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# A holistic approach to aerodrome certification

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**Safety, regularity and efficiency of aircraft operations at aerodromes are of paramount importance, thus generating the need for the existence of a formal system to verify and validate that the airport operator can safely accommodate the foreseen 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 authorisation to open and operate the airport, and the airport operator itself, awaiting the realisation of its operational model.

For this purpose ICAO established the manual on Aerodrome Certification in 2001, which provides guidance to States in establishing a regulatory framework intended to ensure that the facilities, equipment and operational procedures at aerodromes comply with the ICAO Standard and Recommended Practices and the national codes in effect. Prior to this manual being released, the most prominent certification processes were those of the United Kingdom CAA, as described in CAP 168, and FAA Part 139.

Yet, there is another important parameter regarding new airports which has not been systematically addressed to this end. This parameter refers to the readiness evaluation of new airport facilities and their ability to guarantee from day one the successful opening and the safe accommodation of all anticipated traffic activities.

There needs, therefore, to be a seamless system encompassing the certification process for the licensing of an aerodrome and the methodology for the evaluation of its operational readiness. These two distinct domains aim jointly at the efficient and smooth opening of the airport and should be handled holistically as one concrete and unbreakable system, ensuring consistency and efficiency among the specific deliverables of each domain.

## The airport certification process

As of November 2003, States are obliged to certify the aerodromes used for international operations. The certification process shall cover all operational areas needed to assure the aviation authority that the airport can safely accommodate all aircraft operations.

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The foundation of aerodrome certification is the establishment of a Safety Management System (SMS) on which the 'high-level' operational planning is based. This high level planning encompasses the principal documents from which the aviation authority could appraise the operational practices at the airport. These are usually expressed by the i) Operations Manual, ii) Emergency Plan and iii) Security Programme, as governed by the SMS principles. Then, the operational planning at 'working level' is derived by the guidelines provided in these high level documents and is represented by the Standard Operating Procedures (SOPs). This scheme corresponds to the overall airport operational

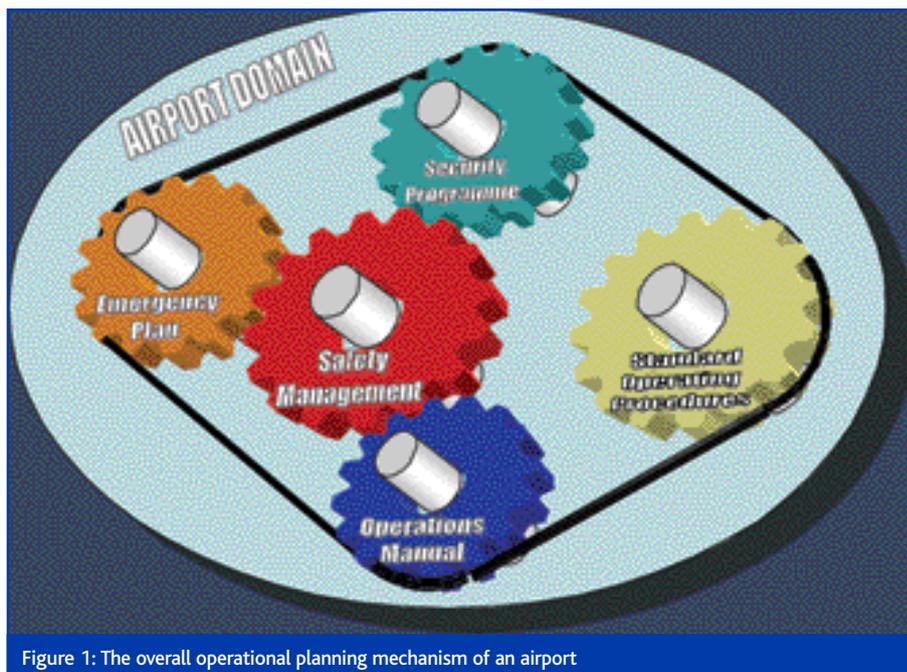


Figure 1: The overall operational planning mechanism of an airport

planning and can be accommodated under the roof of the aerodrome certification process.

