



# NM B2B Strategy



## DOCUMENT CONTROL

<b>Document Title</b>	NM B2B Strategy
<b>Document Subtitle</b>	
<b>Document Reference</b>	
<b>Edition Number</b>	This field is automatically updated
<b>Edition Validity Date</b>	30-04-2024
<b>Classification</b>	White
<b>Status</b>	Final
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## APPROVAL TABLE

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## EDITION HISTORY

<b>Edition No.</b>	<b>Validity Date</b>	<b>Author(s)</b>	<b>Reason</b>
1.0	16/02/2024	Yves Steyt	Initial version
1.1	30/04/2024	Yves Steyt	Updates following NETSYS comments April 2024

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## Executive Summary

The Network Manager (NM) plays a central role in collecting, processing, producing and distributing digital ATM information in Europe.

The Internet is giving access to a vast amount of digital information, continuously transforming the way we live and bringing enormous business opportunities. The European Commission (EC), aiming to foster innovation and economic growth, defined in 2010 a Digital Agenda for Europe, which leverages the digital information market. The EC Aviation Strategy (2019) drew upon the policies and priorities of the Digital Agenda to boost the growth of the European aviation sector. The EC published the Common Project One (CP1) in 2021. Digital transformation is progressing rapidly in all parts of the world.

NM is fully aligned with the European Aviation Strategy, with the Digital Agenda and with the CP1, by making the ATM data widely available and by promoting interoperability based on open standards.

The NM Interoperability Strategy, approved by NDOP and NMB in Spring 2016 identified a list of high-level actions that form the work streams following which NM has been implementing the strategy.

The Transition to SWIM Policy, approved by NDOP and NMB in Spring 2018, describes the policy to be applied by NM in the transition to SWIM, taking into account the ATM Master Plan, the GANP and the PCP Implementing Rule and following the NM Interoperability Strategy.

NM presented regularly reports through the Network CDM process on the implementation of the NM Interoperability Strategy and of the Transition to SWIM Policy.

This NM B2B Strategy document replaces and proposes an updated and rationalised version of the original NM Interoperability Strategy, merged with the Transition to SWIM Policy, and introducing new concrete elements like the NM B2B Concept of Operations (ConOPS). This document aims at the adoption of open data in ATM, enabling true information sharing and supporting the creation of an ATM digital collaborative environment with its Stakeholders, leading to a more performant ATM system.

The NM B2B Strategy and the ongoing consultations with the NM Stakeholders will facilitate the smooth evolution of NM B2B services and their usage, thereby helping all to meet the concerned regulatory requirements and to reach a widely improved European ATM Network.

# 1 NM B2B Strategy

The NM B2B Strategy enables the implementation of the relevant Strategic and Sub-strategic Objectives of the Network Strategy Plan 2025-2029, in particular SO1 - Manage network performance through 'Network-minded' decision-making and SO2 - Digitalise aviation through the deployment and integration of interoperable and secure information management systems.

## 1.1 The Information Sharing Lever in ATM

Automatic exchange of digital information is the enabler for supporting Network-wide collaborative processes, as the Stakeholders can seamlessly integrate the available services within their own processes and tools, creating a digital collaborative environment and increasing business effectiveness.

The wide and automatic information exchange has two inherent characteristics that result in significant benefits. The first one is data quality, as it eliminates data entry errors because data is automatically transferred from one system to the other. The second is timeliness, as data is almost instantaneously available to all, enhancing the speed of decision making and allowing an early and more efficient reactivity of the ATM Network. The increased common and timely situational awareness results in better and more efficient planning and execution, as well as increased safety.

While eliminating the human in the loop for robotic tasks, the automatic information sharing allows for high level processes to be introduced (such as simulations, cross border measures, impact assessment, scenario management, etc.) bringing back the human in the loop for well-informed Collaborative Decision Making, which pushes forward optimisation of ATM operations.

Additionally, using open APIs for ATM information sharing contributes to the growth of the ATM ecosystem, both in operational terms – developing aviation connectivity within and beyond Europe – and in economic terms – creating value for the user community, therefore nurturing the European economy and bringing positive societal impacts.

## 1.2 ATM Interoperability Initiatives

ATM is historically a closed community, with its own standards and closed systems operated over private networks, built on paradigms and technologies dating back from the mid-20<sup>th</sup> century, like the AFTN. The ongoing migration from AFTN to AMHS<sup>1</sup> does not improve the situation, as the communication paradigm remains the same (messaging), not addressing the need for real time complex data exchanges and interactions, as required to modernise ATM.

However, the landscape is changing, and ATM modernisation initiatives are in place since a few years, relying on digital processes and system interoperability, pushing ATM Stakeholders to move forward, for the benefit of the airspace users and ultimately the passenger.

