see "Interactive analytical tool allows users to evaluate CNS/ATM business cases," *ICAO Journal*, Issue 3/2006, page 19.)

The ICAO Secretariat has also created a new secure web tool to facilitate the establishment of a network of experts in the fields of aviation forecasting and economic analysis. The network will make it possible to exchange information needed prior to implementing CNS/ATM systems, such as studies on cost effectiveness, cost-benefit analyses and business cases. It will also facilitate the sharing of other types of forecasts and economic analyses and documents. Experts can join the network by registering at the Civil Aviation Forecasts and Economic Analysis website, accessible via the ICAO secure site. □

DEPOSIT BY POLAND

Poland deposited its instrument of accession to the *Convention on the Marking of Plastic Explosives for the Purpose of Detection* during a brief ceremony at ICAO headquarters on 26 September 2006, bringing the number of parties to the Convention, which entered into force in 1998, to 129. Shown on the occasion are Wlodzimierz Zdunowski, Consul General of Poland in Montreal (left), and Denys Wibaux, Director of the ICAO Legal Bureau.

First priority must remain safety: Council President

The *Global Aviation Safety Roadmap* formally presented to ICAO by the air transport industry on 4 December (see "Industry presents final part of Safety Roadmap," page 26) represents "a great moment in aviation safety," ICAO Council President Roberto Kobeh González told an audience of civil aviation chief executives at a meeting in Singapore on 11 December 2006.

The development of the roadmap, in consultation with ICAO safety specialists, "marks the first time that governments and industry have jointly developed a unified and coordinated approach to reducing accident rates, particularly in developing regions of the world," the Council President stated. The executives were urged to visit ICAO's website to review the newly completed document, developed in accordance with ICAO's Global Aviation Safety Plan.

Noting that the theme of the World Civil Aviation Chief Executives Forum held in mid-December highlighted the opportunities and challenges presented by the growth of the industry, Mr. Kobeh González stressed the importance of safety to future economic prosperity. "Our first priority must continue to be the safety of the global air transport system," he declared, a goal that ICAO takes very seriously. "The enhancement of aviation safety is enshrined in the aims and objectives of ICAO and is the first of six strategic objectives contained in our business plan. It calls upon the organization to enhance global civil aviation safety through specific measures based on prevention, cooperation and the consistent implementation of ICAO standards and recommended practices, or SARPs."

Mr. Kobeh González cited several safety measures that are important to implement, among them the uniform and consistent application of ICAO SARPs and the establishment of safety management systems, the "most effective way of responding to the need for results-based supervision with a relatively small workforce." He also stressed the value of the free flow of safety-related information "by everyone involved in air transport, at every level, and across every discipline."

A culture of transparency and the sharing of information will encourage States to move more quickly to correct safety deficiencies, and is an essential condition for creating or strengthening partnerships to resolve deficiencies, essentially in the form of regional or subregional safety oversight organizations, the Council President added.

Aside from safety, Mr. Kobeh González's keynote address to the forum, held at the Singapore Aviation Academy on 11-12 December 2006, highlighted the critical issues before the aviation community, among them aviation security, the impact of aircraft engine emissions, the anticipated shortage of qualified and experienced operating personnel ("already a problem in many parts of the world, particularly high growth areas"), and the threat posed by avian influenza, to which ICAO has responded by coordinating an international effort to develop guidelines for preparedness planning.

Mr. Kobeh González pointed out that ICAO has just issued security control guidelines in the wake of the alleged terrorist plot to sabotage several airliners over the North Atlantic, unveiled by U.K. authorities in mid-August. The recommended guidelines for screening liquids, gels and aerosol products carried by passengers are to be implemented no later than 1 March 2007.

The impact of aircraft engine emissions "is another very serious challenge, one that could generate enough public pressure to halt the growth of air transport," Mr. Kobeh González cautioned. Encouragingly, one simple way to reduce aircraft emissions is to implement CNS/ATM systems that allow greater utilization of the most fuel-efficient routes.

"Over the past few years, achieving shorter routes has led to the reduction of millions of tonnes of CO_2 emissions," the Council President commented. In 2005, for example, governments worked with the International Air Transport Association (IATA) to shorten 300 routes worldwide, he said. As an example of potential benefits, he noted that airspace management improvements in the Pearl River Delta could save one million tonnes of carbon dioxide a year. But the maximum benefits cannot be achieved without the implementation of a global ATM system that is "based on interoperability and seamlessness across regions for all users during all phases of flight." This is the goal of ICAO's new Global Air Navigation Plan, which Mr. Kobeh González announced had just been approved by the ICAO Council.

The organization "has already integrated this work into its new business plan, which stresses the implementation of harmonized ATM systems and performance-based efficiency improvements, as well as increased functional integration between ICAO headquarters and its regional offices," Mr. Kobeh González added.

