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FEATURES

UPDATE

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Evolving commercial and operating environment presents safety and security challenges

As highlighted by a comprehensive ICAO study, economic liberalization and changes in airline business practices have implications for safety and security regulation which need to be addressed properly.

WANG YUANZHENG
ICAO SECRETARIAT

A series of major aircraft accidents that occurred last August and September — claiming almost 500 lives — has once again focused the spotlight on aviation. With tremendous growth in air travel and the rapid expansion of the airline industry, how well is the global aviation safety regulatory system functioning? Can States adequately ensure safety and security in an industry being transformed by globalization, liberalization and privatization? A recent study conducted by ICAO provided some insight into these matters.

The study reviewed various situations arising from regulatory liberalization and the evolution of business and operating practices in the air transport industry to identify areas that could have implications for safety and security. The purpose was to determine whether any gaps exist in the current ICAO provisions for safety and security, and to ensure that the global regulatory system, including the relevant ICAO standards and recommended practices (SARPs), remains capable of addressing changes and developments in international civil aviation.

ICAO's examination of the safety and security aspects of economic liberalization was recently disseminated to its member States and may be found at ICAO's website (www.icao.int/icao/en/atb/ecp/index.html). The study features a summary of specific situations and their relevant ICAO provisions and guidance material, as well as a summary of the responsibilities of States.

Impact of liberalization

The impact of liberalization on safety and security, and their interrelationship, is not a new issue. The subject has been debated in many aviation forums, including the last two worldwide air transport conferences convened by ICAO in 1994 and 2003.

While the latter conference in particular produced a consensus in favour of liberalization, describing it as a desirable goal, there was also concern expressed over liberalization's potential impact on safety and security. Conference delegates agreed that aviation safety and security must remain of paramount importance. Liberalization should be accompanied by appropriate safeguards, including safety and security safeguards. The challenge for States, in brief, is to capture the benefits of economic liberalization without compromising safety and security.

Many economic benefits are associated with liberalized policies. For example, allowing more open market access and multiple airline designations, or lifting restrictions on capacity, pricing, and commercial opportunities, may bring about growth in passenger and cargo traffic as well as increased aircraft movements. It could also result in more air carriers entering the market, with increased service options and pricing competition, as well as development of travel and tourism and job creation.

Nevertheless, without precautions there can be a downside to liberalization's effects. The resultant growth in air transport activity and the complexity of some commercial arrangements can have repercussions for safety and security regulation.

Under the *Convention on International Civil Aviation* (Chicago, 1944), each ICAO member State is required to provide safety and security oversight. It must meet this obligation both for its own aircraft operators and for foreign aircraft operating in its airspace. A State would not be able to

Jim Jorgenson

A recent ICAO study reaffirms that ultimate responsibility for aviation safety and security rests with States, irrespective of changes in economic regulatory arrangements.

cope with the consequences of market growth and liberalization generally without sufficient legal, regulatory and organizational infrastructure, as well as the human and financial resources needed to perform these regulatory functions. Due regard must be given not only to the expected economic benefits of liberalization but to its potential impact on the capacity to meet the corresponding safety and security requirements. Clearly, it is important each State have a coherent policy to ensure the continued safe, secure and orderly development of civil aviation.

While noting that safety standards have been maintained in many liberalized markets, the ICAO study revealed that economic liberalization and the evolution of airline business practices have two major impacts on safety and security regulation. First, a significant increase in the level of air transport activity can place a strain on a State's capacity to perform its regulatory role. Secondly, some complex commercial arrangements involve a cascade of entities, blurring accountability and making it more difficult for States to identify the line of responsibility.

Rand K. Peck

Economic liberalization is a desirable goal, but only where States can capture its economic benefits without compromising safety and security.

In some cases, the regulatory oversight capacity of the State cannot keep pace with the growth in air transport activity unless measures are taken to ensure oversight responsibilities are not neglected. A State must be adequately equipped to handle a significant increase in activity, whether this takes the form of a rapidly expanding fleet, growing number of air carriers and operating personnel, new service providers or greater traffic volume.

Some concerns exist over new entrant operators or non-traditional service providers. This is mainly based on the premise that such entities — especially those without previous experience in the field — might not have the desired safety culture or qualified and properly trained personnel. States must increase their efforts to ensure that such companies and their personnel meet the required safety and security requirements for certification or licensing. Similarly, there is a need to maintain continuous regulatory surveillance over their performance after licences have been awarded.

Another concern is the way that the industry may respond to difficult times. Airlines facing financial exigencies often resort to various cost-saving measures, and where these impinge on aircraft operations or related personnel, they have a potentially negative effect on maintaining safety and security. To deal with possibly harmful developments arising from staff lay-offs or outsourcing, each State must maintain effective surveillance for the safe operation of air carriers operating in its territory. Even in harsh times, they must ensure that aviation safety and security are not compromised by economic or commercial considerations.

The commercialization or privatization of airports and air navigation services providers in some States has led to the transfer of government operations to autonomous entities or to the private sector. With this change in ownership and control, such entities often place more emphasis on commercial results and may implement cost cuts to achieve their goals. Where this occurs, the State is ultimately responsible, notwithstanding the change in ownership or management of these entities, for the safety, security and economic oversight of their operations. This is why ICAO recommends that governments allow autonomous entities on the strict condition that these bodies observe all relevant obligations of the State. It is further recommended that audits be conducted to ensure compliance with SARPs.

Clear accountability

The issues highlighted above, while challenging enough, generally concern air transport activity occurring within a single country. The situation becomes more complicated where it involves multiple parties in different countries, because this may raise questions about the delineation of responsibility for safety and security oversight under the existing regulatory system.

States meet their obligations to ensure compliance with SARPs through relevant national laws and regulation, as well as provisions in bilateral air services agreements. With respect to aircraft operations, the Chicago Convention and certain annexes assign responsibility for safety and security oversight to the State of an aircraft's registry, the State issuing the operating certificate, and the aircraft operator itself. Where these parties are of the same State, as is traditional, the trail of responsibility is quite easy to follow: the aircraft operator is responsible to the State that issued its operating certificate, which also happens to be the State of registry. As the airline industry evolves along with globalization and liberalization, however, these three parties may be associated with different countries. This can complicate accountability, with responsibility shared among several parties. Following are some examples of the sort of issues that can arise in these circumstances.

Operations of foreign-registered aircraft. The past two decades have seen air operators increasingly employ foreign-registered aircraft for various reasons. More and more, aircraft might be leased or otherwise interchanged and operated outside the State of registry, sometimes for long periods of time. While such arrangements are legitimate from an economic regulatory perspective, they can present problems

from a safety viewpoint. Simply put, these arrangements may lead to the bifurcation of the State of registry and that of the operator. This could result, for example, in a situation where operators are subject to differing implementations of the SARPs.

Flags of convenience. A major safety concern is the problem of "flags of convenience" associated with foreign-registered aircraft. (The term "flag of convenience" derives from the maritime industry which denotes a situation in which commercial vessels owned by nationals of one State, but registered in another, are allowed to operate freely between and among other countries.) When an aircraft rarely, if ever, returns to the State of registry, its airworthiness oversight becomes an issue in the absence of safety oversight arrangements made by the State of registry and the State of the operator.

Jim Jorgenson

A significant increase in air transport activity can place a strain on a State's capacity to perform its regulatory role.

Broadly speaking, there are two groups using foreign-registered aircraft that can be deemed to operate under a flag of convenience: those that do so for fiscal purposes, and those that seek to take advantage of a system with minimal or no economic or technical oversight. The first group may not pose a serious problem provided arrangements are made between the States concerned, thus ensuring proper oversight. This may be accomplished through bilateral agreements under Article 83 *bis*, which permits States to transfer all or a part of certain safety oversight responsibilities under the Chicago Convention. Even for this group, the reality remains far from satisfactory in that relatively few bilateral agreements implementing Article 83 *bis* have been concluded, and around the world numerous aircraft of all types are still subject to split oversight responsibility. But it is the second group — operators attempting to avoid oversight — that creates a major safety problem that must not be overlooked.

Operations involving foreign flight crew. Split oversight problems may also occur in respect of foreign-licensed flight crew. As required by Article 32 (a) of the Chicago Convention, "The pilot of every aircraft and the other members of the operating crew of every aircraft engaged in international navigation shall be provided with certificates of competency and licences issued or rendered valid by the State in which the aircraft is registered." As a result, where an aircraft is operated by a State other than the State of registry, such as in the case of "dry" leases (i.e. the lease of an aircraft without crew), the problem of validation of foreign crew licenses by the State of registry could arise.

The issue becomes complicated when the rules and requirements for crew licences in the State of registry are at variance with the corresponding rules in the country that initially issued the licences. Differences between the laws and regulations of the State of registry and those of the operator may also exist in the case of a "wet" lease (i.e. a lease of aircraft with crew). While the lessor usually remains the official operator in such cases, the lessee may already operate aircraft of a similar type under its air operator certificate (AOC). It may then happen that the wet-leased aircraft are operated under the lessee's AOC and the State of the lessee, consequently, becomes the State of the operator. In such circumstances, proper surveillance of the operating crew may become difficult. The situation could become more complicated still if the operation involves a "mixed" crew where, for example, the cabin crew is employed by the lessee carrier but the cockpit crew is provided by a foreign lessor carrier.

Offshore operations. An "offshore" operation involves flights conducted entirely away from the designating State, the State of registry, and the State of the operator. In a situation where the designated airlines of a bilateral agreement are granted so-called 7th freedom rights, allowing them to carry traffic from the second State to and from a third State without need for the service to provide a link with the "home" State, such airlines may set up an operational base in a second country for services involving third countries. Where the right to carry traffic from one point to another within the territory of a country (a privilege known as cabotage) or the right of establishment is permitted, air carriers may operate in the territory of the granting State. Such a situation could raise the question as to how the required safety oversight should be handled between the State of the operator and the country in which the operation is based.

Multiple parties and shared brand. Operations involving multiple parties and the use of another's brand include codesharing and franchising. Codesharing has been the

continued on page 33

Wang Yuanzheng, an Economist in the Economic Policy Section of the Air Transport Bureau at ICAO headquarters in Montreal, is the coordinator and lead author of the study described in this article.

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Regional safety oversight bodies deliver economies of scale and greater uniformity

Newly formed regional organizations have contributed to impressive improvements in oversight capability around the globe, yet they have the potential to assume even more functions delegated by member States.

Michael Jennison
Federal Aviation Administration (United States)

Jim Jorgenson

One advantage of a regional safety oversight organization is that it serves to promote the harmonization of safety requirements, thus reducing the burden of compliance on struggling air carriers.

SAFETY oversight functions are entrusted by the *Convention on International Civil Aviation* (the Chicago Convention) and its annexes* to sovereign States. Foreign air carriers are required to comply with the operating rules of host States, but it is the State that issued the air carrier's operating certificate that is primarily responsible for ensuring compliance with safety operating rules. The State where the aircraft is registered, meanwhile, is responsible for the airworthiness of aircraft flying its flag. The States of the operator and of aircraft registry can be one and the same with respect to a particular carrier, but increasingly they are not. States can enter into bilateral agreements to heal this rift for aircraft based abroad under Article 83 *bis* of the Chicago Convention, but this provision has not been widely put into practice.

Regional organizations appear at first glance to have no place in this picture. Although so-called regional economic integration organizations are permitted to accede to several recent aviation conventions, the Chicago Convention is not one of them.

The regional safety oversight organization (RSOO) has arisen through a process of gradual delegation. ICAO Contracting States cannot transfer away their safety oversight responsibilities (except through Article 83 *bis* agreements), but they can delegate execution of safety oversight responsibilities. Indeed, a State delegates the execution of its safety functions when it privatizes its civil aviation authority (CAA) or contracts with any third party for carrying out safety oversight tasks. This kind of outsourcing has been going on to some degree for a long time. What is relatively new, however, is the delegation by States of the execution of safety responsibilities to a regional intergovernmental organization. The U.S. Federal Aviation Administration (FAA) has been involved in this trend from the beginning, providing encouragement and assistance to emerging regional organizations for well over 10 years. It has also encouraged ICAO to accommodate and support the phenomenon.

Pros and cons

A regional safety oversight organization has two immediately apparent advantages. First, economies of scale can conserve precious human and fiscal resources. Every State, and especially developing countries, has competing uses for scarce funds. It is difficult to muster the political will necessary to put together the complex and technically sophisticated organization needed to meet international requirements. Just as air carriers must look at every cost item on their ledgers to stay competitive, governments, too, must look for ways to be more productive and efficient. This is why a regional approach can be appealing to small countries with relatively low levels of aviation activity; at the same time, some major aviation powers are pooling resources in regional organizations.

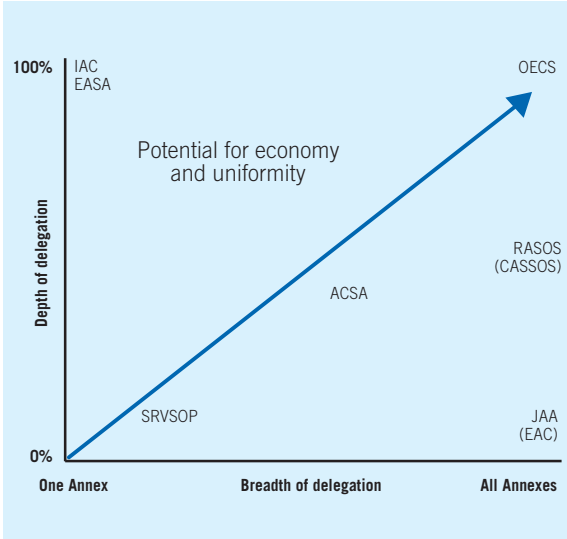
Second, and nearly as important, a regional organization promotes harmonization of safety requirements, reducing the burden of compliance on struggling air carriers. Uniformity of regulatory approaches to safety is a key ICAO goal.

With the global reach of aviation, carriers must be able to fly anywhere economically and stay in compliance with aviation safety rules.

The standards and recommended practices (SARPs) set out in the 18 ICAO annexes provide the backbone of the international regulation of civil aviation, but they cannot implement themselves: it is up to States to enact domestic legislation to make the SARPs effective in their territories. Model laws and regulations published in the ICAO *Manual of Model Regulations* (Document 9388) must be adapted to local conditions and differing forms of government. With leeway for wide variations, a regional organization can help ensure that a suitable regulatory approach achieves the widest possible coverage.

Better safety at lower cost may seem too good to disregard, but nonetheless some States remain reluctant to join with others in an RSOO. Their principal concern is sovereignty; States are reluctant to give up even the execution of their responsibilities and surrender any control over the details of sophisticated and expensive programmes. Indeed, some aspects of aviation safety are close to the core sovereign responsibilities of States — the health, welfare, and safety of the population. States might also be concerned that RSOOs could become unwieldy bureaucracies with inefficiencies that undercut the gains to be had from economies of scale. They might worry that the RSOO could become unresponsive and unaccountable to the very States from which it derives its authority. Indeed, intergovernmental organizations sometimes let concerns like geographic proportional representation in staffing undermine efforts to maximize productivity.

Regional safety oversight is a good idea that can produce very real benefits, but only if it is implemented wisely.



Approximation of the level of delegated authority for several regional safety oversight organizations as of November 2005 (two RSOOs still in planning stage indicated by parentheses). Breadth of delegation represents number of ICAO annexes for which there is oversight responsibility; depth of delegation concerns the level of authority, ranging from simple consultancy to full agency for execution, granted by member States.

