

# ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

## Airport Evolution

Safety remains the guiding priority as technology forges new tools to help 21<sup>st</sup> century facilities meet emerging environmental and capacity challenges

Also in this issue:

The ICAO Airport Programme • IATA's AIS/AIM Data Pool • The Sustainable Airport  
UPS ADS-B Deployment at SDF • Marc Szepan on EFBs • Runway Visibility Advances  
ICAO's Procurement Expertise • Marion Blakey on NextGen

Vol. 63, N° 3

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THE ICAO JOURNAL  
VOLUME 63, NUMBER 3, 2008

#### Editorial

ICAO External Relations  
and Public Information Office  
Tel: +01 (514) 954-8220  
E-mail: journal@icao.int  
Web Site: www.icao.int

Anthony Philbin Communications  
Editor: Anthony Philbin  
Tel: +01 (514) 886-7746  
E-mail: info@philbin.ca  
Web Site: www.philbin.ca

#### Production and Design

Bang Marketing  
Stéphanie Kennan  
Tel: +01 (514) 849-2264  
E-mail: info@bang-marketing.com  
Web Site: www.bang-marketing.com

ICAO Photographs: Gerry Ercolani

#### Advertising

FCM Communications Inc.  
Yves Allard  
Tel: +01 (450) 677-3535  
Fax: +01 (450) 677-4445  
E-mail: fcmcommunications@videotron.ca

#### Submissions

The *Journal* encourages submissions from interested individuals, organizations and States wishing to share updates, perspectives or analysis related to global civil aviation. For further information on submission deadlines and planned issue topics for future editions of the *ICAO Journal*, please forward your request to journal@icao.int.

#### Subscriptions and single copies

Yearly subscription (6 Issues per year) US \$40.  
Single copies available for US \$10. For subscription and sales information please contact the ICAO Document Sales Unit,  
Tel: +01 (514) 954-8022  
E-mail: sales@icao.int

Published in Montreal, Canada. ISSN 0018 8778.

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# Leadership and Vision in Global Civil Aviation



## Results-oriented & Performance-based

What convinced me to join ICAO as Director of the Bureau of Administration and Services in November 2007 was the important role ICAO plays throughout the world as the global regulatory body for international civil aviation. I was very much intrigued by the bold and exciting challenges facing the Organization to meet the increasing demands of Member States, the aviation industry and the public in the context of rapid economic growth and technological development.

After just a few months in my new post, I observed the willingness of management and staff to embrace new operating principles that will enable ICAO to become a results-oriented and performance-based Organization.

Transforming the culture of any organization is no easy task. Above all, it requires vision. It also takes commitment, teamwork, communication and a widespread openness to new ideas and new ways of doing business.

The Bureau of Administration and Services is not only a service provider but also a manager. It is our task to manage the Organization efficiently and effectively, with high quality physical and human resources, by applying the highest standards of work ethics and conduct, and using results-based management skills and tools to support the Organization in implementing its strategic objectives.

Broadly speaking, this refers to three areas:

1. Maintaining the effectiveness and relevance of all documents and material is one. At first glance, this may seem simple and mechanical, but working in six official languages with a simultaneous distribution policy makes the production of Annexes and a wide variety of guidance material, technical specifications and policy manuals a daunting task.
2. Another is promoting the widespread use of information and communications technology to increase overall efficiency and adopt environmentally-friendly management practices. We are making good progress on implementing our Information and Communication Technology Master Plan, emphasizing e-communications and modernizing work processes throughout the Organization.
3. Then there is the drive to continually enhance our human resources management and working environment in line with the best practices in the United Nations System. As we prepare for a sizeable number of staff to retire from



ICAO in the next decade through normal attrition, taking with them invaluable expertise, a large part of the institutional memory and networking capabilities, we need to establish and implement effective succession planning strategies. The objective is to put in place a framework that will attract and retain a competent, diverse and flexible workforce capable of delivering outcomes of the highest calibre and that will motivate staff to contribute optimally to the success of the Organization.

Ultimately, reaching our goal of a results-oriented and performance-based Organization, better equipped to serve all stakeholders of the world aviation community, will depend on the human factor—our leaders, our managers and our staff, and the ability to make optimum use of our full potential.

My team and I are dedicated to effectively and efficiently supporting the Organization in promoting the safe, secure and sustainable development of international civil aviation. ■

**Dr. Fang Liu**

Director, Bureau of Administration and Services

# The ICAO Aerodrome Programme



**By Yong Wang,  
Chief, Aerodromes,  
Air Routes and  
Ground Aids Section**

The aerodrome industry is facing significant challenges as we embark on a new century of air travel. On the one hand, aerodromes need to accommodate rapidly growing traffic and new larger aeroplanes (NLAs); on the other hand they must also ensure acceptable levels of safety. Airside accidents obviously do continue to occur from time to time, and in an overall sense aerodrome safety—as with every other safety sector affecting global aviation—cannot be overemphasized. The principal challenge for aerodrome operators, therefore, will be to provide sufficient aerodrome capacity and efficiency without adversely affecting safety.

It is in this context that ICAO has included in its Air Navigation Work Programme a comprehensive aerodrome initiative encompassing both safety and efficiency priorities. As



reflected in the ICAO business plan for the triennium of 2008 to 2010, the aerodrome programme in the air navigation field supports both Strategic Objective A (Enhance global civil aviation safety) and D (Enhance the efficiency of aviation operations). Specifically, the ICAO aerodrome programme includes aerodrome certification and operational safety elements, as well as aerodrome efficiency and capacity items. Also included is a specific runway safety programme to address runway-related safety issues such as runway incursions and excursions.

Technically speaking, the ICAO aerodrome programme covers five areas: aerodrome design; visual aids for navigation; aerodrome operations and services; rescue and fire fighting; and heliports.

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With the global trend towards greater autonomy and privatization of aerodromes, the role of the aerodrome operator, in many cases, has changed hands from the State to the private sector. However, the role of States to ensure safety remains unchanged. Under Article 28 of the Chicago Convention, States remain responsible for the provision of adequate and safe aerodrome facilities and services in accordance with Standards and Recommended Practices (SARPs) developed by ICAO. It is in this context that, since 2001, *Annex 14—Aerodromes, Volume I—Aerodrome Design and Operations* has introduced requirements for aerodromes to be certified. Included in the requirements is the provision that a certified aerodrome must implement a safety management system.

Aerodrome certification is thus an effective tool to ensure aerodrome safety. ICAO will develop more guidance in this regard to assist States in their implementation of aerodrome certification, including ongoing plans to hold seminars and

workshops on the certification of aerodromes in ICAO regions this triennium. Also on the agenda is a joint programme with the Airports Council International (ACI) to conduct training courses worldwide on aerodrome certification.

With respect to runway safety, ICAO will continue to assist States in the prevention of runway incursions by introducing new SARPs or guidance material on enhancing visual aids for navigation, as well as addressing the issue from an aerodrome design point of view. Technological solutions to the prevention of runway incursions and foreign object damages (FODs) will be looked at. Additionally, requirements for the runway end safety area (RESA), including alternative means of reducing the consequences of aircraft over-running occurrences and runway surface conditions (featuring friction characteristics, etc.) will also be addressed.

To assist with the ongoing industry effort to improve aerodrome efficiency and capacity, ICAO will look at optimizing

aerodrome design taking into account newly available technologies—developing and amending related SARPs and guidance materials as necessary. In addition, ICAO will assist States in implementing the requirements of the various Air Navigation Plans (ANPs) in their regions so that adequate aerodrome facilities and services are available to meet the increasing traffic demand.

To address the introduction of NLAs, ICAO introduced code F specifications into Annex 14, Volume I, in 1999. In the ensuing years some new aerodromes have been built to the new code F specifications, however accommodating NLAs at existing aerodromes remains a challenge for many regions of the world.

In June 2004, ICAO published Circular 305 entitled *Operation of New Larger Aeroplanes at Existing Aerodromes*. The intent was to provide States with tailored information concerning aerodrome facilities, aerodrome services, air traffic management and flight operations, all of which need to be considered with respect to the accommodation of NLAs at existing facilities. This Circular assists States in carrying out appropriate aeronautical studies to evaluate the suitability of existing aerodromes and to determine the need for alternative measures, operational procedures and operating restrictions for the specific aircraft concerned.

In the long term, ICAO will continue to note and address issues relating to operations of NLAs at existing aerodromes, in the interest of both safety and efficiency. It is envisaged that a major effort will be required in this area. ■



# IATA's AIS/AIM Data Pool

IN CLOSE COOPERATION WITH STATE-OF-THE-ART TECHNOLOGY PROVIDERS AND ITS AIRLINE MEMBERS, THE INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) IS PURSUING DEVELOPMENT OF AN AIM/AIS DATA POOL THAT WILL HELP AIRLINES DEVELOP FUEL-EFFICIENT RNP AND RNAV PROCEDURES TO ENHANCE SAFETY MARGINS, IMPROVE TAKE-OFF AND LANDING FREQUENCY AND SHORTEN GATE-TO-GATE TIMES. JOHN SYNNOTT, AIS/AIM SPECIALIST, IATA OPERATIONS AND INFRASTRUCTURE, PROVIDES AN OVERVIEW OF RECENT DEVELOPMENTS AND OBJECTIVES.

As traditional methods of achieving capacity enhancements approach the limits of the technologies and tools now in place, new means are required meet the challenges presented by global aviation's projected traffic growth.

The key element in this equation, Air Traffic Management (ATM), needs to evolve in order to provide the necessary capacity via safe, sustained, timely and efficient methods. To achieve the required evolution, traditional hard-copy provision of Aeronautical Information (AI) needs to be replaced by increasingly data-centred and system-oriented criteria, where reliable data is made available for use in



## AIS/AIM Data Pool Deliverables

1. Stereo Imagery for 200 sq km around airfield in support of the TERPS or PANSOPS Obstacle analysis;
2. Airport Planimetric features or Airport Mapping Database – suitable for an Aerodrome Diagram;
3. 3D Obstacle and Terrain database around Airport suitable for ICAO requirements (with IKONOS: Area-2, with new GEOEYE-1 (stereo at .41 meters) satellite: Area-3) PANSOPS or FAA TERPS GNSS or RNP procedure design;
4. Visualization 3D databases that can be imported into Image Generators for advanced aircraft visual simulation systems.

## IATA AIS/AIM AT A GLANCE

Aviation is transitioning towards the electronic, producing data that acts as the foundation for flight-information. This requires high quality data in the aircraft and ATM systems that meet critical and essential accuracy, integrity and resolution standards. The manner to achieve this is a data supply chain, from collection until production whereby IATA would offer the raw satellite data in a cost-sharing scenario, in association with gate-to-gate solutions and concise schema of operational efficiency.

**Strategic Objective: To make high-quality, satellite-derived data available to airlines in a cost effective environment.**

applications that perform flight planning, flight management, navigation, separation assurance, collaborative decision making (CDM), as well as additional and strategic ATM activities.

Aeronautical Information Systems/ Aeronautical Information Management (AIS/AIM) is the fulcrum of these stated developments. Evidence to support the crucial role of AIS/AIM was gathered in a recently completed project in South America where satellite-derived data formed the basis of developed GNSS/GPS procedures in an environment where relative accuracy is no longer sufficient.

IATA has taken the initiative to supply high-resolution satellite imagery to its airline members. These programs will help these airlines to develop fuel-efficient RNP and RNAV procedures that will also reduce CO<sub>2</sub> emissions, enhance safety margins, improve take-off and landing frequency and shorten gate-to-gate times (*see related feature article on the 2008 FAA/UPS deployment of ADS-B at Louisville International Airport, page 16*).