More than 80 chief executives from civil aviation authorities, airports and air navigation service providers from over 50 countries and nine international and regional organizations attended the second triennial World Civil Aviation Chief Executives Forum. The two-day event provided industry leaders with a platform for a frank exchange of views, sharing of best practices and formulation of strategies to deal with the fast-growing aviation industry. □

DEPOSIT BY SOUTH AFRICA

South Africa deposited its instrument of ratification of the Montreal Convention of 1999 during a brief ceremony at ICAO headquarters on 22 November 2006. Shown on the occasion are (l-r): Tshepo Peege, Representative of South Africa on the Council of ICAO; ICAO Secretary General Dr. Taïeb Chérif; and Denys Wibaux, Director of the ICAO Legal Bureau.

Scheduled airline traffic up by 5 percent in 2006

Preliminary airline traffic results for 2006, released by ICAO in late December, show a 5 percent annual increase in the total tonne-kilometres performed by the world's scheduled airlines (a tonne-kilometre is a combined measure of passenger, freight, and mail traffic that takes into account the distance flown). Meanwhile, the total number of passengers grew last year by about 4 percent to 2.1 billion.

Statistics supplied by ICAO's 189 Contracting States indicate that passenger-kilometres performed rose by about 5 percent in total services (i.e. domestic and international services combined) and some 6 percent in international services alone.

During 2006, North American legacy carriers initiated a change in strategy by consolidating and strengthening their international operations, focusing on longer routes. At the same time, the North American carriers tightened domestic capacity to achieve better fleet utilization in response to low-cost competition.

Changes in capacity worldwide were generally in line with traffic growth, particularly on domestic routes, with the exception of domestic routes in the Asia/Pacific region which showed strong growth in both capacity and traffic. Total seat-kilometres offered rose by around 3 percent; international capacity grew much more rapidly, at almost 5 percent, while domestic capacity, proportionally greater, showed a marginal increase of about 1 percent.

Worldwide passenger-kilometres performed increased more rapidly than capacity. The average passenger load factor on total and international services reached almost 76 percent, up from around 75 percent in 2005. A similar load factor of around 76 percent was recorded on domestic services, compared to under 75 percent in 2005.

In 2006, total scheduled freight traffic showed growth of around 3 percent over 2005. Domestic traffic grew more rapidly, at around 5 percent, while international traffic increased by about 3 percent. Freight tonnes carried worldwide on scheduled services rose to around 39 million tonnes compared with about 38 million tonnes in 2005.

On a regional basis, strong traffic growth in terms of total tonne-kilometres performed continued to be experienced by airlines in the Middle East, followed by those in the Asia/Pacific region and Africa. Growth for airlines in North America, Europe and Latin America were below the world average, mainly because of a more measured deployment of capacity, some route rationalization and changes in the route mix introduced by carriers of the North American and European regions.

A more detailed comparison of scheduled airline traffic in 2006 and 2005 appears on page 5. □

Forthcoming articles

Among feature articles to appear in *ICAO Journal* Issue 2/2007 will be a report on further changes to the air cargo security programme in the United Kingdom, and a look at how safety data can be integrated to better understand the risk to flight safety. □

PANS-OPS amendments receive approval

Volumes I and II of the *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS, Document 8168) have been amended with the objective of improving flight safety, following approval of the changes by the ICAO Air Navigation Commission in early December. The amendments, incorporated in the fifth edition of the ICAO document, become applicable on 15 March 2007.

Among other things, Amendment 15 to Volume I, *Flight Procedures*, provides pilots and operators with guidance on approach procedures that involve vertical guidance (APV) for satellite-based augmentation system (SBAS) operations. The amendment also introduces procedures and guidance for avoiding runway nominations when the preferential runway could pose an operational hazard, and it clarifies the role of flight crew in the operation of the airborne collision avoidance system (ACAS) and in responding to its associated advisories.

Amendment 14 to Volume II, *Construction of Visual and Instrument Flight Procedures*, improves efforts to prevent controlled flight into terrain (CFIT) accidents by providing approach designers with new criteria, as well as improving existing criteria. Key new provisions introduced in this amendment lay the foundation for implementation of performance-based navigation (PBN) by addressing quality assurance in the procedure design process. Because PBN flight procedures rely on the onboard database for navigation information, it has become increasingly important to ensure that the quality of the procedure is maintained at every step of the process. Additional significant provisions include detailed guidance on coding of procedures for use in databases, construction criteria and associated charting provisions for design of SBAS APV approaches and, in recognition of the proven performance of basic GNSS operations, reduced obstacle protection areas for the design of basic GNSS approaches. □

DEPOSIT BY COSTA RICA

Costa Rica deposited its instrument of ratification of the Protocol introducing Article 83 bis to the Chicago Convention (1980) during a brief ceremony at ICAO headquarters on 1 February 2007. The Protocol, in force since 1997, concerns the lease, charter or interchange of aircraft. Shown on the occasion are Paola Patricia Porras Pastrán, Consul of Costa Rica in Montreal, and Denys Wibaux, Director of the ICAO Legal Bureau.

