NEW PERSPECTIVES FOR REGIONAL INTEGRATION AND DIGITALIZATION OF ATC SOLUTIONS

How the centralization of flight plan processing in Brazilian airspace and the latest remote and digital solutions are creating a more integrated ATM ecosystem.

Walter N. Pizzo, Juliana B. Gonçalves, Edson F. Gomes, Agenir C. Dias, Marcos R. Resende, Atech

In a constantly changing environment, the ATM sector has experienced accelerated transformation trends during last decade, mostly due to technological evolution, but also by being substantially affected by unprecedented scenarios, like the Covid-19 pandemic. This entire industry, including ANSPs, airlines, ATM system manufacturers and the international standard-setting organizations, keep jointly working on new ways to adapt and overcome the impacts of this crisis. It is also supporting innovative solutions to deal with societal changes that bring new challenges on environmental sustainability, opportunities for the economic reality ahead and after the pandemic, and increased resilience for future shocks.

An example of this effort was the Industry Consultative Forum (ICF) promoted last June by ICAO. This high-level body was established as result of the Resolution A40-27: Innovation in Aviation, during the 40th Session of the Assembly. The meeting had new trends and innovations discussed, such as the digitalization of ATM services, cyber security, decarbonization and unification of skies. Atech had its place to collaborate in this forum, as an innovative systems and technology provider in the ATM industry, and a company of the Embraer Group.

During the event, the CEO of Atech, Edson Mallaco, emphasized the benefits of such an initiative from ICAO to obtain a fast scan of the industry perspective regarding urban air traffic management, virtual and remote services among other topics that demand new standards to address a faster pace of innovations in this industry.

This digitalization process, with the concentration of ATC Centers, as well as the dissemination of remote operations solutions is now providing better operational efficiency for ANSPs. In addition to the technical and infrastructure gains, the acceleration of virtual and remote solutions optimizes operations, reducing their geographical distribution with a promising perspective to achieve better investment efficiency and reduction of operating costs for each ANSP and bringing overall economic benefits for Airlines and Airports.

Figure 1: Brazil´s DECEA air traffic flow management solution, by Atech, running at the Air Navigation Management Center (CGNA) in Rio de Janeiro

At Atech, one of the main reasons for this continuous innovation is the commitment of some customers, especially the Brazilian ANSP DECEA, that permanently demands innovative ways to face long term technical challenges, while also maintaining strategic investments to keep the entire lifecycle of ATM activities safely running, even in this pandemic disrupting scenario, from design to acceptance and in-house training to onsite maintenance support.

Centralization of flight plan processing in Brazil

An example of the great accomplishments of DECEA, developed through its project management specialized division CISCEA (Airspace Control System Implementation Commission), was the recent introduction of a new advanced Centralized Flight Plan System (CFPS), responsible for receiving, process and distribute flight plans for all ATS units in the entire Brazilian airspace, hosted by the Air Navigation Management Center - CGNA (Figure-1). The Brazilian airspace covers a vast area of 22 million square kilometers under DECEA´s responsibility, with over 1.1 million regular flights and 119 million passengers transported in 2019.

The CFPS was jointly designed by Atech, DECEA and CISCEA based on EUROCONTROL IFPS (Initial Flight Plan System) recommendations and developed by

Figure 2: Operational and technical teams from CGNA, CISCEA and Atech during the activation of the new Centralized Flight Plan System (CFPS) at CGNA

Figure 3: SkyFlow system at the Airports Authority of India´s ATFM Center in New Delhi

Atech. This new CFPS implemented by Atech also improves the capacity and simplicity for a future regional integration in terms of air traffic flow management (ATFM) with other countries in the CAR/SAM region.

Previously, flight plans and update messages went through different paths for procedures such as analysis and forwarding. The professionals responsible for flight control used different resources to perform activities, making traceability and validation difficult, in addition to requiring multiple human interventions in order to verify the information.

The CFPS was coupled to the SIGMA ATFM system as a module, and is responsible for performing all the processing, syntactic and semantic analysis of Air Traffic Service (ATS) messages. Thus, flight plans and messages from the operators are initially submitted to the CFPS for validations before being forwarded to the Aeronautical Information Service (AIS) offices for approval. After this step, the approved flight plans are sent to each ATS units responsible for the flights. This new CFPS started operation in April 2021, after a series of validation and test activities with technical and operational teams from CGNA, CISCEA and Atech (Figure-2). "The centralization of flight plans is a fundamental accomplishment for increasing the flight plan management efficiency in Brazil" says the CGNA Commander, Brazilian Air Force Col. Marcelo Cavalcante.

The centralization of flight plan management is supported by two systems implemented by Atech: the ATFM system SIGMA and the ATC System SAGITARIO. The main effects of this enhancement in both process and system are in the elimination of risks such as absence, deviation or duplication of flight plan, which existed in the previous process, along with an expressive decrease of human errors and needs of allocation of staffing for fixing ATS message with errors. With the centralization of flight plans, pilots and operational flight dispatchers will be able to monitor the processing of flight intentions at each stage. In the meantime, it will be possible for airlines to use their systems to send flight intentions in the form of ATS messages, in batches.

The CFPS stands out for being integrated and ensuring greater safety without losing agility. By having a back-up control center, it ensures the continuity of activities in any situation. "This DECEA initiative places Brazil on an even higher level of air traffic coordination. A single address for receiving all flight plans in the Brazilian Air Space, with no need to send them to each ACC, in an integrated and seamless manner" highlights Maj. Marcio Gladulich, Chief of the Operational Division at CISCEA.