1. **Safety Management System:** ICAO Annex 14 stipulates that as of November 2005 a certified aerodrome shall have in operation a Safety Management System (SMS), while in 2006, ICAO released the first edition of its Safety Management Manual.

*“Every department associated with the daily operation of the airport should establish Standard Operating Procedures describing the way it operates and interfaces with other departments”*

A Safety Management System serves as the basis for the establishment of the operating philosophy and safety culture of all parties involved in airport operations through a system which manages safety in a systematic, proactive and explicit way. This requires a methodical approach to the development of safety policies, procedures and practices to allow the airport organisation to achieve its safety objectives. The SMS may comprise the following key aspects:

- (a) **Safety Policy:** The initial indication of corporate commitment to safety is in the organisation’s stated safety policy and objectives. It demonstrates the formal commitment of the airport management to protect and develop physical and human resources in the interest of safety. Special attention should be given to the organisational behaviour of the airport staff, which is tightly linked to their national, professional or corporate culture.
- (b) **Organisation:** Defines the responsibilities and accountabilities at all levels within the airport domain. This

clarifies the formal and informal reporting lines and specifies the accountabilities for particular activities and procedures where no overlap or omission shall exist.

- (c) **Key Performance Monitoring:** This includes
  - (i) the set of performance targets,
  - (ii) the definition of performance indicators,
  - (iii) the establishment of an occurrence reporting scheme,
  - (iv) procedures for the recording, analysis of data and production of periodic safety reports and
  - (v) a

- (d) **Risk Evaluation & Management:** The aviation industry faces a diversity of risks every day, many capable of compromising the success of an airport operator and some even posing a threat to the facilities or to those involved in different aspects of operations including passengers. However, not all risks can be eliminated and nor are all conceivable risk mitigation measures economically feasible. Thus, the probability and severity of any adverse consequences have to be weighed and decisions be taken accordingly.

This provides the mechanism for proactively identifying hazards and finding ways to control the risk associated with them.

- e) **Safety Auditing:** Safety audits are one of the key methods for fulfilling the safety performance monitoring functions and are a core activity of any safety management system. They provide an insight in to the level of safety in operations, expose areas where remedial actions may be required and assess the consistency in the implementation of operating procedures by airport staff. Consistency in the execution of the same activities by different work shifts during the 7/24 period an airport operates is very important to guarantee the same level of safety and quality at all times
- f) **Safety Promotion:** Safety promotion provides the mechanism through which lessons learned from safety occurrence investigations and other safety-related activities are disseminated to all relevant personnel and actively involves staff in the process of maintaining and improving safety. It also provides a means of encouraging the development of a positive safety culture within the organisation. There are various ways that this can be achieved, such as recurrent training, safety bulletins and leaflets, safety committees, lectures, etc.

2. **Operations Manual:** The aerodrome operations manual is the primary requirement for the certification process and contains information concerning the i) aerodrome site & physical characteristics, ii) facilities, iii) services and core facilitation aspects, iv) equipment mainly related to flight operations, v) guideline operating procedures, and vi) organisation and management structures. The operations manual is a high level document that sets the basis for the development of a number of standard operating procedures. Amendments to this manual are undertaken in line with the changes to the airport operating procedures and the continuous enhancement of the safety principles. It is essential that the operational guidelines of the manual clearly outline the responsibilities/accountabilities of the airport operator, define the reporting line (line of command) and identify the responsibilities of the airport users and all associated entities with regard to the implementation of procedures.