Aviation language symposium to be held in May 2007

A three-day symposium on ICAO language proficiency requirements will take place at ICAO headquarters, Montreal, during 7-9 May 2007. The symposium will focus on how to implement the aviation language proficiency requirements for aviation personnel that take effect in 2008, and is designed for all stakeholders, including managers from government, airlines and air traffic services providers as well as training organizations.

Since September 2004, when ICAO conducted its first symposium on the subject of aviation language, the language training and testing community has developed a wide range of training and testing solutions, and it is now considered timely to draw on lessons learned and establish an implementation plan for what remains to be done.

The first objective of the forthcoming symposium is to present implementation models that support quality aviation language training and testing. The symposium will also provide participants with tools to develop implementation plans within their respective organizations. In addition, the meeting will feature panel sessions on different aspects of language training, specifically training, testing and maintaining operations; language tests for licensing; and resource-sharing initiatives.

Further information related to the symposium, including the agenda and call for papers, may be obtained at the ICAO website (www.icao.int/ials2). *ICAO Journal* Issue 4/2007, to appear in mid-August, will focus on the implementation of language proficiency requirements. □

Commemorative day puts spotlight on top priority

International Civil Aviation Day, celebrated annually since 1994 to mark the creation of ICAO on 7 December 1944, focused in 2006 on the theme of safety and security.

"The theme of the 2006 International Civil Aviation Day, "Safety and security – first and always the top priority," pays tribute to the men and women of aviation who protect the well being of billions of passengers who travel the skies of the world for pleasure or business," ICAO Council President Roberto Kobeh González and ICAO Secretary General Dr. Taïeb Chérif said in a joint statement. "It also recognizes the understanding and cooperation of air travellers for the measures put in place to ensure their safety at all times."

A brief description of International Civil Aviation Day, news releases as well as messages from the Council President and Secretary General from previous celebrations, can be viewed at the ICAO website (www.icao.int). □

Honorary title bestowed

Dr. Assad Kotaite, who retired last year after serving as President of the ICAO Council from 1976, has been bestowed with the lifetime honorary title of President Emeritus of the Council of ICAO, upon the unanimous adoption of a Council resolution on 7 December 2006, the anniversary of the signing of the Chicago Convention and, since 1994, the date celebrated each year as International Civil Aviation Day. □

IF YOU STOP EVOLVING
YOU STOP FLYING.

These are testing times. Only the leanest and fittest survive. More
than ever, an airline's future depends on the cost-effectiveness of its
operations. Your engines are an important part of that equation. That's
why CFM invests extensively in a long-term program of innovations
to improve performance. Our Tech Insertion program, for example,
offers airlines a reduction in operating costs of up to 20%, whilst
reducing emissions and increasing EGT margin. To find out more
about the engines that are constantly evolving, fly to www.cfm56.com

CFM International is a joint company of Snecma, France and General Electric Company, U.S.A.

ICAO Council appointment

T. Mekonnen (Ethiopia)

Tefera Mekonnen has been appointed as the Representative of Ethiopia on the Council of ICAO. Mr. Mekonnen's appointment took effect on 26 October 2006.

An air traffic controller who later held increasingly responsible management positions within the Ethiopian Civil Aviation Authority (CAA), Mr. Mekonnen holds a bachelor's degree in economics. He commenced his aviation career in 1980 upon graduating from the Ethiopian Civil Aviation Training Institute. After serving for eight years as an air traffic controller at the Addis Ababa International Airport and Area Control Centre, he was appointed as a planning officer at CAA headquarters, performing a management and planning role during a period of airport and air navigation infrastructure development and expansion in the country.

In 1995, Mr. Mekonnen was appointed Head of the Planning and Air Transport Services Department, and was responsible for the coordination and implementation of projects and studies funded by ICAO, the United Nations Development Programme (UNDP) and African Development Bank (ADB). In this capacity, he was also responsible for the economic regulation of air transport services.

In 2002, Mr. Mekonnen was appointed Director General of the Ethiopian CAA, which underwent significant structural changes during his tenure.

Mr. Mekonnen has completed various training programmes and courses involving aviation statistics, economics and ICAO familiarization. He was a member of his country's delegation to the 35th Session of the ICAO Assembly in 2004.