The vision for ATM defined by ICAO – as published in 2005 in the Global ATM Operational Concept document is: *“To achieve an interoperable global air traffic*

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<sup>1</sup> “Considering that AMHS is based on an outdated technology, lack of expert resource, higher cost of operations and maintenance is expected”, from “AMHS – Current and Future” presentation done by SITA at the Performance Based Communication Technology Seminar at Rabat, 2009.

*management system*". One of the key performance improvement areas of the ICAO Global Air Navigation Plan is dedicated to *"Globally Interoperable Systems and Data – through globally interoperable System Wide Information Management"*.

The Single European Sky initiative has adapted this vision to the European context and considers ATM interoperability as an essential enabler for defragmenting Air Navigation Services provision in Europe. This has been included also in the European ATM Master Plan.

The NF IR defines the data exchange between the ATS Units and NM and between Airports and NM, and entrusts NM to make all information available free of charge, within the ATM community.

The CP1 IR defines the obligations of the European ATM Stakeholders to implement the SESAR Deployment Programme, including ATM interoperability.

Many ATM initiatives rely on System Wide Information Management (SWIM) to support the new operational concepts. SWIM is basically a set of capabilities enabling seamless and timely information sharing between systems through interoperable services in a secured digital environment.

## **1.3 NM Interoperability Today**

### **1.3.1 NM Role**

The Network Manager supports the implementation of the Network functions and performs the related tasks as specified in the relevant legislation. Amongst other things this means data collection, consolidation and integration to build a continuously updated comprehensive Network view. This consolidated picture, reflecting the up-to-date Network situation and context, is then made available via open interfaces using Internet technologies to operational Stakeholders, as identified in the NF IR, enabling their various functions and services, and collaborative decision-making processes at Network level.

Additionally, NM supports all its Stakeholders by exchanging data with them in many different ways. This has significant added value in enabling smooth Stakeholder's transitions, like was the case in the transition to ICAO 2012 or is the case in the implementation of FF-ICE/R1.

### **1.3.2 Messaging**

Most data exchanges in ATM are using messaging technologies (e.g., AFTN, AMHS). NM continues to use these technologies for interfacing with the ATM systems to exchange flight and flow messages, in support of the Stakeholders' transition to new technologies.

However, the CP1 regulation mandates the transition of a number of essential ATM service exchanges to the SWIM Yellow Profile through its AF 5 "SWIM" element: *"AF 5' or 'system wide information management (SWIM)' means an ATM functionality that consists of standards and infrastructure enabling the development, implementation and evolution of services for information exchange between operational stakeholders via interoperable services which are built on SWIM standards and are delivered through an internet protocol"*.

Based on the CP1 requirements, through the agreed Transition to SWIM Policy, NM and Stakeholders have agreed to foresee a transition period and to decommission on 31/12/2027:

- The ADEXP Flight Update Message (FUM – to be replaced by SWIM NM B2B Flight Data) – users shall use the NM B2B Flight Data instead, typically based on NM B2B Publish/Subscribe;
- The ADEXP DPI messages (which are today supported via both SWIM and in ADEXP through AFTN/AMHS);
- The ADEXP EFD (ETFMS Flight Data) messages transmitted via AFTN/AMHS to Airspace Users and ANSPs – again, users shall use the NM B2B Flight Data instead, typically based on NM B2B Publish/Subscribe.

Finally, discussions are ongoing to completely decommission the EFD at the same date, or slightly later, for ANSPs.

### 1.3.3 NM B2B Web Services

Since 2009, NM is operating Web services supporting automatic system-to-system information exchanges with its operational partners: the 'NM B2B Web Services', or 'NM B2B' in short. The NM B2B was recognised by the ATM community as SWIM pioneer, and this pioneer work had a strong influence on definition of the SWIM Yellow Profile itself.

NM was also a pioneer in the operational deployment of AIXM 5.1, offering in 2010 the first operational service in AIXM 5.1. Since then, most of the airspace data of the NM flight and flow systems is made available in AIXM 5.1, enabling airspace users to create flight plans using the same data as NM, contributing to increase flight plan data quality and, as a consequence, to increase the rate of successful automatic flight plan processing.

The NM B2B services are standard Web based interfaces, SWIM Yellow Profile compliant, currently accessible via the public Internet and via PENS. These services are mainly used by companies that have already made Internet the basis of their business, which is the case of the Airspace Users and of many other small companies that gravitate around Aviation in general, but also airports and some ANSPs.

### 1.3.4 FF-ICE

Flight and Flow Information for a Collaborative Environment is part of the ICAO Global ATM Concept and *"envisages an integrated, harmonised and globally interoperable system for all users in all phases of flight"*.