Given the significant cost structures currently associated with geospatially-generated data, IATA has developed a data- and

cost-sharing scenario as a basis for migration to the new AIS/AIM imperatives within a framework that respects cost-effectiveness and operational efficiency. This basis for data sharing is already fundamental to IATA's cooperative mandate with its airline members. At present over 1,000 airports have been mapped for terrain, obstacles and ICAO aerodrome features.

Future aircraft operation and navigation will be based on defining performance requirements in the form of RNP values. ICAO has endorsed the concept of Required Navigation Performance (RNP) that is a statement of the aircraft navigation performance defined by accuracy, integrity, availability and continuity of service necessary for operation within a defined airspace. Efforts must therefore be aimed at providing navigation data at the required integrity and performance levels to support the various applications as defined by the ATM requirement.

Because AIS/AIM has now established itself as the critical enabler for the implementation of future ATM systems, the global requirement for precise navigation capability will therefore require high quality (based on metrics involving accuracy, resolution and integrity) aeronautical databases. For future

developments it is essential that reliable and precise provisions for the electronic storage, delivery, updating and interrogation of aeronautical databases and charts (including terrain and obstacle information) be implemented.

Superior data integrity requires evolving away from manual processes to the largest possible extent. Cockpit technology is beginning to change from self-contained instruments to software and data-driven, integrated, graphical situational awareness facilitated by Electronic Flight Bags (EFBs—*see related Marc Szepan/Lufthansa interview on page 20*). At present, paper charts (such as those supplied by the IATA Airport and Obstacle Database (AODB)) are being replaced by Aeronautical Databases maintaining terrain, obstacle, and airport mapping data that support and supply the new EFB hardware devices.





# Collectively, we can achieve more

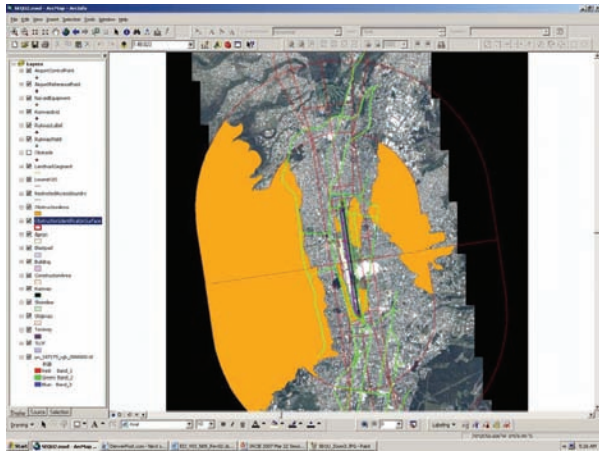


## Working together toward effective industry development

Opportunities for innovation and successful change abound in today's dynamic air transport industry. On the ground and in the air, IATA offers expertise in training, consulting, financial settlement and more in a broad range of customised solutions to support airports and the civil aviation sector.

For more information about how IATA can work with you, visit [www.iata.org/working-together](http://www.iata.org/working-together)

**Fig. 1: Example of first GeoEye survey project at SEQU**



As new applications define new data requirements, the role and importance of AIS/AIM has evolved commensurate with the implementation of FMS, RNAV, RNP and airborne computer-based navigation systems.

#### Partnership Model—AIS/AIM Data Pool

In 2006, The National Geospatial-Intelligence Agency (NGA) Stereo Airfield Collection program awarded IATA's strategic partner in the AIS/AIM Data Pool initiative US\$3.7 million to plot 365 airfields and produce Airport Mapping Databases (AMDB) over a 12-month period. This is the NGA's third and largest Airport Mapping Database allocation following two prior awards for three airfields in 2004 and 15 airfields in 2005. In accordance with these initiatives and through a partnership with IATA, similar programs can be brought forward to the airline industry.

#### Airport Mapping Database

An Airport Mapping Database is a geospatial database that contains significant features of an airport such as runways, taxiways, buildings, obstacles and terrain surrounding an airfield. This information supports the safe movement of aircraft and helicopters on runways and taxiways. These products can also be used to support training, mission or contingency planning and visual simulations for ordinary operations or crisis situations.

IATA's partner has delivered stereo imagery and performed three-dimensional airport feature extraction services in accordance with RTCA and EUROCAE specifications as an essential part of their business model. The company is uniquely positioned to fulfill this service provision by virtue of its satellite's ability to generate a three-dimensional image from stereo data collected during a single orbital pass. The acquired imagery results in a three-dimensional and map-accurate

image of an airport that can be quickly and cost effectively made available (see Fig. 1, left).

Some key features that mark the way forward in comparison with traditional aeronautical information products include interoperability (given the nature of the common formats (or sets of formats) data is characterized as being system and platform-independent), as well as data integrity which was only achievable in earlier frameworks when the entire data chain was maintained through a manual process. Error rates based on human factors were always an issue under past procedures and would thus be circumvented in an automated data-delivery environment.

The impact of late information is also mission-critical in the new data environment, and this increased reliance on data integrity further supports the imperative to evolve away from a manual process. Conventional procedures, where relative accuracy is woefully insufficient, will be replaced by satellite based RNAV/RNP procedures.

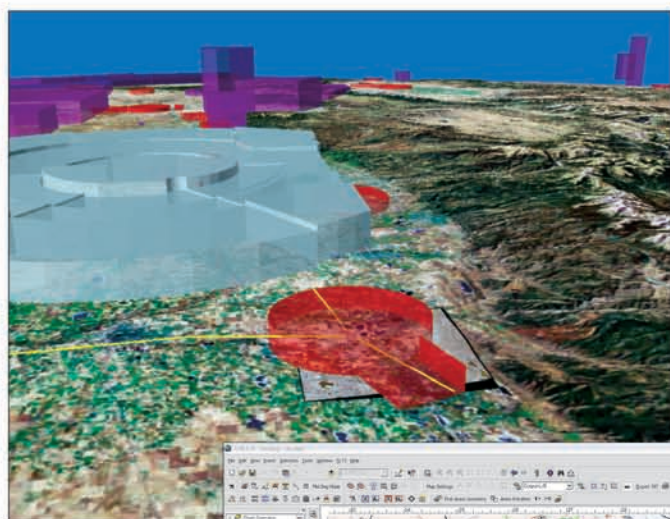
#### Current Objectives for the AIS/AIM Data Pool:

1. Adoption of AICM/AIXM as the data exchange standard. Support appropriate means of compliance and develop global means to the manage and develop the said standard;
2. Develop roadmap to plan, manage and facilitate the transition of a paper-based environment to a wholly electronic one;
3. Suggest and participate in a review and revision of ICAO Annexes 4 and 15 (also begin an Aeronautical Information Management/Service Task Force);
4. IATA Regional offices incorporate transition activities into the AIS data Pool plan to ensure broad based development of AIS/AIM on a global basis;
5. Address legal and institutional issues including those that could constrain adoption and implementation of the AIS Data Pool;
6. Work closely with ICAO at all levels to ensure full SARP compliance and global acceptance;
7. Recognize critical nature of implementing WGS-84 and quality management systems (ATM). ■

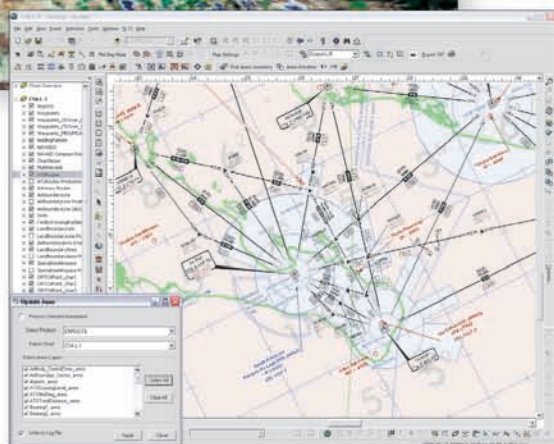
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# Designing the Airport of Tomorrow

## A Sustainable Concept to Meet Future Needs and Requirements

By Sture Ericsson, Johan Odeberg, Bengt Parliden and Johann Rollén, Swedavia.

AIRPORTS OF TODAY PRESENT A NUMBER OF CHALLENGES THAT AT FIRST GLANCE MAY SEEM CONTRADICTIONARY—FOR INSTANCE SAFETY AND SECURITY VERSUS CAPACITY AND EFFICIENCY. IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT APPROACHES THESE SEEMINGLY DISPARATE REQUIREMENTS AND OBJECTIVES CAN BE ALIGNED AND MANAGED IN PARALLEL, SUPPORTING EACH OTHER WHILE STILL CREATING VALUE FOR STAKEHOLDERS. SWEDAVIA COLLEAGUES STURE ERICSSON, BENGT PARLIDEN, JOHAN ODEBERG AND JOHANN ROLLÉN OUTLINE FOR THE JOURNAL THE SUSTAINABLE METHODOLOGIES THAT CAN BE EMPLOYED TO DESIGN AIRPORTS FOR OUR EMERGING 21<sup>ST</sup> CENTURY CHALLENGES.

Today's airports constitute complex operations where economic, social and now environmental systems need to functionally and efficiently interact. In as much as successful development in the aviation sector now requires solid and sustainable foundations, airport planners and authorities need to begin designing and managing these interacting systems and processes to produce positive business results.

Sustainable development is based on the utilization of balanced strategies. This means taking a holistic approach to present and future challenges through the integration of economic growth, social equity and environmental management. It has been Swedavia's experience that a change management strategy is needed in order to migrate to effective and integrated structural decision-making, whether for incremental improvements or more comprehensive system and process innovations. In the end,

# SAFETY. SECURITY. PEACE OF MIND.™

sustainability is about understanding and balancing the visions, goals and needs of all stakeholders, with the balance between creativity and structure being critical to success. This balance between creativity and structure is an ongoing management objective that requires flexibility depending the various stages of a particular development initiative.

Swedavia's experience from its own airport development projects has demonstrated the need to operate on a number of levels to produce the best sustainable business practices. Naturally, all objectives are closely linked and interact both internally and with additional external components. These interactions act both as enhancers and as constraints depending on specific objectives. It is important in any such endeavour, however, to eventually move beyond conceptual frameworks and produce clear processes that result not only in an overview of issues but also a concrete action plan. This concrete plan covers the three main phases which need to be acted upon in order to achieve greater sustainability, as shown in Figure 2 (page 14).

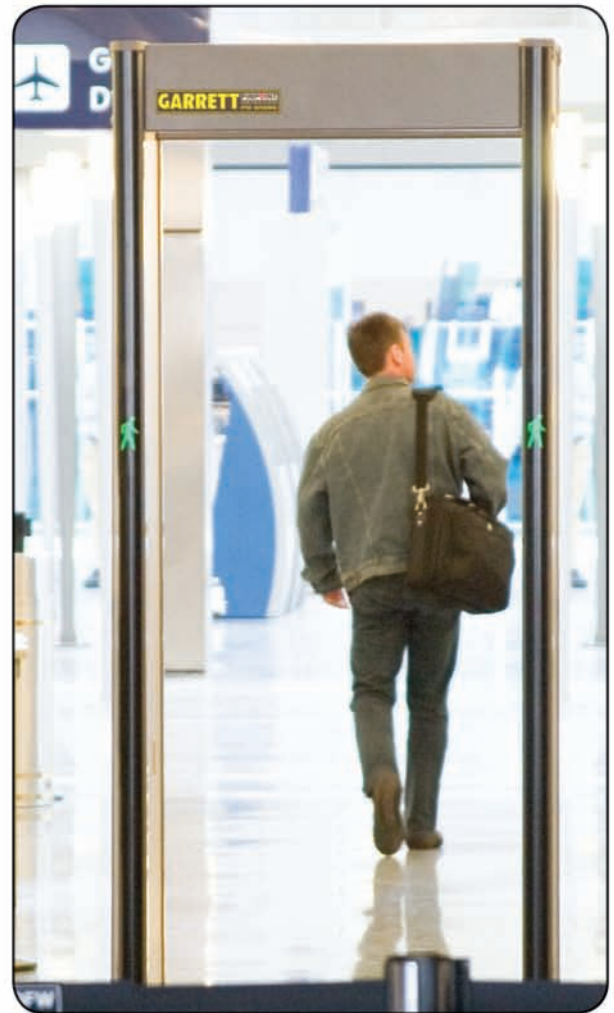
On-going monitoring, together with statements of intent, review schedules, as well as access to toolkits, information and workshops, are all important components of a successful development process. Within the context of sustainable development and to build on a concept introduced briefly above, the authors propose that a sustainable airport development concept be based on three cornerstones: the environment; safety & security, and; capacity and efficiency. All three of these areas require full attention and equal weight when decisions are being contemplated to ensure that a solid base for successful business development and long term value-creating capabilities is created.

