



**ASSEMBLY — 39TH SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 33: Aviation safety and air navigation monitoring and analysis**

**RISK-BASED SAFETY OVERSIGHT**

(Presented by Spain)

**EXECUTIVE SUMMARY**

The implementation and development of State Safety Programmes allow States to adopt best-informed strategic decisions and make a better use of the available resources.

However, this process is not free of challenges; particularly in terms of development of procedures to enable aeronautical authorities to prioritize their inspections and audits in areas involving greater safety risks.

The following shows how Spain addresses these challenges, and how we distinguish three different levels of safety risk analysis (corporate, sectorial and comprehensive), all developed in a systemic and methodological way, with different sources of data and information with impact on aviation safety. The different levels of analysis are briefly described, including some examples of commercial air transport operations.

Finally, attention is drawn to the importance of validating a priori such procedures before making changes in conventional modes of safety oversight.

|                                |   |
|--------------------------------|---|
| <i>Strategic Objectives:</i>   | This working paper relates to the Safety Strategic Objective. |
| <i>Financial implications:</i> | N/A   |
| <i>References:</i>             | Annex 19 — <i>Safety Management (Second Edition)</i>          |

**1. INTRODUCTION**

1.1 Undoubtedly, the State's progressive implementation of the so-called State Safety Programme is already generating a better use of available resources (often limited) to the civil aviation

<sup>1</sup> English and Spanish versions provided by Spain.

authorities. The materialization of this more effective use of the available resources must necessarily be followed by an implementation of robust and validated methodologies, so that this concentration of resources in the areas of greater safety risk at the expense of those involving lower risk, do not unintentionally produce a step back in the level of safety.

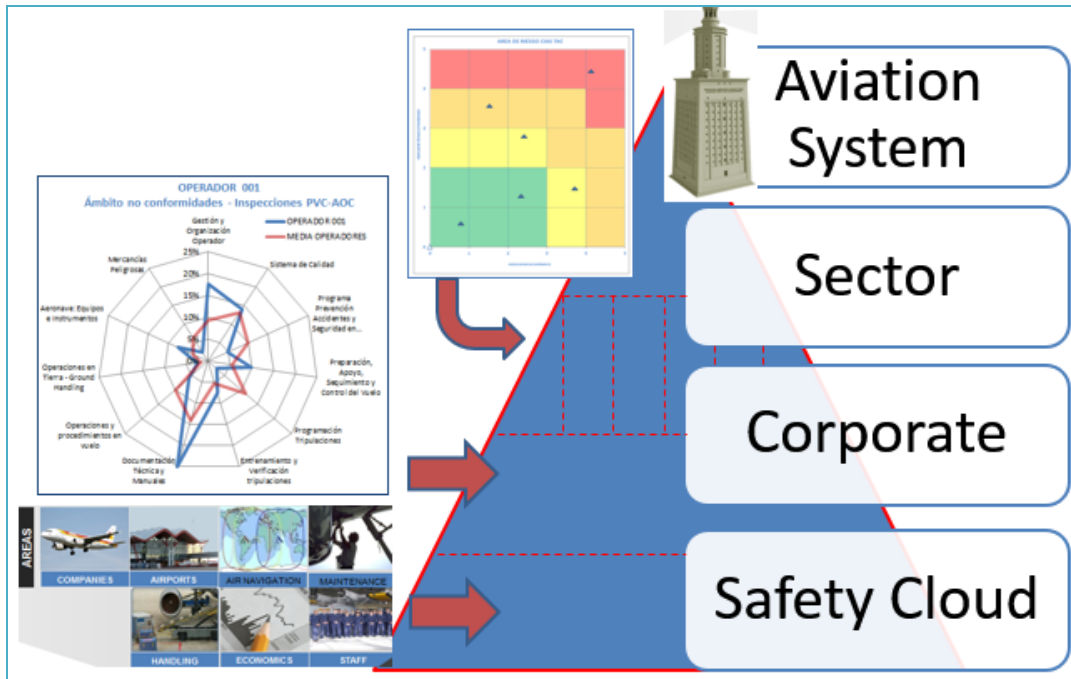
1.2 Recommendation 3.4.1.2 of Annex 19 (second Edition) establishes that *States should establish procedures to prioritize inspections, audits and surveys towards those areas of greater safety concern or need*. Several States have already begun to establish such procedures, using terms such as Risk-Based Oversight or Performance-Based Oversight, pursuing to meet the same purpose: safety risk-based oversight prioritization.

1.3 To comply with this recommendation, we present below the approach currently observed in Spain.

## 2. DISCUSSION

2.1 The two ultimate processes of a State Safety Programme are: 1) the process of safety risk management (SRM), and 2) the process of safety assurance (SA). Both processes are fed with safety data and safety information. Therefore, one of the first concerns a State must solve when implementing a State Safety Programme should be to acquire data and information that may have an influence on safety. In addition, equally important is that these data and information are validated and completed with the highest quality standard possible. These data and information will provide the basis of the pyramid upon which a State will build and develop the two main processes inherent to the Programme (SRM & SA).

