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European ATM Master Plan
Stakeholder consultation Workshop

DAY 1 – 22 April 2024

EUROPEAN PARTNERSHIP

Co-funded by the European Union

WELCOME

ANDREAS BOSCHEN

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KEYNOTE SPEECH

FILIP CORNELIS
DG MOVE,
EUROPEAN COMMISSION

SETTING THE SCENE

ALAIN SIEBERT

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3 MONTHS LEFT TO **BUILD CONSENSUS** WITH ALL **KEY DECISION MAKERS** REPRESENTING EUROPEAN AVIATION

European ATM Master Plan

Exploration

OCT 23 – MAR 24

- Explore full range of options

TODAY

Convergance

APR 24 – JUL 24

- Prioritisation
- Impact analysis
- Input to Fourth Reference Period (RP4)
- Final consolidation

Adoption

AUG 24 – DEC 24

- Formal consultation
- Adoption of new Master Plan

Fourth Reference Period (RP4)

2025

Global Air Navigation Plan (GANP)

TO **REDUCE** OUR CLIMATE IMPACT THE **TIME TO ACT IS NOW**

TODAY

~€40 bn* total investment to implement the **Digital European Sky**

2040+

ZERO EMISSION AVIATION

DESTINATION 2050 ESTIMATES*

€441 bn*
To deliver **alternative fuels**

€820 bn*
$1.7 trillion value chain† to deliver **electric** and **hydrogen aircraft**

* **Source:** European ATM Master Plan 2020

* **Source:** Destination 2050: The Price of Net Zero Report
† **Source:** World Economic Forum: Target True Zero: Delivering the Infrastructure for Battery and Hydrogen-Powered Flight

TO **REDUCE** OUR CLIMATE IMPACT THE **TIME TO ACT IS NOW**

TODAY

Equates to
<€1,5
per passenger
per flight (2020-2040)

Digital European Sky

€441 bn*
To deliver **alternative fuels**

€820 bn*
$1.7 trillion value chain† to deliver **electric** and **hydrogen aircraft**

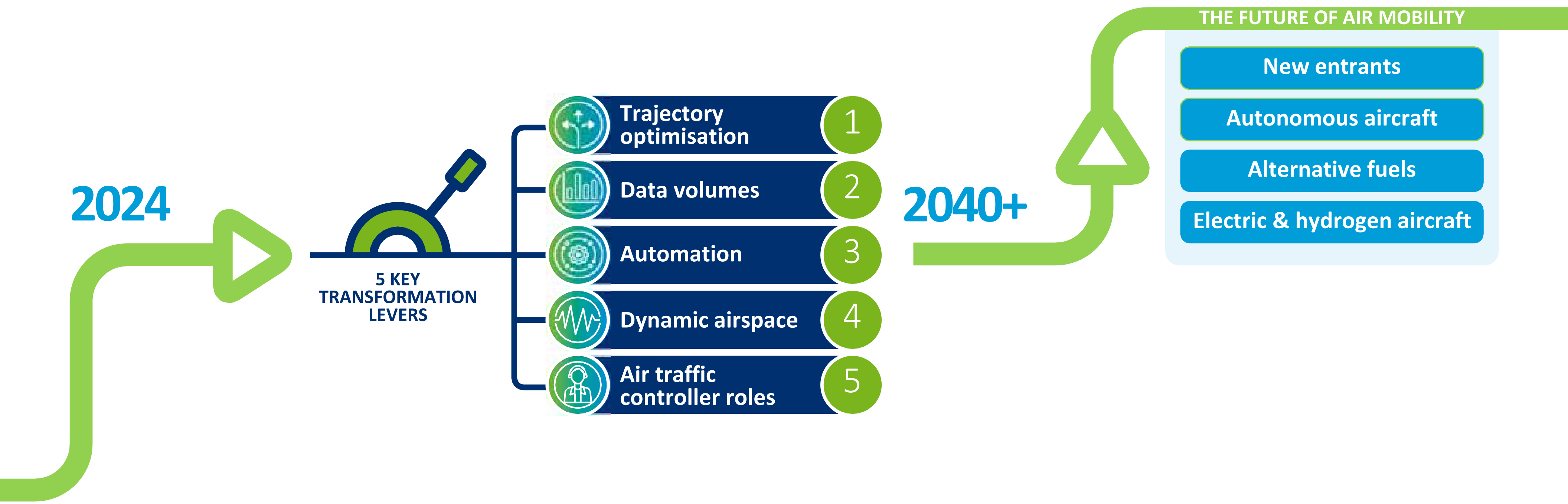
DESTINATION 2050 ESTIMATES*

2040+

ZERO EMISSION AVIATION

* **Source:** Destination 2050: The Price of Net Zero Report
† **Source:** World Economic Forum: Target True Zero: Delivering the Infrastructure for Battery and Hydrogen-Powered Flight

GOALS CAN ONLY BE **ACHIEVED** WITH AN EVEN **STRONGER FOCUS** ON DIGITAL **TRANSFORMATION**



EMERGING ISSUES & OPPORTUNITIES
6 MONTHS INTO THE CAMPAIGN

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1. While the focus now goes beyond fuel burn and CO_2 emissions and integrates other environmental impacts caused by aviation such as non-CO_2 and noise, **we need an integrated ambition**

2. Securing a clear **"before and after" effect** with this edition to mobilise the community to implement the strategy as from RP4

3. **Monolithic systems are no longer part of our future** to enable deeper and faster changes towards a Digital European Sky

4. Integration of all types of current and future airspace users: **we are expecting that complexity will increase** both in type and number of operations

5. What do we need to focus on to **dramatically shorten the innovation cycle** in ATM and complete the implementation of a Digital European Sky by 2040?

OBJECTIVES FOR **TODAY** AND **TOMORROW**

1. Provide transparency on the Master Plan campaign progress to date
2. Gather stakeholder feedback on direction of the Master Plan
3. Inform about next steps

SESSION MODERATORS

AGNIESZKA BYRT

MODERATOR

TRIONA KEAVENEY

MODERATOR

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Express your views through the polls throughout the sessions

4 Submit a question for the Q&A

Submit questions or vote for your favourite ones

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THE VISION

MILENA STUDIC
WG1

PAVEL KOLČÁREK
WG2

RUI ABRANTES
WG3

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ANDREW HATELY
WG4

VICENTE DE FRUTOS CRISTÓBAL
WG5

DIGITAL EUROPEAN SKY: **THE VISION**

SYSTEMATIC, CONTINUOUS AND EXTREMELY PRECISE OPTIMIZATION OF ALL FLIGHTS

NEW FORMS OF MOBILITY AND USE OF THE SKY

NEW SERVICE DELIVERY MODEL

(service oriented and cloud based)

ENHANCED CIVIL-MILITARY COORDINATION

HUMAN-MACHINE TEAMING

PERFORMANCE AMBITION

CLIMATE NEUTRALITY

Future system design should adapt, monitor and strike balance between CO_2 emission minimisation and addressing non-CO_2 impacts, noise, and local air quality.

ENHANCED SAFETY

Increase safety levels to accommodate rising traffic numbers and diversity.

IMPROVED PASSENGER EXPERIENCE

Enhance overall passenger experience through integrated multi-modal transportation, emphasising punctuality and seamless connectivity.

FULLY SCALABLE WITHIN MINUTES

Enable ATS providers to scale airspace capacity dynamically within minutes to meet all demand types (civil, military, manned, unmanned), optimising resource usage.

SECURE DATA FLOW

Ensure free and secure data exchange among trusted users.

SOCIAL AND HUMAN CONSIDERATIONS

Explore the social and human dimensions of changes to ensure social acceptability and cost-efficiency.

5 KEY TRANSFORMATION LEVERS

1. **Trajectory optimisation**
   More precise and continuous trajectory optimisation

NEW SERVICE DELIVERY MODEL AND SUPPORTING REGULATORY FRAMEWORK

2. **Data volumes**
   More data intensive ATM ecosystem
3. **Automation**
   More automated & integrated ATM (in the air and on the ground)
4. **Dynamic airspace**
   More dynamic management of airspace configurations
5. **Air traffic controller roles**
   Evolution of the role and tasks of ATCOs

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

TARGET ARCHITECTURE AND SERVICE DELIVERY MODEL – ARCHITECTURE DRIVERS

SUSTAINABILITY

- Decarbonise European ATM, CNS, & IT infrastructure
- Leverage service orientation & digitalisation for efficient operations & reduced environmental impact

INCLUSIVENESS

- Integrate U-space services (U3/U4) for drone operations in all airspace classes
- Ensure civil-military interoperability for CNS and seamless mixed operations

ENVIRONMENTAL FOOTPRINT AND SEAMLESS JOURNEY

- Utilise environmental data for optimised flight paths and reduced overall aviation carbon footprint

DYNAMIC CAPACITY SCALING

- Scale airspace capacity dynamically based on demand through virtual centres and cloud-based services

SINGLE TRAJECTORY REFERENCE

- Establish a single, shared trajectory reference for all actors (ground and air connectivity) for improved collaboration

SYSTEMATIC AND CONTINUOUS OPTIMISATION

- Continuously optimise operations through network-wide management, trajectory-based operations, and flow-centric concepts

NEW SERVICE DELIVERY MODELS

- Develop new models that redefine stakeholder roles, responsibilities, and service provisioning

MACHINE-TO-MACHINE APPLICATIONS

- Shift towards a data-driven approach with robust M2M applications for routine tasks

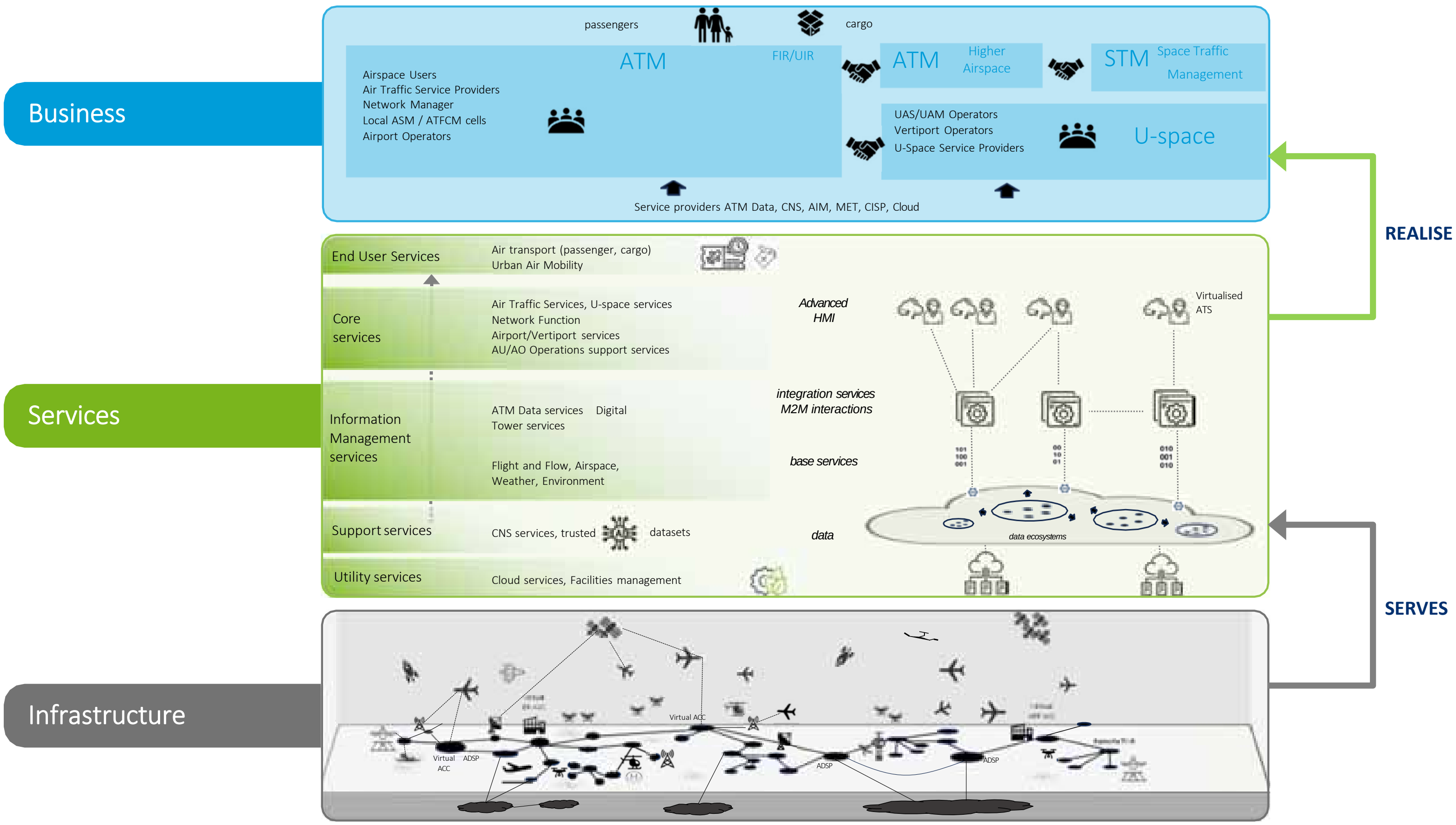
HIGHLY INTEGRATED INFRASTRUCTURE

- Implement European-wide, globally harmonised, and resilient and interoperable CNS services shared by civil and military users