## Business Development & Value Creation

The operation of airports continuously faces a dilemma. From a capacity and efficiency perspective one would optimize for the *common* case. From a security and safety standpoint the *uncommon* case is unavoidable and potentially dangerous.

The difference may seem substantial—to solve problems that help an authority to be more profitable versus the identification of problems or risk areas that impact safety & security margins, cost more money to develop or slow the implementation of new initiatives. What really counts, however, is what the stakeholder is ultimately valuing as a matter of long-term priority. If they are identifying the airport's output as a 'positive total experience' based on good products and good service, then it has been demonstrated that the financial return will be achieved regardless of shorter-term adjustment phases and profit sacrifices.

Swedavia's experience shows that this 'positive total experience' will be achieved if the operation is safe and secure, run efficiently and with enough capacity, and at the same presents its goals and operating procedures as elements of an environmentally



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**“ The challenge here is to identify and clarify on a global as well as local basis the main safety and security concerns. Many solutions can be found within current Safety Management Systems as well as Security Management Systems, and by designing and implementing a comprehensive safety system that fulfils the requirements of an ICAO Certification process for aerodromes (ICAO Doc 9774 AN/969), along with compatible security initiatives, a great deal can be achieved in this regard.”**

sound strategy. Our philosophy is that a sustainable airport development includes and requires a strategic long term perspective on creating value for its stakeholders. It should be noted that by ‘stakeholders’ we include not only owners/operators, but also passengers, airlines, suppliers, staff, neighbours, landlords, and governments. This wide range of needs reflects that running an airport is a highly complex task requiring a holistic and comprehensive management focus.

Under established circumstances, business planning usually begins with strategic analysis of the current airport business in

order to establish an agreed ‘snapshot’ of current conditions, followed by recommendations for the future business vision or model to be developed. In order to establish this vision several business opportunities and strategic directions need to be identified, and out of these alternatives only some will qualify under the new Management Mission to support a sustainable approach. The result is a *strategic description* and *knowledge platform* of the airport business to assist authorities and create tools for them that aid in making correct decisions both in the day-to-day operation of the airport as well as during long-term planning.

The business plan is preferably based on a multi-stage approach to account for the rapid change of development expected in the aviation sector. Each stage requires its own conditions and potentials and consequently different strategies and actions to fully utilise the potential of the airport—as well as to provide management with a tool to cope with different needs during these stages. A parallel objective is to empower executives through new management training to acquire knowledge, apply it, achieve results, and then interpret those results to identify new opportunities for achievement on an ongoing basis.

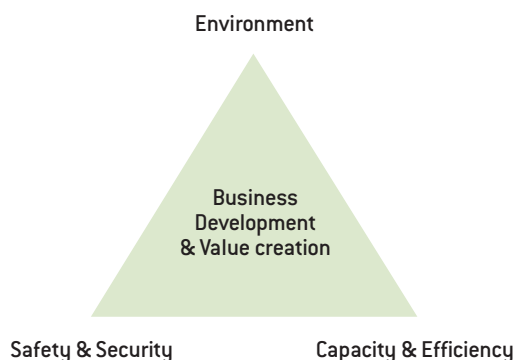
### Safety & Security

Safety and security are the two most important factors when building and maintaining the confidence of both the passenger and society at large for commercial air transport. Together they form the cornerstone for development initiatives and are the foundation of all the economic and social benefits within the air transport system.

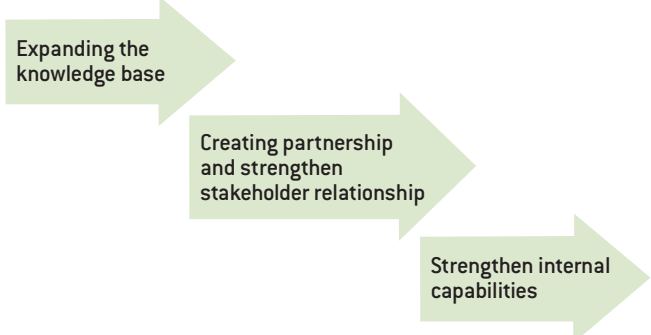
**Fig. 1: The Sustainable Development Concept for Airports**



**Fig. 3: The Three cornerstones of Development and Value-creating Capability**



**Fig. 2: A Three Phase Process to Greater Sustainability**



**FIG. 4: THE SWEDAVIA VISION FOR AIRPORT DEVELOPMENT**

**Airports shall have established business and operational processes that fully utilize their potential by:**

- Meeting demands for a safe, efficient and reliable air travel and cargo logistics.
- Exploring the full value-creating capability of the airport as a central part of the respective region’s economic engine.
- Being capable of supporting sustainable social development balancing economic, social and environmental parameters.



The challenge here is to identify and clarify on a global as well as local basis the main safety and security concerns. Many solutions can be found within current Safety Management Systems as well as Security Management Systems, and by designing and implementing a comprehensive safety system that fulfils the requirements of an ICAO Certification process for aerodromes (ICAO Doc 9774 AN/969), along with compatible security initiatives, a great deal can be achieved in this regard. Whereas the need for state-of-the-art security and safety technologies and processes is self-evident, the most important objective is to develop and establish proactive and also generative safety and security cultures for continuous improvements.

### Capacity & Efficiency

The economic and social aspects of air transport are well known. Lack of capacity in the present and the future will inevitably lead to undefined and un-quantifiable consequences, including lost productivity for the business traveller who has to delay his departure overseas by a day, or for instance the social costs for a granddaughter who finds herself unable to travel to visit her grandparents.

One trivial but relevant example regarding capacity issues is that service levels for an airport's ground service providers are normally dictated via bilateral agreement between an airline and the



respective ground handling company. Imagine however, that an airline signs a contract resulting in a service level that causes delays on perhaps 10% of the flights. This may very well be justified for the isolated airline, but what about the consequences for the entire airport due to the delays of this one carrier? Undoubtedly such isolated planning and decision-making will have cascading effects such as blocked gates/ stands, airport traffic flow disruptions, etc.

One likely reason for not coping with issues of this nature is the lack of tools to describe consequences in detail. Collaborative Decision-Making represents one tool that can be employed to increase predictability, which is of major importance for airlines and airports in their operations management, and it also serves to enhance decision-making capabilities through information sharing among airport partners. It is now well-understood that increased operational efficiencies resulting from collaborative approaches also result in welcome environmental benefits.

Another interesting area is the unlocking of latent capacity. This can be identified and extracted by using theoretical knowledge as well as best practices developed for runway, taxiway and apron operations.

### Environment

In the context of continually rising transportation demand the environmental challenge requires constant consideration during construction, operation and maintenance of the airport and its systems. Our experience reveals that if the environment is integrated into the business development process as a value-adding factor it becomes more obvious as a factor to planners and operators. Solutions to environmental issues can be found in technical improvements, operational measures and infrastructure investments, but just as the environment needs to be considered during other phases and planning, the holistic approach requires

### FACT SHEET: SWEDAVIA

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- Airline Pilots
- Regulators

Swedavia's approach to work collaboratively with airport staff and to share experience and competence ensures that transfer of knowledge and ability is central in all projects which act as a base for continued development and long term effect.

that profitability and safety concerns not be overlooked when environmental measures are being considered.

Airport neighbours and airport managers will also have more fruitful discussions when they are balancing their perspectives in joint discussions.

As with safety & security initiatives, a structured system such as an environmental management system should form the basis for actual, measurable environmental improvements. Such a system also has to be complemented by an environmental 'culture' that must be firmly instilled within airport management.

After all, sustainability is not only judged in the annual report. Our children and our grandchildren are the real shareholders when it comes to what decisions we make today and how they will affect our tomorrow. ■



# Lessons from Louisville

UPS AIRLINES' USE OF CLASS 3 EFBs AND ADS-B AT LOUISVILLE INTERNATIONAL AIRPORT (SDF), AND NEW IMPLEMENTATIONS OF ADS-B IN ALASKA, FLORIDA AND THE GULF OF MEXICO, SHOW REAL PROMISE IN IMPROVING EFFICIENCY IN BOTH THE COMMERCIAL AND CIVILIAN AVIATION SECTORS WHILE MINIMIZING ENVIRONMENTAL IMPACTS.

The FAA granted UPS approval to begin employing ADS-B software in live operations at Louisville International Airport (SDF) on 28 December 2007. Beginning 17 January 2008, the airline began phasing in the use of ADS-B and related procedures for its EFB Class 3-equipped 757 fleets, anticipating further FAA approval for its 767 and 747-400 fleets in the near future. UPS has been researching ADS-B applications since 1996.

The airline's initial goal is to have ADS-B software installed on 55 aircraft by the end of 2008, anticipating that this will translate into 20-25% Continuous Descent Arrivals (CDA) at SDF in 2008. Based on tests to date, UPS estimates its new ADS-B capability will provide a 10-15% increase in landing capacity at SDF, allowing more planes to land during its fixed operation window and therefore accommodating additional volume. Continuous Descent Arrival landings

reduce an aircraft's noise footprint by 30 percent, nitrous oxide emissions by 34 percent and fuel burn by 40-70 gallons per flight (data derived from 2004 tests with the FAA.)

The SDF/UPS project is an off-shoot of a larger program initially called the Ohio Valley Initiative, which was a combined effort of SDF and Lunken Municipal Airport (Cincinnati) in conjunction with airlines UPS, Airborne, FedEx and Delta back in the early 1990s. The ADS-B approaches and technologies that were investigated in the course of that initiative were later adopted under the auspices of the more specific strategic partnership between SDF and UPS both from an operational and, just as importantly, a federal funding standpoint. The migration to ADS-B capability has been an easy one thus far for the Louisville facility, requiring neither major technological nor operational adaptations.

"SDF hasn't had to make any significant alterations per se," commented Skip Miller, SDF Executive Director. "We've had moving-map displays installed in several of our airfield operational vehicles, including our ARF trucks, and we have a remote display in our station, but apart from that the implementation hasn't required any significant physical or operational alterations for us."

"One of the migratory outgrowths of this that we're most excited about," Miller continued, "is the continuous descent and arrival improvements that will be enjoyed with respect to fuel-efficiency and overall more environmentally-friendly take-offs and landings. This creates a win-win scenario for UPS—who will save on fuel costs—and the airport and surrounding community who will experience decreased noise and fuel emissions. From SDF's standpoint this represents a huge bonus."

### How ADS-B works

ADS-B, or Automatic Dependent Surveillance-Broadcast, is a GPS, satellite-based technology that can update an aircraft's position every second—as opposed to traditional radar, which can take as long as 12 seconds per sweep. Since many aircraft travel up to a full mile in a single second, this difference is significant.