Origins of regional safety oversight

The oldest regional safety oversight organizations are between 10 and 15 years old. There were three simultaneous spurs to their emergence in the early 1990s. With the dissolution of the Soviet Union, the Interstate Aviation Committee arose to handle regional airworthiness functions in the Commonwealth of Independent States. At about the same time, civil aviation officials in Europe banded together to harmonize divergent civil aviation laws and regulations and to enter into a transatlantic dialogue centered principally on airworthiness harmonization. European regional integration subsequently accelerated with political developments in the European Union. The most important impetus to development of regional safety oversight organizations in the rest of the world, however, was the advent of two major safety audit programmes that disclosed widespread non-compliance with the ICAO SARPs.

The first of these pivotal programmes was the FAA's International Aviation Safety Assessment (IASA), which began after a series of accidents (especially the Avianca crash on Long Island, New York in January 1990) resulted in investigative reports in the press and hearings in the U.S. Congress. IASA was based on Article 33 of the Chicago Convention, which provides that foreign certificates and licences "shall be recognized as valid by the other Contracting States, provided that the requirements under which such certificates or licences were issued or rendered valid are equal to or above the minimum standards" contained in the ICAO annexes. Any Contracting State may require that other States demonstrate that they are in compliance with the SARPs.

The assessments gauged CAA compliance with the ICAO annexes concerned with personnel licensing, the operation of aircraft and the airworthiness of aircraft, through questionnaires, checklists and voluntary visits. States found not to be in compliance were asked for formal consultations. The FAA then worked with each authority to develop an action plan for achieving compliance with international standards, meanwhile freezing operations of the affected carriers in U.S. airspace at their current level until the deficiencies were cured, as validated by a reassessment.

The initial results of the IASA Programme showed that between two-thirds and three-quarters of the nearly 100 civil aviation authorities assessed under the IASA Programme and responsible for overseeing more than 400 air carriers operating to U.S. airports did not meet ICAO standards in important ways.

The second programme of significance emerged at ICAO, which began in 1996 to perform voluntary safety oversight assessments under its then Safety Oversight Programme. Although ICAO assessments of the time did not give a pass-fail grade, they nonetheless disclosed that a number of States were not in compliance with the SARPs. Indeed, according to an article in *ICAO Journal*, they showed that "serious safety problems" existed, and one practical solution advocated by ICAO was the establishment of regional safety oversight mechanisms (see December 1997, pp. 5-6).

The Universal Safety Oversight Audit Programme (USOAP), the mandatory

Jim Jorgenson

When implemented wisely, regional safety oversight is a good idea that can produce very real benefits.

audit programme that was the eventual successor to the voluntary one, is based mainly on the critical elements contained in Part A of the ICAO *Safety Oversight Manual* (Document 9734), which focuses on the establishment and management of a State's safety oversight system. While the detailed findings of such audits are confidential, a summary of the results are provided to the governments of all Contracting States.

Both IASA and USOAP have helped governments amass the necessary resources and find the political will to build effective, sustainable national safety oversight programmes. They have also helped authorities use these additional resources wisely by pinpointing the areas that need improvement. The attractiveness of RSOOs was apparent early on. Indeed, the Organization of Eastern Caribbean States had an RSOO well before its first external safety audit.

Both the FAA and ICAO have nurtured and encouraged RSOOs. ICAO is currently adapting its key guidance documents to meet the needs of regional organizations, primarily in the form of Part B of *the Safety Oversight Manual*. This new information, which has been posted on the ICAO secure site, focuses on the development and management of regional safety oversight systems.

Conceptual framework

Creating a regional safety oversight organization actually presents a range of options. The more member States it serves, the wider the potential area of uniformity; the more power granted to it by member States, the more efficient and effective it can become. The degree of delegation of oversight functions must be gauged in two dimensions: breadth and depth.

Breadth of delegation is easy to evaluate. The wider the range of responsibilities that the RSOO takes over, the greater the potential for financial savings and uniformity. A quick way to evaluate breadth of delegation is to think in terms of the competencies covered by the ICAO annexes; that is, an RSOO with full safety oversight authority would be in charge of Annexes 1, 6, and 8, which address personnel licensing, operation of aircraft and airworthiness of aircraft, respectively. Similarly, if it had responsibility for accident investigation and airports, the RSOO would be concerned with Annexes 13 and 14, and so on.

Depth of delegation is less obvious, but perhaps even more important. It is the degree to which member States have delegated the execution of particular functions. At the far end of this sliding scale, where the delegation is total, the RSOO is an executive agent. It carries out all the member States' functions within its area of competence. Thus an RSOO that has fully delegated functions under Annexes 1, 6, and 8 would issue licences and certificates, oversee air carrier operations and aircraft airworthiness, and would even run surveillance and enforcement programmes. Perhaps the acid test would be RSOO issuance of air operator certificates (AOCs) on behalf of the State of the operator.

At the near end of the depth-of-delegation scale is a regional entity that has no delegated oversight functions at all. This sort of regional safety organization might be quite effective as a consultative body offering expert advice on planning, training, surveillance and a host of other services. It could promulgate model regulations and guidance, but while such an organization might advance uniformity and technical competence, it is less likely to achieve significant economies of scale.

Most RSOOs develop incrementally. They start with both narrow and limited delegations, perhaps even on an experimental basis, until the member States are satisfied that the RSOO will be effective and accountable. In any case, a means must be established whereby the member States can ensure that the RSOO remains fully accountable to them.

Constitutional arrangements are another key concern. Regional safety organizations can be created through a number of means. One effective method is for the member States to negotiate a free-standing treaty dedicated to the purpose. If this is not politically feasible or practical, it may be possible to build on an existing regional body. Perhaps, for example, a provision in the regional organization's founding convention provides for establishing administrative agencies, or perhaps the mandate of an existing safety agency or authority can be extended. It may also be possible to

amend the basic convention of an existing regional entity to create a safety authority.

In any case, the RSOO should have all the attributes and powers specified in the ICAO *Safety Oversight Manual*. The founding convention must create the RSOO as a legal entity under the law of the member States and the larger regional entity of which it is part.

The constitution of an RSOO must of course take into account the varying systems of government found among the member States. In addition to a mixture of types of government there may exist multiple official languages. The constitution can also provide for the evolution of the organization as experience proves useful, either through planned growth or amendment.

Finally, it is important to highlight enforcement, a core obligation under the Chicago Convention, as a particular area of concern. An effective RSOO might have delegated wide-ranging surveillance powers while leaving enforcement and the correction of deficiencies to the national authorities. Enforcement must not be neglected, since no regulatory system can rely entirely on voluntary compliance and still be effective. At the same time, the use of enforcement must balance the regulatory interests of the government with the rights of the individual.

Existing RSOOs

There are several RSOOs around the world. Following is a brief description of eight of these safety agencies.

East African Community (EAC). Kenya, Tanzania, and Uganda comprise the EAC, a regional intergovernmental organization established by treaty in 1999 and headquartered in Arusha, Tanzania. The EAC is committed to creating an RSOO with fully delegated authority for safety oversight. Kenya Airways is the EAC's principal international carrier, and the Kenyan CAA is leading the harmonization effort. The FAA is assisting EAC officials in developing a common aviation regulatory code and training and guidance materials. The EAC's safety authority could potentially expand to include other countries.

Organization of Eastern Caribbean States (OECS). The OECS was established by the 1981 Treaty of Basseterre. The Eastern Caribbean Civil Aviation Authority (ECCAA) was established under Article 6 of the treaty, which authorizes regional agencies. Member States have promulgated identical civil aviation acts that delegate safety oversight responsibilities to the Director General of the ECCAA, who is headquartered in Antigua. LIAT Airlines, which is based in Antigua and Barbuda and has 11 Caribbean governments among its shareholders, has the most significant operations outside the region. The FAA has assisted the ECCAA in developing effective safety oversight capabilities. OECS member States include Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Lucia, Saint Kitts and Nevis, and Saint Vincent and the Grenadines (Anguilla and the British Virgin Islands are associate members).

Regional Safety Oversight System for the Caribbean (RASOS). In 2001, the directors general of civil aviation (DGCAs) representing 13 Caribbean States formed the Association of Civil Aviation Authorities of the Caribbean (ACAAC), based in Kingston, Jamaica. RASOS is the association's operating arm. Created by memorandum of agreement among the directors general, RASOS focuses on harmonizing rules, standards, inspection procedures and sharing of technical resources. It has developed a cadre of experienced operations and airworthiness inspectors available to the member CAAs. RASOS is developing training facilities and technical libraries, and encourages harmonized guidance materials. Jamaica and Trinidad and Tobago, for example, have published harmonized manuals. RASOS is also encouraging regional harmonization of enforcement. RASOS member States include the OECS members identified above, plus Barbados, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago.

Caribbean Aviation Safety and Security Oversight System (CASSOS). The Caribbean Community and Common Market (CARICOM) was established by the 1973 Treaty of Chaguaramas, which, like the OECS treaty, provides for regional agencies. CARICOM is in the process of establishing CASSOS as an aviation safety mechanism that will essentially elevate and expand

continued on page 34

MORE INFORMATION FROM ICAO JOURNAL

A number of *ICAO Journal* articles have focused on various aspects of regional safety oversight. Below appears a summary of previous articles.

For more on the ICAO Safety Oversight Programme and its successor, the USOAP, see:

- "Recent assessments disclose serious safety problems that call for international action," Issue 10/1997, pp. 5-6;
- "Safety assessment proves helpful in isolating the problem areas, identifying solutions," Issue 1/1999, page 15;
- "Expanding programme to adopt systems approach to future audits," Issue 9/2003, pp. 4-7; and
- "ICAO and FAA collaboration strengthens safety oversight initiatives worldwide," Issue 9/2003, pp. 11-12.

For more on ACSA, see:

- "New regional body has enhanced the safety oversight capability of its member States," Issue 9/2003, pp. 13-15.

For a recent article on EASA, see:

- "New regulatory agency endowed with range of powers to ensure its effectiveness," Issue 3/2005, pp. 16-18.

For more on JAA/ECAC, see:

- "European inspection programme targets aircraft during airport turnarounds," Issue 9/2003, pp. 20-21.

On the practice of outsourcing, see:

- "ANS providers place strong emphasis on implementing best practices," Issue 3/2003, pp. 12-14; and
- "Commercialization of service provider depends on successful strategies," Issue 3/2003, pp. 15-16.

* The technical annexes to the Chicago Convention, numbering 18 in all, contain provisions for the safe, secure, orderly and efficient development of international aviation.

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Icy waters of liberalization prove not so cold in reality

Aviation liberalization is not for the faint of heart, U.S. policymaker says of the ongoing effort to liberalize international markets.

ICAO SECRETARIAT

THE road to a liberalized air transport environment is fraught with obstacles, but the positive result makes the ordeal worthwhile, according to a senior U.S. policymaker who spoke at ICAO headquarters late last year.

"There is nothing easy about liberalizing aviation markets," admitted Jeffrey N. Shane, the Under Secretary for Policy in the U.S. Department of Transportation (DOT), in delivering the second annual Dr. Assad Kotaite lecture to the Montreal Branch of the Royal Aeronautical Society on 8 December. The speech by Mr. Shane, which referred to a pending U.S.-European Union (EU) Open Skies Agreement as an entirely new level of liberalization to transatlantic air services that would "facilitate the most important reinvention of international aviation we have ever seen," recalled the lessons learned from the U.S. experience in advancing aviation liberalization over a period of three decades.

Richard T. Slatter

Jeffrey Shane, Under Secretary for Policy in the U.S. Department of Transport, right, with ICAO Council President Dr. Assad Kotaite. Mr. Shane delivered the 2nd annual Dr. Assad Kotaite lecture in Montreal in December.

While open skies agreements are commonplace today, early U.S. efforts to introduce liberalization — both domestically and later in international markets — encountered strong resistance. Domestic deregulation was enshrined in U.S. law in 1977 only after highly contentious Senate hearings where the proponents and opponents of continued economic regulation of the industry came out in force, recounted Mr. Shane. Shortly thereafter, the U.S. government began a quest for liberal bilateral agreements, a process that made the United States highly unpopular within the international aviation community.

"Aviation liberalization is not for the faint of heart," Mr. Shane summarized as the first and most important lesson learned. "It is the classic good deed that will not go unpunished."

The debate, characterized by Mr. Shane as tense and at times nasty, involved trading partners, established U.S. international airlines, and the International Air Transport Association (IATA), whose system of multilateral tariff agreements was not compatible with a U.S. policy of price competition. But despite disagreement even within the U.S. government over the virtues of liberalization, a number of liberalized bilateral agreements soon took place with trading partners in Europe, the Middle East and Asia, establishing "an important new model for international aviation relations."

The early successes were followed by a period of Congressional lobbying by U.S. international airlines, which complained bitterly about the new agreements. Congress responded with new legislation that placed greater emphasis on the consequences of liberal aviation agreements for U.S. carriers, with the goal of strengthening the competitive position of U.S. air carriers to at least assure equality of opportunity with foreign carriers. There were also numerous public hearings on aviation policy, and a Congressional report that was highly critical of the performance of the government agencies responsible for aviation policy.

As a result, the United States was less aggressive about pursuing liberal agreements for a period of years, with U.S. negotiators focusing less on grand reforms than on individual market-specific issues, recalled Mr. Shane. During this period of relative quiet in international aviation relations, U.S. airlines began to exploit more effectively the broad new freedoms that had been delivered — sometimes over their own vehement objections — in the earlier bilateral agreements.

"In fact," recounted Mr. Shane, "the performance of U.S. airlines in international markets during the 1980s was extraordinary. They carried nearly twice the number of passengers in 1990 as in 1980; their market share grew by about 20 percent; their revenues attributable to international operations more than doubled; and the percentage contribution of international services to their overall system-wide revenues increased by about 20 percent.

"Consumers benefited in even more dramatic ways. In 1980 there had been 17 U.S. gateways with non-stop services to Europe; by 1990, that number had increased to 25. The number of non-stop routes across the North Atlantic — city-pairs with non-stop service — grew from 92 in 1980 to 161 in 1990. Similarly dramatic

increases were seen in the number of gateways and non-stop routes to the Asia/Pacific region and to Latin America. Passenger growth was consistently stronger in liberalized markets than in non-liberalized markets. Cargo carried by U.S. airlines more than doubled between 1980 and 1990."

The next major step in the U.S. embracement of liberalization was the Cities Programme proposed in 1990. Under this initiative, if an airline from a liberal trading partner wished to serve a U.S. gateway that was not listed for service in the applicable bilateral agreement and no U.S. airline was offering to serve the same city, the new service would be permitted without the need for new negotiation. "DOT decided, in other words, not to let the traditional bilateral negotiating process stand in the way of beneficial air service without a good reason," Mr. Shane explained.

The programme represented a dramatic departure from past policy as even the most liberal bilateral agreements of the time still contained major restrictions on the operation of airlines in international markets, many required for the purpose of protecting U.S. airlines, particularly after the Congressional criticism of the late 1970s and early 1980s.

After finalizing this proposal, a number of new services were launched without further negotiations. And while there were some complaints from U.S. airlines, it was "nothing like the attacks of a decade before," remarked Mr. Shane.

The positive experience with the Cities Programme led to a new and even more exciting concept: the possibility of an "open skies" approach to international air services, a policy that was adopted in 1992. Under this approach, airlines of countries that agreed to open their air services markets to U.S. carriers would receive, in return, open access to and through the United States.

Predictably, the initiative to expand liberalization was criticized by U.S. airlines, which asserted that the first open skies agreement, signed with the Netherlands in 1992, granted KLM access to every point in the United States and from any U.S. point to any point in the world without awarding benefits of similar magnitude to the United States, as required by the International Air Transportation Competition Act of 1990.

Mr. Shane observed that the first Open Skies Agreement was only possible because the legislative requirement to obtain "benefits of similar magnitude" had been interpreted in the broadest possible way by DOT, an interpretation that was never challenged. According to this view of the legislation, U.S. negotiators were not expected to obtain "precisely equal economic benefits."