TARGET ARCHITECTURE AND SERVICE DELIVERY MODEL – ARCHITECTURE DESIGN PRINCIPLES

- OPEN AND MODULAR ARCHITECTURE
- DATA FLOW AND AUTOMATION GOVERNANCE
- RESILIENCE
- SUPPORTIVE REGULATORY FRAMEWORK
- SCALABILITY AND INFRASTRUCTURE DECARBONISATION

TARGET ARCHITECTURE – **ILLUSTRATION**



More **automated and integrated** ATM scale

	EASA AI level	Authority of the Human Operator
LEVEL 0 LOW AUTOMATION	1A	Full
LEVEL 1 DECISION SUPPORT	1B	Full
LEVEL 2 RESOLUTION SUPPORT	2A	Full
LEVEL 3 CONDITIONAL AUTOMATION	2B	Partial
LEVEL 4 CONFINED AUTOMATION	3A	Limited
LEVEL 5 FULL AUTOMATION	3B	N/A

MP 2024 target

EVOLUTION OF THE **ROLES** AND **TASKS**

LEVEL 1

Enhanced Decision-Maker

The human makes all decisions based on appropriate overviews of all feasible options (e.g. solution space) provided by automation.

LEVEL 2

Director

The human evaluates the optimal solution provided by automation and improves them where necessary.

The human still has the final say, but automation performs all necessary calculations to prepare the right decision.

LEVEL 3

Supervisor

The human decides which tasks/situations are to be managed by the automation and by themselves.

The human controller oversees and can override automation once a system decision is not deemed appropriate due to certain operational understanding that is not known to automation.

LEVEL 4

Safeguard

The system operates fully autonomously. The human only needs to supervise automation when the system requests so due to its operating out of its allocated operational design domain, based on an assessment by the automation itself.

ENABLING **NEW FORMS** OF **MOBILITY** AND THE **USE OF THE SKY**

USE OF THE SKY 2040

A 2040 EUROPEAN AIRSPACE TRANSFORMED INTO A HUB FOR SUSTAINABLE AND INNOVATIVE AIR MOBILITY

U-space 2.0 (key enabler)

Safe and efficient drone operations for diverse applications

- Fair competition and growth of new air mobility industries
- Environmentally-friendly practices for a sustainable future

Seamless and secure integration of drones into the existing airspace

- Seamless integration of drones into the existing airspace
- Urban Air Mobility (UAM) solutions revolutionising transportation
- Creation of a thriving ecosystem for innovative mobility

U-SPACE 2.0: **UNLOCKING THE POTENTIAL** OF THE FUTURE SKY

U-SPACE 2.0 builds upon the existing U-space framework and introduces advancements to enable

SEAMLESS INTEGRATION
Safe operation of crewed and uncrewed aircraft in the same airspace

ENHANCED AUTOMATION
Supervised autonomous drone operations for increased efficiency and scalability

RISK-BASED APPROACH
Streamlined processes and lower barriers to entry for new entrants in the air mobility sector

OPEN AND SCALABLE INFRASTRUCTURE
Standardised digital platform to accommodate future growth and diverse air mobility solutions

- Safe and reliable air mobility solutions for people and goods
- Efficient use of airspace resources for all types of aircraft
- Minimised environmental impact through optimised flight paths and sustainable practices

ENABLING A **SECURE** EUROPEAN SKY AND **OPTIMIZED ENHANCED CIVIL-MILITARY COORDINATION**

Address European Challenges

(e.g. Geopolitical context)

Blueprint of a future European airspace

(e.g. Enhanced Security, Seamless Civil-Military Coordination & Collaboration, Unimpeded Military Access, Resilient Infrastructure)

KEY CHANGES WE ARE WORKING ON

ATM MASTER PLAN 2020		ATM MASTER PLAN 2024
Focus on digitalisation	→	Digitalisation as an enabler to make Europe more efficient and environmentally friendly sky
Target architecture and service delivery model is designed to address mainly capacity challenges	→	Target architecture and service delivery model is defined more precisely and designed to structurally address both environmental and capacity challenges
Automation ambition defined as a fixed target	→	Aiming at high levels of automation with dynamic human machine teaming, ensuring convergence with EASA AI 2.0 roadmap
U-space roadmap does not consider innovative air mobility needs	→	U-space is upgraded to unlock the value at stake to introduce innovative air mobility services in Europe

THE VISION
Q&A

AGNIESZKA BYRT
MODERATOR

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ROLL-OUT & FIRST RESULTS FROM NETWORK IMPACT ASSESSMENT

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SERGE BAGIEU
SESAR JU

JENS FISCHER
EUROCONTROL

RAZVAN BUCUROIU
NETWORK MANAGER

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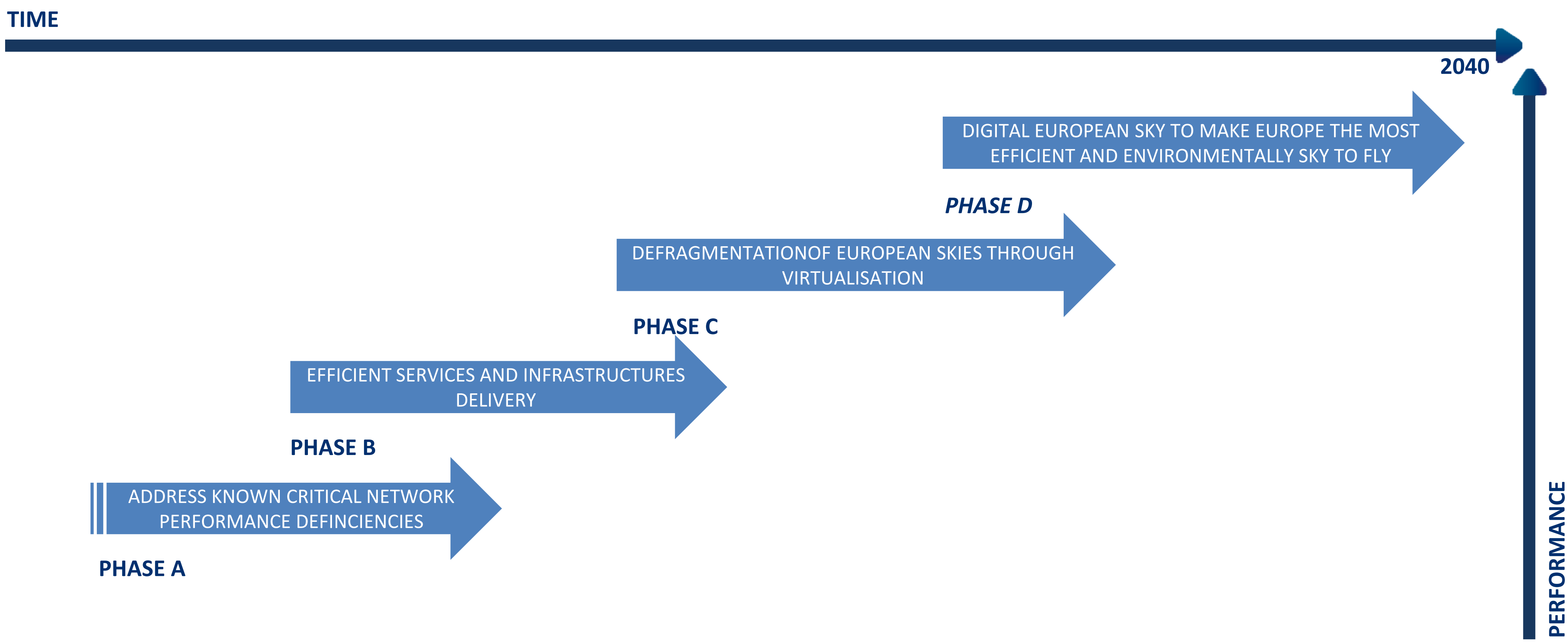
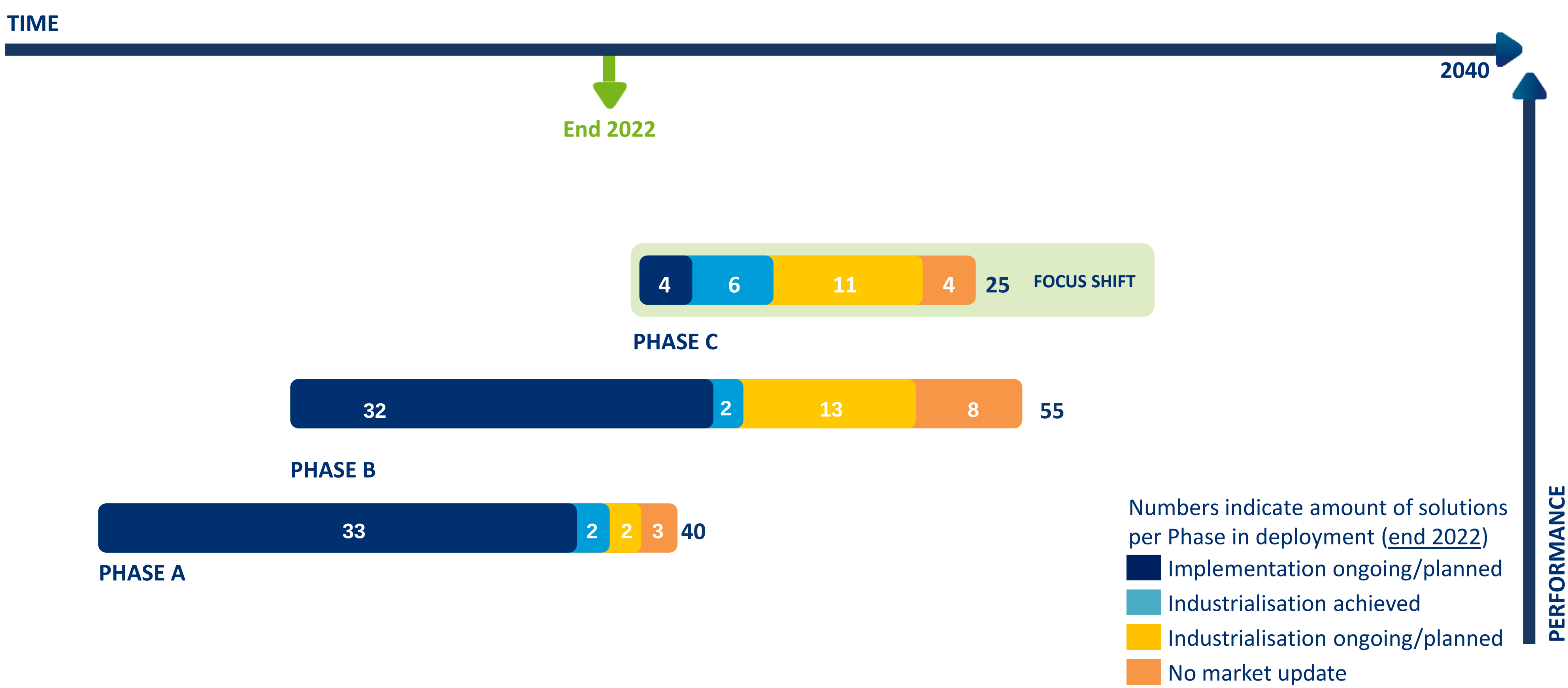
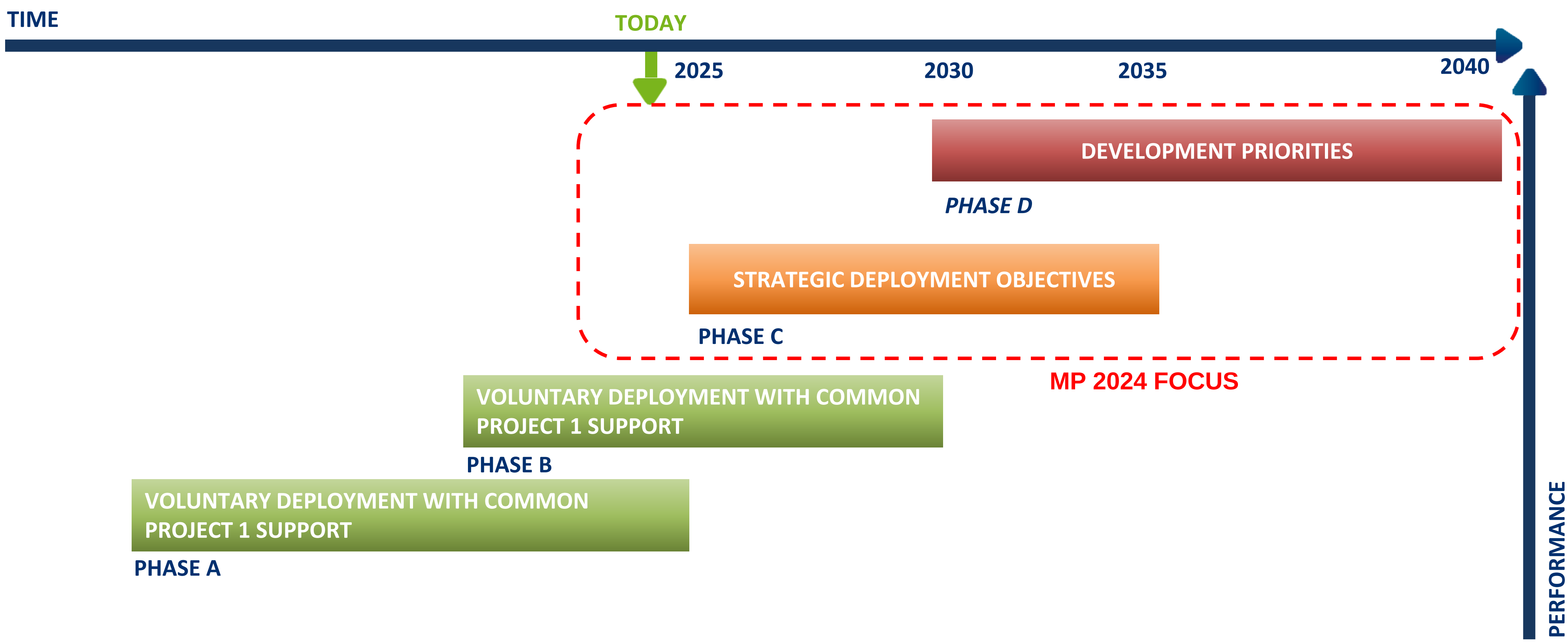
FOUR-PHASED APPROACH TO IMPROVEMENT



