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A Certified Approach



George Saounatsos, Associate Project Director for ADPi, looks at an integrated and methodical approach to aerodrome certification, operational readiness and the transition for green-field airports

There is a growing number of airports operating as private enterprises. This is illustrated by an evident move towards privatization or corporatization, as governments adopt Build-Operate-Transfer (BOT) or Build-Operate-Own (BOO) arrangements for the development or expansion of aerodromes.

This trend has generated the need for the introduction of a formal system, that can verify and validate that the airport operator can safely accommodate the expected aeronautical activity. For an airport opening for the first time, the requirement for a formal certification system is even more crucial for both the aviation authority – granting the authorization to open and operate the airport – as well as the airport operator itself, as it awaits the realization of its business and operational models. Consequently, there needs to be an integrated and seamless approach encompassing four tightly-linked domains which can be defined as: (a) the certification process for licensing the aerodrome, (b) the operational planning, which comes under the roof of the certification process, (c) the operational readiness evaluation methodology and (d) the transition strategy from the old facility to the new one. These four domains are aimed towards jointly enhancing the smooth and efficient opening of a new airport and should be handled as one 'concrete' and unbreakable system, ensuring consistency and efficiency among the specific deliverables of each domain.

Airport Certification Process

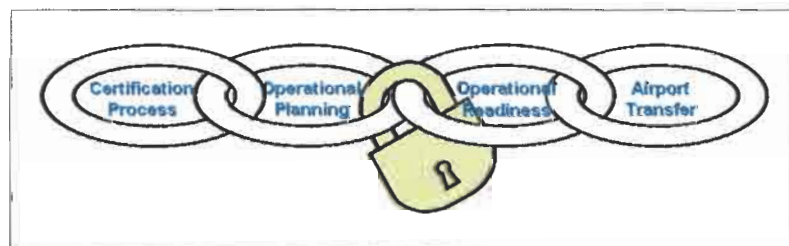
In 2001, ICAO established the Manual on Certification of Aerodromes, which defines the regulatory framework intend-

The new Bangkok Suvarnabhumi Airport successfully employed a full Operational Readiness & Transition (ORAT) programme. (LEVENT BERGKOTTE)

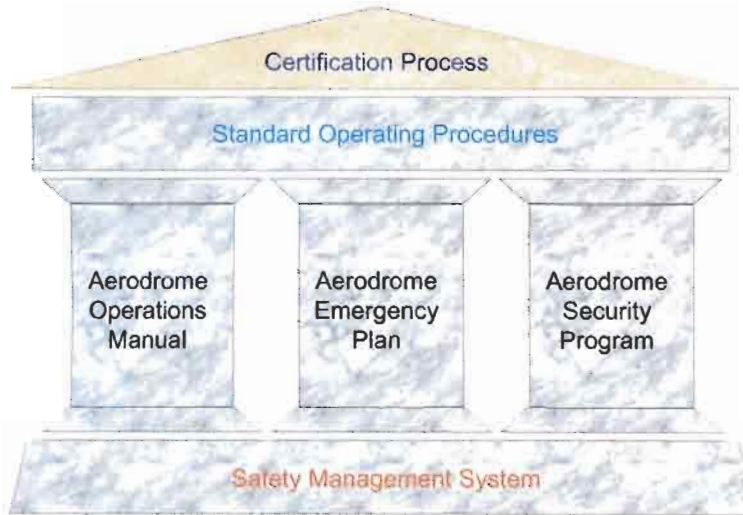
The integrated approach for airport operational planning, readiness and transition.

ed to ensure that the facilities, equipment and operating procedures at aerodromes comply with the ICAO standards and recommended practices. Moreover, as of November 2003, States are obliged to certify the aerodromes used for international operations. The certification process shall cover all operational areas, which are needed to assure the aviation authority that the facility can safely accommodate all aircraft movements. These areas shall have requirements or codes of practice related to the 'what' for standards covering the physical characteristics, facilities and services associated with aircraft operations, and to the 'how' for the competence of the aerodrome organization in managing safety and its interfaces with the end-users. Ideally, the means of proving the technical and functional competence for obtaining an aerodrome operating certificate would need to be agreed in advance with the certifying aviation authority.