In its final order adopting the new policy, pointed out Mr. Shane, DOT addressed the contentious issue with the following statement:

"We are frankly and firmly committed to freer trade in civil aviation services, and our commitment is grounded, in large part, on our experience with both the market-oriented and the restrictive approaches that govern many of our current bilateral aviation relationships. We have seen much larger dividends in those markets which allow greater scope for airline prices and service initiatives. Indeed, if we were to embark on negotiation initiatives only where we could anticipate precisely equal economic benefits, we would have been deterred from some of the most successful agreements we have achieved in the last decade. As with the Cities Programme before, we find that the Open-Skies Programme represents a further progression along the path toward a truly open environment for international aviation service. …"

This initial experience with open skies, in other words, made clear that there is considerable latitude in the implementation of legislative mandates. "Legislation relating to economic policy is typically nuanced and rarely categorical," Mr. Shane explained. "Thus, statutory language enacted in 1980 to moderate perceived liberalizing excesses on the part of U.S. aviation delegations was no obstacle to the adoption of the Open Skies policy a dozen years later."

Rand K. Peck

International aviation liberalization has been beneficial for both industry and consumers, although its introduction was controversial and initially opposed by many established U.S. international airlines.

Among the lessons learned from the U.S. experience with implementing liberalization over the decades, remarked Mr. Shane, liberalization gets easier with time.

"Partly," he quipped, "that's because you develop calluses. But mostly, it's because the sceptics discover that the icy waters of liberalization really aren't that bad once you have been swimming in them for a while."

Another lesson, he said, is that liberalization begets more liberalization.

In this respect, Mr. Shane expressed confidence that a tentative U.S.-EU agreement on transatlantic services will result

continued on page 34

This article is a summary of the 2nd annual Dr. Assad Kotaite lecture, presented by Jeffrey N. Shane, Under Secretary for Policy in the U.S. Department of Transportation to the Montreal Branch of the Royal Aeronautical Society on 8 December 2005. Mr. Shane's speech is available in its entirety at the U.S. DOT website (www.dot.gov/affairs/shanesp120805).

Cooperation is an important aspect of effective fight against terrorism

While much progress has been made in strengthening the legal aviation security regime, the widespread ratification of legal instruments remains a crucial goal that calls for greater cooperation between international organizations.

JEAN-PAUL LABORDE • ANDREA TRESO
UNITED NATIONS OFFICE ON DRUGS AND CRIME

OFFICIALS of the United Nations Office on Drugs and Crime (UNODC) met with ICAO officials at the end of November to explore opportunities for greater cooperation in the international fight against terrorism. The UNODC is the office within the UN Secretariat that is responsible for international action against illicit drugs, crime and terrorism.

ICAO and UNODC already cooperate in some respects, in recent years conducting joint activities to promote awareness of terrorism countermeasures. ICAO, for example, has taken part in several seminars conducted by the UNODC Terrorism Protection Branch (TPB), and experts from UNODC and ICAO have made joint presentations at several ICAO aviation security seminars and workshops since 2004. Both ICAO and UNODC are members of the UN Counter-Terrorism Implementation Task Force, which focuses on issues such as how to strengthen the capacity of the UN system to assist States in combating terrorism.

With civil aviation a primary target of terrorist acts, ICAO has become an important actor within the UN system in the fight against terrorism and the promotion of international cooperation in security matters. Prevention and suppression of terrorism, as well as efforts to facilitate international cooperation, are also among the main goals of UNODC, which is headquartered in Vienna.

TPB's mandate is to address the criminal justice aspects of terrorism, a task it fulfils by providing technical assistance to States that request it. This assistance focuses on efforts to ratify and implement the 12 (soon to be 13) international conventions and protocols, also known as "universal instruments," relating to terrorism. Among these instruments are five aviation security treaties developed through the ICAO framework to combat acts of unlawful interference with civil aviation. Concurrently, ICAO assists States to implement the provisions of Annex 17 to the 1944 Chicago Convention. Hence the activities of UNODC and ICAO in their respective fields of criminal law and aviation security are highly complementary.

UNODC photo

UNODC's TPB has provided counter-terrorism legislative training to more than 1,000 national officials in charge of counter-terrorism efforts. Pictured is a regional TPB workshop under way in Nairobi in December 2005.

Legal framework. A UN resolution adopted shortly after the events of 11 September 2001 legally binds all 191 UN member States to comply with the provisions of the universal instruments, including the five aviation security conventions, by introducing appropriate domestic legislation. Collectively, the instruments represent a global legal framework for preventing terrorist acts and for pursuing perpetrators of terrorism, thereby harmonizing domestic laws and bridging gaps in different legal systems. The instruments oblige State parties, for example, to adopt legislation that helps establish common definitions of certain terrorist offences while clarifying jurisdiction on the basis of territorial considerations, the nationality of the victims or perpetrators, and the country of registration of the aircraft in question.

By laying down the basic principle of "extradite or prosecute," the tools supplied to States by the universal instruments are very powerful. It will take still more time, however, for all States to become parties to the aviation security treaties and to incorporate their provisions into all domestic laws, thereby establishing a truly universal legal regime against acts of unlawful interference with civil aviation.

The five aviation security conventions that are part of the global legal framework comprise the following air law instruments, listed in order of their adoption by diplomatic conferences (all five conventions have entered into force):

- The Convention on Offences and Certain Other Acts Committed on Board Aircraft (Tokyo, 1963);
- The Convention for the Suppression of Unlawful Seizure of Aircraft (The Hague, 1970);

• The Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation (Montreal, 1971);
• The Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation, supplementary to the Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation (Montreal, 1988); and
• The Convention on the Marking of Plastic Explosives for the Purpose of Detection (Montreal, 1991).

The other seven universal instruments relating to the prevention and suppression of terrorism are as follows (again, listed in chronological order):
• The Convention on the Prevention and Punishment of Crimes against International Protected Persons (New York, 1973);
• The International Convention against the Taking of Hostages (New York, 1979);
• The Convention on the Physical Protection of Nuclear Material (Vienna, 1980) and its Amendment adopted on 8 July 2005 (which has not yet entered into force);
• The Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (Rome, 1988) and its Protocol adopted on 14 October 2005 (which has not yet entered into force);
• The Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf (Rome, 1988) and its Protocol adopted on 14 October 2005 (which has not yet entered into force);
• The International Convention for the Suppression of Terrorist Bombing (New York, 1997); and
• The International Convention for the Suppression of the Financing of Terrorism (New York, 1999).

In addition to promoting the ratification and implementation of these 12 instruments, TPB's work will now include, in accordance with Resolution 2005/19 of the Economic and Social Council of the United Nations (ECOSOC), the promotion of the *International Convention on the Suppression of Acts of Nuclear Terrorism*. This instrument was adopted by the UN General Assembly in April 2005 and opened for signature in New York in September 2005.

Gerry Ercolani

The creation of a global legal framework for the fight against terrorism is a significant accomplishment. It will take time, however, before all States become parties to the security-related legal instruments, and still more time before they incorporate their provisions into all domestic laws.

TPB, under an expanded mandate approved by the UN General Assembly in October 2002, has contributed to considerable improvement in the status of ratification and, more pointedly, the implementation of the aviation security conventions and other universal instruments in the past three years. It has, for example, provided legislative and capacity-building assistance, including specialized training for criminal justice officials, especially judges and prosecutors, in close coordination with the Counter-Terrorism Committee (CTC) of the Security Council and its Executive Directorate (CTED). On request from States, moreover, it has helped establish effective mechanisms for international cooperation in the criminal aspects of terrorism, especially extradition and mutual legal assistance.

The TPB's achievements are evident in the numbers. By mid-2001, only two States had ratified all of the universal instruments, including the aviation security treaties; by September 2005, however, this number had risen to 70. Over 110 States have been assisted through regional and sub-regional workshops or more directly through bilateral efforts to ratify and implement the aviation security treaties and other universal instruments. During 2004-05, for example, TPB organized 10 regional workshops at which 75 States were assisted in the drafting of criminal laws and legislative amendments, many of which focus on aviation security. In approximately one-third of these States, new legislation has been drafted, while in 37 of the 75 countries TPB has trained judges and prosecutors in the application of the universal instruments for international judicial cooperation.

In addition to assistance for the 75 States that participated in regional workshops up to September 2005, TPB has provided legislative advice to 47 governments that took part in national workshops conducted by UNODC. Through such workshops, TPB has provided counter-terrorism legislative training to more than 1,000 national officials in charge of counter-terrorism work, and has familiarized these officials with the criminal law aspects of the aviation security treaties and other universal instruments.

continued on page 36

Jean-Paul Laborde is the Chief of the Terrorism Prevention Branch of the United Nations Office on Drugs and Crime (UNODC). He is based at UNODC's headquarters in Vienna. Andrea Treso, Crime Prevention Expert, Terrorism Prevention Branch, works in UNODC's New York Liaison Office.

Varig joins growing list of operators performing line operations safety audits

LOSA implementation provides the air carrier with a systemic snapshot of flight operations that can engender a collaborative effort to improve safety.

Capt. Ronald Van der Put
Varig Airlines
(Brazil)

ALONG with a growing number of proactive air carriers around the world, Varig Airlines recently established its own line operations safety audit (LOSA) programme to observe flight crews at work so that it can identify safety issues in a routine operational context. Varig's LOSA implementation is notable because it was developed entirely in-house using ICAO Document 9803. Significantly, the quality of its data is judged to be very high, and are therefore suitable for entry in the LOSA archives maintained by the University of Texas at Austin. This research material is used by human factors specialists to identify the strengths and weaknesses of an airline's flight operations system.

ICAO Document 9803, essentially a blueprint for setting up a LOSA programme, was compiled following ICAO's decision to endorse LOSA as the primary tool for developing countermeasures to human error in aviation operations. It was produced with extensive input from human factors experts at The University of Texas at Austin, Continental Airlines, US Airways, and the international offshoot of the Air Line Pilots Association (ALPA). The manual describes basic error concepts, implementation methodology, and the safety change process that should occur following implementation of LOSA. It includes a case study focused on one airline's experience in implementing the programme, as well as examples of appropriate reporting forms and a list of recommended reading and reference material.*

While providing valuable guidance to airlines, the ICAO document was never intended to convert readers into instant expert observers or LOSA auditors. Varig used the manual as an introduction to the concept, methodology and tools of LOSA. The company worked with both ICAO and human factors experts at the University of Texas at Austin, where the LOSA concept was conceived, to develop and implement an initiative that it calls the Programme for Observation of Line Flights (PROL).

The in-house effort to create the new safety programme at Varig formally commenced in mid-2004, when the airline joined forces with ICAF, a Brazilian human factors research centre, and Brazil's Civil Aviation Authority (DAC) to establish a team within the air carrier responsible for implementing the LOSA concept. In November of that year, Varig and ICAF sent safety specialists to an ICAO LOSA seminar in Seattle, held concurrently with an International Air Transport Association (IATA) human factors meeting. Following these informative events, Varig and ICAF signed a memorandum of agreement in December 2004 to formally establish the airline's LOSA research and development team.

Varig Airlines' LOSA programme initially focused on Boeing 737 operations, but has expanded to other fleets including Varig's long-haul aircraft. The programme's first group of instructors and observer pilots, shown above, commenced formal LOSA observations in August 2005.

Varig's LOSA team, which began its work with weekly meetings, soon recruited two additional members, one a representative of Brazil's National Pilots Union (SNA), the other a retired captain who had gained experience implementing LOSA at EVA Air following his retirement as a line pilot at Varig.

The most demanding tasks facing the team were the creation of an in-house LOSA manual and the selection of the observers. With the support of aircraft fleet managers and the SNA, the LOSA team narrowed an initial pool of 1,800 pilots to 85 on the basis of administrative files. With feedback from fleet managers, the company then identified 30 captains who

were mainly instructors or check airmen with experience in cockpit resource management (CRM) and line-oriented flight training (LOFT). Twenty percent of this select group were retired line pilots who had continued working for Varig as flight simulator instructors. Among the new LOSA observers were pilot union members, both of the SNA and the Varig Airlines Pilots Association (APVAR).

The next step was to develop a training syllabus for the newly appointed observers, but before beginning this process Varig signed a protocol with the SNA to officially launch the programme. The entire group of observers was required to sign a contract binding them to uphold the programme's protocol and statement of ethics, including a promise to maintain confidentiality. The contract, in fact, provides for an observer's dismissal in the event that collected data are used in an inappropriate manner.

An educational campaign was then undertaken, beginning with the electronic dissemination of the protocol and a bulletin describing the programme guidelines to all Varig pilots. The programme protocol was also posted at the Varig Corporate Safety Office website. No stone was left unturned in this effort to promote awareness: information folders were sent to every line pilot, briefings were provided for both flight crews and ground staff, and banners were hung at operational dispatch offices. The SNA Safety Office also backed the awareness campaign, posting the protocol and information about PROL at its website.

The Varig team joined an IATA human factors working group in May 2005 to learn more about the latest LOSA developments. About the same time, the National Accident Prevention Committee (CNPAA), a component of the Brazilian Accident Investigation and Prevention Agency (CENIPA), convened a safety meeting attended by representatives of regulatory authorities as well as flight safety officers from aircraft operators based all over Brazil. This led to the creation of a LOSA task force with the goal of developing regulation based on ICAO Document 9803. The task force was also directed to draft a related amendment to the CENIPA accident prevention programme.

Varig's first course for LOSA observers was held in June 2005. The training syllabus comprised two days, of which the first — attended by representatives of the Brazilian Accident Investigation and Prevention Agency, the Brazilian Civil Aviation Authority and airline safety officers from outside Varig — featured information of a general nature, including a review of the Tenerife runway accident of 1977 from the perspective of a safety analysis tool known as the threat and error management (TEM) framework. (For more on TEM, see "ICAO examining ways to monitor safety during normal ATS operations," Issue No. 3/2004, pp 14-16).

One important issue raised by the Brazilian Civil Aviation Authority on the first day of the course was the necessity for the airline to officially create an observer function before observers could legally occupy a cockpit jumpseat. The second day of the course focused more on practical training, and was therefore limited to observers and company training department members.

The initial training effort was followed by on-the-job training which involved monitoring flight deck activities on both legs of the Boeing 737 shuttle operation between Rio de Janeiro and Sao Paulo. The data collected during this training exercise, which involved a total of 38 flights by two variants of the B737 over a 10-day period, was analysed using special software to generate Varig's first LOSA reports. The results of this early analysis are shown in the accompanying table. As indicated, during the practical training phase observers identified a total of 66 threats, 91 errors that needed to be managed by the flight crews, and 35 occasions when the aircraft entered an undesired state. (An "undesired aircraft state" is said to occur when the flight crew places the aircraft in a situation where existing margins of safety are reduced.)

With this practical experience in hand, the observers participated in an exercise known as "recalibration" training, in which observation forms were reviewed and discussed with a focus on how threats and errors had been classified, and a review of the findings of undesired aircraft states. The recalibration process was useful in resolving doubts about how to fill out the form and featured electronic passwords known only to the programme manager so that individual observers could be identified when necessary.

The results of the shuttle flight observations were shared with fleet managers and the shuttle service crews, but only after the data had been carefully analysed and software issues had been addressed. Pilots and fleet managers were informed that the data would not be used to report errors to management for disciplinary reasons, thereby respecting the programme's requirement for confidentiality and immunity from punishment.