CURRENT STATE OF **IMPLEMENTATION**



ROLL OUT **MILESTONES**



CRITICAL **PATH**

Defined to reach target vision and architecture with focus on safety and environmental sustainability, supporting improved capacity, flight efficiency, and predictability.

Critical path for eliminating environmental inefficiencies

1. Improving ATM capacity and efficiency
2. Reducing fuel burn and emissions per flight by improving flight efficiency
3. Mitigating non-CO_2 impact of aviation
4. Developing the environmental performance monitoring and management
5. Improvement of local air quality and reduction of noise at airports
6. Facilitating and optimising the benefits from the use of SAF
7. On the airspace management: dynamic RAD phase 1 and for the longer-term phase 2

KEY DRIVERS

Establishing Europe as a role model for ATM worldwide

Reaching the target architecture

1

Progress from **local to joint optimisation across the wider network** is enabled **through automation, machine-learning and AI**, to ultimately realise the **Digital European Sky**.

2

Cyber-security is at the forefront of achieving the Digital European Sky. Across the digital ecosystem **authorised and authenticated access** needs to be ensured, and **resilience to external attacks must be built into a robust system.**

3

Efficient infrastructure is a key enabler with **full integration of crewed and uncrewed air traffic**, and **seamlessness achieved between controlled airspace and U-space**.

4

ATM system should allow full scalability based on planned demand, and accommodate the needs of civil and military communities, fully co-ordinated.

5

Connecting architectural concepts with the ICAO GANP update and ensuring global interoperability

KEY CHANGES WE ARE WORKING ON

ATM MASTER PLAN 2020	ATM MASTER PLAN 2024
Content of Phase C defined only at high level based on on-going R&D at that time	Actionable (and prioritised) Strategic Deployment Objectives defined for 2025-2035 based on R&D results
No critical path defined to achieve the vision bringing together development & deployment priorities	Critical path to achieve the vision defined
2 scenarios defined for full implementation of the Vision (2040 and 2050)	Focus on securing implementation of the full vision by 2040 and associated conditions for successful roll-out
MP and Performance Scheme handled as 2 separate instruments	MP and Performance Scheme working hand-in-hand to promote MP related investments

NETWORK PERFORMANCE IMPACT ASSESSMENT

PRELIMINARY RESULTS PREVIEW

OBJECTIVE – ASSESS THE NETWORK PERFORMANCE IMPACT OF THE PRIORITISED SDO SOLUTIONS

Environmental benefits

Identify the fuel consumption and CO_2 emissions saving

Capacity improvements

Prove the network resilience towards the forecast increase of traffic

Safety

Confirm the increase of safety by identifying the reduction of accidents

Punctuality & Predictability

Ensure that flights will reduce delay and increase the predictability

METHOD TO ASSESS PERFORMANCE IMPACT – COMBINING TWO SOURCES

NEST[1] Simulations

- All SDO Solutions, excluding technological and airport related Solutions, have been simulated*
- NEST provides performance impact for Capacity and Environmental performance indicators
- CAPAN[2] methodology has been applied to derive ACC ATCO productivity

&

SESAR R&I Performance assessment

Calculation based on SESAR results for the KPIs not measured by NEST simulations*:

- Airport Capacity
- Punctuality & Predictability
- Safety
- APP/TWR ATCO Productivity

* The KPIs related to the simulations have not been merged with Performance Assessment results, as there was no significant overlap found.

* For these KPIs, the performance has been considered for all **SDO Solutions** (simulated and non-simulated), considering the relationships between them.

[1] **NEST:** Network strategic tool
[2] **CAPAN:** Capacity analysis methodology

KEY PERFORMANCE INDICATORS MEASURED – PER DATA SOURCE

NEST Simulation outputs

Track mileage saved
NM (nautical miles)

En-route (&TMA) ATFM delay
Minutes
- Network throughput IFR flights (2040)
- Network throughput IFR flight hours (2040)
- Flights per day for a peak traffic day (2040)

ACC ATCO productivity
Flights per ACC ATCO-Hour on duty

Translated SESAR R&I Performance indicators

Fuel efficiency
Fuel burnt per flight saved

Environmental efficiency
CO_2 Emissions per flight saved

Time efficiency
Gate to gate flight time saved

Airspace Capacity
En-route and TMA throughput in challenging airspace per unit time

ACC ATCO productivity
Flights per ACC ATCO-Hour on duty

SESAR R&I Performance assessment outputs

Airspace Capacity
Peak Runway Throughput

Predictability
Variance of Difference in actual & Flight Plan or RBT durations

Punctuality
Average departure delay per flight

Safety
Percentage reduction in number of accidents with direct ATM contribution

APP/TWR ATCO productivity
Flights per APP/TWR ATCO-Hour on duty

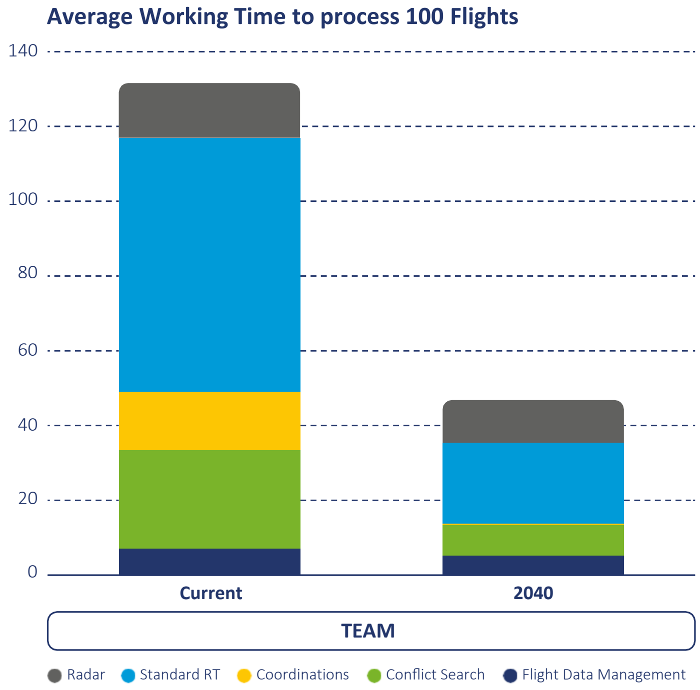
NEST SIMULATIONS **ASSUMPTIONS**

SIMULATION PARAMETERS	COMMON NETWORK PERFORMANCE IMPACT SIMULATION ASSUMPTIONS
Geographical scope	ECAC area (airports not included)
Time horizon	2040
Traffic forecast	Air traffic is predicted between all city-pairs based on the following assumptions: • Traffic forecast uses the October 2023 EUROCONTROL Network Manager Seven-Year Forecast, covering the period **2023-2029**. • After 2029, the traffic was calculated by extrapolating the base growth scenario traffic increase foreseen between 2028 and 2029. As such, a yearly traffic growth of 1.3% was considered for the entire period **2029-2040**. • The calculation of the traffic demand follows the same procedure as for the **Network Operations Plan** and as described in the agreed capacity planning process
Simulation dates	• Future air traffic simulations are made starting from 2 weeks in summer / 2 weeks in winter
Military zones and activities	• No inclusion of military zones and activities

The results of the simulations show the benefits improvements between:

- **"As-is" scenario:** includes all evolutions related to CP1 deployment and other major projects, as covered by the local plans provided for the NOP by the ANSPs and as reflected in the NOP 2024-2029
- **Simulated scenario:** includes As-is scenario and all SDO Solutions implementation

KEY MESSAGES – ACC ATCO PRODUCTIVITY



CAPAN assessment: evolution of ACC ATCO workload, between the Scenario As-is (Current situation) and the Scenario 2040, expressed in average working time to process 100 flights.

Average working time to process 100 flights (current vs 2040): Reduced by ~50%

100% sector capacity increase:
45 flights/hour (current) → **97 flights/hour (2040)**

ACC ATCO Productivity is expected to double

KEY MESSAGES – ATFM DELAY & EFFECTIVE CAPACITY

	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Scenario AS-IS delay (min/flt)	0.8	0.92	1.34	1.76	2.31	2.98	3.57	4.32	5.07	5.91	6.82
Scenario 2040 delay	0.72	0.67	0.64	0.61	0.56	0.5	0.5	0.5	0.5	0.5	0.5

AS-IS simulation: current plans are insufficient to cope with the baseline traffic growth
Scenario 2040: deployment of SDOs could provide sufficient capacity until 2040

2023 → 2040 ABSOLUTE IMPROVEMENT:

Traffic: +34%

Effective capacity: +60%

Network throughput (flights):

- **Flights/year:** 8,468,349 → 13,601,471
- **Flight hours/year:** 13,549,358 → 21,762,354
- **Peak traffic day in 2040:** ~46,580 flights/day
- **Peak traffic day in 2040:** ~74,529 flight hours/day

DIRECT SDO IMPACT IN 2040*:

Effective capacity: +45% excluding CP1 effects

KEY MESSAGES – FLIGHT EFFICIENCY / ENVIRONMENT

Without the capacity increase there is no environmental improvement!!!

