Intro to European TBO roadmap

Olivia Nunez, 17 February 2026

EUROPEAN PARTNERSHIP

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sesar JOINT UNDERTAKING

- Connected and automated ATM
- Air-ground integration and autonomy
- Multimodality and passenger experience
- Capacity-on-demand and dynamic airspace
- Aviation Green Deal
- U-space and urban air mobility
- Artificial intelligence for aviation
- Virtualisation and cyber-secure data sharing
- Civil/military inter-operability and coordination

Smart ✓ Sustainable ✓ Resilient ✓

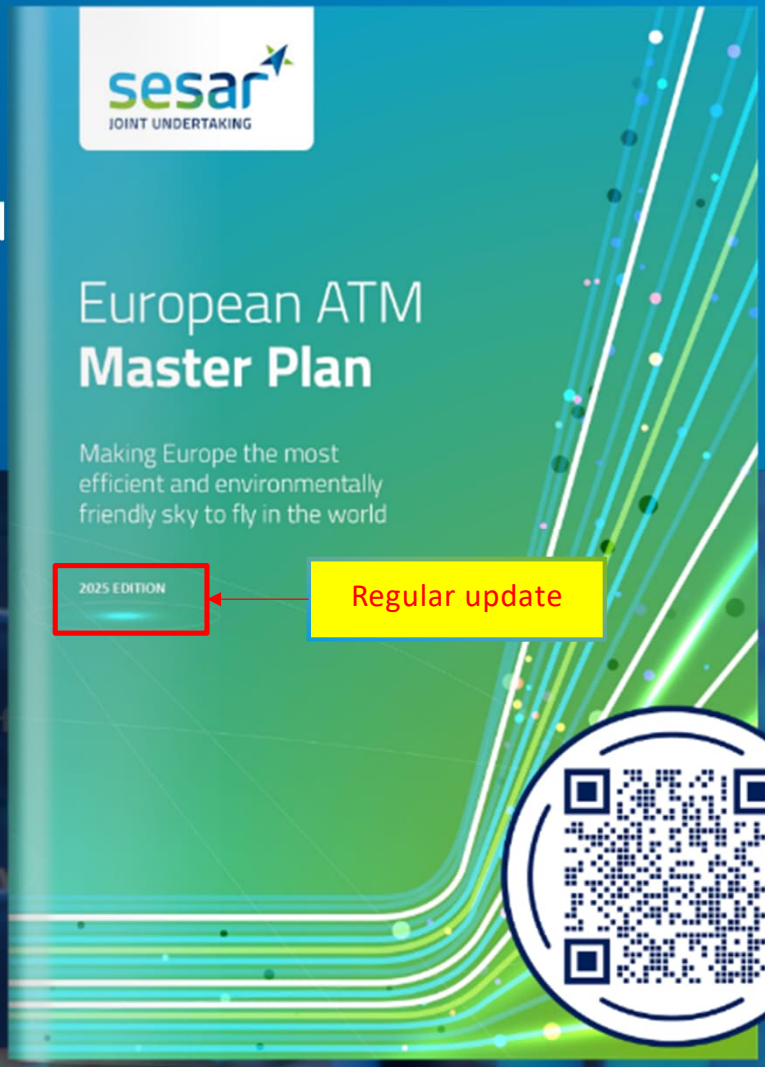
55 members

78 projects in operation

139 delivered solutions

Making Europe the most efficient and environmentally friendly sky to fly in the world

- Focus on **efficiency** and **environment**
- Agreed roadmap prepared in consultation with all European stakeholders
- Content: Vision, roll-out, deployment priorities, development priorities, benefits and investment needs
- Adopted in December 2024
- Time horizons:
  - **2030 –** Significant progress on research and innovation
  - **2035 –** Implementation of 10 strategic deployment objectives
  - **2045 –** Full implementation