Flight Phase	Threats	Errors	Undesired Aircraft State
Pre-flight/taxi-out	39	31	13
Take-off/climb	8	17	5
Cruise	7	5	1
Descent/appch/landing	9	36	16
Taxi-in	3	2	0
Total	66	91	35

Results of initial LOSA reports submitted by observer trainees at Varig Airlines in mid-2005

Toward the end of June Varig made a formal presentation on its implementation of LOSA to ICAO and The LOSA Collaborative, a special unit partnered with the University of Texas in the research, development and implementation of LOSA worldwide. The significance of the data collected during the observers' training exercise and later analysed was discussed in depth, with human factors experts offering practical advice. Another presentation on Varig's experience was made at a LOSA workshop organized by the SNA in Rio de Janeiro, the first international workshop of its kind.

The next milestone was the launch of formal observations in August 2005. The official programme was initiated with the goal of observing 400 flights, a valid sample of the airline's total operations, involving some 14,000 monthly departures. The flights earmarked for LOSA had to reflect a cross-section of different types of operations and consequently this selection was influenced by factors such as aircraft type, destination, time of day and type of crew.

The LOSA team identified a three-month period for performing the observations, from August to October inclusive, in part to avoid conducting the audits during high season. Keeping the observers' schedule up-to-date proved to be a full-time task because of aircraft type changes that would affect the schedule, as well as the requirement to avoid conducting LOSA on any flights involving checkrides or instruction. Because scheduling adjustments were so demanding, the LOSA team recruited a coordinator who could also address other administrative issues that might arise. A company flight attendant who also served as a safety adviser was chosen for this pivotal role.

At the time of writing in mid-November 2005, 350 flights had been audited, and the Varig Safety Office had begun evaluating the quality of the data and classifying information on the basis of threats, errors and undesired aircraft states. As flight crew participation in PROL is entirely voluntary, it is encouraging that refusal to take part has so far been very limited; among the first 350 planned observation flights, LOSA observers were denied flight deck access on just five occasions.

As the collection of data grew, fleet managers and LOSA team representatives from ICAF and SNA convened a round table meeting in order to validate the process, in particular the verification of routine operational issues related to specific aircraft types.

The programme protocol requires that the Varig Safety Office provides both management and flight crews with a report based on the completed analysis of collected data. It also calls for management to prepare a report on the corrective actions recommended as a result of the PROL report; this is why it is important for fleet managers to participate in the analysis of data. Once corrective actions have been implemented, it is the responsibility of the Safety Office to follow up and determine whether the corrective actions were adequately implemented.

Initiatives such as PROL are not possible, of course, without funding. In the case of Varig, the cost of the programme entails the services of three full-time safety specialists in the company's Safety Office as well as the part-time employment of personnel from ICAF and one consultant for a period of six months. In addition, LOSA observers are paid according to their status: active pilots receive the same hourly rate earned on flight duty, while retired pilots are paid at the same rate as a simulator instructor. Aside from these costs, PROL required the attention of a number of staff members, and depended on support from various departments. It called on the company's information technology department for support in developing web-based forms; from crew scheduling when coordinating the observers' activities; and from the chief pilot and fleet managers when analysing the data. Not to be overlooked, the LOSA team also required support from the company's legal office, since it was essential for lawyers to review the LOSA protocol and related contracts.

Including the cost of installing a suitable software programme, in this case a product known as Sphinx at a price of U.S. $5,800, the total cost of performing

continued on page 36

* Document 9803, *Line Operations Safety Audit (LOSA)*, can be obtained from the ICAO Document Sales Unit, tel. +1 (514) 954-8022; e-mail sales@icao.int.

Capt. Ronald Van der Put is the Corporate Flight Safety Manager at Varig Airlines. This article was co-authored by Dr. Rosana D'Orio, the Human Factors Coordinator Flight Safety at Varig, and Dr. Selma Ribeiro, of ICAF, a Brazilian human factors research centre.

UNION SUPPORTS FLIGHT SAFETY INITIATIVE

Capt. Célio Eugênio de Abreu Júnior
National Pilots Union
(Brazil)

Brazil's National Pilots Union (SNA) understands that the success of safety initiatives such as LOSA depends on the full support of front-line personnel because the monitoring of normal flight operations must be conducted on a voluntary basis. But while no one is compelled to participate, considering the value of real operational data to safety enhancement and the assurance of confidentiality, cooperation can only benefit everyone.

An effective approach to safety enhancement requires frequent and realistic snapshots of the civil aviation system that can reveal threats that may led to an accident. LOSA is just such a tool: trained observers build a database used to generate reports on the strengths and weaknesses of the system. Reports on LOSA results can provide a starting point for remedial actions designed to address shortcomings. In this collaborative environment, operating personnel work side-by-side with management and safety authorities to collect insightful operational data that supports a proactive approach to safety issues, instead of a reactive one.

Aside from a safer operation, the business-like approach to flight safety represented by programmes such as LOSA can allow an airline to reduce its costs by, for example, negotiating lower insurance premiums.

continued on page 37

Radar surveillance upgrade brings greater safety and efficiency

Although not yet fully operational, the evolutionary transition to Mode S surveillance begun in Europe has already brought benefits to crowded airspace.

JOHN LAW
EUROCONTROL

WORK aimed directly towards the implementation of Mode S surveillance in Europe commenced in earnest several years ago with the adoption of the initial implementation strategy for secondary surveillance radar (SSR) Mode S enhanced surveillance. Although those initial plans were significantly modified over the intervening years, the work undertaken in the mid-1990s resulted in the establishment of a solid platform, based on recognized cost-benefit metrics, for implementing both Mode S elementary and Mode S enhanced surveillance. The implementation is now being coordinated and advanced through a combination of two Eurocontrol programmes, one focused on Mode S; the other on the airborne collision avoidance system (ACAS).

SSR Mode S is, of course, significantly different from a conventional radar system. Simply put, conventional SSR (i.e. SSR Modes A and C) regularly interrogates all aircraft within range, whereas a Mode S radar station, using ground station interrogator codes, establishes selective interrogations with individual aircraft within its coverage area.

Before describing the status of Mode S implementation in Europe, including the steps that have been taken to resolve certain implementation issues, it is useful to first review the rationale for upgrading Europe's surveillance system.

Important system upgrade

In Europe, the predominant reason for upgrading from surveillance based on conventional and monopulse SSR (MSSR) Mode A/C to radar based on Mode S is to maintain the existing level of flight safety despite rapid traffic growth. In airspace experiencing high traffic density, the existing SSR/MSSR stations are reaching the limit of their operational capability, a problem compounded by radio frequency congestion. In this surveillance environment, Mode S selective interrogation will not only maintain probability of target detection at an acceptable level, but will also improve the quality and integrity of detection, identification and altitude reporting. These improvements translate into benefits in terms of safety, capacity and efficiency, which are essential to support future air traffic management (ATM) needs in Europe's high traffic density airspace.

The first step in upgrading Europe's surveillance system is to establish Mode S elementary surveillance (ELS). This advancement will present the air traffic controller with a better surveillance picture by eliminating synchronous garble, providing improved tracking through greater data integrity and precision, and enhanced vertical tracking through provision of 25-foot altitude reporting increments. ELS will also enable system acquisition of downlinked aircraft identification.

The second step is known as Mode S enhanced surveillance (EHS). This builds on the concept of elementary surveillance by providing the extraction of further aircraft-derived information known as downlinked aircraft parameters.

Ground acquisition of downlinked aircraft parameters will give controllers better information for the tactical separation of aircraft, while also creating the opportunity to deploy better controller support tools using aircraft-derived data. Downlinked parameters include such data as magnetic heading, indicated airspeed, vertical rate and the altitude selected by the flight crew in the aircraft's autoflight system (commonly known as "selected altitude"). Currently, Mode S enhanced surveillance is being implemented in major terminal control areas and the en-route airspace of

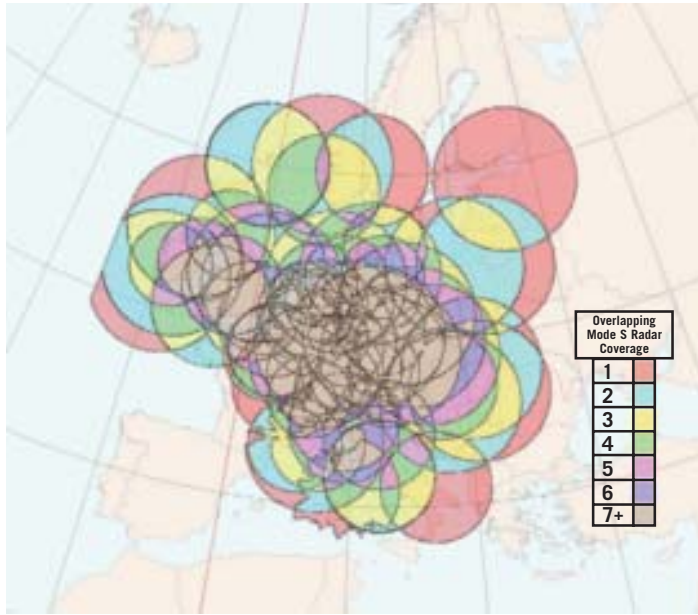

Figure 1. Extent of European Mode S radar coverage at the end of 2005.

three European States: France, Germany and the United Kingdom.

Mode S and ACAS Programme. The Eurocontrol Mode S and ACAS implementation programme coordinates the introduction of Mode S technology in Europe, and involves a number of States responsible for traffic management in much of the highest density airspace in Europe. It provides participating States and air navigation service providers with common tools to enable the implementation of interoperable Mode S ground station designs. These tools include operational guidelines and procedures, system implementation concepts and safety assessments, and delivery of interface specifications.

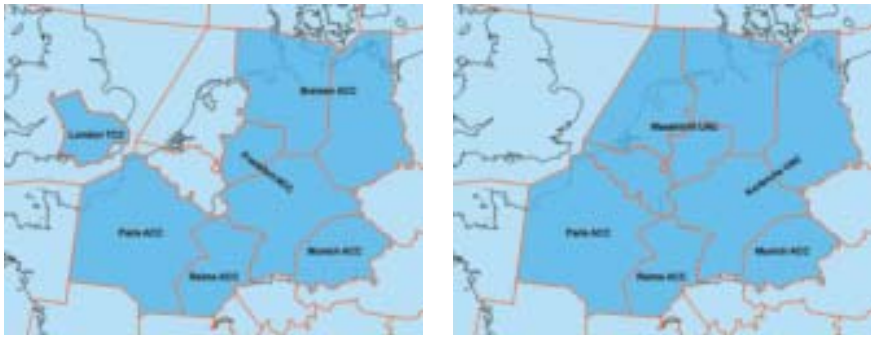

Figure 2. Mode S EHS coverage area for lower airspace (left) and upper airspace anticipated by 2008.

Performance monitoring tools are also available, with the establishment of a coordinated airborne monitoring project to track progress of installation of Mode S transponders on the aircraft fleet and to provide confirmation of their functional performance. In addition, specimen aeronautical information circulars are being developed as necessary, and support is provided for the development of Mode S specifications by the European Organization for Civil Aviation Equipment (EUROCAE) as well as for the ICAO standards. The programme also supports the European Aviation Safety Agency (EASA) and national airworthiness authorities in their development of Mode S airworthiness, equipment carriage and certification requirements.

Mode S radar installation. A significant number of operational Mode S radars have now been installed in Europe by civil and military operators alike. By the end of 2005, over 50 Mode S systems had been installed for air traffic control (ATC) or air defence, and more than 80 radars are expected to be operational by the end of 2006. In addition, a further 14 Mode S radars are being utilized for test, research and development purposes. *Figure 1* illustrates the extent of European Mode S radar coverage at the end of 2005; good multiple coverage and redundancy levels have been achieved.

Code allocation process. It is essential for each Mode S interrogator to be allocated a separate interrogator code to prevent interference by other Mode S interrogators operating in coincident or contiguous airspace. The original design of the Mode S system limited the number of interrogator codes available (excluding zero) to 15 interrogator identifier codes, which proved to be insufficient for operational needs. Design modifications introduced a further 63 codes which are known as surveillance identifier codes. At this stage, however, only some 70 percent of installed Mode S transponders can support the surveillance code functionality, and therefore it is not yet possible to exploit this capability.

Consequently, a rigorous process must be used to control interrogator code allocation. The need to have a process that ensures that the current and future Mode S infrastructure will be able to interoperate successfully has been borne out by experience. Coordination between ANS providers in the functioning of their radar networks is not only desirable, but also a necessity in a Mode S surveillance environment.

The ICAO European Air Navigation Planning Group (EANPG) has developed provisions for administering and monitoring the Mode S interrogator code allocations. The allocation plan is managed by Eurocontrol, in close coordination with the ICAO European and North Atlantic Office. Representatives of the national regulatory authorities of European States and those international organizations applying for interrogator codes meet at regular intervals to approve the allocations.

Airborne installation requirements. To facilitate the introduction of Mode S surveillance in the face of some significant implementation issues — among them the unavailability of certificated transponder equipment — the transitional arrangements have been extended until March 2007. Beyond this date, aircraft which are required to carry Mode S transponder equipment must be compliant with either elementary or enhanced surveillance.

A blanket exemption against the requirements of Mode S elementary surveillance is available for all aircraft until 31 March 2007; exemptions for meeting enhanced surveillance requirements, however, must be obtained on an individual airframe basis. This exemption policy aims to maintain the necessary momentum for installation of transponders compliant with Mode S ELS and EHS requirements while also seeking, in a pragmatic manner, to take account of the equipage and cost issues faced by aircraft operators. Nevertheless, aircraft operators are being encouraged to install Mode S ELS- and EHS-compliant equipment as soon as possible as no further extension of the transitional arrangements is likely.

The exemptions process is being managed on behalf of the regulatory authorities of the States implementing Mode S radar surveillance by the Exemption Coordination Cell established within the Eurocontrol Mode S and ACAS Programme.

In parallel, a significant effort is being made to verify performance in the operational environment. This is taking place through monitoring of both Mode S ground stations and Mode S transponders already installed on aircraft.

A number of issues affecting required functionality have been identified with certain Mode S transponders, and these are being resolved in coordination with avionics manufacturers and regulatory authorities, either through modifications to the affected Mode S transponders or to the ground stations. Experience in this area has shown the value and necessity for close coordination with the appropriate regulatory authorities. Without this, an extensive avionics implementation programme cannot be achieved successfully.

Initial operations

The operational introduction of Mode S elementary surveillance does not lend itself to the "big-bang" approach, but rather needs to be evolutionary in nature.

The operational use of aircraft identification will eventually obviate the need for discrete Mode A code assignments, and gate-to-gate Mode S operations will negate the need for SSR code changes completely. It is necessary, however, for ATC to gain confidence in the integrity of the downlinked aircraft ID. Airborne monitoring is helping in this respect. It is also important to establish the means for flight crew to re-set incorrect aircraft ID on the ground because, once airborne, it is not possible on the majority of commercial aircraft to correct the ID that has been entered. Furthermore, the use of transmitted aircraft ID needs to be accomplished without increasing controller or flight crew workload. It is important that the well established procedures for aircraft transfer between ATC units are not disturbed to the extent that the benefits of Mode S elementary surveillance are compromised.

The initial use of aircraft identification is coordinated by the Mode S and ACAS Programme. This involves taking account of Mode S coverage, redundancy requirements and progress in modifying the ground ATC systems to permit correlation of surveillance data and the transmitted aircraft ID against stored flight plan information.

Mode S elementary surveillance is being introduced initially in the airspace of Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland. Even before ELS is fully introduced, however, the Mode S radars now in operation are providing improved surveillance quality, despite the fact some Mode S transponders do not yet support their operation in pure Mode S mode.

Unlike the need for a cohesive operational introduction of Mode S elementary surveillance, enhanced surveillance can be introduced as soon as the ground infrastructure is in place. The initial European Mode S EHS surveillance area is shown in *Figure 2*.

