



# Departamento de Controle do Espaço Aéreo

Department of Airspace Control



## DECEA 2040

An outlook for the future of the  
Brazilian Airspace Control System



## EXECUTIVE SUMMARY

This document is an initiative of the Department of Airspace Control (DECEA) in order to deepen the dissemination of the Operational Design for National Air Traffic Management (CONOPS ATM Brazil), presented in Chapter IV of **DCA 351-7** (“Air Force Command Directive for the Brazilian Airspace Control”).

DCA 351-7 is the document that establishes, for the 2040 horizon, the foundations, direction and goals of the Brazilian Airspace Control System (SISCEAB), which will enable the Air Force Command (COMAER) to continue ensuring sovereignty, safety, efficiency and environmental sustainability of operations in the airspace under the responsibility of Brazil.

CONOPS ATM Brazil was prepared in accordance with the guidelines issued by COMAER, taking into account national needs and realities and, in a sovereign manner, the guidelines issued by the International Civil Aviation Organization (ICAO), especially those contained in Doc 9750 “Global Air Navigation Plan (GANP)”.

This work presents, in an illustrated way, the complete scenario of the Brazilian ATM in 2040, considering the infrastructures of Communications, Navigation, Surveillance, production and sharing of information, including the implications for the area of Cybersecurity, and the actions of allocation and maintenance of Human Resources proficiency that will be analyzed, developed and implemented by the DECEA Strategic Program (SIRIUS Program).



DCA 351-7



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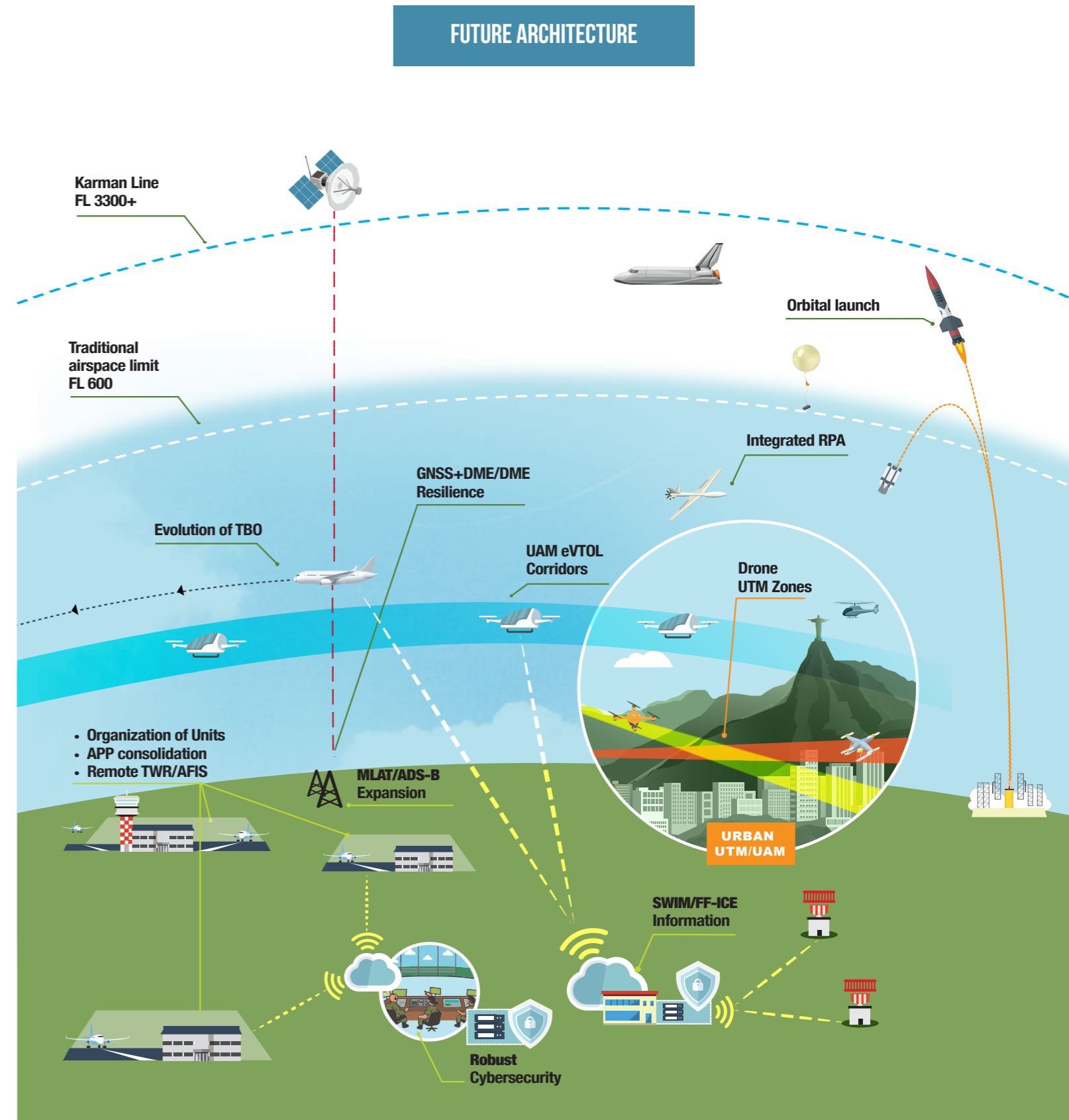
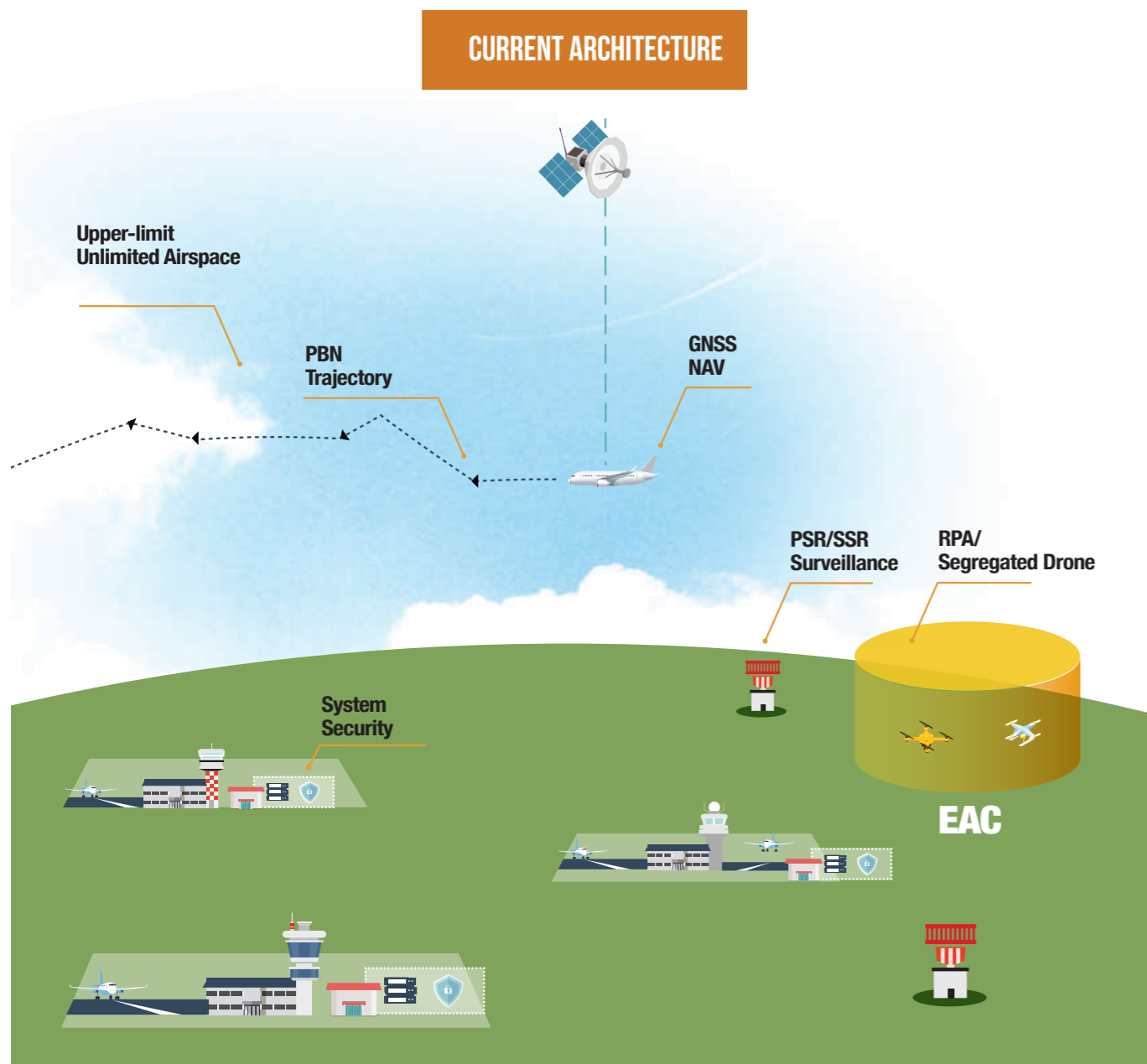
# ATM OF THE FUTURE