Mr. Mekonnen served as Vice-President of the interim Air Transport Regulatory Board of the Common Market for Eastern and Southern Africa (COMESA), and has also been a Vice-President of the African Civil Aviation Commission (AFCAC). Most recently, he served as Director of the newly restructured Ethiopian Civil Aviation Training Centre in Addis Ababa. □

Annex amendment concerned with passenger health

ICAO Council adopted an amendment to ICAO Annex 9, *Facilitation*, in late November concerned with protecting the health of passengers and crews. Amendment 20 will become applicable on 15 July 2007.

The new amendment strengthens the provisions concerned with protecting passenger and crew health and prevention of the spread of communicable disease through international travel. It contains new and revised standards and recommended practices (SARPs) that address States' contingency plans for dealing with a health-related crisis involving international air transport. □

Tabletop exercise highlights issues related to bioterrorism threat

ICAO and several other organizations participated in a first-ever bioterrorism international coordination exercise ("Black ICE") hosted by the United States and Switzerland in early September. The tabletop exercise, conducted over two days in Montreux, Switzerland, involved delegations from 12 international organizations and relied on a fictional bioterrorism attack to drive group discussion. After the exercise, organizers released a report containing several recommendations, among them a call for States to bolster their preparedness for a bioterrorism event. (The event took its unusual name from the extremely hazardous but hard-to-detect black ice found on roadways in colder climates, since a bioterrorism attack may also be difficult to detect and may, in early stages, appear to be merely a manageable, naturally occurring disease outbreak.)

Black ICE provided a forum for exploring the roles, responsibilities and capabilities of international organizations in preparing for, and responding to, a bioterrorism event. It increased awareness of the international community's ability to respond to such an event, and identified key challenges in a coordinated international response. Discussions underscored the need to explore further how best to coordinate international response and recovery efforts, and provided an opportunity to explore areas for greater synergy.

The scenario created for the tabletop exercise consisted of a team of terrorists who infect themselves with smallpox (obtained from an unknown source) and then exploit air transport as a means of spreading the contagion. The attackers continue to expose as many people as possible by circulating

extensively among holiday celebrants at their destination. After a time, governments and public health systems are overwhelmed and cannot meet demands for medicine and humanitarian support. Fictional news broadcasts enhanced the realism of the exercise, which consisted primarily of discussions and thought-provoking questions from a facilitator pertaining to an international response to a bioterrorist attack.

Funded through a strategic public-private and international partnership, the exercise was intended to build bridges between organizations while simultaneously highlighting critical gaps in international counterterrorism coordination and response planning for a bioterrorism attack. Among the issues identified were the need for international response coordination authority, efficient sharing of resources and coordination with national governments and regional entities, as well as the challenges posed by competing priorities. The exercise indicated clear divergences between those working in the areas of security and public health, highlighting the need for greater multi-sectoral international engagement in combating bioterrorism. Participants endorsed plans to further explore these and other issues in a series of two follow-up exercises that Interpol has offered to host. □

List of invitees grows

The list of international organizations that are invited to attend relevant ICAO meetings was expanded in November 2006 to include several more intergovernmental organizations, specifically the African Civil Aviation Commission (AFCAC), the European Civil Aviation Conference (ECAC), the Latin American Civil Aviation Commission (LACAC) and the African Union (AU). Also added to the list was one non-governmental organization, the Civil Air Navigation Services Organisation (CANSO). □

COST RECOVERY WORKSHOP

A workshop on cost recovery in the field of aeronautical meteorology, organized jointly by the World Meteorological Organization (WMO) and ICAO for States in the Caribbean, Central and South American region, was held in Santo Domingo, Dominican Republic on 14-15 December 2006. The event was held back-to-back with another workshop on MET quality management held on 11-13 December. Fifty participants, including officials from both national meteorological departments and civil aviation administrations of 17 member States, participated in the combined workshops.

Runway safety

avoided through the use of current technology only after several steps transpire. First, the system must detect the conflict resulting from the incursion, and then relay the alert to the controller, whose attention may be elsewhere on the manoeuvring area and who may be in the midst of passing instructions to other aircraft. Next, the controller must note the alert, assimilate the information, decide on the best course of action to resolve the conflict, and communicate this to the pilot (provided the frequency is available). Finally, the pilot needs to hear the instruction and react to it while doing other things.

To overcome the drawbacks of existing technologies, a system that would function like a ground-based airborne collision avoidance system (ACAS) should be developed. By providing a graphical display to pilots of their position on the aerodrome, together with that of other nearby aircraft, such a system could stop pilots from entering active runways even when they think they have an ATC clearance, because the position and intention of other aircraft would be evident from the display. Furthermore, if a dangerous situation were to develop, immediate action could be taken by the pilots because they would be continuously aware of all relevant information.

Clearly, there is a long way to go in the development of this particular technology, but its availability would certainly provide the ultimate safety enhancement, in the same way that ACAS has done for aircraft in the sky.

