ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

The process of
Proficiency

Why ICAO and aviation English education specialists are now working together to support shared Level 4 implementation and validation objectives

Contents

CORRECTION NOTICE

ICAO Journal 01, 2009 (Vol.64, No.1), mistakenly reflected Mr. David Fahey's name as "John Fahey" in
the cover introduction to his interview with ICAO's Environment Unit. The *Journal* editorial team wishes to
apologize to Mr. Fahey and the Environment Unit for this unfortunate oversight.

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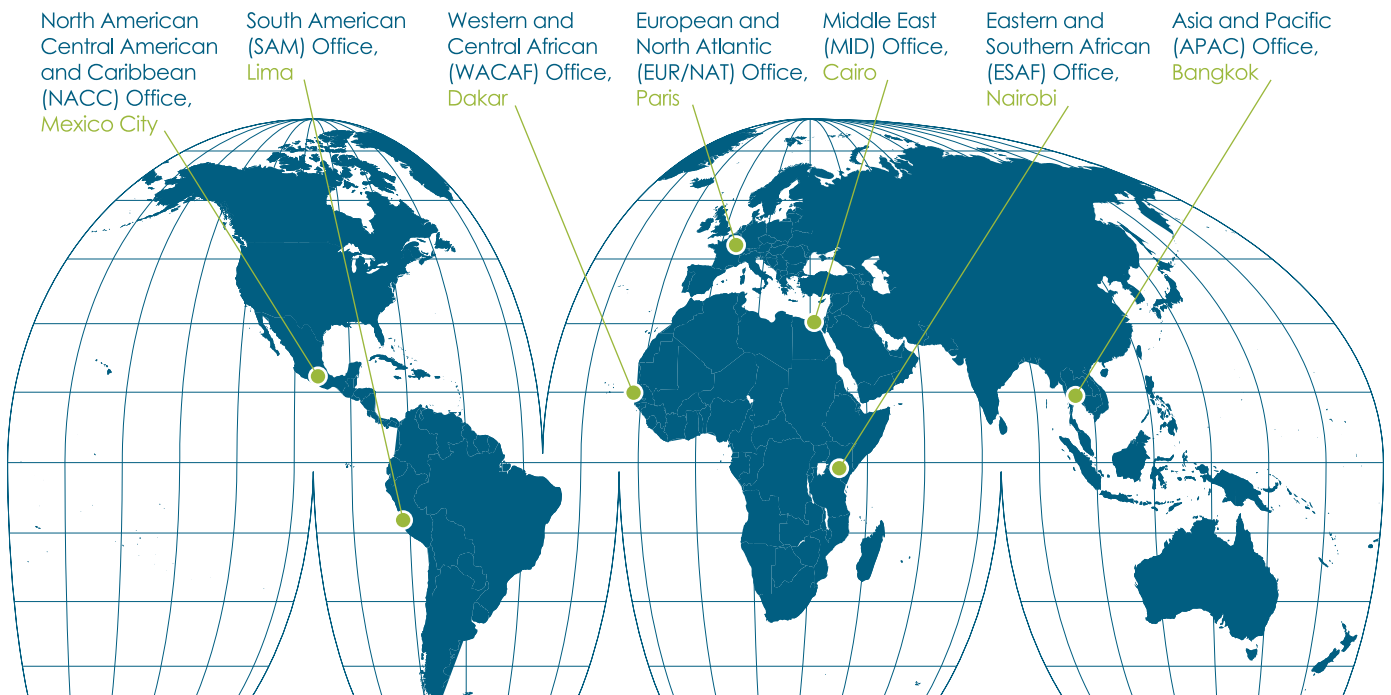
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The International Civil Aviation Organization

New Guidelines for aviation English training programmes

The introduction of the ICAO Level 4 Language Proficiency Requirements (LPRs) in 2003, as well as the subsequent steps taken to assist in their effective and timely implementation, has significantly altered the environment in which aviation English training is now carried out.

To help address the challenges that have emerged for aviation English educators and the end-users of new training programmes that have been developed to address ICAO's requirements, the International Civil Aviation English Association (ICAEA) is now finalizing, in cooperation with ICAO, a set of "Guidelines for Aviation English Training Programmes" that will be of invaluable assistance to all aviation English stakeholders as they continue to fine-tune their training programmes and end-user objectives.

While there are internationally recognized bodies providing accreditation for schools teaching English as a foreign language (including the qualifications required for teachers of English as a foreign language), there is presently no formal system of accreditation or qualification for schools or teachers developing and delivering aviation English training.

Similar to aviation English testing, aviation English training is an unregulated industry. It remains, however, that language training in aviation has specific objectives, content, criteria of proficiency, conditions of use and professional and personal stakes which set it apart from the teaching of language in any other area of human activity. Some of these unique criteria may be summarized as follows:

■ Language is designed to ensure unambiguous pilot-controller communication.

Five facts about aviation English you cannot ignore:

1. Language proficiency is a **safety** imperative.

2. There are no short-cuts when it comes to language learning and **safety**.

3. From 2008, ICAO **Safety** Audits *will* include Standards for Language Proficiency.

4. An increase in **safety** requires closely focused training to achieve lasting results.

5. Aviation English Services personnel were leaders in the development of the **safety**-driven ICAO language proficiency requirements.

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ICAEA President Philip Shawcross (front row, second from left) standing with staff from ICAO's MID (Middle East—Cairo) Regional Office.

- The language used employs a very specific set of vocabulary, expressions and functions.
- Operational efficiency, rather than linguistic correctness, is the ultimate criterion by which proficiency is assessed.
- Communication is predominantly oral and most often with no supplementary visual clues.
- Aviation communication not only affects the safety of the travelling public and success of individual careers, it also carries economic repercussions for many activities and actors in the aviation industry—directly through testing and training costs and indirectly through effects on staffing.

In the absence of any current system of accreditation, validation or specific teacher qualifications, the "Guidelines for Aviation English Training Programmes" have been drawn up by the International Civil Aviation English Association (ICAEA), in cooperation with ICAO, in order to assist the aviation community in the process of selecting and contracting with aviation English training providers and to set appropriate standards of good practice for the teaching of aviation English. An agreement to co-publish the new Guidelines is also being explored by ICAO and ICAEA

with a target publication date now set for later in 2009.

"ICAEA approached ICAO about the concept of these new Guidelines and we realized from the onset that this would be a very useful development with respect to our wider objectives with the Language Proficiency Requirements (LPRs) we had introduced in 2003," commented Nicole Barrette-Sabourin, ICAO's Technical Officer responsible for Language Proficiency. "ICAO's goals have always been safety-driven and aviation-focused in this area, but upon the introduction of the LPRs we were pleased to see that they elicited a great deal of interest in the aviation English language education community. When ICAEA approached us about the idea for the Guidelines we were happy to collaborate with them in order to better support ICAO's Member States and the other aviation stakeholders in their efforts to address the Requirements in as cost-effective a manner as possible."

The ICAO LPRs apply to achieving and maintaining proficiency in all languages employed in radiotelephony communications. As English is by far the language most widely used in common by the global aviation community, however, and the only one which there is a specific

requirement to provide, the aviation community's main focus for the time being is to improve levels of spoken English.
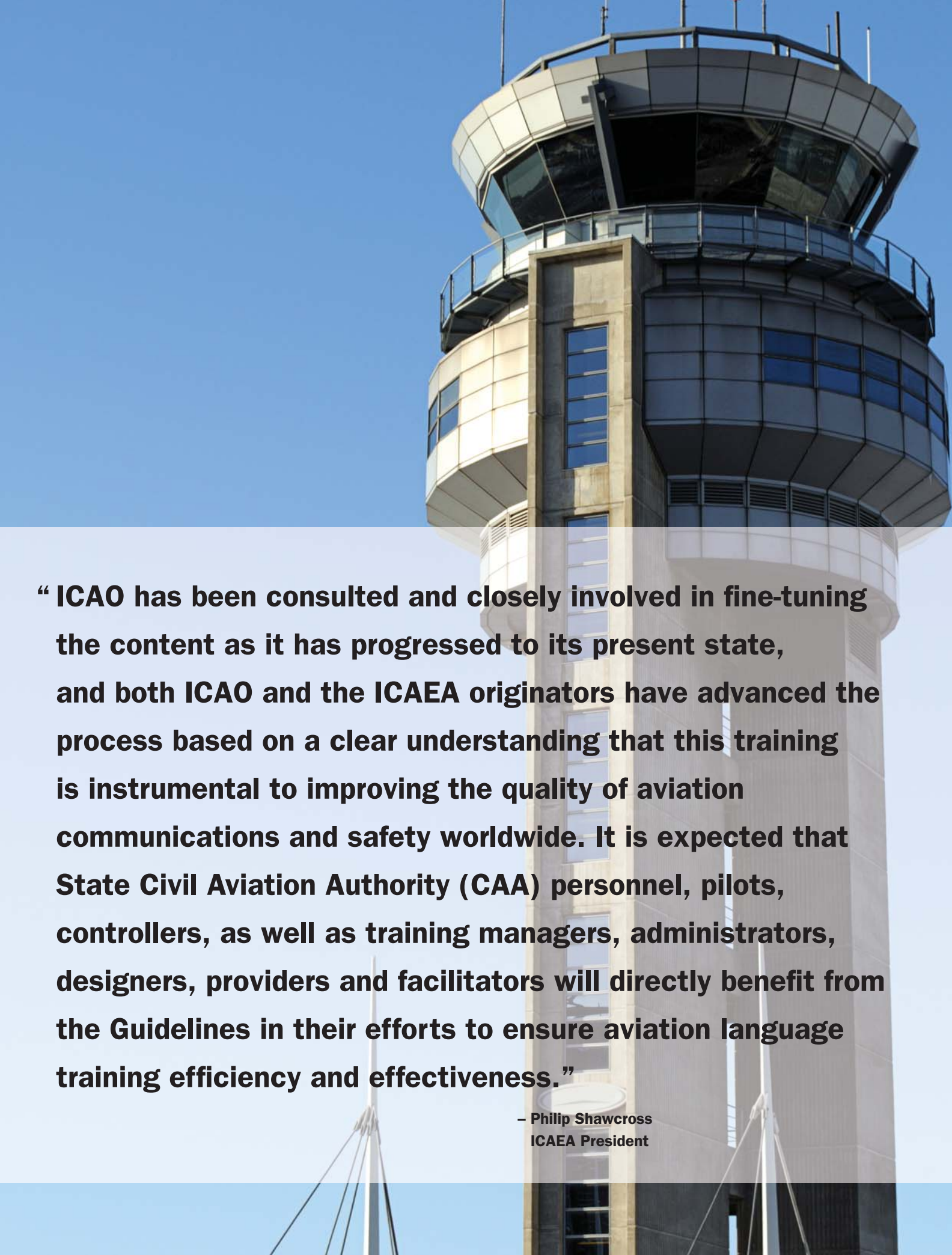
But where ICAO's goal was to define an end-point that would achieve its safety-related objectives, the worldwide English language education community saw this new development from their own perspective and were immediately interested in the particular challenges that aviation English training posed to its existing network of trainers and courses. The situation was tailor-made for a win-win collaboration between the two communities.