## Trends and Vision 2040

The 2040 horizon has the perspective of a more digital, autonomous and globally integrated SISCEAB.

Trends include:

- Integration of Urban Air Mobility (UAM) and Unmanned Air Traffic (UTM) operations with traditional ATM;
- Higher Airspace Operations (HAO) with stratospheric and orbital vectors;
- Full interoperability through System-Wide Information Management (SWIM); and
- Advanced automation to support decision-making, ensuring greater capacity, safety and security



# OPERATIONAL DESIGN OVERVIEW

1

## Air Traffic Management (ATM)

Continuous modernization of processes, integration with Unmanned Traffic Management (UTM) and Advanced Air Mobility (UAM), adoption of the concept of Trajectory-Based Operations (TBO) and control in four dimensions

2

## Communications (COM)

Transition from legacy infrastructure to digital networks such as the Aeronautical Telecommunications Network - Brazil (ATN-Br) and L-band Digital Aeronautical Communications System (LDACS), with a focus on performance and scalability.

3

## Navigation (NAV)

Rationalization of navaids, expansion of Performance-Based Navigation (PBN), support for operations in degraded environments (fallbacks).

4

## Surveillance (SUR)

Combined use of radars, Automatic Dependent Surveillance-Broadcast (ADS-B), Multilateration (MLAT) and distributed sensors, with redundancy and civil-military integration.

5

## Information Services

Digital and integrated management of aeronautical, meteorological and flow information through System-Wide Information Management (SWIM) and three dimensions interoperable cartography, ensuring quality, standardization and decision support to ATM.

6

## Factors and Human Resources

Excellent initial technical training, continuous education and support for quality of life in challenging operational environments.

7

## Sustainability and Environment

Minimization of aviation adverse environmental effects, improvement of general and environmental performance of operational improvements, implementation of national and international plans and programs.

8

## Operational Resilience

Cyber protection, continuity of critical services (Minimum Operational Network - MON), defense against interference, ability to respond to extreme events.

# EVOLVING FUNCTIONAL ARCHITECTURE

The functional architecture of SISCEAB is in full evolution, supported by digitalization and increasing integration among services, applications and users of airspace. The designed model highlights three major axes: new users and emerging operations; services and integrated applications; and critical supporting infrastructure.

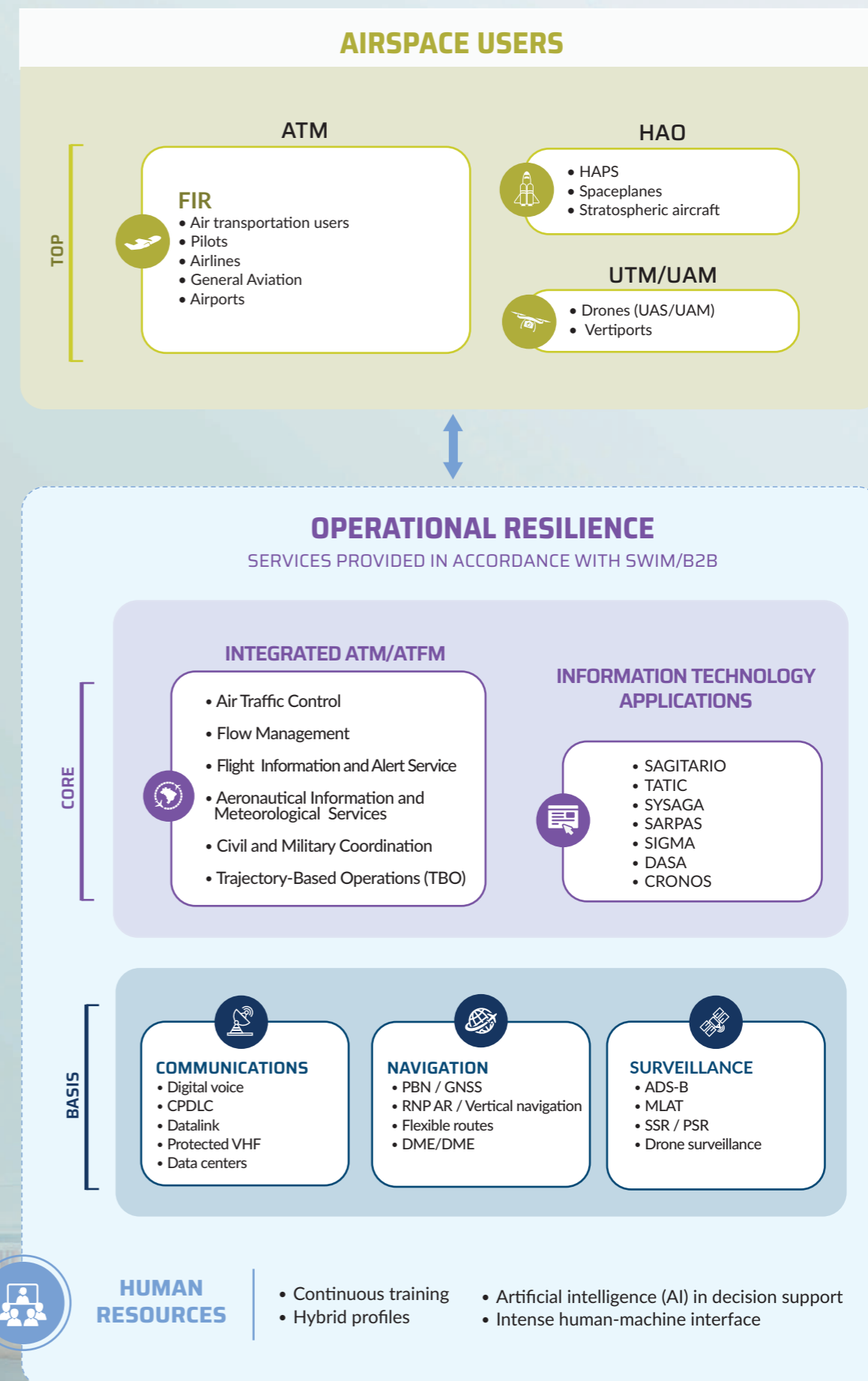
At the top of the architecture, airspace users stand out in different domains: traditional ATM, and Urban Air Mobility (UAM) and Unmanned Traffic Management (UTM) operations, as well as Higher Airspace Operations (HAO), with stratospheric and orbital vectors. The full integration of these segments represents one of the major challenges for future airspace management.