Addressing human factors. Most of the work on runway incursion prevention has been focused on systemic improvement, which has produced some very positive results. There remains an outstanding area that needs action — human factors issues.

The types of incidents that are the most difficult to address seem to be the result of a lapse of memory. For example, from time to time an aircraft is instructed to hold short of a runway, and although the instruction is acknowledged by the flight crew, the aircraft inexplicably proceeds to cross the runway a short time later. Or a controller will clear an aircraft to take-off, and a few seconds later the same controller will clear another aircraft to cross the same runway. These kinds of incidents, while infrequent, continue to occur and will be very difficult to resolve. While viable solutions have yet to be found, safety efforts to date clearly point to the need to focus on the role of human factors in runway incursions.

Taking stock. The European initiative to prevent runway incursions has raised awareness of a serious issue, and there is now a clear indication of the real numbers of incursions taking place.

The fact that the reporting of incursions has been encouraged could account for a significant increase in the number of incursions in Eurocontrol's latest data, as shown in *Figure 1* (page 10). At the same time, there would appear to be a significant reduction in the more serious incursions classified as A or B, an assessment supported by feedback from individual airports (*Figure 2*).

Meanwhile, Eurocontrol will continue its effective partnership with airlines, pilot associations, airport operators and ATC organizations both at the European level and at each airport. It is only through this approach that the difficult and complex problem of runway incursions can finally be solved. □

Variance analysis

decisions affecting traffic growth. If certain fares are reduced on a particular route to stimulate traffic, there should be more than a commensurate increase in passenger traffic to compensate for a decline in yields. The net differential between variances in revenues related to yields and traffic, as outlined above, should register positively on route revenues and fare type/class of service, failing which management must consider means other than dropping yields to stimulate traffic on the route concerned.

Where the impact is positive, success might be explained by lower fares (yields) or other measures such as scheduling changes and more effective product promotion. Regardless of the result, understanding how much of the traffic growth stemmed from yield variances will help management determine the need to focus on other measures such as better scheduling, market differentiation and fare type.

The number of passengers choosing a higher fare class may increase due to better product or service differentiation. In this case, cost variance analysis can tell management how much extra cost was incurred to provide improved service and, more importantly, whether the traffic growth at the higher fare class justifies the additional cost.

Another example is where the airline has introduced fare types to optimize market segmentation. Variances in traffic for different fare types in a particular class, and cross-verification

with yield variance and cost variance related to each fare type, can reveal the net impact on the airline's revenues. Such data indicate to management whether its efforts to introduce new fare types with varying travel restrictions are bearing results, increasing net revenues through the improved segmentation of the market by the carrier.

Cost analysis. Variance analysis of operating costs is essential to not only identify potential areas of cost control, but also to ensure that costs incurred to generate traffic are delivering results. To perform this analysis, operating cost variances should be looked at in tandem with the variances on the revenue side.

For expenditures such as fuel, landing fees, passenger amenities and so on, the variances can be broken down into three broad types involving exchange variances, changes in the unit rates (i.e. price) and units (i.e. quantity consumed), and changes in capacity offered.

As with revenues, an airline's operating costs involve various currencies. However, unlike foreign currency assets and liabilities, where a restatement helps the airline to automatically determine the exchange gain or loss to be reflected in the income statement, no such exercise is usually carried out for expenditures. As such, the impact on the bottom line due to exchange variances in cost items is masked. It is essential therefore for the airline accounting process to highlight the foreign currency payment schedule and the currencies involved so as to determine the gain or loss related to exchange rate variances for a specified period. If such analysis determines that the impact on the airline's financial results is indeed significant, or has the potential to become so, exchange risk management becomes essential.

Variance in operating costs due to changes in unit rates and units is calculated with capacity offered at equivalent levels for the compared time periods. An increase in unit rates is justifiable in some cases; to give one example, a desired scheduling change that necessitates a landing during peak hours will increase the unit rate for landing fees. In cases where the increase in unit rates cannot be justified, this needs to be investigated, with market rates in mind and, if possible, renegotiated, especially when the rates are not in line with increases sought by the vendor.

A material increase in units consumed, where capacity is unchanged from the previous period, may indicate potential wastage, unless this consumption can be justified. Similarly, improved unit quality and the resultant higher costs have to be justified by an increase in traffic and cross-verification against the revenue traffic variance analysis. The net impact of an increase in revenues due to traffic and a rise in costs related to service improvements should be positive, otherwise the feasibility of continuing to incur higher costs has to be looked into. For other cases involving higher unit consumption where capacity offered is constant, the same analysis is needed to prevent wastage and maximize cost-control initiatives.