TBO in the European 2045 vision

Continuous trajectory optimisation in planning and execution

G-G and A-G sharing of trajectory data

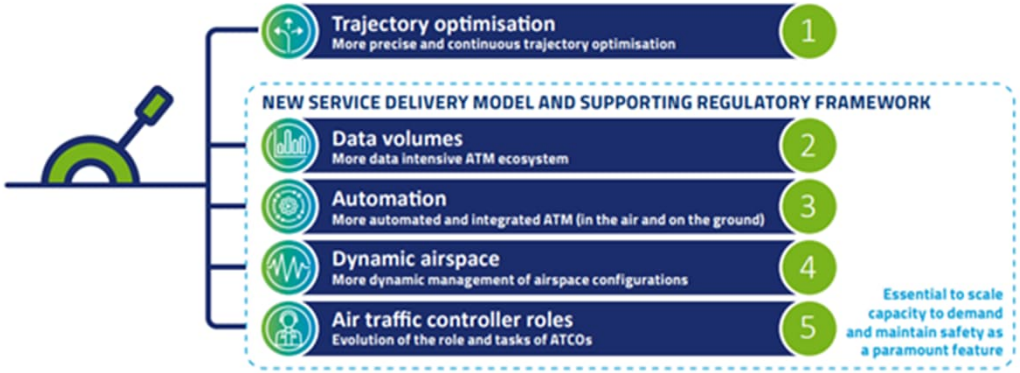
Human-machine teaming:

- High automation in planning and execution (including ATC)
- Reduction of dispatch, flight-deck, ATFM and ATC workload

From airspace management to the management of individual flights -> reduced environmental impact

Routine ATC clearances are automated (and uplinked automatically via CPDCL)

- Controllers responsible for tasks where human capabilities have added value



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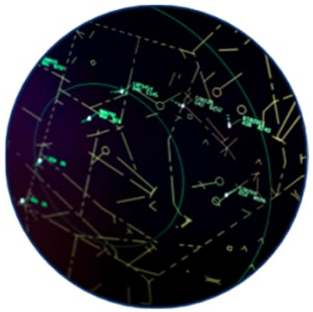
WE ARE ALL TBO