At the core of the architecture, there are the essential services (SWIM, AIM and MET), responsible for ensuring interoperability,

standardization and data exchange in real time among organizations (B2B). On this architecture, there is the operation of the critical applications (STVD, eSTRIP, SAGITARIO, SIGMA, TATIC, SYSAGA, SARPAS, DASA, CRONOS, etc.) that support decision-making flows and operational efficiency.

At the basis, there are infrastructure systems: secure digital communications, Performance-Based Navigation (PBN), flexible routes, multi-layer surveillance (ADS-B, MLAT, SSR, PSR, drone monitoring), and strengthening cybersecurity as a cross-cutting element.

Finally, the evolution of the architecture depends on qualified Human Resources, with hybrid profiles, continuous training and support from artificial intelligence in decision-making, consolidating a more secure, resilient and integrated operating model to the global context.



# 1 Air Traffic Management



**A**ir Traffic Management (ATM) in Brazil has been undergoing a profound transformation to ensure that the airspace remains safe, efficient and prepared for new aircraft types and new operating models. This breakthrough involves both the modernization of traditional practices and the incorporation of emerging technologies and new users, such as drones, remotely piloted aircraft, and electric vertical takeoff and landing aircraft.

Over the next few years, the objective of ATM will continue to be the management of air movements during all phases of flight, meeting established levels of safety and providing optimal and sustainable operations. The evolution of ATM will follow a path of continuous integration, in which traditional aviation and new aircraft will coexist safely and harmoniously, supported by digital processes, modern infrastructure and new forms of coordination between the various agencies and operators.

## Expected progress

- **Performance Management**

Performance Management guides the modernization of Air Traffic Management (ATM) with the understanding that automation, digitalization and use of surveillance and navigation data are essential enablers of the evolution and resilience of SISCEAB.

In this sense, DECEA will reinforce the culture of Performance Management to optimize airspace use, reduce flight times and mitigate environmental impacts. By 2040, ongoing and consolidated key performance indicator (KPI) analysis and use of business intelligence (BI) capabilities will facilitate proactive identification of improvements and alignment with industry best practices

- **Safety as a pillar of development**

Safety will guide the modernization of the ATM with the understanding that early alarms, automation and digitalization are not only increases in Safety, but essential enablers of the evolution of the System. Tools capable of broadening situational awareness, reducing workload and supporting critical decisions transform safety into an active factor of progress: the more robust prevention, integrity, and resilience mechanisms are, the greater the ATM's ability to operate with major levels of efficiency, predictability and equitable access.

- **Digital and shared flight information**

Introduction of a fully automated system that will replace the Traditional Flight Plan. This new format will allow real-time updates from planning to landing, strengthening coordination among airlines, airports and regulatory bodies.

- **Management based on the complete trajectory of the aircraft**

The evolution to Trajectory-Based Operations (TBO), considering position and time, will allow all involved to follow the same digital route of the aircraft. This will increase accuracy, predictability and safety by reducing manual interventions and enhancing the efficiency of operations.

- **Remote control units**

Towers and Approach Controls will be able to operate from remote locations, using cameras, sensors, high-quality digital systems and communication networks of great capacity and reliability. This will enable service provision to several airports in an integrated way, reducing costs and maintaining high safety standards.

- **Collaborative decision-making processes**

Expansion of the model in which operators, authorities and service providers analyze information together and make decisions aligned, avoiding delays, reducing impact of contingencies and increasing overall efficiency of the network.

- **Simultaneous support of civil and military operations**

Modernization of systems and structures to ensure that military activities, especially those of Air Defense, coexist efficiently with civilian traffic, maintaining national security without compromising the fluidity of other operations.

- **Advanced use of technology and automated forecasts**

Application of data analysis tools and algorithms capable of predicting scenarios of airspace saturation and proposing adjustments in real time.

- **Drone traffic management**

Creation of a specific system to organize and supervise the use of drones of different sizes and capabilities, ensuring that this equipment operates safely and is compatible with the rest of air traffic operations.

- **Electric Vertical Take-Off and Landing operations**

Evolution of the rules that will allow the safe and scalable operation of vehicles intended for Urban Air Mobility (UAM), integrating them into the traditional air traffic environment and the drone system.

- **Remotely piloted aircraft on regular routes**

Gradual insertion of remotely piloted aircraft into operations similar to conventional aviation, including long-distance and adverse weather flights from controlled airports.

- **Dynamic and flexible use of airspace**

Restructuring of flight areas to allow different categories of aircraft to share the same air environment safely, respecting their characteristics and operational needs.



# 2

## Communications



**A**eronautical communications are the basis for safe and continuous coordination among aircraft, Air Traffic Service (ATS) units and support systems. CONOPS ATM Brazil establishes the transition to a more robust, digital and resilient communications infrastructure.