Distance savings
1.69 billion NMs

Time savings
- 3.9 million of flight hours
- 1.2 min/flight

Fuel savings
- 13.9 million tons of fuel
- 70kg of fuel per flight

CO_2 emissions savings
- 43.8 million tons of CO_2 emissions
- 220 kg of CO_2 emissions per flight

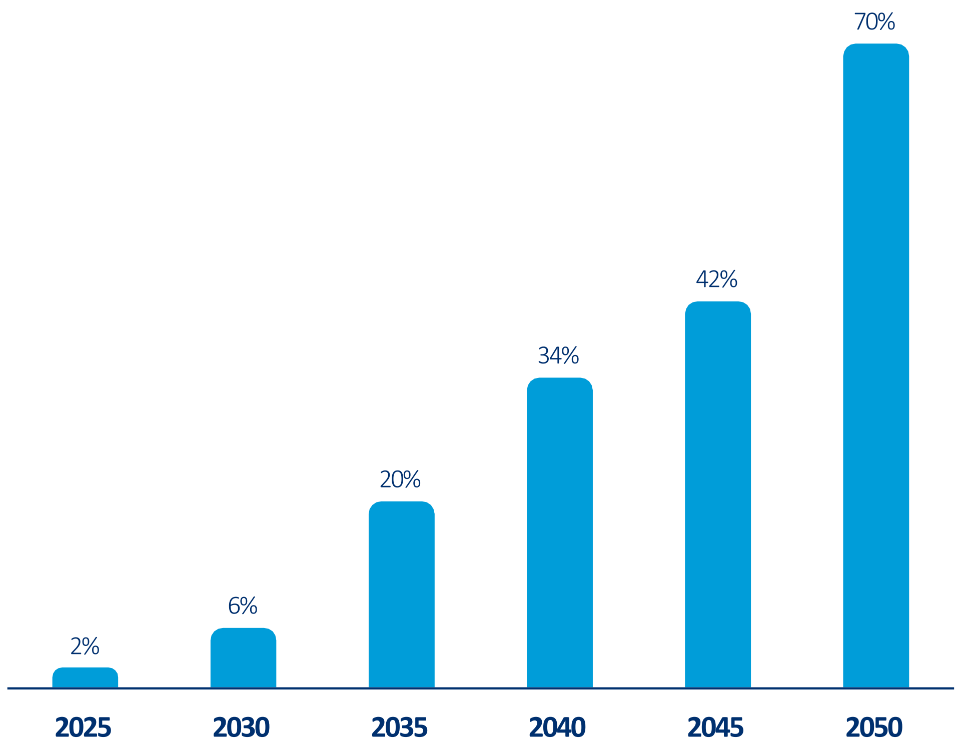
ASSUMPTIONS FOR SUSTAINABLE AVIATION FUEL (SAF) UPTAKE – **POST-PROCESSING OF NEST RESULTS**

The Simulations result of CO_2 emissions can be post-processed, applying yearly the base scenario for SAF (and e-fuel) implementation, based on ReFuelEU regulation for SAF uptake.

The ReFuelEU aviation regulation will oblige:

Aircraft fuel suppliers at EU airports to gradually **increase the share of sustainable fuels** (notably synthetic fuels) that they distribute.

Minumum share of supply of sustainable aviation fuels (in %)



NEST SDO NETWORK PERFORMANCE IMPACT RESULTS (2040)

COMPARES THE BENEFITS IN 2040 OF IMPLEMENTING SDOS ECAC WIDE

+60%
Absolute Effective Capacity increase 2023-2040 for **34% traffic growth**

+45%
Effective Capacity (direct SDO impact)

+100%
ACC ATCO productivity

70kg
Fuel burnt per flight saved

220kgCO_2
Emissions per flight saved

SAF

190kgCO_2
Emissions per flight saved

-1.2 min
Gate to gate flight time

SESAR R&I SDO NETWORK PERFORMANCE IMPACT RESULTS (2040)

COMPARES THE BENEFITS IN 2040 OF IMPLEMENTING SDOS ECAC WIDE

Individual Solution performance assessment:

Solutions validate and compare the delta between:

- Reference scenario (without Solution implemented)
- Solution scenario (Solution implemented)

In a particular operating environment with a particular traffic sample*

*This varies by Solution and Exercise

Extrapolation to 2040:

Results are extrapolated ECAC wide and for 2040 using the SESAR Common Assumptions.

Final aggregated results:

Only takes the SDO Solutions performance, considering their identified relationships

-13%
Number of accidents with direct ATM contribution (safety)

+15%
Airport Capacity

-0.9 min
Average departure delay per flight

+9%
Predictability

+10%
APP/TWR ATCO productivity

Scope: ECAC area

GLOBAL SDO NETWORK PERFORMANCE IMPACT RESULTS (2040)

GLOBAL* VIEW OF THE BENEFITS IN 2040 OF IMPLEMENTING SDOS

+45%
Effective capacity (direct SDO impact)

70kg
Fuel burned per flight saved

$220kgCO_2$
Emissions saved per flight

$190kgCO_2$ (SAF)
Emissions saved per flight

-1.2 min
Gate to gate flight time

+47%
ATCO productivity (ACC/APP/TWR)
+100% ACC
+10% APP/TWR

-13%
Number of accidents with direct ATM contribution (safety)

+15%
Airport capacity

-0.9 min
Average departure delay per flight

+9%
Predictability

Closure of current capacity gap, meeting traffic growth at reasonable performance levels

* ECAC-wide

ROLL-OUT PLAN & NETWORK IMPACT ASSESSMENT RESULTS Q&A

TRIONA KEAVENEY

MODERATOR

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EXECUTIVE ROUNDTABLE

MODERATOR: ALAIN SIEBERT
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ATHANASSIOS TZIOLAS
EASA

CHRISTOPHE VIVIER
EUROPEAN DEFENCE AGENCY (EDA)

CHRISTOPH RAAB, ALLIANCE FOR NEW MOBILITY EUROPE (AME)

LUC LAVEYNE
ACI EUROPE

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OURANIA GEORGOUTSAKOU
A4E

ULF THIBBLIN
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European ATM Master Plan
Stakeholder consultation Workshop

DAY 2 – 23 April 2024

EUROPEAN PARTNERSHIP

Co-funded by the European Union

WELCOME AND REFLECTIONS FROM DAY 1

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DEVELOPMENT PRIORITIES

OLIVIA NUNEZ
SESAR JU

ALFREDO GOMEZ
SESAR JU

Prepare for Q&A session

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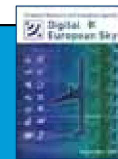
DEVELOPMENT PRIORITIES ASSESSMENT

A FOUR-STAGE PROCESS

1 Sources of Development Priorities

298 development candidates identified from 4 sources



SRIA R&I

All Working Groups R&I

Scientific Committee on future ER

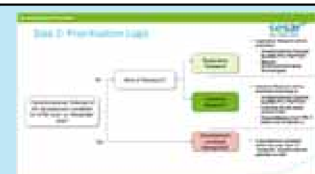
Gartner Market Research

2 Consolidation

Overlapping candidates consolidated into 27 distinct development priorities

3 Prioritisation

Prioritisation logic applied



Prioritisation criteria

- Transformational potential for ATM
- Maturity
- Criticality for the vision
- Time to Market

4 Results

12 development priority candidates retained

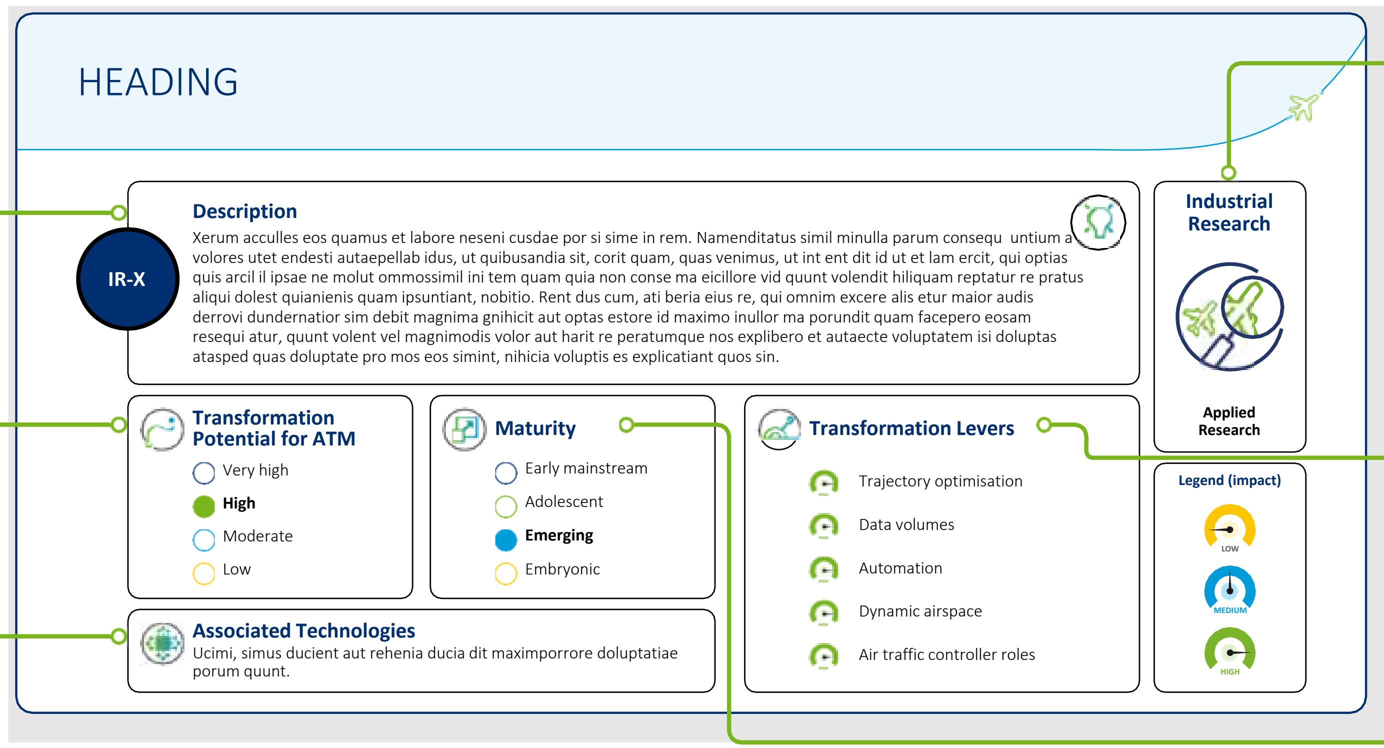
- Exploratory Research: 4 candidates
- Industrial Research: 8 candidates

INITIAL DEVELOPMENT PRIORITIES

Description
High-level summary of the development priority, outlining the main objective, approach, and the expected outcomes.

Transformational Potential for ATM Assesses the potential degree of transformation in ATM, from enabling major industry shifts (Very high) to slight process improvements (Low).

Associated Technologies
Lists the main (ATM) technologies involved in or relevant to the development priority.



Research Pillar
Indicates the kind of research required for the development priority.

Transformation Levers Impact
Evaluates the development priority's impact on the transformation levers as defined in the SESAR Joint Undertaking Multiannual Work Programme.

Maturity
Indicates the current stage of development for the priority, ranging from 'emerging' to 'Early mainstream'.