3. **Emergency Plan:** This plan shall outline the response, business continuity and recovery actions for critical situations that may adversely affect the operation of the airport. Particulars of the emergency plan may include:
- (a) Plans for dealing with emergencies occurring at the airport or within its vicinity. These emergencies are distinguished into i) 'aircraft related' such as malfunction of aircraft in flight, bomb threat, unlawful seizure, etc. or ii) 'non-aircraft related' such as structural fires, road traffic accidents within airport premises, facilities-related bomb threats, natural disasters or severe weather phenomena, accident with dangerous goods, quarantine situations, etc.
  - (b) Principles and requirements for the establishment of a Crisis Management Centre and appointment of an airport on-scene commander for the overall coordination of emergency operations
  - (c) Details for the facilities and equipment to be used in emergencies and their frequent testing
  - (d) Guidelines for exercises to test the emergency response of the airport operator and associated end-users
  - (e) List of organisations or persons involved in the implementation of the Emergency Plan and their contact information, e.g. telephone numbers, e-mails etc.
- As the Emergency Plan is a high-level document, it is recommended to produce working level, easy-to-use 'checklists' for all the operational departments that run the airport on a shift basis. After the conclusion of each airport emergency situation, the completed checklists can be reviewed by the airport operator's audit team or even the aviation authority, identifying areas for further

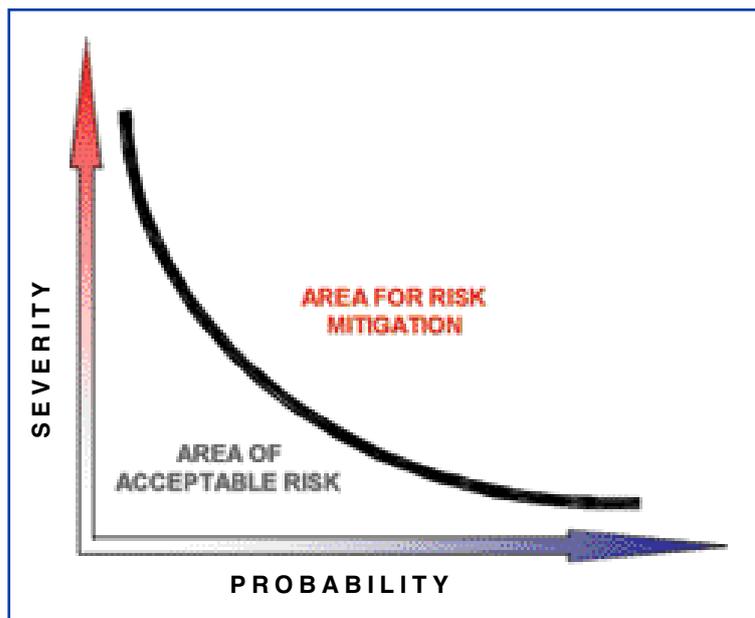


Figure 2: Risk Management Curve

improvement in emergency response, communication, coordination or command.

4. **Security Programme:** Every airport shall have in force a security programme as per the guidelines of ICAO Security Manual and also taking into consideration IATA security principles. The aim of this plan is the security of all flights arriving and departing from the airport and the

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elaboration of guidelines and measures for the protection against any acts of unlawful interference likely to endanger the safety of aircraft, airport facilities, or people. This programme shall detail the security structure and responsibilities of the staff of each party concerned within the airport community, including guidelines for the minimisation of the possibility of unlawful acts.

5. **Standard Operating Procedures:** Every department associated with the daily operation of the airport should establish Standard Operating Procedures describing the way it operates and interfaces with other departments. A large number of these refer to detailed processes, explanations or work instructions for the execution of the daily duties of airport staff. There are two main categories of SOPs:

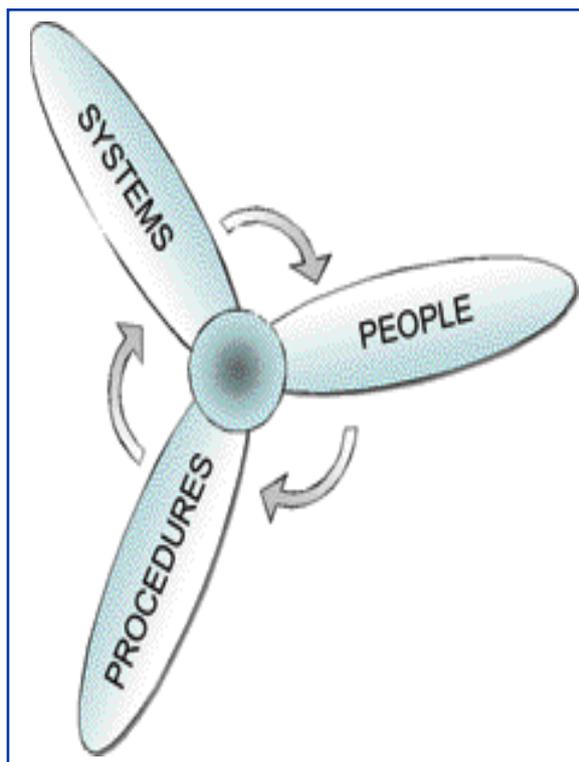


Figure 3: The three-fold evaluation of operational readiness

- (a) the Departmental SOPs, such as airside operations, terminal operations, curbside, maintenance, security, baggage handling system, etc.
- (b) the Inter-Departmental SOPs, where there are interfaces among various departments, hence more than one department is involved in the elaboration and update of these procedures. A typical example is the terminal evacuation procedure, or incoming passenger quarantine procedures where State entities are also involved. The emergency operating procedures can cover a larger number of other events, not necessarily in the context of the emergency plan, such as the failure of systems non-critical to flight operations or safety, e.g. external telephone network, etc.

*“Familiarisation can be considered as the preface of the most thorough and systematic training period. Familiarisation of airport staff and end-users can start during the last stages of construction through site visits, presentations and distribution of handouts”*

For a typical international airport with a methodical and systematic approach to airport operations there may be more than 200 different SOPs covering all operational departments and functional needs of the airport. The total number of SOPs depends of course on the

size and complexity of the airport itself and its organisational structure.

### Evaluation of operational readiness

The planning, supervision and implementation of an operational readiness programme should come as an integral part of the airport certification and operational planning process discussed above, as it is of capital importance for the successful opening of a new airport. During this phase the operational planning is verified and validated and the interfaces between the airport 'systems', the 'people' who will be employed at the airport and the implementation of 'procedures' are thoroughly tested.

Trial operations are the main indicator for the airport operator that the airport is ready to open and operate safely. This is crucial as during the first days of operations airports face a high probability of technical problems, which, combined with the lack of experience in dealing with them, may result in operational mishaps. Trials also provide the end-users with the opportunity to assess their operational readiness and to "align" their own procedures with the operational concept and environment of the new airport. Airport trials inherently increase the confidence in operational readiness of the airport community and aim at:

- evaluating the correctness and completeness of the airport operating procedures
- identifying interfaces and possible new interdependencies or operational inconsistencies and deficiencies
- validating the responsibilities within the airport operational structure
- appraising end-users' readiness and communication/interface principles
- evaluating the functionality of airport systems and facilities (flows, potential bottlenecks, etc.)
- providing familiarization and training to all end-users

The methodology for the evaluation of the airport operational readiness can involve the following basic parameters indicated in figure 4:

The Core Processes of the airport are usually subdivided into operational domains such as i) passenger & crew handling, ii) baggage handling, iii) ramp handling, including mail and cargo, iv) aircraft control & line-maintenance, v) airport security, vi) airport access, vii) environmental integration, viii) administration/management, and ix) commercial services.

Based on these domains, a typical international airport environment can accommodate as many as 600 sub-processes that need to be assessed in order to evaluate the operational readiness. For the purpose of trials, each sub-process shall specify the i) responsibilities, ii) interfaces, iii) systems, equipment and facilities required, iv) human resources and v) elements used to represent or replace the physical presence of humans or subjects during the trial.