Additionally, Atech released a new mobile app for pilots and airlines, the electronic flight bag (EFB), which gives pilots access to digital aeronautical charts and other up-to-date relevant information via iOS or Android tablets. The EFB module is an extension of FPLBR, an app from Atech launched in 2018 for filling and submitting flight plans. The FPLBR connects to the CFPS allowing the user to submit flight plan and to receive all the approvals, requests for changes, and updates related to the submitted flight plan. The user may also submit delay or change messages, or even cancel a flight plan. Available for Android and iOS, by using FPLBR and EFB apps to fill up the flight plan, the user can access the route library, AIP, up-to-date meteorological information, NOTAM, and all relevant information for planning a flight.

SkyFlow in India

Atech also deployed a similar solution for the Indian ANSP AAI (Airports Authority of India): the IFPS (Initial Flight Plan System), coupled with the SkyFlow ATFM system, also developed by Atech, will perform the centralization of the initial flight plan submission for the entire Indian airspace. The IFPS, branded as LEO system by Atech, adopts modern IFPS concepts and is based on EUROCONTROL recommendations.

After starting operation of SkyFlow in 2017, since 2019 AAI is operating the system at the new ATFM Center in New Delhi (Figure-3), the system is in full operation, running the strategical and tactical planning of the Indian airspace. AAI relies, since then, on an essential tool for air traffic flow optimization, capable of providing the best balance between demand for flights and operational capacity. The advanced ATFM solution from Atech is increasing the safety of operations, regularity and punctuality of flights, bringing improvements in India's civil aviation flights network, while generating aircraft fuel savings over this important region, where roughly 187 million passengers fly each year.

A new web portal for the AAI ATFM Center was also activated in June 2020, providing easy public access to various information in India, such as airport situation, flight delays, weather information and ongoing ATFM measures. The portal presents information in four views, tactical, pre-tactical, strategic and post-operational (Figure-4). This new service is integrated with Atech's SkyFlow ATFM solution.

Digitalization and remote services

Atech has also launched its latest version of its ATFM systems, the SkyFlow Cloud, developed as an affordable operational choice for more countries to be able to run

Figure 4: SkyFlow WebPortal in operation for the Airports Authority of India

their own ATFM system, with lower investments and maintenance costs.

When hosting the system in a cloud platform, Atech opens a new opportunity to many ANSPs, according to their needs and specificities of each country, since they can start an ATFM system operation without the typical implementation investments. This alternative also shortens the deployment time, optimizing the start of operations with an "as a service" solution, drastically reducing the amount of initial infrastructure, maintenance and operational costs.

The cloud solution for a new ATFM system can also be an attractive entry strategy even for an ANSP with more significant flow management needs. Thus, depending on its local expansion or operational policies, a cloud based ATFM can be used as a first step to a subsequent migration, if the ANSP intends, after an initial phase of cloud-based operations, to have its own complete local IT infrastructure for the already running ATFM system.

As part of the cloud solution Atech has also developed internationalized apps, branded as JANUS EFB, JANUS eFPL and IFPS LEO, allowing the user to submit flight plans and to receive all the approvals, requests for changes, and updates related to the submitted flight plans. The user may also submit delay or change messages, or even cancel a flight plan.

Available for Android and iOS, by using JANUS apps to fill up the flight plan, the user can access the route library, AIP, up to date meteorological information, NOTAM, and all relevant information for planning a flight.

In addition, Atech has substantially increased the project activities performed remotely by using a pre-existing online remote maintenance infrastructure, the SMAR system, which was developed by 2018 and already used by DECEA, mainly to provide continuous status monitoring and fast diagnosis of technical or operational alarm situations, maintenance tasks or scheduled software updates. The company also used its cloud-based deployment architecture, an internal feature of Atech's ATM family of products (Makron), which meant some ANSPs were already connected to the test bench at Atech facilities.

In 2021 DECEA has also activated the new OPMET system (Figure-5), also developed by CISCEA and Atech, with new interoperability capabilities of SWIM (system-wide information management) standards, as part of the International Civil Aviation Organization Global Air Navigation Plan. With this recent accomplishment DECEA introduced Brazil as the first country in the CAR/SAM Region to start operations of an advanced OPMET solution compliant with the new IWXXM protocol and web service standards.

Installed in all Brazilian area control centers (ACCs), SAGITARIO is operated by DECEA at its four integrated centers for Air Defense and Air Traffic Control (CINDACTAs), covering the regions of Brasília, Curitiba, Manaus and Recife, which also controls a large part of the Atlantic Ocean under Brazilian jurisdiction. SAGITARIO is also installed in more than twenty approaching centers (APP) (Figure-6) and towers (TWR) throughout Brazil and other countries.

In this unprecedented pandemic outbreak scenario, Atech has demonstrated innovation and readiness to support services and deploy capacity in ATM solutions. The international support services Atech offers include both local and remote options for training, deployment, test, status monitoring and maintenance activities, these allow for better autonomy in terms of operational availability, configuration control and much easier customization and product evolution, through either a technology transfer partnership with the ANSP or with local partner organizations. ❖

Figure 5 : New OPMET system, installed in Brasília, being remotely accessed at the Aeronautical Meteorology Integrated Center (CIMAER) in Rio de Janeiro

Figure 6: SAGITARIO system in Brasil, at the APP Rio de Janeiro