### Expected progress

- **Evolution for the Aeronautical Telecommunications Network - Brazil (ATN-Br)**  
National data network based on IP (Internet Protocol), ensuring interoperability and high availability of services.
- **Integration of the L-band Digital Aeronautical Communications System (LDACS)**  
Scalable technology to gradually replace VHF/AM analog links, offering higher bandwidth, spectral efficiency and additional navigation capabilities. This technology is aligned with the cybersecurity guidelines established by the International Civil Aviation Organization (ICAO).
- **Expansion of the use of Controller-Pilot Data Link Communications (CPDLC)**  
Text and data communication between pilots and controllers, increasing operational clarity and reducing the risk of voice misunderstandings.
- **Expansion for new entrants**  
With drones, air taxis and autonomous vehicles, the System should integrate new users of airspace, allowing Unmanned Traffic Management (UTM), Urban Air Mobility (UAM) and Higher Airspace Operations (HAO) and Air Traffic Management (ATM) to operate harmoniously on the same digital infrastructure.

# 3 Navigation



The modernization of the Navigation area in SISCEAB is aimed at consolidating Performance-Based Navigation (PBN), which offers greater accuracy, flexibility, operational economy and environmental benefits.

## Expected progress

- **Rationalization of terrestrial infrastructure**

The evolution process foresees the rationalization of the nav aids infrastructure, gradually reducing reliance on conventional ground systems for primary navigation in favor of satellite-based solutions. This optimization seeks to direct resources towards more precise and cost-effective technologies, without sacrificing operational resilience, ensured by a Minimum Operational Network (MON), supported by composite solutions such as DME/DME and aircraft sensors, capable of supporting operations in cases of degradation or unavailability of satellite systems (GNSS).

- **RNAV and RNP expansion for all phases of flight**

The consolidation of the PBN concept includes the expansion of the RNAV (Area Navigation) and RNP (Required Navigation Performance) specifications for all phases of flight - Route, Terminal and Landing - ensuring greater accuracy, predictability and operational flexibility. This expansion will increase the ability to provide optimized trajectories and standardization of procedures in Brazilian airspace, reducing the workload of controllers and crews.

- **Provision of environmentally sustainable pathways**

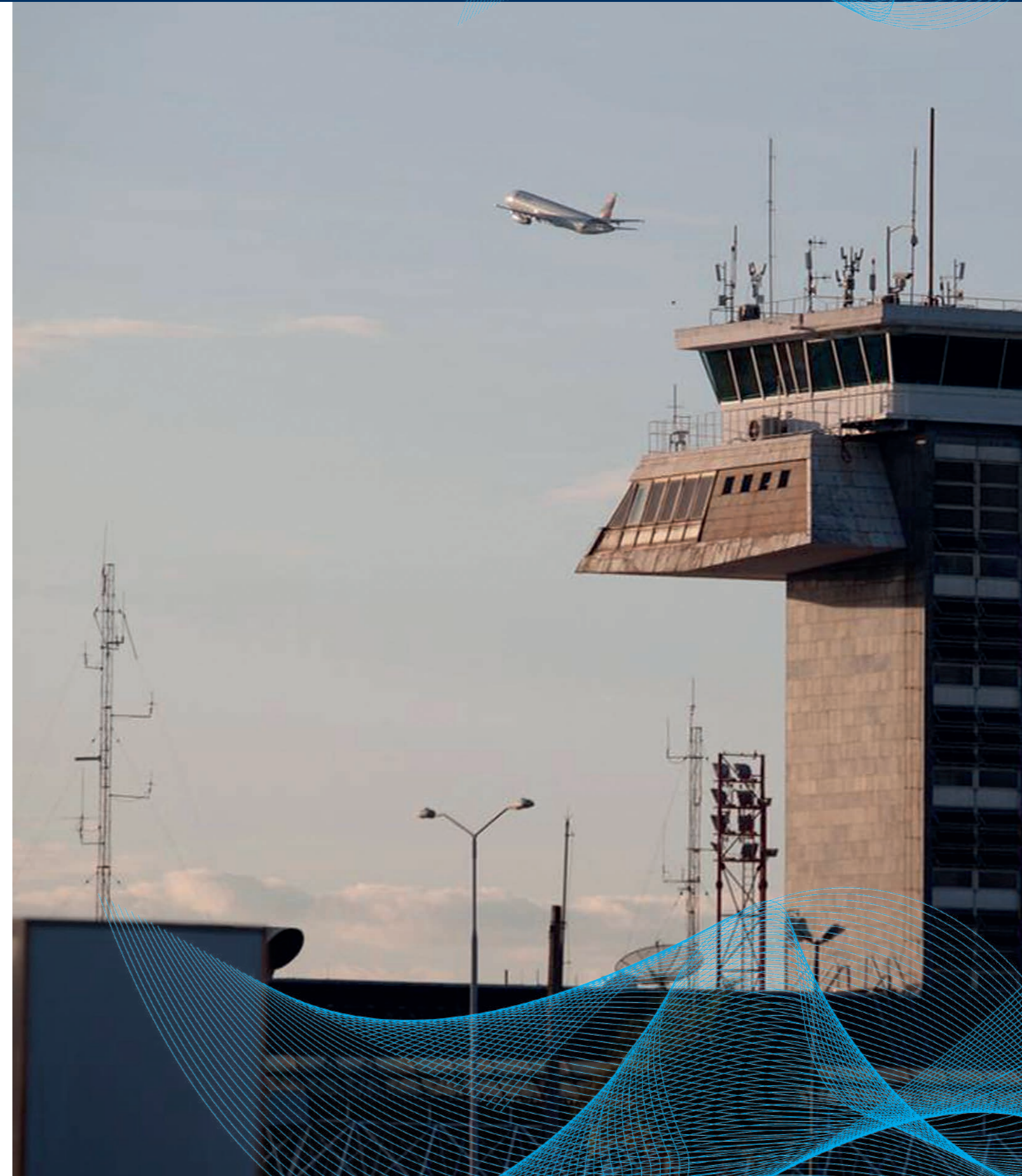
The development of optimized trajectories, in addition to maximizing operational efficiency, will contribute to reducing environmental impacts for aviation. Through the application of concepts such as Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO), it aims to reduce fuel consumption and noise levels and emissions.

- **Increased availability of Instrument Flight Rules (IFR) operations**

Expanding the availability of IFR operations is an essential vector for territorial integration and strengthening of domestic air connectivity. The implementation of PBN procedures, notably the RNP APCH (RNP Approach) with or without vertical orientation (LNAV/VNAV, LPV), will provide safe operations even under adverse weather conditions, reducing cancellations and deviations to alternative destinations. This initiative extends air access to a greater number of destinations in the country, contributing to the internalization of development.

- **Integration of satellite-based navigation into new operational concepts**

The integration of satellite-based navigation into new operational concepts represents a fundamental advance in interoperability and the evolution of airspace management. The use of satellite means in emerging domains, such as Unmanned Traffic Management (UTM), Urban Air Mobility (UAM) and Higher Airspace Operations (HAO), requires new technical and regulatory architectures that ensure continuity, integrity and safety. Supported by infrastructures based on complementary satellites (multifrequency and multi-constellation) and integrated data management through System-Wide Information Management (SWIM), SISCEAB prepares to provide resilient and adaptable navigation services for these new scenarios.



# 4 Surveillance



The surveillance of Brazilian airspace is in continuous evolution to meet the increasing demand and the diversification of users.