"ICAEA had been concerned about ways of enhancing the standards and appropriateness of aviation English training," began ICAEA President, Philip Shawcross. "By that point I had already determined the four main headings that now define the structure of the Guideline content and, after some brief discussions regarding appropriate methods that would guide our endeavour, Nicole and I agreed that we could make use of the upcoming ICAEA *Eighth International Civil Aviation English Association Forum* at Cambridge (held in September 2007) to establish Working Groups that could help us define the main chapters in more detail."

The introduction of the ICAO LPRs, as well as the subsequent steps taken to assist in their effective implementation, has significantly altered the environment in which aviation English training is now carried out. From an optional, irregular objective that once sat on the periphery of professional training and was entirely dependent on available funds, ICAO's Operational Level 4 proficiency requirements have now provided aviation English training activities with a very specific set of objectives and timelines.

This transition has had considerable repercussions. In earlier periods, when language training delivery was entirely restrained by budgetary limits, there was little real awareness of the considerable time required in order for a learner to

" ICAO has been consulted and closely involved in fine-tuning the content as it has progressed to its present state, and both ICAO and the ICAEA originators have advanced the process based on a clear understanding that this training is instrumental to improving the quality of aviation communications and safety worldwide. It is expected that State Civil Aviation Authority (CAA) personnel, pilots, controllers, as well as training managers, administrators, designers, providers and facilitators will directly benefit from the Guidelines in their efforts to ensure aviation language training efficiency and effectiveness."

– Philip Shawcross
ICAEA President

make significant progress. Nor was much attention given to the differences in the rates at which various learners will effectively acquire a language. As awareness has matured regarding the very significant training times involved to reach genuine operational proficiency, a substantial impact has resulted on both the direct and indirect costs of this training.

Hard financial realities thus make it all the more necessary to select appropriate, efficient and cost-effective training solutions. These issues, and many more, are addressed in the new ICAEA/ICAO-developed Guidelines, with a view to fostering a better understanding of this very specific type of training.

ICAEA GUIDELINES AT A GLANCE

The following questions have been developed to provide an Executive Summary of the new ICAEA aviation English training programme Guidelines. The questions should be taken into consideration by aviation language educators and training clients/recipients when creating or acquiring an effective and efficient aviation English training system. Each is addressed in more useful detail in the Guidelines themselves.

What is the final goal of aviation English training and testing?

- Aviation English training and testing are ultimately designed to enhance safety by enabling the effective implementation of the ICAO Language Proficiency Requirements.

What distinguishes aviation English training from other types of language teaching?

- The high stakes involved require the highest level of professional standards and personal commitment throughout the training process.
- Aviation English training has very specific characteristics which set it apart from general English teaching and even English for specific purposes in other fields.
- Aviation English training needs to serve the specific content, the critical language functions, the essentially voice-only nature and the operational context in which language is used in aviation.

What determines the appropriateness of aviation English training?

- The relevance of training content, objectives and activities should always be assessed in the light of real-life operational requirements.
- Training should have a predominantly communicative bias.

What should state-of-the-art aviation English training concentrate on?

- All six ICAO skills should be addressed.
- Plain language in an operational context is the prime focus of aviation English training.
- The content used for language acquisition should be relevant to the population being trained, i.e. pilot or controller, professional or ab initio.
- Relevant, motivating and authentic content should be used as a medium for language acquisition and practice.
- All training activities should ultimately contribute to attaining and maintaining effective oral communication.

What are the main factors which increase the probability of reaching operational language proficiency?

- Appropriate content-based language training is a more efficient, motivating and cost-effective form of aviation English training.
- Student motivation and commitment are essential to successful training outcomes; this motivation and commitment require an efficient and correctly maintained learning environment.
- High standards of trainer recruitment, training and support are prerequisites for a successful training process; there are no short cuts to training properly qualified aviation English trainers.
- Attaining operational language proficiency within the institution is a team effort.

What is the most cost-effective means of aviation English training?

- Financial savings on training materials and infrastructure, and on trainer quality, training and support, may have very expensive consequences when operational staff obtains inadequate levels of communicative ability.

What are some of the features which guarantee quality in an aviation English training process?

- The student should be at the heart of the learning process.
- A committed trainer is the training provider's most valuable asset.
- Effective training is built on a high and sustained quality of trainer recruitment, trainer training and trainer support.
- Training is a life-long process for both trainer and trainee; levels need to be maintained and enhanced by recurrent training.
- Maintaining the quality of the training process requires consistent monitoring, feedback, review and adjustment.

It is expected that enhanced insight in this area will foster the selection of more appropriate, efficient and cost-effective solutions by both aviation community decision-makers and appropriate training providers.

"The new ICAO Requirements, when they were introduced in 2003, essentially required that an entire new training sector be established in a very short period of time," commented Shawcross. "We began to see materials and techniques being employed that were not necessarily appropriate to the ultimate objective, and so it became an early goal for us not only to provide information and guidance to educators, but also to the aviation decision makers who were having to seek out suitable programmes in the training marketplace."

The purpose of the new Guidelines, therefore, is not to recommend or accredit any given training provider, institution or school. Nor are they intended to replace aviation English trainer training. What the Guidelines do seek to achieve, however,is to lay down a set of principles of best practice and to reflect specific benchmarks by which aviation English training programmes can be usefully assessed.

The Guidelines address four primary areas: aviation English training design & development; aviation English training delivery; aviation English trainer profiles and backgrounds; and aviation English trainer training. They were written based on the expertise and experience of the ICAEA Board and Members as an integral part of their joint commitment to enhancing standards in aviation English training.

ICAO has been consulted and closely involved in fine-tuning the content as it has progressed to its present state, and both ICAO and ICAEA originators have advanced the process based on a clear understanding that this training is instrumental to improving the quality of aviation communications and safety worldwide. It is expected that State Civil Aviation Authority (CAA) personnel,

LANGUAGE TRAINING ISSUES AND VARIABLES

The following is a partial list of the concerns addressed in the new ICAEA aviation English training programme Guidelines and that are being considered on a global basis as effective plans are determined to address Level 4 Proficiency training budgets and programmes:

- Realistic training durations.
- Differences between individual learners.
- Communicative nature of the language required.
- Value of training content.
- Operational relevance of the communication functions to be acquired.
- Effectiveness of the blending of self-study and classroom activities.
- Need for remedial and recurrent training to obtain results.
- Characteristics of appropriate language trainers.

pilots, controllers, as well as training managers, administrators, designers, providers and facilitators will directly benefit from the Guidelines in their efforts to ensure aviation language training efficiency and effectiveness.

"Ultimately, everything that ICAO does is guided by joint objectives that seek to effectively balance the safety and efficiency needs of the global air transport system," confirmed Barrette-Sabourin. "Our LPRs will be very-well supported by these Guidelines in this sense and they should also bring the added benefit of helping any organization engaged in aviation English training ensure course effectiveness while controlling costs as much as possible. This is a very important concern in the current economic climate."

Using the Guidelines

The Guidelines' table of contents provides a summary and a checklist of the key points to be kept in mind when evaluating aviation English training.

The document has not been designed to be read necessarily in order from beginning to end. Rather particular paragraphs may be consulted as required. Moreover, similar observations will be found in different chapters, for example a specific point could be reflected Chapter 1 from a training design point of view and in Chapter 4 from a train the trainer perspective. While these points may be redundant from an aggregate

standpoint, following this approach also allows each section of the document to be more self-contained.

Readers will be encouraged to choose the depth at which the Guidelines will be used at any given time. Specific uses may range from employing the table of contents and the Executive Summary as a checklist of actions to complete, to pursuing a more comprehensive understanding of the subjects through the many resources to which there are cross-references.

A questionnaire at the end of each of the four chapters enables readers to validate their understanding of the contents and acts a quick means of reviewing essential chapter content.

The Guidelines are also provided with six appendices: *Appendix A* is divided into seven sections and provides resources for further reading and research. These resources are referred to in the text of the Guidelines. Four forms in *Appendices B* through *E* provide models of how some of the questions which need to be addressed can be formulated. These forms can be adapted by organizations selecting or contracting language training services, as well as by providers seeking to present this information. *Appendix F* provides information about the International Civil Aviation English Association. ■

Testing the tests

New accreditation measures sought for aviation English language tests

Ongoing and detailed monitoring of State implementation plans and compliance with the ICAO Language Proficiency Requirements is essential to ensure that the full safety and efficiency objectives at the heart of the new Level 4 Proficiency Standard are effectively achieved.

