International Civil Aviation Organization

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Agenda Item 5.2: Global, Regional and National Air Navigation Plans (GANP, MID ANP and NANPs

FROM VISION TO DELIVERY: INDUSTRY SUPPORT TO ICAO PRIORITIES FOR FUTURE SKIES

(Presented by CANSO)

SUMMARY

This Working Paper provides an update on the activities of the Complete Air Traffic System (CATS) Global Council, following previous updates to MIDANPIRG and RASG-MID.

Following the publication of the CATS CONOPS for Future Skies and its recognition at the 42nd ICAO Assembly, the focus of the CATS Global Council has evolved from defining a shared industry vision to supporting its practical implementation in alignment with ICAO frameworks and regional priorities.

The CATS Work Programme for 2026–2028 ("Skies in Transition") is structured to support this transition, with particular emphasis on:

- Contributing industry input to ICAO's ongoing work on the Global Air Navigation Plan (GANP), including the development of the Minimum Implementation Path (MIP);
- Supporting States and regions with guidance for implementation planning, including advanced roadmaps adapted to regional contexts;
- Developing targeted Think Papers on key enablers such as Service-Oriented Architecture (SOA), True North, and Change Management;
- Advancing the evolution of safety through the "Elevating Safety" initiative under Working Area 2, promoting data-driven and system-wide safety management approaches.

The paper highlights ongoing regional engagement activities aimed at supporting implementation readiness, capturing regional priorities, and strengthening alignment between global initiatives and regional implementation pathways.

The MID Region is encouraged to actively contribute to these activities and support the development of globally harmonised yet regionally adaptable implementation pathways for future ATM transition.

REFERENCES

https://www.futureskyvision.com/cats-conops
https://www.icao.int/about-icao/Council/Pages/strategic-plan-2026-2050.aspx
ICAO Global Air Traffic Management Operational Concept (GATMOC),
ICAO Global Air Navigation Plan (GANP)

1. INTRODUCTION

1.1 The aviation sector is entering a period of profound transformation, driven by sustained traffic growth, increasing operational complexity, and the rapid emergence of new airspace users, including uncrewed systems, advanced air mobility, and higher airspace operations.

1.2 In this context, the Complete Air Traffic System (CATS) Global Council was established as a unique, high-level industry platform, bringing together ANSPs, airlines, airports, regulators, manufacturers, technology providers, and new entrants. Its objective is to foster a shared understanding of future aviation needs and to provide coordinated industry input to ICAO and States, supporting the evolution of global frameworks in a coherent and harmonised manner.

1.3 Building on this collaborative approach, the CATS Global Council developed the CATS Concept of Operations (CONOPS) [1]for Future Skies, a comprehensive and forward-looking framework describing how the global ATM system should evolve to meet future demand. The CONOPS defines a set of foundational and operational transformations and introduces a phased pathway, from digital information sharing and infrastructure transformation, through advanced automation and performance-based operations, to the long-term vision of seamless, fully integrated airspace.

1.4 Developed with contributions from over 80 organisations across the aviation ecosystem, the CATS CONOPS reflects a broad industry consensus and is intended to contribute to ICAO strategic documents, by providing a strategic bridge between global vision and implementation.

1.5 At the 42nd ICAO Assembly, the CATS CONOPS was widely recognised as a valuable and timely industry contribution, with the Assembly encouraging ICAO to consider its concepts in the evolution of key frameworks such as the Global Air Navigation Plan (GANP), the Global Air Traffic Management Operational Concept (GATMOC), and the ICAO visions for Advanced Air Mobility (AAM) and Higher Airspace Operations (HAO).

1.6 This recognition marks an important inflection point: the global aviation community now shares not only a common vision for future skies, but also a growing expectation to translate that vision into coordinated, practical, and regionally adaptable implementation pathways.

1.7 In parallel, the 42nd ICAO Assembly also tasked ICAO with the development of a Minimum Implementation Path (MIP) as a key element in the evolution of the Global Air Navigation Plan. This decision reflects a growing recognition of the need to move beyond flexible but fragmented implementation approaches, towards a more coordinated and prioritised pathway. The MIP is expected to define a globally agreed baseline of essential capabilities and associated timelines, supporting greater alignment, interoperability, and effective delivery of ATM modernisation across States and regions.

2. THE CATS CONOPS TRANSFORMATION PHASES

2.1 A central element of the CATS CONOPS for Future Skies is the definition of a phased transformation pathway, providing a structured and progressive approach to the evolution of the global air traffic management (ATM) system.

2.2 Rather than prescribing a fixed implementation sequence, the phases offer a common reference framework to support States and regions in aligning their modernisation efforts while maintaining flexibility to reflect local priorities and capabilities.