## Expected progress

- **Maintenance of a redundant network of primary and secondary radars**

Brazilian airspace surveillance is based on a national network of primary (PSR) and secondary (SSR) radars, strategically distributed to ensure continuous and redundant coverage. This framework allows effective monitoring of cooperative and non-cooperative aircraft, strengthening the safety and sovereignty of airspace. The maintenance and updating of this network follow criteria of reliability and interoperability.

- **Expanding the use of ADS-B and MLAT sensors**

The incorporation of Automatic Dependent Surveillance-Broadcast (ADS-B) and Multilateration (MLAT) sensors will expand the coverage and accuracy of monitoring, especially in remote and oceanic areas. These technologies integrate the concept of Performance-Based Surveillance, optimizing airspace management and allowing smaller separations between aircraft without compromising safety.

- **Integration of civil and military surveillance data**

The integration of sensor surveillance data for civil and military use strengthens situational awareness, ensures a unified view of airspace and favors coordination between Air Traffic Control and Air Defense, enhancing accuracy and responsiveness. Interoperability between systems is guaranteed by standardized protocols and processing centers that consolidate and distribute data in real time.

- **Modernization of ATM Data Processing and Visualization Systems (STVD)**

The modernization of STVD is fundamental for the efficiency and safety of air traffic control. The new platforms integrate different sensors and information sources, offering real-time updates and more intuitive interfaces for controllers. These advances improve conflict detection and decision-making process.

- **Adoption of collaborative surveillance concepts**

Collaborative surveillance, based on the participation of users equipped with ADS-B systems and other embedded technologies, represents a breakthrough in aerial surveillance architecture. This approach allows for direct sharing of information between aircraft and control centers, increasing redundancy and system resilience. In addition to expanding coverage in remote areas, it contributes to reducing infrastructure costs and strengthening situational awareness in SISCEAB.

# 5

## Information Services



The purpose of Information Services is to ensure the efficient exchange, management and provision of information essential to air navigation. Integrated information management supports higher levels of safety, efficiency and predictability of operations, allowing for more effective coordination among all SISCEAB users.

### Expected progress

- **Data quality and reliability assurance**  
Information management in SISCEAB aims to ensure that the data made available are reliable, timely and of proven quality, forming the basis for precise decisions in Air Traffic Management (ATM). This process enhances the safety and security of operations, and efficiency of the System, ensuring that controllers, operators and other users have consistent and updated information for the performance of their duties.
- **Building an integrated situational overview**  
Information management enables the formation of a comprehensive and continuously updated situational overview that considers track record, present state, and future projections of operations. This approach favors the early analysis of scenarios and the adoption of proactive measures in air traffic control, contributing to predictability and coordination among the various ATM services.
- **Support for collaborative decision-making**  
Grounded in an integrated information environment, the information management process supports data-driven collaborative decision-making. This capability allows all stakeholders to act in a coordinated and aligned manner, reducing operational uncertainties and increasing the overall efficiency of the system.
- **Domains and information patterns used**  
The scope of information management covers all domains necessary for the collaborative ATM environment, including the exchange of information within standardized protocols such as aeronautical information (AIXM - Aeronautical Information Exchange Model), meteorological information (IWXXM - ICAO Weather Information Exchange Model) and flight and flow information (FIXM - Flight Information Exchange Model). These standards ensure technical and semantic interoperability between national and international systems, in accordance with the principles of the System-Wide Information Management (SWIM) concept prescribed by ICAO.

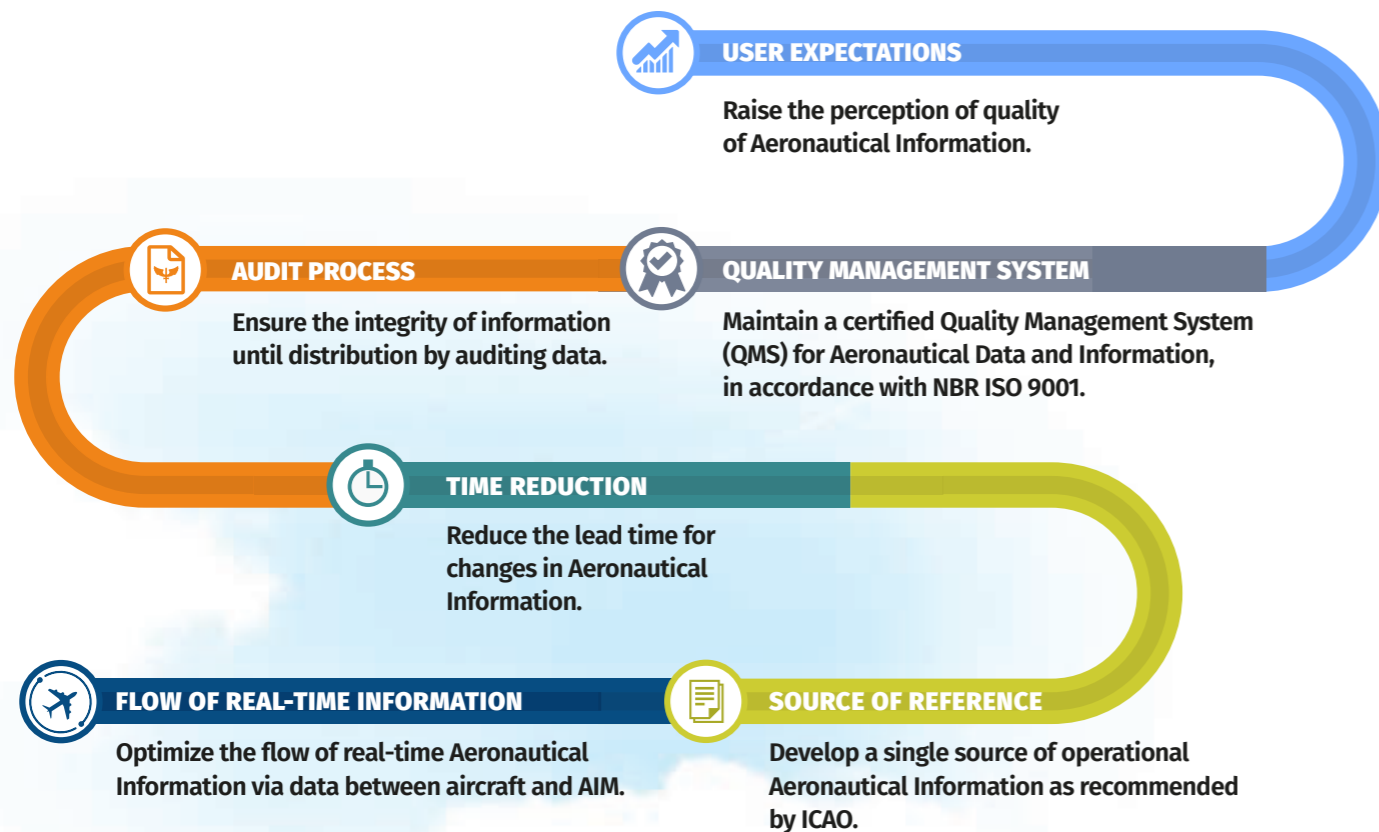
## 5.1 Aeronautical Information Management (AIM)