Changes in capacity offered by the airline, either because of changes in frequencies or aircraft types during the period of comparison, will result in variances in operating costs. These will have to be looked at jointly with revenue variances stemming from changes in traffic, together with capacity offered, to determine whether the airline has gained financially as a result of changes in capacity.

Summary. Systematic variance analysis helps an airline to identify whether decisions taken with the intent of increasing revenue traffic are achieving the desired results. If not, such analysis helps identify areas that call for attention.

On the operating cost side of the ledger, variance analysis helps the airline exercise cost control, and provides management with a true picture of the cost of efforts to increase revenue traffic and profitability. Finally, variance analysis is a good platform for keeping track of exchange variances and managing exchange-related risks.

While all airlines practice some form of revenue analysis, the level of detail and amount of investment in information technology depends on the size of the airline and the complexity of daily transactions. A well-planned variance analysis could ensure management has the right information streams to make decisions that enhance the airline's competitiveness and profitability in these times of excess capacity, pressure on yields and rising costs. ☐

Integrated information system

required because a system of statistical information should not be closed, but needs to interrelate with other systems and have its degree of influence or dependence assessed. This interrelationship is established through parallel, supra and complementary systems.

Parallel systems. The importance of a company is most evident when its performance is compared with others in the same field. Similarly, by using standardized statistical data such as that collected by ICAO, the development of a country's aviation industry can also be measured in relation to aviation in other countries. This requires comparable indicators which have been constructed within known generalized parameters, since an indicator which cannot be compared serves no purpose.

Suprasystems. The aviation sector generates wealth and is part of a national economy and, ultimately, of the world economy. Its contribution to these two larger economic systems should be understood and compared using either the economic indicators of the larger system or of the ultimate objective, the quality of life.

Complementary systems. Complementary systems concern economic components affecting the aviation industry, such as the price of fuel and the cost of insurance, to name two factors having the greatest influence in recent years. Similarly, the services of the aviation industry are a part of other industries such as, in Colombia's case, tourism and the export of perishable flowers. Complementary information allows a company to increase productivity by facilitating access to the best data available.

The integrated aviation statistical system described above can be used by States in the economic oversight of their air transport system. By including data from all the stakeholders in a single system, planners at both government and industry levels are able to monitor the capacity of the air transport system as a whole against actual requirements, and make informed economic decisions as to when any individual element of the system may need to be modified to meet the expected higher demand. Analyses of comprehensive data may indicate the need for longer or new runways, enlarged or new terminals, or additional or new air traffic control (ATC) equipment.

The traffic and service quality data collected by an integrated system also assist the nationally based carriers to monitor the demand for air services to foreign destinations as well as their competitiveness with respect to foreign carriers. Moreover, such a statistical system can provide a civil aviation administration with the economic data needed to substantiate the case for additional funding from a central government or financial institution despite competition for development funds with other sectors within the country or region. ☐

Statistical databases

For ATS purposes, aircraft are grouped in terms of certain performance characteristics such as similar rate of climb and descent, wake dissipation, and so forth. However, for economic analyses, the main criteria are payload capacity and composition (i.e. passengers and/or cargo). Aircraft performance is also important, but mainly in relation to average stage length, block speed and annual aircraft utilization.

IATA has its own aircraft type codes. Its system is more appropriate for use in economic analyses, but in some cases is not very precise, particularly with subtypes, as these may only acquire a new code when there is a sufficient number of subtypes in service to warrant such a change.

With respect to aircraft types, there is no simple solution. Any entity starting a new database would do well to acquaint itself with the standard adopted jointly by the Commercial Aviation Safety Team (CAST) and ICAO (http://www.intlaviationstandards.org/). The level of detail that one may want to use will depend on how the data are to be used. Often it might be sufficient to limit the designator to the master series (e.g. Boeing 777-200), as described at the CAST/ICAO website.

One important recommendation made by CAST/ICAO is to use the same designator assigned by the aircraft's manufacturer. With this approach, database managers may wish to add an extra field for the aircraft designator to indicate the nature of the payload, as this information — passenger, combi or all-cargo — is not always obvious from the manufacturer's designation. For example, while many all-cargo aircraft have a letter F in the designator, this is not always the case.

ICAO solution. It is clear from the above review of existing operational codes that, while it may be tempting to make use of ICAO or IATA operational codes for statistical purposes simply

because these systems already exist, this approach should be avoided. At a minimum, before adopting an existing coding system, database administrators would be well advised to consider the system's primary purpose and should not take for granted that it will meet statistical requirements.