An example of the early use of EHS downlinked aircraft parameters in ATC is a pioneering initiative taken by the United Kingdom's National Air Traffic Services (NATS). NATS introduced a vertical stack list tool in late 2005 which allows controllers to manage holding patterns in London Terminal Control airspace more efficiently. This tool capitalizes on the improved tracking and integrity of surveillance data inherent with Mode S and the provision of downlinked parameters from aircraft capable of enhanced surveillance. It presents a vertical depiction of aircraft within a holding pattern, and, in practical terms, makes it possible for controllers to continuously view call signs and occupied flight levels even though SSR labels may overlap on their radar displays.

There are also a number of safety benefits. For example, downlinked selected altitude values will be visible to controllers. With this information, the potential exists for controllers to reduce the incidence of altitude violations or "busts." *Figure 3* illustrates the vertical stack list tool display being used by NATS. Shown in the right-hand column of the vertical stack list window and in the label blocks on the radar display is the downlinked selected altitude.

Conclusion

A near-term reality in Europe, Mode S radar surveillance offers improved surveillance data capability, efficiency and safety. Moreover, it offers the capacity to handle the rising traffic demand of the forseeable future. As the implementation of Mode S gathers speed across Europe, a number of implementation issues have arisen; these are being addressed methodically, yet aggressively.

Mode S is being deployed in European airspace not a moment too soon and, although not yet fully operational, is already providing improved surveillance for the safe and efficient handling of air traffic in high density airspace. □

Figure courtesy of U.K. National Air Traffic Services

Figure 3. A new tool for managing aircraft holding patterns utilizes downlinked aircraft parameters in the EHS environment.

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Further information on all aspects of Mode S radar surveillance implementation in Europe can be found by visiting www.eurocontrol.int/mode-s.

Academia exploring innovative approaches to achieving "silent" flight

Working with partners in industry, university research departments hope to conceive an aircraft design whose engine and airframe noise would be imperceptible in the urban environment around airports.

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Edward Greitzer
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A major barrier in the expansion of airport operations is aircraft noise. According to Greener by Design, a U.K. initiative to address environmental concerns, "the downward trend in noise exposure around airports of past years … has now flattened out at major airports. Virtually all the older aircraft have been phased out and, while the continued fleet renewal will introduce progressively quieter types, the benefit will be appreciably less than has been achieved from phasing out of Chapter 2 aircraft."

Among the various projects that are exploring ways to reduce aircraft noise, the Silent Aircraft Initiative (SAI) was launched in November 2003 with the ambitious aim of addressing this situation in a new way. The SAI approach was to start with the goal of a radical reduction in noise as a primary design criterion and define, at a conceptual level, the type of aircraft and engine system that could achieve this goal.

Noise reduction targets have already been set by the aviation community. What SAI aims for is a bolder reduction, to the point where the noise of an aircraft would be imperceptible to the people living in the urban environment around airports. This challenging goal can only be achieved by an aircraft with highly integrated airframe and engines, and with the design and mode of operation together optimized for low noise emission.

From the outset of the project it was recognized that the skills and capabilities of a range of partners in academia, industry and government would be needed to succeed. Involving a wide range of partners in the work was, in fact, exactly what the Cambridge-MIT Institute (CMI) had in mind when it set up the initiative.

Baseline (conventional) wing slat and high-lift system mounted in a wind tunnel for noise assessment.

CMI is a U.K. government-supported joint venture between Cambridge University and Massachusetts Institute of Technology (MIT), a U.S. university with strong connections with industry and a track record in translating its research ideas into the marketplace. SAI is one of the CMI's "knowledge integration communities" — a research community that aims to find new ways in which academia and industry can work together and exchange knowledge to advance technology in areas such as aerospace. As well as academic researchers at Cambridge, MIT and other universities, the "silent aircraft" community comprises airframers, engine manufacturers, airport and airline operators, air traffic control (ATC) agencies, regulators and noise measurement specialists — a thriving, still growing, community of over 30 participants.

The idea behind the knowledge integration community is to foster linkages and two-way flows of information between young students, at one end, and senior colleagues from industry at the other; between manufacturers and airport noise lobby groups; and between academic researchers and their colleagues in commerce. Creating such a community, in which ideas, knowledge, suggestions and solutions can be exchanged among a range of participants faster than could otherwise be done, can help boost the competitiveness of the U.K. aerospace industry.

The SAI research work is divided into five major areas. Airframe and engines are obvious focal points, but it is in their effective integration — the third area of research — that some of the biggest advances can be made. The Operations Team is focused on ways to reduce noise by changing take-off and approach procedures. Finally, economics researchers are looking into both the regulatory scenarios under which the aircraft would meet an airline's business case, and the possible benefits to the U.K. economy, both nationally and regionally.

The current conceptual design features an airframe concept that is radically different from current aircraft. Modern jet engines are much quieter than their predecessors, and when throttled back on approach to landing, the airframe generates half of the noise heard on the ground. To create the desired noise reduction, researchers have adopted a design in which the wings blend seamlessly into the aircraft body in a configuration sometimes referred to as a "flying wing."

Such aircraft shapes have been examined in the past because they have good aerodynamic efficiency and reduced drag. SAI researchers plan to use the extensive surface area provided by this shape to shield listeners on the ground from much of the engine noise; by mounting the engines above the fuselage, much of the aircraft noise can be reflected upwards without compromising the overall efficiency of the aircraft. An initial computer-aided design (CAD) rendering of this conceptual aircraft, whose design continues to evolve, is shown in the adjacent illustration.

CAD rendering of a "silent" aircraft design features an airframe and engine configuration that is radically different from existing designs. A final conceptual design is expected to be ready for industry review in autumn 2006.

To reduce the amount of engine noise at take-off, the engine exhaust velocity must be decreased. The specific requirement to meet SAI's low-noise target is that the exit area for air leaving the engine needs to be nearly three times that of a conventional design. To achieve low noise at take-off while obtaining competitive fuel efficiency in cruise, the current design uses an exhaust nozzle that varies in area so different bypass ratios can be set near the ground and at cruise. The engines are also embedded within the airframe rather than in pods attached to the wing. This leads to less drag as well as increased propulsive efficiency. The longer inlet and exit ducts in this configuration also provide scope to further reduce engine noise by allowing additional acoustic liners to absorb the engine noise.

Embedding the engines within the airframe implies a high degree of airframe and engine integration. Engine airflow is now affected by the airframe; similarly, the embedded engines alter the flow around the aircraft and thus affect lift and drag. According to recent findings embedded engines could provide substantial performance benefits, but there remain several obstacles that must be overcome before this configuration becomes practical.

The conceptual design of the aircraft is being carried out using industry design tools whenever possible. Boeing has made available its multidisciplinary design optimization code, WingMOD, which helps identify the optimum aircraft planform subject to over 200 constraints around the aircraft mission. Similarly, Rolls-Royce allows the research team to use its design, performance and noise evaluation tools to examine ideas about potential engine designs. Further, industry partners have been a source of help and advice and provide ongoing in-depth reviews of emerging design concepts.

Current research is addressing some of the major sources of noise and is investigating ways to reduce it. A four-by-five foot wind tunnel has been equipped with an array of 100 microphones that pinpoints noise sources and separates them from the background noise of the tunnel. The undercarriage, a major source of noise in the approach configuration, is being studied in the wind tunnel to see if it can be made quieter. Even the surface roughness of the airframe is being examined to determine the effect on noise level.

The way aircraft are flown can have a substantial impact on the noise level on the ground. Noise reduction, for example, can be achieved by optimizing engine power settings throughout the climb for low noise, and, similarly, using low noise as a major criterion when choosing the speed and trajectory during approach.

Most sources of sound are directly related to the aircraft's speed, with noise diminishing as speed is reduced. One challenge is to design an aircraft that can fly very slowly on approach. High-lift devices now in use, such as wing leading-edge slats, are too noisy. Similarly, conventional aircraft use their flaps or extended undercarriage early in the approach to increase drag and slow down. Both flaps and landing gear, however, are significant sources of noise.

The accompanying photo (page 24) illustrates a conventional slat-wing configuration installed in a wind tunnel, a baseline reference for the noise reduction research. Through wind tunnel tests such

continued on page 37

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For more information about the Silent Aircraft Initiative, visit the SAI website (http://silentaircraft.org).

Ministerial Conference focuses on transport security

Declaration urges States to enforce existing security standards and to address vulnerabilities in all transport systems

Ministers who gathered for a conference on international transport security in Tokyo in mid-January were unanimous in their desire to send the world a strong message of their commitment to assure security in transportation through cooperation among countries. At the end of the two-day conference, which focused on enhancing security while maintaining smooth and efficient transportation systems, they declared their intention to intensify efforts to achieve more active and wider ranging international and domestic cooperation.

ICAO Council Dr. Assad Kotaite, a keynote speaker at the conference, emphasized that global efforts should be designed to create an impenetrable security net that covers all modes of transportation, individually and collectively.

"Our motivation must remain our solid conviction that one more act of unlawful interference, whatever form it takes, is one too many," the Council President informed participants.

The ministerial declaration included a joint statement on aviation security which included a call for measures to address vulnerabilities within the global civil aviation network as a "high collective priority."

While acknowledging that more stringent security measures have been applied since September 2001, the ministers observed that terrorists remain a serious threat, citing the example of the suicide bombing of two Russian airliners in 2004, and they stressed the need to promote international research and development to improve explosives detection technologies. They also encouraged States to register with the ICAO aviation security point-of-contact network so that they can maintain effective communication during situations of heightened threat or security-related emergencies.

Security measures must be compatible with the efficient flow of passengers and goods, through increased capacity building, the ministers added. Also stressed was the importance of promoting compatible security measures that reduce regulatory divergence.

Identified were eight principles on which international efforts to ensure aviation security should be based, the first of these being the implementation and enforcement of the standards and recommended practices (SARPs) contained in Annex 17 to the *Convention on International Civil Aviation* and other ICAO provisions relating to aviation security.

Ministers from 14 countries signed a Ministerial Declaration on transport security, including a statement on aviation security, during the conference held recently in Tokyo.

The conference also issued a ministerial statement on avian influenza in light of the fact that a disease pandemic has the same potential to disrupt transport systems as a security crisis. The ministers indicated that they would endeavour to minimize any negative impact on transport systems by an outbreak of avian flu or other infectious diseases.

ICAO Council President Dr. Assad Kotaite with Kazuo Kitagawa, the Minister of Land, Infrastructure and Transport of Japan.

The ministers called for the establishment of a new international working group to promote cooperation in ground transport; unlike the maritime and aviation modes of transport, which promote cooperation through the International Maritime Organization (IMO) and ICAO, there is no international framework for ground transport safety.

The entire declaration, including the statement on aviation security and its eight principles to guide international efforts, is posted at the conference's website (http://www.mlit.go.jp). It was approved by the ministers responsible for transport security in Australia, Canada, China, France, Germany, Indonesia, Italy, Japan, Malaysia, the Republic of Korea, the Russian Federation, Singapore, the United Kingdom, and the United States.

In his address, Dr. Kotaite reviewed developments in the field of aviation security since 2001, and outlined ICAO's role in assisting member States in enhancing security systems, specifically by achieving compliance with ICAO Annex 17 standards. The Council President focused on the long-term global strategy for aviation, including the critical need to assess new and emerging threats while continually monitoring and upgrading existing security processes. Another critical objective he cited was the expeditious clearance of passengers while maintaining the highest level of security. On this last point, Dr. Kotaite emphasized the importance of risk management using new technologies, and pointed to machine readable travel documents (MRTDs) and biometrics as essential elements in the global effort to facilitate air travel while preventing terrorism. Some 110 States currently use MRTDs, he observed.

Looking to the future, the Council President spoke of the need for new legal work. "The legal dimension of the security challenge will need close scrutiny," he said of apparent gaps

and inadequacies in the existing international aviation legal conventions (see article on this page).

"More study is needed with regard to potentially devastating attacks involving bacteriological, chemical or even nuclear substances, as well as electronic or computer-based attacks on air traffic control networks or aircraft," Dr. Kotaite explained. "The legal conventions which aim at the repression of suicide attacks against civil aviation will not be effective against the suicide perpetrators themselves. Serious penalties should therefore be imposed on those organizing, instigating, sponsoring or financing such terrorist acts and harbouring terrorists themselves."

Attended by over 200 participants, the conference featured individual sessions on maritime, aviation and land transport security. In addition to ICAO, representatives from the European Commission, the IMO and the World Customs Organization (WCO) also took part. The conference was chaired by the Minister of Land, Infrastructure and Transport of Japan.

Discussions with government leaders. While in Tokyo from 10 to 14 January, the Council President — accompanied by the ICAO Regional Director of the Asia and Pacific Office — discussed various aviation matters with the Minister of Land, Infrastructure and Transport of Japan; the Senior Vice-Minister for Foreign Affairs; the Director General, Global Issues Department at the Ministry of Foreign Affairs; the Director General of Civil Aviation; and the President of Japan Airlines. Among topics discussed with the Japanese authorities were the global safety conference to be held at ICAO headquarters this March to address recent safety concerns, the integration of the voluntarily funded activities of the ICAO aviation security plan of action into the organization's regular programme budget, and the ratification of certain international air law instruments.

While in Japan Dr. Kotaite also met with the ministers of transport of Australia and Singapore, the Minister of Civil Aviation of China, and the Assistant Secretary, U.S. Transportation Security Administration (TSA). □

Survey highlights need for new air law instrument

ICAO Contracting States have indicated that there is a need to amend the existing international air law instruments or alternatively to adopt a new instrument to cover the new and emerging threats to civil aviation, according to the results of a survey conducted by the organization recently.

Of 54 replies received from Contracting States — one reply was also received from an industry body, the International Federation of Air Line Pilots' Associations (IFALPA) — in early November 2005, 50 States representing 92.5 percent of total respondents indicated they would support creation of a new international legal instrument, either in the form of an amendment or a separate convention, to address the new and emerging security threats.

Among the new and emerging threats that have been identified by ICAO are the misuse of aircraft as weapons; suicide attacks in the air and on the ground; electronic attacks using radio transmitters or other means to jam or interfere with ground or airborne navigation or guidance control systems;

computer-based attacks which block or alter aeronautical communications; chemical and biological attacks against passengers; misuse of nuclear or other radioactive materials; and attacks on aircraft using a man-portable air defence system (MANPADS).

Based on the results of the survey, ICAO has decided to form a Secretariat study group to focus on the issue. The group is expected to meet for the first time in 2006. In the meantime, member States that have not yet responded to the questionnaire are being urged to do so by 31 March 2006. □

States urged to actively support growth of USOAP

ICAO will expand its team of seconded safety oversight experts as soon as possible because of the high volume of audit missions and related activities resulting from the expansion of the Universal Safety Oversight Audit Programme (USOAP). Member States have been invited to nominate three more experts, preferably before 30 March 2006, to join the five already on secondment to USOAP.

The additional experts will complement ICAO's own auditing staff and are needed for a period of two to three years in order to support the effective implementation of the comprehensive systems approach for audits. In place since January 2005, the new approach encompasses provisions in all safety-related annexes and not only those standards and recommended practices (SARPs) related to personnel licensing and the operation and airworthiness of aircraft — the focus of the programme during the first cycle of audits (1999-2004).

In a letter disseminated to member States in early December, ICAO indicated that unless the requirement for more experts can be met, the number of audits planned and other USOAP activities, including training course development and seminars and workshops, could be adversely affected. Seconded experts are required on a long-term basis because budget constraints prevent ICAO from recruiting more staff.

Under the new phase of the programme, USOAP requires staff with expertise in more than one specialty area. Candidates selected for secondment receive training in all matters related to the programme and the conduct of USOAP audits.