The *Journal* spoke recently with Charles Alderson, a Member of the Lancaster Language Testing Research Group and Professor of Linguistics and English Language Education at Lancaster University, about his team's new research findings regarding ICAO FSIX Web site data and the pressing need to ensure that States are taking valid and measurable steps to ensure the new Level 4 Standards are being properly met.

In 2003, ICAO introduced new Language Proficiency Requirements (LPRs) which defined six different levels of aviation English competency. Pilots, air traffic controllers and aeronautical station operators are required to achieve at least Level 4 on this scale, initially by March 2008, in order to be licensed to fly aircraft or control air traffic on international (cross-border) flights, or to work in international operations.

By 2007, it had become apparent that many ICAO Member States were not going to be in a position to comply with the Level 4 Requirement by the 2008 deadline. As a result, the Council of ICAO proposed, and its 36th Assembly adopted, Resolution A36-11—*Proficiency in the English language used for radiotelephony communications*. In that resolution, the ICAO Council recognized that:

"…some Contracting States encounter considerable difficulties in implementing the language proficiency requirements including the establishment of language training and testing capabilities; … (and) that some Contracting States will require additional time to implement the language proficiency provisions beyond the applicability date."

It was agreed, therefore, that the March 2008 deadline could be extended to March 2011. Contracting States that were not able to comply with the language proficiency requirement were urged:

"to post their language proficiency implementation plans including their interim measures to mitigate risk, as required, for pilots, air traffic controllers and aeronautical station operators involved in international operations on the ICAO website as outlined in accordance with the Associated Practices below and ICAO guidance material."

In 2006, two years before the ICAO LPRs were originally due to be implemented, the European Organisation for the Safety of Air Navigation (EUROCONTROL) commissioned the Lancaster Language Testing Research Group (LLTRG) to conduct a validation study of the development of the ELPAC (English Language Proficiency for Aeronautical Communication) test, which was intended to assess the language proficiency of air traffic controllers. The ELPAC validation study would require the LLTRG to develop a cross-sample of aviation English tests currently being employed in order for them to develop a proper analysis.

Though it wasn't obvious from the outset, this general investigation by the LLTRG into the number and quality of English language proficiency tests in the aviation sector would

ICAO'S LEVEL 4 PROFICIENCY REQUIREMENTS AT A GLANCE

ICAO's Language proficiency Requirements establish six levels of skill in six areas of English language usage: pronunciation, structure, vocabulary, fluency, comprehension and interactions. The criteria for achieving Level 4 Proficiency in each of these areas are as follows:

Pronunciation
Assumes a dialect and/or accent intelligible to the aeronautical community. Pronunciation, stress, rhythm, and intonation may be influenced by the first language or regional variation, but only sometimes interfere with ease of understanding.

Structure
Relevant grammatical structures and sentence patterns are determined by language functions appropriate to the task. Basic grammatical structures and sentence patterns are used creatively and are usually well-controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning.

Vocabulary
Vocabulary range and accuracy should be sufficient to communicate effectively on common, concrete, and work-related topics. Subjects may paraphrase successfully when lacking vocabulary in unusual or unexpected circumstances.

Fluency
Produces stretches of language at an appropriate tempo. There may be occasional loss of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this should not prevent effective communication. Can make limited use of discourse markers or connectors. Fillers are not distracting.

Comprehension
Comprehension is to be mostly accurate on common, concrete, and work related-topics when the accent or variety used is sufficiently intelligible for an international community of users. When the speaker is confronted with a linguistic or situational complication, or an unexpected turn of events, comprehension may be slower or require clarification strategies.

Interactions
Responses are usually immediate, appropriate, and informative. Subject initiates and maintains exchanges even when dealing with an unexpected turn of events, and deals adequately with apparent misunderstandings by checking, confirming, or clarifying.

eventually reveal important data on the measurable state of compliance by ICAO Member States with the Organization's new global Language Proficiency Requirements.

"The impetus for the FSIX study can actually be traced back to when we were originally invited to tender on the validation study for the ELPAC test in Europe," began Charles Alderson, LLTRG Member and Professor of Linguistics and English Language Education at Lancaster University, England. "At that point we didn't have any particular aviation English experience under our belts but that wasn't important in this case and didn't affect the fact that we were eventually awarded the study. The *validation* of a language test is more concerned with the objective analysis of the various studies and data that are already available to comparatively gauge a test's overall effectiveness."

As part of the ELPAC Validation Study, Internet searches for evidence of other tests of air traffic controller English proficiency found very little evidence available to attest to the quality of the tests being employed at that time for licensure of either pilots or air traffic controllers. It was therefore decided to conduct an independent survey of all providers of tests intended for air traffic control. Alderson (2008) reports on the methodology and findings of that survey.

Since the Executive Summary of the ELPAC Validation Study had been framed by the Guidelines for Good Practice of the European Association for Language Testing and Assessment (EALTA), it was decided to base the new LLTRG survey questionnaire on the same Guidelines, which consist of the following headings:

- Test Purpose and Specification.
- Test Design and Item Writing.
- Test Analysis.
- Test Administration and Security.
- Test Revision.
- Test Washback and Impact.

The LLTRG ELPAC survey therefore consisted of two stages: a filter questionnaire which elicited opinions about the ICAO Requirements and general information about aviation English; and secondly some detailed follow-up questions sent to 74 organisations and individuals whose tests were thought to be used for licensure of pilots and air traffic controllers.

Only 22 relevant responses to this survey were received, and these varied considerably in quantity and quality. While this disappointing response rate may be indicative of the lack of quality of the tests being used and an associated reluctance to admit this in public, non-response cannot absolutely be taken to indicate lack of quality, although it may well indicate lack of public accountability of such providers.

" We were rather shocked to discover that, although some tests in this area did exist, there was actually no independent data available on the quality of current aviation English examinations. We decided to conduct an independent study to provide the language testing community with some much-needed and objective data on the user-experience and general quality of the aviation English tests that were out there and being employed. "

– Charles Alderson,
**Professor of Linguistics and English Language
Education, Lancaster University**

The LLTRG ELPAC survey therefore concluded that:

"We can have little confidence in the meaningfulness, reliability, and validity of several of the aviation language tests currently available for licensure.

Monitoring is required of the quality of language tests used in aviation to ensure they follow accepted professional standards for language tests and assessment procedures."

"We were rather shocked to discover that, although some tests in this area did exist, there was actually no independent data available on the quality of current aviation English examinations," Alderson commented. "It was decided therefore, after we'd submitted our ELPAC Report, that we'd conduct an independent study to provide the language testing community with some much-needed and objective data on the user-experience and general quality of the aviation English tests that were out there and being employed. It was this independent research which led us to the ICAO Flight Safety Information

Exchange (FSIX) Web site and some of the surprises that we found there."

LLTRG research into the ICAO FSIX

On the ICAO FSIX, the LLTRG researchers could access update reports from ICAO State Civil Aviation Authorities (CAAs) that reflected the extent of the various States' compliance with the ICAO LPRs. The researchers could also access details of the reporting States' implementation plans. These online documents included the names, addresses and, in most cases, the e-mail addresses of those responsible within the various CAAs for compliance with the ICAO Requirements and for the implementation of pertinent national plans.

Since the LLTRG ELPAC survey had identified a relatively small number of aviation English examinations that were being used at that time for licensure of pilots, air traffic controllers and others, the Group felt that it would be important to find out which tests were already recognized by ICAO Member State CAAs, and furthermore any additional tests

that non-compliant States may have been planning to recognize.

Unlike the ELPAC process, where the LLTRG had developed an online questionnaire also available as an MS-Word document, it decided in the first round of the FSIX Reporting Study simply to address an e-mail query to the person named on the site as being responsible for implementation of the LPRs in each CAA. This letter requested the names of the tests that the authority had recognized or approved, as well as the contact details of those organizations providing the tests.

At the time of data collection for the first round of the study, 55 States had still not supplied information to ICAO regarding their compliance with the regulations. Of the remaining 140, four States had responded but had not provided any email contact address and 25 had replied solely in languages other than English—specifically French or Spanish—as compared with other countries that supplied two versions of their responses (one in English). Due to time pressures the LLTRG focused

Contracting States contacted by ICAO	195 (190 States + 5 territories)	% of 195
Round 1 (May 2008): Survey of CAAs		
Countries which did not reply to ICAO request for compliance details	55	28%
Countries which replied to ICAO	140	72%
Of those who did reply to ICAO we were unable to make contact with some because:	140	
a) no (usable) e-mail for an official contact person	4	3% (of 140)
b) replies only in languages other than English	25	18% (of 140)
TOTAL	**29**	**21% (of 140)**
Of the 140 replies to ICAO which we did contact		
We did not receive reply	87	78% (of 111)
We received reply	24	21% (of 111)
TOTAL	**111**	**79% (of 140)**
Round 2 (October 2008): Analysis of ICAO data		
Claimed compliance	53	27%
Stated non-compliance	89	46%
Not known – had not replied to ICAO	53	28%
TOTAL	**195**	**100%**

its efforts on those States who had supplied responses in English.

In response to its request for information to the 140 or so e-mail addresses available to it based on these sample criteria, 11 representatives were unreachable due to an incorrect e-mail address having been supplied, while a further 87 for which the LLTRG did have functional e-mail addresses failed to respond to its survey query. Table 1 *(above)* summarizes these figures.

Out of the 24 responses to the LLTRG survey query, a total of only ten different tests or assessment procedures was reported, seven of which were reported by a single respondent. The Mayflower College procedure (for pilots and controllers) was reportedly in use by seven CAAs, and the ELPAC test for air-traffic controllers was being used by six CAAs.

These responses did not reassure the LLTRG that appropriate tests or assessment procedures had been recognized

by applicable CAAs. Indeed, *Alderson 2008/1* had concluded, on the basis of the 17 responses received by the time that report was compiled, that:

"…the Survey of Aviation English Tests indicates that it is unclear whether national civil aviation authorities have the knowledge to judge the quality of tests."