[1] https://canso.org/an-industry-global-strategy-and-roadmap-for-future-skies/

Phase 1: Digital Information Sharing and Infrastructure Transformation

The first phase focuses on establishing the digital foundation required for future ATM.

It emphasises the transition from fragmented and system-centric operations toward a connected, data-driven environment, enabled by:

- Interoperable digital information exchange (e.g. SWIM, FF-ICE);
- Early deployment of Trajectory-Based Operations (TBO);
- Adoption of service-oriented architectures (SOA) to support modular and scalable systems;
- Progressive virtualisation and modernisation of infrastructure.

This phase represents a critical shift from legacy systems toward a globally interoperable digital backbone, enabling more efficient and predictable operations.

Phase 2: Advanced Automation and Performance-Based Operations

Building on the digital foundation, the second phase focuses on the integration of advanced automation and system-wide performance management.

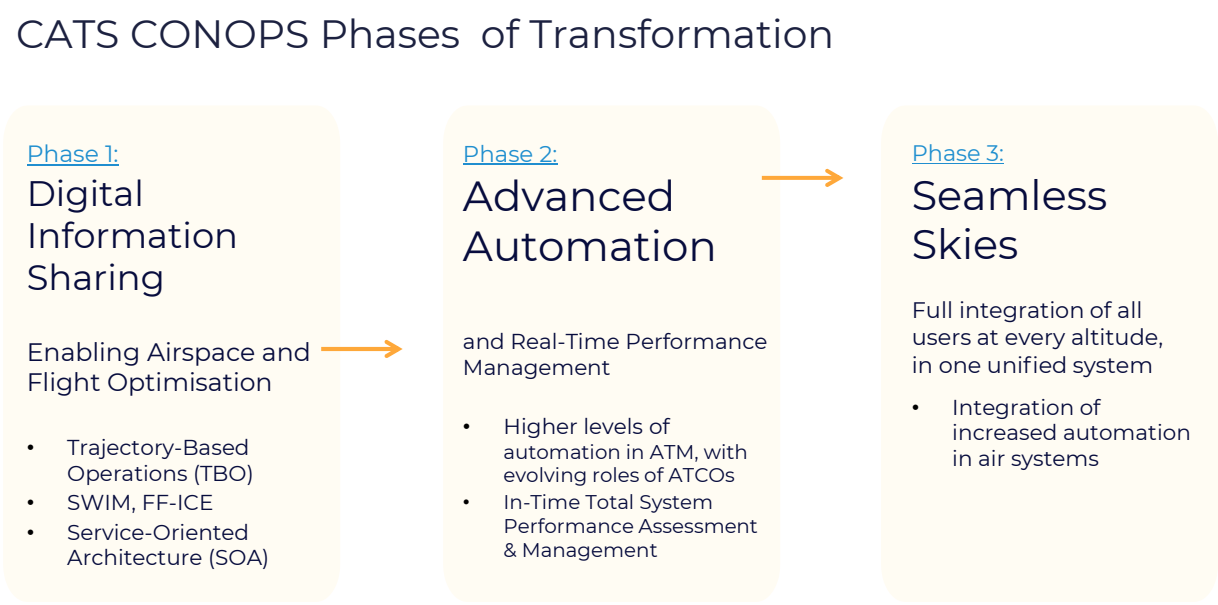
Key characteristics include:

- Increased use of automation in core ATM functions, including separation management and flow optimisation;
- Evolution of human roles toward strategic airspace management, supported by decision-support systems;
- Implementation of performance-based and in-time system management, enabling real-time optimisation of the network;
- Greater integration of diverse airspace users within a coordinated operational framework.

This phase marks the transition toward a hybrid human-machine system, where automation enhances decision-making and system performance

Phase 3: Seamless Skies

The CATS CONOPS ultimately envisions a third phase, Seamless Airspace, characterised by a fully integrated, unified airspace system accommodating all users and operations in a safe, efficient, and scalable manner.



3. FROM VISION TO IMPLEMENTATION: A SHIFT IN FOCUS

3.1 While previous engagements focused on defining the future of ATM, the current phase is centred on operationalising that vision. This shift is strongly aligned with ICAO's evolving direction, including:

- The development of a Minimum Implementation Path (MIP) to provide a stable and sequenced set of capabilities for States;
- The transition of the GANP from a catalogue of options toward a structured implementation framework

3.2 In this context, the Minimum Implementation Path (MIP) represents a fundamental shift in the GANP from a catalogue of options towards a prioritised and decision-oriented implementation framework. By defining a globally agreed baseline of essential capabilities, the MIP provides States with clearer guidance on what to implement, when, and why, supporting convergence and reducing fragmentation across regions.

3.3 Importantly, the MIP can be seen as a transitional layer between the flexibility of the ASBU framework and the more prescriptive nature of ICAO Basic Building Blocks (BBBs), providing early visibility on capabilities that are likely to become foundational for future global operations.