### AIM Implementation: General Overview

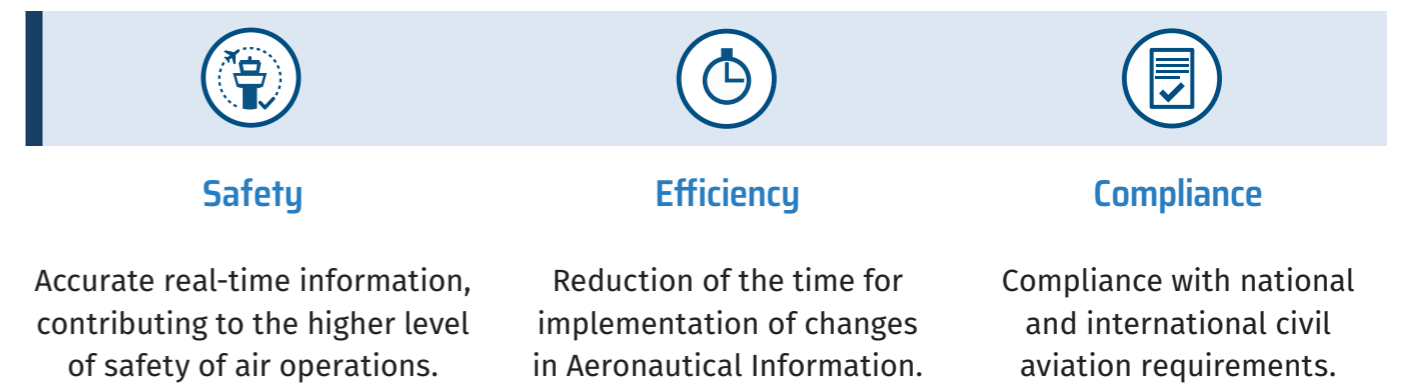
The implementation of AIM represents a significant advance in the Aeronautical Information Service, replacing traditional models with a modern, data-driven approach. In line with ICAO guidelines, the AIM responds to the demands of an increasingly complex and dynamic air traffic.

### Objectives

The objectives of AIM underpin **data integrity, quality** and **availability**, which are essential pillars for safe and efficient air operations.



### Benefits



## 5.2 Meteorological information

The Meteorological Service is essential for the safety, efficiency and regularity of air navigation by providing timely and reliable information to SISCEAB users. Integrated into modern Air Traffic Management (ATM) and aligned with international standards, it must be globally interoperable, with data adapted in content, format and opportunity to support decisions at all phases of flight and reduce risks and environmental impacts.

### Future Trends and Demands

- Real-time update of meteorological information, with intensive use of data link;
- Customized and very short-term forecasts to support tactical decisions in air operations;
- Application of artificial intelligence in numerical models, increasing the accuracy and efficiency of weather forecasts;
- Incorporation of new sensors and technologies, such as wind profilers and weather drones;
- Digital integration between systems through web services and applications, ensuring greater agility and interoperability; and
- Continuous monitoring of severe weather phenomena and space weather, enhancing safety and decision-making in airspace control.



### Benefits



#### SISMET Meteorology System

Integration of meteorological data and more efficient weather forecast.



#### OPMET Data Bank

Greater interoperability and accuracy of meteorological information, with automated and standardized exchange.



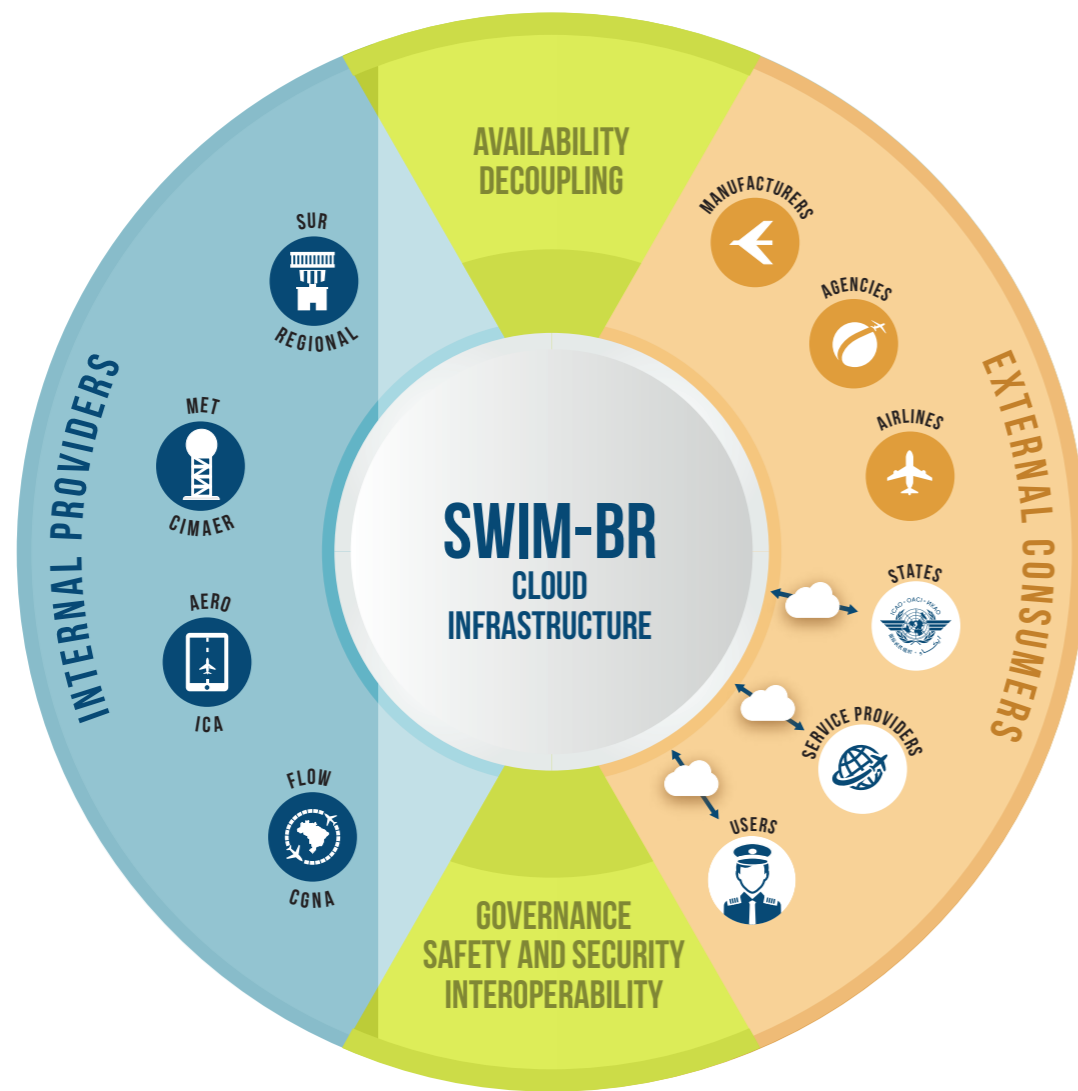
#### Automatic Meteorological Stations

Increased capacity for collecting upper air data by improving weather forecasting models.