The LLTRG's research in this regard was carried out in two rounds. The 12 percent response rate to round 1 did not reassure it that appropriate tests or assessment procedures had been recognized by the CAAs, and the Group concluded that it could have little confidence in the meaningfulness, reliability and validity of several of the aviation English language tests currently being employed for licensure.

The second round involved analyzing responses, not to a survey, but to the ICAO request for information on implementation plans and responding-

State details of the assessment procedures they had in place or which were in the process of being developed.

Although the response rate for this second round was greater than to the first, only 53 respondents (27 percent of the ICAO Member States) noted that they had complied with regulations requiring the assessment of the English language proficiency of pilots and air traffic control staff. A further 27 percent had failed to supply ICAO with compliance details and the remaining 89, or almost half of ICAO's Member States, stated that they were non–compliant.

It should be noted, however, that of those states which claimed they were already compliant with the ICAO LPRs, different countries replied with varying degrees of information that rarely constituted proper evidence of compliance. 16 States merely asserted that they were compliant but included no further details to support this claim.

31 out of the 53 States claiming compliance indicated the regulations they were complying with and gave references to their own legislation. Nevertheless, only 14 States out of the compliant 53 States provide estimates of the language proficiency levels of pilots and ATCs—and it is far from clear how accurate these estimates are.

Furthermore, details of the assessments used were very scant and not obviously relevant in many cases. Descriptions of "test methods" used included:

- *"written, listening, interview"*
- *"formal evaluation"*
- *"verbal testing"*
- *"licensing test"*
- *"conversation"*
- *"diagnostic tests"*

For the LLTRG researchers, these descriptive labels did not inspire confidence in the ability of applicable CAAs to identify, develop or commission suitable instruments to measure language proficiency in such a high-stakes setting. Indeed, it is unclear whether many CAAs have the knowledge necessary to judge the quality of tests, or whether they take seriously the need to ensure that the language proficiency of aviation personnel is assessed professionally and meets standards that the public has a right to expect.

"I was very surprised at the number of CAAs who either hadn't replied to the FSIX yet or else had replied but didn't have any particular plans in place," noted Alderson. "The other thing that leapt out from our research was how vague a lot of State plans were with respect to the measures they had in place or would be putting in place to achieve compliance in the future."

The lack of response to the request for information on measures to mitigate risk, and the lack of detail in the few responses which were received did not provide a basis for reassurance in the LLTRG team that CAAs are taking seriously the risks associated with inadequate measures of language proficiency.

The LLTRG determined that response rates to ICAO's requests were disappointing and suggestive that not all Contracting States heeded either ICAO's request or even the agreed need to comply with ICAO's Language Proficiency Requirements. The lack of evidence for compliance gave the researchers further cause for concern. The LLTRG concluded that ongoing and detailed monitoring of implementation plans and compliance with the ICAO LPRs is essential, preferably by ICAO or by an independent organization, and that full details of the result of such monitoring should be made publicly available.

The LLTRG's second conclusion is that appropriate test accreditation services are clearly required and the Group strongly recommends that these be established. Alderson will be visiting ICAO later in 2009 to discuss the types of measures that might be able to resolve some of the shortcomings in this regard.

The LLTRG further concluded that it is of the utmost importance that CAAs supply full details to ICAO of the assessment procedures and tests they recognize, and that those who develop such tests and assessment procedures be required to provide objective evidence of the quality, the reliability and the validity of the instruments and procedures in use.

"The CAAs themselves need to be made much more aware of what is meant by "quality" in the area of language tests," Alderson noted. "It's now under discussion with testing quality stakeholders such as the International Civil Aviation English Association *(ICAEA, see related article on page 4)* and the International Language Testing Association (ILTA) to establish a type of voluntary accreditation system for aviation English tests. ILTA, also a Montreal-based organization, now has a Working Group under proposal to look at the ins-and-outs of this process."

In Alderson's view this type of accreditation programme should be voluntary and could be paid for by the test development organizations themselves to help support their quality assurance claims. In a parallel development, he noted that a recent Teaching English as a Second Language (TESOL) conference also held a symposium on aviation English that led to discussions and conclusions similarly highlighting the need for a test accreditation process to be established.

ICAO would likely play a role in encouraging and recognizing the envisaged accreditation process now coming under discussion, as well as possibly expanding the scope of the FSIX Web site to include accreditation information of the aviation English tests being employed by its Member States.

"These are precisely the types of preliminary suggestions and details I hope to be discussing with ICAO when I visit there this summer," concluded Alderson. The *Journal* will publish an update in a later 2009 issue that reports on the substance and any results of his meetings. ∎

The New Zealand approach to Proficiency

As it nears the end of its first year since implementing the ICAO English Language Level 4 Proficiency requirements, New Zealand's experience illustrates an interesting transition for a nation of predominantly English speakers.

In this profile of their new testing model for the ICAO *Journal*, Emma Peel of the Civil Aviation Authority of New Zealand outlines her State's approach for new trainees as well as existing pilot and air traffic controller license holders.

English language proficiency has been a requirement of the New Zealand Civil Aviation Rules since they were first established in 1992. The Rules require that each pilot and air traffic controller be observed for language proficiency by their instructors throughout their aviation training, and that ultimately this proficiency is required to be assessed by aviation English examiners.

In May 2008, NZ Advisory Circular (AC) 61.1 became effective, outlining a new acceptable means of compliance for satisfying the language component of the existing Civil Aviation Rule. The new AC is now fully compliant with applicable ICAO English Language Proficiency (ELP) Standards.

A purpose-built NZ testing method has also been developed with two key university partners, and as of May 2008 all new pilot or controller licence candidates have been required to meet this new requirement. A successful test result is endorsed on a graduating candidate's licence, as per the relevant stipulations in the ICAO Standard.

The New Zealand model additionally reflects a demanding interpretation of the ICAO Standard as it relates to existing licence holders. The country proceeded on the basis that it could not be assumed that existing licence holders would automatically meet the operational requirements of ICAO Level 4 or above, as these individuals had never been formally tested against that standard by suitably qualified aviation language assessors.

New Zealand's Civil Aviation Authority Manager for Personnel Licensing, John McKinlay, remarked that although his country's Civil Aviation Rules have always required an acceptable

standard of English, it was not possible to guarantee accurately where on the ICAO rating scale existing licence holders would be placed until their proficiency began to be more objectively measured.

"Flight examiners or air traffic service examiners are not trained aviation language assessors, and New Zealand is becoming an ever-more popular location for training international students," McKinlay commented. "About 50 percent of commercial pilots currently being trained in New Zealand are from outside countries."

New Zealand has thus determined that existing licence holders who hoped to have their licences endorsed with the new ICAO Level 4 Language Proficiency Standard would first need to satisfy the requirements of the newly-developed New Zealand test.

"The affected pilots are primarily those who fly on international routes, and who therefore may be required by other ICAO Member States to hold licences that are endorsed for Level 4 proficiency," McKinlay noted. "We estimate that about 700 existing pilots are affected by the new requirement, and the NZ CAA has issued strong recommendations that these pilots sit the test and have their licences properly endorsed. It's our objective that this must be achieved by the 2011 deadline set by ICAO."

Each applicant for a higher NZ licence must also now sit the test. Private pilots are being endorsed as they upgrade to commercial licences, and similarly commercial pilots seeking to upgrade to airline transport pilot licences.

"In addition to the ICAO standard, ab initio or student pilots who remain under the direct supervision of an instructor may fly solo only if they have an acceptable standard of English'" McKinlay added. "New guidance criteria for flight instructors came into effect in New Zealand on March 31st of this year."

New Zealand's ELP tests were developed by Aviation Services Ltd. (ASL), the organization also responsible for carrying out aviation examinations and flight testing in the country, in partnership with the Linguistics Departments of Auckland University and Australia's Melbourne University. The examinations cannot be taken until the applicant has passed all of the Private Pilot License (PPL) theory examinations to ensure they have enough aviation knowledge to answer the questions fully.

Candidates may sit one of two tests depending on their level of competence. Native English-speakers, or those with English as a very good second language, are advised to sit the first test, known as the Level 6 Proficiency Demonstration (L6PD). This seven to ten-minute test is carried out over the telephone to simulate the radiotelephony environment as closely as possible. A series of recorded human voice prompts are

randomly selected by a computer and played to the candidate. The candidate's responses are recorded and rated by qualified linguists who have been specifically trained in aviation terminology.

Candidates that pass the L6PD test are issued a valid English Language Proficiency endorsement for all time. Candidates who do not achieve Level 6 receive a result notice that reflects "L6 not determined", and must then take the second test option after any required remedial training.

The second test or Formal Language Evaluation (FLE) is for those candidates for whom English is not a first or strong language. It determines whether the candidate meets the ICAO minimum operational Level 4 standard or higher, and is a 20 to 25-minute, two-phase test.

In the first part, the candidate is questioned by a live interviewer over the telephone and their comprehension and interactions are assessed. The second part is a similar test to the L6PD, also via telephone, and includes random human voice recordings. FLE recorded responses are assessed by two qualified and trained linguists working independently.

Those that score Level 5 are endorsed as proficient but must re-sit the test in six years. Those that score Level 4 are also endorsed proficient but must re-sit the test in three years. It is also still possible to achieve a Level 6 score on the FLE and obtain a full lifetime endorsement.

The NZ tests are managed by an internet platform, specifically developed for ELP, and that allows examinations to be offered anywhere in the world. The Civil Aviation Safety Authority of Australia has also made use of the tests for pilot licence endorsements in Australia.

"About 1,500 candidates have so far sat the L6PD, while approximately 220 have sat the FLE," remarked Mike Lynskey, Chief Executive of Aviation

Services Ltd. "We think the tests are supporting the standards effectively and, as with all our examinations, the questions and learning processes associated with them will be subject to constant redevelopment and improvement. The main challenge we've faced so far has actually revolved around legitimizing the need for the testing to native English-speakers." McKinlay supported Lynskey's remarks while noting that, although the New Zealand model has met with some opposition, it nonetheless provides for a fair, objective, and standardized system.