Applications employing ADS-B data provide exact air speed, position, attitude and turning details, as well as ground position on the airfield to help avoid collisions and runway incursions. Data is available both to the cockpit and air traffic control tower.

Current ADS-B software applications in the aviation sector are designed to improve the safety and efficiency of flight operations. The software's capabilities include merging & spacing and surface area movement management (SAMM). SAMM applications display an aircraft's location and proximity to other aircraft and vehicles on the airfield. The software leverages EFB technology to display diagrams of runways, taxiways, gates and airport infrastructure, alerting pilots to potential runway incursions.

The merging & spacing function provided by ADS-B capability enables aircraft to display information that guides merging maneuvers and spacing behind other aircraft during flight arrival. This improved situational awareness allows pilots to maintain proper sequencing, and the data instructs pilots to speed up or slow down to keep a consistent interval between their aircraft and others on approach. These improvements permit operators to keep engines near idle during descent, which can save hundreds of pounds of fuel with each approach. The system will also enable significant reductions in noise and emissions below 3,000 ft.



The FAA has been working very closely SDF and UPS on the Louisville initiative, bringing to bear its technical expertise as well as pumping in US\$ 40 million for equipment and other expenses. It's been moving quickly now to move forward additional implementations in Florida and the U.S. Gulf Coast. ADS-B is one of the most important, underlying technologies in the FAA's plan to transform air traffic control from the current radar-based system to the satellite-based system of the not-too-distant future.

ADS-B will serve as the cornerstone for this transformation, bringing the precision and reliability of satellite-based surveillance to the nation's skies.

"This technology is a critical part of developing our initial capabilities in satellite-based control and surveillance," commented Robert Sturgell, acting FAA Administrator. "ADS-B provides an essential capability for reduced separation and allows for greater predictability in departure and arrival times, and will

also give real-time cockpit displays of traffic information, both on the ground and in the air, to equipped users throughout the system. We estimate that ADS-B applications in the terminal environment will save \$1.5 billion for commercial aviation through 2035. At SDF UPS aims to cut noise and emissions by about 30 percent each and reduce fuel burn by 40-70 gallons for each arrival."

In August 2007, the FAA approved a contract with ITT Corporation to provide ADS-B services. Under the contract, ITT will install, own, and maintain the ground infrastructure, while FAA pays for the surveillance and broadcast services. Since the contract award, the program is on track. The FAA now intends to deploy ADS-B at key sites by 2010 and will roll out the nationwide infrastructure in 2013. ADS-B is also being implemented in the Gulf of Mexico, where controllers currently operate without radar coverage and must track low-flying aircraft using a grid system based on reported—



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actual—position. To ensure safety, a significant amount of separation must be maintained between aircraft, severely reducing capacity. ADS-B will allow the FAA to dramatically reduce the amount of separation while maintaining safety levels, saving an estimated \$1.5 billion through 2013 and providing support for an additional 246,400 flights over the Gulf between 2017 and 2035.

With ADS-B, pilots for the first time will see the same kind of real-time traffic displays that are viewed by controllers. This will dramatically improve pilots' situational awareness, since they will know where they are in relation to other aircraft, bad weather and terrain. The technology is already showing benefits in another ongoing implementation in Alaska, where there is currently a projected 47 percent drop in the fatal accident rate for aircraft equipped with ADS-B in the state's southwestern region. ■



*The SDF/UPS project is an off-shoot of a larger program initially called the Ohio Valley Initiative, which was a combined effort of SDF and Lunken Municipal Airport (Cincinnati) in conjunction with airlines UPS, Airborne, FedEx and Delta back in the early 1990s.*

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# EFBs and Information Management

ELECTRONIC FLIGHT BAGS (EFBs) ARE ESSENTIAL TO NEW AIS/AIM EFFICIENCY SOLUTIONS AND WILL BECOME LEVERAGED MORE AND MORE AS COCKPITS EVOLVE TO MANAGE 21<sup>ST</sup> CENTURY DATA STREAMS. **MARC SZEPA**N, SENIOR VICE PRESIDENT, AIRLINE OPERATIONS SOLUTIONS AT **LUFTHANSA SYSTEMS**, SPOKE TO THE JOURNAL ABOUT THIS NEW TECHNOLOGY AND ITS PROMISE AS A DRIVER OF FUTURE IMPROVEMENTS IN SAFETY AND EFFICIENCY.

**ICAO Journal:** Electronic flight bags have historically enjoyed greater penetration into the private and corporate aviation sectors. What are the barriers that need to be crossed to improve implementation levels with commercial operators?

**Marc Szepan:** The airline industry has always taken a pioneering role in terms of deploying new technologies. It is a common trend that innovations in aviation technology originate in the military sector, get picked up by the private aviation sector and then gradually move into commercial aircraft. What we've seen from a business and interoperability perspective is that the commercial carriers are currently very excited by the aircraft performance and route optimization potential of EFB-based applications, not to mention emerging navigational capabilities in system-wide information management (SWIM) networks. Lufthansa currently has Class 1 units assisting on about 1,300-1,400 daily flights in the commercial sector, but further EFB market penetration, including Class 3 EFBs running Type-C software applications, will likely only occur based on the broader aircraft purchase and retrofit timetables of the operators.

**Is there a regional component to current implementations?**

Europe and North America are currently showing the highest level of roll-out which is interesting given the tendency of Asian markets to aggressively pursue

and implement the most advanced communications and technology solutions in other sectors. Notable exceptions to this rule would be Singapore Airlines and several Middle Eastern carriers, which are presently taking delivery of new generation aircraft in conjunction with EFB programs.

**What is the potential of Class-3 EFBs with respect to newer ADS-B applications and especially System-Wide Information Management (SWIM) developments?**

There are two key drivers behind EFB/ADS-B applications and the SWIM environment capabilities that will be expected under NextGen and SESAR planning guidelines: safety and efficiency. If we look at the basic trends that we've been seeing in air navigation and in flight

planning over the last 20-30 years, there has only been incremental development in the sense that routes are still calculated on the ground and then executed during flight.

The efficiency trend that we will see in the future, one that will likely be a paradigm shift during the next decade or two at most, will be one in which in-flight recalculations of flight plans become possible.

The safety enhancement potential of ADS-B is already being experienced to a degree based on current Type-C and in some cases Type-B applications. These relate during taxi to the situational awareness of the flight crew with respect to other airborne or ground-based vehicles, alerting them when collisions may occur and otherwise





# Integration and Harmonization of **NextGen** and **SESAR** into the Global ATM Framework

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- Industry
- Academics

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reducing the possibility of runway incursions. Non-ADS-B related safety enhancements now in place include the wide range of route and chart data that is presented simultaneously on the EFB screen rather than from divergent paper-based sources, as well as FMS, airport obstacle and other database-driven information essential to both aircraft performance and route optimization that is now kept more up to date and accessible to pilots when and how they need it.

**Do you feel that current VDL Mode 2 capabilities are sufficient to begin to allow the two-way communications that will be required for the paradigm shift you describe above?**

I think technology available now is sufficient to make this possible. The issue is not so much the evolution of current technological capability per se— but possibly more an issue of moving forward with regulatory and procedural issues.

If you look at the way that air navigation control is handled in major regulatory environment, for example, there are shared responsibilities between pilots and dispatchers. Once a pilot is able to recalculate a flight plan in-flight based on an EFB/ADS-B capability, what types of implications does that pose for a shared responsibility framework? If ICAO could take the lead on this type of discussion and begin to structure

and shape the dialogue required beyond the purely technological realm—exploring regulatory and procedural implications—I think that would be an excellent step forward.

**Any final points you'd like to make?**

I think one absolutely crucial issue affecting current EFB development and implementation goals is airline sensitivity to total life-cycle cost implications related to new technologies. For aircraft operators there are decisions to be made regarding installation of a Class 1, 2 or 3 device as well as the type of software applications that they need to run—both immediately and in the future. These decisions, when extended to fleet-level economies, have huge cost implications, and my own view is that for most carriers the big decision being made today is whether they are going to treat the EFB like a OTS notebook or Class 2 device or to install a Class 3 avionics device. ■

#### About Marc Szepan

Mr. Szepan assumed his current leadership role as Senior Vice President Airline Operations Solutions on January 1, 2006 and is responsible for Lufthansa Systems' global flight operations products and services.

The Airline Operations Solutions division offers a full range of products covering the process chain of airline flight operations including flight planning and dispatch systems, performance engineering, navigational charts in paper and electronic format, FMS data, and EFB solutions which are used by more than 150 airline customers worldwide.

Prior to his current position, Mr. Szepan held managerial appointments at Lufthansa Technik AG and two other German industrial companies with postings in Germany, in the Philippines, and in the People's Republic of China.

In addition to his operational roles, Mr. Szepan has served on the Board of Directors of two joint venture companies in the People's Republic of China and as Research Associate at Harvard Business School, Cambridge, USA.



# Paraguay refits with AMHS

The National Direction of Civil Aviation (Dirección Nacional de Aviación Civil – DINAC) of Paraguay has officially started operation of a new Air Traffic Service Message Handling System (AMHS), together with an AMHS native NOTAM Databank, selected and provided under the oversight of an ICAO procurement mechanism which also included related training programs and local testing support.

The new communication system, which became operational last November, provides for the integration of 34 terminals located at the main Paraguayan airports. The supporting NOTAM Databank is accessible from domestic as well as foreign users worldwide through international links to Argentina and Brazil.

The new AMHS is totally compliant with pertinent ICAO SARPs and was designed as an integral part of the future ATN Aeronautic Telecommunications Network, aimed to integrate all the communications required to operate and manage national air traffic. It covers communications between terrestrial control centers, but as part of the ATN it can be expanded to include ground-air data communication, facilitating further introduction of automated systems.

The Radiocom AMHS system has been designed and installed over an IP network and uses satellite links for data transport. Specialized software permits supervisors real-time monitoring of system component status in any part of the country.

DINAC's new AMHS replaces the old AFTN System and allows the exchange of air traffic management messages, as well as meteorological, aeronautical information and administrative messages between stations in Asunción (main control center), Ciudad del Este, Pedro Juan Caballero, Concepción, Mariscal Estigarribia, Pilar, Bahía Negra, DINAC Central Offices, an Air Force Base and two international circuits to Brazil and Argentina.

Paraguay is now the second South American country with AMHS Capability, preceded only by Argentina's deployment in 2005, also guided by ICAO. ■



*DINAC's President addresses assembled dignitaries at the launch of the new AMHS system.*



*Paraguay's new AMHS capability gets its first test drive.*

# Reducing the Costs and Increasing the Reliability of Runway and Visibility Systems

Case studies of comparative trials of new and existing sensors and the implications for airport installation and maintenance costs.

By Alan Hisscott, Meteorological Office, Isle of Man Airport

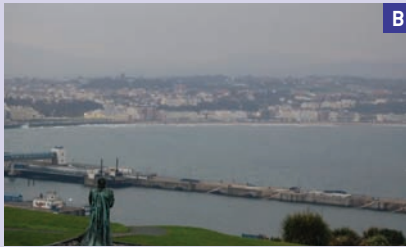
ACCURATE AND RELIABLE MET REPORTS ARE ESSENTIAL FOR PILOTS TO MAKE SAFETY-CRITICAL DECISIONS IN ADVERSE WEATHER CONDITIONS AND FOR OPERATORS TO MAKE SHORT-TERM STRATEGIC PLANS. ALTHOUGH ADVANCES IN AIRCRAFT TECHNOLOGY ARE MUCH PUBLICIZED AND OFTEN VERY APPARENT TO TRAVELLERS, DEVELOPMENTS OCCURRING MORE 'BEHIND THE SCENES' OFTEN GO UNNOTICED EVEN BY INDIVIDUALS

CLOSELY RELATED TO AIRLINE AND AIRPORT MANAGEMENT. THUS THE RECENT ATC GLOBAL 2008 SEMINAR PROGRAMME WAS A MUCH APPRECIATED OPPORTUNITY TO BRING TO A BROADER AUDIENCE SOME RECENT DEVELOPMENTS IN METEOROLOGICAL SENSORS WHICH PROMISE BOTH INCREASED RELIABILITY AS WELL AS COST REDUCTIONS.