The principal documents based on which the aviation authority could access the planning of the airport operator are commonly the (a) Aerodrome Operations Manual (AOM), (b) Airport Emergency Plan (AEP), (c) Airport Security Programme



The Three Pillars of Operational Planning



The basis for aerodrome certification is the establishment of a SMS, which is also an ICAO Annex 14 Standard. Hence, the SMS is the 'foundation' on which the three 'pillars' of high-level operational planning are based. In this illustration, these three pillars are expressed by the Aerodrome Operations Manual, the Aerodrome Emergency Plan and the Aerodrome Security Programme. These manuals are governed by the SMS principles, where applicable. Then, the operational system at a working level rests on top of this high-level planning and is represented by the SOPs. Most of the SOPs are derived from or based on the guidelines of the three manuals mentioned above, which are seen as a prerequisite for the development of these operating procedures. All these can be accommodated under the 'single roof' of the certification process.

(ASP) and (d) Safety Management System (SMS) the principles of which can be also reflected in the other manuals. In fact, these documents represent the airport planning at high level, which is accomplished under the terms of the certification process. The details at working level can then be addressed by the Standard Operating Procedures (SOPs). A large part of these procedures is based on the guidelines provided by the AOM, the AEP or the ASP and are governed by the philosophy of the SMS, as applicable. For a typical international airport with a methodical and systematic approach to operations there may be more than 200 different SOPs, covering all departments and functional needs, such as the terminal, airfield, baggage handling system, maintenance, and so on. The total number of SOPs depends, of course, on the size and complexity of the aerodrome itself and its organizational structure.

Evaluation of Operational Readiness

The planning, supervision and implementation of an operational readiness programme comes as an integral part of the certification/operational planning discussed earlier and is of capital importance for the successful opening of an airport. During this phase, the operational planning is verified and validated and the links and interfaces between systems, people and processes are thoroughly tested.

For the facility's stakeholders, trial operations are the main indicators that everyone and everything is adequately prepared in order to open and run the new airport safely and efficiently even under the most challenging circumstances. This is crucial, as during the first days airports are more likely to face technical problems, which, combined, with the lack

RIGHT: The evaluation of an operational readiness (EOR) mechanism simply tests the links and interfaces between the airport systems, the people who are going to work within the airport environment and the implementation of procedures associated to certain processes.

of experience in dealing with them may result in operational mishaps. Trials also provide the end-users with the opportunity to assess their readiness and to 'align' their own procedures with the operational concept and environment of the new airport. Past experiences show that the absence of trials may potentially lead to unfavourable situations during the commencement of business.

The opening of the Hong Kong International Airport in July 1998 was recorded in history as a classic example of what can go wrong during an opening. Some 22 core problems appeared that knocked out almost every function of the facility and resulted in a chaotic situation during the first few weeks. The cargo miss-handling alone contributed to the loss of approximately 4.6 billion HK\$, 0.35% of the GDP of Hong Kong economy.

Airport trials inherently increase the stakeholders' confidence in their facilities operational readiness. Their aims are wide-ranging, encompassing:

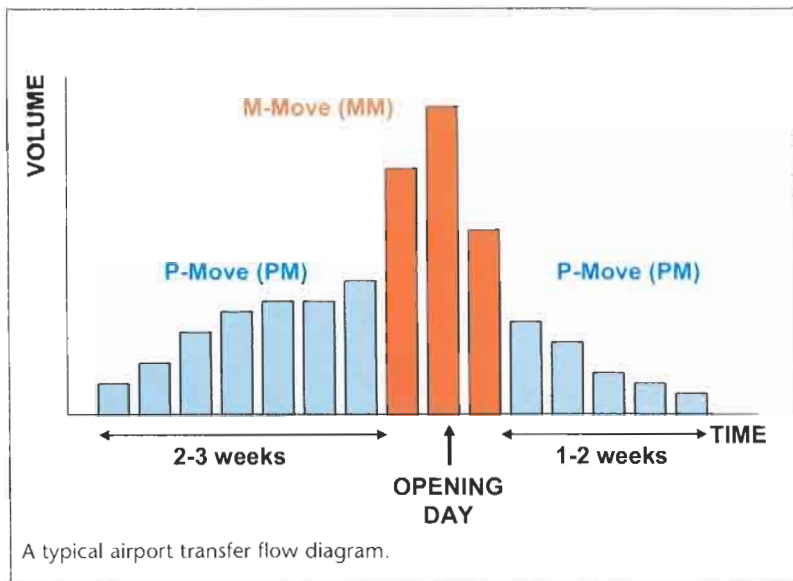
- Evaluating the airport operating procedures (correctness and completeness).
- Identifying interfaces and possible new interdependencies or operational inconsistencies.
- Validating the responsibilities within the operational structure.
- Evaluating end-users' readiness and communication/interfacing principles.
- Evaluating the functionality of systems and facilities, e.g. baggage handling system, IT, extra low-voltage equipment, airfield lighting, air navigation equipment, etc.
- Providing familiarization and training to all end-users.
- Assessing the signage, passenger behavioural patterns, flows and potential bottlenecks on kerbside/terminal areas.
- Collecting feedback from end-users and identifying potential deficiencies on both landside and airside.



The methodology for the evaluation of the airport operational readiness can involve six basic parameters:

- 1) **The identification of core processes of the facility.** These are usually subdivided into I) passenger & crew handling, II) baggage handling, III) ramp handling, including mail and cargo, IV) aircraft control & line-maintenance, V) administration/management, VI) security, VII) access, and VIII) environmental integration.
- 2) **The definition of sub-processes.** In a typical international environment there can be around 600 sub-processes, which need to be assessed.
- 3) **The Elaboration of a Function Matrix.**

Each sub-process requires a function matrix which specifies the: I) responsibilities, II) interfaces, III) systems, equipment and facilities required, IV) human resources and V) elements which are used to represent or replace the physical presence of humans or subjects during the trial of a sub-process, such as participants assuming the role of passengers, vehicles sim-



ulating taxiing aircraft on the movement area or baggage loaded with ballast, etc.

4) **The Definition of Trials.** These are usually distinguished into four categories: (a) Principal Trials, where the purpose is to evaluate the functionality of each sub-process and the associated systems and facilities of the airport. Part of these trials will be based on the operational planning documentation such as the AOM, ASP and SOPs; (b) Integrated Trials, focusing on the interfaces between the interrelated sub-processes, leading to integrated tests. During this stage a number of disturbing factors, for which effective actions need to be taken, will be tactically introduced into the individual trials. (c) Contingency Trials, where the objective is to test the implementation of fallback plans, verifying whether the primary functions of the airport can continue to work when some key elements, systems or facilities are unavailable; (d) Emergency Trials, which involve the implementation of representative full scale emergency exercises to verify the capability of the staff to handle a potential crisis based on the AEP and the emergency SOPs. The evaluation of the

emergency exercises should focus on communication, coordination and command aspects, which are key parameters in crisis management.

5) **The elaboration of scenarios.** This requires a set of scenarios for each trial which shall comprise I) an objective, II) the situation to be tested, III) a detailed description of the scenario (where applicable) and IV) any parameters and the supporting material for the trial. Each can then be performed, subdivided into four main stages of implementation such as briefing, execution, debriefing and remedy actions.

6) **Establishing an operational readiness steering committee.** This must have representation from all parties involved with daily airport procedures. During the planning phase of trials, the committee needs to acquire the same understanding about the objective of the trials and ensure the availability of facilities, systems, staff and equipment. This committee should comprise the airport operational management, the designer/contractor/main subcontractors, the State entities (police, immigration, customs, air traffic control, etc), the ground handlers and the based carriers. Permanent representatives to the committee shall be nominated and be responsible for the onward promulgation of information to their respective organization and the follow up of the complete operational readiness evaluation.