3.4 The CATS Global Council is actively supporting this transition by developing implementation guidance, contributing industry input to ICAO activities, and supporting regional alignment efforts.

3.5 To enable this transition, the CATS Global Council has established a structured Work Programme for 2026–2028, titled "Skies in Transition", which reflects both the urgency and the opportunity associated with this new phase of global ATM evolution. This Work Programme is designed to:

- Translate the CATS CONOPS into actionable implementation pathways;
- Support ICAO's evolving frameworks, including the Global Air Navigation Plan (GANP) and the Minimum Implementation Path (MIP);

- Engage States, regions, and industry stakeholders in collaborative, globally aligned transformation efforts;
- Ensure that implementation is both globally harmonised and regionally adaptable.

3.6 The programme is structured around six Working Areas addressing key dimensions of the transformation. In the context of MIDANPIRG and RASG-MID, this paper focuses on two priority areas:

4. WORKING AREA 1 (WA1): ROADMAP FOR IMPLEMENTATION

4.1 Working Area 1 (WA1) focuses on translating the CATS CONOPS into implementable pathways, aligned with ICAO frameworks and regional priorities.

4.2 WA1 directly supports ICAO's work on the MIP, contributing to:

- Identification of core capabilities required globally;
- Sequencing of implementation steps;
- Alignment with ASBU frameworks and regional planning mechanisms.

4.3 This reflects a broader industry recognition that implementation must move from fragmented initiatives to coordinated, prioritised system evolution. In supporting the development of the MIP, WA1 also recognises the need to enhance the usability of the ASBU framework as a practical implementation tool. While the ASBUs provide a comprehensive menu of capabilities, their current flexibility has contributed to variability in implementation priorities and timelines across regions.

4.4 A key dimension of the MIP is its role in supporting economic viability. Global alignment around a common set of capabilities is essential to reduce implementation costs, avoid fragmented investments, and enable scalable industrialisation of ATM modernisation solutions.

4.5 Beyond the MIP, WA1 aims to support regions, including the MID Region, in developing:

- Guidance material for advanced implementation roadmaps, tailored to local operational, institutional, and investment contexts;
- Mechanisms to address cross-regional interoperability and synchronisation challenges.

4.6 This approach recognises that while global alignment is essential, regional pathways must reflect local realities.

Think Papers Supporting WA1

4.7 WA1 is supported by a set of targeted strategic Think Papers, currently under development by the CATS Global Council in collaboration with key industry partners. These papers are being developed to support States, regions, and industry stakeholders in progressing from strategic vision to practical implementation.

4.8 Rather than technical specifications, these Think Papers translate key elements of the CATS CONOPS into actionable insights, implementation considerations, and policy-relevant guidance, supporting both States and industry stakeholders in progressing from concept to delivery.

4.9 The initial set of priority Think Papers includes:

a) **Service-Oriented Architecture (SOA)**

- Establishes SOA as a foundational enabler for future ATM;
- Supports modular, interoperable, and scalable system evolution;
- Addresses governance, procurement, and interoperability challenges.

b) **True North**

- Explores the transition from magnetic to geodetic reference systems;
- Positions True North as a structural enabler of digital and automated ATM;
- Highlights long-term safety, efficiency, and cost benefits.

c) **Change Management (in collaboration with Global ATC Alliance, IFATCA, IFATSEA, IFAIMA)**

- Focuses on the human dimension of transformation;
- Provides practical guidance on trust, co-design, and workforce evolution;
- Emphasises safety, including psychological and organisational aspects, as foundational to change.

5. WORKING AREA 2 (WA2): ELEVATING SAFETY

5.1 The successful deployment of future ATM concepts will depend on evolving safety frameworks capable of supporting increasingly automated, interconnected, and multi-actor operational environments. However, traditional approaches, largely reactive, event-driven, and siloed, are increasingly insufficient in the context of a highly automated, data-rich, and interconnected airspace system.

5.2 WA2 addresses this gap by promoting a transition toward predictive, data-driven, and system-wide safety performance management. In line with the CATS CONOPS, safety is positioned not only as a compliance function, but as a core system enabler, intrinsically linked to performance, resilience, and public trust.

Key Concepts

5.3 The “Elevating Safety” initiative introduces a set of interrelated concepts to support this transformation:

- **In-Time Safety Management Systems (SMS):** Continuous, proactive safety management in dynamic environments, enabling early hazard identification, real-time system health monitoring, and risk mitigation in highly automated and human-machine integrated operations.

- **Global Safety Intelligence**: The development of a shared, near-real-time safety picture across stakeholders, enabled by the integration and fusion of operational, surveillance, CNS, and environmental data, supported by common taxonomies and interoperable data-sharing mechanisms.