## "ON A CLEAR DAY YOU CAN SEE FOREVER" – MET VISIBILITY AND RUNWAY VISUAL RANGE



A



B



C

**A** In this view across Douglas Bay in the Isle of Man one can identify features such as fields or isolated buildings on a distant hillside since light from the object of interest travels in a straight line to the eye, so one sees a clear image of all the features in view.

**B** However, for a similar view on a less-clear day, two phenomena combine to reduce visibility. Firstly, aerosol particles (dust or smoke) or droplets (fog or precipitation) in the intervening atmosphere cause some of the direct light from a distant object to be scattered out of our line-of-sight. Also, they cause light from other sources to be scattered into our eyes. The combined result is that less direct light and more scattered light reaches our eyes so the view becomes less distinct, or 'rather hazy'.

Visibility is defined as the limiting distance at which a dark object can be discerned against its background. In the above picture, the hills at around 10km distant can just be identified against the sky so, in this case, the 'MET visibility' would be reported as 10km.

The effect of such visibility reduction was described mathematically by Koschmeider. He defined an 'extinction coefficient' (conventionally written as the greek letter  $b$ ) which is related to visibility ( $V$ ) by the very simple equation known as 'Koschmeider's Law':  $V = 3 / b$

**C** Part of the same view on a day when an increased concentration of particles or droplets in the atmosphere reduced the visibility to around 2km. However, although it has become difficult to identify individual buildings on the promenade across the bay, the row of lights along the sea front is still clearly identifiable. This is why lights are used to delineate runways and the visibility of lights (as distinct from non-illuminated objects) was studied mathematically by Allard. He developed an equation known as 'Allard's Law' which can also be arranged to give an expression for the extinction coefficient:  $b = (1 / V) \times \log (I / V^2 E_t)$

Where	$I$ = Light intensity
and	$E_t$ = Illuminance threshold

The illuminance threshold is essentially the weakest light intensity which the viewer's eyes could distinguish against the same background as the light of known intensity  $I$ . This is obviously a more complicated expression than equation (1) above but the two 'laws', due to Koschmeider and Allard, form the basis of RVR calculations.

## New technology for wind measurement

Conventionally, wind speed and wind direction are measured by distinct sensors. Wind direction has been determined by wind vanes for many centuries now, as the obvious examples above many classical buildings can readily attest to. For use as present-day meteorological sensors, small wind vanes are used to drive the sliding contact of a circular potentiometer—which provides a changing resistance, or electrical signal, proportional to the wind direction in degrees from North. The potentiometer has to have a small insulating gap, usually near North, known as the 'dead-band' of the sensor. Wind speed is usually measured by an array of three cups, arranged so that one cup will 'catch the wind' while the other two present their streamlined side towards the wind. The asymmetric aerodynamic thrust causes the cup-rotor to rotate at a speed more or less proportional to the wind speed. However, the asymmetric thrust on the rotor bearings can exacerbate wear, so the anemometer requires regular calibration to a wind-tunnel standard and refurbishment as required.

In recent years, 'ultrasonic' anemometers have been developed which can measure wind speed and direction using a single sensor with no moving parts. Figure 1 (page 27) illustrates such a device—an ultrasonic anemometer used by Aeronautical & General Instruments (AGI) in their Ultrasonic Wind System (UWS) for airport surface wind measurement. It stands approximately 40 cm high.

In operation, a pulse of ultrasound is sent from one of the anemometer's transducers and is detected by the opposite transducer. The 'time-of-flight' ( $T_1$ ) depends on the speed of sound in still air (at the prevailing temperature and pressure) plus the velocity of the air itself ( $V$ ) between the two transducers. By sending a similar pulse in the opposite direction, and measuring the time-of-flight ( $T_2$ ), the simple expressions shown can be used to derive both the speed of sound ( $C$ ) and, more importantly, the speed of the air ( $V$ ) between the transducers. By cycling this process around the 4 transducers (aligned with N-E-S-W) several times per second, we can use the components to calculate a true wind speed and direction (for the full 360 degrees of the compass).

### Advantages of the ultrasonic wind sensor include:

- Acts as a single sensor to measure both wind speed and direction.
- Covers the full 360 degree span.
- Has no moving parts.
- Capable of very low 'start speeds' in light wind conditions.
- Calibration can be completed in situ (a simple 'zero-wind' check).
- Light weight and compact with standard mounting.
- Integrated processing with digital and/or analogue outputs allows straightforward interfacing with existing wind measurement systems.
- Output can provide the standard wind averaging and extreme values as recommended by ICAO Annex 3.



A comparison trial was completed at London Heathrow Airport from July 2005 to March 2006. An ultrasonic anemometer was situated close to conventional anemometer/wind-vane sensors of the existing airfield wind system. The comparison data was analysed by Dr. Sujit Sahu at the School of Mathematics of the University of Southampton. His report concluded that

*"...there is virtually zero probability that the ultrasonic and conventional sensors differ by more than one knot... Most of the directions recorded by the ultrasonic sensor are within a difference of 4 degrees of the directions recorded by the conventional sensor".*

### New technology for assessing Runway Visual Range (RVR)

Few people outside of the core of individuals directly involved with RVR (even aircrew, air traffic controllers, airline and airport managers) really understand the difference between 'MET visibility' and Runway Visual Range.

The Convention on International Civil Aviation, Annex 3 (MET Service), originally defined RVR as:

*"The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line".*

This definition was modified at the Eighth Air Navigation Conference in Montreal (1974) to read:

*“Since, in practice, RVR cannot be measured directly on the runway... a RVR observation should be the best possible assessment of the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line...”*

This modification acknowledged the fact that that RVR cannot be measured from the ideal position on the centreline of the runway (the pilot’s real view), but rather should be the best possible assessment respective of the pilot’s view, and made as close to the runway edge as allowed by installation and safety constraints.

To appreciate some of the problems with making an RVR assessment, we first need to understand how MET visibility and RVR differ.

Traditionally, in IRVR applications, instruments called transmissometers (Fig. 2, page 27) have been used to measure transmittance of a light beam which is then used to derive an extinction coefficient (*b*). Although they are very precise instruments, transmissometers are very expensive to install and maintain. In particular, they require very stable bases to maintain accurate optical alignment and the light sources themselves must provide a very stable intensity output.

Forward Scatter Meters (FSMs, see Fig. 3, page 27), on the other hand, are much smaller and self-contained (so alignment is not a problem) and the light-sources employed are inherently more reliable. However FSMs only measure a sample of the light



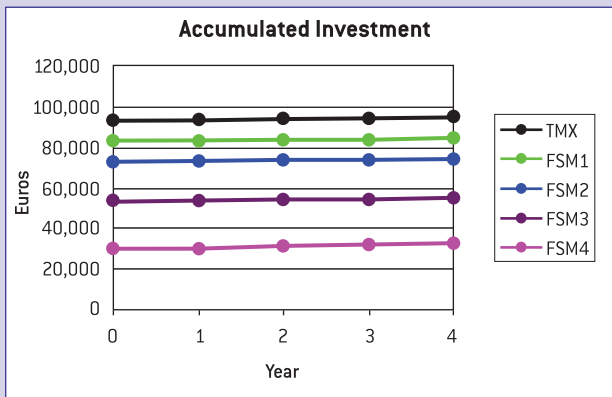
scattered out of the source beam in the direction of the detector, whereas transmissometers measure the transmittance of the entire light beam. This basic difference means that FSMs cannot provide an ‘absolute’ measurement of the extinction coefficient but each design must be initially calibrated against a transmissometer.

#### FSM trials at Isle of Man Airport (1992-2004)

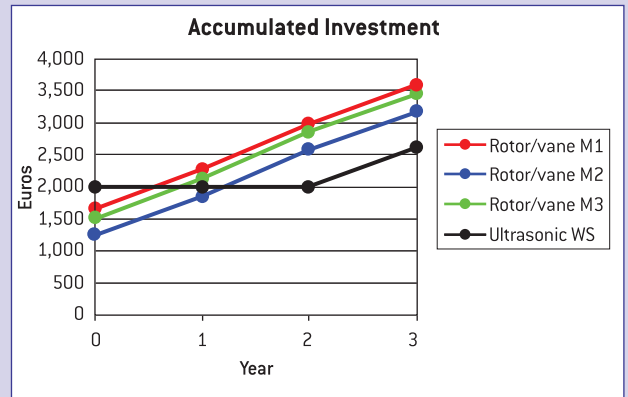
Although initial resistance to using FSM technology for IRVR probably centred on this fundamental difference in the way the sensors work, I decided to investigate the overall effect that the different types of sensors might make to the assessment of RVR. After all, it’s only the accuracy of the end result which is of interest to a pilot.

One FSM sensor was placed in front of the MET Office to enable comparison with the MET Observer’s reports of ‘MET visibility’. At the time, a Human Observer (HORVR) was employed and a

### COST COMPARISONS FOR CONVENTIONAL AND NEW TECHNOLOGY SYSTEMS



Graph indicating typical costs for investment in IRVR systems—top (black) line for a typical transmissometer-based system—other lines indicate a selection of FSM based IRVR systems.



Similar diagram for wind sensors—black line shows that although ultrasonic sensors are initially more expensive, the on-going costs are less and soon reduce the overall investment cost.

second FSM was placed in the line-of-sight of the observer (who is normally located at the RVR Observation Point for runway 26, or 26 ROP on the airfield diagram. See Fig. 4, page 28). In conditions of reduced visibility, the human observer counts the number of (far-side) runway lights he can discern from the ROP and a calibration graph is used to convert the number of lights reported to an equivalent RVR assessment for the runway centre-line.

The results showed promising correlation and were reported in *Meteorological Magazine* (Hisscott, 1993) and at a meeting of the Royal MET Society Instrumentation Group (Hisscott, 2004). More recently, AGI operated a Biral FSM adjacent to the existing AGI transmissometer installed at Birmingham Airport for a year in 2007/8. A data-file containing around 600,000 one-minute simultaneous readings was provided to me for analysis. The dataset included 8777 occasions when both instruments were reporting readings corresponding to the region of interest for RVR reporting (0-1600 m). I completed the 'box-plot' type of analysis described in the ICAO RVR Manual (see Fig. 5, page 28).