### 5.3 System-Wide Information Management (SWIM)

The SWIM concept was developed to enable the digital transformation of Air Traffic Management (ATM), promoting standardized and secure information exchange, ensuring interoperability, real-time access and quality of shared data, enabling more efficient, predictable and collaborative operations.

In the context of SISCEAB, SWIM integrates civil and military systems, consolidating the information base for the continuous modernization of the national ATM environment.



### Main Changes in SWIM Architecture

BEFORE	AFTER	
Paradigm of information exchange point-to-point between systems.		Exchange of information via interoperable services based on internet technologies.
Systems with customized communication protocols.		Architecture of services that uncouple the providers of consumers, avoiding that information is generated again in each domain.
Architecture demanding high cost for maintenance and expansion, based on point-to-point integrations, leading to hindrance to adapt to new requirements, to integrate new systems and to enable ATM evolution.		Exchanges of information through interoperable services, allowing the gradual evolution, reuse of information and greater agility in adapting the ATM system.
Information in paper format (graphics and text).		Information generated in digital format and available through interoperable information services.
Lack of semantic interoperability, with key concepts having different meanings in different fields.		Capability of systems and organizations to exchange information with a shared and unambiguous meaning (semantic interoperability).
Need for dedicated connections between providers and consumers.		Access to information via publication and subscription, without the need for dedicated connections between providers and consumers.
Difficulty of access and high cost for timely exchange of information between stakeholders.		Management and exchange of information in a flexible, adaptable and scalable way among the qualified parties.

# 6

## Human Resources and Training



The success of SISCEAB depends on the qualification, motivation and well-being of the professionals who operate and maintain the System. The technological evolution expected by 2040 requires a transformation in people management, with DECEA investing in training professionals with hybrid profiles, capable of operating sophisticated human-machine interfaces and artificial intelligence systems, maintaining critical judgment and adaptability to increasingly complex and interconnected operational environments.

### Expected progress

- **Excellence in initial technical training**  
Modernization of teaching methodologies in training schools, incorporating state-of-the-art simulators, realistic operational scenarios and content aligned with best educational practices and ICAO guidelines.
- **Continuous education and skills development**  
Implementation of permanent technical update programs for Air Traffic Controllers, meteorologists, AIM operators and maintenance technicians, with emphasis on new technologies, digital procedures and aeronautical English proficiency.
- **Preparation for new technologies and automation**  
Specific training for the operation of automated systems, remote control units, decision-support tools based on artificial intelligence and integrated environments via System-Wide Information Management (SWIM).
- **Development of hybrid professional profiles**  
Training of versatile professionals, with multidisciplinary skills that allow them to move between different roles and quickly adapt to the demands of a constantly evolving operational environment.
- **Support for quality of life and well-being**  
Strengthening policies for psychosocial support, assistance to military families in remote locations, occupational health programs and work-life balance initiatives, recognizing the challenges inherent in continuous operational activity.
- **Organizational knowledge management**  
Development of systems and practices for the capture, preservation and dissemination of institutional knowledge, ensuring the transfer of experience between generations of professionals and the maintenance of SISCEAB technical memory.

# 7 Sustainability and Environment



**E**nvironmental protection is an integral part of the SISCEAB planning process, seeking to minimize the adverse environmental effects of air activities through actions developed in the operational, administrative and infrastructure areas.

## Expected progress

- **Environmental management and institutional sustainability**

The implementation of Environmental Management Systems and Practices (EMS) allows for continuous monitoring of environmental impacts and performance, guiding adjustments and improvements. In parallel, the implementation of the Sustainable Logistics Plan (SLP) in all units strengthens the integration of efficiency and socio-environmental responsibility actions. In addition, waste and natural resource management is essential to reduce impacts, optimize inputs and promote sustainable practices in operational activities.

- **Emissions reduction and Operational efficiency**

Participation in the ICAO CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) reinforces the commitment to offset and reduce aviation emissions. This commitment is strengthened by the adoption of more efficient operational procedures, which directly reduce the emission of polluting gases. In addition, the implementation of GANP (Global Air Navigation Plan) incorporates environmental assessments that ensure a sustainable development of air navigation and is aligned with industry best practices.

- **Management of fauna and vegetation**

The control of wildlife risk, especially related to the presence of birds, is fundamental to increase the safety of air operations. Additionally, controlled plant suppression acts in the prevention of risks to air traffic, enhancing safety. On the other hand, forest restoration and recovery initiatives developed by DECEA play an essential role in mitigating environmental impacts and preserving affected ecosystems.

- **Innovation and partnerships**

The development and application of environmental technologies for reducing impacts are key to making operations more sustainable. In addition, partnerships with environmental bodies and research institutions strengthen the exchange of knowledge, stimulate innovation and expand the effectiveness of environmental protection actions.

# 8

## Operational Resilience



The aeronautical environment, now highly digitalized, connected and dependent on real-time information, requires networks, sensors, applications, data, and people to be able to withstand, react, and recover quickly from technical, operational, or cyber disruptions.

### Expected progress

- **Hyper-connected environment**

In the future, SISCEAB should operate in a hyper-connected environment, in which the Communications, Navigation, Surveillance and Information Systems infrastructure will increasingly rely on integrated and high-performance digital networks. Given this, DECEA will increasingly invest in an architecture with high cyber resilience, capable of anticipating threats, detecting anomalies and responding to incidents with agility and accuracy.

- **Increased redundancies**

The SISCEAB infrastructure is being redesigned to extend its redundancy. Control centers, surveillance systems, means of communication, navigation aids, data servers and the infrastructure of the System-Wide Information Management (SWIM) concept should have alternative paths and distributed backups. If a link or system is compromised by failure, natural disaster, or cyber attack, solutions such as automatic entry of the alternative infrastructure or application of the Minimum Operational Network (MON) will ensure the continuity of the operation.