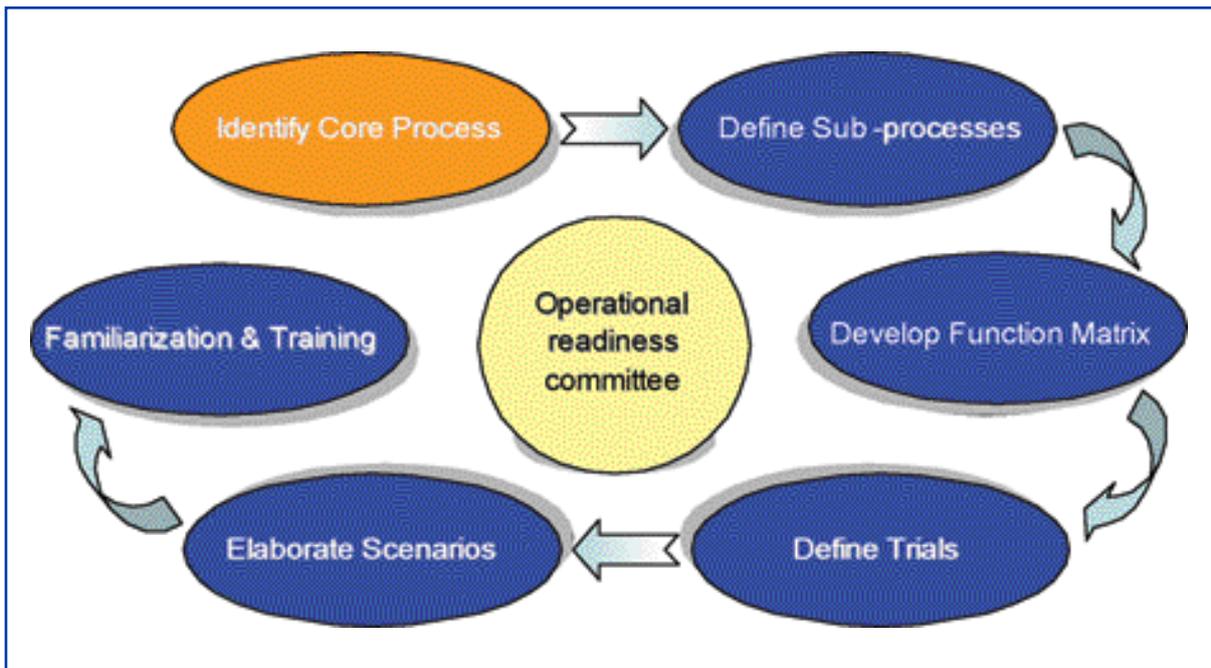


Figure 4: The operational readiness aspects

The trials can then be distinguished into i) 'Principal trials', where the purpose is to evaluate the functionality of each sub-process and the associated systems and facilities of the airport, ii) 'Integrated trials', focusing on the interfaces between the interrelated sub-processes, leading to integrated tests, iii) '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 are unavailable and iv) 'Emergency trials', which involve the implementation of representative full scale emergency exercises to verify the capability of the airport staff to handle a potential crisis based on emergency planning.

Subsequently, the elaboration of scenarios for each trial shall comprise i) an objective, ii) the situation to be tested, iii) a detailed description of the scenario and iv) any parameters or the supporting material for the trial. Each trial can then be performed, and subdivided into different implementation stages such as briefing, execution and debriefing. It is also essential that a database with all necessary remedial actions is maintained in order to re-visit the necessary subjects requiring further attention.

Familiarisation can be considered as the preface of the most thorough and systematic training period. Familiarisation of airport staff and end-users can start during the last stages of construction through site visits, presentations and distribution of handouts. Training on the new systems, processes and procedures constitutes the second step after the introductory period. It is of fundamental importance as in most occasions a mishap in an airport 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 the operation of a particular system.

An important parameter in the scheme described above is the establishment of an operational readiness coordination committee with representation from all parties involved in daily airport operations. This committee should be comprised of the airport operational management, the designer/contractor/main subcontractors, the State entities (police, immigration, customs, air traffic control, etc.), the ground handlers and the home carriers. Permanent representatives to the committee shall be nominated and be responsible for the onward promulgation of information to their respective organisation and the follow up of the complete operational readiness evaluation.

**Conclusion**

The increasing number of new airports around the world and the higher safety standards envisioned by the global aviation community prompt airport operators to follow an established aerodrome certification process, in order to set the basis for managing safety and methodically develop their operational planning. Simultaneously and in order to secure the safe and successful commencement of operations from day one, airport stakeholders should define a system for the evaluation of the aerodrome operational readiness as an integral and indispensable part of the certification process. □

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