"The tests are delivered, like all aviation examinations in New Zealand, on a user-pay basis," Mckinlay continued. "The price is set at the minimum possible, but the cost has raised some initial concern."

It may appear to some that New Zealand has taken a fairly hard line with its interpretation of the ICAO ELP Standards, but it's important to remember that, unlike many other ICAO Member

States, New Zealand still issues life-time licences and there is currently no automatic mechanism for examiners to recheck language proficiency. In this environment, New Zealand has to be very sure that each endorsed licence holder meets the intent of the ICAO standard.

"There's really nothing new about these requirements for New Zealand pilots and air traffic controllers to be proficient in the English language," McKinlay concluded. "It's been a requirement of the New Zealand Civil Aviation Rules since they were first established in 1992. What has changed is that New Zealand has now introduced increased objectivity and standardization into its language testing, and this can only help to ensure that New Zealand licence holders fully meet applicable ICAO Standards." ∎

Take 2: Alternative fuels

In recent years, the aviation sector has been increasingly challenged to provide concrete solutions to the problem of greenhouse gas engine emissions and to clearly articulate how it intends to address its aggregate impact on climate change. Alternative fuels are emerging as a promising option.

Jane Hupe, Chief of the ICAO Environment Section, explains for the *Journal* how the use of alternative fuels in air transport can ultimately be a viable option in helping aviation to meet current challenges.

In order to face the threat posed by the fuel crisis—one epitomized by the extreme fuel price volatility of 2008—the aviation sector has taken a series of additional new steps to minimize fuel consumption.

Measures are now continually being sought to allow for optimal performance at the aircraft, airport and air navigation system level, leading both to cost reductions and lower emissions *(for additional details in this regard please see the fuel crisis feature in ICAO Journal Vol.64, No.1, 2009)*. This crisis has also stirred research and development into lesser-explored but still very promising options, such as alternative fuels.

Though often referred to as "innovative", the practicalities and efficiencies of alternative fuels have actually been understood for decades now. At the end of World War II, approximately 85 percent of German military aviation was being powered by a synthetic fuel produced from hydrogenated coal, using the "Fischer-Tropsch" process *(see diagram on page 21)*.

In addition to fuel security concerns, aviation's response to the 2008 oil market crisis was also strongly influenced by the new global green order and emerging scientific evidence that fossil fuel-based activities, such as air transport, were contributing to global warming. These realties, as presented in the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC 4AR), made it clear that any alternative fuel solutions would also need to be environmentally-friendly.

The fact is that in a very short period of time, what seemed to be a wishful intention has now proven to be technically feasible. The prospect for the use of sustainable alternative fuels in aviation operations on a global scale in the next decade is similarly a tangible option.

Effective Global Leadership
Through Balanced Priorities

The International Civil Aviation Organization

Initial reactions to proposals for operating aircraft with alternative fuel often revolve around concerns that: massive change will be required; that we will need to develop new engines and aircraft, new airport infrastructure, new fuel pipelines, etc; and finally that this magnitude of transformation would require decades to achieve.

This is why the current proposal for using "drop-in" fuels is such an interesting concept. Simply put: *THERE IS NO NEED TO CHANGE THE ENGINE, THE AIRCRAFT OR THE AIRPORT INFRASTRUCTURE.*

I like to compare this entire exercise with inviting friends for dinner and, instead of serving a traditional meat dish, secretly preparing a nice meal with tofu. It is the same table and place settings, the food consistency and taste is comparable, but the end-result is much better from a health perspective and, if well prepared, one would never know they were eating tofu…

A "drop-in" solution

What is now being proposed with the aviation alternative fuels concept is simply to exchange the current fuel for an equivalent one. A "drop-in" fuel solution, in other words. As the fuel specifications are almost identical, users can also blend fuel alternatives with aviation kerosene in proportions of 10, 15 and even up to 50 percent, or else eventually use the alternative as a complete substitute. Blending and substitution solutions will ultimately depend on availability.

A critical concern is that any fuel under consideration must be subjectable to the same certification criteria (having the same specifications as current aviation jet (fossil) fuels), thereby rendering the fuels completely interchangeable. Most of the technology needed for this is available today, but what is required is the prioritization of efforts and resources on key steps to turn these prospects into a reality, and the certification of new fuels is major. It's also noteworthy that aviation's well-defined global fuel distribution network facilitates the possibility of it being the first sector to employ alternative fuels on a worldwide scale.

I would like to emphasize here that aviation is not pursuing the goal of a unique and universal alternative to aviation kerosene. What is envisaged is to optimize available sources of energy for aviation around the globe, building upon local and regional capabilities

In the 1920s, German researchers Franz Fischer and Hans Tropsch developed the Fischer-Tropsch Process for transforming coal into synthetic fuel. Since then, the process has been adapted to allow feedstocks (including biomass) to be transformed into fuel.
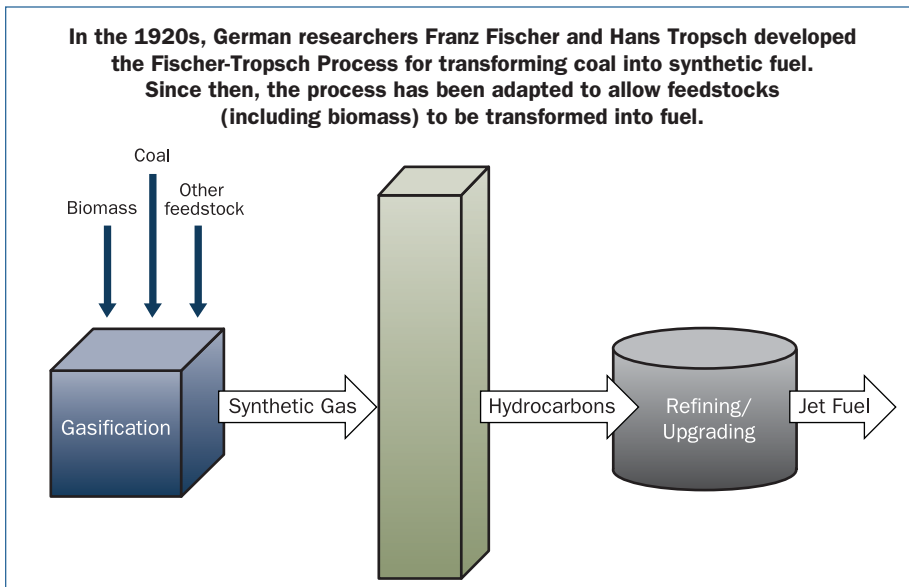
while respecting the fundamental needs of sustainability and energy security. Aviation is currently exploring a range of solutions in this respect; from synthetics to biofuels. In the biofuels area we are looking into a catalogue of oils instead of a single source.

A portfolio of options, with different plants, different processes and different regional solutions seems to be the key for success.

Promising renewable sources now being investigated

When we look at the most promising prospects today, biofuels produced from renewable sources such as jatropha and camelina, salt water-tolerant plants and algae, seem to fulfil most of the desired requisites of the new green era. Among other requirements, this new green imperative demands that alternative fuel life-cycles (planting, harvesting, production and end-use) produce lower GHG emissions than fossil fuels. In fact, as an end-vision for sustainable aviation, one could ultimately foresee a fuel life-cycle resulting in "zero" CO_2 emissions.

Various points will need to be addressed while analyzing the potential options for feedstock, for example: the amounts of soil, water and energy (which shall be kept to a minimum); the respect for, and preservation of, the food/agriculture chain and drinking water resources; and finally socio-economic issues that could alleviate poverty and improve the economic situation of local residents.

One of the main challenges for this initiative remains the cost issue. Although it is expected that, in the long-run, the cost of production of fossil fuels will increase and the cost of alternative fuels will be reduced, today the cost of the latter is still higher.

ICAO recently held a workshop on aviation and alternative fuels. Information on the event and a summary of the findings are available at www.icao.int/waaf2009. This information, together with further developments in this area, will provide the basis for an ICAO Conference on Aviation and Alternative Fuels that will take place November 17–19, 2009.

We should not forget that alternative fuels are an option for addressing aviation emissions that can be most effective when applied with the continued development of technologies that improve the environmental performance of aircraft and the air transportation system. Aircraft and air traffic management technologies have resulted in the 70% improvement in the efficiency of aircraft operations over the last 40 years. Planned improvements in operations have the potential to provide substantial emissions reductions through increased efficiency and the use of market-based measures have the potential to deliver additional reductions in emissions in a cost-effective way.

ALTERNATIVE FUEL FLIGHT TESTS GAINING SPEED

- GE / Boeing / Virgin Atlantic - 1Q 2008
  – Boeing 747 using a mix of coconut oil and babassu oil
- Rolls Royce / Airbus / Shell - 1Q 2008
  – Airbus A380 using Gas to Liquid (GTL) derived fuel
- Rolls Royce / Boeing / Air New Zealand - 4Q 2008
  – Boeing 747 using jatropha oil
- CFM / Boeing / Honeywell / Continental – 1Q 2009
  – Boeing 737 using jatropha and algal oil
- Pratt and Whitney / Boeing / JAL - 1Q 2009
  – Boeing 747 using camelina, jatropha, and algal oils

ALTERNATIVE FUEL CERTIFICATION MILESTONES

Today	100 percent synthetic coal-to-liquid jet fuel certified
mid-2009	50 percent Fischer-Tropsch synthetic jet fuel blends from biomass, coal, and gas certification expected
2010	• 50 percent hydro-treated renewable synthetic jet fuel blends, such as algae, certification expected • 100 percent Fischer-Tropsch synthetic jet fuel certification expected
2013	100 percent hydro-treated renewable synthetic jet fuel certification expected

One of the main concerns with air transport is that, despite ongoing efforts, the emissions resulting from aggregate global traffic growth are still outpacing new efficiencies achieved to-date. Passenger air travel growth rates are on the order of 4.3 percent annually and yearly CO_2 emissions from civil air travel are predicted to grow by approximately 3 percent. This makes it clear that the sector will need to use all possible options to address its emissions footprint.