USOAP experts must have extensive work experience with a national civil aviation organization as an inspector or auditor. They must also have good knowledge of the *Convention on International Civil Aviation,* the adoption and implementation of ICAO SARPs, and related ICAO documentation and guidance material. Also required is a command of English and one of the other official languages of the organization (i.e. Arabic, Chinese, French, Russian or Spanish). Among desirable qualifications, USOAP experts should have extensive experience working in an aviation industry environment such as an airline, aviation training centre or approved maintenance organization. Also desired is certification as an ISO auditor and/or certification as an approved ICAO auditor in one of the technical areas covered by the programme.

USOAP came into being in January 1999 after ICAO was given a mandate to conduct regular, mandatory, systematic and harmonized safety audits of all Contracting States. □

Scheduled traffic tops two billion passengers in 2005

World airline traffic in 2005 grew by about 5.5 percent over 2004, according to preliminary figures analysed at year's end by ICAO. Tonne-kilometres performed on total scheduled services (i.e. domestic and international services combined) rose from 459,000 million in 2004 to about 485,500 million in 2005 (a tonne-kilometre is a combined measure of passenger, freight and mail traffic which also takes into account the distance flown).

Statistics supplied by ICAO's 189 Contracting States show an increase of 7.5 percent in passenger-kilometres performed on total scheduled services, while international passenger-kilometres performed rose by some 8.5 percent in comparison with 2004. The number of passengers carried on total scheduled services in 2005 exceeded two billion for the first time, up from more than 1.8 billion in 2004, the previous record.

Aircraft seating capacity also rose last year, but at a slightly slower pace than in the previous year, resulting in an average passenger load factor of almost 75 percent in both total traffic and in international services. This compares with 2004 average passenger load factors of 73 percent for total services and 74 percent on international routes.

Scheduled freight tonne-kilometres performed showed little change over 2004. Both total and international freight tonne-kilometres performed grew by about 1 percent, and therefore freight carried worldwide on scheduled services remained at about 38 million tonnes.

On a regional basis, the airlines of the Middle East continued to experience strong traffic growth, followed by those of Latin America and the Caribbean, and Africa. Growth for airlines in Asia/Pacific and Europe was similar to the world average, while airlines from North America showed increases in total freight traffic that were below the world average. □

ICAO to hold global symposium on air transport liberalization

ICAO will hold a two-day global symposium on air transport liberalization on 18-19 September 2006 in Dubai, United Arab Emirates. The meeting, hosted by the Department of Civil Aviation, Government of Dubai, will take place in the Dubai International Convention and Exhibition Centre.

The air transport symposium will be the first such global event organized by ICAO since the 2003 Worldwide Air Transport Conference. The purpose is to build on the outcome of the 2003 conference, which produced considerable guidance material as well as a policy framework for liberalization. The symposium will provide a forum for States to share their experiences in liberalization, exchange information and views on trends and issues, and learn about different policy options and approaches to liberalization.

While primarily organized for government policymakers, air service agreement negotiators and aviation regulators, the symposium will be open to the aviation industry and all others interested in air transport regulatory policy, among them financiers, consultants and academics. The programme covers topical and practical issues in international air transport regulation, which will be addressed by prominent speakers and panelists from a cross-section of States, regions and entities. Ample time is reserved for open discussion by delegates.

Participants will achieve a better understanding of various aspects of the liberalization process, including issues as seen from different perspectives. They will gain valuable insight into the pros and cons of various regulatory approaches that may be useful in developing a more coherent and balanced policy for the benefit of all stakeholders in international air transport. Detailed information about the symposium can be found at the ICAO website (www.icao.int/dubai2006).

The symposium provides an excellent opportunity for participants to meet not only their counterparts among delegates to the ICAO meeting, but also aviation industry executives attending the concurrent 12th World Route Development Forum (Routes). Routes is an annual gathering of airline route planners and airport representatives from around the world. Information about Routes may be found at its website (www.routesonline.com). □

Annex 17 amendment adopted by Council

An important amendment to Annex 17 of the Chicago Convention has been adopted by ICAO Council and will become applicable on 1 July 2006. The document contains provisions, including standards and recommended practices (SARPs), for aviation security.

Amendment 11 is intended to ensure that the measures in ICAO Annex 17 are commensurate with the level of threat faced by civil aviation. Proposed by the Aviation Security Panel following meetings it held in 2004 and 2005, the revisions are based on a review of Annex 17 provisions that focused on clarifying the wording of existing SARPs. The changes are expected to facilitate the common interpretation of SARPs by Contracting States as well as the ease of auditing compliance with SARPs under the ICAO Universal Security Audit Programme (USAP).

Contracting States are required to notify ICAO before 10 April 2006 if there is any part of the amendment of which they disapprove. States have also been requested to notify ICAO by 1 June 2006 of any differences that will exist between their national regulations or practices and the amended Annex 17, as well as the dates by which they anticipate achieving compliance with the amended annex. □

ICAO disseminates guidelines on managing PNR data

ICAO recently disseminated guidelines on passenger name record (PNR) data to its member States. The guidance material is intended for States that may require access to PNR data to supplement identification data received through an advance passenger information (API) system.

Completed with the assistance of a Secretariat study group, the guidelines seek to establish uniform measures for PNR data transfer and the subsequent handling of such data. They are intended to assist States in implementing a recommended practice that became effective on 11 July 2005, and that calls on Contracting States to ensure that their data requirements and the handling of such data conform with the ICAO guidelines. □

ICAO Council appointment

G. Miranda Aguirre (Chile)

Gonzalo Miranda Aguirre has been appointed Representative of Chile on the Council of ICAO. His appointment took effect on 3 October 2005.

Mr. Miranda is a graduate of the Institute of Political Sciences of the Universidad de Chile, Santiago, where he obtained a master of political sciences and a diploma in strategic management and decision making. He also holds a master of business administration from Chile's Institute for Executive Development.

Mr. Miranda began his career in 1958 when he joined the Chilean Air Force. Among his assignments over the years, he served as a flight instructor at the Chilean Air Force Academy and as the Commander of various Air Force units.

Ultimately reaching the rank of Air Force General, Mr. Miranda has served in a number of high-level posts over the course of his career. He was appointed Executive Director of the 1988 International Air and Space Fair which took place in Santiago. In the United Kingdom, he served as Mission Chief and Air Attaché to the Chilean Embassy in London. From 1994 to 1997, Mr. Miranda was the Director General of Civil Aviation of Chile's National Civil Aviation Administration. He served as Under Secretary in the Ministry of Defense for Police Affairs from 2000 to 2005, and was recently appointed Air Attaché to the Chilean Air Force Mission in Washington, D.C. □

DEPOSIT BY POLAND

Poland has formally become involved in the International COSPAS-SARSAT Programme as a user State with its deposit of a letter of notification during a brief ceremony at ICAO headquarters recently. Shown on the occasion are Roman Jankowiak, Poland's Senior Trade Commissioner in Montreal (left), and Denys Wibaux, Director of the ICAO Legal Bureau. The COSPAS-SARSAT system comprises two satellite constellations and associated ground stations that are used to locate the site of an emergency or accident.

ICAO Council appointment

Dr. N. Zaidi (India)

Dr. Nasim Zaidi has been appointed Representative of India on the Council of ICAO, and commenced his tenure on 21 November 2005.

A long-time civil servant, Dr. Zaidi served in increasingly responsible positions at both the state and federal levels. Most recently, he served for three years as Joint Secretary in the Ministry of Civil Aviation in the Government of India, a post that involved handling airport infrastructure matters and issues related to airspace management and aviation security.

Dr. Zaidi was active in setting up two "greenfield" airports at Hyderabad and Bangalore through public-private partnerships. He also has experience in developing gateway airports — specifically, New Delhi and Mumbai — through a restructuring process involving public-private partnership. He oversaw formulation of complex concession agreements for the above mentioned airports, as well as agreements involving government financial support, land leases, finances and, on the technical side, agreements concerning CNS/ATM infrastructure. Dr. Zaidi was also responsible for formulating draft legislation to establish an Airport Economic Regulatory Authority.

In the field of aviation security, Dr. Zaidi was involved in development of the relevant legal framework as well as a contingency plan for addressing aircraft hijackings and terrorism threats. In the operational and managerial spheres, he has served as a member of several committees involved with matters such as slot allocation, institutional restructuring and strengthening of CNS/ATM services.

Dr. Zaidi obtained a master's degree in public administration from Harvard University's Kennedy School of Government, and has a post-graduate diploma in business finance from the Indian Institute of Finance. He also holds a doctorate in biochemistry, and has published several papers in scientific and administrative journals. □

Fellowship training programme continues current focus

The ICAO-Singapore Developing Country Training Programme, which has been awarding fellowship training at the Singapore Aviation Academy (SAA) since 2001, is offering the same courses in 2006 that were made available in 2004-05 because of an overwhelming response to the course offerings. The current programme focuses on integrated safety management systems, safety oversight, civil aviation management, and CNS/ATM developments.

Various training sessions, ranging from five days to three weeks in duration, are available from mid-April to late August 2006. The fellowships are intended for participants nominated by their respective governments. For more details, consult the SAA website (www.saa.com.sg/fellowships).

Since its inception, the joint programme has provided 162 fellowships to participants from more than 59 ICAO member States. It is sponsored by the Singaporean Government and administered by ICAO's Technical Cooperation Bureau. □

Regional air navigation system planners meet in Santiago

An air navigation planning and implementation meeting held recently in Santiago, Chile focused on various technical and operational issues facing the Latin American and Caribbean regions. The participants discussed, among other things, the establishment of a maximum two-year period for eliminating urgent deficiencies. It was also proposed that where this timeframe cannot be met, an alternate facility or procedure would be designated in the Air Navigation Plan as a last resort, or alternatively a risk analysis concerning that deficiency would be undertaken where the choice of an alternate is not feasible. The proposal to implement last-resort action takes effect at the end of 2007.

Among other developments at the 13th meeting of the Caribbean/South American Regional Planning and Implementation Group (GREPECAS) were:

- the development of a new set of traffic forecasts for six major route groups and for the top 25 city pairs in each of the six groups, and airport movement forecasts and peak-period analyses;
- agreement on 1 March 2006 as the target date for implementing national programmes for aviation security, quality control in aviation security, and cargo security;
- the development of a regional strategy for implementing air-ground data links and deployment of the aeronautical telecommunication network (ATN);
- agreement on target dates for regional implementation of automatic dependent surveillance-contract (ADS-C) and automatic dependent surveillance-broadcast (ADS-B) technologies; and
- the adoption of an action plan for implementing air traffic flow management in the CAR/SAM regions.

The meeting, held from 14 to 18 November 2005, was attended by 90 participants from 17 GREPECAS member States, five other ICAO Contracting States and seven international organizations. □

States reminded of ACAS recommendations

ICAO recently disseminated a letter to member States drawing attention to recommendations concerning the airborne collision avoidance system (ACAS). The recommendations, arising from a meeting of the Surveillance and Conflict Resolution Systems Panel (SCRSP) held in November 2004, reflect a continuing need to confirm the safety benefits of ACAS and to detect and correct, if possible, potential problems arising from traffic density increases, airspace structure evolution and changes to air traffic operations.

In light of the meeting's recommendation, which was approved by the ICAO Air Navigation Commission in mid-2005, ICAO has requested that Contracting States continue to monitor ACAS performance using the guidelines contained in the draft ACAS Manual. (While not yet available in print form, the manual may be accessed at the ICAO secure website.)

ICAO has also requested that States in a position to do so take steps to maintain their expertise in ACAS design. □

Commemorative day calls for "greening of aviation"

International Civil Aviation Day, celebrated annually since 1994 to mark the creation of ICAO on 7 December 1944, focused in 2005 on an environmental theme. In a call for the "greening of aviation," ICAO highlighted efforts to maximize civil aviation's compatibility with the quality of the environment.

Commenting on ICAO's role in the global effort towards a more sustainable aviation sector, ICAO Council President Dr. Assad Kotaite pointed to a range of standards, policies and guidance material developed by the organization that have contributed to more efficient aircraft operations, thus reducing fuel consumption and consequent air pollution. He nevertheless emphasized the need for even more concerted efforts on the environmental front, pointing out that the remarkable growth of the air transport sector is outpacing environmental achievements.

Dr. Kotaite underscored ICAO's pivotal role in addressing aviation's impact on the environment. The entry into force of the Kyoto Protocol to the *United Nations Framework Convention on Climate Change* in February 2005, he pointed out, gave new impetus to ICAO's efforts to address greenhouse gas emissions and reinforced its leadership role in aviation and climate change.

In his message to mark the event, ICAO Secretary General Dr. Taïeb Chérif outlined how the organization had recently strengthened its commitment to environmental protection. Protection of the environment had received high priority when the organization adopted its six strategic objectives last year, he recalled. Moreover, he added, ICAO's new business plan has stressed the organization's status as the leading international organization pursuing unified and coordinated measures for reducing civil aviation's impact on the environment.

As it moves ahead, Dr. Chérif added, "ICAO builds on a strong record of setting standards for the certification of aircraft noise and engine emissions, and developing policies to minimize the effect of aircraft operations on the environment."

Emphasizing the importance of reliable information to policy development, Dr. Chérif announced that ICAO will publish its first Environment Report in 2007. The authoritative report will serve as a valuable reference resource at ICAO's triennial sessions of the Assembly. The document will also be of value to the aviation community, relevant UN bodies, specific non-governmental organizations, universities and the news media. □

AVIATION PROFILE

Bangladesh

Aircraft on civil register	35
Active pilot licences	334
Commercial air transport operators	20
Approved maintenance organizations	7
Aviation training establishments	4
Aircraft manufacturing organizations	0
Aircraft type certificates issued	0
International airports	2

(data from November 2004)

ANC appointment

Adrian Sayce

Adrian G. Sayce, of the United Kingdom, has been appointed President of the ICAO Air Navigation Commission (ANC) for a period of one year commencing 1 January 2006. Mr. Sayce has been a member of the ANC since 2002.

Prior to his appointment as ANC President, Mr. Sayce served as Chairman of the ANC Working Group on Procedural Matters, and as Rapporteur for two ANC ad hoc working groups concerned respectively with cockpit security (2004) and consultation with industry (2005).

Trained both in aeronautical engineering and law, Mr. Sayce commenced his career in aviation in 1968, joining the U.K. Civil Aviation Authority in 1983 as a Design Requirements Surveyor. He was appointed an Aircraft Systems Design Surveyor in 1985, and served as Senior Research Project Manager from 1989 to 1994. Before his appointment as Air Navigation Commissioner and Alternate Representative of the United Kingdom on the Council of ICAO, he served as Head, Strategic Safety and Analysis and Deputy Head of Policy in the U.K. CAA's Safety Regulation Group.

Mr. Sayce holds a degree in law from the Nottingham Law School, of the U.K. He obtained a master of science degree in air transport engineering from Cranfield University, and was named a chartered engineer by the Royal Aeronautical Society, where he remains a Fellow. Mr. Sayce is soon to complete a master of law programme at the University of Wales, specializing in environmental law.

The Air Navigation Commission, the technical arm of the ICAO Council, is comprised of 19 experts nominated by Contracting States and appointed by the Council. The body provides advice to the Council on any issue related to air navigation. □

Volcano watch specialists meet in Lima

The second meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG) was held in Lima, Peru in late September 2005. The meeting at the ICAO South American Office was attended by 18 experts from eight volcanic ash advisory centre (VAAC) provider States as well as the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO), International Air Transport Association (IATA), International Federation of Air Line Pilots' Associations (IFALPA), International Union of Geodesy and Geophysics (IUGG) and the World Meteorological Organization (WMO).