DEVELOPMENT PRIORITIES OVERVIEW

Industrial research

IR-1	Transformation to Trajectory-Based Operations
IR-2	Transition towards high level of air-ground connectivity (multilink)
IR-3	Future ATC platform for En-Route operations
IR-4	Future ATC platform for TMA operations
IR-5	Future ATC platform for Airport operations
IR-6	Infrastructure as a Data Service for Future Platforms (targeting CNS, MET, AIM & IT)
IR-7	Enable Reduced/Single Pilot Operation
IR-8	Wake Energy Retrieval (WER) for Continental Airspace

Exploratory Research

Fundamental Research

FR-1	ATM impact on Climate Change
FR-2	Digital Flight Rules
FR-3	Investigate Quantum Sensing & Computing Applied to ATM

Applied research

AR-1	Artificial Intelligence (AI) Assurance, Human Factors and Safety Risk Mitigation

TRANSFORMATION TO **TRAJECTORY-BASED OPERATIONS** (TBO)

IR-1*

Description

This development priority focuses on completing the industrial research needs that are identified in the TBO roadmap. This may include, pending finalisation of the TBO roadmap, elements such as FF-ICE/R2 for the revision of the flight plan beyond the North Atlantic and intra-European use cases, AOC-EFB-FMS integration, etc.

Industrial Research

Transformation Potential for ATM

- Very high
- **High**
- Moderate
- Low

Maturity

- **Early mainstream**
- Adolescent
- Emerging
- Embryonic

Transformation Levers

- Trajectory optimisation (HIGH)
- Data volumes (HIGH)
- Automation (HIGH)
- Dynamic airspace (HIGH)
- Air traffic controller roles (HIGH)

Legend (impact)

- LOW
- MEDIUM
- HIGH

Associated Technologies

4D trajectory planning tools, flight and flow information systems, next generation FMS connected to AOC.

* IR: Industrial research

TRANSITION TOWARDS **HIGH LEVEL OF AIR-GROUND CONNECTVITY** (MULTILINK)

IR-2*

Description

Complete R&D activities on the concept of "Hyperconnected ATM" - which explores the integration of non-safety, commercial links into a hybrid communication infrastructure for ATM safety communication needs - and the complete development on the new terrestrial link LDACS.

Industrial Research

Transformation Potential for ATM

- **Very high** (selected)
- High
- Moderate
- Low

Maturity

- Early mainstream
- **Adolescent** (selected)
- Emerging
- Embryonic

Transformation Levers

- Trajectory optimisation — HIGH
- Data volumes — HIGH
- Automation — HIGH
- Dynamic airspace — HIGH
- Air traffic controller roles — HIGH

Associated Technologies

LDCAS, Hyperconnected ATM.

Legend (impact)

- LOW
- MEDIUM
- HIGH

* IR: Industrial research

FUTURE ATC PLATFORM FOR EN ROUTE & TMA OPERATIONS AND FUTURE ATC PLATFORM FOR AIRPORT OPERATIONS

IR-3
IR-4
IR-5*

Description

This development priority focuses on the evolution of the enroute, climb/descent and airport phase of flight to an environment where ATC is highly automated (traffic is handled under closer supervision by air traffic controllers supported by digital assistants that are designed to safely handle a large number of routine tasks). The development of the future platforms aims to incorporate advanced technologies and innovative approaches to implementation of a new service delivery model (service oriented and cloud based) in which service providers are able to dynamically and collaboratively scale up or down capacity in line with demand by all airspace users (both civil and military). Key areas of focus include bolstering cyber-resilience and cybersecurity to protect critical ATM infrastructure and data, harnessing artificial intelligence to optimise flight paths and airspace utilisation, and fostering enhanced civil-military collaboration for seamless airspace management.

Industrial Research

Transformation Potential for ATM

- **Very high** (selected)
- High
- Moderate
- Low

Maturity

- Early mainstream
- **Adolescent** (selected)
- Emerging
- Embryonic

Transformation Levers

- Trajectory optimisation — HIGH
- Data volumes — HIGH
- Automation — HIGH
- Dynamic airspace — HIGH
- Air traffic controller roles — HIGH

Legend (impact)

- LOW
- MEDIUM
- HIGH

Associated Technologies

Cybersecurity tools, artificial intelligence, dynamic airspace configuration systems, human-centric design principles.

* IR: Industrial research

INFRASTRUCTURE AS A DATA SERVICE FOR FUTURE PLATFORMS (TARGETING CNS, MET, AIM & IT)

IR-6*

Description

This development priority focuses on the transition to Infrastructure as a Data Service to help feed future platforms, specifically targeting Communication, Navigation, and Surveillance (CNS), Meteorology (MET), and Aeronautical Information Management (AIM). It has to enable the transition to a new service delivery model (service oriented and cloud based) in which service providers are able to dynamically and collaboratively scale up or down capacity in line with demand by all airspace users (both civil and military).

Industrial Research

Transformation Potential for ATM

- Very high **High**
- Moderate (selected)
- Low

Maturity

- Early mainstream
- **Adolescent** (selected)
- Emerging
- Embryonic

Transformation Levers

- Trajectory optimisation — HIGH
- Data volumes — HIGH
- Automation — HIGH
- Dynamic airspace — MEDIUM
- Air traffic controller roles — MEDIUM

Associated Technologies

Service-Oriented Architecture (SOA), Infrastructure as a Service (IaaS) platforms, data exchange standards.

Legend (impact)

- LOW
- MEDIUM
- HIGH

ENABLE REDUCED/SINGLE PILOT OPERATIONS (SPO)

IR-7*

Description

This development priority focuses on enabling Reduced/Single Pilot Operation (SPO) in the aviation industry. The transition to SPO is being investigated with a view to respecting societal expectations for a human presence in the cockpit, while leveraging increased automation for automatic flight phases. This involves the integration of AI and other advanced technologies to support human operators during complex scenarios, reduce workload, and ensure safety. The priority also emphasises the need for secure and efficient air-ground and air-air communication to support SPO and cross-border operations. Further, it explores the development of new human-machine interfaces and real-time workload monitoring systems based on AI. A key aspect of this initiative is the development of safety systems and crew health monitoring systems to ensure safe operations with a reduced crew.

Industrial Research

Transformation Potential for ATM

- Very high
- **High** (selected)
- Moderate
- Low

Maturity

- Early mainstream
- **Adolescent** (selected)
- Emerging
- Embryonic

Transformation Levers

Trajectory optimisation	LOW
Data volumes	MEDIUM
Automation	HIGH
Dynamic airspace	LOW
Air traffic controller roles	HIGH

Associated Technologies

AI, advanced navigation and surveillance tools, air-ground and air-air communication technologies, human-machine interfaces.

Legend (impact)

- LOW
- MEDIUM
- HIGH

* IR: Industrial research

WAKE **ENERGY RETRIEVAL** FOR CONTINENTAL AIRSPACE

IR-8*

Description

This development priority focuses on the application of Wake-Energy Retrieval (WER). WER, inspired by the principle of migrating birds, involves aircraft flying in formation to achieve significant fuel savings. Formation flight tests have demonstrated potential fuel savings of between 5% and 10% per trip when two aircraft fly approximately 3 km apart, without compromising passenger comfort and safety. The priority involves research and innovation activities to develop the required avionics and necessary ATM procedures, with the aim to develop demonstrators and prepare for market uptake.

Industrial Research

Transformation Potential for ATM

- Very high
- **High** (selected)
- Moderate
- Low

Maturity

- Early mainstream
- **Adolescent** (selected)
- Emerging
- Embryonic

Transformation Levers

Trajectory optimisation	MEDIUM
Data volumes	LOW
Automation	MEDIUM
Dynamic airspace	LOW
Air traffic controller roles	MEDIUM

Associated Technologies

Advanced avionics, ATM procedures.

Legend (impact)

LOW

MEDIUM

HIGH

* IR: Industrial research

FRAMEWORK FOR **AI TRUSTWORTHINESS** APPLIED TO ATM

AR-1*

Description

This development priority aims at baselining how the four building blocks that are considered in the EASA AI Roadmap 2.0 as essential for creating a framework for AI trustworthiness focusing at Level 2 AI (human-AI teaming) and well as Level 3 (advanced automation). The four building blocks are: AI trustworthiness analysis, AI assurance concept, Human factors for AI and AI safety risk mitigation.

Transformation Potential for ATM

- Very high
- **High** (selected)
- Moderate
- Low

Maturity

- Early mainstream
- Adolescent
- **Emerging** (selected)
- Embryonic

Associated Technologies

AI algorithms, machine learning, reinforcement learning, Gen-AI, NLP, cybersecurity measures.

Transformation Levers

HIGH	Trajectory optimisation
HIGH	Data volumes
HIGH	Automation
HIGH	Dynamic airspace
HIGH	Air traffic controller roles

Explorative Research

Applied Research

Legend (impact)

- LOW
- MEDIUM
- HIGH

* AR: Applied research

ATM IMPACT ON **CLIMATE CHANGE**

FR-1*

Description

Aviation contributes significantly to greenhouse gas emissions and other pollutants that impact climate change. Understanding the exact magnitude of this impact, as well as the mechanisms involved, is essential for developing effective ATM optimisation strategies that can be automated and that take into account the total impact on the climate of each flight. Accurate scientific data is necessary to develop evidence-based optimisation algorithms and rules aimed at reducing the environmental impact of aviation. Without comprehensive research, it's challenging to implement measures that effectively balance e.g. the CO^2 vs non-CO^2 impacts.

Explorative Research

Fundamental Research

Transformation Potential for ATM

- Very high
- **High** (selected)
- Moderate
- Low

Maturity

- Early mainstream
- Adolescent
- **Emerging** (selected)
- Embryonic

Transformation Levers

- Trajectory optimisation (HIGH)
- Data volumes (HIGH)
- Automation (HIGH)
- Dynamic airspace (HIGH)
- Air traffic controller roles (HIGH)

Legend (impact)

- LOW
- MEDIUM
- HIGH

Associated Technologies

N/A.

* FR: Fundamental research

DIGITAL FLIGHT RULES

FR-2*

Description

This development priority focuses on the exploration and implementation of Digital Flight Rules (DFR), a proposed new set of rules for an ATM system that as a whole would operate with significantly higher levels of automation for ground systems as well as autonomy for airborne systems. Indeed, higher levels of automation, autonomy and new data services may prompt the need for adjustments to e.g. PANS-OPS rules to ensure that new technologies support an increase in safety, compatibility, operational efficiency, and international harmonisation.

Explorative Research

Fundamental Research

Transformation Potential for ATM

- **Very high**
- High
- Moderate
- Low

Maturity

- Early mainstream
- Adolescent
- Emerging
- **Embryonic**

Transformation Levers

- Trajectory optimisation (HIGH)
- Data volumes (HIGH)
- Automation (HIGH)
- Dynamic airspace (HIGH)
- Air traffic controller roles (HIGH)

Legend (impact)

- LOW
- MEDIUM
- HIGH

Associated Technologies

Future core ATC platforms for high automation, future airborne platforms with higher levels of autonomy, new CNS environment.

* FR: Fundamental research

INVESTIGATE **QUANTUM SENSING & COMPUTING** APPLIED TO ATM

FR-3*

Description

This development priority focuses on exploring the potential applications of quantum sensing and computing within the realm of Air Traffic Management (ATM). Quantum computing, a rapidly emerging technology, promises to revolutionise the computing landscape with its potential for high-speed and high-capacity data processing. In the context of ATM, quantum computing could significantly enhance the service-oriented architecture, improving efficiency and accuracy in air traffic control and management. This research priority aims to position ATM to fully leverage the advancements in quantum technology, ensuring that the sector stays at the forefront of technological innovation. It will involve studying the potential benefits and challenges of integrating quantum sensing and computing into ATM, and developing strategies to effectively implement this technology.

Explorative Research

Fundamental Research

Transformation Potential for ATM

- **Very high** (selected)
- High
- Moderate
- Low

Maturity

- Early mainstream
- Adolescent
- **Emerging** (selected)
- Embryonic

Transformation Levers

Trajectory optimisation	HIGH
Data volumes	HIGH
Automation	HIGH
Dynamic airspace	MEDIUM
Air traffic controller roles	MEDIUM

Legend (impact)

LOW

MEDIUM

HIGH

Associated Technologies

Quantum Computing, Quantum Sensing, Service Oriented Architecture (SOA).