- **Integrated Risk Management:** Moving beyond siloed assessments toward system-level understanding of risk, recognising interdependencies across operations, technologies, and stakeholders, and supporting more balanced and informed decision-making.

- **Safety-by-Design:** Embedding safety considerations into the design and deployment of emerging operational domains, including Advanced Air Mobility (AAM), uncrewed systems, and Higher Airspace Operations (HAO), ensuring that safety is integrated from the outset rather than retrofitted.

5.4 Together, these concepts aim to transform safety from a reactive assurance function into a proactive, performance-driven capability, supporting system-wide optimisation and enabling safe scalability of future airspace operations.

From Concept to Implementation

5.5 WA2 is designed to provide a structured, non-prescriptive framework to guide the evolution of safety management across States, service providers, and industry stakeholders. It establishes common reference models, performance concepts, and implementation pathways, while preserving national sovereignty and regulatory responsibilities.

5.6 In particular, WA2 is closely aligned with the broader CATS implementation approach, ensuring that safety transformation evolves in parallel with system transformation. This includes alignment with emerging implementation pathways under WA1, including the Minimum Implementation Path (MIP), supporting a coherent and synchronised transition toward future ATM.

Alignment with ICAO and RASG-MID

5.7 WA2 is designed to:

- Support ICAO's ongoing evolution of Annex 19, State Safety Programmes (SSP), and Safety Management Systems (SMS), including the transition toward more performance-based and data-enabled oversight approaches;

- Complement RASG-MID activities by strengthening data-driven safety planning, enhancing regional safety intelligence, and supporting more integrated risk management approaches;

- Provide a common reference framework for States and ANSPs to evolve safety practices in line with increasingly automated, digital, and multi-actor operational environments;

- Contribute structured industry input to ICAO processes, supporting the development of globally harmonised yet adaptable safety frameworks.

6. GLOBAL AND REGIONAL ENGAGEMENT: FROM GLOBAL VISION TO REGIONAL INPUTS

6.1 To ensure that the transition from vision to implementation reflects the diversity of operational, institutional, and investment realities across regions, the CATS Global Council has initiated a series of regional workshops and engagement activities.

6.2 These workshops, already conducted in regions including Africa, Latin America, Europe, and Asia-Pacific, aim to:

- Gather regional perspectives, priorities, and constraints related to ATM transformation;
- Identify common challenges and region-specific implementation barriers;
- Explore how global concepts such as the Minimum Implementation Path (MIP) can be adapted to regional contexts;
- Support the development of regionally relevant implementation pathways and priorities;
- Strengthen alignment between industry initiatives and ICAO regional planning mechanisms, including PIRGs and RASGs.

6.3 In this context, alignment between the CATS CONOPS, the GANP, the evolving ASBU framework, and the Minimum Implementation Path will be critical to ensuring that global aviation evolves in a coherent, scalable, and interoperable manner. The priority is no longer to define the vision, but to enable its consistent and effective delivery worldwide.

6.4 Initial outcomes from these engagements confirm that, while the vision for future skies is broadly shared, implementation readiness, priorities, and constraints vary significantly across regions. This reinforces the need for a globally aligned yet regionally adaptable approach.

6.5 The CATS Global Council is also planning to organise a regional workshop in the Middle East, tentatively in Oman toward the end of the year (subject to confirmation), to further engage with States and stakeholders in the region and capture specific regional inputs.

6.6 The CATS Global Council will continue to work closely with ICAO Regional Offices, States, and industry stakeholders to ensure that these regional insights are systematically integrated into the ongoing development of implementation frameworks, guidance material, and think papers. This approach ensures that the evolution toward future skies is not only globally coordinated, but also grounded in operational reality and supported by strong regional ownership.

7. CONCLUSION

7.1 The aviation industry has reached a critical juncture. The aviation community now shares a broadly aligned vision for the future evolution of ATM. The priority must now shift toward coordinated implementation, ensuring that modernisation efforts remain globally harmonised, operationally scalable, and economically sustainable.

7.2 Through its Work Programme and collaboration with ICAO, States, regions, and industry stakeholders, the CATS Global Council aims to support this transition by contributing implementation guidance, strategic input, and practical coordination mechanisms aligned with the evolution of the GANP and the Minimum Implementation Path.

7.3 Continued regional engagement and active participation from States and stakeholders will be essential to ensure that future ATM transformation reflects both global interoperability objectives and regional operational realities.

8. ACTION BY THE MEETING

8.1 The meeting is invited to:

a) note the information provided in this paper;

b) recognise the importance of coordinated implementation approaches to support the evolution of future ATM systems;

c) encourage States and stakeholders within the MID Region to engage in relevant CATS Working Areas and regional implementation activities; and

d) encourage continued alignment between regional planning activities and the evolving ICAO GANP and Minimum Implementation Path (MIP).

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