FF-ICE is relying on SWIM to ensure timeliness and accuracy in the exchange of complex flight and flow information, which is modelled in XML through the Flight Information Exchange Model (FIXM). In order to reach *"all users"* at a global scale, the implementation is ongoing with the SWIM Yellow Profile.

CP1 regulation mandates five FF-ICE/R1 services. It applies to all airspace users intending to fly IFR within the EU+ airspace as well as to all ANSPs within EU+. In addition, the mandate is extended to AROs that are used to file the eFPL.

NM has been involved since inception in the FF-ICE initiative and in the FIXM definition, and delivered the first FF-ICE/R1 implementation in the world based on FIXM in releases NM-25 (2021) and NM-26 (2022).

Because the CP1 regulation does not apply outside EU+ area, there is no decommissioning plan for the ICAO flight planning messaging.



### 1.3.5 iNM ConOPS

The iNM ConOPS documents (mainly Network 4DT, ATFM-ASM and iDL) consider the need to develop several new NM B2B services by the end of this decade. The non-exhaustive set of new NM B2B service contains some highlights of Network 4DT ConOPS that is already agreed by NMB and will be enriched by the ones elaborated in other ConOPS documents:

- Preliminary Flight Plan Service (part of FF-ICE/R1 but not mandated by CP1);
- NM Trajectory Service;
- NM B2B services concerning the coordination and transfer updates;
- NM B2B tactical update service;
- CDM process data sharing service.

## 1.4 NM B2B Strategy

The NM strategy for further progressing the implementation of interoperability requirements is based on the adoption of open data, open APIs, open standards and widely used mainstream technologies, mostly for cost efficiency reasons.

By managing Network-wide information, NM is, de facto, in a position to exchange the ATM data in open way, allowing other organisations to leverage this data and to provide added value services to the ATM community.

Observing the progress of interoperability from a global perspective, it is clear that the various ATM communities are evolving at different pace and in different ways, widening the technological gap between the more advanced ones and the more conservative ones. However, the CP1 regulation acts as a centric force tending to reduce the technological gap between these categories of actors.

Serving all Stakeholders, the NM B2B Strategy supports multiple technologies, while favouring and promoting the migration to state-of-art mainstream technologies. In this way, NM is able to support the progressive and unsynchronised deployment of new technologies of its Stakeholders, smoothening the transitions. NM plays then a bridge role, acting as a gateway that connects and integrates the different communities in the Network.

The NM B2B Strategy is articulated around the following actions:

#### ***Influence standardisation***

1. Keep contributing to the SWIM Yellow Profile evolution and standardisation and drive its implementation with operational partners;
2. Keep contributing to the definition and validation of FIXM;
3. Advise regulatory bodies on the optimum balance to be achieved between the setting up of standards or technical specifications, with the purpose of enabling some flexibility in the practical implementation of interfaces, also taking into account cost effectiveness concerns.

#### ***Lead implementation of open data***

4. Keep delivering FF-ICE services, return experience-based feedback;

5. Deploy new B2B Web Services, in line with the iNM ConOPS documents, in order to allow building the ATM digital collaborative environment, and in line with the NM B2B ConOPS (see below);
6. Engage with the user community, by involving them in the definition of the technologies and services, by providing the quality of service required to create trust and trigger adoption, and by supporting them in successfully leveraging the NM APIs – this is the main objective of the NM B2B ConOPS;
7. Implement ICAO Global Air Navigation Plan and ensure interoperability between Europe and other Regions;
8. Continuously update current NM service agreements.

### **Interface NM / ATC systems**

9. Reinforce the relationship between NM and ATC systems to further improve the Trajectory management, ATFCM processes, and the sharing of more consistent planning information with all involved actors.

### **Support Stakeholders' transitions to new technologies and concepts**

10. Support the Stakeholders in progressively and smoothly migrating to new technologies (mandated by CP1 or ICAO), by keeping simultaneously old and new technologies during the transition of all Stakeholders and decommission old technologies when deemed feasible and agreed.

## **1.5 Transition to SWIM Policy**

Taking into account the transition to SWIM required by CP1 IR, the following principles are applied by NM:

- In order to support a progressive migration to SWIM of its Stakeholders, NM will be compliant well in advance of the CP1 IR deadlines for the services supporting the data exchanges with NM listed in CP1.
- NM B2B is and will remain SWIM-compliant.
- NM will continue to support the existing services via non-SWIM technologies to the existing users of those services, for a duration to be agreed with the Stakeholders.
- New client software (meaning client software using the NM B2B, from a new organisation or from an organisation using already the NM B2B) of an existing NM service that is available via both non-SWIM messaging technologies and NM B2B will not be offered the choice to access the service via non-SWIM messaging, unless mandated by ICAO.
  - Example: A new Airport willing to become Advanced Tower or A-CDM airport will be required to use the NM B2B
  - Example: An Airline willing to have access to flight data updates will be required to use the NM B2B Publish/Subscribe and will not be given access to EFDs
- New NM services (required by CP1 or other) will only be provided via NM B2B (and HMI) and not via non-SWIM messaging technologies.