* FR: Fundamental research

KEY CHANGES WE ARE WORKING ON

ATM MASTER PLAN 2020		ATM MASTER PLAN 2024
Limited prioritisation with notion of “key R&D needs” covering mainly adaptations to current ATM	→	Priority on developing solutions that hold the potential to transform ATM
Designed to address mainly capacity challenges	→	Designed to address a multitude of new challenges (climate urgency, IAM, HAO, security …)
Focused at improving existing systems and procedures	→	Focused at developing the next generation platforms for high automation
Mainly focused at industrial research	→	Also setting priorities for exploratory research

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DEVELOPMENT PRIORITIES Q&A

TRIONA KEAVENEY
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WG6

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WHAT ARE **STRATEGIC DEPLOYMENT OBJECTIVES**?

Prioritise deployment actions to support the critical path to reach the ATM vision and associated performance ambitions

Operational & Technological improvements resulting from validated SESAR Solutions / Elements (R&I completed or in the pipeline)

Some Strategic Deployment Objectives (SDO) may need standardisation and regulatory activities to enable market uptake.

OBLIGATION/COMMITMENT TO DEPLOY?

YES	NO
MANDATORY SDO	VOLUNTARY SDO

SDO PRIORITISATION RATIONAL

4 criteria

- On the critical path towards climate neutral aviation
- Structurally addressing capacity and scalability challenges of ATM
- Safety critical
- Essential to promote the uptake of Innovative Air Mobility

Each **SDO** is **resulting** from **SESAR Solutions/ Elements** that are:

R&I COMPLETED ✓

OR

IN THE PIPELINE FOR DELIVERY ✓

PROPOSED **STRATEGIC DEPLOYMENT OBJECTIVES**

SDO 1
ALERT FOR REDUCTION OF COLLISION RISKS ON TAXIWAYS & RUNWAYS

SDO 2
OPTIMISING AIRPORT AND TMA ENVIRONMENTAL FOOTPRINT

SDO 3
DYNAMIC AIRSPACE CONFIGURATION

SDO 4
INCREASED AUTOMATION SUPPORT FOR CONTROLLERS

SDO 5
TRANSFORMATION TO TRAJECTORY-BASED OPERATIONS (TBO)

SDO 6
VIRTUALISATION OF OPERATIONS

SDO 7
TRANSITION TOWARDS HIGH LEVEL OF AIR-GROUND CONNECTIVITY (MULTILINK)

SDO 8
SERVICE-ORIENTED DELIVERY MODEL (DATA DRIVEN AND CLOUD BASED)

SDO 9
CNS OPTIMISATION, MODERNISATION AND RESILIENCE

SDO 10
ENABLE INNOVATIVE AIR MOBILITY (IAM) & DRONE OPERATIONS

SDO 11
MANDATORY SDO: COMMON PROJECT 1 (CP1) IMPLEMENTATION

SDO 1

ALERT FOR REDUCTION OF COLLISION RISKS ON TAXIWAYS & RUNWAYS

Preventing collisions on the airport surface, while increasing traffic in all weather conditions, avoiding a safety critical issue.

STAKEHOLDERS INVOLVED

- ANSP
- AO
- AU
- MIL

OPERATIONAL ENVIRONMENTS

- AIRPORT

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)		(€53m)	
IRR	–%	BCR	–
Payback year		–	

CBA results for AO			
NPV (8%)		(€4m)	
IRR	–%	BCR	–
Payback year		–	

CBA results for AU (Civil)			
NPV (8%)		€151m	
IRR	–%	BCR	–
Payback year		–	

CONTENT SUMMARY

1. **Extended Airport Safety Nets** for controllers at A-SMGCS airports
2. Guidance Assistance through **airfield ground lighting** provided by Airport Operators
3. **On-board Traffic Alerts** for pilots
4. **Enhanced Visual operations** for pilots

SDO 1

ATP
Airport and TMA performance

SDO 1 – Alert for reduction of collision risks on taxiways & runways

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
1.1	**Adapt airport ground safety nets** to extend conflicting ATC clearances (CATC) to the entire Aerodrome Movement Area, to enlarge the set of Conformance monitoring (CMAC) alerting functions and to provide integrated occupancy/ conflict status of a runway.	● PJ.02-W2-21.1		TBC	TBC	●									●			
1.2	Implementation of **guidance assistance/taxiway centreline lights** at the airport for controllers, flight crews and vehicle drivers providing an unambiguous route for the taxiing aircraft/vehicle to follow through airfield ground lighting (AGL). Taxiway centre line lights are automatically and progressively activated (switched on to green), either in segments of several lights or individually, along the route cleared by the controller.	● PJ.02-W2-21.4		TBC	TBC	●		●							●			
1.3	Implementation of **on-board systems to generate alerts** when detecting risks of collision with other traffic during runway and taxiway operations.	● PJ.03b-05		✓	✓		●			●					●			
1.4	Implementation of **Enhanced vision systems (EVS)** and **synthetic vision systems (SVS)**, alone or in combination, to enable more efficient taxi and landing operations in low visibility conditions (LVC).	● PJ.03a-04		✓	✓		●								●			

*** DISCLAIMER:** THE DEPLOYMENT ACTION ID DOES NOT PROVIDE ANY SENSE OF DEPLOYMENT ORDER OR PRIORITY.

KEY
- ● SOLUTION TRL6 COMPLETED
- ● SOLUTION IN THE PIPELINE FOR DELIVERY
- ✓ CONTRIBUTES TO HIGH-LEVEL NETWORK CONOPS 2029
- ✓ YES, IF WITHIN THE CURRENT REGULATORY FRAMEWORK
- ✓ YES, IF THE IMPLEMENTATION ACTION STARTS IN RP4
- TBC TO BE CONFIRMED
- TBC TO BE CONFIRMED, OTHERWISE

SDO 2

OPTIMISING AIRPORT AND TMA ENVIRONMENTAL FOOTPRINT

Optimising continuity of capacity delivery at airports and in TMAs, avoiding network-wide delays, while reducing environmental impact.

STAKEHOLDERS INVOLVED

- ANSP
- AU
- AO
- MIL
- NM

OPERATIONAL ENVIRONMENTS

- AIRPORT
- EN-ROUTE
- TMA
- NM

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)	(€411m)		
IRR	–%	BCR	0.1
Payback year	–		

CBA results for AU (Civil)			
NPV (8%)	€4,320m		
IRR	–%	BCR	179.3
Payback year	–		

CBA results for AO			
NPV (8%)	(€124m)		
IRR	–%	BCR	0.0
Payback year	–		

CBA results for NM			
NPV (8%)	(€4.8m)		
IRR	–%	BCR	–
Payback year	–		

CONTENT SUMMARY

1. **Collaborative management of regional airports and their integration with Network Management (NM)** sharing Departure Planning Information (DPI)
2. Better **integration of Large/Very Large airports and NM**
3. **Environment performance management** at airport
4. **Coordination between ATSUs and different E-AMAN units** and **TTA management at airports**
5. **Enhanced Arrival Procedure** to reduce environmental impact
6. **Increase airport runway capacity** both on arrivals and departures

SDO 2

ATP
Airport and TMA performance

iN
ATM interconnected network

SDO 2 – Optimising airport and TMA environmental footprint

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
2.1	Implementation of **collaborative management of regional airports and their integration with Network Manager (NM)** by sharing departure planning information (also shared between NM and airspace users).	🟢 PJ.04-W2-28.1 🟡 PJ.04-W2-28.2 🟢 PJ.09-03-02	✓	TBC	✓	●	●	●	●	●					●	●	●	●
2.2	Implementation of solutions **for better integrate large / very large airports and the network** via enhanced AOPs-NOP tactical, pre-tactical and strategic planning and AOP to AOP collaborative planning process.	🟡 FastNET SOL#1 🟡 FastNET SOL#2	✓	TBC	TBC	●	●	●	●						●			●
2.3	Implementation of **environmental performance management at airports** and solutions to reduce the airport impact on emissions (single engine taxiing, engine-off taxiing though use of sustainable taxiing vehicles).	🟡 PJ.04-W2-29.3	✓	TBC	TBC	●	●	●							●			
2.4	Implementation of capabilities to better **manage arrival constraints between different E-AMAN units** in cross-border environments and to better integrate the out-of-area inbound flights.	🟢 PJ.25-01 🟢 PJ.25-02	✓	✓	✓	●	●								●	●	●	●

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KEY
- 🟢 SOLUTION TRL6 COMPLETED
- 🟡 SOLUTION IN THE PIPELINE FOR DELIVERY
- ✓ CONTRIBUTES TO HIGH-LEVEL NETWORK CONOPS 2029
- ✓ YES, IF WITHIN THE CURRENT REGULATORY FRAMEWORK
- ✓ YES, IF THE IMPLEMENTATION ACTION STARTS IN RP4
- TBC TO BE CONFIRMED
- TBC TO BE CONFIRMED, OTHERWISE

SDO 2

ATP
Airport and TMA performance

iN
ATM interconnected network

SDO 2 – Optimising airport and TMA environmental footprint

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
2.5	Implementation of **optimised descent operations using merge to point and advanced approach procedures** (i.e., second runway-aiming point (SRAP), increased second glide slope (ISGS), increased glide slope to a second runway aiming point (IGS-to-SRAP)), which aim at reducing the aviation environmental impact (e.g., noise, fuel consumption, CO_2 emissions, etc.) on the airport neighbouring communities.	🟢 PJ.02-W2-14.2 🟢 PJ.02-W2-14.3 🟢 PJ.02-W2-14.5 🟢 #11		TBC	✓	●	●	●		●					●	●	●	
2.6	Implementation of **new capabilities to increase airport runway capacity both on arrivals and departures** based on Wake Turbulence Separations based on static aircraft characteristics, Required Surveillance Performance (RSP) and Runway Occupancy Time (ROT) characterisation of the leader aircraft.	🟢 PJ.02-01-01 🟢 PJ.02-01-02 🟢 PJ.02-01-04 🟢 PJ.02-01-06 🟢 PJ.02-03 🟢 PJ.02-08-03 🟢 PJ.02-W2 🟡 14.6a	✓	TBC	TBC (otherwise)	●	●	●							●	●		

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KEY
- 🟢 SOLUTION TRL6 COMPLETED
- 🟡 SOLUTION IN THE PIPELINE FOR DELIVERY
- ✓ CONTRIBUTES TO HIGH-LEVEL NETWORK CONOPS 2029
- ✓ YES, IF WITHIN THE CURRENT REGULATORY FRAMEWORK
- ✓ YES, IF THE IMPLEMENTATION ACTION STARTS IN RP4
- TBC TO BE CONFIRMED
- TBC TO BE CONFIRMED, OTHERWISE

SDO 3

DYNAMIC AIRSPACE CONFIGURATION

Dynamically adapt ATS capacity to response to changes in demand, increasing flexibility of airspace capacity for civil & military users, maximising controller teams productivity.

STAKEHOLDERS INVOLVED

- ANSP
- AU
- MIL
- NM

OPERATIONAL ENVIRONMENTS

- EN-ROUTE
- NETWORK

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP	
NPV (8%)	(€669m)
IRR –%	BCR –
Payback year	–

CBA results for AU (Civil)	
NPV (8%)	€5,057m
IRR –%	BCR –
Payback year	–

CBA results for NM	
NPV (8%)	(€31.9m)
IRR –%	BCR –
Payback year	–

CBA results for MIL	
NPV (8%)	(€267m)
IRR –%	BCR –
Payback year	–

CONTENT SUMMARY

1. Increase **the granularity and flexibility in airspace configuration**, by:
   - Dynamically adjusting airspace configuration in response to changes in demand
   - Refining airspace management within and across ANSP's areas of responsibility
2. **Mission trajectory** and **dynamic mobile areas (DMAs) of type 1 and type 2**

SDO 3

dA

Fully dynamic and optimised airspace

SDO 3 – Dynamic Airspace Configuration

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
3.1	Implementation of higher granularity and flexibility in the **airspace configurations, dynamically adjusting them** in response to changes on demand, and refining airspace management within and across ANSPs' areas of responsibilities.	● PJ.09-W2-44	✓	TBC (to be confirmed)	TBC (otherwise)	●	●		●	●							●	●
3.2	Implementation of **mission trajectory and dynamic mobile areas (DMAs) of type 1 and type 2** using the improved Operational Air Traffic Flight Plan (iOAT FPL) into dynamic airspace configuration processes in medium to short-term ATM planning phase supporting military airspace requirements.	● PJ.07-03 ● PJ.07-W2-40	✓	TBC (to be confirmed)	TBC (otherwise)	●	●		●	●							●	●

* **DISCLAIMER:** THE DEPLOYMENT ACTION ID DOES NOT PROVIDE ANY SENSE OF DEPLOYMENT ORDER OR PRIORITY.