Familiarization & Training

Familiarization can be considered as the preface of the most thorough and systematic training period. For airport staff and end-users this can start during the last stages of construction, since it mainly involves an introduction to the new facility and systems through site visits, presentations and distribution of handouts. Training on the new systems, processes and procedures constitutes the second step after the introductory period and is of fundamental importance for the successful opening of the airport. This is because usually a mishap in the operational environment is attributed to the collapse of interfaces between systems, human comprehension and procedure implementation. Even in cases of system malfunction, an interface can be usually found to have failed somewhere in between the mistaken execution of a fallback procedure or the lack of knowledge for running a particular system.



Familiarization can be considered as the preface to the most thorough and systematic training period. For airport staff and end-users this can start during the last stages of construction since it mainly involves an introduction to the new airport environment and systems through site visits, presentations and distribution of handouts. Part of the test phase for Munich's Terminal 2 is seen here in a picture from February 2003.

(KEY-CHRIS PENNEY)

Indicative schedule for airport certification, operational readiness and transition.



Airport Transition

The objectives of a transition strategy can be identified as the:

- Definition of the hand-over sequence (phasing) from the old airport to the new one.
- Prioritization of the items to be transferred based on the operational needs of this phasing.
- Securing the transfer feasibility of all items.
- Ensuring the transfer of all end-users' equipment to the new facility.
- Guaranteeing the smooth and safe transfer of all goods.
- Optimizing the transfer economically.

In planning the methodology for the transition to the new airport one should identify the critical time window(s) during which there is minimum aeronautical activity, while considering the volumes to be transferred. This involves, defining the timing for the transfers, identifying the means of transportation, plotting the transport routing and optimizing the transfer of critical systems. The materials to be moved can be distinguished into two categories based on their prioritization as well as their nature:

A-resources (critical items), involving goods which are essential for the functioning and opening of the new airport and require special attention due to their technical complexity and time requirements for their re-installation. Examples of this include large machinery, backbone electronic equipment, or items that require special handling or considerations during transport due to their dimensions, weight or shape, such as GSE items.

B-resources (ie non-critical items), which are not difficult to transport or do not require any special attention to put them back into operation.

In an airport transition, the flow of transferred volume usually peaks close to the opening day because the A-items can be transferred only at the very end, unless new equipment has been purchased for the new airport. Hence, two different phases of moving are usually foreseen; the main move (MM) period, usually for two-three days, and the pre/post move (PM) period, usually two-three weeks before opening and up to one-two weeks after opening.

Programme Implementation

The timeframe for the implementation of an aerodrome certification, operational readiness and transition programme can be divided into three phases:

Phase 1: The airport operator has to discuss with the avia-

tion authority and agree on the list of manuals and SOPs to be produced. The focus of the aviation authority is usually on the high-level documents, such as the AOM, AEP, ASP or SMS, while the SOPs are produced without the necessity to go through an intensive review by the authority due to their detailed and more technical content.

Phase 2: This phase comprises the development of all certification documentation (ie operational planning), the development of the readiness evaluation methodology and the transition strategy. Towards the end of this stage the familiarization and training of all end-users on the facility's new environment, procedures and systems can commence.

Phase 3: This period can begin after the technical commissioning of the airport and involves the operational trials. At the same time the detailed planning of the transition strategy can be finalized so that a successful transfer to the new facility is realised.

Conclusion

As the number of green-field airports around the world is on the rise, it is crucial that their operators follow an established aerodrome certification process to set the basis for managing safety and methodically developing their operational planning. At the same time, and in order to secure the safe and successful commencement of business from day one, operators should define a system that enables the evaluation of their aerodrome's readiness and transition strategy as an integral and indispensable part of the certification process.

The opening of the Hong Kong International Airport in July 1998 was a classic example of what can go wrong during a facility's opening. Some 22 core problems were experienced that knocked out almost every function of the airport and resulted in a chaotic situation during the first few weeks. (HKIA)