In a year when the aviation sector is being challenged to provide concrete solutions, and to clearly define how it is going to address its impact on climate change, the potential of alternative fuels for aviation comes as very good news. They could ultimately address challenges related to the climate change debate concerning mitigation, adaptation, technology transfer and financing.

Future issues of the ICAO *Journal* will further explore the alternative fuel options now becoming available, and the topic will be covered comprehensively in Journal No. 4 of this year, which will more specifically focus on alternative fuels issues related to aviation. ■

APAC States review CEANS developments

An ICAO Workshop on the economics of airports and air navigation services was held in Bangkok, Thailand, in February 2009. It was attended by a total of 62 participants coming from 15 Asia/Pacific States and two international organizations.

The issues discussed focussed mainly on the results of the Conference on the Economics of Airports and Air Navigation Services (CEANS), held in September 2008 in Montreal, and the subsequent changes brought to ICAO's Doc 9082 – *Policies on Charges for Airports and Air Navigation Services* (Eighth edition). ∎

APAC ATM Workshop explores National Performance Framework

A workshop on the development of a National Performance Framework to achieve a Global Air Traffic Management (ATM) System was conducted at the ICAO Asia and Pacific (APAC) Regional Office in March 2009.

The workshop is one of several ICAO APAC Special Implementation Projects (SIPs) scheduled for 2009. The ATM workshop was attended by nearly 70 participants from 18 ICAO Member States and representatives from aviation organizations. ∎

NEW VERSION! – ICAO/ACI – User Charges

The ICAO designed workshop includes a review of the main recommendations adopted by the Conference on the Economics of Airports and Air Navigation Services (CEANS), held in Montreal in September 2008, and of the eighth edition of ICAO Policies on Charges for Airports and Air Navigation Services (Doc 9082), which has been updated to reflect the CEANS recommendations and has been published recently.

Designed for financial managers, the course is also of particular interest to those airports that are contemplating, or in the process of revising their charges levels and/or structures. The three-part course, covering the key elements of establishing and implementing user charges at airports, is delivered by experts from the ICAO Economic Policy and Infrastructure Management (EPM) section of the Air Transport Bureau, ICAO Headquarters, Montreal.

Next Course: 15-19 June 2009 – **Location:** Geneva – **Cost:** EUR 2000
For more information, please contact: Ms. Nathalie Zulauf (nzulauf@aci.aero)

Fifth ICAO Symposium on

MRTDs, Biometrics and Security Standards

21-23 September 2009
ICAO HQ, Montreal, Canada

ICAO will hold its Fifth Symposium and Exhibition on ICAO MRTDs, Biometrics and Security on 21-23 September 2009. An Exhibition will complement the Symposium and highlight important products and services related to MRTDs, biometric identification and border inspection systems.

The 2009 Symposium follows last year's successful event, attended by hundreds of participants from States, international organizations, companies and institutions.

The Symposium will be of particular interest to officials of passport and official ID document issuing agencies, immigration, customs, and other border control and security authorities. Officials from airlines and airports involved in passenger service systems, handling of travel documents, facilitation and aviation security should also participate.

Your participation is encouraged. Presentations and handouts will be available only in English. Simultaneous interpretation will be available in English, French, Spanish and Russian, as required. For further information on the programme, exhibition, and arrangements for the Symposium, please be sure to visit:

www.icao.int/MRTDsymposium/2009

Efforts are being made to encourage currently non-compliant States to issue ICAO-Standard Machine Readable Passports by the April 2010 deadline. If your State is not yet issuing these documents please contact the ICAO MRTD Programme for further information.

CERG safety developments proceeding on pace

SMS/SSP & USOAP initiatives form backbone of new Central European safety objectives

The Central European Rotation Group for the Council of ICAO (CERG—composed of Romania, the Czech Republic, Hungary, the Slovak Republic and the Republic of Slovenia) is making excellent progress with the early objectives of its new **SMS/SSP & USOAP 2010+** safety programme.

The new *SMS/SSP & USOAP 2010+* initiative represents a unique CERG regional effort that highlights the importance of implementing effective Safety Management Systems (SMS) in CERG Member States' civil aviation entities as part of their respective State Safety Programmes (SSP). The initiative was originally brought forward by Romania, which presently represents the interests of CERG Member States on the ICAO Council. The programme has also been included in the official calendar of ICAO for 2009—significant in that this is the first time when an initiative of CERG has been so reflected.

The following is a review and update of recent and projected *SMS/SSP & USOAP 2010+* programme activities.

SMS Course – February 2009, Bucharest

This course was attended by 31 experts from the CERG Member States, representatives of civil aviation authorities, air operators, airports, as well as Air Navigation Services Providers (ANSPs). The aim of the course was to develop participants' knowledge of safety management concepts, as well as certification and oversight of the implementation of key components of a basic SMS in compliance with relevant ICAO SARPs and national regulations. In the opinion of the CERG representatives and the ICAO instructors this aim was fully achieved by this event.

High-Level Meeting – April 2009, Bucharest

This meeting was opened by Mr. Radu Berceanu, Minister of Transport and Infrastructure of Romania. Mr. Catalin Radu, Director General of Civil Aviation or Romania, was the moderator of the event's round table discussion.

Mr. Raymond Benjamin, the recently appointed Secretary General of ICAO effective August 1st 2009, also honoured the meeting with his presence. Besides directors general of civil aviation from the CERG Member States, the meeting was also attended by representatives of the air operators, ANSPs, airports and training organizations (approximately 80 participants in total).

The main purpose of the meeting was a discussion on the management level of the different aspects related to the implementation of SMS in CERG Member States. Additional discussions were held on the basis of the applicable criteria established in the CERG SSPs (how SSPs come into play and how aviation service providers could ensure appropriate input in determining acceptable levels of safety), as well as on issues related to post-2010 USOAP audits. The last of ICAO's first-round comprehensive audits will be finalized in 2010 and participants looked at where the Organization would be focusing its audit activity after this point.

Ms. Nancy Graham, Director of the ICAO Air Navigation Bureau, presented participants with useful perspectives on the role of the State in managing aviation safety. Mr. Mohammed Elamiri, ICAO Chief, Safety and Security Audits, elaborated on the earlier discussions regarding the objectives and mission of USOAP beyond 2010. Mr. Miguel Ramos, ICAO Technical Officer ISM Training, provided information on SMS and SSP courses.

Taking into account the initiatives on safety matters at a broader Regional level, European Commission views on the management of aviation safety were presented by a representative of the EC Directorate General for Transport and Energy/Air Transport Directorate, while the role of the competent authorities for safety management at the European level was presented by a representative of the European Aviation Safety Agency (EASA). Lastly, the participants found out more about the EUROCONTROL ESIMS Audit Programme and its cooperation with the ICAO USOAP.

SSP Course – April 2009, Bucharest

This was the first SSP course organized by ICAO in Europe. It was attended by 35 experts from the CERG Member States, representatives of civil aviation authorities, air operators, airports and ANSPs.

The course was specifically targeted to civil aviation authorities from CERG Member States with responsibilities regarding the implementation of SSPs and the implementation and/or oversight of SMS in the areas of aircraft operations, air traffic services and aerodrome operations. Direct reference was made to the amendments already finalized to applicable ICAO SARPs.

The objective of the course was to develop participants' knowledge on the ICAO SSP framework and its components, to provide practical guidance on key elements of an SSP and the establishment of a State's acceptable level of safety.

As with the previously-described course and High Level meeting, the SSP course was hosted by ROMATSA, the Romanian ANSP.

Workshop on SMS implementation – September 2009, Bratislava

This event will focus on the evaluation of an effective level of implementation of SMS in the CERG Member States, the organization of SMS and SSP courses, as well as the sharing of views on this implementation and possible difficulties that could be encountered.

To assist with increasing the visibility of the overall SSP/SMS programme and to help stress the collaborative nature of these CERG initiatives, this last event will be held in the Slovak Republic, reflecting the fact that it will represent the CERG Member State as a candidate for the Council of ICAO when new elections are held for Council posts in 2010.

So far, the programme has proven to be a tremendous success all CERG stakeholders are looking forward with great interest to the workshop that will be hosted by the Slovak Republic.

CERG considers this ongoing regional programme to be a great support for the participating CAAs and regional service providers. Its Members' goal is to implement global aviation's highest possible safety standards. ■

Beating the odds at Wellington International

New Zealand airport develops innovative localizer antenna installation that could prove useful to facilities facing similar sea spray dump and jet blast issues

By M. J. King, Airways Corporation of New Zealand

Mel King is a Nav Aids Engineer heading the Airways Corporation Flight Inspection Unit. He has been a serving member of the International Committee for Airspace Standards and Calibration since 1999.

Wellington International Airport's runway is built on an isthmus. The South end of the runway finishes adjacent to Lyall Bay and the open sea of Cooks Strait, while the Northern end reaches to Evans Bay in Wellington harbour.

Inline Instrument Landing Systems (ILS) serving these North/South approaches were first installed some 30 years ago. The localizers associated with these ILS had their antenna systems mounted down the bank at each end of the strip so as to avoid penetrating Obstruction Clearance Surfaces (OCSs). This arrangement also provided protection for the antenna system from direct jet blast.

In order to provide for a runway end-safety area at the Southern end of the runway, the runway strip needed to be extended over an existing roadway and up to the edge of an existing wave trap. There was no possibility of locating a localizer antenna down the bank into the wave trap, so as an alternative consideration was given to locating a reduced height antenna on the surface and at the end of the Runway Extension Safety Area (RESA) adjacent to the wave trap. The challenges faced in accomplishing this were:

1. OCS requirements limited the total available height for the new localizer antenna to one metre. This restriction would impact upon the localizer's coverage.