KEY

- ● (green) SOLUTION TRL6 COMPLETED
- ● (yellow) SOLUTION IN THE PIPELINE FOR DELIVERY
- ✓ CONTRIBUTES TO HIGH-LEVEL NETWORK CONOPS 2029
- ✓ YES, IF WITHIN THE CURRENT REGULATORY FRAMEWORK
- ✓ YES, IF THE IMPLEMENTATION ACTION STARTS IN RP4
- TBC (yellow) TO BE CONFIRMED
- TBC (blue) TO BE CONFIRMED, OTHERWISE

SDO 4

INCREASED AUTOMATION SUPPORT FOR CONTROLLERS

Paving the way to Trajectory-Based Operations providing Air Navigation Services high productivity allowing controller to focus on complex tasks.

STAKEHOLDERS INVOLVED
- ANSP
- AU

OPERATIONAL ENVIRONMENTS
- EN-ROUTE
- TMA

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)	€962m		
IRR	45%	BCR	2.4
Payback year	2030		

CBA results for AU (Civil)			
NPV (8%)	€431m		
IRR	–%	BCR	–
Payback year	–		

CONTENT SUMMARY

Increase the level of automation of the support to controllers through:

1. **New sector team configurations** combining one planning ATCO to two tactical/executive ATCOs in En-Route / Extended-TMA environment
2. **New HMI interaction modes** combining automatic speech recognition (ASR), user profile management system (UPMS) and attention guidance (AG) to support ATCOs

SDO 4

dA
Fully dynamic and optimised airspace

vS
Virtualisation of service provision

SDO 4 – Increased automation support for controllers

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
4.1	Implementation of **sector team configurations** which, in specific airspace configuration, include the **combination of one planning ATCO to two tactical/executive ATCOs in En- Route / eTMA environment**.	● PJ.10-01a1	✓	✓	✓	●											●	
4.2	Implementation of **automatic speech recognition (ASR), user profile management system (UPMS) and attention guidance (AG)** to provide higher automation environment to support ATCOs role.	● PJ.10-W2-96 AG ● PJ.10-W2-96 UPMS ● PJ.10-W2-96 ASR		TBC	TBC	●										●	●	

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KEY
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- ● SOLUTION IN THE PIPELINE FOR DELIVERY
- ✓ CONTRIBUTES TO HIGH-LEVEL NETWORK CONOPS 2029
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- ✓ YES, IF THE IMPLEMENTATION ACTION STARTS IN RP4
- TBC TO BE CONFIRMED
- TBC TO BE CONFIRMED, OTHERWISE

SDO 5

TRANSFORMATION TO **TRAJECTORY-BASED OPERATIONS** (TBO)

Sharing the same information about flights and using automated tools to assist in detecting, analysing and resolving potential conflict, as well as in monitoring adherence to agreed and optimised trajectories, while securing a safe, cost-efficient and environmentally optimised trajectory for the whole flight.

STAKEHOLDERS INVOLVED
- ANSP
- AU
- NM
- AO

OPERATIONAL ENVIRONMENTS
- EN-ROUTE
- NETWORK
- TMA
- AIRPORT

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

Main CBA Caveats:
The CBA for this SDO has higher uncertainty, some solutions lack a CBA.

CBA results for ANSP (Civil)			
NPV (8%)	(€166m)		
IRR	4%	BCR	0.9
Payback year	–		

CBA results for AU (Civil)			
NPV (8%)	€6,132m		
IRR	97%	BCR	8.2
Payback year	–		

CBA results for NM			
NPV (8%)	(€15.5m)		
IRR	–%	BCR	–
Payback year	–		

CONTENT SUMMARY

Provide a **standardised means of exchanging up-to-date flight information** across all flight phases in a timely manner:

1. Using **aircraft derived data to enhance conflict detection and resolution tools (ATN B2)**
2. **Air/ground trajectory information synchronisation through CPDLC**
3. Improved **automation in sector planning and separation management** via enhanced trajectory predictions and controller tools
4. **Dynamically manage Route Availability Document** (RAD) restrictions
5. Integrating the **Airspace User trajectories, preferences and priorities into the NM** and the decision process
6. Extended Flight Plan including detailed 4D trajectory: **Advanced FF-ICE/R1 Trajectory Services beyond trials and filing services**
7. **Inter-ACC information exchanges** involving the NM
8. **New CDM processes** in the planning and execution phase (**FF-ICE/R2**)

SDO 5

iN
ATM interconnected network

TBO
Trajectory-based operations

SDO 5 – Transformation to trajectory-based operation (TBO)

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS									OPERATING ENVIRONMENT			
						ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	AIRPORT	TMA	EN-ROUTE	NETWORK
5.1	Implementation of **enhanced conflict detection and resolution (CD&R) support tools by using aircraft derived data** (i.e., extended projected profile (EPP)) supported by the full implementation of ATN B2 and high-resolution wind models.	● PJ.18-W2-53B	✓	✓	✓	●	●									●	●	
5.2	Implementation of multi-element clearances using **controller pilot data link communications (CPDLC) with lateral and vertical data link clearances** and increased ground automation tools (e.g., CD&R tools) and trajectory prediction supporting the **earlier detection and resolution of potential conflicts**.	● ATC-TBO SOL#4 ● ATC-TBO SOL#5	✓	TBC	TBC	●	●									●	●	
5.3	Implementation of a **dynamic RAD** to allow the dynamic management of restrictions based on traffic evolutions, a better integration of Letters of Agreement (LoAs) between ATC centres and the provision of preliminary flight plans by Airspace Users, ahead of dynamic network constraints publications initiated the day before operations.	● #201	✓	TBC	TBC	●	●		●							●	●	●
5.4	Implementation of **airspace user capabilities to provide, through the UDPP, their preferences and priorities** and influence arrival ATFM arrival regulations.	● PJ.07-W2-39 ● PJ.07-02	✓	✓	✓		●		●						●			●

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- TBC TO BE CONFIRMED, OTHERWISE

SDO 5

iN
ATM interconnected network

TBO
Trajectory-based operations

SDO 5 – Transformation to trajectory-based operation (TBO)

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
5.5	Implementation of interaction tools supporting the full integration of the FOC into the ATM network process and the flight delay criticality concept, to **better integrate airspace user priorities in flow management decisions** looking at short term implementation step.	🟢 PJ.07-W2-38	✓	✓	✓	●	●		●							●	●	●
5.6	Exploitation of **new FF-ICE/R1 trajectory services** beyond the CP1 services, which are just the filing and trial services, for improving completeness and precision of traffic load calculation and advanced network performance capabilities.	🟢 PJ.09-W2-45 🟢 PJ.09-W2-49 🟡 NETWORK-TBO SOL#1	✓	TBC	✓	●	●	●	●						●	●	●	●
5.7	Implementation of **seamless ATC-ATC coordination and sharing with NM of the ATC-ATC exchanges**, encompassing more complex coordination dialogues implying negotiation between controllers across ACC boundaries.**	🟢 PJ.18-02b 🟡 NETWORK-TBO SOL#3	✓	TBC	TBC	●			●							●	●	●
5.8	Implementation of data exchanges between Network Manager and all operational stakeholders to enable stakeholders that intend to **implement new CDM processes in the planning** and **execution phase (FF-ICE R2) and update network trajectory** with the best available data.	🟡 NETWORK-TBO SOL#2	✓	TBC	TBC	●	●		●							●	●	●

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** NOTE THAT SDM ACTION PLAN TO BUILD CONSENSUS ON IOP IS ON-GOING.

KEY
🟢 SOLUTION TRL6 COMPLETED
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✓ CONTRIBUTES TO HIGH-LEVEL NETWORK CONOPS 2029
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TBC TO BE CONFIRMED, OTHERWISE

SDO 6

VIRTUALISATION OF OPERATIONS

Making defragmentation of Single European Sky more efficient and flexible in use of resources, without being limited by geographical, and ultimately organisational, ATSUs localisation.

STAKEHOLDERS INVOLVED

- ANSP
- AO

OPERATIONAL ENVIRONMENTS

- EN-ROUTE • AIRPORT
- TMA

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)	(€661m)		
IRR	3%	BCR	0.8
Payback year	–		

CBA results for AU (Civil)			
NPV (8%)	€4,207m		
IRR	–%	BCR	–
Payback year	–		

CONTENT SUMMARY

1. **Decoupling the ATM data service provider (ASDP) and Air Traffic Service Unit (ATSU)** based on infrastructure using **Virtual Centre**-Based Technology
2. **Dynamic ATS delegation amongst ATSUs** (ACCs and TWRs)
3. Flexible and dynamic allocation of **different Multiple Remote Tower Modules (MRTMs) accommodated within a Remote Tower Centre (RTC)** – Multiple small airports
4. **Low-cost surveillance** service **for supporting remote tower operations**

SDO 6

dA
Fully dynamic and optimised airspace

vS
Virtualisation of service provision

SDO 6 – Virtualization of Operations

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
6.1	Implementation of **virtual centre to allow decoupling the ATM data service provider (ADSP) and air traffic service unit (ATSU) through service interfaces supporting new ways of dynamic ATS delegation** (e.g., contingency delegation, night delegation (scheduled), fixed time delegation (scheduled), “on-demand”).	● PJ.10-W2-93 ● PJ.10-W2-93A ● PJ.16-03 ● IFAV3 SOL#1 ● ISNAP SOL#2 ● ISLAND SOL#2 ● VITACY SOL#1 ● VITACY SOL#2 ● VITACY SOL#3	✓	TBC	TBC	●				●						●	●	
6.2	Implementation of multiple remote tower module (MRTM) **flexible and dynamic allocation of different MRTMs accommodated within a Remote Tower Centre (RTC)** that allows the ATCO to maintain situational awareness for 2 or more small airports. It **covers the deployment of low- cost surveillance service for supporting remote tower operations**.	● PJ.05-02 ● PJ.05-W2-35 ● PJ.14-W2-84b		TBC	TBC	●		●		●					●			

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SDO 7

TRANSITION TOWARDS **HIGH LEVEL** OF **AIR-GROUND CONNECTIVITY** (MULTILINK)

Improving datalink performance, accelerating technology uptake, and achieving economies of scales while reducing fragmentation characterising current data link implementation.

STAKEHOLDERS INVOLVED
- ANSP
- AO
- MIL
- AU

OPERATIONAL ENVIRONMENTS
- EN-ROUTE
- TMA
- NETWORK
- AIRPORT

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)	(€328m)		
IRR	–%	BCR	–
Payback year	–		

CBA results for AU (Civil)			
NPV (8%)	(€109m)		
IRR	–%	BCR	–
Payback year	–		

CBA Caveats:
- SDO#07 is an enabling infrastructure for applications that require air-ground communication, but it does not bring operational benefits by itself
- Therefore, the CBA includes the cost of implementing the multilink services but does not monetise any direct operational benefit
- However, SDO#07 is a key enabler for SDO#05 "Transition to TBO", which deployed together would achieve a positive NPV of €5,622m

CONTENT SUMMARY

1. **FCI network infrastructure**, which supports ATN/IPS multilink capability
2. **SatCom class B** to enable data and voice communications for oceanic, remote, polar, and gradually continental regions
3. **Terrestrial datalink system (LDACS)** to deliver higher data capacity and communications performance
4. **Satellite communications** for both the continental and remote/oceanic regions
5. **Hyper connected ATM**

SDO 7

CNS

CNS infrastructure and services

SDO 7 – Transition towards high level of air-ground connectivity (multilink)

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
7.1	Implementation of **future ground communications network infrastructure, which supports ATN/IPS multilink capability** and complete mobility between different datalink.	🟢 PJ.14-W2-77		TBC	TBC	●									●	●	●	●
7.2	Implementation of **SatCom class B**, which makes feasible to provide data and voice communication services using existing satellite technology systems in oceanic, remote, polar, and gradually continental airspace.	🟢 #109	✓	TBC	TBC	●	●			●						●	●	
7.3	Implementation of **VDL2 successor** (e.g., **Terrestrial datalink system** L-band-digital aeronautical communication system (LDACS), datalink for ATM and AOC operations over commercial communication systems (Hyper connected ATM), **Satellite communications** for both the continental and remote/oceanic regions.	🟡 PJ.14-W2-107 🟡 FCDI SOL#4 🟡 FCDI SOL#2	✓	TBC	TBC	●	●	●		●					●	●	●	●

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- TBC TO BE CONFIRMED, OTHERWISE

SDO 8

SERVICE-ORIENTED DELIVERY MODEL (DATA DRIVEN & CLOUD BASED)

Enabling the virtual defragmentation towards a service-oriented architecture and a new model of ATM service provision, making it possible to decouple service provision from local infrastructure.