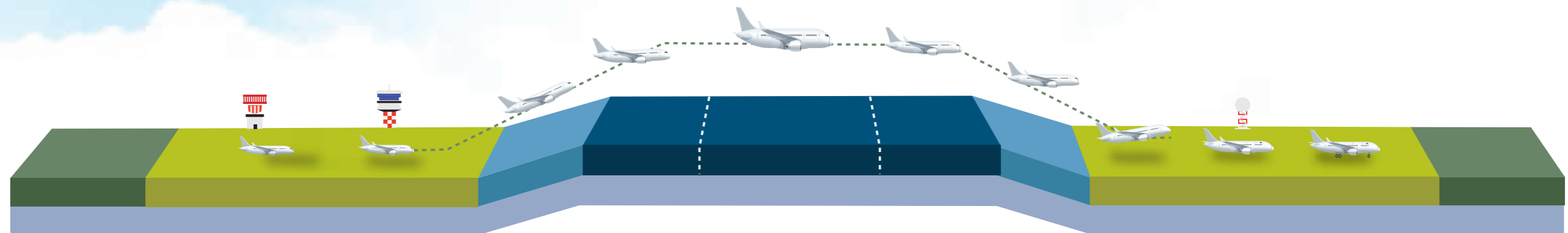
- **Continuous improvement of cyber defenses**

Cyber defense activities will evolve continuously, supported by artificial intelligence systems that will monitor networks, links and air traffic control applications. Specialized algorithms should detect suspicious behavior, undue access, electromagnetic interference or distributed attacks, allowing response within seconds and ensuring the integrity of essential systems.

- **Integrity and Continuity of Operations**

The union between operational resilience, technological robustness and cybersecurity will allow SISCEAB to be able to maintain the integrity of operations even under pressure or threat, ensuring that Brazilian airspace control remains efficient, safe and sovereign.

# PHASES OF FLIGHT - EVOLUTION



**PLANNING    PRE-DEPARTURE    TAXI AND TAKE-OFF    CLIMBING    CRUISE LEVEL    DESCENT    LANDING AND TAXI    POST-FLIGHT**



**IMPROVEMENT OF THE PRODUCTIVITY OF AIR NAVIGATION SERVICES**

**OPTIMIZATION OF THE USE OF SISCEAB INFRASTRUCTURE**

**EXPANSION OF GLOBAL INTEROPERABILITY AND COLLABORATION**

**IMPROVEMENT OF AIRPORT PERFORMANCE**

**IMPROVEMENT OF AIRPORT PERFORMANCE**

**BETTER FORECASTING AND MONITORING OF SEVERE WEATHER PHENOMENA**

**IMPROVEMENT OF FLIGHT PATHS AND REDUCTION OF NEGATIVE ENVIRONMENTAL IMPACTS**

**OPTIMIZED CLIMBS WITH REDUCED CO<sub>2</sub> EMISSIONS**

**OPTIMIZED DESCENTS WITH REDUCED CO<sub>2</sub> EMISSION**

**GREATER AUTOMATION FOR THE ATM OF THE FUTURE**

**IMPROVEMENT OF PERFORMANCE MEASUREMENT**

**GREATER INTEGRATION OF REGIONAL AIR TRANSPORTATION**

**INCREASED RESILIENCE AND CYBERSECURITY**

**INCREASED SAFETY AND SECURITY**

**BENEFITS FOR CIVIL SOCIETY**



## ATM OF THE FUTURE

<b>ADS-B</b>	Automatic Dependent Surveillance-Broadcast	<b>NAV GNSS</b>	Satellite Navigation (GNSS - Global Navigation Satellite System)
<b>AFIS</b>	Aerodrome Flight Information Service	<b>PBN</b>	Performance-Based Navigation
<b>APP</b>	Approach Control	<b>PSR</b>	Primary Surveillance Radar
<b>ATM</b>	Air Traffic Management	<b>RPA</b>	Remotely Piloted Aircraft
<b>B2B</b>	Business to business	<b>SSR</b>	Secondary Surveillance Radar
<b>DME</b>	Distance measuring equipment	<b>SWIM</b>	System-Wide Information Management
<b>EAC</b>	Special Use Airspace	<b>TBO</b>	Trajectory-Based Operations
<b>eVTOL</b>	Electric Vertical Take-off and Landing	<b>TWR</b>	Aerodrome Control Tower or Aerodrome Control
<b>FF-ICE</b>	Flight and Flow Information for a Collaborative Environment	<b>UAM</b>	Urban Air Mobility
<b>FL</b>	Flight Level	<b>UTM</b>	Unmanned Traffic Management
<b>HAO</b>	Higher Airspace Operations		
<b>MLAT</b>	Multilateration		



## EVOLVING FUNCTIONAL ARCHITECTURE

<b>ADS-B</b>	Automatic Dependent Surveillance-Broadcast	<b>PSR</b>	Primary Surveillance Radar
<b>AIM</b>	Aeronautical Information Management	<b>RNP AR</b>	Required Navigation Performance Authorization Required
<b>ATFM</b>	Air Traffic Flow Management	<b>SAGITARIO</b>	Advanced Air Traffic Information Management System and Operational Interest Report
<b>ATM</b>	Air Traffic Management	<b>SARPAS</b>	System for Requesting Access to Brazilian Airspace
<b>CPDLC</b>	Controller-Pilot Data Link Communications	<b>SIGMA</b>	Integrated Air Movement Management System
<b>CRONOS</b>	Complete Reliable Operable NOTAM System	<b>SSR</b>	Secondary Surveillance Radar
<b>DASA</b>	Digital Airspace System Analysis	<b>STVD</b>	ATM Data Processing and Visualization System
<b>DME</b>	Distance measuring equipment	<b>SWIM</b>	System-Wide Information Management
<b>eSTRIP</b>	Electronic Strip	<b>SYSAGA</b>	Process Management System of the AGA Area (Aerodromes and Ground Aids)
<b>FIR</b>	Flight Information Region	<b>TATIC</b>	Total Air Traffic Information Control
<b>GNSS</b>	Global Navigation Satellite System	<b>TBO</b>	Trajectory-Based Operations
<b>HAO</b>	Higher Airspace Operations	<b>UAM</b>	Urban Air Mobility
<b>HAPS</b>	High-Altitude Platform Station	<b>UAS</b>	Unmanned Aircraft Systems
<b>IA</b>	Artificial Intelligence	<b>UTM</b>	Unmanned Traffic Management
<b>MET</b>	Meteorology	<b>VHF</b>	Very High Frequency
<b>MLAT</b>	Multilateration		
<b>PBN</b>	Performance-Based Navigation		



## LINKS AND PUBLICATIONS

- ICAO GANP PORTAL – [HTTPS://GANPPORTAL.ICAO.INT/](https://ganpportal.icao.int/)
- SIRIUS PORTAL – [HTTPS://SIRIUS.DECEA.MIL.BR/](https://sirius.decea.mil.br/)
- SISCEAB PERFORMANCE PORTAL – [HTTPS://PERFORMANCE.DECEA.MIL.BR/](https://performance.decea.mil.br/)
- DRONE PORTAL – [HTTPS://WWW.DECEA.MIL.BR/DRONE/](https://www.decea.mil.br/drone/)
- SWIM PORTAL – [HTTPS://PORTALSWIM.DECEA.MIL.BR](https://portalswim.decea.mil.br)
- REDEMET PORTAL – [HTTPS://REDEMET.DECEA.MIL.BR/](https://redemet.decea.mil.br/)
- PCA 351-7 NATIONAL UAM OPERATIONAL DESIGN
- DCA 351-6 NATIONAL UTM OPERATIONAL DESIGN

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An outlook for the future of the  
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