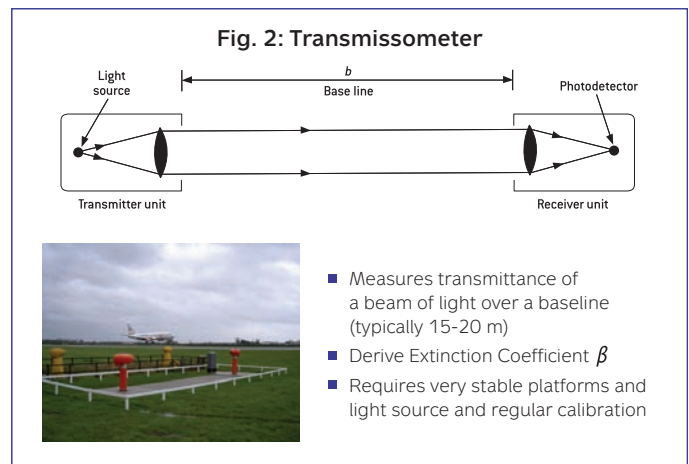
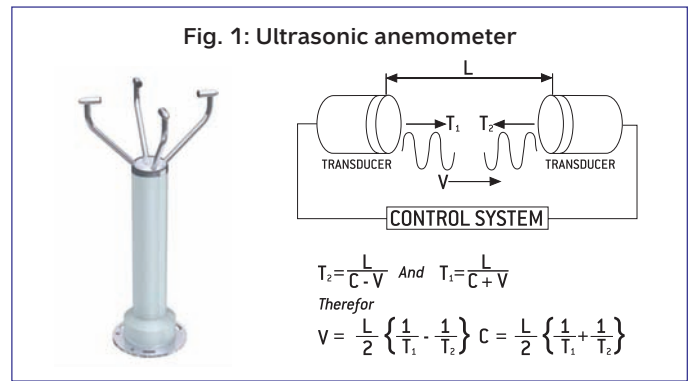
For the comparison, the transmissometer was chosen as the 'standard' instrument. Meteorological Optical Range (MOR) is the instrument equivalent measure of human observed visibility. The ratio of the MORs reported simultaneously by each instrument (MOR measured by FSM divided by MOR measured by the transmissometer) was calculated for each of the 8777 occasions and a statistical analysis was made of the distribution of these ratios for various standard MOR's.

The 'X's in the diagram show the median value of the FSM/transmissometer MOR ratio and the width of the 'boxes' includes 50% of the observed ratio values at each standard transmissometer MOR range.

Basically, the graph shows that the FSM tended to report a slightly lower value of MOR than the transmissometer over the whole range, which is essentially in good agreement with a slightly 'safe bias'.

Predominantly, Allard's Law is used in the calculation of RVR, since in conditions of low visibility the runway lights provide the main visual guidance to the pilot. As well as measurements of the extinction coefficient ( $b$ ), the calculation requires values for the light intensity ( $I$ ) and the illuminance threshold ( $E_t$ ). The output intensity for each light unit can be estimated from the design parameters and the known power setting. In order to determine the illuminance threshold, we need to compare the sensitivity of the human eye with the brightness of the background against which the runway lights are viewed. The background illumination is normally measured by a 'background luminance meter' close to the runway.

However, all of these parameters have inherent measurement errors. The theoretical runway light intensity can be significantly



## ABOUT THE AUTHOR

Alan Hisscott works for the Isle of Man Government as Senior Meteorological Officer of the Isle of Man MET Office, based at the Isle of Man Airport. As a physicist he has an interest in any new technology which becomes available and as the head of a small national meteorological service he has the opportunity to get 'hands-on' experience with new instrumentation (primarily with respect to the island's network of approximately 30 automatic weather stations). Dr. Hisscott has been involved with regular calibrations of the Isle of Man's Human Observer RVR assessments (HORVR) and with several trials investigating the suitability of forward scatter visibility sensors for RVR assessment.

reduced by contamination of the external surface and by the ageing of the light source. The illuminance threshold can be influenced by the location of the background luminance meter and the sensitivity of the pilot's eyes will vary between individuals. Also, the true visual guidance available to the pilot can be affected by the windshield transmittance, which depends on design, inclination and thickness, etc. The ICAO Manual on RVR provides an analysis of the likely magnitude of many of these effects on the RVR calculation from a measured extinction coefficient. My conclusion was that the magnitude of the difference in measuring the extinction coefficient with either transmissometer or forward scatter sensors was no larger than the accepted uncertainties in the other parameters used in the calculation of RVR.

I compiled all of the results and conclusions described above into a business case suggesting that Isle of Man Airport should procure an IRVR system based on FSMs (*see sidebar, page 26—bottom*). The document was also discussed at a meeting with UK Civil Aviation Authority Safety & Regulation Group.

Following a positive discussion, the CAA SRG decided to adopt the ICAO Annex 3 recommendation for the use of instrumented systems for the assessment of RVR on runways intended for operations to ILS Category 1. An ATS Information Notice (ATSIN) was published suggesting that UK airports currently using HORVR should consider adopting IRVR using either transmissometers or FSM instruments. Also the CAA publication CAP670 (ATS Safety Requirements) is currently being amended to reflect the recommendation for IRVR to be provided for CAT1 runways using either transmissometer or forward scatter instruments. Allowing the use of forward scatter visibility sensors should make IRVR a cost effective option for many airfields with ILS CAT1 runways and contribute to the safety of operations in adverse weather conditions. ■

Fig. 4: Isle of Man Airfield Diagram

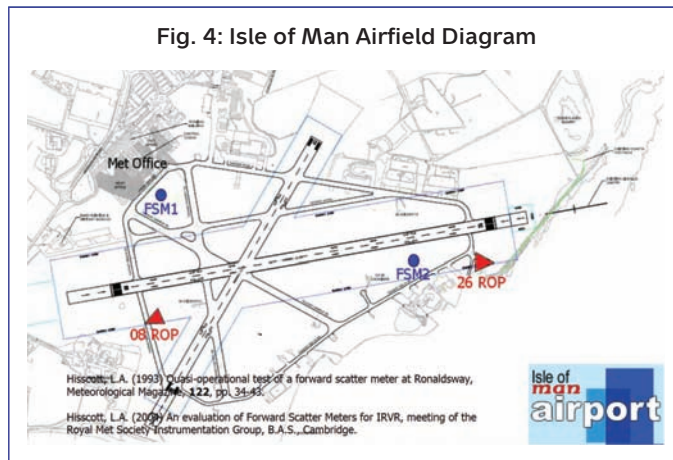
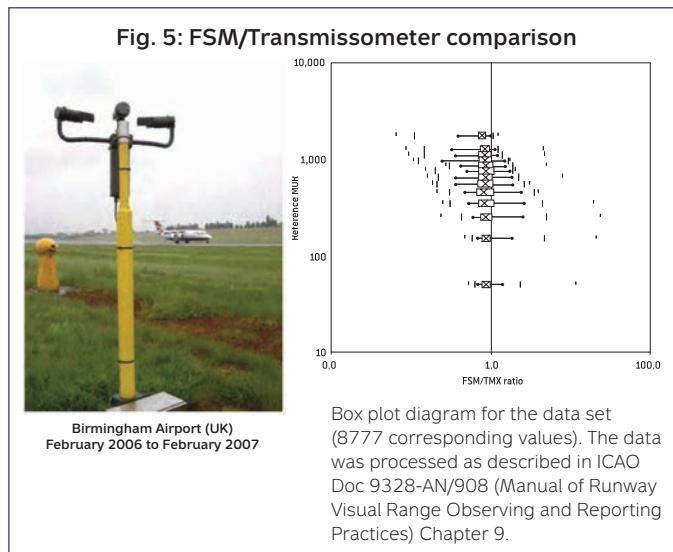


Fig. 5: FSM/Transmissometer comparison



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- Hisscott, L.A. (1993). Quasi-operational test of a forward scatter meter at Ronaldsway, *Meteorological Magazine*, 122, pp. 34-43.
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# IATA STEADES

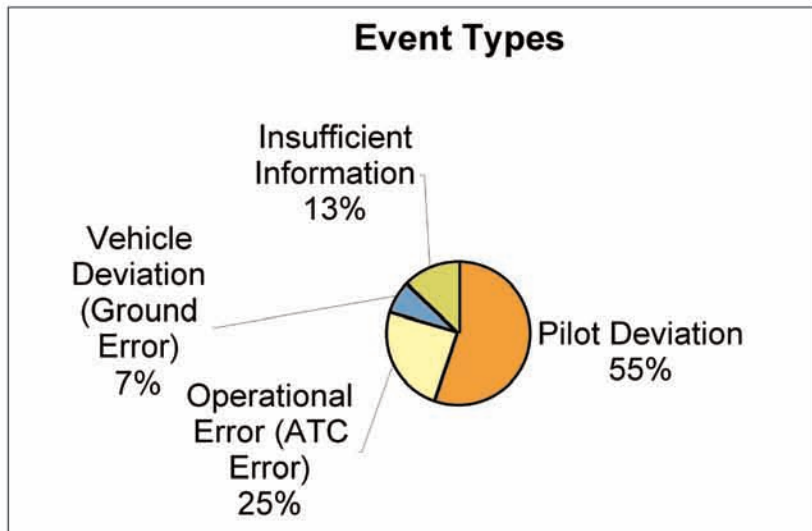
## Runway Incursion Analysis

There are relatively few ground collision accidents resulting from runway incursions each year. Whilst most of the runway incursions tend to be benign, the decreased margin for safety and increased chance of collision make them important. The aviation community stands to learn from incidents. Just as this industry has come together and has significantly reduced CFIT accidents, so must we turn our attention and resources to preventing collisions. Reducing CFIT accidents was done through wide ranging efforts from increasing awareness to developing technology solutions such as EGPWS.

The potential for a collision due to a runway incursion is of concern to both IATA's Safety Group and Operations Committee. In 2005, in an effort to raise awareness among pilots, air traffic controllers, airport vehicle operators and airport managers, and to disseminate practices developed worldwide to enhance safety and prevent future occurrence, IATA and ICAO launched a joint Runway Incursion Prevention toolkit. Still today, IATA's efforts to understand and reduce runway incursions continue.

Despite the many initiatives launched to prevent runway incursions, they continue to plague the industry. What are the common threat scenarios surrounding these events? IATA performed analysis using STEADES<sup>1</sup> data to explore threat scenarios linked with runway incursions in order to provide an updated perspective and highlight prevention strategies.

The analysis of 110 high-risk runway incursion reports contained in STEADES from 01 July 2002 to 31 March 2007 revealed that the majority (55%) of runway incursions are the result of pilot error, whereas 25% resulted from ATC errors and 7% from vehicle deviations. The contributing factors linked with each of these categories are explored in the narrative analysis. The analysis exposed that airlines and flight crew should be especially cognisant of the following threat scenarios:



- Occasions when the flight crew is instructed by ATC to follow another aircraft, either during taxi or as a conditional clearance for take-off. In these situations there is a higher likelihood for confusion in communicating and determining which aircraft to follow, as well as the pilot acting on an anticipated clearance, instead of an actual clearance.
- Flight crew are the last line of defence in runway incursions involving vehicles, as they are the first to notice and react to the conflict. ATC was first to react to runway incursion involving vehicles in only 11% of cases.
- Airport expansion and the associated construction lead to multiple closed taxiways and runways creating confusion for the pilots. In addition, some closures change on a day-to-day basis therefore airlines and flight crews need to be vigilant in noting ATIS and NOTAM information. Airport authorities should take into consideration the increased potential for confusion associated with construction and closed taxiways and thus consider the routing of aircraft during the planning of construction.

To understand these threat scenarios and learn more about the prevention strategies associated with them, download the full Runway Incursion analysis at [www.iata.org/steades2008](http://www.iata.org/steades2008)

<sup>1</sup> STEADES (Safety Trend Evaluation, Analysis and Data Exchange System) is a database, the largest of its kind, consisting of over 500,000 Safety Reports. The analysis is possible due to a community of over 60 companies contributing data regularly. Contributors benefit from industry insights garnered from regular analysis presented and shared in quarterly analysis reports. Other benefits include access to query the global STEADES database and tools for benchmarking airline safety reporting performance. STEADES will form the foundation of IATA's new Safety Information Centre, a new web portal of safety information. To join this community or to find out more about STEADES please visit [www.IATA.org/STEADES](http://www.IATA.org/STEADES).

# Paving the Way to Safer Airports

THE FIRST-EVER ANALYSIS OF ICAO'S UNIVERSAL SAFETY OVERSIGHT AUDIT PROGRAMME RESULTS IS PROVING INVALUABLE IN THE DETERMINATION OF AERODROME SAFETY-RELATED DEFICIENCIES AND WILL BE AN ESSENTIAL GUIDE-POST FOR FUTURE SOLUTIONS

The continuous improvement of runways is absolutely critical to safe and efficient air transport operations, yet this function must also be viewed within the much larger context of airport systems and facilities. Airports are where the vast majority of operational elements of a flight come together.

