

EUROPEAN TBO ROADMAP

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EUROPEAN ATM MASTER PLAN 2024

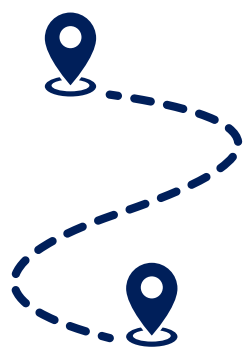
Our vision: Establish Europe as the most efficient and environmentally friendly sky to fly in the world with safety as a paramount feature.



European ATM Master Plan update ongoing



TBO is one of the five key transformation levers



Detailed 2025-2040 TBO roadmap under development as part of the future European ATM Master Plan addressing all TBO threads



Trajectory optimisation
More precise and continuous trajectory optimisation

1

NEW SERVICE DELIVERY MODEL AND SUPPORTING REGULATORY FRAMEWORK



Data volumes
More data intensive ATM ecosystem

2



Automation
More automated & integrated ATM (in the air and on the ground)

3



Dynamic airspace
More dynamic management of airspace configurations

4



Air traffic controller roles
Evolution of the role and tasks of ATCOs

5

Essential to scale capacity to demand and maintain safety as a paramount feature

WE ARE ALL TBO



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



ATCTBO

- 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

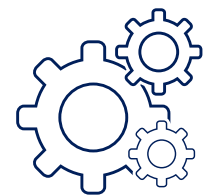


REGIONAL TBO

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

TBO DEPLOYMENT 2025-2035

Transformation to TBO is a strategic deployment objective in the ATM Master Plan 2024:



EPP into ATC tools (beyond the EU mandate) (ATC TBO)



First step multi-element clearances via CPDLC with autoload, including cross border (ATC TBO)



Dynamic RAD phase 1 (Network TBO)



Enhanced consideration of user priorities: arrival ATFM & pro-active flight delay criticality concept



FF-ICE/R1 beyond the EU mandate (planning service, constraint management)