The group reviewed IAVW-related provisions in both ICAO Annex 3 and in regional air navigation plans. It also addressed a number of issues related to the operation, implementation and future of the IAVW Operations Group, in particular the evaluation of new techniques for real-time detection and identification of volcanic eruptions. Also discussed was the development of eruption source parameters for improving forecasts of volcanic ash movement in the atmosphere. □

Air transport study

continued from page 7

most prevalent element in transnational airline alliance arrangements and can take a variety of forms. Although it is usually treated as a commercial arrangement, the complexity of some codesharing arrangements can make it difficult for safety and security authorities to determine their level of involvement vis-à-vis other authorities. In these circumstances, the question of responsibility and accountability for safety and security can lead to uncertainty. Also, since such arrangements allow an operator to use the name or assume the public face of another carrier (e.g. in the case of franchising), the need to safeguard reputation has led to some regulatory action. Some States, for instance, require foreign airlines that have codesharing arrangements with their national airlines to demonstrate a comparable level of safety. This may raise still other questions: should all States whose airlines are involved in a codesharing operation be involved in such safety oversight and, if so, to what extent?

Another concern arising from codesharing relates to the security implications caused by the potential transfer of a threat against one airline to its partner in a codesharing arrangement, and any subsequent additional security measures imposed by the appropriate authorities. Since technical and operational regulations may vary considerably from one partner airline (and its State) to another, this raises the question as to how to handle accountability and responsibility for safety and security among the partner airlines and their States.

Cross-border airline merger/acquisition. Where mergers or acquisitions are permitted across national boundaries, this can lead to such companies having operations or places of business in different States, or operating mainly outside the State in which their registered offices and/or owners are located. This situation could raise questions about the attribution of regulatory oversight responsibility among the States concerned when, for instance, the merged airline has two principal places of business, or a decision must be made about how to apply standards when differences in their implementation exist in the countries concerned.

Outsourcing activities. Airlines may outsource activities that directly affect aircraft operation. Examples include ground handling performed by contractors, repair or maintenance work performed in foreign countries, and the contracting out of certain flight operations or crew administration to another company. In each of these areas, multinational industries have emerged to provide such services. Some States have also encountered the situation where an AOC applicant has only a corporate skeleton, with most of its proposed operational activities to be performed by foreign companies. This phenomenon, sometimes referred to as a "virtual airline," could present challenges for the licensing and safety oversight authorities from both the State issuing the AOC and the State of the outsourced activity. The onus is on the States concerned to ensure that such a practice or entity properly meets the safety and security requirements.

While some of the above situations already make it difficult to identify or attribute individual responsibility for safety and/or security compliance and oversight, it could become more problematic when dealing with a complex situation combining many of the features described above. As the industry evolves and liberalization spreads, States face an increasing number of such situations. The objective, regardless of the form of regulatory or commercial arrangement, is to ensure that it is always clear which State or delegated authority is responsible for safety and security oversight for any given aircraft operation.

Along with the trends of liberalization and globalization as well as broader regional economic integration, many States have taken a regional approach as an effective means in pursuing regulatory change in international air transport. In some regions, States have taken steps to strengthen safety regulation, including the delegation of certain regulatory functions to a regional body. While these regional arrangements have many advantages and can bring benefits, chiefly economies of scale and the promotion of uniformity within the region, they vary a great deal in the extent to which they delegate the execution of national responsibilities. This situation could raise the issue of harmonization on a broader scale. In addition, there is clearly a need for transparency of such regional arrangements so that all parties affected, especially third parties, know exactly what functions have been delegated to the regional body and what remains with the State. (For more on regional safety oversight organizations, see "Regional safety oversight bodies deliver economies of scale and greater uniformity," page 9.)

Conclusions. The global aviation system continues to be fundamentally safe. While existing ICAO provisions and guidance material on overseeing aviation safety and security are generally adequate to address various situations, the SARPs and guidance material need to adapt to the evolution of business practices. In particular, States should be strongly encouraged to use Article 83 *bis*, a useful means of addressing complex situations involving aircraft transferred abroad. More attention should also be given to improving the enforcement and implementation of relevant SARPs and guidance material, and to efforts to address the identified safety and security oversight shortfalls on a worldwide basis.

Safety and security must remain of paramount importance in the operation and development of international air transport and should at no time be compromised by economic considerations. All parties — governments, air operators and service providers — must have a clear understanding of their respective responsibilities for safety and security compliance and oversight. States must accept their primary responsibility for ensuring regulatory oversight of safety and security, irrespective of any change in economic regulatory arrangements.

As the findings of the recent study indicate, ICAO needs to continue closely monitoring industry and regulatory developments. Moreover, there is a need for appropriate action to ensure that the global regulatory system for aviation safety and security continues to work effectively in dealing with the evolution of the air transport industry and the increasingly complex, often multinational business practices.

ICAO, for its part, has already taken action to further improve the implementation of SARPs and guidance material, and to assist member States in resolving safety- and security-related deficiencies. One major development is the recent decision to convene a two-day global conference on the subject of aviation safety. The gathering of the world's directors general of civil aviation at ICAO headquarters in March 2006 will focus on shaping a renewed global strategy for aviation safety. Given the thrust of this meeting, it can be expected that transparency and the sharing of information will be among the major issues to be discussed. □

Economic liberalization

continued from page 15

in further liberalization. And he is enthused about its anticipated impact.

A U.S.-EU agreement "can be expected to enhance the quality of competition across the Atlantic in a dramatic way. It would bring nearly 750 million people and many of the world's great airlines together under a single liberalized regime. It would take liberalization to the next level, linking two huge markets and allowing airlines from both sides of the Atlantic unprecedented flexibility in how they build, manage, and expand their operations. It would give us the momentum to do even more in follow-on U.S.-EU accords. And it would instantly become a new multilateral template for aviation liberalization elsewhere in the world. A U.S.-EU agreement would be, quite simply, the most important thing we could do to enhance the contribution that air transport makes to all our economies."

The advent of a new and more relevant model for the conduct of international aviation relations "is an opportunity we should not squander," Mr. Shane asserted. □

Regional safety oversight

continued from page 12

RASOS to a community-wide organization. The FAA is assisting CARICOM in the development of an agreement to create CASSOS under the Chaguaramas Treaty. It is in the final stages of negotiation. The CARICOM member States are Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago (associates are Anguilla, Bermuda, the British Virgin Islands, Cayman Islands and Turks and Caicos Islands).

Agency on Aeronautical Safety for Central America (ACSA). ACSA is known in English by its Spanish acronym, which stands for Agencia Centroamericana de Seguridad Aeronáutica. It was established in 1999 by the executive council of the Central American Corporation for Air Navigation Services, also known in English by its Spanish acronym, COCESNA (Corporación Centroamericana de Servicios de Navegación Aérea). ACSA was formed to harmonize and standardize safety oversight in the region and is based in Costa Rica. Legislation adopted by its member States allows delegation of the exercise of safety oversight authority, but so far ACSA only provides technical assistance to member States. With the assistance of the FAA and the European JAA it has drafted civil aviation regulations and guidance material, as well as developed training programmes, to be adopted by each CAA. ACSA member States are Belize, Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

Regional System for Cooperation on Operational Safety Oversight (SRVSOP). SRVSOP is an arm of the Latin American Civil Aviation Commission (LACAC). Known in English by its Spanish initials (which stand for Sistema Regional de Cooperación para la Vigilancia de la Seguridad Operacional), SRVSOP was established in response to the IASA and USOAP audit programmes by a 1998 memorandum between LACAC and ICAO. Eleven of LACAC's 21 member States participate. Airbus, Embraer, and the FAA are observers. SRVSOP is collocated with the ICAO South American Office in Lima, Peru. SRVSOP's purpose is to help member States establish safety oversight systems that comply with Annexes 1, 6, and 8. It is currently developing Latin American aviation regulations, or LARs. LAR 145, dealing with repair stations, was recently approved with a goal of harmonizing national rules within five years. SRVSOP also promotes uniform guidance and procedures and facilitates technical assistance to participating States. The FAA supports its regional oversight efforts and provides training. Membership includes Argentina, Bolivia, Brazil, Chile, Cuba, Ecuador, Panama, Paraguay, Peru, Uruguay, and Venezuela.

European Aviation Safety Agency (EASA). EASA was established in 2002 by a regulation of the European Parliament and the Council of the European Union (EU). In September 2003, it took over EU member State responsibilities for aircraft type certification as well as the environmental certification of aircraft and other aeronautical products. Headquartered in Cologne, Germany, EASA is an independent executive body with a legal personality and autonomy in legal, administrative and financial matters. It adopts certification specifications and guidance material, conducts technical inspections, and issues certificates. The EU has not granted EASA the authority to issue legislation or regulations, but the agency assists the European Commission in developing aeronautical legislation. During the current transitional period most of the work is being done by personnel of member State national authorities, but on behalf of EASA. EASA plans gradually to assume further responsibilities from member States, including air carrier operations, aircrew licensing, air traffic control (ATC) and airports. It will eventually issue AOCs, but will leave enforcement with the national authorities. On behalf of the European Commission, EASA has developed bilateral agreements on aircraft certification with Canada and the Interstate Aviation Committee, and is negotiating agreements with the FAA. EASA membership comprises the 25 States of the European Union.

Joint Aviation Authorities (JAA). The JAA is an associated body of the European Civil Aviation Conference (ECAC), with headquarters in Hoofdorp, Netherlands. The JAA began as an informal coordination effort to develop a model European aviation regulatory code, the Joint Aviation Regulations (JARs). Adopted by the European Union in 1999, the JARs currently cover airworthiness, operations and flight crew licensing, and has been used as a model for safety oversight regulation in some countries outside Europe. The JAA has worked intensively to harmonize its regulatory approach with the FAA's Federal Aviation Regulations (FARs). JAA membership results from signing the "JAA Arrangements," a document adopted in Cyprus in 1990. The JAA's future, which depends to a great extent on the evolution of EASA, is uncertain. JAA membership consists of the ECAC member States; in other words, the 25 EU member States plus Armenia, Albania, Bulgaria, Croatia, Iceland, The former Yugoslav Republic of Macedonia, Monaco, Norway, Republic of Moldova, Romania, Serbia and Montenegro, Switzerland, Turkey, and Ukraine.

The Interstate Aviation Committee (IAC). Shortly after the dissolution of the Soviet Union, the IAC was formed through an intergovernmental agreement on civil aviation and airspace use adopted in 1991. The IAC performs the airworthiness and accident investigation functions of the member States and acts as a

consultant in other areas. As the aircraft type and production certification authority for IAC States, it has issued a full range of airworthiness regulations. In 2004, the IAC entered into a working arrangement on airworthiness with EASA. The IAC also coordinates ATC responsibilities. IAC membership includes Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, the Russian Federation, Tajikistan, Turkmenistan, Uzbekistan, and Ukraine.

Financial considerations. Safety oversight requires a sophisticated systems approach, with qualified experts in a variety of aviation disciplines. To attract competent technical staff, CAAs have to offer pay that is comparable to industry salaries and which may well exceed typical civil servant salaries. Moreover, there is a natural tendency to allocate funds for visible infrastructure projects such as runways and passenger terminals instead of on regulations, guidance publications, training programmes and safety surveillance systems. Sufficient funding can be hard to obtain in part because safety oversight activities are largely invisible.

The difficulty of marshalling sufficient resources for safety oversight is compounded in small and developing countries. Competing uses for scarce resources may be more compelling, and the disparity in pay between government and industry may be greater. Even the basic arithmetic may not add up. As cited by ICAO in an article published in ICAO Journal in December 1997, the 100 smallest aviation States account collectively for at most 1 percent of global aviation activity, but require perhaps 400 qualified inspectors to carry out effective oversight (not to mention the proper safety oversight infrastructure). A small aviation State thus might expend as much as 10 times the resources for a given level of aviation activity as a large State.

A regional organization can help by lowering costs, but it does not necessarily help in developing the political will to implement proper safety oversight. States and regional organizations simply have to recognize that safety oversight is an essential overhead. It is especially important in countries where aviation is an engine of development, considering the critical importance of maintaining the confidence of the travelling public.

Several different means are used to generate funding for civil aviation authorities. Among these are general tax revenues, a portion of the charges levied by airports and air navigation services (ANS) providers, and sometimes airline ticket taxes as well as exit or entry taxes levied on international passengers. According to recently revised ICAO guidance material, only safety and economic oversight costs that are directly related to service provision and imposed on providers may be included in the cost basis for airport and ANS charges. The established international policy on charges and taxes on international civil aviation is found in Article 15 of the Chicago Convention, as well as ICAO's *Policies on Charges for Airports and Air Navigation Services* (Document 9082) and *Policies on Taxation in the Field of International Air Transport* (Document 8632), which are available free of charge at the ICAO website.

Sources of effective funding are all the more essential in designing an effective RSOO. Grants and assistance from third parties may be crucial during the development of the RSOO, but adequate funding for normal operations must be sustainable over the long haul, with adequate support from member States.

Prospects for growth. The emergence of the FAA and ICAO audit programmes, as well as several RSOOs and ICAO's renewed emphasis on safety, have resulted in impressive improvements in oversight capability around the globe. Even so, about 30 percent of countries subject to IASA assessments still do not fully meet international standards, and several European countries have established so-called "blacklists" of non-compliant air carriers after a series of recent accidents. As this brief survey suggests, there is potential for further development of RSOOs, with much more to be gained in both economy and uniformity.

Assuming the work begun by the existing regional organizations brings satisfactory results, member States should consider orderly expansion of the areas of safety oversight entrusted to their RSOO. At the same time, however, they should consider granting RSOOs a fuller delegation of the execution of safety oversight. More can be done to encourage regional safety cooperation. ICAO, industrialized countries, the more prosperous developing countries, industry and financial institutions can all play an important role in this respect.

Regional cooperation is highly desirable, and more cooperation is better than less. Maximum benefits accrue when the delegation of the execution of safety oversight responsibilities reaches its maximum breadth and depth, provided adequate safeguards are in place. The safeguards must ensure accountability to the member States, which retain their rights and responsibilities under the Chicago Convention, and must ensure equitable enjoyment of the benefits. □

Aviation security

continued from page 17

To ensure the efficient delivery of its legal advisory services in criminal law matters, UNODC has developed a variety of technical assistance tools such as manuals and guides. These tools assist TPB experts in the training of judges and prosecutors. Among other things, the tools include a legislative guide to the universal instruments; a guide for the legislative incorporation of the provisions of the universal instruments; a counter-terrorism legislative database on the anti-terrorism legislation in 140 States; manuals on extradition and mutual legal assistance; and relevant computer software.

Cooperation with other entities. In order to ensure an integrated and effective response to terrorism, TPB has been building partnerships with other entities, both internal and external to the UN system, that are involved in the prevention and suppression of terrorism. For example, TPB has been working closely with several UN departments, programmes and funds, specialized agencies and with other international organizations. It has also cooperated with regional, sub-regional and non-governmental organizations and institutes.

Cooperation with other entities has included joint technical projects, contributions to reports, participation in meetings and briefings, mutual technical support, and sharing of information, including lessons learned. One of TPB's goals is to expand its partnerships to ensure that requests made by States for technical assistance receive an efficient response. Such cooperation has not only mobilized additional funding, but has resulted in a larger audience, increased attention and additional expertise. It has helped avoid duplication of efforts and resources, and has maximized impact and cost effectiveness.

Since ICAO and TPB offer their respective expertise in aviation security and criminal law to assist States in implementing the provisions of aviation security treaties, they form ideal partners within the UN system.

Although civil aviation is not directly related to the TPB's work, the provision of special legal advisory services to help States ratify outstanding aviation security treaties and incorporate security provisions into domestic laws is one of its main concerns. This work is facilitated by a widespread presence in the field. TPB has experts — mostly working part-time — in the Middle East and North Africa, West Africa, Latin and Central America, the Commonwealth of Independent States and Central Asia, as well as in South-east Asia and the Pacific. TPB's work, in addition, is supported by UNODC's 21 field offices as well as ICAO regional offices in Mexico City, Dakar, Cairo and Bangkok, where there are stationed regional officers who specialize in aviation security matters.