To ensure optimum safety and efficiency of all airport operations, it is essential that ICAO Standards and Recommended Practices (SARPs) contained in *Annex 14—Aerodromes*—to the Convention on International Civil Aviation be fully implemented and enforced. This is the individual responsibility of the 190 Member States of the Organization. Many of them, however, do not always possess the expertise or the methodology to assess by themselves their performance.

Enter the ICAO Universal Safety Oversight Audit Programme (USOAP). The mandatory USOAP was launched on 1 January 1999 to help States identify and correct potential shortcomings in the implementation of SARPs. The initial phase of the programme was limited to *Annex 1—Personnel Licensing*, *Annex 6—Operation of Aircraft* and *Annex 8—Airworthiness of Aircraft*. In 2005, the USOAP was expanded to all Annexes with safety-related provisions, including Annex 14, which covers aerodrome design and operations. Audits would now be conducted under a Comprehensive Systems Approach, or CSA.

Since its inception, USOAP has had a markedly positive impact on aviation safety. Its value was further demonstrated with the first analysis of audit results under the CSA, which was

## CORE REGULATORY AREAS

The analytical process involved looking at eight core regulatory areas, including aerodromes, against eight Critical Elements (CEs) of a safety oversight system. The level of effective implementation of the CEs indicates a State's capability for effective safety oversight. The CEs are:

- CE-1. Primary aviation legislation.** The provision of a comprehensive and effective aviation law consistent with the environment and complexity of the State's aviation activity and compliant with the requirements contained in the Convention on International Civil Aviation.
- CE-2. Specific operating regulations.** The provision of adequate regulations to address, at a minimum, national requirements emanating from the primary aviation legislation and providing for standardized operational procedures, equipment and infrastructures (including safety management and training systems), in conformance with ICAO SARPs.
- CE-3. State civil aviation system and safety oversight functions.** The establishment of a Civil Aviation Authority (CAA) and/or other relevant authorities or government agencies, headed by a Chief Executive Officer, supported by the appropriate and adequate technical and non-technical staff and provided with adequate financial resources. The State authority must have stated safety regulatory functions, objectives and safety policies.
- CE-4. Technical personnel qualification and training.** The establishment of minimum knowledge and experience requirements for the technical personnel performing safety oversight functions and the provision of appropriate training to maintain and enhance their competence at the desired level.
- CE-5. Technical guidance, tools and the provision of safety-critical information.** The provision of technical guidance, tools and safety-critical information, to the technical personnel to enable them to perform their safety oversight functions in accordance with established requirements and in a standardized manner.
- CE-6. Licensing, certification, authorization and approval obligations.** The implementation of processes and procedures to ensure that personnel and organizations performing an aviation activity meet the established requirements before they are allowed to exercise the privileges of a licence, certificate, authorization and/or approval to conduct the relevant aviation activity.
- CE-7. Surveillance obligations.** The implementation of processes, such as inspections and audits, to proactively ensure that aviation licence, certificate, authorization and/or approval holders continue to meet the established requirements and function at the level of competency and safety required by the State to undertake an aviation-related activity for which they have been licensed, certified, authorized and/or approved to perform.
- CE-8. Resolution of safety concerns.** The implementation of processes and procedures to resolve identified deficiencies impacting aviation safety, which may have been residing in the aviation system and have been detected by the regulatory authority or other appropriate bodies.



presented to the 36th Session of the ICAO Assembly in September 2007. The Report covers the period from April 2005 to May 2007 and involves a balance of 53 developed and developing States audited under the CSA.

Given the need for a holistic approach to the subject of aerodrome design and operations, including runway integrity, the Report provides clear indications for improving not only the runways themselves but also the systemic context in which such improvements must be defined and carried out. Following is an overview of aerodrome-related findings by Critical Element.

#### **CE 1**

Approximately 75% of States audited have promulgated primary aviation legislation. There were, however, significant shortcomings in the effective implementation of various components of the legislation with regard to compliance with the Chicago Convention, the establishment of a CAA, the delegation of authority and the empowerment of CAA inspectors.

#### **CE 2**

Many Contracting States have not developed an effective system for amending their regulations pursuant to receiving ICAO Annex amendments. A majority have not established a system for the identification and notification of differences to ICAO.

#### **CE 3**

Several States have not yet established an organizational structure responsible for the certification and surveillance of aerodromes. In addition, most States have not clearly defined the functions and responsibilities of the aerodrome regulatory technical staff. A large number of States do not have sufficient human resources with the different technical disciplines required for the certification and surveillance of aerodromes, especially in the areas of airport operations and certification. Another area of concern in aerodromes is that States have not yet established a distinct separation between the service provider and the regulatory authority.

#### **CE 4**

The majority of the States have not established a Directorate of Aerodromes for the certification and surveillance of aerodromes. As a result, the technical personnel qualifications and experience have not been established. Also, a large number of the States have not developed and implemented a training policy and programme.

#### **CE 5**

A large percentage of ineffective implementations relating to technical guidance, tools and the provision of safety-critical information is linked to aerodromes—primarily since the majority of States have not established procedures for the certification of these facilities. Also, several of the States have developed little or no guidance for the certification and surveillance of aerodromes for the regulatory technical personnel and the industry.

#### **CE 6**

Most States have not certified their aerodromes for compliance with the international standard for establishment of a safety management system (SMS), and have not submitted to the appropriate authority an aerodrome manual for review and approval by the CAA. As part of the certification process, many States have not ensured that aerodrome operators comply with all of the requirements pertaining to aerodrome operational services and physical facilities. In addition, for the States that have not certificated their aerodromes, the operational services and physical facilities have not been inspected as part of the aerodrome certification process.

#### **CE 7**

A number of States have not established a formal surveillance programme for the continuing supervision of aerodrome operators. Some States are conducting surveillance with an ad-hoc approach, and have not established and formalized a surveillance programme. In other cases, where there is no clear separation of authority between the service provider and the regulatory function, the State is conducting surveillance only as the service provider. It is also the case that some States do not have personnel with the required expertise in the different technical areas to conduct effective surveillance of their aerodromes.

#### **CE 8**

Results show a 34% lack of effective implementation regarding the resolution of safety concerns.

This analysis of USOAP audit results sheds light on the major weaknesses for each of the areas under investigation with respect to specific provisions of the ICAO Annexes. With respect to aerodromes, the analysis has revealed that a large number of the States have not yet certified (or established a process for the certification of) aerodromes. In particular, most States have not ensured that aerodrome operators implement an SMS as part of their aerodrome certification process. There was a high lack of compliance with provisions for runway friction, runway end safety areas (RESA), pavement use and the periodic testing and review of the aerodrome emergency plans. The remaining high percentage of unsatisfactory results points to weaknesses in State's surveillance programmes, including lack of expertise in highly specialized areas such as rescue and fire fighting, as well as bird hazard control.

Ensuring optimum safety and efficiency of airport operations requires the full cooperation of all stakeholders—ICAO, Member States, airport management, suppliers and air line operators. This first analysis of USOAP audit results offers practical insight into the measures that need to be taken cooperatively in order to improve not only the design and operation of aerodromes, including runways, but the entire civil aviation oversight system. ■

# ICAO's Civil Aviation Purchasing Service (CAPS) – 30 years on

## An Important Element Of Technical Co-operation

**Ruben Gallego Rodriguez, Chief, Procurement Section, Technical Co-operation Bureau and Colin Everard, Former Chief (1971-1979), Procurement Section, TCB**

During the seventies, ICAO's technical co-operation activities had expanded rapidly; the value of ICAO's supporting inputs increased some ten times over a period of about eight years—from project inputs of US\$ 8M in 1970 to US\$ 85M in 1980 (taking inflation into account US\$ 85M in 1980 would equate to \*US\$ 210M in 2007).

With this expansion, the importance and scale of equipment project components considerably increased. It was also of significance that, in the interest of air safety, the UNDP recognized the need to finance operational equipment. With this overall expansion, ICAO's TCB Procurement Section gained valuable experience in purchasing equipment and services in the higher-value categories.

### CAPS Concept

During this period, ICAO's TCB Procurement Section had put in place sound procurement practices and procedures which reflected the most up-to-date professional standards. The system included, for example, a highly developed international sourcing sub-

system. This led to some State civil aviation agencies entering into Trust Fund agreements with ICAO for the purpose of acquiring equipment.

The application of the Trust Fund Agreement was originally inflexible, with the overhead rate fixed at 14% (for a period this was reduced to 13%). This very rigid approach effectively prevented a State civil aviation department or agency from benefiting from ICAO's procurement expertise when it needed high-value equipment and systems, simply because the application of the across-the-board standard rate became prohibitively more expensive as the value of the procurement increased. This reality led to the development of ICAO's CAPS Service.

Before CAPS was formally introduced, some two years elapsed while the details of the type of service to be offered were discussed in-house and (informally) with several civil aviation administrations. Eventually a circular letter was addressed to civil aviation administrations enquiring whether they would support the introduction of the service, and

within two months some 80 positive responses had been received. Today, the number of CAPS Registrations held by ICAO is 123.

### Structural Approach

From the outset, the watchword for CAPS was flexibility linked with practical simplicity. Under CAPS, not only was the overhead rate progressively lowered as the value of the procurement increased, but specific elements of the service were detailed separately in terms of the associated overhead cost. For example, systems design, the compiling of detailed equipment specifications, evaluation of bids, the procurement itself, factory/on site inspections and so forth were stated as linked-but-separate entities. As well, each element was shown with its associated overhead percentage cost. Thus, a government civil aviation user could take advantage (or not) of any or all elements as decided by the user of the Service.

One aspect of the Service which merited special consideration was the approach to be adopted to the bidding process.





With speed, flexibility and overall efficiency as the main consideration, a balance was struck between a lengthy drawn-out procedure and a shorter method.

### Advantages

For the civil aviation agency or administration user there are several major advantages to be derived from using ICAO's CAPS scheme. Interestingly, one of these advantages is the psychological aspect. In following all the complex steps in seeing a significant and invariably complex procurement operation succeed, the fact that ICAO is totally on the side of the buyer is of tremendous psychological benefit.

From the aspect of operational effectiveness, enormous benefit is also derived from the fact that the secretariat staff of ICAO constitutes one of the most comprehensive concentrations of international legal, air transport and technical capabilities in the world. To the extent that particular specialized expertise might additionally be needed, ICAO maintains a comprehensive consultants' roster.

### Types of CAPS Work Undertaken

The scope of CAPS mandate has been particularly broad. The yearly value of CAPS work is variable, which means that its approach must be ready at all times to handle a highly-varied mix of work. The essence of sound procurement is to buy the right equipment at the right price for delivery at the right time. Certainly, in the

case of complex systems (often with a value of several million US dollars), the task involved can prove highly challenging. Some CAPS work has encompassed complete airport development, while other procurements have covered navigational aids, lighting systems, CFR (crash, fire, rescue) equipment, communications systems and flight simulators.

ICAO is always conscious of the fact that procurement is the responsibility of the civil aviation administration, meaning that ICAO performs a role which is essentially supportive in nature. In the case of major procurements, the civil aviation agency often has important infrastructure responsibilities in connection with the installation and commissioning of systems, and in the case of navigation equipment and systems meticulous site preparation is of crucial importance.

Finally, the critical need for the training of operational and maintenance staff needs to be addressed at an early stage, meaning that if a major procurement is to be successfully accomplished (sometimes over a period of 2-3 years), the inevitably complex operation needs to become a constructive partnership.