- Regarding NM B2B services exposed today in two SWIM ways, one mandated by CP1, the other not:
  - New client software (meaning client software using the NM B2B, from a new organisation or from an organisation using already the NM B2B) will be required to use the CP1-mandated way
  - Sunset dates will be agreed with Stakeholders for the non-CP1-mandated way
  - Example: most NM B2B flight plan preparation and filing services exist today in two versions: the initial one, and the FF-ICE/R1 one – the initial version will be decommissioned at some agreed sunset date
  
- New client software (meaning client software using the NM B2B, from a new organisation or from an organisation using already the NM B2B) of NM B2B services exposed via both Request/Reply and Publish/Subscribe will be required to use the Publish/Subscribe whenever possible. Request/Reply will be used for exceptional data synchronisation reasons, not as the nominal way to update the local version of the data.  
Developers of existing client software will be encouraged to promote Publish/Subscribe in place of Request/Reply.
  - Example: NM B2B users willing to have access to Flight data updates will be required/encouraged to use the NM B2B Flight (Plan) Publish/Subscribe to the maximum extent, not Request/Reply API
  - Example: NM B2B users willing to have access to Airspace updates will be required/encouraged to use the NM B2B Airspace Publish/Subscribe as much as possible, not Request/Reply API

## 2 The NM B2B ConOPS

In continuation of the business-oriented iNM ConOPS documents (Network 4DT, ATFM-ASM and iDL) and to ensure the implementation of this NM B2B Strategy, NM shall develop, in cooperation with its operational stakeholders, the NM B2B ConOPS.

The NM B2B ConOPS shall be of technical nature, shall compile the views from the other ConOPS documents mentioned above and shall define the transition from the current situation to the future.

The NM B2B ConOPS shall be organised as all other ConOPS documents, mainly by providing:

- (1) An overview of the current and future NM B2B context and scope, and a summary of the objectives of its future evolutions;
- (2) The NM B2B “as-is” situation, serving as the problem statement;
- (3) The solutions that NM will bring to the items described in the problem statement;
- (4) A view on the transition plan to these solutions.

The main objectives of the NM B2B ConOPS shall be:

### ***Operational Efficiency***

Help NM B2B Stakeholders to further improve the integration of the operational requirements from regulations (e.g. CP1), improve their operational efficiency, reduce costs, and enhance productivity through the NM B2B services.

### ***Development Planning***

Help NM B2B Stakeholders to build their operational development plans (driven by changes to operational requirements, e.g. FF-ICE/R2 or iDL AIRAC data building) as well as their technology evolution plans (mostly driven by total cost of ownership considerations, e.g. depreciation of legacy protocols), through the provision of the NM B2B development plans (and behind the corresponding backend developments), in a collaborative manner (through the NM CDM Process).

This planning is intended to rationalise changes coming from different sources, like iNM (and associated ConOPS plans) and CP1/SDP, to avoid a sequence of changes that would better be handled in some other way and timeframe.

By defining and sharing migration plans, this document also intends to clarify how business continuity of NM B2B services delivered to NM B2B Stakeholders will be supported.

### ***Quality of Service***

As all trends today move the ATM community from older technologies (like AFTN) to more modern SWIM ones, this document emphasises efforts made in the area of Quality of Service (QoS), considering the intensive use of Internet and its inherent issues (e.g. DDoS), more generally on the many aspects related to risks on service delivery, including scalability and contingency.

### ***User Support***

In addition to the QoS objective, the NM B2B ConOPS aims at describing more specifically how NM intends to improve the current NM B2B user support to address issues promptly and ensure a positive user experience. This implies strengthening

the relationships with NM B2B users, in particular gathering feedback from experienced NM B2B users and building on their feedback to continuously enhance the NM B2B services.

Across all these objectives, the NM B2B ConOps aims at realising the appropriate and agreed balance between change and service stability: one should not change for the sake of changing. Consequently, the B2B ConOps will make sure that the proposed evolutions are duly motivated either by regulatory context, and/or obsolescence of technology, and/or business evolution, and/or clearly identified values for the Users.

## 3 Abbreviations

Abbreviations and acronyms used in this document are available in the EUROCONTROL Air Navigation Inter-site Acronym List (AIRIAL) which may be found here:

<http://www.eurocontrol.int/airial/definitionListInIt.do?skipLogon=true&glossaryUid=AIRIAL>





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