While TPB provides legal advisory services in criminal law matters, ICAO programmes help States to implement the security-related aspects of the aviation security treaties as well as the Annex 17 standards. In order to assess the implementation of these international standards, ICAO has been conducting audits under its Universal Security Audit Programme (USAP) since 2002. As of 30 November, 104 States had been audited by ICAO audit teams, and the first round of audits of all 189 ICAO Contracting States should be completed by the end of 2007. In addition to helping States improve their aviation security systems by identifying deficiencies and developing projects to rectify shortcomings, the security audits are expected to provide useful feedback concerning Annex 17 provisions.

As noted above, UNODC and ICAO have conducted various joint activities. The two organizations, for example, made joint presentations at aviation security and regional assistance workshops and seminars in Kyiv and Tunis in 2004, and in Marrakech in 2005. As a further step to increase cooperation, UNODC and CTED briefed the ICAO Council on their activities in November 2005. Under discussion are possible future joint technical cooperation activities and the sharing of information and technical assistance tools by UNODC and ICAO.

Although all UN member States are legally bound to implement effective counter-terrorism measures, many governments do not have the resources or the capacity to fulfill their obligations. Domestic weaknesses such as lack of legislation, ineffective border control or poor financial oversight can be exploited by terrorists, as can the lack of a mechanism for effective international cooperation. It is critical therefore to increase technical assistance to States that are unable to strengthen their ability to deal more effectively with terrorist threats.

Through its legal advisory services and training programmes for criminal justice officials, UNODC has contributed significantly to improvements. At the same time, ICAO has been helping States comply with international security standards.

A strong legal framework helps to ensure that terrorists will have neither a safe haven nor the resources and means to commit terrorist acts. This legal solution, as well as efforts to provide States with the capacity to prevent and suppress acts of unlawful interference with civil aviation, are important elements of any comprehensive counter-terrorism strategy. In this respect, the work carried out by TPB and ICAO has helped to enhance global aviation security and suppress terrorism.

While much progress has been made in strengthening the legal aviation security regime, widespread ratification of the universal instruments, and especially the implementation of the aviation security treaties, remains a distant goal. This is why increased cooperation between ICAO and the UNODC's TPB is vital in the fight against terrorism. □

LOSA Programme

continued from page 20

400 LOSA observations in 2005 is estimated at U.S. $63,000.

The cost and effort of implementing PROL is justified if only because the initiative will allow Varig to manage safety in a proactive manner through a detailed knowledge of all aspects of its operations. This approach inspires confidence among employees, and by successfully enhancing safety, can have a similar effect on the airline's customers.

Importantly, PROL gives pilots the opportunity to actively participate in a programme that will almost certainly improve their operating environment. Another advantage stems from the cost of insurance, which is expected to decline as a result of LOSA implementation. Varig has already briefed insurance companies on the implementation of the programme, and is in the process of renegotiating contracts with insurers following their positive written feedback. Like the 30 airlines worldwide that have so far embraced LOSA, insurers recognize the value of monitoring routine operations in a manner that promotes safety change. □

Aircraft noise research

continued from page 25

as this and computational modelling, SAI researchers are investigating ways of obtaining high lift and drag on approach while generating less noise. Various mechanisms are being examined including suction, novel ways to use the engine as an air-brake, and even vectored thrust, which exploits the low speed engine exhaust. The impact of these features on aircraft noise emission, aircraft controllability and fuel efficiency is being assessed, and eventually the best design options will be refined to yield the silent aircraft and the ideal approach trajectory.

A key feature of the project is the substantive collaboration between industry and academia, made possible because university researchers and their industrial partners have found new ways of working together. In addition to having each student develop ideas and technology concepts that enable them to earn a university degree, the results of the research need to be integrated into a workable design concept. Researchers are thus learning to work as part of an integrated product team, with weekly videoconferences and even more regular e-mail and telephone contact.

Members of the team have formed task forces to address specific design questions at crucial stages of the project, involving aspects such as the aircraft design range and engine configuration. These are short and intense activities, drawing on members from all research areas, and frequently involve an exchange of personnel.

There are biannual formal meetings of all the partners in the research initiative, but interaction between some partners happens almost on a daily basis. One innovation is the "briefing room," an informal meeting of about an hour where industry experts are quizzed about their work. The time limit keeps the discussion focused on relevant design issues. On several different levels, the Silent Aircraft Initiative has been an instructive and useful experiment in academic-industry interaction.

Another aspect of SAI is its appeal to undergraduates. The project to define a "silent" aircraft has sparked student enthusiasm for aviation and aerospace engineering. Among evidence of this was the strong response to a notice posted last summer at Cambridge University's Engineering Department. Undergraduates were invited to get involved in some of the engineering challenges inherent in designing an aircraft that is radically quieter than conventional aeroplanes; the turnout for the information meeting far exceeded expectations, with an overflow crowd that filled the department's large central courtyard, forcing organizers to shift the meeting from an office to a large lecture theatre. The SAI project has been equally popular with industrial trainees who have worked on secondment with the university researchers.

Work is in progress on further iterations in the aircraft configuration and operational aspects, together with improved fidelity noise estimates. The final version of the conceptual design will be ready in September 2006, at which point industry will undertake an in-depth review. It should be emphasized, however, that even if all research results are positive, it could take another 20 years or more to turn today's concept into a commercial aircraft. In the meantime, it is possible — and indeed part of the project strategy — for some quiet technologies or procedures currently being developed by the researchers to find earlier application.

In the nearer term, the Operations Team is developing an advanced form of a continuous descent approach (CDA) that could allow today's aircraft to gain immediate benefits. SAI researchers hope to test out these improved approaches in trials at Nottingham East Midlands Airport next year. The experiment requires the collaboration of many of the project's industrial partners, among them the U.K. Civil Aviation Authority, U.K. National Air Traffic Services, and air carriers such as DHL, easyJet and Thomsonfly. For this research community, early success in demonstrating enhanced CDA benefits would provide strong support indeed for a new approach to a complex and difficult engineering problem. □

Safety initiative

continued from page 20

For the LOSA process to proceed productively, organizational culture must be supportive. It is essential that the voluntary participation of pilots be respected, and that a non-punitive policy be followed: unless pilots are confident that an observer on the flight deck will bring no repercussions, their behaviour may not mirror operational reality. The importance of trust, therefore, cannot be overstated.

The signing of a LOSA protocol served to demonstrate to all those involved in the programme that transparency is paramount, and reflected a commitment to a process that would lead to safety improvements and a safer operating environment.

The SNA encourages pilots to support PROL. The LOSA process requires a collaborative approach, giving pilots an important opportunity to participate in a worthwhile safety initiative. □

IN THE SPOTLIGHT...

DEPOSIT BY PAKISTAN
Pakistan recently deposited an instrument of ratification of the *Protocol relating to an amendment of Article 50(a) of the Convention on International Civil Aviation* (1990) and an instrument of accession to the *Protocol for the amendment of the 1956 Agreement on the Joint Financing of Certain Air Navigation Services in Iceland* (1982). Shown on the occasion are (l-r): Saif Ullah Chattha, Consul General of Pakistan in Montreal; Shahid Malik, High Commissioner of Pakistan; ICAO Secretary General Dr. Taïeb Chérif; Mokhtar Ahmed Awan, Representative of Pakistan on the Council of ICAO; and ICAO Legal Bureau Director Denys Wibaux.

MIDDLE EAST OFFICE
During his stay in Cairo, Egypt in September 2005, ICAO Council President Dr. Assad Kotaite visited the ICAO Middle East Office, where he addressed the staff on ICAO's recently adopted unified strategy to resolve safety-related deficiencies, as well as on the current budgetary constraints facing the organization.

AIRPORT SECURITY SEMINAR
A seminar on airport security matters was held in Santa Cruz, Bolivia from 14 to 18 November 2005. Conducted by ICAO's Technical Cooperation Bureau, the seminar was co-sponsored by the Aeropuertos Españoles y Navegación Aérea (AENA), of Spain, and the Spanish Agency of International Cooperation (AECI). Fifty-eight participants from 15 States attended presentations on security, facilitation and training given by experts from Bolivia, Peru, Uruguay, Spain and ICAO.

REGIONAL WORKSHOPS
Regional workshops on airport and route facility management were held in Port of Spain and in Cairo during October and November 2005, respectively. The workshops assisted member States in dealing with economic, organizational and other managerial issues related to airports and air navigation services (ANS), and provided the participants with an opportunity to exchange views and information. Special attention was given to the revised ICAO policy and guidance in the field of airport and ANS economics and management, as well as new ideas related to the performance of the air navigation system. Pictured is the workshop in Port of Spain last October, which attracted 39 participants from eight States in the region; the Cairo workshop was attended by 46 participants from 16 States.

SAFETY ROADMAP

The *Global Aviation Safety Roadmap*, a strategic action plan for future aviation safety, was formally presented to ICAO on 16 December 2005. Developed by the Airports Council International (ACI), Airbus, Boeing, the Civil Air Navigation Services Organisation (CANSO), the Flight Safety Foundation (FSF), the International Air Transport Association (IATA) and the International Federation of Air Line Pilots' Associations (IFALPA), the action plan is currently under review by the ICAO Air Navigation Commission and will likely be tabled at a conference of the world's directors general of civil aviation (DGCAs) in March. The roadmap covers the 2005-2010 time frame, and was developed by industry with the primary objective of providing a common frame of reference for all stakeholders including States, regulators, airline operators, airports, aircraft manufacturers, pilot associations, safety organizations and air traffic service providers. Pictured on the occasion are (l-r): Paul Lamy, Chief of the ICAO Flight Safety Section; William Voss, Director of the ICAO Air Navigation Bureau; Mike Comber, Director, ICAO Relations at IATA; ICAO Council President Dr. Assad Kotaite; David Mawdsley, Director Safety at IATA; Adrian Sayce, President of the ICAO Air Navigation Commission for 2006; and Libin Wen, Second Vice-President of the ICAO Air Navigation Commission.

DEPOSIT BY THE RUSSIAN FEDERATION

The Russian Federation has deposited an instrument of ratification of four Protocols of amendment to the Chicago Convention relating to Article 56 of 1989 (increasing membership of the ICAO Air Navigation Commission to 19 members); Article 50(a) of 1990 (increasing membership of the ICAO Council to 36 members); the Final Paragraph of 1995 (referring to the authentic Arabic text of the Chicago Convention); and the Final Paragraph of 1998 (referring to the authentic Chinese text of the Convention). Shown at the brief ceremony at ICAO headquarters are Igor M. Lysenko, Representative of the Russian Federation on the Council of ICAO (at left), and ICAO Secretary General Dr. Taïeb Chérif.

DEPOSIT BY BANGLADESH

Bangladesh deposited an instrument of accession to the *Convention on the Marking of Plastic Explosives for the Purpose of Detection* during a brief ceremony at ICAO headquarters recently. Shown on that occasion are (l-r): Rafiq Ahmed Khan, High Commissioner for Bangladesh (Ottawa); Dr. Taïeb Chérif, ICAO Secretary General; and Denys Wibaux, Director of the ICAO Legal Bureau.

TRAFFIC FORECASTERS MEET

The ICAO Caribbean and South American Traffic Forecasting Group (CAR/SAM TFG), established in 1996, held its sixth meeting at the ICAO South American Office in Lima, Peru in September 2005. The CAR/SAM TFG holds its meetings periodically with the objective of assisting regional air navigation system planners through the development of aircraft movement forecasts and peak-period analyses. The forecasts produced during the recent meeting were presented to the 13th meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS) in November 2005.

VOLCANO WATCH

The International Airways Volcano Watch Operations Group met at the ICAO South American Office at the end of September 2005 to review IAVW-related provisions in both ICAO Annex 3 and in regional air navigation plans. (For more about the meeting, see text on page 32.)

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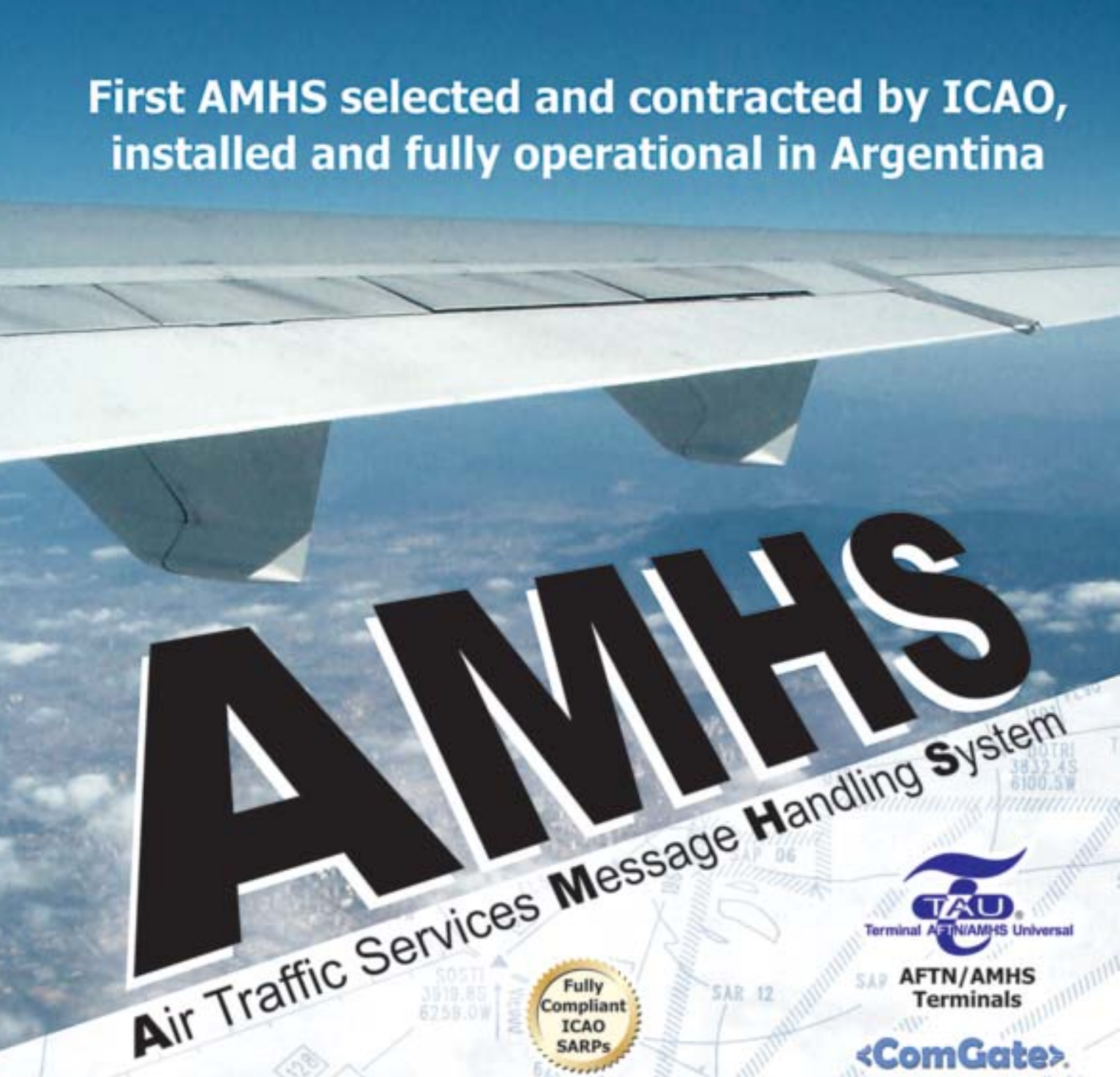

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