During the design of a new aviation statistics database that ICAO deployed in 2002, the issues posed by operational codes had to be addressed. While it may not be desirable, nonetheless statistical data received from States, air carriers, airports and air navigation service providers regularly make use of the ICAO or IATA operational codes. Since such codes are not useful for identifying historical records, the new ICAO integrated statistical database (ISDB) reference files for air carriers and airports allow both the ICAO and IATA codes (where these exist) to be entered, but also employs a unique, permanent machine-generated code for record identification. For air carriers in particular, the use of the machine-generated code has allowed ICAO to recognize over time a continuous data series for a specific air carrier regardless of how many times it changed name or ICAO/IATA codes.

As explained above, the use of some of the location indicators and air carrier three-letter codes issued by ICAO is being extended into areas for which these were not necessarily intended. In some cases, the initial intent to limit their application to international operations is being overridden by usage. The time may be right to formally review the purpose and popular usage of the codes to determine whether this would merit a properly planned extension to all activities. As a plus, such clarification might also bring some order to how States issue location indicators or request three-letter codes from ICAO.   □

Council appoints ANC President

Bjørn Ramfjord

Bjørn Ramfjord, of Norway, has been appointed President of the ICAO Air Navigation Commission (ANC) for a period of one year commencing 1 January 2007. Mr. Ramfjord has been a member of the ANC since May 2005.

An air traffic controller with management and business experience, Mr. Ramfjord served with the Norwegian Civil Aviation Authority (CAA) for a period of five years before becoming a Commissioner. His activities included chairmanship of various working groups, including a group responsible for implementing reduced vertical separation minimum (RVSM) operations in Norway. Mr. Ramfjord was involved in auditing of air traffic services (ATS) units in Norway, and also played a role in implementing new noise abatement procedures for Oslo's Fornebu Airport.

Mr. Ramfjord obtained his controller's licence in 1971. After serving for a few years at different control towers and gaining experience at Tower, Approach and Radar Approach positions, he became the Training Manager at Fornebu Control Tower. He was appointed Chief Air Traffic Controller of the Fornebu Tower in 1991, and served as Head of Air Traffic Control (ATC) at the airport from 1993 to 1996.

In addition to training as a controller in both Norway and the United Kingdom, Mr. Ramfjord completed a business administration programme at the Norwegian School of Management in Oslo. He has experience as a consultant in the ATC field, collaborating with industry to develop an advanced ground movement guidance and control system. His consultancy work has included training of controllers in Australia, China (Hong Kong) and Malaysia.

Mr. Ramfjord has been a member of several Eurocontrol teams, among them a licensing review group concerned with the implementation of controller licensing in the 42 member States of the European Civil Aviation Conference (ECAC). □

Incident report

• The pilots correctly determined the aircraft's take-off performance for a take-off from Runway 06L had it been at full length, but this calculation was incorrect at its reduced length.
• The pilots had no means of determining take-off performance for the aircraft from Runway 06L at reduced length.
• The aircraft was more than nine tonnes overweight to conduct a reduced thrust take-off from the reduced runway length available.
• The taxiing instructions issued to the flight crew by Manchester ATC did not include a specific holding point.
• The version of the *Manual of Air Traffic Services* (MATS), Part 1, current at the time of the incident did not require a specific holding point to be included in taxiing instructions.
• Radio communications between Manchester ATC and the flight crew regarding the lining up point on Runway 06L were misinterpreted by both parties.
• The aircraft was lined up on Runway 06L via holding point AG using a non-standard technique.
• The pilots used a non-standard technique to set take-off power at the commencement of the take-off roll.
• Seven vehicles associated with the work-in-progress were on Runway 06L at the time of take-off; closest to the aircraft's point of rotation was a rubber-removal vehicle with a height of 14 feet.
• The pilots only became aware of the presence of vehicles as they crested the rise in the runway just prior to the aircraft attaining rotation speed, V_r.
• The aircraft was rotated at the pilots' calculated V_r speed.
• After becoming airborne, the aircraft passed within 56 feet of the vehicle.
• The pilots did not believe they had been involved in a serious incident and so did not make a report to their company, the CAA or the AAIB.
• Both MA plc and Manchester ATC senior management were made aware of the incident on the day of its occurrence, but did not necessarily appreciate its true significance at the time.
• The incident was witnessed by some ATC and airport operations staff.
• No report was made by any members of MA plc or Manchester ATC immediately following the incident.
• The incident was reported seven days after its occurrence to the AAIB by NATS on receipt of a report by Manchester ATC.

Causal factors. The crew of G-XLAG did not realize that Runway 06L was operating at reduced length due to work-in-progress at its far end, until their aircraft had accelerated to a

speed approaching the rotation speed, despite:

• being in possession of a NOTAM concerning the work-in-progress;

• tuning into the ATIS broadcast relating to the work-in-progress; and

• receiving information from ATC on the take-off distance available.

At this point, the aircraft was approaching seven vehicles on the runway and was at a position which precluded an abort within the useable runway length remaining.