2. During Southerly storm weather conditions, a significant quantity of sea spray is dumped over the wave trap at the Southern end of the runway. Sea spray had already been a cause of shutdown with the existing localizer antenna. With the new localizer antenna located even closer
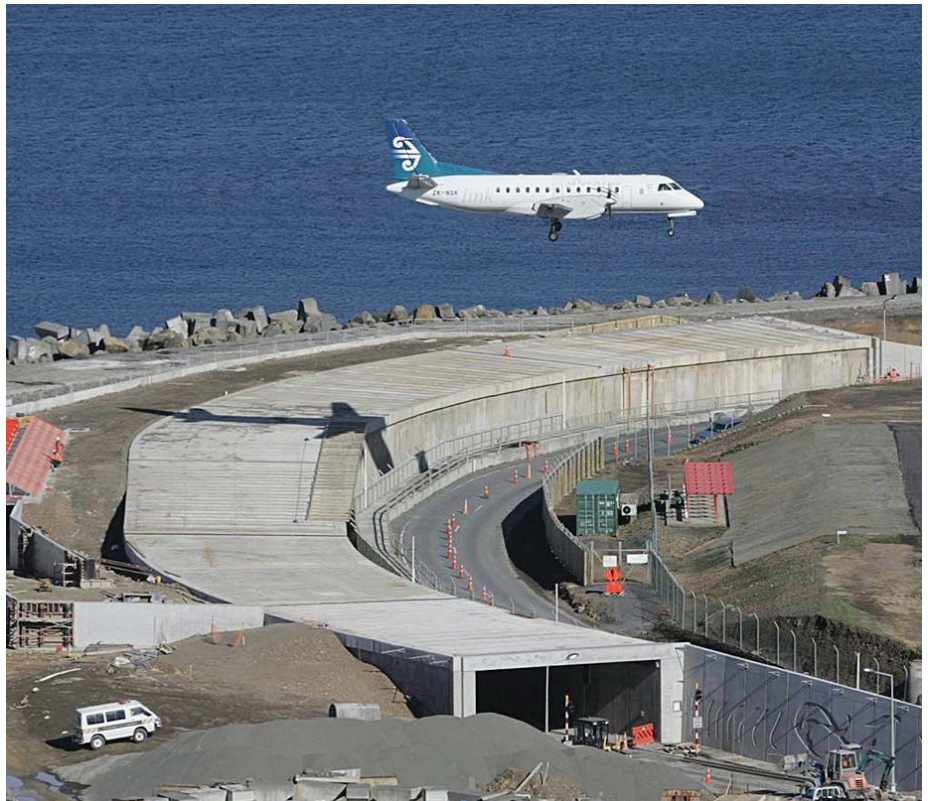

New Localizer Antenna

A satellite image depicting Wellington International Airport's runway location (inset), and a closer image of the new localizer antenna location at the Southern end of the apron near Lyall Bay.

to the sea the problem of spray dump would thus be exacerbated.

3. The new localizer antenna would be only 53 metres from the runway starter extension. At this distance the antenna could be subjected to jet blast wind speeds greater than its design limit.

To address the impact upon coverage, the new antenna was chosen to be a 14-element Log Periodic Dipole (LPD) array in contrast to the original 8-element LPD array. Also, the equipment room would be placed underground, immediately below the antenna array, to minimize the Radio Frequency (RF) feed-cable length and therefore signal loss.

To address the sea spray dump problem, an investigation was undertaken using a single LPD antenna. This investigation determined how sea spray dump affected the characteristics of the signal radiated, as well as which parts of the LPD antenna were most sensitive to spray dump.

Taken during construction, this photo shows both the old and new localizer antenna arrays, as well as the new roadway underpass tunnel and the jet blast deflector immediately in front of the new localizer antenna.

" While sea spray dump was a significant issue for the new WIA localizer location, is hoped that there may be additional locations in the world where the low height-profile and jet blast protection features of the WIA configuration would enable an inline localizer to be installed on runway strips previously determined to be incapable of allowing for this type of installation."

A moderate sea spray dump impacting upon the new WIA localizer antenna. To date, sea spray effects have not been responsible for any shutdowns of the new localizer.

A tanker with a high power pump and fire hose were used to simulate a heavy sea spray dump. From this investigation it was found that with the addition of a supplementary cover, placed over the LPD's protective cover or radome, the effect of sea spray dump could be largely overcome. The results from this single LPD antenna test were then inserted into a computer model of the 14-element array. This indicated that the radiated signal characteristics would likely be held comfortably within the prescribed ICAO tolerances—even with a heavy sea spray dump sweeping over the antenna array. This gave sufficient confidence to proceed with the supplementary cover arrangement.

To address the jet blast problem, a prototype jet blast deflector was designed. This employed sloping 100mm steel panels at 100mm spacings forming a comb-like structure. Testing of the deflector showed no measurable attenuation of the localizer signal when the deflector was placed in front of a single LPD antenna.

A scale model of the prototype deflector and LPD antenna was then tested in a wind tunnel to establish the reduction factor in wind speed impacting upon the LPD. Optimum spacing between the LPD and the deflector was also determined in this manner. These test results demonstrated that the deflector design provided the protection needed to protect the LPD antenna from damage due to jet blast.

The final deflector was constructed from Aluminium panels. Tough plastic reflective panels were fastened to the surfaces facing the runway to provide for obstacle identification. All parts of the antenna array assembly were constructed as frangible objects by the incorporation of shear pins at appropriate points.

Flight inspection recorded the new coverage being achieved to be slightly better than for the previous localizer installation. The new coverage comfortably met ICAO 18/10nm alternative criteria. It should be noted that the off-course coverage is limited by terrain.

Because wind produces significant air turbulence around the LPD antenna structure, the possibility of salt build up on the LPD radome underneath the supplementary cover remained a possibility. Accordingly, a fresh water spraying system was incorporated inside each of the supplementary covers. This spray-cleaning system is manually operated from inside the equipment building from time to time to keep the radome surfaces clean.

While sea spray dump was a significant issue for the new WIA localizer location, is hoped that there may be additional locations in the world where the low height-profile and jet blast protection features of the WIA configuration would enable an inline localizer to be installed on runway strips previously determined to be incapable of allowing for this type of installation. ■

The many "eras" of aviation

The following is an adapted version of a speech given recently by Angela Gittens as part of ICAO's "Women in Aviation" lecture series in March 2009. Gittens has served as Director General of ACI World since April 2008, after concluding her tenure as Vice-President Airport Business Services for HNTB Corporation, a leading firm in transportation infrastructure services, and has held top executive positions at three of the largest US airport systems.

During her service as Director of the Miami-Dade County Aviation Department, Miami International Airport attained international recognition for its environmental achievements with ISO 14001 certification, the first airport in the US to do so. Her responsibilities included leadership of a multi-billion dollar capital improvement programme and the development and operation of five smaller airports. Prior to that, as Vice-President of TBI Airport Management, Gittens managed operations contracts at several airports in the U.S. and Canada. She also directed the transition to private ownership of the 6 million passenger airport in Luton, England, negotiating a new airport-airline relationship and gaining wide experience with alternative rates and charges models and new revenue enhancement initiatives.

As General Manager of Atlanta's Hartsfield-Jackson International Airport she led the airport's preparations for the 1996 Olympics and during her tenure the airport became the busiest airport worldwide. As Deputy Director of the San Francisco Airports Commission, she focussed on developing new concessions at the airport to enhance financial returns and customer satisfaction.

Gittens has served on numerous aviation industry boards and committees including the FAA's Management Advisory Committee, the Executive Committee of the Transportation Research Board and the Board of Directors of JetBlue Airways.

I wanted to talk today about the opportunities that come with the environment of change. Those of you who toil in the field of global aviation have long been accustomed to its environment of change or, indeed, its environment of turbulence, and the fact that what goes on in one part of the world affects other parts of the world. Today that fact is manifest in almost every segment of the economy and in almost every part of the world.

Aviation has long been an industry highly sensitive to economic conditions of local, national and global character and, as such, it is an industry where the only constant is change. I've been in this industry for some twenty-five years now and have watched it produce entire new "eras" about every five years.

As a U.S. citizen, I think of the deregulation of domestic aviation in 1978 as the beginning of time, or, in geological reference, the beginning of recent time. With the dawn of competition a helter-skelter of new airlines soon discovered that, although the government had deregulated the skies, it had not de-regulated the airports or the computer reservation systems and these carriers found they couldn't get the space they needed at airports to serve their passengers and were being all but ignored by travel agents.

Most of those new airlines did not survive. The airports sat there comfortably, with their long-term leases with airlines and concessionaires, and took those leases to the bond markets and borrowed money to build new and improved facilities that were planned with the "legacy" airline staff.

If we follow on our "geographic time" metaphor and consider these early baby steps of competition as the Paleocene era, then next we had the Eocene era, in which the legacy carriers shocked us by declaring bankruptcy and going out of business, then shocked us some more by declaring bankruptcy and not going out of business. Suddenly, some

airports had caverns of space tied up in bankruptcy and airline employees saw their careers and their labor agreements tossed out in court. Airports started questioning the value of their long term leases and got serious about trying to accommodate new entrants and growing carriers. Some of the more forward-looking of these got aggressive about planning and managing their facilities and no longer passively accepting airline planning as the authoritative source for airport planning.

In other countries, the national flag carriers still controlled the space at the airport and handled the carriers from other nations under protective bilateral agreements.

Then came the "insurgency era" (we're up to Oligocene now), where mergers and acquisitions within the airline industry made things really interesting at airports since the operations of these disparate carriers had to get coordinated on the ground. Airports also had to deal with the effects on other tenants, like concessionaires, as changes in passenger flows wreaked havoc on carefully crafted merchandizing programs. Balanced curbsides soon became unbalanced as airline concen-trations at many airports increased. In Europe during this period, aviation deregulation had finally gotten started with a few fledgling new entrants, but the national carriers and the enormous all-inclusive charter market still control-led the airports.