NETWORK TBO

ATC TBO

REGIONAL TBO

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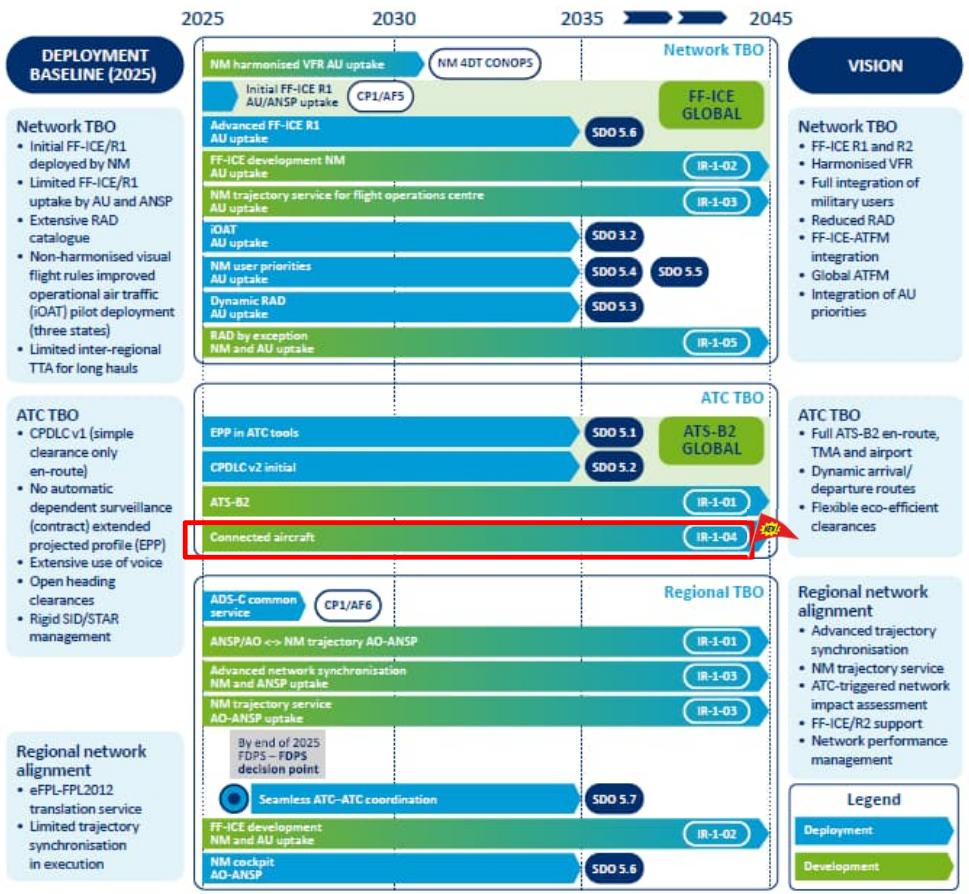
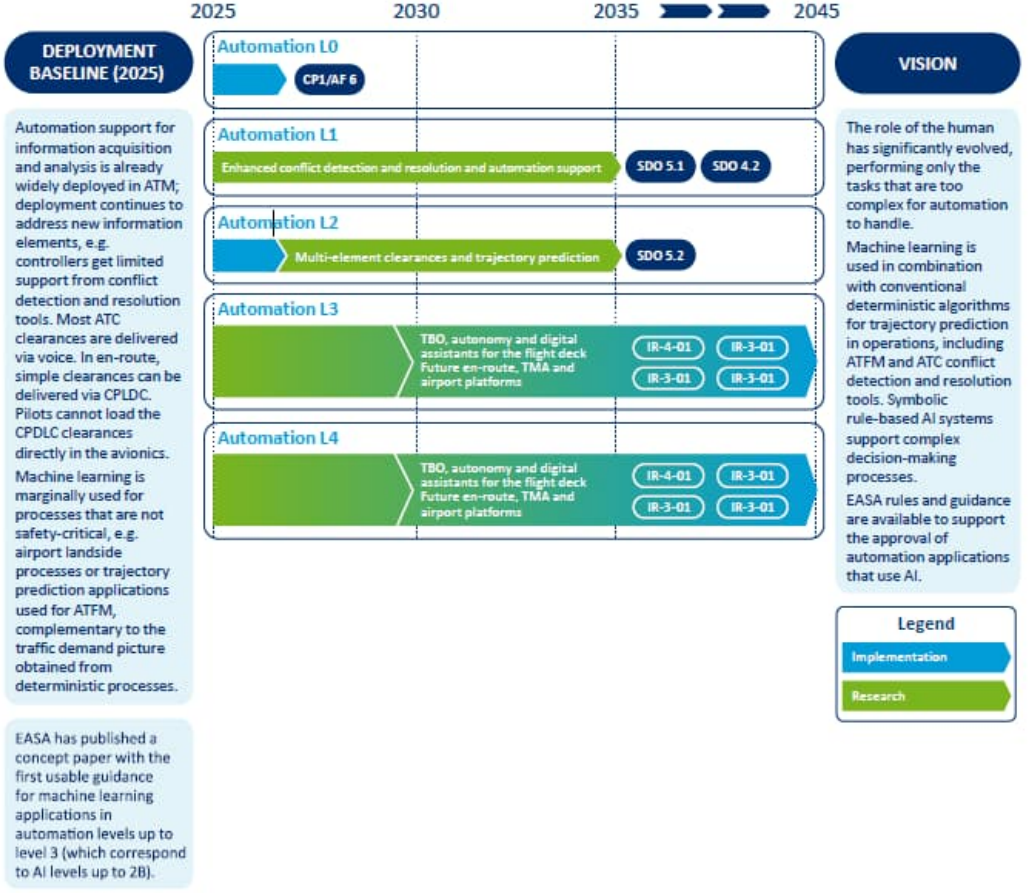
TBO & Automation Roadmaps





FIRST STEPS: DEPLOYMENT IN PROGRESS

NETWORK TBO

- **Initial FF-ICE Deployment**
- SWIM standard published by EUROCONTROL and used in operations
- **EU Mandate:** Airspace User uptake period 2024-2025