2.2 In the case of Spain, the procedures developed for prioritizing inspections are nurtured by information coming from different sources, both internal and external, to the civil aviation authority, structured (stored in databases) and not-structured. For example, we do not only use a consolidated safety occurrences database and the result of audits and inspections conducted by both the Spanish aviation authorities and by other authorities under the SAFA program, but we also use information about the financial situation of airlines, complaints, disciplinary procedures, accident reports and even written and digital media information.



2.3 Based on this "safety cloud", we developed procedures in order to assess the risk profile of a particular aviation organization, be it an airline, an aerial-work company, an airport or an air traffic control unit (tower or Area Control Center -ACC). It is what we call "*corporate level*" of safety risk analysis. The purpose of this level of analysis is to provide the inspector with the safety DNA of such organization. That is to say, that the inspector is able to identify at a glance the safety health of the organization, so that when performing the inspection, he/she can focus time and effort on those aspects that pose a greater safety risk.

2.4 For the "corporate" level of analysis, we developed a number of key indicators to assess the situation of the different business areas of an organization, comparing their situation with the average of the organizations belonging to the same group or category. Organizations are grouped under a common risk exposure criterion so that they are comparable in relation to complexity and volume of activity. Thus, for example, in the area of operations of an airline, aspects such as technical documentation and manuals, equipment and instruments, quality system, ground operations, crew rostering, safety management systems, etc. are distinguished. The origin of the analysis may come from an occurrence, the result of a ramp inspection, a complaint, etc. The important thing is that the inspector has at hand already processed information easy to digest.

2.5 At the next level of analysis, "the sector level", we seek to compare some organizations with other organisations in terms of safety risk within the same sector (aerial work, airlines, air navigation, airports, etc.). That is to say, among other things, we try to answer questions that allow us to elaborate and manage more efficiently the Annual Safety Oversight Plan. What airports should we inspect more frequently? What airlines are currently experiencing a greater risk? What control towers require our attention? What ACCs should be inspected first?

2.6 In order to respond to these and other questions of similar nature, we prepared a safety risk map for each sector, where we can compare one provider with another in terms of the risk posed for safety. Safety risk maps represent two variables: one on the vertical axis and the other on the horizontal axis, which in turn are composed of a cluster of well-defined indicators and sub-indicators. Using again

the example of an airline (for the ease of brevity, we cannot refer to all sectors), a so-called technical indicator (vertical axis) and a financial indicator (horizontal axis) are represented. We use a financial indicator because experience has shown that when an airline goes through a difficult economic situation, its safety levels can end up deteriorated (posts holders' turnover, lack of supplies, tight production capacity, staff worried about their employment future, etc.). The financial indicator takes into account aspects such as return of assets, operating margin, financial profitability, current and non-current assets financing, financial autonomy, short-term, long-term and total debt, financial leverage, coefficient of guarantee, technical solvency, and immediate liquidity.

2.7 The other indicator used for the airline industry is called the technical indicator. This indicator consists in turn of a network of sub-indicators, to take into account many aspects such as: age (aircraft and design) and heterogeneity of the fleet, the volume of operations, the result of inspections and audits (number and severity of non-conformities) in the area of operations, airworthiness and ramp inspections, the non-conformities closing time, number of deferred defects, number of maintenance tasks extended, serious incidents and accidents suffered, reporting culture, its capacity to manage safety risks inherent to its operation, etc.

2.8 Eventually all operators, grouped by category (Category A, B, plane, helicopter), are represented in a safety risk map. Depending on the operator location on the map, we may adopt measures, such as increasing the number of inspections, conducting extraordinary audits, convening upper managers to discuss the airline situation, and in extreme cases, we may start proceedings to cancel, limit or revoke the airline operating license or air operator certificate. We also represent separately the various indicators and sub-indicators and we evaluate their historical series and time evolution, both individually and on the safety risk map. Time series representations allow us to detect negative trends and act preventively.

2.9 The last level of analysis "aviation system", the top of the pyramid, is the level aimed to jointly assess the overall aviation system in our country, so that we can detect safety problems that take place at the interfaces where different sectors interact. The methodology used for this level is described in a separate WP presented by Spain and entitled Risk Management in Aviation Safety (RIMAS).

### 3. CONCLUSION

3.1 As part of the implementation and development of a State Safety Programme, each State should implement procedures to prioritize audits and inspections towards the areas of greater safety concern or needs. The way in which a State implements and develops these procedures is critical, since if not done properly, the State could be making an inappropriate use of available resources, and what is more worrisome, some organizations or areas could be consequently left unattended, and such service deterioration could mean lowering safety levels.

3.2 Spain addressed this process in a gradual, systemic, and methodological way, and in cooperation with the aviation industry. We distinguished different levels of safety risk analysis, seeking to respond to different purposes. The *corporate level* is intended as a tool for the inspector; the *sector level* facilitates the elaboration and management of safety oversight sectorial plans; and the *aviation system level* seeks to identify the areas of greater safety risk of the aviation system as a whole, serving as a basis for the development of safety action plans, as SSP products. It is crucial that before modifying or supplementing conventional safety oversight modes, these procedures and methodologies are validated, challenged and endorsed before launching their final implementation in a State.