Now we're up to the Miocene era: roughly 1995 to 1999. During this period the strong U.S. economy brought the cut-throat air fare wars to an end as business travellers were willing to pay any price to get on an airplane to make their deals, and leisure travellers had the confidence to spend on vacations because their stock portfolios kept appreciating. The big crisis for the air-ports and national governments was keeping up with capacity, but there was no trouble getting money out of the bond and equity markets as these no longer

judged an airport's credit strength by looking at its balance sheets but instead now looked to the a facility's market fundamentals—the strength of the aggregate local economy and the desti-nation magnetics of the surrounding region. It was in this sense that the strength of Disneyworld became more important than the strength of Delta Airlines when Orlando airport went to the bond market.

In Europe, Asia-Pacific, and Latin America around this time, national and local governments were privatizing or corporatizing their airports, seeking access to capital to improve their facilities' infrastructure and provide the capacity that would drive the economic vitality of their communities.

Then came the Pliocene era. It actually started before the events of 9/11, 2001, but in the end it's probably most accurate to characterize it as the post-9/11 period. 9/11 obscured the fact that in August of 2001 United Airlines, then the largest carrier in the world, announced that it had lost a billion dollars.

Something else was going on and the airline industry was being attacked from another quarter—their customers. The mass market use of the internet made airfare pricing highly transparent and gave the so-called "low cost carriers" direct access to the customer, reducing the power of the travel agents and airline-controlled computer reservation systems. Now the customer could search by price alone and the airline seat became much more of a commodity.

Of course, that other little thing going on in the airline world was the aftermath of 9/11. Those of us who were around at that time remember that airports became ghost towns as passengers avoided flying like the plague. Airports, with their high fixed costs, cut back where they could but essentially were still able to pass on their losses to the airlines. The fundamental weaknesses in the legacy carriers' business model

were exposed. At one point during this era, 50 percent of the seating capacity in the United States was on aircraft being flown by carriers under bankruptcy protection.

One of the more successful aspects of that business model was the garnering of a dominant position at an airport so that the airline could retain some of the pricing power that had been lost through internet shopping. But this also gave airport management a problem because their communities wanted low fares and blamed the airport if they couldn't get one of the low-cost carriers into the airport to put competitive pressure on the dominant carrier.

As the low cost carriers expanded into community after community, the airport that boasted a Southwest or an easyJet soon found itself widening its market reach. The rise of the low-cost carrier extended from Europe to Asia and challenged the previously national carriers that had lost their privileged positions with subsidies from their governments and protection from competition at their home airports. Passenger and cargo demand grew dramatically, particularly in the emerging

powerhouse markets of China and India but also in Africa and Latin America. 2007 was an all-time high in the world of aviation, with 4.8 billion passengers and 88.5 metric tonnes of cargo carried by global airlines.

But, by 2008, we've now begun yet another new era, one for which I've now run out of names and who knows how it's going to turn out. It's the post 9/11, high fuel cost, open skies, global financial retrenchment period. Air service is the focus of attention for airport management and it is up to them to attract it and retain it. Few countries provide any subsidies to their airports and most airports do not recoup their costs of service to airlines through rates and charges, generating more of their operating income from passenger charges and commercial revenue. Many airports around the world pay taxes now and are obliged to generate dividends and capital appreciation for their shareholders. All airports contend with primarily fixed operating costs and debt service, and all risk making long term investment decisions in the face of uncertainty. Some 250 airports around the world have lost all commercial service in the last two years, yet they still have to pay for their capital investment.

I certainly didn't know that there was such a thing as "airport management". Back then I just assumed that airlines ran the airports—a misconception that some airlines still seem to have.

So then I didn't have a specific career goal as I contemplated college, but read in one of those college guides they give you in high school that you had a better chance of getting a scholarship if you entered a field where there was scarcity— and they gave a list of those fields. One was criminology, so my first career goal was to become a prison warden! I applied to schools that had criminology coursework and indeed got a scholarship—although I realized later that I only got the scholarship because they had no African Americans at the school. In fact, my white freshman roommate walked in the room, took one look at me and my family and backed out of the room in panic—this was the 1960s. It's said that living well is the best revenge—I applied myself and got straight 'A's my freshman year so that my college reputation would be firmly established.

In this era, airport management has to both set a vision, yet remain adaptable, willing and able to go after the opportunities that change and uncertainty generate. Playing it safe can be an illusion.

What holds true for organizations can also hold true for individuals. Like an organization, an individual has to have a vision, pursue the opportunities that change brings, and understand that playing it safe can be an illusion. It would also be nice to say you should have a plan but that would be hypocritical on my part because I never planned any of the career moves I've made. So you will need another speaker to talk to you about career planning.

But I did have a vision, partially formed by my parents and the way I was raised and partially formed from early experiences. From my parents I learned to work hard and give good value to the people paying you. The early experience was working in boring summer jobs as a teenager—that formed my vision of having a job where the first time I looked at the clock every day it would already be five o'clock! Underpinning all of that were the values from my family of honesty and integrity.

Like a lot of kids, I didn't know what was out there in the world so I can't say I ever had a vision of a specific career—

My major was sociology, and, by the way, the school only had one class in criminology which I didn't even take until my junior year so the whole prison warden thing went nowhere. I didn't really know what kind of a living I could make from sociology so I was still searching for a career goal when I took a class in medical sociology that was very interesting. As it turned out, I misunderstood the instructions, applied for the "wrong" degree and wound up in a Ph.D program. I left before finishing because my dissertation professor was of the belief that since it took him eight years to get his degree, it should take his students eight years too! I wasn't clever enough to figure out how to get a different dissertation professor so I went back to New York City to get my career started instead.

I got a job with the New York City Health and Hospitals Corporation that had been newly-formed to operate the city's 19 hospitals. It didn't take me long to figure out that all my knowledge of "health care programs" didn't help much without understanding how to finance, budget and manage such programs, so that's what I applied myself to learning and developed a reputation for being able to get things done and for being honest—two qualities that turned out to be in fairly short supply.

During all the political upheavals that beset that organization in its early years, I kept rising up the corporate ladder because

I was known for doing my job even when I wasn't being watched! Remember, I don't like to be bored. So every time there was a management shake-up I got a promotion because the new management wanted someone they could trust who could keep things going.

So I learned something else: be trustworthy.

At some point, a former boss who had gone to run a hospital in San Francisco offered me a job. I had never contemplated leaving New York but I employed what would become my main personal career planning question: *"What's the worst that could happen?"* Well, I could always go back to New York and this way I would get the experience of living out west for a while. So I went, and I loved it.

After making the move to San Francisco, I eventually heard that the local airport was looking for someone to head their business and finance department. The job had turned over three times in 18 months under a new boss who understood that the management needs at airports had changed and that it would take a new breed to get them through turbulent times. Because I had a reputation for integrity and good management my name came to the airport's attention.

I ultimately got offered the job and said to myself again: *"What's the worst that could happen?"* I could always go back to my hospital career—there's lots of hospitals in San Francisco and everywhere else—and this was an opportunity to experience a new field. The business was changing so my lack of specific experience wasn't that big a handicap. It was new territory for experienced people as well.

I have stayed in this business ever since and I learned something again: embrace change—you just might like it.

Then Atlanta airport was looking for a new director—their previous director had been indicted for soliciting bribes from airport concessionaires (he ultimately was convicted and went to prison). Atlanta in this period was facing the challenges of the coming 1996 Olympics and the demise of their second-largest carrier, Eastern Airlines, had caused a financial crisis at the airport and the business community was very nervous about the city's most prized asset—its airport. I was offered and accepted the position and was off to Atlanta. Suddenly, this quiet kid from New York was suddenly thrust into a highly visible position.

The Atlanta airport situation was actually worse than it appeared on the surface. I called upon all the resources at my disposal to help me figure it out and I was constantly on the phone seeking advice. To make a very long story short, we were wildly successful: the facilities; the concession program; the Olympics, handling; security; the customer service; the finances; the confidence of the business community—it was all a remarkable turnaround.

I learned something else during my first year in Atlanta. Don't be afraid to ask for help—all they can do is say no.

I later went to work for a private airport company that has operating contracts at airports in the U.S. and runs "privatized" airports outside of the U.S. I went to England for the start-up of one of those private airport leases and learned a whole other side to the airport business as well as getting a primer on private investment sector financial considerations.

Later, when the call came from Miami International Airport, I was already comfortable with being in a high profile position. Later, when a national consulting company called, I was already comfortable being in the private sector. Later still, when Airports Council International called, I was already comfortable with working across national borders.

My message to all of you therefore is that change and uncertainty represent opportunity. The industry is currently at a point that's analogous to when I started in it—turbulent, uncertain and it has a lot of opportunity right now. It needs the best and the brightest, it needs creativity and resourcefulness. What made a lot of sense five or ten years ago may be sheer folly now: and what ends up making sense today may be just as pointless another ten years further on.

Ultimately, if you don't like to be bored, you do like to work hard, and you're comfortable with constant change, then aviation is the industry for you. ■

2009-2010 ICAO CALENDAR OF EVENTS

Meeting	Site	Duration
Seventh MEVA II REDDIG Coordination Meeting (MR/7)	Mexico City, Mexico	10 – 11 June 2009
ICAO CAR/SAM Workshop on Data Collection, Forecasting and Analysis	Mexico City, Mexico	29 June – 3 July 2009
ICAO-World Bank — Routes Development Forum Maximizing Civil Aviation's Contribution to Global Development Aviation Development: Focus on Asia/Pacific	Beijing, China	14 – 15 September 2009
Fifth Symposium on ICAO MRTDs, Biometrics and Security Standards	ICAO Headquarters, Montreal	21 – 23 September 2009
Global ATM (Air Traffic Management) Forum on Civil/Military Cooperation	ICAO Headquarters, Montreal	19 – 21 October 2009

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