ATC TBO

- EPP/initial trajectory information sharing
- Already operational in 1 ACC (Maastricht)
- EU NM/ANSP uptake period 2024-2027
- **EU Mandate:** all new aircraft must be equipped from 2028

REGIONAL TBO

- Intra-European trajectory synchronisation for enhanced ground-ground messages
- Supporting NM/airport connectivity
- **EU mandat**e: ASD-C used to improve NM trajectory (in addition to radar data) by 2028

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FF-ICE flight plan: not just a new format

FPL 2012 is the last “form-based” flight plan…

But the new FF-ICE format will not bring benefits if used in the same way as FPL2012

We need to take advantage of the new possibilities it opens!

The move to the FF-ICE flight plan (eFPL) will have limited benefits if:

- The ASP **accepts all flight plans** even if not flyable, and ATC must fix the situation
- The ASP does not maintain the **catalogue of constraints** that AU must consider when flight planning
- The eFPL cannot be **changed after take-off** (note this is FF-ICE/R2)
- …

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TBO deployment 2025-2035

Transformation to TBO is a **strategic deployment objective (SDO 5)** in the ATM MP 2025:

ON1

1) **EPP into ATC tools (beyond the CP1 scope) (ATC TBO)**
2) **First step multi-element clearances via CPDLC with push-to-load, including cross border (ATC TBO)**
3) **Dynamic RAD phase 1 (Network TBO)**
4) User priorities: arrival ATFM
5) User priorities: pro-active flight delay criticality concept
6) **FF-ICE/R1 beyond the CP1 scope**
7) Seamless ATC-ATC coordination for cross-border clearances

Note: elements in bold are CP2 candidates

Slide 9

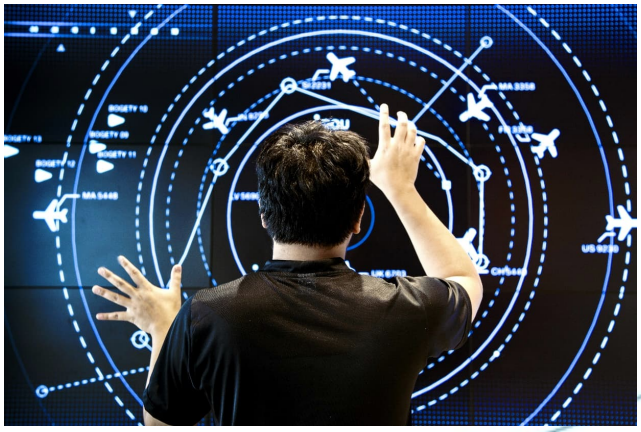
ON1 (We want to encourage audience to contact SESAR members for more info, maybe we can add links to each of the points for distribution?)

Olivia Nunez, 2024-05-28T11:27:41.484

TBO R&D 2025-2035

Strategic development priorities in the 2025-2030 period:

1) ATS B2 development, including extension to lower airspace and the airport surface *(ATC TBO)*
2) Development of FF-ICE, including pre-departure enhancement (e.g. ATFM integration) and post departure FF-ICE/R2 *(Network TBO)*
3) Network trajectory synchronisation in the execution phase *(Regional TBO)*
4) Connected aircraft FMS, EFB and FOC integration in support of trajectory optimisation *(ATC TBO)*
5) Dynamic RAD development towards a RAD by exception environment *(Network TBO)*



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JOINT UNDERTAKING

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What is the role of the SESAR Joint Undertaking?

Accelerate through **research** & **innovation** the delivery of an **inclusive, resilient & sustainable Digital European Sky.**

ATM MODERNISATION

Strategic planning & monitoring

EUROPEAN ATM MASTER PLAN

RESEARCH & INNOVATION

Manage research and development projects

DELIVER SESAR SOLUTIONS

MARKET UPTAKE

Facilitate an accelerated market uptake of SESAR solutions

DEMONSTRATE
COORDINATE
SUPPORT