In 2007, the estimated value of work to be handled under CAPS is estimated (at this time) to exceed US\$ 130 million. Current projects involve procurement on behalf of several civil aviation administrations and covers a wide range of services.

### Challenges Foreseen

With the excellent international procurement experience gained under the CAPS scheme, in general terms the CAPS outlook indicates continued healthy expansion. Based on experience to date, attention should be directed to two areas so that the quality of CAPS can be enhanced.

It should be noted in advance that in the field of procurement there are no shortcuts—case histories have clearly shown that where essential procurement steps have been abbreviated or ignored the result has been a (sometimes very

serious) wastage of money and resources. There are two particular areas therefore where attention needs to be directed by both civil aviation agencies and ICAO itself:

1. Cases where apparent external attempts have been made to influence the CAPS procurement process. As far as ICAO is concerned the ethical procedural transparency and overall integrity inherent in every procurement process must remain of paramount importance. Should any outside steps be shown as constituting attempted interference in the proper procurement process then ICAO should institute whatever steps as may be required to negate such attempted influence.
2. Conflicts which may occur between the provisions of a user-Government's procurement law and the criteria employed by ICAO when assessing bids. This conflict surfaces, for example, when a national procurement law states that a contract must be awarded to the lowest bidder. However, in large-scale, complex procurements there are additional factors other than price which need to be addressed when evaluating bids. What is often of greater importance is the overall *value* represented by a given submission, and ICAO must forcefully emphasize this fact when the safety and efficiency of the facility or system in question may be compromised by lowest-bid methodologies.

In the interest of achieving the best possible level of air navigation safety, it is strongly recommended that Governments review their procurement law as applied to the provision of civil aviation systems and equipment, with a view to permitting a more flexible approach, thus ensuring a more effective result. To the extent that the two areas referred to above can be more efficiently handled, enhancement in the execution of procurements under ICAO's CAPS will be achieved. In turn, this will lead to greater international, and national, flight safety. ■



## ICAO Aviation Security Passenger/Cabin Baggage Screening (AVSEC/PAX/BAG) Seminar: Workshop for the North American, Caribbean and South American Regions

(Montego Bay, Jamaica, 28 to 30 January 2008)

The ICAO Aviation Security Passenger/Cabin Baggage Screening (AVSEC/PAX/BAG) Seminar-Workshop for the NAM/CAR/SAM Regions was held in Montego Bay, Jamaica, from 28 to 30 January 2008, as part of the ICAO/Canada Training Awareness Programme Phase II Initiative and kindly hosted by the Civil Aviation Authority of Jamaica. The event was conducted in English and Spanish and attracted 73 participants from Argentina, Barbados, Brazil, Chile, Colombia, Cuba, Dominica, El Salvador, Haiti, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Peru, Saint Lucia, Spain, United States, Uruguay, Venezuela, ACI-LAC, COCESNA, IATA and IFALPA. ■

## Preview: Accident Investigation and Prevention (AIG) Divisional Meeting 2008

(Montréal, 13-18 October 2008)

The Accident Investigation and Prevention (AIG) Divisional Meeting is open to all Contracting States and, as invited by the Council, to non-Contracting States and international organizations. The representatives of non-Contracting States and international organizations may participate in the meeting with observer status.

The meeting is called for to discuss subjects in the fields of aircraft accident investigation and accident prevention. The theme of the meeting is "Developing investigations to enhance safety worldwide". In this respect, the meeting would address a number of important provisions in Annex 13—

Aircraft Accident and Incident Investigation with a view to further improving and amplifying the scope of investigations in a cost-effective environment.

The meeting would also discuss, among other issues, the future of accident and incident investigations, aimed at helping some States through the development of regional investigation bodies.

Representatives from aircraft accident investigation authorities of all Contracting States and regional and international safety organizations have been invited and are strongly encouraged to participate. ■



Participants at the Safety Indicators Study Group (SISG) 8<sup>th</sup> meeting on 13–15 February 2008. This group develops safety indicators and improves base data related to in-depth analysis of the Accident/Incident Reporting (ADREP) System. Members discussed categorization and classification issues as well as future solutions for the tasks to be progressed through common taxonomy—including the development of new safety indicators. ■



Members of the AFI Comprehensive Implementation Programme (ACIP) Steering Committee met for the first time on 14 and 15 February 2008 at ICAO headquarters. The purpose of the event was to review and approve the work programme developed by the Secretariat and report to the Council for endorsement. **Front row:** Mr. Charles E. Schlumberger, Mr. Haile Belai, Ms. Susan McDermott, Dr. Taïeb Chérif, Dr. O.B. Aliu, Ms. Berti Kawooya, Mr. Michael Comber, Mr. Tshepo Peege. **Back row:** Mr. Timothy Fenoulhet, Mr. Georges Thirion, Mr. Libin Wen, Mr. Moussa Halidou, Mr. Papa Issa Mbengue, Mr. Boubacar Djibo, Mr. Jalal Haidar. ■



The EC/ICAO Symposium on Regional Organizations was held at ICAO HQ on 10 & 11 April. Delegates discussed the impact of regional organizations on international civil aviation. The photo above shows the members of Panel One who discussed regulatory cooperation at regional level, notably in the field of safety. **Back row from left-to-right:** Mr. A. Tuela (PASO), Mr. H. Belai (ICAO), Mr. John Wilson (RASOS), Mr. Patrick Goudou (EASA) and Mr. Michael Jennison (FAA). **Seated from left-to-right:** Ms. Felicia Alvarez (ACSA), Ms. Nancy Graham (ANB/ICAO), Mr. David McMillan (EUROCONTROL) and Cpt. Len Cormier (CTA, COSCAP-SEA). ■

## New ICAO Council Appointments



**Name: Eduardo Falcón ■ Country: Venezuela**

Eduardo Antonio Falcón Gotopo was named Representative of Venezuela on the Council of ICAO on 28 September 2007.

Colonel (AVB [Bolivarian Aviation]) Falcón Gotopo obtained a degree in military arts and sciences with a specialization in aeronautics from the Venezuelan School of Military Aviation on 5 July 1983. He holds the rank of Colonel.

In Venezuela he has studied aviation resources management and has done master's courses in the management of air power. In addition he has taken an air command and staff course in Brazil.

Colonel (AVB) Falcón Gotopo is a military pilot and helicopter flight instructor. He has been a professor at Venezuela's School of Air Warfare, teaching problem-solving techniques, staff functions, the study of air warfare and single-action and double-action war games.

Mr. Falcón was General Manager of Aviation Safety and Security at the Venezuelan National Institute of Civil Aviation from 2003 to 2005, and he was Permanent Representative of Venezuela to ICAO from 2005 to 2007. ■



**Name: Dionisio Méndez Mayora ■ Country: Mexico**

Mr. Dionisio Méndez Mayora completed his professional studies at the Universidad Nacional Autónoma de México. He began his professional career with Grupo DESC in the area of technology transfer and industrial security. In the private sector he worked for the National Bank of Mexico as Director of capital risk and financial engineering of energy and transportation projects. In 1995, he joined the Ministry of Communications and Transports of Mexico as Director of Transport and Aeronautical Control and later he held the position of General

Director Alternate for the National Civil Aviation Authorities. In 1997 he was credited to the Permanent Mission of Mexico to the ICAO as Technical Specialist, and in 2002 he was designated as Alternate Representative of Mexico before the Council, a position that he occupied until May 30<sup>th</sup>, 2007, when he was nominated by the Government of Mexico as Permanent Representative before the Council.

Mr. Méndez has participated as Delegate for Mexico in several ICAO Assemblies and Conferences and has been a member for several years of the ICAO group of experts on airports economics, as well as on the Committees on "Unlawful Interference", "Air Transportation" and "Finances". On a regional level, he was designated to attend several Assemblies and meetings of the Latin American Civil Aviation Commission, as well as to the North American Aviation Trilateral Meeting.

The Government of Mexico awarded him with the National Prize and he has been an expert for the Latin American Energy Organization (OLADE) 1983-1985; consultant for the United Nations for Industrial Development (ONUDI) 1985-1990 and consultant for the Enterprise Coordinating Council 1991-1992. ■



## Aviation's NextGen – Plan for a Global System

Marion Blakey

President and CEO, Aerospace Industries Association of America

ABRIDGED VERSION OF THE ORIGINAL PRESENTATION TO THE FOURTH ANNUAL ASSAD KOTAITE LECTURE ROYAL AERONAUTICAL SOCIETY – MONTREAL BRANCH MONTREAL, QUEBEC

We are at a pivot point in international aviation. The looming question is “How do we expedite the next generation of air transportation in a way that is internationally integrated?” I think we all recognize that despite the differing names and details, the only way to cope with the challenges of booming international aviation is by moving rapidly to a seamless, interoperable, satellite-based system.

To do so, the U.S. and Europe need to work together—along with our partners—to foster this international interoperability. I was pleased to learn today that ICAO will be hosting two Symposia on this subject in 2008. Both events are intended to advance international interoperability and to identify what the community needs from ICAO in order to expedite the development and implementation of the future generation of air transportation.

Frequently, particularly in computers and telecommunications, we talk of technology “leapfrogging.” It occurs when less-developed countries, regions or economies make huge gains by skipping over entire phases of advancement and adopting state-of-the-art technologies. Think of widespread use of mobile phones in many developing nations with no land-line infrastructure to speak of. I believe there is great potential for this phenomenon now in aviation as well.

While it is obvious the architecture of most of today's air traffic management is a little long in the tooth, that does not mean there has not been progress. RNAV, RNP and Ground Based Augmentation Systems like WAAS and LAAS, are providing significant improvements while proving the worth of satellite-based technology. But there is no escaping the fact they are still based upon an aging and limited platform.

Which brings us to ADS-B—Automatic Dependant Surveillance-Broadcast. Much of the discussion about the benefits ADS-B will bring, especially when talking about the United States, has centered on dealing with delays and the need for ever-growing capacity. One of the early adopters of the technology, UPS, convinced me that ADS-B had great potential for significant safety enhancements, including avoiding runway incursions (see related article on page 16).

Less talked about, too, is one of the most important benefits inherent in advanced air traffic management technologies—the reduction of the impact of aviation on our environment. The FAA estimates that improvements included in the NextGen program will reduce CO<sub>2</sub> emissions by 12 percent, and IATA has reported its proactive program to improve airspace design and operational procedures saved up to 15 million tons of CO<sub>2</sub> emissions in 2006.

One of the most interesting things is the way ADS-B is spreading in pockets around the world. One great example is a proposed World Bank-funded program in East Africa involving Kenya, Tanzania and Uganda. Other projects are taking place or are planned for Indonesia, China and Japan. And throughout much of this you see a common thread. You do not have to overcome a huge investment in “what is” to achieve “what could be.”

As an aside, these international experiences have provided a couple of important lessons. One is that a regional approach can be vital to the success of technology advancement. Another is that implementation of the system must be accompanied by a strong regulatory oversight system with the authority of law. The entrenched architecture of an old system will be a problem wherever it exists. In Europe they are grappling with the Single Sky issue, coming up again against tough parochial concerns. Measures they hoped to achieve voluntarily may have to be mandated, and it is still questionable whether the various nations will agree to combine their air space at all. Solutions for these problems are hard to come by.

I want to state this very clearly. We can achieve a seamless global air transportation system. What's more, we must. ICAO has worked hard to encourage improvements to global air traffic management, and it is a natural forum to oversee the structure and implementation of the global system. And the U.S. and Europe—they have to avoid letting “what is” be the enemy of “what could be.” As a world community we need to ensure developing countries are not left by the wayside. But, in fact, with the ease of implementing technology and the leapfrog effect, those with the least in aviation may very well lead us. ■

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