Safety recommendations. The serious incident which triggered this investigation resulted from a non-adherence to established procedures by the flight crew, rather than a failing in the procedures themselves. The operator took early and appropriate action to prevent a reoccurrence by the crew involved.

In investigating the event involving G-XLAG, the planning and management of the rubber-removal operation by MA plc and NATS Manchester raised additional concerns. They, too, largely centre on non-adherence to established procedures. Since the event, both these organizations have taken considerable action and, as a result, the majority of the issues identified in the report have now been resolved.

The report contains six safety recommendations calling for further action to be taken to ensure runway safety. □

Invasive alien species

species, including a 2002 decision that contained guiding principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species. Through experience, it has become clear that prevention is much more effective and usually considerably more cost-efficient than efforts to control or eradicate invasive alien species.

The parties to the CBD, at their 8th Conference (COP-8) in March 2006, welcomed ICAO Assembly Resolution A35-19 and suggested that ICAO address the issue of invasive alien species as a matter of urgency. Furthermore, the parties encouraged ICAO to coordinate with other relevant bodies, including the CBD, and requested that the CBD support any efforts to develop guidelines or standards as a result of the ICAO Assembly resolution.

The parties to the CBD have identified tourism as a particular pathway for invasive alien species — one that has obvious links to civil aviation. This has encouraged the World Tourism Organization, IATA, and other relevant international organizations to promote public awareness of the role of tourism as a pathway for the introduction and spread of invasive alien species. One way to educate the public in this regard is through the development of codes of practice.

In addressing civil aviation as a pathway for invasive alien species, COP-8 also encouraged CBD parties and other governments to promote collaboration among their relevant agencies responsible for dealing with invasive alien species and/or civil air transport, with the goal of raising all relevant issues through national participation in ICAO.

Such inter-agency cooperation at the national level is critical to addressing the problem of invasive alien species effectively. In other fora, governments have also recognized the impor-

tance of inter-agency collaboration. The governing body of the International Plant Protection Convention (IPPC), for example, recommended in 2005 that contracting parties and national plant protection organizations enhance linkages between environmental, plant protection and agricultural authorities and related ministries, and improve communication between CBD focal points and IPPC contact points.

In summary, clearly, civil air transport provides an important pathway for the introduction of invasive alien species, and one that requires further attention at the international level. Governments have shown their commitment to addressing the issue. Development of international guidelines, and possibly standards and recommended practices under the auspices of ICAO, will be an important step forward. The CBD Secretariat will work closely with ICAO, GISP and other relevant organizations in this regard. The issue of invasive alien species will be reviewed in depth by the 9th Conference of the Parties to the CBD in 2008, and progress in mitigating civil aviation's role in transporting invasive alien species will be an important aspect of this review. □

Airport security

screening is performed on high-speed x-ray equipment with an automatic explosives diagnostics function capable of rejecting 20 percent of the baggage and directing it for additional screening. The rejected bags are then screened on a computer tomograph. Finally, bags are searched by hand, if the computer tomograph confirms the presence of explosives.

Unannounced inspections are used to assess the current security level at airports and airlines in Russia, and security drills and exercises aimed at the suppression of terrorism and other acts of unlawful interference at airports and civil aviation enterprises will continue to be conducted on a timely basis. □

ICAO MEETINGS

CAR/SAM Regional Planning and Implementation Group (GREPECAS/14)
15-20 April 2007, Costa Rica

ICAO Aviation Language Symposium (IALS/2) *
7-9 May 2007, Montreal

Aeronautical Communications Panel (ACP/1) *
10-18 May 2007, Montreal

Colloquium on Aviation Emissions
14-16 May 2007, Montreal

Legal Committee (LC/33) *
26 June – 6 July 2007, Montreal

Airport Economics Panel (AEP/6) *
10-14 September 2007, Montreal

ICAO Assembly 36th Session (A36)
18-28 September 2007, Montreal

Dangerous Goods Panel (DGP/21) *
5-16 November 2007, Montreal

* Dates to be confirmed

ATNS knows Africa

TRAINING

VSAT

ADVANCED
AIR TRAFFIC
SYSTEMS

Whichever way you look at it

Responsible for approximately **10% of the world's airspace**, ATNS proudly manages more than **half a million** arrival and departure movements every year and is making **Cape to Cairo satellite communications** a reality. ATNS trains international aviation professionals, maintains **ISO 9001** accreditation and subscribes to **ICAO Standards and Recommended Practices.**

CEIA EMDs

STATE-OF-THE-ART
ENHANCED METAL DETECTORS

CEIA EMD application

- Fully compliant with the New Security Standards for Conventional and non-Conventional Weapons
- Unsurpassed Passenger Throughput
- Exceptional Immunity to Environmental Interference

CEIA®

www.ceia.net/emd