



FOURTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 26 August to 6 September 2024

Agenda Item 3: Air Navigation System Performance Improvement

3.1: Proposals to improve the efficiency of air navigation services contributing to LTAG

ROADMAP FOR DATA STANDARDIZATION (INPUT/OUTPUTS) RESULTING FROM SIMULATIONS CARRIED OUT BY AIRLINES IN AIR TRAFFIC MANAGEMENT (ATM) PROJECTS

(Presented by Brazil)

EXECUTIVE SUMMARY

This Information Paper presents improvements of the evaluation process of the new Airspace Concepts, both in the validation phase of the operational scenarios, to confirm if the project could proceed to the implementation phase, and in the post-implementation phase, to verify if the project objectives were achieved.

1. INTRODUCTION

1.1 Developing new Airspace Concepts to optimize air circulation and increase airspace capacity represent important aspects of a country's economy, as it directly affects the aviation industry and air transport in general. The airspace organization and structure must constantly evolve in order to adapt to the new operational scenarios imposed by increased air traffic, increased air transport, or new systems, concepts, techniques and procedures employed in airspace planning.

1.2 SIRIUS Brazil Program, as Department of Airspace Control (DECEA)'s strategic program for the implementation of the national air traffic management (ATM), has a specific undertaking to address the constant optimization of the airspace structure and organization within the Brazilian Airspace Control System (SISCEAB).

1.3 The "National Airspace Optimization" Project of the SIRIUS Brazil Program consolidates several projects for the implementation of new Airspace Concepts, which seek to meet important objectives for air navigation, such as reducing the complexity of airspace and the workload of air traffic controllers and pilots, increasing airspace capacity in control area (CTA), upper control area (UTA), terminal control area (TMA) and control zone (CTR), as well as the reduction of distances flown and the consequent reduction of CO₂ emission in the atmosphere contributing greatly to the achievement of long-term aspirational goal (LTAG).

1.4 Currently, global navigation satellite system (GNSS)-based area navigation (RNAV) routes and procedures are fully implemented throughout the country. The major challenge of the enterprise revolves around increasing efficiency in operations, in order to reduce fuel consumption and CO₂ emissions in the atmosphere through more optimized trajectories without compromising airspace capacity.

1.5 During the implementation of the Route Efficiency and Northeast Cardinal project, which took place in 2023, it was observed that it would be necessary to improve the methodology used in the evaluation of the proposed operational scenarios, so as to make this process more efficient and transparent to all users.

1.6 In this sense, the “Airspace Concept Assessment” Workshop was conceived and carried out in the period from 19 to 23 February 2023, with the participation of DECEA (Subdepartment of Operations (SDOP), the Institute of Aeronautical Cartography (ICA), Air Navigation Management Centre (CGNA), Regional Center of Southeast Airspace Control (CRCEA-SE)), airlines (GOL, LATAM, AZUL), International Air Transport Association (IATA), the Brazilian Association of Airlines (ABEAR) and BOEING, and had the main objective of improving the evaluation process of the new Airspace Concepts, both in the validation phase of the operational scenarios, to confirm if the project could proceed to the implementation phase, and in the post-implementation phase, to verify if the project objectives were achieved.

2. DISCUSSION

2.1 In a practical way, the expected result of the workshop was to develop an initial set of procedures to be observed by those involved in the evaluation of new operational scenarios, to establish a more efficient and standardized methodology for measuring the performance of these new scenarios.

2.2 The methodology should contain the process of analysis of the proposed airspace concepts, the necessary deadlines for each evaluation step, as well as the data exchange model, including the formats and types of files to be used.

2.3 The following topics were presented during the Airspace Concept Assessment Workshop:

- a) Airspace Concept Projects
- b) Results of the Efficiency/NE Cardinal and TMA-CT/FL Projects
- c) Proposal of Methodology on Analysis of Airspace Concepts
- d) Demonstration of the Flight Planning Software
- e) Data Provision Model; and
- f) Results Achieved from the Workshop

Results of the efficiency/NE cardinal and TMA-CT/FL projects

2.4 The airlines presented the methodology used in the analysis of the mentioned projects, as well as the preliminary results achieved in the post-implementation period of the efficiency/NE cardinal and TMA-CT/FL projects. In general, the preliminary analysis indicated that the results of the Efficiency/NE Cardinal project present opportunities for improvement, while the results of the TMA CT/FL project demonstrated a significant operational gain.

2.5 A detailed analysis was proposed for the 10 pairs of cities that presented greater opportunities for improvement of each airline (AZUL, GOL and LATAM), which will be considered during the post-implementation process of the project. In this sense, it is concluded that a joint work should be carried out between ICA/CGNA and airlines to achieve a possible optimization in the short term, through modification of air navigation procedures (SID, STAR and IAC) as well as employment of optional routes.

Proposal of methodology on analysis of airspace concepts

2.6 The IATA presented a proposal of methodology on Analysis of Airspace Concepts by Aircraft Operators, which was formatted, preliminarily, in a normative framework in which: the work methodology should be focused on the analysis of new airspace concepts, based on the harmonization of data exchange between airlines and the ICA; a mechanism should be introduced to ensure that the inputs used for ATM simulations (real-time and accelerated-time) and the analysis of aircraft operators are the same.

Demonstration of the flight planning software

2.7 The participants of the airlines presented the limitations of the application of Flight Planning Software for the analysis of airspace concepts, in the design and validation phases. It was observed that the software has the required precision, provided that a harmonization of the inputs is guaranteed and that initiatives are taken to ensure the appropriate comparison. It is worth mentioning that this software is used for the determination of the fuel to be loaded in the aircraft, having, in this way, an adequate precision for such purpose.

2.8 Considering the needs of airspace planning, it has been suggested that airlines provide more complete performance data of the several types of aircraft, in addition to the initial ascent profile, including full ascent, route, arrival and approach, in order to be considered in future developments of airspace concepts.

2.9 A demonstration was made of the software used to obtain the actual flight data, which have the potential for further analysis of pairs of cities that are considered priority or that require a verification of the results achieved.

2.10 The software also allows to obtain the trajectory of several flights performed in a specific city pair, which can be used in the design phase, in order to mitigate any problems identified in the trajectories, as well as in the post-implementation phase, in order to verify the planning and execution of flights in comparison to that foreseen by the new airspace concept implemented.

2.11 Finally, the possibility of using aircraft performance tools was mentioned, to further explain details on aircraft vertical profiles. In addition, flight simulators may be used for this purpose.

Data Provision Model

2.12 A data sheet model was proposed to be used by all involved parties, in order to allow the analysis of the proposals of airspace concepts in a more efficient and professional way.

3. CONCLUSION

3.1 The proposed methodology was analyzed and improved and is aimed to establish the procedures to be observed by those involved in the implementation of Airspace Concepts, to make the process of evaluating new operational scenarios more efficient and aligned with the needs of airspace users.