STAKEHOLDERS INVOLVED
- ANSP
- NM
- MIL

OPERATIONAL ENVIRONMENTS
- EN-ROUTE
- TMA
- NETWORK
- AIRPORT

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)	(€11m)		
IRR	–%	BCR	–
Payback year	–		

CBA results for AU (Civil)			
NPV (8%)	(€7m)		
IRR	–%	BCR	–
Payback year	–		

CBA Caveats:
- CBA to be refined after stakeholder consultation feedback

CONTENT SUMMARY

1. Open ATM integration patterns enabling participation of **third-party system providers**
2. **Enables decoupling of service** and infrastructure layers as defined in the Master Plan through Cloud Computing
3. **New service agreements** governing the delivery of core services (common to all ANSPs in Europe) vs additional services (specific to one ANSP)

SDO 8

iN
ATM interconnected network

dS
Digital AIM and MET services

SDO 8 – Service-oriented delivery model (Data driven & Cloud based)

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
8.1	Implementation of **Phase C target architecture** and a **service-oriented delivery model (data driven and cloud based)**. By 2035, a new core ATC service delivery model for operations in all phases of flight should be in place that enables: - Open ATM integration patterns enabling participation of third-party system providers - Enables decoupling of service and infrastructure layers as defined in the Master Plan through Cloud Computing (including FDP, HMI and the relation between FDP and HMI) - New service agreements governing the delivery of core services (common to all ANSPs in Europe) vs additional services (specific to one ANSP)	● PJ.14-W2-101 (solution TRL6 completed) ● PJ.18-04a (solution TRL6 completed)	✓ (contributes)	TBC (to be confirmed)	TBC (to be confirmed, otherwise)	●			●	●					●	●	●	●

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- TBC TO BE CONFIRMED, OTHERWISE

SDO 9

CNS OPTIMISATION, MODERNISATION AND RESILIENCE

Leading to network optimisation, following deployment of new functionality and/or technologiesto support high performance and efficiency.

STAKEHOLDERS INVOLVED
- ANSP
- MIL
- NM
- AU

OPERATIONAL ENVIRONMENTS
- EN-ROUTE
- NETWORK
- TMA
- AIRPORT

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)

NPV (8%)		€278m	
IRR	40%	BCR	2.7
Payback year		2030	

CBA results for AO

NPV (8%)		(€55m)	
IRR	–%	BCR	–
Payback year		2030	

CBA results for AU (Civil)

NPV (8%)		(€125m)	
IRR	–%	BCR	0.0
Payback year		–	

CONTENT SUMMARY

1. **GBAS based on single frequency signals (Cat II/III precision)** to rationalise ILS CAT II/III systems
2. Alternative Position, Navigation, and Timing **(A-PNT)** technologies, based on L-DACS-NAV and enhanced DME
3. Data fusion for en-route and TMA **surveillance chain integrating secured surveillance functionality**
4. **Minimum Operational Network (MON)**
5. **Rationalise ILS** and cost-effective maintenance methods
6. **Optimise Surveillance**

SDO 9

CNS

CNS infrastructure and services

SDO 9 – CNS Optimisation, Modernisation and Resilience

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	AIRPORT	TMA	EN-ROUTE	NETWORK
						STAKEHOLDERS									OPERATING ENVIRONMENT			
9.1	Implementation of **GBAS based on single frequency signals to support Cat II/III precision** approach, landing, and departure procedures in all-weather operations conditions.	#55 PJ.14-W2-79a	✓	TBC	TBC	●	●								●	●		
9.2	Implementation of **A-PNT technologies** based on L-DACS-NAV and enhanced DME.	MIAR SOL#2		TBC	TBC	●	●			●						●	●	
9.3	Implementation of **data fusion for en-route and TMA surveillance chain integrating secured surveillance functionality** enabling detection and when possible, mitigation of security threats that could affect the surveillance chain.	PJ.14-W2-84c		TBC	TBC	●									●	●	●	
9.4	Implement minimum operational network (MON). **	N/A			✓	●			●							●	●	●
9.5	**Rationalise ILS** and Implementation of efficiency measures / methods for a more cost-effective maintenance of ILS, providing link between ICAO Doc. 8071 and national CNS provision. **	N/A			✓	●			●							●		●
9.6	Optimizing surveillance. **	N/A			✓	●			●							●	●	●

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** LINKED TO CNS EVOLUTION PLAN WHERE IMPLEMENTATION DETAILS WILL HAVE TO BE DEVELOPED.

KEY

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SDO 10

ENABLE INNOVATIVE AIR MOBILITY (AIM) & DRONE OPERATIONS

Safe, secure, and sustainable air mobility passengers and cargo enabled by new-generation technologies integrated in a multimodal transportation system.

STAKEHOLDERS INVOLVED

- ANSP
- AU
- Drone/UAS Operator
- Vertiport operator
- USSP CISP
- MIL
- AO

OPERATIONAL ENVIRONMENTS

- EN-ROUTE
- TMA
- AIRPORT
- VERIPORT

READY FOR INVESTMENT IN RP4

INVESTMENT EFFORT

CBA results for ANSP (Civil)			
NPV (8%)	(€160m)		
IRR	–%	BCR	–
Payback year	–		

CBA results for USSP			
NPV (8%)	(€363m)		
IRR	–%	BCR	–
Payback year	–		

CBA results for AU (Civil: SA+eVTOL+RPAS)			
NPV (8%)	(€734m)		
IRR	–%	BCR	–
Payback year	–		

CBA results for CISP			
NPV (8%)	(€261.1m)		
IRR	–%	BCR	–
Payback year	–		

CBA results for AU (Military)			
NPV (8%)	(€14m)		
IRR	–%	BCR	–
Payback year	–		

CONTENT SUMMARY

1. **Equip IFR RPAS & IAM flying in A to C airspaces with DAA systems** that perform, at least, as well as TCAS II and See and Avoid
2. **Foundational (U1) & initial (U2) U-space services** to enable UAS operations in U-space airspaces
3. **Common ATM-U-space interface and Dynamic airspace reconfiguration** service
4. **Simultaneous non-interfering (SNI) operations (e.g. PinS) for IAM users** in airports and TMA
5. **ACAS Xa** through a **surveillance and tracking module (STM)**

SDO 10

CNS
CNS infrastructure and services

U-s
U-space services

M3
Multimodal mobility and integration of all airspace users

SDO 10 – Enable Innovative Air Mobility (AIM) & Drone Operations

Action #	Deployment Actions*	SESAR Solution(s)/ Elements	NM CONOPS 2029	Within current regulatory framework (preliminary)	Start of Investment in RP4 timeframe	STAKEHOLDERS: ANSP	AU	AO	NM	MIL	UUSP	CISP	VERTIPORT Operator	Drone/UAS Operator	OPERATING ENVIRONMENT: AIRPORT	TMA	EN-ROUTE	NETWORK
10.1	Implementation of system support and procedures for the integration of **IFR RPAS and IAM in airspaces A to C are required to have Detect and Avoid (DAA) systems that perform at least as well as TCAS II** (Traffic alert and Collision Avoidance System) **and See and Avoid**.	🟢 PJ.13-W2-115 🟡 IRINA SOL#1	✓	TBC	TBC	●	●			●				●		●	●	
10.2	Implementation of **foundational (U1) and initial (U2) U-space services** as defined by the Regulatory Framework for the U-Space (Commission IR 2021/664).	🟢 U1 Services 🟢 U2 Services		✓	✓						●	●		●				
10.3	Implementation of a **common ATM-U-space interface and Dynamic airspace reconfiguration service** to help ATC actors in charge of airspace reconfigurations to increase safety keeping manned and unmanned aircraft segregated within the designated U-space airspace.	🟡 ENSURE SOL#1 🟡 ENSURE SOL#2		TBC	TBC	●	●	●		●	●	●		●	● **	●	●	
10.4	Implementation of **simultaneous non-interfering (SNI) operations** (e.g., parallel, or convergent Point-in-Space (PinS) procedures) **and capabilities** (i.e., GNSS and the RNP navigation specification) allows **IAM users** (e.g., rotorcraft, eVTOL) to operate to and from airports and TMAs without conflicting other traffic or requiring runway slots.	🟢 PJ.01-06 🟢 PJ.02-05		TBC	TBC	●	●	●					●	●	● **	●		
10.5	Implementation of **ACAS Xa through a surveillance and tracking module (STM)** which processes raw surveillance data coming from the surveillance sensors.	🟢 PJ.11-A1		TBC	TBC		●			●						●	●	

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** AIRPORT OPERATING ENVIRONMENT INCLUDES WHEN APPLICABLE VERTIPORT

KEY
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TBC TO BE CONFIRMED
TBC TO BE CONFIRMED, OTHERWISE

CONDITIONS FOR **SUCCESSFUL DEPLOYMENT**

Need to shorten the innovation cycle:

Implementation completed*

26%

63%

R&D completed

***Source:** Strategic deployment monitoring report

STRATEGIC DEPLOYMENT OBJECTIVES

To secure a smooth implementation of the SDOs:

1. Standard and regulatory framework available in a timely manner to facilitate implementation by early movers
2. Funding mechanisms (e.g. Digital Sky Demonstrators)
3. Incentive schemes

KEY CHANGES WE ARE WORKING ON

ATM MASTER PLAN 2020		ATM MASTER PLAN 2024
Limited deployment orientation	→	Strong deployment orientation with introduction of strategic deployment objectives
Limited coverage of industrialisation needs	→	Regulatory gap assessment performed for each deployment objectives also covering standards
MP was not consulted with key investors and regulators	→	Dedicated consultation with SDM, NM, EASA to secure buy-in on deployment priorities
MP does not provide a strong reference for investment by early movers	→	Notion of voluntary strategic deployment objectives to mobilise investment by a critical mass of early movers as of RP4 (linking the 2 SES instruments)

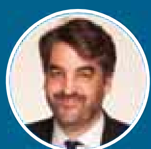
DEPLOYMENT PRIORITIES Q&A

AGNIESZKA BYRT
MODERATOR

Join at menti.com | use code **6606 2467**

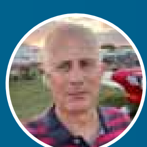
SESAR JOINT UNDERTAKING

EXECUTIVE ROUNDTABLE



MODERATOR: ALAIN SIEBERT
SESAR JU

COSTAS CHRISTOFOROU
IFATSEA



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AIRBUS

MARIAGRAZIA LA PISCOPIA
SESAR DEPLOYMENT MANAGER

CONCLUSIONS AND NEXT STEPS

ANDREAS BOSCHEN

SESAR JU

Conclusions from the stakeholder consultation workshop

- **Good attendance**
- **Good temperature checks**
- **A lot of valuable feedback for us to improve the draft material**
- **Our mood: feel encouraged and motivated to work hard over the next weeks to make the best ever Master Plan**
- **Next steps:**
  - **Analyse results from the ongoing consultation on the voluntary SDO**
  - **Final draft Master Plan in July for adoption in December 2024**
  - **Prepare IR and ER calls for launch in 2025**
  - **Prepare for RP4 (investments in SDO)**
  - **Global TBO Symposium, 4 – 6 June in Brussels**
- **A big THANK YOU to all**

THANK YOU FOR
YOUR ATTENTION