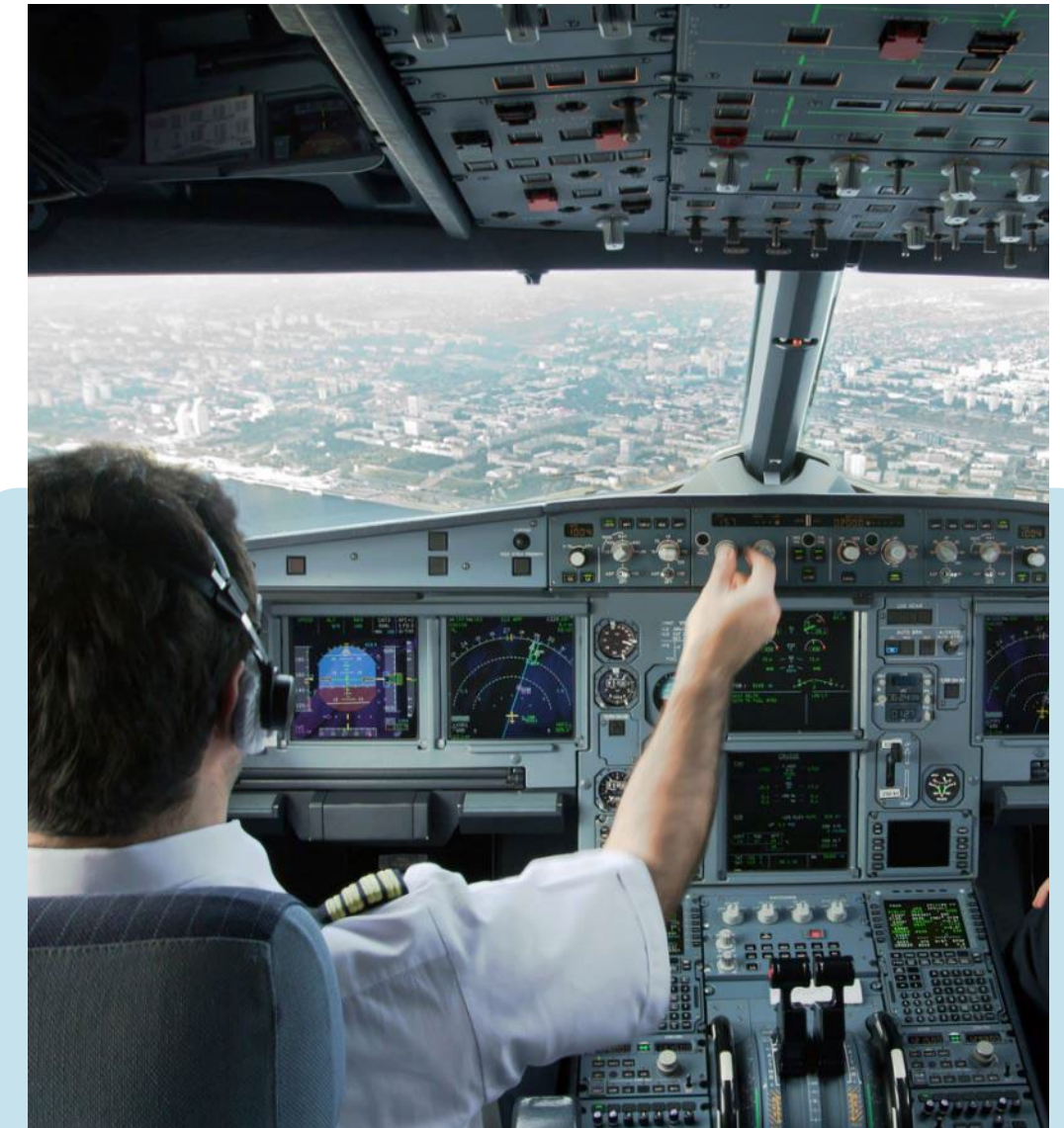


Seamless ATC-ATC coordination for cross-border clearances

All elements will be
TRL6 by 2026
(most are already
TRL6 today)

TBO RESEARCH AND DEVELOPMENT PRIORITIES 2025-2035

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



TRANSITION TOWARDS MULTILINK

DIGITALISATION



↑↑↑
DATA TRAFFIC

- MULTILINK = performance + resilience
- Principle of backwards compatibility
- Move to IPS
- Coexistence of different A/G communication technologies:
 - VDLM2
 - SATCOM
 - LDACS
 - Hyperconnected (use of commercial networks)
 - VHF voice (ground and satellite-based)



Transition towards highperformance A/G connectivity through multilink is a strategic deployment objective in the ATM Master Plan 2024



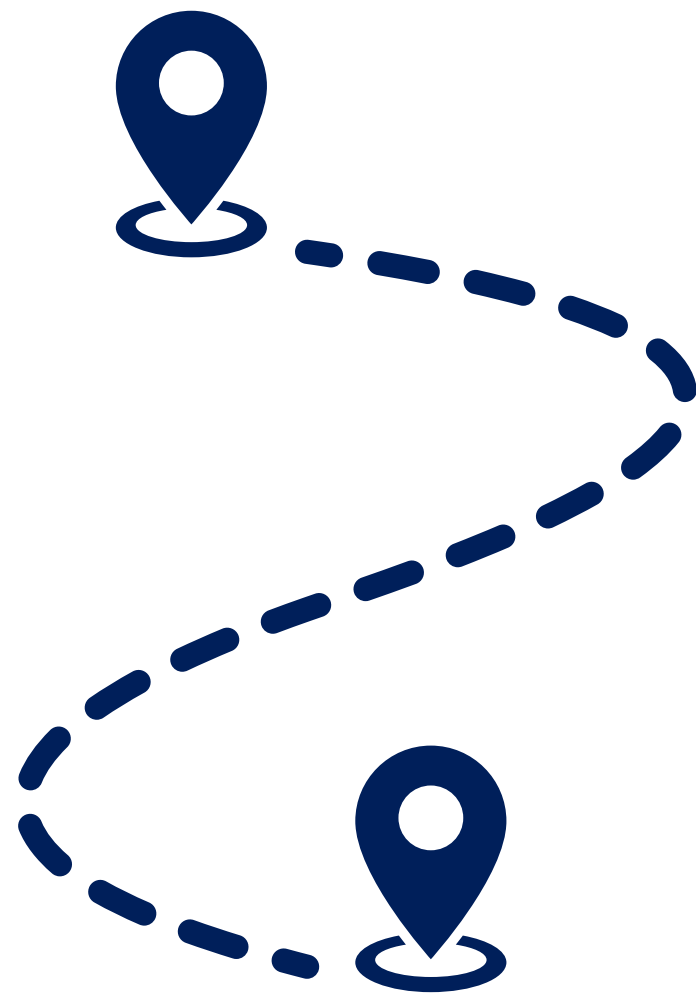
TBO IN THE 2040 VISION

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
 - › Reduction of dispatch, flight, ATFM and ATC workload
- From airspace management to the management of individual flights → reduced environmental impact
- Routine ATC clearances are automated



NEXT STEPS FOR THE EUROPEAN ATM MASTER PLAN



July 2024 Final draft of ATM Master Plan (including TBO roadmap)
for formal consultation with stakeholders

December 2024 Adoption of the Master Plan by the
SESAR Joint Undertaking Governing Board

In the meantime, still open for discussion and improvements

THANK YOU FOR YOUR
ATTENTION